

NOTICE INVITING BIDS

OWNER: City of Post Falls
408 Spokane St.
Post Falls, ID 83854

Separate sealed BIDS for the construction of: **Black Bay Park Phase 1** will be received at the office of the City Clerk (Shannon Howard), City of Post Falls, located at City Hall, 408 N. Spokane Street, Post Falls, Idaho 83854 until 10:00 a.m., Wednesday, November 1st, 2023. Following receipt of bids, they will be publicly opened and read aloud at the Basement Conference Room, located at City Hall. A mandatory pre-bid meeting will be held On-site, at 10:00 a.m. prevailing local time on Tuesday, October 17th, 2023. Any bid submitted by a firm, which did not attend this pre-bid conference, will be rejected.

Work associated with the proposed project is generally described as follows:

Schedule A – Complete replacement of existing park entrance driveway including concrete sidewalk installation and entry planting beds, construction of an arrival plaza and pavilion, upgrades to plaza area including: furnishings, firepit, lighting, retaining wall, boulders and logs, and drywell; regrading of existing park hillside and lawn area including demolition of existing CMU wall, installation of boulders along hillside and boulder play cave, complete reconstruction of the south asphalt trail including regrading to meet ADA requirements and repaving, and upgrades to the beach area including: furnishings, regrading and with new fill. All construction includes stormwater and drainage improvements and treatment, upgrade to the electrical service provided to the park, installation of a domestic water line, and installation of a new gas propane tank, gas line, propane tank fence enclosure.

Schedule B – Construction of rip rap as armoring along designated areas of the Black Bay shoreline as well as stake plantings and a root wad, construction of an MSE wall, construction of a boardwalk with solar lights and floating boardwalk at the entrance of the bay area, and installation of boulders with riprap zone at beach.

Interested bidders may obtain bid documents at <https://www.questcdn.com/>. Download the digital documents for \$22.00 by inputting **Quest Number: 8725425** on the website's Bid Posting search page after login. To be considered a plan holder and to receive automatic addenda and bid updates, register with QuestCDN.com for a free Regular membership. Please contact QuestCDN Customer Support at 952-233-1632 or support@questcdn.com for assistance in membership registration and downloading digital bid documents. Bid documents are also viewable on the City's website at www.postfalls.gov. BID DOCUMENTS will be made available after 12 p.m., Tuesday, September 26th, 2023.

A BID GUARANTY of 5 percent of the BID AMOUNT is required. Separate PERFORMANCE AND PAYMENT BONDS each in the amount of 100 percent of the CONTRACT AMOUNT will be required. Each bidder must supply all the information required by the Bid Documents and Specifications.

This Project provides a 2-month project material submittal period where submittal review and material procurement can begin, but the construction timeline listed in calendar days within the Notice to Proceed

does not begin. A second Notice to Proceed for construction will be negotiated once submittals have been reviewed and approved. This project has a final completion date of no later than August 31, 2024.

This project is funded by the Build America, Buy America Act (BABA) and is subject to all requirements set forth in the contract documents.

All contractor, subcontractor, or specialty contractor shall be required to have a current license as a Public Works Contractor in the State of Idaho in order to submit a bid or proposal on this project.

The City, in accordance with Title VI of the Civil Rights Act of 1964, 78 stat. 252, 42 U.S.C. 2000d to 2000d-4 and Title 49, Code of Federal Regulations, Department of Transportation, Subtitle A, Office of the Secretary Part 21, Nondiscrimination in Federally-assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all applicants that it will affirmatively ensure that in any contract entered into pursuant to the advertisement, disadvantaged business enterprises as defined at 49 CFR Part 23 will be afforded full opportunity to submit offers in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, or sex in consideration for an award.

All prospective bidders are directed to the Instructions for Bidders for discussion of Bid policies, procedures, and requirements. The Owner reserves the right to reject any and all Bids, to waive any and all informalities and to negotiate contract terms with the successful Bidder, and the right to disregard all non-conforming, non-responsive or conditional Bids.

All questions shall be directed, in writing, to:
Meghann Kolb at Ardurra, Inc. (208) 762-3644, mkolb@ardurra.com
Scott Jordan at Civitas, Inc. (303)-571-0053 X162, sjordan@civitasinc.com

Owner: City of Post Falls
Robbie Quinn, Parks and Recreation

PUBLICATION DATE:
Tuesday, September 26th, 2023
Tuesday, October 3rd, 2023

CITY OF POST FALLS

CONSTRUCTION DOCUMENTS AND SPECIFICATIONS

FOR

BLACK BAY PARK PHASE 1

July 2023

Prepared By:

**T-O ENGINEERS, LLC, an Ardurra Company.
7950 N. MEADOWLARK WAY, SUITE A
COEUR D'ALENE, IDAHO 83815**

CITY OF POST FALLS

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Civitas
1200 BANNOCK STREET
DENVER, COLORADO 80204

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Owner: City of Post Falls
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INSTRUCTIONS TO BIDDERS

1. Defined Terms:

Terms used in these Instructions to Bidders, which are defined in the General Conditions of the Construction Contract, have the meanings assigned to them in the General Conditions. The term "Successful Bidder" means the lowest, qualified, responsive Bidder to whom Owner on the basis of Owner's evaluation as hereinafter provided makes an award.

2. Copies of Bidding Documents:

- 2.1. Interested bidders may obtain bid documents at <https://www.questcdn.com/>. Download the digital documents for \$22.00 by inputting **Quest Number: 8725425** on the website's Bid Posting search page after login. To be considered a plan holder and to receive automatic addenda and bid updates, register with QuestCDN.com for a free Regular membership. Please contact QuestCDN Customer Support at 952-233-1632 or support@questcdn.com for assistance in membership registration and downloading digital bid documents. BID DOCUMENTS will be made available after 12 p.m., Tuesday, September 26th, 2023.
- 2.2. Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents. It is the Bidder's responsibility to assure that he possesses complete sets of the Bidding Documents.
- 2.3. Owner and Engineer in making copies of Bidding Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.
- 2.4. If the Bidder requests hard copies or rapid delivery or special shipping service, the Bidder shall pay the additional shipping cost in advance. No reimbursement of shipping costs will be made to a Bidder.
- 2.5. Electronic Bidding Documents are provided by the Owner for the Bidder's convenience. It is the responsibility of the Bidder to obtain all updates from the Ardurra's Online Planroom.

3. Qualifications of Bidders:

- 3.1. Each Bid must contain evidence of Bidder's qualification to do business in the state where the Project is located prior to submitting a bid for the contract, i.e. an Idaho Public Works Contractors License.
 - 3.1.1. Idaho Code Section 67-2310 requires subcontractors who will perform plumbing, HVAC work, or electrical work, if applicable to the project, to be named on the bid of the general contractor. If the Contractor intends to perform plumbing, HVAC work, or electrical work under the provisions of his own license, he shall name himself providing he is properly licensed. The Contractor shall not name more than one subcontractor for each work item. Failure to name subcontractors or list the valid contractor's license number for plumbing, HVAC or electrical work being self-performed by the general contractor on Designation of Subcontractors and Suppliers (Additional Bid Forms, Exhibit I) shall result in the bid being deemed nonresponsive.

- 3.2. A Bidder's failure to submit required qualification information within the times indicated may disqualify Bidder from receiving an award of the Contract.
- 3.3. Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

4. Examination of Contract Documents and Site:

- 4.1. It is the responsibility of each Bidder, before submitting a Bid, to (a) examine the Contract Documents and other related data identified in the Bidding Documents thoroughly, (b) visit the site to familiarize himself with local conditions that may in any manner affect cost, progress or performance of the Work, (c) familiarize himself with and consider Federal, State and local laws, ordinances, rules and regulations that may in any manner affect cost, progress or performance of the Work; and (d) study and carefully correlate Bidder's observations with the Contract Documents, (e) to promptly notify Engineer, pursuant to Article 5 below, of all conflicts, errors, ambiguities, or discrepancies which Bidder has discovered in or between the Contract Documents and such other related documents.
- 4.2. Information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based upon information and data furnished to Owner and Engineer by owners of such Underground Facilities or others, and Owner and Engineer do not assume responsibility for the accuracy or completeness thereof.
- 4.3. On request, Owner may provide each Bidder access to the site to conduct such investigations, subject to the approval of the Owner, as each Bidder deems necessary for submission of his Bid.
- 4.4. The lands upon which the Work is to be performed, rights-of-way for access thereto, and other land designated for use by Contractor in performing the Work are identified in General Requirements or Drawings. Additional lands and access thereto required for temporary construction facilities, construction equipment or storage of materials and equipment to be incorporated in the Work, or disposal of unsuitable or excess materials off-site are to be obtained and paid for by Contractor. Owner does not warrant that the Contract Documents or plans will be free from defect or error and Bidder is responsible for verifying viability of any plans and specifications for accuracy and completeness, and if a defect or error is discovered, the Bidder is obligated to inform the Owner.
- 4.5. Before submitting a Bid each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies and data concerning conditions (surface, subsurface and Underground Facilities) at or contiguous to the site or otherwise, which may affect cost, progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the Contract Documents.
- 4.6. The submission of a Bid will constitute an incontrovertible representation by the Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Contract Documents and applying the specific means, methods, techniques, sequences or procedures of construction (if any) that may be shown or indicated or expressly required by the Contract Documents, that Bidder has given Engineer

written notice of all conflicts, errors, ambiguities and discrepancies that Bidder has discovered in the Contract Documents and the written resolutions thereof by Engineer if acceptable to Bidder, and that the Contract Documents are sufficient in scope and detail and that the time allocated for the preparation of the Bid was adequate to indicate and convey understanding of all terms and conditions for performance of the Work.

5. Pre-Bid Conference

- 5.1. If a pre-Bid conference is to be held, it will be held at the time and location stated in the invitation or advertisement to bid. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference. Engineer will issue such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

6. Interpretations and Addenda

- 6.1. Questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing, to be received at least three business days before the date and time upon which bids are scheduled to be opened. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda.
 - 6.1.1. Objections to specifications or bidding procedures shall be submitted to the Owner in writing, to be received at least three business days before the date and time upon which bids are scheduled to be opened. Any objection not perfected within the time limitations shall be deemed to constitute a waiver of any rights to raise such objection or appeal thereafter.
- 6.2. Addenda may be issued to clarify, correct, supplement, or change the Bidding Documents. Only questions answered by formal Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 6.3. It is the responsibility of the Bidder to obtain all Addenda and project updates from the Ardurra's Online Planroom at <https://www.questcdn.com/>.

7. Bid Security

- 7.1. Each Bid must be accompanied by Bid Security made payable to Owner, **in the amount of 5 percent of the Bidder's maximum Bid price** and in the form of a certified bank check or a Bid Bond (on form attached, if a form is prescribed) issued by the Surety meeting the requirement of paragraph 5.01 of the General Conditions and licensed to do business in the State of Idaho.
- 7.2. The Bid Security of the Successful Bidder will be retained until such Bidder has executed the Agreement and finished the required Contract Security and met the other conditions of the Award, whereupon it will be returned. If the successful Bidder fails to execute and deliver the Agreement and furnish the required Contract Security within 10 days after the Notice of Award, Owners may annul the Notice of Award and the Bid Security of that Bidder will be forfeited.

The Bid Security of the other Bidders who Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of the 7th day after the "effective date of

Agreement" (which term is defined in the General Conditions) by Owner of Contractor and the required Contract Security is furnished or the 90th day after the Bid Opening. Bid Security of the other Bidders which are not competitive will be returned within seven days of the Bid opening.

8. Contract Time/Commencement of Construction:

8.1. The number of days within which, or the dates by which, the Work is to be completed and ready for final payment are set forth in the Agreement. The date that the Owner expects the Contractor to begin project construction work is specified in the Specifications. The submission of a Bid is a representation by the Bidder that Bidder will commence construction work and will complete construction during the time specified in the Contract Documents.

9. Liquidated Damages:

9.1. Provisions for liquidated damages, if any, for failure to timely attain a Milestone, Substantial Completion, or completion of the Work in readiness for final payment, are set forth in the Agreement.

10. Substitute Material and Equipment:

10.1. The Contract, if awarded, will be on the basis of material and equipment described in the Drawings or specified in the Specifications without consideration of possible substitute or "or-equal" items. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or "or-equal" item of material or equipment may be furnished or used by Contractor, if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the "effective date of the Agreement". The procedure for submittal of any such application by Contractor and consideration by Engineer is set forth in paragraphs 7.05 and 7.06 of the General Conditions and supplemented by general Requirements; Specification Section 1340, Submittals, Shop Drawings and Samples; and others. Any assumptions regarding the possibility of post-bid approvals of "or-equal" or substitution requests are made at the Bidder's sole risk.

11. Subcontractors:

11.1. "Designation of Subcontractors" requires the identity of mechanical, electrical and plumbing Subcontractors be submitted to Owner as a part of the bid. The Bidder shall provide additional "Evidence of Competency" for each such Subcontractor, person and organization proposed for the work, upon the request of the Engineer. Per Idaho Code 67-2310, each subcontractor shall include their Idaho Public Works License number. Failure to comply with this section shall render Bidder's Bid unresponsive and void.

11.2. Prime contractor is responsible for distribution of approved construction drawings and specifications to all subcontractors during bidding.

12. Bid Form and Bid Documents:

12.1. One Bid Form is provided in the Construction Documents and Specifications.

- 12.2. Bid Schedule(s) must be completed in ink or by typewriter. The bid unit price of each item on the form must be stated in words and numerals; in case of a conflict, words will take precedence. A Bid price must be indicated for each section, Bid item, alternative, adjustment unit price item, and unit price item listed therein, or the words "No Bid", "No Change", "Not Applicable", or "N/A" entered. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum.
- 12.3. Bids by corporations must be executed (signed) in the corporate name by the president or a vice-president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
- 12.4. Bids by partnerships must be executed in the partnership name and signed by a partner, whose title must appear under the signature, and the official address of the partnership must be shown below the signature.
- 12.5. All names must be typed or printed below the signature.
- 12.6. The Bid shall contain an acknowledgment of receipt of all Addenda (the numbers of which shall be filled in on the Bid Form).
- 12.7. The address and telephone number for communications regarding the Bid must be shown in the space provided.

13. Submission of Bids:

Bids shall be submitted at the time and place indicated in the Invitation to Bid and shall be enclosed in an opaque sealed envelope, marked with the Project title and name and address of the Bidder and other required documents. If the Bid is sent through the mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "BID ENCLOSED" on the face thereof. Bids received after the required time of submittal will be returned unopened to the prospective Bidders.

14. Modification and Withdrawal of Bids:

- 14.1. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.
- 14.2. If, within 5 days after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a clerical or mathematical mistake in the preparation of his Bid and the mistake was material, satisfying the conditions of 54-1904C, Idaho Code, that Bidder may withdraw their Bid. Bidders seeking relief from a bid that do not satisfy the conditions found in 54-1904C, Idaho Code, shall forfeit any Bid Security. Bidders failing to execute a contract and not satisfying the conditions found in 54-1904C, Idaho Code, shall also forfeit any Bid Security.
- 14.3. A Bidder who claims a mistake or forfeits their bid security will be prohibited from participating in any rebidding of the Work on which the mistake was claimed.

15. Opening of Bids:

Bids will be opened publicly and read aloud. A tabulation of the amounts of the Bids and bid items will be available from the Engineer 48 hours after the opening of Bids.

16. Bids to Remain Subject to Acceptance:

All Bids shall remain subject to acceptance for 60 days after the day of the Bid opening, but Owner may, in its sole discretion, release any Bid and return the Bid Security prior to that date.

17. Award of Contract:

17.1. Owner reserves the right to reject any and all Bids, including without limitation the rights to waive any and all informalities and to negotiate contract terms with the "Successful Bidder," as defined in paragraph 19.1.4, and the right to disregard all nonconforming, non-responsive, unbalanced, or conditional Bids. Failure to submit required Bid Documents with the sealed Bid shall be considered a Non-Responsive Bid.

17.2. In evaluating Bids, Owner shall consider whether or not the Bids comply with the prescribed Bid requirements, and such alternates, unit prices, and other data as requested in the Bid forms or by the Engineer prior to the Notice of Award.

17.3. If the contract is to be awarded it will be awarded to the lowest Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interests of the Project. Refer to Section 19.1 for additional criteria. It is Owner's intent to accept all bid schedules; however, Owner may choose to accept them in any order or combination.

17.4. If the contract is to be awarded, Owner will give the Successful Bidder a Notice of Award within 60 days after the day of the Bid opening.

17.5. If the Owner deems it is in its best interest, it may, on refusal or failure of the Successful Bidder to execute the contract, award it to the second lowest responsive Bidder. On the failure or refusal of the Successful Bidder to execute a contract, their Bid Security shall be forfeited. If the second lowest responsive Bidder fails or refuses to execute the contract, the Owner may likewise award it to the next lowest responsive Bidder.

17.6. On the failure or refusal of the second or next lowest responsive Bidder to execute a contract, their Bid Security shall be likewise forfeited.

17.7. The Owner may determine it is in its best interests to cancel and rebid the public works project and retain any forfeited Bid Security.

18. Bonds and Insurance:

Article 6 of the General Conditions (Supplemental Conditions-Owner) and Specification Section 1000, Special Provisions set forth Owner's requirements as to Bonds and Insurance. When the Successful

Bidder delivers the executed Agreement to Owner, it shall be accompanied by the required Contract Security and documentation of required insurance coverages.

19. Signing of Agreement:

When Owner gives a Notice of Award to the Successful Bidder, it will be accompanied by the required number of unsigned counterparts of the Agreement with other written Documents attached. Within 10 days thereafter, unless otherwise stipulated in the Notice of Award, Contractor shall sign and deliver the required number of the Agreement to Owner with all other required Contract Documents attached. Within 30 days thereafter Owner will deliver one fully signed counterpart to Contractor. Engineer will identify those portions of the Contract Documents not fully signed by Owner and Contractor and such identification shall be binding on all parties.

20. Special Legal Requirements:

20.1. Bid Schedules

20.1.1 Bid Schedules included in the Bid are titled as follows:

Schedule A – Black Bay Park Phase 1
Schedule B – Black Bay Park Phase 1

20.1.2. A "Responsive" Bidder shall submit a Bid including schedule along with the required Bid Securities and additional Bid Forms.

20.1.3. It is the Owner's desire and intent to award all schedules for which adequate funding is available to the "Successful Bidder." The Contractor is forewarned that Budget Limitations may prevent the award of one or more of the Schedules and/or require the deletion of items or portions of the work scope of a given Schedule.

20.1.4. The "Successful Bidder" for the purpose of subsequent negotiations, if necessary, will be the responsive Bidder who submits the total of the low bid for the work to be awarded; which is expected to be all schedules based on availability of funding.

20.1.5. The Bidders attention is directed to Section 16: "Award of Contract" of these Instructions to Bidders for further discussion of evaluation of the Bid and to Section 18: "Signing of Agreement".

20.1.6. The Owner reserves the right to delete all or a portion of individual Schedule(s) for budget, weather, schedule or other circumstances and select those Schedules or portions thereof which the Owner, at his sole discretion determines to be to the benefit of the project.

20.1.7. Force Account Work Allowance: The Contractor shall maintain accurate records of all equipment, materials, and labor used to complete Force Account work directed by the Engineer. Signed copies of the records shall be provided to the Engineer with each monthly pay request. Hourly rates for the labor and equipment shall be established by negotiations between Contractor and Engineer.

20.2. Contracts

20.2.1. The Bidder/Offeror certifies, by submission of this proposal or acceptance of this contract, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any State or Federal department or agency. It further agrees by submitting this proposal that it will include this clause without modification in all lower tier transactions, solicitations, proposals, contracts, and subcontracts. Where the Bidder/Offeror/Contractor or any lower tier participant is unable to certify to this statement, it shall attach an explanation to this solicitation/proposal.

BID

PROJECT IDENTIFICATION: **Black Bay Park Phase 1**

CONTRACT IDENTIFICATION AND NUMBER: **190551**

THIS BID IS SUBMITTED TO OWNER: **CITY OF POST FALLS
408 N Spokane Street
Post Falls, ID 83854**

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an Agreement with OWNER in the form included in the Contract Documents to complete all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the Contract Documents.
2. BIDDER accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid Security. This Bid will remain open for 30 days after the day of Bid Opening. BIDDER will sign the Agreement and submit the Contract Security and other documents required by the Contract Documents within 10 days after the date of OWNER'S Notice of Award.
3. In submitting this Bid, BIDDER represents, as more fully set forth in the Agreement, that:

a) BIDDER has examined copies of all the Contract Documents and of the following addenda:

<u>Addendum Date:</u>	<u>Number of Addendum:</u>
_____	_____
_____	_____
_____	_____

(Receipt of all of which is hereby acknowledged) and also copies of the Advertisement or Invitation to Bid and the Instructions to Bidders;

- b) BIDDER has examined the site and locality where the Work is to be performed, the legal requirements (Federal, State and local laws, ordinances, rules and regulations) and the conditions affecting cost, progress or performance of the Work and has made such independent investigations as BIDDER deems necessary;
- c) BIDDER has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.
- d) BIDDER agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the

price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

- e) BIDDER has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents and confirms that the written resolution thereof by Engineer is acceptable to Bidder. Bidder has verified the viability of any plans and specifications for accuracy and completeness.
- f) The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.
- g) The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.
- h) BIDDER certifies that:
 - A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;
 - B. BIDDER has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;
 - C. BIDDER has not solicited or induced any individual or entity to refrain from bidding; and
 - D. BIDDER has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 3.h.D:
 - 1. “corrupt practice” means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process;
 - 2. “fraudulent practice” means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;
 - 3. “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and
 - 4. “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

i) The BIDDER and all Subcontractors currently possess the appropriate Idaho Public Works CONTRACTOR'S LICENSE.

Idaho Contractors License No. _____.

j) All Subcontractors currently possess the appropriate Idaho Public Works CONTRACTOR'S LICENSE.

4. BIDDER will complete the Work per the prices established in the attached Bid Schedule:

BID SCHEDULE SUMMARY:

<u>Title</u>	<u>Total Schedule Price</u>
Schedule A	\$ _____
Schedule B	\$ _____
Total Price	\$ _____

BIDDER acknowledges that (1) each bid unit price includes an amount considered by bidder to be adequate to cover contractor's overhead and profit for each separately identified item, and (2) estimated quantities are not guaranteed, and are solely for the purpose of comparison of bids, and final payment for all unit price bid items will be based on actual quantities, determined as provided in the contract documents.

5. BIDDER agrees that the:

- a) Work will be Substantially Complete and Complete on or before the dates or within the number of calendar days indicated in Article 3.1 of the Agreement.
- b) BIDDER accepts the provisions of Article 3.2 of the Agreement as to Liquidated Damages in the event of failure to complete the Work on time.

6. The following documents are attached to, and made a condition of, and incorporated by reference into this Bid if not attached.

- a) Bid Schedule A
- b) Bid Schedule B
- c) Bidder's Checklist
- d) Required Bid Security
- e) Designation of Subcontractors
- f) Non-Collusion Affidavit
- g) Anti-Discrimination Affidavit
- h) Affidavit of Payment or Securement of All Taxes
- i) Non-Discrimination Exhibit C

7. Communications concerning this Bid shall be addressed to:

The address of BIDDER indicated below:

8. The terms used in this Bid which are defined in the General Conditions of the Construction Contract included as part of the Contract Documents have the meanings assigned to them in the General Conditions, and as may be amended.

9. Bid Opening: _____
Date Time
SUBMITTED on _____, 20____.

If BIDDER is:

A Corporation

(Corporation Name)

(State of Incorporation)

By _____
(Signature of Person Authorized to Sign)

(Name and Title of Person Authorized to Sign)

Attest _____
(Secretary)

Business Address _____

Phone No. _____

A Joint Venture

By _____
(Signature)

(Name)

(Address)

By _____
(Signature)

(Name)

(Address)

(Each joint venturer must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above.)

Attest _____
(Secretary)

Business Address _____

Phone No. _____

A Partnership

(Firm Name)

(Signature of General Partner)

(Name of General Partner)

Business address _____

Phone No. _____

Attest _____
(Secretary)

Business Address _____

Phone No. _____

An Individual

By _____
(Signature of Individual)

By _____
(Individual's Name)

Doing business as _____

Business address _____

Phone No. _____

Attest _____
(Secretary)

Business address _____

Phone No. _____

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CITY OF POST FALLS
Black Bay Park Phase 1
BID SCHEDULE A
1299 E 3rd Ave, Post Falls, ID 83854
SECTION 02 TOWNSHIP 50 NORTH, RANGE 5 WEST, BOISE MERIDIAN
July 2023

BIDDER acknowledges receipt of following ADDENDA:

Item No.	Item Description	Estimated Quantity	Unit Measure	Unit Price	Extended Price
01- GENERAL REQUIREMENTS					
1	Mobilization (not to exceed 5% of Total Bid) @	1	LS	\$	\$
2	Quality Control @	1	LS	\$	\$
3	Dust Control @	1	LS	\$	\$
4	Silt Fence @	925	LF	\$	\$
5	Water Bars @	2	EA	\$	\$
6	Storm Water Pollution Prevention Plan (SWPPP) @	1	LS	\$	\$
7	6-ft Chain Link Temporary Construction Fence @	1,510	LF	\$	\$
8	Temporary Construction Security Fence @	910	LF	\$	\$
9	Pavilion @	1	LS	\$	\$
10	Pedestrian Light @	2	EA	\$	\$
02- SITE WORK					
11	Removal of Obstructions @	1	LS	\$	\$
12	Removal of Existing Asphalt Pavement @	1,604	SY	\$	\$
13	Removal of Retaining Wall @	1	LS	\$	\$
14	Removal of CMU Block Wall and Temporary Restroom @	1	LS	\$	\$
15	Removal of Existing Gravel - Beach Area @	1	LS	\$	\$
16	Excavation to Embankment @	651	CY	\$	\$
17	General Structural Fill @	476	CY	\$	\$
18	Waste Material @	19	CY	\$	\$
19	Rock Excavation @	189	CY	\$	\$
20	Crushed Aggregate Base @	125	SY	\$	\$
21	Import Material @	30	CY	\$	\$
22	Clearing and Grubbing @	2,722	SY	\$	\$
23	Trenching and Backfill @	668	LF	\$	\$
24	Pipe Bedding @	1,411	LF	\$	\$
25	French Drain System @	1	LS	\$	\$

26	Stormwater Drain System @	1	LS	\$	\$
27	Single Barrel Drywell @	2	EA	\$	\$
28	2" HDPE DR-13.5 Water Pipe @	238	LF	\$	\$
29	3/4" HDPE DR-9 Water Pipe @	25	LF	\$	\$
30	2" 90° Elbow @	1	EA	\$	\$
31	2"x2"x3/4" Tee @	1	EA	\$	\$
32	2" Stop and Waste Valve @	1	EA	\$	\$
33	Asphalt Pavement @	114	TONS	\$	\$
34	Topsoil @	526	CY	\$	\$

03- CONCRETE

35	Curb and Gutter/Straight Curb @	562	LF	\$	\$
36	Drainage Curb Cut @	4	EA	\$	\$
37	Concrete Seatwalls @	58	LF	\$	\$

55000 METAL FABRICATIONS

38	Fence @	22	LF	\$	\$
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129300 SITE FURNISHINGS

39	Adirondack Chair @	9	EA	\$	\$
40	Bench - Wood Topper @	6	EA	\$	\$
41	BBQ Grill @	1	LS	\$	\$
42	Chaise Lounge @	3	EA	\$	\$
43	Drinking Fountain @	1	EA	\$	\$
44	Firepit @	2	EA	\$	\$
45	Harvest Table - Standard @	1	EA	\$	\$
46	Harvest Table - ADA @	2	EA	\$	\$
47	Litter Receptacle @	3	EA	\$	\$
48	Recycling Receptacle @	3	EA	\$	\$
49	Entry Sign @	1	EA	\$	\$
50	Wayfinding Sign @	2	EA	\$	\$

260000 ELECTRICAL UPGRADES

51	Electrical Upgrades @	1	LS	\$	\$
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52	Utility Electrical Service to Site @	1	LS	\$	\$
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321313 CONCRETE PAVING

53	Concrete Sidewalk @	1470	SY	\$	\$
54	4" Concrete Paving (integral color) @	153	EA	\$	\$

328400 LANDSCAPE IRRIGATION

55	Landscape Irrigation @	1	LS	\$	\$
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329100 LANDSCAPE SYSTEMS

56	Mineral Mulch @	1,332	CY	\$	\$
57	Organic Mulch @	4,903	CY	\$	\$
58	Crushed Stone Paving with Stabilizer @	3,108	SF	\$	\$
59	Boulders - Type A: 6' x 6' x 5' @	16	EA	\$	\$
60	Boulders - Type B: 5' x 4' x 4' @	85	EA	\$	\$
61	Boulders - Type C: 3' x 3' x 3' @	106	EA	\$	\$
62	Natural Logs @	6	EA	\$	\$
63	Boulder Stepping Stone @	10	EA	\$	\$
64	Steel Edger @	252	LF	\$	\$

329200 TURF AND GRASSES

65	Seeded Turf @	11,837	SF	\$	\$
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329220 NATIVE SEEDING

66	Seeded Native Grass Mix @	5,020	SF	\$	\$
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329300 PLANTS

67	Shrubs (1 Gal.) @	59	EA	\$	\$
68	Shrubs (5 Gal.) @	63	EA	\$	\$
69	Perennials(1 Gal.) @	303	EA	\$	\$
70	Ornamental Grasses 1 Gal. @	406	EA	\$	\$

BID SCHEDULE A TOTAL = \$ _____

CITY OF POST FALLS
Black Bay Park Phase 1
BID SCHEDULE B
1299 E 3rd Ave, Post Falls, ID 83854
SECTION 02 TOWNSHIP 50 NORTH, RANGE 5 WEST, BOISE MERIDIAN
JULY 2023

BIDDER acknowledges receipt of following ADDENDA:

Item No.	Item Description	Estimated Quantity	Unit Measure	Unit Price	Extended Price
01- GENERAL REQUIREMENTS					
1	Mobilization (not to exceed 5% of Total Bid) @	1	LS	\$	\$
2	Quality Control @	1	LS	\$	\$
3	Dust Control @	1	LS	\$	\$
4	Silt Fence @	100	LF	\$	\$
5	Rip Rap @	704	SY	\$	\$
6	Stake Plantings @	369	LF	\$	\$
7	Root Wad @	1	EA	\$	\$
8	Boardwalk @	1	LS	\$	\$
9	Floating Boardwalk @	1	LS	\$	\$
10	MSE Wall @	1	LS	\$	\$
11	Solar Light @	3	EA	\$	\$
02- SITE WORK					
12	Excavation to Embankment @	483	CY	\$	\$
13	General Structural Fill @	69	CY	\$	\$
14	Import Material @	16	CY	\$	\$
15	Clearing and Grubbing @	405	SY	\$	\$
129300 SITE FURNISHINGS					
16	Bench - Freestanding @	4	EA	\$	\$
329100 LANDSCAPE SYSTEMS					
17	Boulders - Type A: 6' x 6' x 5' @	51	EA	\$	\$
329220 NATIVE SEEDING					
18	Seeded Native Grass Mix @	129	SF	\$	\$
329300 PLANTS					
19	Shrubs (5 Gal.) @	1	EA	\$	\$

BID SCHEDULE B TOTAL = \$ _____

BIDDER'S CHECK LIST

The Bidder's Check List is offered to the prospective bidder as a means of checking that his/her bid Proposal is a complete Bid free from omissions and errors that could possibly lead to rejection of the bid.

Check off when completed:

- 1. Are all blank spaces filled out on Bid Form? Is a complete set of Bid Proposal documents intact?
- 2. Have questions arising from the bidding, contract specifications, or plans been submitted to the proper authority and resolved in the proper manner?
- 3. Are Bid amounts shown correctly as well as extensions and totals? Recheck for errors or omissions.
- 4. Are authorized signatures properly affixed to the Bidding Documents, giving also title, Idaho Public Works Contractor license number, etc.?
- 5. Per Idaho Code 67-2310, have all electrical, plumbing, and HVAC subcontractors to whom work will be awarded been listed, as well as their Idaho Public Works Contractor license number?
- 6. A BID BOND, CERTIFIED, OR CASHIERS CHECK in the amount of five percent (5%) of the TOTAL BASE BID must be included.
- 7. Have all Addenda and required affidavits been received and acknowledged with the proper signature on the Bid Proposal and included with the Bid?
- 8. All Bidding Documents shall be placed in properly addressed, sealed envelope, and delivered to the specified authority prior to the time designated for the bid opening.
- 9. Has the original and a copy of the Bid Proposal plus all forms and attachments been included?

The City may reject all Bids not containing the mandatory submittals as non-responsive.

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BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER (*Name and Address*):

SURETY (*Name, and Address of Principal Place of Business*):

OWNER (*Name and Address*):

BID

Bid Due Date:

Description (*Project Name— Include Location*):

BOND

Bond Number:

Date:

Penal sum

\$

(Words)

(Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

(Seal)

(Seal)

Bidder's Name and Corporate Seal

Surety's Name and Corporate Seal

By:

Signature

By:

Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest:

Signature

Attest:

Signature

Title

Title

Note: Addresses are to be used for giving any required notice.

Provide execution by any additional parties, such as joint venturers, if necessary.

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from the Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after the Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

DESIGNATION OF SUBCONTRACTORS

The bidder's attention is directed to the provisions of Idaho Code Section 67-2310 which requires subcontractors who will perform mechanical, electrical or plumbing work to be named on the bid of the general contractor. The Contractor shall not name more than one subcontractor for each work item. If the Contractor intends to perform mechanical and/or electrical work under the provisions of his own license, he shall name himself providing he is properly licensed. Plumbing and HVAC are not anticipated on this project.

The Contractor shall not, without written consent of the Owner, make any substitution, alterations, or additions to the following list of subcontractors which is made a material part of this BID.

The following is a complete list of the proposed Subcontractors: (Attach additional sheets if necessary.)

Name and Address	Approximate Amount of Subcontract or Value of Materials	Idaho Public Works Contractor License No.	Type Work To Be Done

	(Name of Firm)
(Date)	(Signature)
	(Title)

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Non-Collusion Affidavit

(THIS FORM TO BE EXECUTED BY EACH BIDDER AND SUBMITTED WITH BID)

State of _____)

:ss

County of _____)

_____, being duly sworn, deposes and says that
he/she is _____
(sole owner, a partner, president, secretary, etc.)

of _____,
the party making the foregoing bid, that such Bid is not made in the interest of or on behalf of any undisclosed person, partnership, company association, organization or corporation; that such Bid is genuine and not collusive or sham; that said Bidder has not directly or indirectly induced or solicited any other bidder to put in a false or sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a shame bid, nor that anyone shall refrain from bidding; that said Bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of said Bidder or of any other bidder, nor to fix any overhead, profit, or cost advantage against the public body awarding the contract or anyone interested in the proposed contract; that all statement contained in such Bid are true; and, further, that said Bidder has not directly or indirectly, submitted its bid price or any breakdown thereof, nor the contents thereof, nor divulged information or data relative thereto, not paid and will not pay fee in connection therewith to any corporation, partnership, company, association, organization, bid depository, nor to any member or agent thereof, nor to any other individual except to such person or persons as have a partnership or other financial interest with said bidder in his/her general business.

Signed: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20_____.

Notary Public in and for the State

of _____

Residing at: _____

My Commission expires: _____

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Anti-Discrimination Affidavit

STATE OF _____)
)ss
COUNTY OF _____)

The Bidder hereby covenants, stipulates and agrees that no person shall be discriminated against in the bidding of the services and/or materials herein under and that the Bidder shall no refuse to hire any person therefore because of such person’s race, creed, sex, color, or national origin, unless based on a bona fide occupation qualification. Also, the Bidder will in no manner discriminate against any person because of such person’s race, creed, sex, color, or national origin. Any such discrimination shall be deemed a violation of this Bid and shall render this Bid subject to forfeiture.

Contractor’s Signature

Subscribed and sworn to before me this _____ day of _____, 20__.

NOTARY PUBLIC in and for the State
of _____, residing at

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Contractor's Affidavit Concerning Taxes

STATE OF _____

COUNTY OF _____

Pursuant to the Idaho Code, Title 63, Chapter 15, I, the undersigned being duly sworn, depose and certify that all taxes, excises and license fees due to taxing units in the state of Idaho, for which I or my property is liable then due to delinquent, have been paid, or secured to the satisfaction or the respective taxing units.

(Name of Contractor)

Address

City and State

By: _____
(Signature)

Notary Public

Residing at: _____

Commission Expires

Note: This form is to be completed and delivered to the Post Fall's City Clerk's office when contracts are signed.

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Exhibit C
City of Post Falls
Black Bay Park Phase 1 Project
Nondiscrimination Requirements

This Attachment is to be inserted in every contract subject to Title VI of the Civil Rights Act of 1964 and associated Regulations.

During the performance of this contract, the contractor/consultant for itself, its assignees and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations

The contractor shall comply with the Regulations relative to non-discrimination in federally assisted programs of United States Department of Transportation (USDOT), Title 49, Code of Federal Regulations, part 21, as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract. The parties acknowledge that this is not a USDOT project and the referenced regulations are adopted for purposes of spelling out and clarifying non-discrimination for application to this project.

2. Nondiscrimination

The Contractor, with regard to the work performed by them during the term of this Agreement, shall not in any way discriminate against any employee or applicant for employment; subcontractor or solicitations for subcontract including procurement of materials and equipment; or any other individual or firm providing or proposing services based on race, color, sex, national origin, age, disability, limited English proficiency or economic status.

3. Solicitations for Subcontracts, Including Procurement of Materials and Equipment

In all solicitations, either by bidding or negotiation, made by the Contractor for work or services performed under subcontract, including procurement of materials and equipment, each potential subcontractor or supplier shall be made aware by the Contractor of the obligations of this Agreement and to the Civil Rights requirements based on race, color, sex, national origin, age, disability, limited English proficiency or economic status.

4. Information and Reports

The contractor shall provide all information and reports required by the Regulations or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the contracting agency or the appropriate federal agency to be pertinent to ascertain compliance with such Regulations, orders and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish this information, the contractor shall so certify to ITD or the USDOT as appropriate, and shall set forth what efforts it has made to obtain the information.

5. Sanctions for Non-compliance

In the event of the contractor's non-compliance with the non-discrimination provisions of this contract, the contracting agency shall impose such contract sanctions as it or the USDOT may determine to be appropriate, including, but not limited to:

- * Withholding of payments to the contractor under the contract until the contractor complies, and/or;
- * Cancellation, termination, or suspension of the contract, in whole or in part.

Incorporation of Provisions

The contractor shall include the provisions of paragraphs (1) through (5) in every sub-contract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives issued pursuant thereto. The contractor shall take such action with respect to any sub-contractor or procurement as the contracting agency or USDOT may direct as a means of enforcing such provisions including sanctions for non-compliance.

Provided, however, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request ITD enter into such litigation to protect the interests of the state and, in addition, the contractor may request the USDOT enter into such litigation to protect the interests of the United States.

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II. CONTRACT FORMS

AGREEMENT

THIS AGREEMENT is dated as of the _____ day of _____ the year 2023 by and between **The City of Post Falls**, (hereinafter called OWNER) and _____, (hereinafter called CONTRACTOR).

OWNER and CONTRACTOR, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1 WORK

CONTRACTOR shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described by Schedule, or part thereof as identified in the Notice of Award as follows:

Black Bay Park Phase 1

Schedule A – Complete replacement of existing park entrance driveway including concrete sidewalk installation and entry planting beds, construction of an arrival plaza and pavilion, upgrades to plaza area including: furnishings, firepit, lighting, retaining wall, boulders and logs, and drywell; regrading of existing park hillside and lawn area including demolition of existing CMU wall, installation of boulders along hillside and boulder play cave, complete reconstruction of the south asphalt trail including regrading to meet ADA requirements and repaving, and upgrades to the beach area including: furnishings, regrading and with new fill. All construction includes stormwater and drainage improvements and treatment, upgrade to the electrical service provided to the park, installation of a domestic water line, and installation of a new gas propane tank, gas line, propane tank fence enclosure.

Schedule B – Construction of rip rap as armoring along designated areas of the Black Bay shoreline as well as stake plantings and a root wad, construction of an MSE wall, construction of a boardwalk with solar lights and floating boardwalk at the entrance of the bay area, and installation of boulders with riprap zone at beach.

Article 2 ARCHITECT

The Project has been designed by Civitas, 1200 Bannock Street, Denver, CO 80204, who is hereinafter called ARCHITECT and who will assume all duties and responsibilities and will have the rights and authority assigned to ARCHITECT in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents.

Article 3 CONTRACT TIME

3.1 Work encompassed by this Agreement as identified in Article 1 above shall be Substantially Complete, as defined in paragraph 1.01 and as stated in paragraph 15.03 of the General Conditions; and shall be Complete and ready for Final Payment, in accordance with paragraph 15.06 of the General Conditions; in accordance with the following:

<u>Substantial Completion</u>	<u>Final Completion</u>	<u>Liquidated Damages per Calendar Days</u>
180 Calendar Days	190 Calendar Days	\$1500 after Substantial Completion \$500 after Final Completion

3.2 Contractor shall complete all work related to the Black Bay shoreline including rip rap/armoring, MSE wall construction, root ball installation, water bars, stake plantings, and all other associated construction activities during the specified work window of January 15, 2024, through March 15, 2024. Black Bay’s annual low water elevation will begin to rise after this work window is complete.

3.3 The Contractor will be given authorization to commence construction upon issuance of the Notice to Proceed. The Contract Time shall commence upon the Notice to Proceed date as described in the Section 01000 Special Provisions.

3.4 Liquidated Damages. OWNER and CONTRACTOR recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not substantially complete within the time specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 11 of the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by OWNER if the Work is not substantially complete on time. Accordingly, instead of requiring any such proof, OWNER and CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) CONTRACTOR shall pay OWNER the amount(s) specified in Paragraph 3.1 for each phase for each day that expires after the time specified in Paragraph 3.1 for Final Completion of each phase until each phase of the Work is complete.

Article 4 CONTRACT PRICE

OWNER shall pay CONTRACTOR for performance of the Work in accordance with the Contract Documents in current funds as follows: See copy of CONTRACTOR'S BID (and attachments) marked Exhibit 1, attached.

Article 5 PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 15 of the General Conditions on or about the 26th day of each month. Applications for Payment will be processed by ARCHITECT as provided in the General Conditions.

5.1 Progress Payments. OWNER shall make progress payments on account of the Contract Price on the basis of CONTRACTOR's Applications for Payment as recommended by ARCHITECT, during construction as provided below. All progress payments will be on the basis of the progress of the Work measured by the schedule of values provided for in paragraph 15.01 of the General Conditions.

5.1.1. Prior to Final Completion, progress payments will be in an amount equal to 95% of the Work completed, less aggregate of payments previously made and less such amounts as ARCHITECT shall determine in accordance with paragraph 15.01 of the General Conditions.

5.1.2 The CONTRACTOR is notified and accepts by execution of the Agreement, that progress payments may not be made for up to 45 (forty-five) days from the date of approval of the payment request by the Owner.

5.1 Final Payment. Upon final completion and acceptance of the Work in accordance with paragraph 15.06 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by ARCHITECT as provided in said Paragraph 15.06.

5.2 Payments to Subcontractors. The CONTRACTOR agrees to pay each subcontractor it contracts with to perform any portion of the work for satisfactory performance of its contract no later than 30 days from the receipt of each payment the CONTRACTOR receives from the OWNER. The CONTRACTOR agrees further to return retainage payments to each subcontractor within 30 days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the OWNER. Failure by the CONTRACTOR to carry out these requirements shall be a material breach of this Agreement.

Article 6 INTEREST

All moneys not paid when due hereunder shall bear interest at the legal rate set by 28-22-104, Idaho Code.

Article 7 CONTRACTOR'S REPRESENTATIONS

In order to induce OWNER to enter into this Agreement, CONTRACTOR makes the following representations:

- 7.1 CONTRACTOR has examined and carefully studied the Contract Documents, and any data and reference items identified in the Contract Documents.
- 7.2 CONTRACTOR has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.
- 7.3 CONTRACTOR is familiar with and is satisfied as to all Laws and Regulations that may affect cost, progress, and performance of the Work.
- 7.4 CONTRACTOR has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.
- 7.5 CONTRACTOR has considered the information known to Contractor itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Contract Documents; and the Site-related reports and drawings identified in the Contract Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor; and (3) Contractor's safety precautions and programs.
- 7.6 Based on the information and observations referred to in the preceding paragraph, CONTRACTOR agrees that no further examinations, investigations, explorations, tests, studies, or data are necessary for the performance of the Work at the Contract Price, within the Contract Times, and in accordance with the other terms and conditions of the Contract.
- 7.7 CONTRACTOR is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Contract Documents.

- 7.8 CONTRACTOR has given ARCHITECT written notice of all conflicts, errors, ambiguities, or discrepancies that CONTRACTOR has discovered in the Contract Documents, and the written resolution thereof by ARCHITECT is acceptable to CONTRACTOR.
- 7.9 The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.
- 7.10 CONTRACTOR's entry into this Contract constitutes an incontrovertible representation by CONTRACTOR that without exception all prices in the Agreement are premised upon performing and furnishing the Work required by the Contract Documents.

Article 8 CONTRACT DOCUMENTS

The Contract Documents which comprise the entire Agreement between OWNER and CONTRACTOR consist of the following:

- 8.1 This Agreement, pages 1 to 9, inclusive.
- 8.2 Performance and Payment Bonds.
- 8.3 Certificates of Insurance.
- 8.4 Notice of Award.
- 8.5 Construction Documents and Specifications bearing the title: **Black Bay Park Phase 1**, dated July 2023, to include, but not limited to Contract Documents, Specifications, General Conditions, and Supplementary Conditions - Owner and consisting of divisions and pages, as listed in Table of Contents, dated July 20, 2023, thereof, copy of Table of Contents attached.
- 8.6 Drawings bearing the title: **Black Bay Park**, dated March 2023, consisting of sheets numbered L000 through S3.1, inclusive.
- 8.7 Addendums Numbered____, dated _____; **Black Pay Park Phase 1**.
- 8.8 CONTRACTOR's Bid, dated _____, including Additional Bid Forms, attached.
- 8.9 Any Modification, including Change Orders, duly delivered after execution of Agreement.

There are no Contract Documents other than those listed above in this Article 8. The Contract Documents may only be altered, amended or repealed by a Field Order, Work Change Directive, Change Order, or Written Amendment as defined in Article 1 of the General Conditions. Copies of the appropriate forms are included in Section II of the document referenced in item 8.5 above.

Article 9 MISCELLANEOUS

- 9.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions shall have the meanings indicated in the General Conditions.
- 9.2 Unless expressly agreed to elsewhere in the contract, no assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and specifically, but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.
- 9.3 OWNER and CONTRACTOR each binds himself, his partners, successors, assigns and legal representatives to the other party hereto, his partners, successors, assigns and legal representatives in respect to all covenants, agreements and obligations contained in the Contract Documents.

Article 10 OTHER PROVISIONS

10.1 Contractor's Certifications

10.1.1 Contractor certifies that it has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for or in executing the Contract. For the purposes of this Paragraph 10.1.1:

10.1.1.1 "corrupt practice" means the offering, giving, receiving, or soliciting of any thing of value likely to influence the action of a public official in the bidding process or in the Contract execution;

10.1.1.2 "fraudulent practice" means an intentional misrepresentation of facts made (a) to

influence the bidding process or the execution of the Contract to the detriment of Owner, (b) to establish Bid or Contract prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

10.1.1.3 “collusive practice” means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish Bid prices at artificial, non-competitive levels; and

10.1.1.4 “coercive practice” means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the execution of the Contract.

10.2 Other Provisions

10.2.1 The Contractor, in consideration of securing the business of constructing public works in this state, recognizing that the business in which he is engaged is of a transitory character, and that in the pursuit thereof, his property used therein may be without the state when taxes, excises, or license fees to which he is liable becomes payable, agrees:

10.2.1.1 To pay promptly when due all taxes, (other than on real property), excises and license fees due to the state, its subdivisions, and municipal and quasi-municipal corporations therein, accrued or accruing during the term to this Agreement, whether or not the same shall be payable at the end of such term;

10.2.1.2 That if the said taxes, excises, and licenses fees are not payable at the end of said term, but liability for the payment thereof exists, even though the same constitute liens upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof; and

10.2.1.3 That, in the event of his default in the payment or securing of such taxes, excises, and licenses fees, to consent that the department, officer, board, or taxing unit entering into this Agreement may withhold from any payment due him hereunder the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing units to which said Contractor is liable.

10.2.2 Pursuant to the provisions of section 63-1504 of the Idaho Code, before final

payment can be made, the Contractor shall furnish to the Owner, evidence that he has paid all taxes, excises, and license fees due to the state and its taxing units, due and payable during the term of the contract for such construction, and that he has secured all such taxes, excises, and license fees liability for the payment of which has accrued during the term of such contract, notwithstanding they may not yet be due or payable.

10.3 Work shall not commence until Pre-Construction Conference has been held at a mutually agreed to time and place.

10.4 The CONTRACTOR shall not commence work on the project until receipt of the Notice To Proceed. Contract time shall commence on the effective date of the Notice to Proceed.

10.5 ADDITIONAL REQUIREMENTS OF THE STATE OF IDAHO: The clauses in this Section are required by the State of Idaho. The inclusion of these clauses in this Agreement by the City does not indicate the City's support or opposition to these clauses nor acknowledgment by the City that these clauses are relevant to the subject matter of this Agreement. Instead, these clauses are included solely to comply with Idaho state law.

10.5.1 Boycotting Israel: If payments under this Agreement exceed one hundred thousand dollars (\$100,000) and the CONTRACTOR employs ten (10) or more persons, then the Consultant certifies that it is not currently engaged in and will not, for the duration of this Agreement, engage in a boycott of the goods or services of the state of Israel or territories under its control as those terms are defined in the "Anti-Boycott Against Israel Act" (Idaho Code 67-2346).

10.5.2 Government of China: CONTRACTOR certifies that it is not and will not, for the duration of this Agreement, be owned or operated by the government of China as those terms are defined in Idaho Code Title 67, Chapter 23.

10.5.3 Contract with Abortion Providers: To the extent this Agreement is subject to the use of public funds, CONTRACTOR certifies that it is not, and will not, for the duration of this Agreement, become an abortion provider or an affiliate of an abortion provider as those terms are defined in the "No Public Funds for Abortions Act" (Idaho Code Title 18, Chapter 87).

10.5.4 Employment of Bona Fide Idaho Residents: If this Agreement contemplates public works construction, CONTRACTOR agrees to employ ninety-five percent (95%) bona fide Idaho residents, as that term is defined in Idaho Code 44-103, as employees on Black Bay Park Phase 1 in order to comply with the requirements of Chapter 10, Title 44, Idaho Code. If

CONTRACTOR employes less than fifty (50) employees on Black Bay Park Phase 1, CONTRACTOR may employ up to ten (10%) nonresidents on Black Bay Park Phase I. In all cases, CONTRACTOR agrees to give a preference to bona fide Idaho residents. The parties agree that if Black Bay Park Phase I involves the expenditure of federal aid funds, that this clause will not be enforced in a manner that conflicts with federal statutes prescribing a labor preference for veterans or prohibiting unlawful discrimination or preferences among United States citizens.

IN WITNESS WHEREOF, the parties hereto have signed this Agreement in triplicate. One counterpart each has been delivered to OWNER, CONTRACTOR, and ARCHITECT. All portions of the Contract Documents have been signed or identified by OWNER and CONTRACTOR or by ARCHITECT on their behalf.

This Agreement will be effective on _____, 2023.

OWNER:

CONTRACTOR:

City of Post Falls _____

By: _____

By: _____

Name: _____

Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

Address for giving notices:

Attest _____

Address for giving notices:

—

License No.:

Agent for service of process:

Notary Public in and for the State

of _____

Residing at: _____

My Commission expires: _____

PAYMENT BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 18

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Payment Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

_____ *(seal)*

Contractor's Name and Corporate Seal

_____ *(seal)*

Surety's Name and Corporate Seal

By: _____

Signature

By: _____

Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____

Signature

Attest: _____

Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner to pay for labor, materials, and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference, subject to the following terms.
2. If the Contractor promptly makes payment of all sums due to Claimants, and defends, indemnifies, and holds harmless the Owner from claims, demands, liens, or suits by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, then the Surety and the Contractor shall have no obligation under this Bond.
3. If there is no Owner Default under the Construction Contract, the Surety's obligation to the Owner under this Bond shall arise after the Owner has promptly notified the Contractor and the Surety (at the address described in Paragraph 13) of claims, demands, liens, or suits against the Owner or the Owner's property by any person or entity seeking payment for labor, materials, or equipment furnished for use in the performance of the Construction Contract, and tendered defense of such claims, demands, liens, or suits to the Contractor and the Surety.
4. When the Owner has satisfied the conditions in Paragraph 3, the Surety shall promptly and at the Surety's expense defend, indemnify, and hold harmless the Owner against a duly tendered claim, demand, lien, or suit.
5. The Surety's obligations to a Claimant under this Bond shall arise after the following:
 - 5.1 Claimants who do not have a direct contract with the Contractor,
 - 5.1.1 have furnished a written notice of non-payment to the Contractor, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were, or equipment was, furnished or supplied or for whom the labor was done or performed, within ninety (90) days after having last performed labor or last furnished materials or equipment included in the Claim; and
 - 5.1.2 have sent a Claim to the Surety (at the address described in Paragraph 13).
 - 5.2 Claimants who are employed by or have a direct contract with the Contractor have sent a Claim to the Surety (at the address described in Paragraph 13).
6. If a notice of non-payment required by Paragraph 5.1.1 is given by the Owner to the Contractor, that is sufficient to satisfy a Claimant's obligation to furnish a written notice of non-payment under Paragraph 5.1.1.
7. When a Claimant has satisfied the conditions of Paragraph 5.1 or 5.2, whichever is applicable, the Surety shall promptly and at the Surety's expense take the following actions:
 - 7.1 Send an answer to the Claimant, with a copy to the Owner, within sixty (60) days after receipt of the Claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed; and
 - 7.2 Pay or arrange for payment of any undisputed amounts.
 - 7.3 The Surety's failure to discharge its obligations under Paragraph 7.1 or 7.2 shall not be deemed to constitute a waiver of defenses the Surety or Contractor may have or acquire as to a Claim, except as to undisputed amounts for which the Surety and Claimant have reached agreement. If, however, the Surety fails to discharge its obligations under Paragraph 7.1 or 7.2, the Surety shall indemnify the Claimant for the reasonable attorney's fees the Claimant incurs thereafter to recover any sums found to be due and owing to the Claimant.
8. The Surety's total obligation shall not exceed the amount of this Bond, plus the amount of reasonable attorney's fees provided under Paragraph 7.3, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.
9. Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any construction performance bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.
10. The Surety shall not be liable to the Owner, Claimants, or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for the payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligation to make payments to or give notice on behalf of Claimants, or otherwise have any obligations to Claimants under this Bond.
11. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.
12. No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the state in which the project that is the subject of the

Construction Contract is located or after the expiration of one year from the date (1) on which the Claimant sent a Claim to the Surety pursuant to Paragraph 5.1.2 or 5.2, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

13. Notice and Claims to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears. Actual receipt of notice or Claims, however accomplished, shall be sufficient compliance as of the date received.
14. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.
15. Upon requests by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor and Owner shall promptly furnish a copy of this Bond or shall permit a copy to be made.

16. Definitions

16.1 **Claim:** A written statement by the Claimant including at a minimum:

1. The name of the Claimant;
2. The name of the person for whom the labor was done, or materials or equipment furnished;
3. A copy of the agreement or purchase order pursuant to which labor, materials, or equipment was furnished for use in the performance of the Construction Contract;
4. A brief description of the labor, materials, or equipment furnished;
5. The date on which the Claimant last performed labor or last furnished materials or equipment for use in the performance of the Construction Contract;
6. The total amount earned by the Claimant for labor, materials, or equipment furnished as of the date of the Claim;

7. The total amount of previous payments received by the Claimant; and
8. The total amount due and unpaid to the Claimant for labor, materials, or equipment furnished as of the date of the Claim.

16.2 **Claimant:** An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials, or equipment for use in the performance of the Construction Contract. The term Claimant also includes any individual or entity that has rightfully asserted a claim under an applicable mechanic's lien or similar statute against the real property upon which the Project is located. The intent of this Bond shall be to include without limitation in the terms of "labor, materials, or equipment" that part of the water, gas, power, light, heat, oil, gasoline, telephone service, or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials, or equipment were furnished.

16.3 **Construction Contract:** The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and all changes made to the agreement and the Contract Documents.

16.4 **Owner Default:** Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

16.5 **Contract Documents:** All the documents that comprise the agreement between the Owner and Contractor.

17. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

18. Modifications to this Bond are as follows:

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PERFORMANCE BOND

CONTRACTOR *(name and address)*:

SURETY *(name and address of principal place of business)*:

OWNER *(name and address)*:

CONSTRUCTION CONTRACT

Effective Date of the Agreement:

Amount:

Description *(name and location)*:

BOND

Bond Number:

Date *(not earlier than the Effective Date of the Agreement of the Construction Contract)*:

Amount:

Modifications to this Bond Form: None See Paragraph 16

Surety and Contractor, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Performance Bond to be duly executed by an authorized officer, agent, or representative.

CONTRACTOR AS PRINCIPAL

SURETY

Contractor's Name and Corporate Seal *(seal)*

Surety's Name and Corporate Seal *(seal)*

By: _____
Signature

By: _____
Signature *(attach power of attorney)*

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

Notes: (1) Provide supplemental execution by any additional parties, such as joint venturers. (2) Any singular reference to Contractor, Surety, Owner, or other party shall be considered plural where applicable.

1. The Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

2. If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except when applicable to participate in a conference as provided in Paragraph 3.

3. If there is no Owner Default under the Construction Contract, the Surety's obligation under this Bond shall arise after:

3.1 The Owner first provides notice to the Contractor and the Surety that the Owner is considering declaring a Contractor Default. Such notice shall indicate whether the Owner is requesting a conference among the Owner, Contractor, and Surety to discuss the Contractor's performance. If the Owner does not request a conference, the Surety may, within five (5) business days after receipt of the Owner's notice, request such a conference. If the Surety timely requests a conference, the Owner shall attend. Unless the Owner agrees otherwise, any conference requested under this Paragraph 3.1 shall be held within ten (10) business days of the Surety's receipt of the Owner's notice. If the Owner, the Contractor, and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default;

3.2 The Owner declares a Contractor Default, terminates the Construction Contract and notifies the Surety; and

3.3 The Owner has agreed to pay the Balance of the Contract Price in accordance with the terms of the Construction Contract to the Surety or to a contractor selected to perform the Construction Contract.

4. Failure on the part of the Owner to comply with the notice requirement in Paragraph 3.1 shall not constitute a failure to comply with a condition precedent to the Surety's obligations, or release the Surety from its obligations, except to the extent the Surety demonstrates actual prejudice.

5. When the Owner has satisfied the conditions of Paragraph 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

5.1 Arrange for the Contractor, with the consent of the Owner, to perform and complete the Construction Contract;

5.2 Undertake to perform and complete the Construction Contract itself, through its agents or independent contractors;

5.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner

and a contractor selected with the Owners concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Paragraph 7 in excess of the Balance of the Contract Price incurred by the Owner as a result of the Contractor Default; or

5.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor, and with reasonable promptness under the circumstances:

5.4.1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, make payment to the Owner; or

5.4.2 Deny liability in whole or in part and notify the Owner, citing the reasons for denial.

6. If the Surety does not proceed as provided in Paragraph 5 with reasonable promptness, the Surety shall be deemed to be in default on this Bond seven days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Paragraph 5.4, and the Owner refuses the payment or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

7. If the Surety elects to act under Paragraph 5.1, 5.2, or 5.3, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. Subject to the commitment by the Owner to pay the Balance of the Contract Price, the Surety is obligated, without duplication for:

7.1 the responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

7.2 additional legal, design professional, and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Paragraph 5; and

7.3 liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

8. If the Surety elects to act under Paragraph 5.1, 5.3, or 5.4, the Surety's liability is limited to the amount of this Bond.

9. The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators, successors, and assigns.

10. The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders, and other obligations.

11. Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after a declaration of Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this paragraph are void or prohibited by law, the minimum periods of limitations available to sureties as a defense in the jurisdiction of the suit shall be applicable.

12. Notice to the Surety, the Owner, or the Contractor shall be mailed or delivered to the address shown on the page on which their signature appears.

13. When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

14. Definitions

14.1 Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made including allowance for the Contractor for any amounts received or to be received by the Owner in settlement of insurance or other claims for damages

to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

14.2 Construction Contract: The agreement between the Owner and Contractor identified on the cover page, including all Contract Documents and changes made to the agreement and the Contract Documents.

14.3 Contractor Default: Failure of the Contractor, which has not been remedied or waived, to perform or otherwise to comply with a material term of the Construction Contract.

14.4 Owner Default: Failure of the Owner, which has not been remedied or waived, to pay the Contractor as required under the Construction Contract or to perform and complete or comply with the other material terms of the Construction Contract.

14.5 Contract Documents: All the documents that comprise the agreement between the Owner and Contractor.

15. If this Bond is issued for an agreement between a contractor and subcontractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

16. Modifications to this Bond are as follows:

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CONTRACTOR'S CERTIFICATE OF INSURANCE

Contractor to submit documentation of insurance as required in Section 6.02 of the General Conditions and Specification Section 1000, Special Provisions. Replace this sheet with the appropriate Certificates of Insurance and other evidence of insurance.

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FIELD ORDER

No. _____

PROJECT Black Bay Park Phase 1

DATE OF ISSUANCE _____ EFFECTIVE DATE: _____

OWNER City of Post Falls

OWNER's CONTRACT NO. _____

CONTRACTOR _____

ARCHITECT Civitas, Inc.

Your are directed to proceed with the following work task(s):

DESCRIPTION:

REASON FOR WORK:

ATTACHMENTS:

Estimated Cost of Additional Work is: _____

Not-to-exceed Authorized Cost is: _____

Work accomplished pursuant to this Field Order shall be paid for on a time and materials basis in accordance with:

Bid Item(s) _____

Other _____

Authorized By:

Accepted By:

ARCHITECT

CONTRACTOR

DATE: _____

DATE: _____

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Work Change Directive No.

Date of Issuance: _____ Effective Date: _____
 Owner: City of Post Falls Owner's Contract No.: _____
 Contractor: _____ Contractor's Project No.: _____
 Architect: Civitas, Inc. Architect's Project No.: 190551
 Project: Black Bay Park Phase 1 Contract Name: _____

Contractor is directed to proceed promptly with the following change(s):

Description:

Attachments: *[List documents supporting change]*

Purpose for Work Change Directive:

Directive to proceed promptly with the Work described herein, prior to agreeing to changes on Contract Price and Contract Time, is issued due to: *[check one or both of the following]*

- Non-agreement on pricing of proposed change.
- Necessity to proceed for schedule or other Project reasons.

Estimated Change in Contract Price and Contract Times (non-binding, preliminary):

Contract Price \$ _____ [increase] [decrease].
 Contract Time _____ days [increase] [decrease].

Basis of estimated change in Contract Price:

- Lump Sum Unit Price
- Cost of the Work Other

RECOMMENDED:

AUTHORIZED BY:

RECEIVED:

By: _____	By: _____	By: _____
Architect (Authorized Signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)
Title: _____	Title: _____	Title: _____
Date: _____	Date: _____	Date: _____

Approved by Funding Agency (if applicable)

By: _____ Date: _____
 Title: _____

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CHANGE ORDER

No. _____

PROJECT: Black Bay Park Phase 1

DATE OF ISSUANCE: _____ EFFECTIVE DATE _____

OWNER: City of Post Falls

OWNER's Contract No.: _____

CONTRACTOR: _____

ARCHITECT: CIVITAS, INC.

You are directed to make the following changes in the Contract Documents.

Description:

Reason for Change Order:

Attachments: (List documents supporting change)

CHANGE IN CONTRACT PRICE	CHANGE IN CONTRACT TIMES
Original Contract Price \$	Original Contract Times Substantial Completion: Ready for final payment: days or dates
Net changes from previous Change Orders No. __ to No. \$	Net changes from previous change Orders No. __ to No. days
Contract Price prior to this Change Order \$	Contract Times prior to this Change Order Substantial Completion: Ready for final payment: days or dates
Net Increase (decrease) of the Change Order \$	Net Increase (decrease) of the Change Order days
Contract Price with all approved Change Orders \$	Contract Times with all approved Change Orders Substantial Completion: Ready for final payment: days or dates

RECOMMENDED:

APPROVED:

ACCEPTED:

By: _____
Architect (Authorized Signature)

By: _____
Owner (Authorized Signature)

By: _____
Contractor (Authorized Signature)

Date: _____

Date: _____

Date: _____

CHANGE ORDER

INSTRUCTIONS

A. GENERAL INFORMATION

This document was developed to provide a uniform format for handling contract changes that affect Contract Price or Contract Times. Changes that have been initiated by a Work Change Directive must be incorporated into a subsequent Change Order if they affect Contract Price or Times.

Changes that affect Contract Price or Contract times should be promptly covered by a Change Order. The practice of accumulating change order items to reduce the administrative burden may lead to unnecessary disputes.

If Milestones have been listed any effect of a Change Order thereon should be addressed.

For supplemental instructions and minor changes not involving a change in the Contract Price or Contract Times, a Field Order shall be used.

B. COMPLETING THE CHANGE ORDER FORM

Architect initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by contractor, or requests from Owner, or both.

Once Architect has completed and signed the form, all copies should be sent to Contractor for approval. After approval by Contractor, all copies should be sent to Owner for approval. Architect should make distribution of executed copies after approval by Owner.

If a change only applies to Contract Price or to Contract Times, cross out the part of the tabulation that does not apply.

APPLICATION FOR PAYMENT NO. _____

To The City of Post Falls (OWNER)

Contract For Black Bay Park Phase 1

OWNER's Contract No. _____ ARCHITECT'S Project No. 190551

For Work Accomplished Through The Date Of _____

Bid Schedule	Work Completed Preceding Pay Application No. ____	Work Completed This Payment Period	Total Work Completed To Date
Change Order(s)			
Total(s)			

Payment Calculation:

Gross Payment Amount Due	\$ _____
Less ____% Retainage	\$ _____
Less Other Retainage	\$ _____
Payment Amount Due to Date	\$ _____
Less Previous Payments	\$ _____
• Payment Amount Due Contractor This Application	\$

Accompanying Documentation:

1. Detailed Schedule of Values for Bid Items
2. Certification of Subcontractor Payment
3. Description of Other Retainage (if Necessary)
4. Change Order(s) No. _____, _____, _____, _____ (if Appropriate)
5. Other: _____

CONTRACTOR'S Certification:

The undersigned CONTRACTOR certifies that: (1) **all previous progress payments received from OWNER on account of Work done under the Contract referred to above have been applied to discharge in full all obligations of CONTRACTOR incurred in connection with Work covered by prior Applications for Payment numbered 1 through ____ inclusive;** (2) title to all Work, materials and equipment incorporated in said Work or otherwise listed in or covered by this Application for Payment will pass to OWNER at time of payment free and clear of all liens, claims, security interest and encumbrances (except such as are covered by Bond acceptable to Owner indemnifying OWNER against any such lien, claim, security interest or encumbrance); and (3) all WORK covered by this Application for Payment is in accordance with the Contract Documents and not *defective* as that term is defined in the Contract Documents.

CONTRACTOR

Dated _____

By _____
(Authorized Signature)

Payment of the Above AMOUNT DUE THIS APPLICATION is recommended.

Civitas, Inc.

Dated _____

By _____
(Authorized Signature)

Payment of the Above AMOUNT DUE THIS APPLICATION is approved by:

City of Post Falls

Dated _____

By _____
(Authorized Signature)

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CERTIFICATION OF IDAHO RESIDENTS (SAMPLE)

City of Post Falls form to be completed and submitted by the contractor with each pay application.

CERTIFICATION
Idaho Statute 44-1001
Employment Of Residents Of Idaho

(Project Name)

I, _____, certify as _____ of
(Name) (President | Owner | Other)

_____ that we complied with Idaho Statute 44-1001.
(Company Name)

"Employment of Residents of Idaho", during the period of time for which Pay Request No. _____
was processed.

SIGNATURE:

DATE:

(Signature)

(Print Name)

CERTIFICATE OF SUBSTANTIAL COMPLETION

Owner:	City of Post Falls	Owner's Contract No.:	
Contractor:		Contractor's Project No.:	
Architect:	Civitas, Inc.	Architect's Project No.:	190551
Project:	Black Bay Park Phase 1	Contract Name:	

This [preliminary] [final] Certificate of Substantial Completion applies to:

- All Work The following specified portions of the Work:

Date of Substantial Completion

The Work to which this Certificate applies has been inspected by authorized representatives of Owner, Contractor, and Engineer, and found to be substantially complete. The Date of Substantial Completion of the Work or portion thereof designated above is hereby established, subject to the provisions of the Contract pertaining to Substantial Completion. The date of Substantial Completion in the final Certificate of Substantial Completion marks the commencement of the contractual correction period and applicable warranties required by the Contract.

A punch list of items to be completed or corrected is attached to this Certificate. This list may not be all-inclusive, and the failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract.

The responsibilities between Owner and Contractor for security, operation, safety, maintenance, heat, utilities, insurance, and warranties upon Owner's use or occupancy of the Work shall be as provided in the Contract, except as amended as follows: *[Note: Amendments of contractual responsibilities recorded in this Certificate should be the product of mutual agreement of Owner and Contractor; see Paragraph 14.04.D of the General Conditions.]*

Amendments to Owner's responsibilities: None As follows

Amendments to Contractor's responsibilities: None As follows:

The following documents are attached to and made a part of this Certificate: *[punch list; others]*

This Certificate does not constitute an acceptance of Work not in accordance with the Contract Documents, nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract.

EXECUTED BY ARCHITECT:		RECEIVED:		RECEIVED:	
By: _____	By: _____	By: _____	By: _____	By: _____	By: _____
(Authorized signature)	Owner (Authorized Signature)	Contractor (Authorized Signature)			
Title: _____	Title: _____	Title: _____			
Date: _____	Date: _____	Date: _____			

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CONTRACTOR'S PROJECT CERTIFICATION

STATE OF IDAHO)
)ss
COUNTY OF _____)

_____, being duly sworn according to law,
deposes and says that he is the _____
(Title or Office) of _____,
Contractor, in a construction contract entered into between the Contractor and _____
_____, Owner, for construction of _____
_____ and that he is authorized to and does make this
certificate on behalf of the Contractor.

Affiant further states that the Contractor has paid in full for all his materials used in, for, or on
the complete contract, as well as having made full payment to any Subcontractors he has used on
this contract for subletting work or materials in compliance with the laws of the State of Idaho.

This Certification form indemnifies the Owner and saves harmless the Owner from all
liabilities, claims or lawsuits arising from the contract in relation to Contractor's, subcontractor's
work, material, labor, etc.

DATED this _____ day of _____, 20__.

(Subcontractor's Signature)

(Title)

STATE OF)
)ss
COUNTY OF _____)

On this _____ day of _____, 20__, before me a notary public in and for said
state personally appeared _____
_____ known to me to be the person(s) whose
name(s) is/are subscribed to within instrument, and acknowledged to me that he/she/they executed
the same, on behalf of _____
_____.

Notary public for _____
Residing at _____
My Commission Expires _____

**MATERIAL SUPPLIER CERTIFICATE AND WAIVER OF LIEN –
ACKNOWLEDGEMENT OF PAYMENT**

Supplier: _____

Project: _____

Address: _____

Owner: _____

Period from: _____ to _____
Date Date

Materials, Equipment, and/or Machinery have been delivered to the site, or materials have been especially fabricated for the Project during the Period as follows:

Description:

_____ (Supplier) hereby certifies that payment has been received in full for the above and hereby waives all right to liens and claims against the Owner therefore.

By: _____

Title: _____

Date: _____

Witness by hand and notary seal, this _____ day of _____

_____ My Commission Expires: _____

Notary

_____ County of Residence: _____

Printed Signature

SUBCONTRACTOR'S LIEN WAIVER

STATE OF IDAHO)
)ss
COUNTY OF _____)

_____, being duly sworn according to law,
deposes and says that he is the _____
(Title or Office) of _____,
Subcontractor, in a construction contract entered into between _____, Contractor and _____.

Affiant further states that the Subcontractor has been paid in full for all his materials used in, for, or on the complete contract, as well as having received full payment for all work performed on the project, in compliance with the laws of the State of Idaho.

This Certification form indemnifies the Owner and saves harmless the Owner from all liabilities, claims or lawsuits arising from the contract in relation to Contractor's, Subcontractor's work, material, labor, etc.

DATED this _____ day of _____, 20__.

(Subcontractor's Signature)

(Title)

STATE OF)
)ss
COUNTY OF _____)

On this _____ day of _____, 20__, before me a notary public in and for said state personally appeared _____
known to me to be the person(s) whose name(s) is/are subscribed to within instrument, and acknowledged to me that he/she/they executed the same, on behalf of _____.
_____.

Notary public for _____

Residing at _____

My Commission Expires _____

SUBCONTRACTOR'S LIEN WAIVER

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CERTIFICATE OF FINAL COMPLETION

OWNER: City of Post Falls

OWNER'S CONTRACT NO: _____

OWNER'S PROJECT NO: _____

ARCHITECT'S PROJECT NO: 190551

PROJECT: Black Bay Park Phase 1

LOCATION: Post Falls, Idaho

The Project to which this Certificate applies has been inspected by authorized representatives of OWNER, CONTRACTOR, AGENCIES and ENGINEER, and that Project is hereby declared to be final and complete in accordance with the Contract Documents. The CONTRACTOR's one year warranty of all completed work shall commence as dated below.

DATE OF FINAL PROJECT COMPLETION: _____

ACCEPTANCE BY:

OWNER: City of Post Falls

BY: _____ DATE: _____

CONTRACTOR: _____

BY: _____ DATE: _____

ARCHITECT: Civitas, Inc.

BY: _____ DATE: _____

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**III. STANDARD GENERAL CONDITIONS OF THE
CONSTRUCTION CONTRACT**

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

ISPWC DIVISION 100 – STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Modified From

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

2015 IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC)

NOTE: The base document is the 2007 EJCDC version. Items added to EJCDC to form the 2015 ISPWC are underlined. Items deleted from the EJCDC to form the 2015 ISPWC are shown in strikeout format.

This document has important legal consequences; consultation with an attorney is encouraged with respect to its use or modification. This document should be adapted to the particular circumstances of the contemplated Project and the controlling Laws and Regulations.

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

Prepared by

ENGINEERS JOINT CONTRACT DOCUMENTS COMMITTEE

and

Issued and Published Jointly by

ACEC

AMERICAN COUNCIL OF ENGINEERING COMPANIES



ASCE American Society
of Civil Engineers

P/E National Society of
Professional Engineers
Professional Engineers in Private Practice

AMERICAN COUNCIL OF ENGINEERING COMPANIES

ASSOCIATED GENERAL CONTRACTORS OF AMERICA

AMERICAN SOCIETY OF CIVIL ENGINEERS

PROFESSIONAL ENGINEERS IN PRIVATE PRACTICE
A Practice Division of the
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

Endorsed by



CONSTRUCTION SPECIFICATIONS INSTITUTE

These General Conditions have been prepared for use with the Suggested Forms of Agreement Between Owner and Contractor (EJCDC C-520 or C-525, 2007 Editions). Their provisions are interrelated and a change in one may necessitate a change in the other. Comments concerning their usage are contained in the Narrative Guide to the EJCDC Construction Documents (EJCDC C-001, 2007 Edition). For guidance in the preparation of Supplementary Conditions, see Guide to the Preparation of Supplementary Conditions (EJCDC C-800, 2007 Edition).

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STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

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ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 3. *Application for Payment*—The form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
 4. *Asbestos*—Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
 5. *Bid*—The offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.
 12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
 13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
 14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.

15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *Effective Date of the Agreement*—The date indicated in the Agreement on which it becomes effective, but if no such date is indicated, it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *Hazardous Waste*—The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.

33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *Project Manual*—The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
35. *Radioactive Material*—Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor’s Applications for Payment.
40. *Shop Drawings*—All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
41. *Site*—Lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
- 42.a. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
- 42.b. *Standard Specifications*—Wherever in these Contract Documents reference is made to the Standard Specifications, said reference shall be understood as referring to the Idaho Standards for Public Works Construction which applicable parts are incorporated herein and made a part of these Documents by specific reference thereto. If requirements contained in the Standard Specifications are modified by or are in conflict with supplemental information in these Contract Documents, the requirements of these Contract Documents shall prevail.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.

47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement to Contractor issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Engineer ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times.

1.02 Terminology

- A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.
- B. *Intent of Certain Terms or Adjectives:*
 1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.
 2. “Command” type language is used in the Contract Documents. This command language refers to, and is directed to the Contractor.
- C. *Day:*
 1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.
- D. *Defective:*
 1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or

- b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
- c. has been damaged prior to Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

- 1. The word "furnish," when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 - 2. The word "install," when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 - 3. The words "perform" or "provide," when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 - 4. When "furnish," "install," "perform," or "provide" is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, "provide" is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 *Delivery of Bonds and Evidence of Insurance*

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 *Copies of Documents*

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 *Commencement of Contract Times; Notice to Proceed*

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. No Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 *Before Starting Construction*

- A. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 2. a preliminary Schedule of Submittals; and
 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.
 2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
 3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- B. It is the intent of the Contract Documents to describe a functionally complete project (or part thereof) to be constructed in accordance with the Contract Documents. Any labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.

C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

A. Standards, Specifications, Codes, Laws, and Regulations

1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *Amending and Supplementing Contract Documents*

- A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 - 1. A Field Order;
 - 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or
 - 3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 - 1. have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer or its consultants, including electronic media editions; or
 - 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if

any, of any adjustment in the Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.02 *Subsurface and Physical Conditions*

- A. *Reports and Drawings:* The Supplementary Conditions identify:
 - 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
 - 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

- A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:
 - 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
 - 2. is of such a nature as to require a change in the Contract Documents; or
 - 3. differs materially from that shown or indicated in the Contract Documents; or
 - 4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.
- C. *Possible Price and Times Adjustments:*
1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
 2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
 3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *Underground Facilities*

- A. *Shown or Indicated:* The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:
1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
 2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and

- d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be

within the scope of the Work. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.

1. The Contractor's scope of work shall include implementation of necessary safety, public health and environmental procedures and requirements relating to sanitary sewage encountered during the work.
 2. The Contractor's scope of work shall include necessary safety and environmental requirements for handling and disposal of asbestos pipe removed from service or excavated during the course of the work.
- D. If Contractor encounters a Hazardous Environmental Condition not indicated in the Drawings or Specifications or identified in the Contract Documents or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.
- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work; or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a Claim therefor as provided in Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligent acts or omissions ~~negligence~~.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.

- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, and Other Bonds*

- A. Contractor shall furnish performance and payment bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. If the surety on any bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions. Surety and insurance companies from which the bonds and insurance for this Project are purchased shall have a Best's rating of no less than A:VII, in addition to the other requirements specified herein.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.
- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 Contractor's Insurance

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;
 2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
 3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
 4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
 5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07;
 6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.

- b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuing coverage during the two year period of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

NOTES TO USER

The Owner, in consultation with their attorney and risk manager, should choose which party shall provide property insurance. In accordance with the Owner's direction, use the appropriate Section A below.

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
 2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, false work, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions;
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other additional insured to whom a certificate of insurance has been issued.
- A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:
1. include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners,

employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings, falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. ~~Owner~~Contractor shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- ~~D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.~~
- D. Contractor shall be responsible for any deductible or self-insured retention.
- ~~E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.~~
- E. If Owner requests in writing that other special perils be included in the property insurance policies provided under paragraphs 5.06.A or 5.06.B of the General Conditions, Contractor shall, if possible, include such insurance, and the cost thereof will be charged to Owner by appropriate Change Order or Written Amendment. Prior to commencement of the Work at the site, Contractor shall in writing advise Owner whether or not such other insurance has been procured by Contractor.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
 - 1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 - 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing

within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit ~~overtime work~~ or the performance of Work outside the regular working hours or on a Saturday, Sunday, or any legal holiday without Owner's written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties, special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.

- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
 - 1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 - 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
 - 1. *"Or-Equal" Items:* If in Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and,
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially to the detailed requirements of the item named in the Contract Documents.
 - 2. *Substitute Items:*
 - a. If in Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
 - b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable

substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
 - d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change.
- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

- E. *Engineer's Cost Reimbursement*: Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense*: Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.
- C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
 - 1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 - 2. shall create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier ~~who is listed as a loss payee~~ whose interests are included on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the

Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *Patent Fees and Royalties*

- A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if, to the actual knowledge of Owner or Engineer, its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.
- B. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents..

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.
- B. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.

- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.
- D. While not intended to be inclusive of all Laws or Regulations for which Contractor may be responsible under paragraph 6.09, the following Laws or Regulations are included as mandated by statute or for the convenience of the Contractor:

Idaho Code Section 63-1501. Definitions. As used in this act, the following terms shall have the following meanings:

“Contracting units” shall include the state or any officer or department thereof, the counties or other subdivisions of the state, and all municipal and quasi-municipal corporations therein.

“Contractor” shall mean any person, firm, co-partnership, association, or corporation, foreign or domestic, entering into a contract for the construction, erection, repair, or improvement of any kind or character of public works in this state.

“Taxes” shall mean all taxes, assessments, excises, and license fees authorized to be levied, assessed, and collected under the laws of this state, other than taxes on real property.

“Taxing unit” shall mean the state or any officer or department thereof, the counties or other subdivisions of the state, and all municipal and quasi-municipal corporations therein authorized by law to assess, levy and collect taxes.

Idaho Code Section 63-1502. Conditions precedent to contract for public works. Before entering into a contract for the construction of any public works in this state, the contracting unit shall require as conditions precedent that the contractor be authorized to do business in this state and that he furnish satisfactory evidence that he has paid or secured to the satisfaction of the respective taxing units all taxes for which he or his property is liable then due or delinquent.

Idaho Code Section 63-1503. Contractor for public works to pay or secure taxes—Agreement. Every contract for the construction of public works by a contracting unit of this state shall contain substantially the following provisions:

The contractor, in consideration of securing the business of erecting or constructing public works in this state, recognizing that the business in which he is engaged is of a transitory character, and that in the pursuit thereof, his property used therein may be without the state when taxes, excises, or license fees to which he is liable become payable, agrees:

1. To pay promptly when due all taxes (other than on real property), excises and license fees due to the state, its subdivisions, and municipal and quasi-municipal corporations therein accrued or accruing during the term of this contract, whether or not the same shall be payable at the end of such term;
2. That if the said taxes, excises, and license fees are not payable at the end of said term, but liability for the payment thereof exists, even though the same constitute liens upon his property, to secure the same to the satisfaction of the respective officers charged with the collection thereof; and
3. That in the event of his default in the payment or securing of such taxes, excises, and license fees, to consent that the department, officer, board, or taxing unit entering into this contract may withhold from any payment due him hereunder the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing units to which said contractor is liable.

Idaho Code Section 44-1002 requires the following: The Contractor must employ ninety-five percent (95%) bona fide Idaho residents as employees on any job under any such contract except where under such contracts fifty (50) or less persons are employed, the Contractor may employ ten percent (10%) nonresidents, provided, however, in all cases employers must give preference to the employment of bona fide residents in the performance of said work, and no contract shall be let to any person, firm, association, or corporation refusing to execute an agreement with the above mentioned provisions in it; provided, that, in contracts involving the expenditure of federal aid funds this act shall not be enforced in such a manner as to conflict with or be contrary to the federal statutes prescribing a labor preference to honorably discharged soldiers, sailors, and marines, prohibiting as unlawful any other preference or discrimination among citizens of the United States.

Idaho Code Chapter 19 of Title 54 requires proper licensing of Public Works Contractors.

6.10 Taxes

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.
- B. In the event of the Contractor's default on the payment of taxes, excises, and license fees as set forth in Idaho Code 63-1503, the Owner shall have the authority to withhold from any payment due the Contractor under this contract, the estimated amount of such accrued and accruing taxes, excises, and license fees for the benefit of all taxing authorities to which said Contractor is liable.

6.11 Use of Site and Other Areas

A. Limitation on Use of Site and Other Areas

- 1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work. Contractor shall not enter upon nor use property not under Owner control until appropriate easements have been executed and a copy is on file at the site.
- 2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
- 3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

- B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.
- C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

- D. *Loading Structures:* Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.12 *Record Documents*

- A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Change Orders, Work Change Directives, Field Orders, and written interpretations and clarifications in good order and annotated to show changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Engineer for reference. Upon completion of the Work, these record documents, Samples, and Shop Drawings will be delivered to Engineer for Owner.

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:
1. all persons on the Site or who may be affected by the Work;
 2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 3. other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.
- B. Contractor shall comply with all applicable Laws and Regulations relating to the safety of persons or property, or to the protection of persons or property from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and other utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by any of them, or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).
- F. Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.
 - 1. *Shop Drawings:*
 - a. Submit number of copies specified in the General Requirements.
 - b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.
 - 2. *Samples:*
 - a. Submit number of Samples specified in the Specifications.
 - b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.
- C. *Submittal Procedures:*
 - 1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;

- b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
 3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *Continuing the Work*

- A. Contractor shall carry on the Work and adhere to the Progress Schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 - 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 - 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 - 1. observations by Engineer;
 - 2. recommendation by Engineer or payment by Owner of any progress or final payment;
 - 3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
 - 4. use or occupancy of the Work or any part thereof by Owner;
 - 5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
 - 6. any inspection, test, or approval by others; or
 - 7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:

1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

6.22 *Quality Control*

- A. Contractor shall provide quality control, which shall include the initial and subsequent inspections of Contractor's Work to ensure that the Work conforms to the Contract Documents.
- B. Contractor shall designate the person responsible for Contractor's quality control while Work is in progress, and shall notify Engineer, in writing, prior to any change in quality control representative assignment.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe access to the Site, provide a

reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful actions or inactions.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

A. Owner's duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

A. Owner's responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

A. Owner's responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner's Responsibilities*

A. The Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER’S STATUS DURING CONSTRUCTION

9.01 *Owner’s Representative*

- A. Engineer will be Owner’s representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner’s representative during construction are set forth in the Contract Documents.

9.02 *Visits to Site*

- A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor’s executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site to check the quality or quantity of the Work. Engineer’s efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.
- B. Engineer’s visits and observations are subject to all the limitations on Engineer’s authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer’s visits or observations of Contractor’s Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor’s means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer’s consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *Authorized Variations in Work*

- A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor, who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.

- D. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 14.07.A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.
- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.
- F. Contractors, Subcontractors, Suppliers and others on the Project, or their sureties, shall maintain no direct action against the Engineer, its officers, employees, affiliated corporations, and subcontractors, for any claim arising out of, in connection with, or resulting from the engineering services performed. Only the Owner will be the beneficiary of any undertaking by the Engineer.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the Progress Schedule as provided in Paragraph 6.18.A.

10.04 Notification to Surety

- A. If the provisions of any bond require notice to be given to a surety of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 Claims

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than ~~30~~ 10 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within ~~60~~ 20 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within ~~30~~ 10 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within ~~30~~ 20 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said ~~30~~ 21 days, the Claim shall be deemed denied.
- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 Cost of the Work

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality

of the Project, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:

1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.
4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in

accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.

- g. The cost of utilities, fuel, and sanitary facilities at the Site.
- h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
- i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

- 1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.4, all of which are to be considered administrative costs covered by the Contractor's fee.
- 2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
- 3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.
- 4. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
- 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.

C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.

D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.

B. *Cash Allowances:*

- 1. Contractor agrees that:

- a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.
- C. *Contingency Allowance:*
1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.
- D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

- A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.
- B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.
- C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.
- D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:
 1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
 2. there is no corresponding adjustment with respect to any other item of Work; and
 3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

- A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
 1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or

2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 12.01.C).

C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:

1. a mutually acceptable fixed fee; or
2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the claim to the Engineer and the other party to the Contract in accordance with the provisions of paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.

- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 *Notice of Defects*

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 *Access to Work*

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 *Tests and Inspections*

- A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.
- B. ~~Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:~~ Contractor shall employ an independent testing laboratory or testing agency and shall be responsible for arranging and shall pay for all specified tests, inspections, and approvals (including tests, inspections, and approvals to be paid for on a cash allowance basis) required for Owner's and Engineer's acceptance of the Work at the site except:
 1. ~~for inspections, tests, or approvals covered by paragraphs 13.03.C and 13.03.D below; costs incurred in connection with tests or inspections pursuant to paragraph 13.04.B of the General Conditions shall be paid for as provided in said paragraph; and as otherwise specifically provided in the Contract Documents.~~
 2. ~~that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.04.B shall be paid as provided in said paragraph 13.04.C; and.~~

~~3. as otherwise specifically provided in the Contract Documents.~~

- C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.
- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.
- F. Uncovering Work as provided in paragraph 13.03.E shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.
- B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If, the uncovered Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *Owner May Stop the Work*

- A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not

limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's warranty, special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents) or by any specific provision of the Contract Documents, any Work is found to be defective, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *Acceptance of Defective Work*

- A. If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Engineer's recommendation of final payment, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness) and for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and Owner shall be

entitled to an appropriate decrease in the Contract Price, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days written notice to Contractor, correct, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the Site, and incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.
- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 *Schedule of Values*

- A. The Schedule of Values established as provided in Paragraph 2.07.A will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

14.02 *Progress Payments*

- A. *Applications for Payments:*
 - 1. At least 20 days before the date established in the Agreement for each progress payment (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.

2. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. *Review of Applications:*

1. Engineer will, within ~~7~~40 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:
 - a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
 - a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
 - a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner referred to in Paragraph 14.02.B.2. Engineer may also

refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. ~~Ten~~ Thirty days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items including, but not limited to, liquidated damages entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *Contractor's Warranty of Title*

- A. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

- B. Promptly after Contractor's notification, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will, within 14 days after submission of the tentative certificate to Owner, notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will, within said 14 days, execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.
- D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed part of the Work which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:
 - 1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
 - 2. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work.
 - 3. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 14.04 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.
 - 4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars

in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. Application for Payment:

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and
 - d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. If, through no fault of Contractor, final completion of the Work is significantly delayed, and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. a waiver of all Claims by Owner against Contractor, except Claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to Paragraph 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:

1. exclude Contractor from the Site, and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site, and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion);
 2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if, within 7 days of receipt of notice of intent to terminate, Contractor begins to correct its failure to perform and proceeds diligently to cure such failure and become in compliance with the contract requirements. Such cure must occur within no more than 30 days of said notice unless otherwise extended by the Engineer. ~~Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.~~
- E. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and
 4. reasonable expenses directly attributable to termination.
- B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

- A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.
- B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

- A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.
- B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.
- C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:
 - 1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or
 - 2. agrees with the other party to submit the Claim to another dispute resolution process; or
 - 3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 *Giving Notice*

- A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if:
 - 1. delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended; or
 - 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 *Computation of Times*

- A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

17.03 *Cumulative Remedies*

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents. The provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.04 *Survival of Obligations*

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 *Controlling Law*

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 *Headings*

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

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IV. SPECIFICATIONS

Division One - General Requirements

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1. COORDINATION OF PLANS, SPECIFICATION AND SPECIAL PROVISIONS:

These technical specifications, special provisions, general conditions, plans and all supplementary documents are essential parts of the contract, and a requirement in one is binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work or project. In case of discrepancy, calculated dimensions will govern over scaled dimensions; special provisions shall govern over plans, technical specifications, general conditions and cited standards/circulars/testing; plans shall govern over technical specifications, general conditions and cited standards/circulars/testing; technical specifications shall govern over general conditions and cited standards/circulars/testing; general conditions shall govern over cited standards/circulars/testing. If there is a conflict in requirements between the general notes and details on the plans, the requirement of the detail on the plans shall prevail.

The Contractor shall take no advantage of any apparent error or omission in the plans or contract documents. In the event the Contractor discovers such an error or omission, he shall immediately notify the Engineer. The Engineer will then make such corrections and interpretations as may be deemed necessary for fulfilling the intent of the plans and contract documents.

2. REFERENCED SPECIFICATIONS

All construction within the public rights-of-way shall be performed in accordance with the latest edition of the Idaho Standards for Public Works Construction (ISPWC), and City of Post Falls Standards. In the event of a conflict with these technical specifications, or other referenced documents, the more stringent criteria shall apply.

3. SUPPLEMENTARY CONDITIONS – OWNER

These Supplementary Conditions amend or supplement the General Conditions of the Construction Contract and other provisions of the Contract documents as indicated below. All provisions, which are not so amended or supplemented, remain in full force and effect.

Article 1.

The terms used in these Supplementary Conditions, which are defined in the General Conditions of the Construction Contract, have the meanings assigned to them in the General Conditions.

Article 1, Section 1.01.

Delete definition 1.01.A.45. of the General Conditions in its entirety and insert the following in its place:

1.01.A.45. Successful Bidder - The Bidder submitting the lowest responsive Bid whose Bid the Owner accepts, and to which the Owner makes an award of contract, subject to stated conditions.

Article 1, Section 1.01.A – Item 44.

Add the following language at the end of the Paragraph 1.01.A.44 as follows:

Substantial Completion is further defined as (i) that degree of completion of the Project's operating facilities or systems sufficient to provide the Owner the full time, uninterrupted, and continuous beneficial operation of the Work; and (ii) all required functional, performance and acceptance, or startup testing and commissioning has been successfully demonstrated for all components, devices, equipment, and instrumentation and control to the satisfaction of the continuous days operation without significant interruption has been completed, as specified; and (iv) all inspections required have been completed and identified defective Work replaced or corrected, and (v) all paving is complete.

Article 2, Section 2.03.A

Delete the paragraph and replace with the following:

The Contract Times will commence to run on the day indicated on the Notice to Proceed. A Notice to Proceed may be given at any time as Agreed upon by the Owner and Contractor after the effective date of the Agreement.

Article 2, Section 2.05

Delete paragraph 2.05.A of the General Conditions in its entirety and insert the following in its place:

2.05.A Preliminary Schedules: Within five days after the Effective Date of the Contract (or as specifically required in the General Requirements), Contractor shall submit to the Resident Project Representative (RPR) for timely review:

2.05.A.1 a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract; and

2.05.A.2 a preliminary Schedule of Submittals.

Article 4, Section 4.02

4.02.A Subsurface and Physical Conditions

Supplement paragraph 4.02.A of the General Conditions as follows:

Contact the Engineer for availability of geotechnical investigation report.

Article 4, Section 4.04

4.04.A Underground Facilities

Supplement paragraph 4.04.A of the General Conditions as follows:

No complete As-Built Drawings are available for the Contractor.

Article 5, Section 5.04.

The limits of liability for the insurance required by Section 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by law:

Worker's Compensation, under Section 5.04 of the General Conditions:

- (1) State: Statutory
- (2) Applicable Federal
(i.e. Longshoreman's): Statutory
- (3) Employer's Liability: \$500,000

Comprehensive General Liability (under Section 5.04 of the General Conditions):

- (1) Bodily Injury:
\$1,000,000 Each Occurrence
\$2,000,000 Annual Aggregate, Products and Complete Operations
- (2) Property Damage liability insurance will provide Explosion, Collapse and underground coverage where applicable.
- (3) Personal Injury, with Employment Exclusion Deleted
\$2,000,000 Annual Aggregate

Comprehensive Automobile Liability (under Section 5.04):

- (1) Bodily Injury and Property Damage:
\$1,000,000 Each person
\$1,000,000 Each Accident

Additional Insurance Requirements (under Section 5.04):

- (1) Contractor shall provide completed operations and products coverage in the amount of \$1,000,000.
- (2) Add City of Post Falls and T-O Engineers, Inc. as named insured under terms of policies for coverages under Sections 5.04 - C.

Article 5, Section 5.06:

A. Contractor shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof. This insurance shall:

1. include the interests of Owner, Contractor, Subcontractors, Engineer, Engineer's Consultants and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, partners, employees, agents and other consultants and subcontractors of any of them each of whom is deemed to have an insurable interest and shall be listed as a loss payee;
2. be written on a Builder's Risk "all-risk" or open peril or special causes of loss policy form that shall at least include insurance for physical loss and damage to the Work, temporary buildings,

- falsework, and materials and equipment in transit and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage, and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.

Article 6, Section 6.06

Delete paragraph 6.06.B of the General Conditions in its entirety and insert the following in its place:

B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price or Contract Times, or both, will not be adjusted by the difference in the cost occasioned by such replacement. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or entity, whether initially or as a replacement, shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

Article 6, Paragraphs 6.17, 6.19, and 6.21

Paragraphs 6.17, 6.19, and 6.21 make reference to the wording and language "review and approval". This wording shall be replaced in all locations with the following wording "review and comment".

Article 6, Paragraph 6.19

Add paragraph 6.19.D to Article 6 of the General Conditions, which is to read as follows:

6.19.D The Contractor's standard warranty and guarantee period shall be one year and shall commence on the date of final project acceptance as indicated on the Certificate of Final

Completion; or for such longer period of time as may be prescribed by the terms of any specific provisions of the Contract Documents or Specifications.

Article 8, Paragraph 8.01

Delete paragraph 8.01.A of the General Conditions in its entirety and insert the following in its place:

8.01. A Except as otherwise provided in these General Conditions, Owner may issue all communications to Contractor through Engineer or directly to Contractor. Owner shall copy Engineer on any communications delivered directly to Contractor.

Article 12, Section 12.03.C

Delete paragraph 12.03.C of the General Conditions in its entirety and insert the following in its place:

C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, acts of God, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.

Article 11, Paragraph 11.03.D

Delete paragraph 11.03.D of the General Conditions in its entirety.

Article 13, Paragraph 13.03.G

Add paragraphs 13.03.G, 13.03.G.1, and 13.03.G.2 to Article 13 of the General Conditions, which are to read as follows:

13.03.G Inspections, tests, or approvals required by the Contract Documents to be performed by Contractor and that require test certificates to be submitted to Owner or RPR for acceptance shall be made by an independent testing laboratory or agency licensed or certified in accordance with Laws and Regulations and applicable state and local statutes. In the event state license or certification is not required, testing laboratories or agencies shall meet following applicable requirements:

13.03.G.1 Basic requirements of ASTM E 329, "Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials as Used in Construction" ASTM D 3666, "Standard Specification for Minimum Requirements for Agency Testing and Inspecting Bituminous Paving Materials, as applicable.

13.03.G.2 Calibrate testing equipment at reasonable intervals by devices of accuracy traceable to either the National Bureau of Standards or accepted values of natural physical constants.

Article 13, Section 13.07.A.

Amend paragraph 13.07.A to read as follows:

If within one year after the date of Final Completion (or such longer period of time as may be prescribed by the terms of any applicable special guarantee required by the Contract Documents), Owner gives Contractor written notice that any Work has been found to be defective, or that Contractor's repair of any damages to the Site or adjacent areas has been found to be defective, then after receipt of such notice of defect Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:

1. correct the defective repairs to the Site or such adjacent areas;
2. correct such defective Work;
3. remove the defective Work from the Project and replace it with Work that is not defective, if the defective Work has been rejected by the Owner, and
4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others, or to other land or areas resulting from the corrective measures.

Article 14, Section 14.02.C.1

Amend paragraph 14.02.C.1 to read as follows:

Forty-five days after approval of the Application for Payment to Owner with Engineer's recommendation, the amount recommended (subject to any Owner set-offs) will become due, and when due will be paid by Owner to Contractor.

Article 14, Section 14.04.

Add paragraph to Section 14.04 of the General Conditions which is to read as follows:

A copy of the Certificate of Substantial Completion issued by the Engineer is included for information purposes.

Article 14, Paragraph 14.07

Delete paragraph 14.07.C of the General Conditions in its entirety and insert the following in its place:

14.07.C Forty-five days after approval by Owner of the final Application for Payment and accompanying documentation, the amount recommended by Engineer (less any further sum Owner is entitled to set off against Engineer's recommendation, including but not limited to set-offs for liquidated damages and set-offs allowed under the provisions above with respect to progress payments) will become due and shall be paid by Owner to Contractor.

Article 15, Paragraph 15.04

Delete paragraph 15.04 of the General Conditions in its entirety and insert the following in its place:

15.04 Contractor May Stop Work or Terminate

15.04.A If, through no act or fault of Contractor, (1) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (2) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (3) Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days written notice to Owner and Engineer, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the contract and recover from Owner payment on the same terms as provided in Paragraph 16.03.

15.04.B In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this paragraph are not intended to preclude Contractor from submitting a Change Proposal for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this paragraph.

Article 16.

Article 16 – Final Resolution of Disputes. Add the following sentence:

The prevailing party in any legal action shall be entitled to payment of their attorney fees.

Article 17, Paragraph 17.01, Giving Notice

Delete paragraph 17.01 of the General Conditions in its entirety and insert the following in its place:

17.01 Giving Notice

A. Whenever any provision of the Contract requires the giving of written notice to Owner, Engineer, or Contractor, it will be deemed to have been validly given only if delivered:

1. in person, by a commercial courier service or otherwise, to the recipient's place of business; or
2. by registered or certified mail, postage prepaid, to the recipient's place of business; or
3. in writing to the to the recipient by electronic transmission if a method for electronic transmission is set forth in the agreement, or through common practice by the parties, with the words "Formal Notice" or similar in the electronic transmission's subject line.

Article 17, Miscellaneous

Add paragraph 17.07 to Article 17 of the General Conditions, which is to read as follows:

17.07 Litigation Costs

Should litigation occur between the two parties relating to any provision of this Contract, all litigation costs, collection expenses, witness fees, court costs and attorney fees incurred by the prevailing party as allowed by the court shall be paid to the prevailing party by the non-prevailing party and on appeal or bankruptcy proceedings.

END OF SECTION 001000

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BUILD AMERICA, BUY AMERICA SUPPLEMENTAL

PART 1 -

PART 2 - GENERAL

2.1 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.

2.2 SUMMARY

- A. Section includes information regarding Build America, Buy America requirements that are met for project components depicted in the contract drawings and not specified in specific specification sections.

2.3 DEFINITIONS

- A. Build America, Buy America is required by Section 70914 of the Bipartisan Infrastructure Law (also known as the Infrastructure Investment and Jobs Act), P.L. 117-58, on or after May 14, 2022, none of the funds under a federal award that are part of Federal financial assistance program for infrastructure may be obligated for a project unless all of the iron, steel, manufactured products, and construction materials used in the project are produced in the United States, unless subject to an approved waiver. The requirements must be included in all subawards, including all contracts and purchase orders for work or products under this program.
 1. All iron and steel used in the project are produced in the United States--this means all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States;
 2. All manufactured products used in the project are produced in the United States —this means the manufactured product was manufactured in the United States; and the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States is greater than 55 percent of the total cost of all components of the manufactured product, unless another standard for determining the minimum amount of domestic content of the manufactured product has been established under applicable law or regulation; and
 3. All construction materials are manufactured in the United States—this means that all manufacturing processes for the construction material occurred in the United States.
- B. The Buy America preference only applies to articles, materials, and supplies that are consumed in, incorporated into, or affixed to an infrastructure project. As such, it does not apply to tools, equipment, and supplies, such as temporary scaffolding, brought to the construction site and removed at or before the completion of the infrastructure project. Nor does a Buy America

preference apply to equipment and furnishings, such as movable chairs, desks, and portable computer equipment, that are used at or within the finished infrastructure project, but are not an integral part of the structure or permanently affixed to the infrastructure project.

PART 3 - PRODUCTS (Not Used)

PART 4 - EXECUTION

4.1 EXAMINATION

- A. All items including, articles, materials, supplies, and furnishings in this project most meet the requirements of the Build America, Buy America act.
- B. For items that do not meet the requirements, there must be an approved waiver provided.
- C. Include Build America, Buy America requirements in all contracts and purchase orders.

END OF SECTION 010001

PART 1 – GENERAL

1.1 PROJECT LOCATION

The project is located within the City of Post Falls. The project is within the boundary Black Bay Park, south of North Bay Street on the Spokane River. The park is located on the 1200 block of East 3rd Avenue at the North Bay Street entrance.

1.1 DESCRIPTION OF WORK.

The City of Post Falls has proposed an improvement plan for Black Bay Park by incorporating design elements while maintaining community goals outlined in the Black Bay Park Vision Plan dated January 2019. This project entails the following upgrades to the existing park system:

- Black Bay Park, Phase I – Construct a boardwalk and terraced dock system, elevated lawn area re-design that includes re-grading, stormwater treatment, and drainage improvements, and bay restoration to minimize erosion.

The project also includes the installation of a utilities including a 2” domestic water for a drinking fountain, the design and sizing of a propane tank and connection for an outdoor barbeque in the arrival plaza of the park, and a power connection to reach lighting within the arrival plaza as well. Measures to protect existing adjacent and crossing irrigation lines will be required to complete the water line, gas, and power installation. Temporary and permanent relocation of existing utilities and/or irrigation lines may be necessary for the Contractor to complete the work. It is the Contractors responsibility to coordinate with all Utility facilities that could be impacted by this project or that could affect the completion of the park improvements.

PART 2 - PRODUCTS

No products are required in this section.

PART 3 - EXECUTION

3.1 CONTRACTOR USE OF SITE AND PREMISES:

- A. Contractor access to the site is shown on the plans.
- B. Contractor shall schedule work to allow access to adjacent residences.

3.2 CONTRACTOR’S WORK/STORAGE AREAS:

The contractor’s work areas are shown on the construction plans. Storage/staging areas shall be determined at the Pre-Construction conference. It is the Contractor’s responsibility to coordinate, negotiate and secure storage and staging areas for construction, the Owner and Engineer shall approve the storage and staging areas but is not responsible for finding, coordinating or

negotiating any terms with third parties. The Contractor may use the appropriate areas following issuance of the Notice to Proceed for this project.

3.3 WORK SEQUENCE:

- A. Phasing will not be utilized to complete this portion of the construction project.
- B. Contractor shall work in an orderly and timely manner. The Contractor shall coordinate the schedule and sequence of operations with the Owner.
- C. Contractor will be given authorization to commence construction upon issuance of Notice to Proceed on an agreed upon date following execution of the Agreement. Once the contractor starts work, contractor shall work continuously to complete the project in accordance with the contract times listed in the Agreement.
- D. The Contractor shall provide a draft construction schedule a minimum of five days prior to the Pre-Construction Conference. The schedule shall identify the Contractor's plan for accomplishing the work in accordance with the Contract Time. During the active portion of the project, a schedule update covering two-week periods will be required on a weekly basis.
- E. Other contractors and utility companies may be working on site during construction of this project, including extension of other utilities. The Contractor shall coordinate and cooperate with other contractors and Utility companies as required to progress the work with minimal conflict and interference.

3.4 WORK HOURS

The Contractor shall base the project construction schedule on a five-day workweek of eight hours per day or a four-day workweek of up to ten hours per day, with construction activities limited to the hours of 7:00 AM to 7:00 PM Monday through Friday. From the effective date of the Notice to Proceed, the Contractor and his subcontractors shall work diligently and continuously to the completion of the project without any unjustified delays or non-working periods except for legal holidays, Saturdays, Sundays or as may be directed or approved by the Owner. Work during extended hours before or after typical business hours may be necessary, this is to limit customer outages. It is the Contractor's responsibility to coordinate with business owners any shutdowns that will affect them, concurrence from affected customers shall be presented to Owners and Engineer in writing prior to authorization of additional scheduled work hours, at no time should shutdowns cause outage during business hours without prior written authorization. The Owner and Engineer must authorize additional scheduled work hours in advance. Priorities of work extensions are as follows:

- a. Extended hours during the five-day workweek.
- b. Saturday work.
- c. Sunday work.

3.5 EXISTING UTILITIES

The locations of any existing utilities, as shown, are approximate only. No guarantee is made or implied that all existing underground utilities are shown. It shall be the Contractor's responsibility to contact all utility companies and to verify the type, size and location of all existing utilities prior to starting any work. Any discrepancies in or from the information shown on the plans shall

be reported to the Engineer prior to the commencing construction. Additionally, the Contractor shall coordinate and cooperate with all necessary existing utility companies as required to progress the work with minimal conflict and interference. This includes any necessary utility temporary or permanent relocation or protection.

PART 4 – METHOD OF MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work under this Section.

END OF SECTION 001010

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PROTECTION OF MONUMENTATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Included in this Specification Section are the project requirements and associated responsibilities for the Contractor-related to protection of the project monumentation and instrumentation.
- B. Related Work described elsewhere:
 - 1. Summary of Work, Section 01010.
 - 2. Staking, Quantities and Drawings of Record, Section 01050.

PART 2 – PRODUCTS

No products are required in this section.

PART 3 - EXECUTION

3.1 GENERAL

- A. The Contractor shall be responsible for preservation of all survey monuments, benchmarks and other project or property monumentation or instrumentation.
- B. PER IDAHO CODE TITLE 55, CHAPTER 16, PARAGRAPH 13 ALL SURVEY MONUMENTS SHALL BE PROTECTED IN PLACE. IN THE EVENT ANY OF THESE SURVEY MONUMENTS OR THEIR ACCESSORIES ARE DESTROYED OR DISTURBED BY CONSTRUCTION, THEY SHALL BE REESTABLISHED AND REMONUMENTED OR WITNESSED AT THEIR ORIGINAL LOCATION, AT THE EXPENSE OF THE CONTRACTOR UNDER THE DIRECTION OF A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF IDAHO.
- C. If during the Work, any monuments, bench marks or other project/property monumentation are destroyed or disturbed, Contractor shall immediately notify the Engineer, who shall have them reinstalled or corrected at the Contractor's expense.

PART 4 – METHOD OF MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work required under this Section.

END OF SECTION 001030

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PROJECT COORDINATION AND ADMINISTRATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Included in this specification are the project requirements and associated responsibilities for the CONTRACTOR and ENGINEER related to project coordination and administration. The requirements and conditions addressed in this section do not in any way amend or change the requirements of other respective sections, but its intent is to support and clarify project coordination and administration functions and/or requirements of the ENGINEER and CONTRACTOR.
- B. Related information and requirements:
 - 1. Summary of Work, Section 01010
 - 2. Submittals, Shop Drawings and Samples, Section 01340.

PART 2 - PRODUCTS

- A. No products are required in this section

PART 3 - EXECUTION

3.1 PROJECT CORRESPONDENCE

- A. General: The CONTRACTOR and ENGINEER shall conform to the following requirements in issuing and receiving project correspondence related to contract conditions. All correspondence, requests, clarifications, submittals, and information shall be addressed directly between the CONTRACTOR and ENGINEER. No other form of communications written or oral shall be permitted between project participants without the CONTRACTOR and/or ENGINEER consent by assigning the responsibility to an authorized agent act in that contractual capacity or role. The transferring of this authority by either party shall be in the written form issued to the other corresponding party that he or she has transferred that specific authority in the contract.
- B. Correspondence: All correspondence issued from the ENGINEER or CONTRACTOR shall be identified by the construction management software (CMS) for tracking and referencing specific documents. The construction management software shall be Procure or approved equal. The correspondence shall include notification of all documents requiring action by either party (i.e. transmittals, submittals, request for information, request for change and general correspondence). The CMS shall include punch list creation, meeting management, project schedule viewing, photo uploading, and construction plans and specifications. All CMS functionalities shall be made available to the ENGINEER. All other correspondence related to the project beyond the listed CMS capabilities above must be completed via email or telephone.

3.2 INFORMATION, REQUEST AND REPORTING

- A. Request for Information: RFI can be initiated or requested from any of the project participants but shall be addressed and answered in written correspondence between the CONTRACTOR and ENGINEER before it is considered binding to the contract. The ENGINEER will record all RFI in a RFI log that tracks all request that require response regardless who initiates the request. The RFI Log will be made available to the CONTRACTOR upon his request in writing to the ENGINEER.
- B. Request for Change/Contract Modification: RFC can be initiated or requested from any of the project participants but must be addressed and answered in written correspondence between the CONTRACTOR and ENGINEER before it is considered binding to the contract. The ENGINEER will record all RFC in an RFC log that tracks all request that require response regardless who initiates the request. The RFC Log will be made available to the CONTRACTOR upon his request in writing to the ENGINEER.
- C. Contract Deficiencies/Non-Comply Work: The ENGINEER shall issue Deficiency and Non-Complying Work Notices to the contractor for work items that do not meet or exceed the quality requirements stated in the contract documents related to workmanship, materials or methods used by the CONTRACTOR. The CONTRACTOR shall be required to provide the ENGINEER a schedule for correcting the specific deficiencies or have the deficiencies corrected within 3 working days of the notice. The ENGINEER will record and track all deficiencies and non-complying work activities on a Deficiency Log until the specific deficiencies are corrected and resolved by the CONTRACTOR. The Deficiency Log shall be made available to the CONTRACTOR upon his request in writing to the ENGINEER.
- D. Exception Reports: The ENGINEER shall issue Exception Reports to the CONTRACTOR for the purpose of assessing project status and identifying potential problems. Typical reasons to issue the Exception Reports (but not limited to) are: submittals not received from the CONTRACTOR on scheduled submission dates, submittals not returned to the CONTRACTOR within the contract required time period, responses on RFI and RFC not received from corresponding parties within the contract time frame, correction of deficiencies not completed by the CONTRACTOR within the agreed time period and negotiations of changed work scope not completed within the agreed time period. The interval of issuing these reports shall be at the discretion of the ENGINEER on "As-Need" basis.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for the work required under this Section.

END OF SECTION 001041

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STAKING AND DRAWINGS OF RECORD

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: This specification shall outline the responsibilities for survey work necessary to construct the work to specified lines and grades and for the maintenance of records required to properly determine quantities and develop as-constructed records.
- B. Related Work described elsewhere:
 - 1. General Conditions, 4.05.

1.2 QUALITY ASSURANCE

The survey and staking requirements for the project shall be established and agreed upon by the Contractor, Owner and Engineer prior to or at the preconstruction meeting.

PART 2 - PRODUCTS

No Products this Section.

PART 3 - EXECUTION

3.1 CONSTRUCTION STAKING

- A. Engineers responsibility: Unless stated otherwise in Sections 1000 and 1010, the following construction staking will be provided by the Engineer. Construction staking shall be provided one time for each construction item, additional staking which has been provided previously and is requested again is considered additional and retainage will be withheld from Contractors application for payments.
 - 1. Sanitary and Storm Sewer Collection Systems:
 - a. Stakes for trench drain pipe alignment every 25-feet at an offset to be determined based on site conditions.
 - b. Offset stake(s) at manholes for invert grade control and 25 feet outside of manhole.
 - 2. Water Distribution Systems:
 - a. Centerline stakes for alignment.
 - b. Location stakes for valves, hydrants, and other appurtenances.

- c. Location stakes for service lines.
 - d. Offset stakes for approximate valve box and hydrant elevations.
 - 3. Pavement Repair:
 - a. Centerline stakes.
 - b. Centerline offset reference hubs at 50-foot stations, one side only.
 - c. Slope stakes at 50-foot stations at the beginning of construction.
 - 4. Structures:
 - a. Baseline for horizontal control.
 - b. Benchmark for vertical control.
 - 5. Overlot Grading, Embankments Earthwork:
 - a. Baseline for horizontal control.
 - b. Benchmark for vertical control.
 - 6. Curb, Gutter, Sidewalk, and Paving Stones:
 - a. Grade stakes at the beginning of construction at 25-foot intervals along the backside of the curb or sidewalk at a 1-foot to 3-foot offset distance.
 - b. Radius point stakes for all curved sections.
 - c. Location and grade stakes for changes in design cross-section, width, direction, etc.
 - d. Field designed grade and cut sheets.
 - 7. Other: Staking as may be required or agreed upon between the Contractors and the Engineer.
- B. Contractor Responsibility: In general, the following construction staking is to be provided by the Contractor.
 - 1. Sanitary and Storm Sewer Collection and Water Distribution System:
 - a. Periodic verification of grade between grade stakes established by the Engineer.

- b. Placement of additional grade stakes between those provided by the Engineer.
 - c. Establishing final finished grades of valve boxes and other appurtenances.
 - d. Any string line or batter board staking desired.
2. Pavement Repair:
- a. Grade and slope control or grade "checks" during subgrade construction.
 - b. Additional or intermittent slope stakes beyond those provided by the Engineer at the onset of work, if necessary.
 - c. Confirmation of proper subgrade elevation within specified tolerances prior to placement of "blue tops" for subbase course placement.
 - d. String lines desired for asphalt placement.
 - e. Slope stakes as desired on bicycle paths.
3. Structures:
- a. Transfer of horizontal and vertical control from Engineer established baselines and benchmarks as required for layout and grade control.
 - b. Regular checks of grades and locations of work from baselines and benchmarks.
4. Overlot Grading, Embankments, and Earthwork
- a. Transfer of horizontal and vertical control from Engineer established baselines, grids, and benchmarks as required for layout and grade control.
 - b. Regular checks of grades and locations of work from baselines, grids, and benchmarks.
 - c. Additional or intermittent slope stakes beyond those provided by the Engineer at the onset of work, if necessary.
 - d. Confirmation of proper subgrade elevations within specified tolerances prior to placement of "blue tops" for subbase course placement in proposed paved areas and topsoil in other areas.
5. Curb, Gutter, Sidewalk, and Paving Stones:
- a. Any string line or batter board staking desired.

- b. Transfer of horizontal and vertical control from Engineer - established staking.
- c. Confirmation of proper subgrade elevations within specified tolerances prior to placement of bed course or concrete.

3.2 NOTIFICATION

- A. **Staking:** The Contractor shall notify the Engineer minimum of five (5) normal working days (does not include Saturdays, Sundays and legal holidays) prior to the commencement of any work which requires construction control, layout, or grade staking so as to permit the Engineer to properly schedule the verification or completion of survey work.

Any delays in the performance of project work which may result from the Contractor's failure to properly notify the Engineer in advance of the need for survey work shall be the Contractor's sole responsibility.

- B. **Correction of Staking:** The Contractor shall satisfy himself as to the accuracy of all measurements before construction of any permanent structure and shall not take advantage of any errors which may have been made in laying out the work. The contractor shall notify the Engineer immediately upon encountering any known staking errors or if the Contractor suspects a staking error. Any work performed by the Contractor to apparent erroneous staking information shall be at the Contractor's risk.
- C. **Pre-Construction Conference:** At a mutually agreed time prior to commencement of project work, the Contractor and Engineer shall meet at a Pre-Construction Conference for the purpose of establishing a survey work schedule and reviewing survey control and construction staking to be provided by the Engineer and by the Contractor.

3.3 DRAWINGS OF RECORD

- A. **Drawings:** The Contractor will be furnished with one complete set of prints of all Contract Drawings upon which the Contractor shall maintain a neat and accurate record of all contract work. The Contractor shall promptly record the as-built quantities and dimensions of all contract work as it is performed on this set of prints. At the completion of project work, the entire set of prints plus any additional drawings necessary shall be submitted to the Engineer for final inspection and comment. The Contractor shall correct, amplify and do all other work as may be required by the Engineer to complete the as-built record in a manner satisfactory to the Engineer.
- B. **Information required:** The Contractor's record shall include, for example, locations of valves, fittings, connections, service lines, cleanouts, and manholes. Locations are to be established by three-point ties to physical objects which will remain undisturbed. Materials and fittings used; relative placement of fittings, with dimensions; depths of water mains (if over 8 feet of cover or less than 7 feet of cover), and locations of lines or

other important items which enter into structures or pass under foundation walls are also to be clearly defined.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment will be made for work required under this section.

In case of negligence on the part of the Contractor, or his employees, which results in the destruction of stakes or markings established by the Engineer, an amount equal to the cost of replacing the same may be deducted from subsequent pay applications due the Contractor at the discretion of the Engineer or at the direction of the Owner. No such deduction will be made without prior notification to the Contractor.

END OF SECTION 001050

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PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: Reference is made in these contract documents to codes and standards which establish qualities and types of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.

Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standards, it is the Contractor's responsibility to provide materials and workmanship which meet or exceed the specifically named code or standard.

It is also the Contractor's responsibility, when so required by the Contract Documents or by written request from the Engineer, to deliver to the Engineer all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Engineer, and copies of a certified report of tests conducted by a testing agency approved for that purpose.

- B. Related Work Described Elsewhere: Specific naming of codes or standards occurs on the drawings and in other Sections of these Specifications.

1.2 QUALITY ASSURANCE

- A. Codes and Standards: Familiarity with pertinent codes and standards: In procuring all items used in this work, it is the Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements.

- B. Rejection of non-complying items: The Engineer reserves the right to reject items incorporated into the work which fail to meet the specified minimum requirements. The Engineer further reserves the right, and without prejudice to other recourse the Engineer may take, to accept non-complying items subject to adjustment in the Contract Amount as approved by the Engineer and the Owner.

- C. Additional Standards and Requirements: Applicable standards listed in these Specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. AASHTO = American Association of State Highway and Transportation Officials, 444 North Capitol St., NW, Suite 249, Washington, D.C. 20001.
2. ACI = American Concrete Institute, Box 19150, Redford Station, Detroit, Michigan 48219.

3. AISC = American Institute of Steel Construction, Inc., 1221 Avenue of the Americas, New York, New York 10020.
4. ANSI = American National Standards Institute (Successor to USASI and ASA), 1430 Broadway, New York, New York 10018.
5. ASTM = American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.
6. AWS = American Welding Society, Inc., 2501 N.W. 7th Street, Miami, Florida 33125.
7. AWWA = American Water Works Association, Inc., 6666 West Quincy Avenue, Denver, Colorado 80235.
8. CRSI = Concrete Reinforcing Steel Institute, 228 North LaSalle Street, Chicago, Illinois 60610.
9. CS = Commercial Standard of NBS, U.S. Department of Commerce, Government Printing Office, Washington, D.C. 20402.
10. FGMA = Flat Glass Marketing Association, 3310 Harrison, Topeka, Kansas 66611.
11. ISPWC = Idaho Standards for Public Works Construction, Local Highway Technical Assistance Council (LHTAC), 3330 Grace Street, Boise, Idaho 83705.
12. NAAMM = The National Association of Architectural Metal Manufacturers, 1033 South Boulevard, Oak Park, Illinois 60302.
13. NEC = National Electrical Code (see NFPA).
14. NEMA = National Electrical Manufacturers Association, 155 East 44th Street, New York, New York 10017.
15. NFPA = National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210.
16. SDI = Steel Deck Institute, 135 Addison Avenue, Elmhurst, Illinois 60125
17. SSPC = Steel Structures Painting Council, 4400 5th Avenue, Pittsburgh, Pennsylvania 15213.
18. TCA = Tile Council of America, Inc., P.O. Box 326, Princeton, New Jersey 08540.
19. Underwriters' Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611.
20. Fed Specs and Fed Standards, Specifications Sales (3FRI), Bldg, 197,

Washington Navy Yard, General Services Administration, Washington, D.C.
20407.

21. MIL-SPECS = Military Specifications, Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402.
22. UBC = Uniform Building Code, International Conference of Building Officials, 5360 South Workman Mill Road, Whittier, California 90601.

PART 2 - PRODUCTS

No products this section.

PART 3 - EXECUTION

The Contractor is responsible for being familiar with all named or implied codes. The latest revision or edition of codes or standards shall be used unless otherwise stated.

PART 4 - MEASUREMENT AND PAYMENT

There will be no separate measurement or payment for work required by the Section.

END OF SECTION 001091

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PROJECT MEETINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Included in this specification are the project requirements and associated responsibilities for sponsoring, assisting, and participating in project meetings related to the project construction and coordination.
- B. Related information and requirements:
 - 1. Summary of Work, Section 01010.
 - 2. Project Coordination and Administration, Section 01041.
 - 3. Project Construction Progress Schedule, Section 013216.

1.2 QUALITY ASSURANCE

Project participants designated by the Contractor to attend project or construction meetings shall have all required authority to commit the Contractor to solutions agreed upon at the meetings.

1.3 SUBMITTALS

- A. Agenda Items: To the maximum extent practicable, advise the Engineer at least 24 hours in advance of the project or construction meetings regarding all items to be added to the meeting agenda.
- B. Meeting Minutes: The Engineer shall compile minutes of each project or construction meeting and will furnish a copy to the Contractor. The Contractor shall review the minutes for content and correctness, if the Contractor finds discrepancies or errors in the meeting minutes it should be addressed with the Engineer immediately.

PART 2 - PRODUCTS

No products are required in this section.

PART 3 - EXECUTION

3.1 PROJECT MEETINGS

A. PRE-CONSTRUCTION CONFERENCE

- 1. Pre-Construction Conference: A mandatory Pre-Construction Conference shall be held prior to the start of project construction. This conference is the appropriate and logical place for the participants (Owner, Engineer, Surveyor,

Contractor, Subcontractors, Suppliers, Utility Companies, End Users and all other involved parties) to discuss and resolve issues related to execution of the construction contract. Mandatory attendance shall be required of the Contractor, Subcontractors and major Suppliers performing work related to the construction contract. The Pre-Construction Conference agenda topics for discussion or resolution shall be, but not limited to: coordination with private utilities, form of payment request, submittals requirements, insurance and bonding requirements, surveying and staking, quality control, labor requirements and reporting, correspondence and management reporting, contract administration procedures, construction schedules and updating, project safety requirements, regulatory and permitting requirements, coordination, temporary facilities and controls, storage and staging areas, security, change order requirements, record drawings, final payment and project close-out procedures.

The Notice to Proceed will be issued at the Pre-Construction Conference when all contractual requirements are satisfied by the Contractor. The primary purpose for this conference is to establish acceptable ground rules related to the contract requirements. This will ensure that the Contractor understands the complete project requirements and coordinates the work to produce a completed project within the allotted time constraints specified in the contract.

2. Minimum Agenda Items (Distribution and Discussion):
 - a. Organization arrangement of Contractor's forces and personnel, subcontractors, material suppliers, utilities and Engineer.
 - b. Channels and procedures for project communications.
 - c. Construction Schedules.
 - d. Contract documents; including distribution of required copies of original documents and revisions.
 - e. Processing of shop drawing and submittals to the Engineer for review.
 - f. Processing of field decisions and change orders.
 - g. Rules and regulations governing performance of the work.
 - h. Procedures for safety, emergencies, security, quality control, housekeeping, and other related matters.

B. CONSTRUCTION MEETINGS

1. Weekly Construction Meetings: Weekly "On-Site" construction meetings will be required for the purpose of discussing and reviewing project status on changes, progress, short-term scheduling, impacts to the construction process, submittals, outstanding correspondence and resolving critical issues or problems at the construction site. The Contractor, Subcontractors and Supplier involved in the

active prosecution of the work shall be in attendance at all of the Weekly Construction Meetings.

C. PROGRESS AND SCHEDULING MEETINGS

1. Monthly Progress and Scheduling Meetings: Once a month the Contractor shall meet with the Engineer for the purpose of reconciling pay quantities, progress and determining construction activity status (percent complete, remaining duration, start and finish dates and non-performance of scheduled work). This meeting will be the basis of preparation of the Contractor's application for monthly progress payments and construction schedule updating procedures. This meeting shall be precedent to all progress payment reviews or actual payment to the Contractor.

D. SPECIAL MEETINGS

1. Pre-operational/Installation Meetings: These are special meetings prior to the construction and/or installation of sensitive functions of a system or features during the prosecution of the construction work. These meeting are generally called for and arranged by the Engineer but could be requested by the Contractor for his Subcontractors or Suppliers. The purpose of these meetings is to coordinate the interface between all of the necessary project participants related to the installation. At this meeting the Engineer shall reinforce and clarify the contract requirements related to the system or feature of the work that will be installed by the Contractor.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment to the Contractor will be made under this Section.

END OF SECTION 001200

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UNIT PRICES SUPPLEMENTAL

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. Section includes supplementary unit prices for project components depicted in the contract drawings and not specified in specific specification sections.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Methods of measurement and payment for unit prices are included in Part 3.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Refer to individual Specification Sections to review requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF STRUCTURES

A. Unit Price 64: Pavilion

1. Description: The contract unit price paid as listed on the contract bid form for Pavilion shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Pavilion including: shop drawings, excavation, structural footings, testing, preparation, installation, finishing and cleaning of Pavilion; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
2. Unit of Measurement: Lump Sum pricing.

B. Unit Price 65: Boardwalk

1. Description: The contract unit price paid as listed on the contract bid form for Boardwalk shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Boardwalk including but not limited to: shop drawings, structural footings, decking, railing, attachments, all environmental mitigation, installation, finishing and cleaning of Boardwalk complete in place and fully operational, as shown on the Drawings and as specified in these Technical Specifications.
2. Unit of Measurement: Lump Sum pricing.

C. Unit Price 65: Floating Boardwalk

1. Description: The contract unit price paid as listed on the contract bid form for Floating Boardwalk shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Floating Boardwalk including but not limited to: shop drawings, attachments, all environmental mitigation, installation, finishing and cleaning of Boardwalk complete in place and fully operational, as shown on the Drawings and as specified in these Technical Specifications.
2. Unit of Measurement: Lump Sum pricing.

3.2 SCHEDULE OF UNIT PRICES – ELECTRICAL/LIGHTING

A. Unit Price 66: Pedestrian Light

1. Description: The contract unit price paid as listed on the contract bid form for Pedestrian Light shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Pedestrian Light including but not limited to: all necessary excavations, conduit, structural footings, pole, light fixture and electrical connections and handholes as shown on the Drawings and as specified in these Technical Specifications.
2. Unit of Measurement: shall be per Light.

B. Unit Price 67: Solar Light

1. Description: The contract unit price paid as listed on the contract bid form for Solar Light shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Solar Light including but not limited to: all necessary structural connections/footings, pole, light fixture and solar connection and modules as shown on the Drawings and as specified in these Technical Specifications.
2. Unit of Measurement: shall be per Light.

END OF SECTION 012201

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PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and government standards, or description of required attributes and performance.

To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advance submittal of design data and for their review by the Engineer.

Make all submittals required by the Contract Documents, and revise and resubmit as necessary to establish compliance with the specified requirements.

- B. Related information:

1. General Conditions of the Construction Contract, Articles 7.05, 7.06 and 7.16.

1.2 QUALITY ASSURANCE

- A. Coordination of submittals: Prior to each submittal, carefully review and coordinate all aspects of each item being submitted and verify that each item and the submittal for it conforms in all respects with the requirements of the Contract Documents. By affixing the Contractor's signature to each submittal, certify that this coordination has been performed.

- B. Certificates of compliance: Certify that all materials used in the work comply with all specified provisions thereof. Certification shall not be construed as relieving the Contractor from furnishing satisfactory materials if, after tests are performed on selected samples, the material is found to not meet specified requirements.

Show on each certification the name and location of the work, name and address of Contractor, quantity and date or dates of shipment or delivery to which the certificate applies, and name of the manufacturing or fabricating company. Certification shall be in the form of letter or company-standard forms containing all required data. Certificates shall be signed by an officer of the manufacturing or fabricating company.

In addition to the above information, all laboratory test reports submitted with Certificates of Compliance shall show the date or dates of testing, the specified requirements for which testing was performed, and results of the test or tests.

1.3 SUBMITTALS

- A. Submittal Schedule: Within 7 days after execution of the Agreement, and before any items are submitted for approval, submit to the Engineer two copies of the schedule described in Article 2.1 of this Section.
- B. Certificates of Compliance: Prior to installation of the materials, and as a condition of acceptance, submit to the Engineer all Certificates of Compliance required.
- C. Shop Drawings, Samples, and Substitutions: Make all submittals of Shop Drawings, Samples, Requests for Substitution, and other items, in strict accordance with this Section. When the Contractor elects to use a material exceeding specifications for his convenience or availability, he does so at his own expense unless approved by the Engineer.
- D. Test Summary Submittal: The Contractor's testing lab will prepare a list of all required submittals and minimum testing frequency of all materials. These shall be identified by Section and Item numbers. This Test Summary shall be approved by the Engineer prior to starting construction.

1.4 GUARANTEE

The Contractor shall bear ultimate responsibility for providing a complete working system and shall guarantee that all installed system components are compatible and will provide for the intended operation of the component and the system of which it is a part.

PART 2 - PRODUCTS

2.1 SUBMITTAL SCHEDULE

- A. General: Compile a complete and comprehensive schedule of all submittals anticipated to be made during progress of the work.

Include a list of each type of item for which Contractor's drawings, Shop Drawings, Certificates of Compliance, material samples, guarantees, or other types of submittals are required. Upon review and comment by the Engineer this schedule will become part of the Contract and the Contractor will be required to adhere to the schedule except when specifically otherwise permitted.
- B. Coordination: Coordinate the schedule with all necessary subcontractors and materials suppliers to ensure their understanding of the importance of adhering to the approved schedule and their ability to so adhere. Coordinate as required to ensure the grouping of submittals as described in Paragraph 3.2 below.
- C. Revisions: Revise and update the schedule on a monthly basis as necessary to reflect conditions and sequences. Promptly submit revised schedules to the Engineer for review and comment.

2.2 SHOP DRAWINGS AND COORDINATION DRAWINGS

A. Shop drawings:

1. Scale and measurements: Make all Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the work.
2. Prints required: Submit electronic copies of all Shop Drawings to the Engineer.

2.3 MANUFACTURERS' LITERATURE

Where contents of submitted literature from manufacturers includes data not pertinent to the submittal, clearly indicate which portion of the contents is being submitted for review.

2.4 SAMPLES

- A. Accuracy of samples: Samples shall be of the precise article proposed to be furnished.
- B. Number of samples required: Unless otherwise specified, submit 2 samples, one of which will be retained by the Engineer.
- C. Reuse of samples: In situations specifically so approved by the Engineer, the Engineer's retained sample may be used in the construction as one of the installed items.

2.5 COLORS AND PATTERNS

Unless the precise color and pattern is specifically described in the Contract Documents, and whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts to the Engineer for review and selection.

2.6 SUBSTITUTIONS

- A. Approval required: The Contract is based on the standards of quality established in the Contract Documents.

All products proposed for use, including those specified by required attributes and performance, shall require approval by the Engineer before being incorporated into the work.

- B. See also. General Conditions Article 7.06.

2.7 AVAILABILITY OF SPECIFIED ITEMS

- A. Verification: The Contractor shall be responsible for verifying to his satisfaction that all specified items will be available in time for installation during orderly and timely progress of the work.
- B. Notification: In the event specified items will not be available, the Contractor shall notify the Engineer prior to receipt of bids.

- C. Delays: The costs of delays resulting from non-availability of specified items, when such delays could have been avoided by the Contractor, will be the Contractor's liability and shall not be borne by the Owner.

PART 3 - EXECUTION

3.1 IDENTIFICATION OF SUBMITTALS

- A. General: Consecutively number all submittals. Accompany each submittal with a letter of transmittal containing all pertinent information (bid item and specification section number) required for identification and checking of submittals. Provide a complete table of contents for each submittal. For PDF submittals, provide bookmarks for each section and subsection listed in the table of contents.
- B. Internal identification: On each copy of each submittal, and elsewhere as required for positive identification, clearly indicate the submittal number in which the item was included. Contractor shall clearly identify each page of each submittal with its corresponding Bid Schedule and Bid Item number.
- C. Resubmittal: Resubmittals shall include a new letter of transmittal with item and section numbers as defined Section 3.1, Paragraph A.
- D. Submittal log: Maintain an accurate submittal log for the duration of the Contract, showing current status of all submittals at all times. The minimal required information on the submittal log shall be the date it was transmitted, Contractor's transmittal number, description, subcontractor reference, specification reference, Engineer's review status and date returned to the Contractor. The Contractor shall submit his submittal with his progress payment application on a monthly basis. The updated submittal log will be precedent to all progress payments unless otherwise directed by the Engineer.

3.2 COORDINATION OF SUBMITTALS

- A. General: Prior to submittal for review and comment, use all means necessary to fully coordinate all material including, but not necessarily limited to:
 - 1. Determine and verify all interface conditions, catalog numbers, and similar data.
 - 2. Coordinate with other trades as required.
 - 3. Clearly indicate all deviations from requirements of the Contract Documents.
- B. Grouping of Submittals: Unless otherwise specified, make all submittals in groups containing all items within a section to ensure that information is available for checking each item when it is received. Partial submittals may be rejected as not complying with the provisions of the Contract Documents and the Contractor shall be strictly liable for all delays so occasioned. Full compliance of Section 3.1 is an understood requirement of this section by the Contractor.

3.3 TIMING OF SUBMITTALS

- A. General: Make all submittals far enough in advance of schedule dates for installation to provide all time required for reviews, for securing necessary approvals, for possible revisions and Resubmittals, and for placing orders and securing delivery.
- B. Engineer's Review Time: In scheduling, allow at least 10 calendar days for review by the Engineer following his receipt of the submittal.
- C. Delays: Delays caused by tardiness in receipt of submittals will not be an acceptable basis for extension of the Contract completion date.

3.4 ENGINEER'S REVIEW

- A. General: Review by the Engineer shall not be construed as a complete check, but only that the general method of construction and detailing is satisfactory. Review shall not relieve the Contractor from responsibility for errors which may exist.
- B. Authority to Proceed: The notations "No Exception Taken", "Make Corrections Noted", and "Other", authorize the Contractor to proceed with fabrication, purchase, or both, of the items so noted, subject to the revisions, if any, required by the Engineer's review comments.
- C. Revisions: Make all revisions required by the Engineer. If the Contractor considers any required revision to be a change, he shall so notify the Engineer as provided for under "Changes" in the General Conditions. Show each drawing revision by number, date, and subject in a revision block on the drawing. Make only those revisions directed by the Engineer.

Only two submittals will be permitted for each item. Expenses for reviews of an item in excess of two reviews will be taken out of the Contractor's retainage.
- D. Revisions After Review and Comment: When a submittal has been reviewed by the Engineer, resubmittal for substitution of materials or equipment will not be considered unless accompanied by an acceptable explanation as to why the substitution is necessary.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement or payment to the Contractor will be made for the work required under this Section.

END OF SECTION 001340

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QUALITY CONTROL SERVICES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for quality control and quality assurance services including special inspections. Including but not limited to project requirements for sampling, testing and submittals required to control installation of trench excavation and backfill; subgrade preparation; production, delivery and placement of all aggregates and bituminous pavement mixes to be used in accordance with these specifications and plans for construction.

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.
- B. The latest edition of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC) Division 2100 Field QC Manual.

1.3 RELATED INFORMATION

A. Earthwork Items:

- I. Trench Excavation and Backfill, Specification Section 02227.

B. Aggregates:

- I. General Structural Fill – Excavation, Embankment, and Site Grading, Specification Section 02221
- II. Crushed Aggregate Base – Excavation, Embankment, and Site Grading, Specification Section 02221
- III. Topsoil – Topsoil Specification Section 32 91 00.
- IV. Gravel Surface Repair – Pavement, Specification Section 02710.

C. Bituminous Products:

- I. Pavement, Specification Section 02710.

1.4 RESPONSIBILITIES

- A. Owner's Responsibilities: The Owner will provide inspections, tests, and similar quality assurance services that may be specified in individual Specification Sections and required by governing authorities.

- D. Contractor's Responsibilities: Contractor shall retain the services of an independent Testing Agency. Contractors Testing Agency shall meet the requirements set forth in ASTM D3666, ASTM E329, ASTM D3740 and ASTM E548 or AASHTO R18. The Contractors Testing Agency shall provide all inspections and similar quality control services that may be specified in individual specification sections as necessary to control work process and final products including but not limited to the following:
- I. Subgrade Moisture-Density. The Contractor shall retain the services of an independent testing laboratory to be responsible for sampling and determining the moisture-density (Proctor) of native subgrade material and material excavated on-site used in embankments.
 - II. Subgrade and Aggregate Acceptance. The Contractor shall retain the services of an independent testing laboratory to be responsible for acceptance tests of subgrade density and aggregate density. The Contractor's independent testing laboratory shall also be responsible to sample and determine the moisture-density (Proctor) of aggregates.
 - III. Subgrade, Embankment and Aggregate Placement Quality Control. The Contractor shall retain the services of an independent testing laboratory for progress Quality Control testing of subgrade and aggregate compaction. All supplemental tests and assistance necessary for the Contractor to monitor the compaction process shall be the responsibility of the Contractor.
 - IV. Thickness. Measuring thickness for material acceptance of aggregates shall be the responsibility of the Contractor. The Engineer shall evaluate the measurements for compliance.
 - V. Smoothness. Smoothness testing for material acceptance shall be performed and evaluated by the Engineer.
 - VI. Other Plant Mix Pavements Testing: Tests for material acceptance as identified that shall be performed by the Contractor are:
 - i. Grade. Contractor shall perform the surveying for the Engineer's evaluation.
 - ii. Drainage. Contractor shall perform the flooding of the pavement surfaces for the Engineer's evaluation.
 - VII. Plant Mix Bituminous Pavements - Street Cuts and Surface Repair: Unless otherwise specified, tests required for quality control and material acceptance identified in Specification Section 02710 and ISPWC Sections 307 and 810 shall be performed by the independent testing laboratory retained by the Contractor.
- E. Bituminous Pavements Acceptance Testing and Quality Control
- I. Job Mix Formula Plant Mix Pavements: The job mix formula for Plant Mix Bituminous Pavements shall be provided by the Contractor.

- F. Coordination: The Contractor shall coordinate the sequence of activities with each agency engaged to perform inspections, tests and similar services to accommodate required services with a minimum of delay.
 - I. The Contractor is responsible for scheduling times for inspections, tests, taking samples and similar activities.
 - II. The Owner will pay for the first test required in the contract and requested by the Contractor. All retests, resulting from failed tests, shall be paid for by the Contractor.

PART 2 - PRODUCTS

2.1 CONTRACTOR QUALITY CONTROL PLAN.

The Contractor shall submit a Quality Control Program one week prior to the pre-construction conference and other documentation in conformance with the requirements of the most recent version of ISPWC requirements and City of Post Falls Standards for Construction. Plan shall be approved by the City prior to contractor starting work.

2.2 QUALITY CONTROL SUMMARY REPORT.

Within 20 working days of project completion, the Contractor's independent testing laboratory shall submit to the Engineer electronic copies of all tests (organized by specification number) conducted on the project. Test results shall be summarized in the format of the Acceptance Tests and Control Tests reporting forms that follow this specification. A typed summary of all material failures and corrective action shall be included.

PART 3 – EXECUTION

3.1 CONTRACTOR'S QUALITY CONTROL.

- A. General: The Contractor shall establish, provide and maintain a quality control system and submit a Quality Control Plan that will provide assurance that all materials and completed construction submitted for acceptance conform to contract requirements, whether manufactured or processed by the Contractor or procured from subcontractors or vendors. Although guidelines are established and certain requirements are specified, they are minimal and the Contractor shall assume full responsibility for meeting all requirements.

The Contractor shall be prepared to present and discuss, at the Pre-Construction conference, his understanding of the quality control responsibilities for specific items as included in these specifications.

The Contractor, via an independent testing laboratory, shall perform quality control sampling, testing and inspection during all applicable phases of the work and shall perform them at a rate sufficient to ensure that the work conforms to the contract requirements and at minimum test frequencies.

- B. Trench Excavation and Backfill: Compaction testing shall take place at each compacted backfill layer, at least 1 test for each 100 feet or less of trench length, but no fewer than 2 tests for trench lengths less than 100 feet.
- C. Crushed Aggregate Base Course – Street Cuts and Surface Repair: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 sq. ft. or less of paved area, but in no case fewer than 3 tests for areas smaller than 2,000 sq. ft.
- D. Plant Mix Bituminous Pavement – Street Cuts and Surface Repair: Compaction testing for each lift, at least 1 test for every 2,000 sq. ft. or less of paved area, but in no case fewer than 3 tests for areas smaller than 2,000 sq. ft.
- E. Gravel Surface Repair – Street Cuts and Surface Repair: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 sq. ft. or less of paved area, but in no case fewer than 3 tests for areas less than 2,000 sq. ft.
- F. Surface Conditions: The Contractor is responsible to ensure that the surface conditions of each course are as specified with regard to compaction, horizontal and vertical tolerances and proper moisture content before proceeding with subsequent surface work. Contractor shall submit all compaction test results to engineer prior to commencing with subsequent surface work.
- G. Engineer's Use of Test Results: The Engineer may, at his sole discretion, accept the test results developed in conformance with paragraph 3.1.A to establish compliance with acceptance criteria.

3.2 ADDITIONAL QUALITY ASSURANCE TESTING BY ENGINEER.

The Engineer may, at his discretion, conduct additional testing of materials and placement of materials to determine if the Contractor's Quality Control Program is in conformance with these specification requirements or to establish quality assurance.

If the Engineer determines that the Contractor's Quality Control Program or the performance of the Contractor's independent laboratory is deficient, the Engineer shall identify the deficiency(s) and issue a notification to stop work until such deficiency(s) in the Contractor's program are corrected.

PART 4 – MEASUREMENT AND PAYMENT

Measurement for payment will be made for the Contractor's Quality Control on a Lump Sum Basis. Payments will be made proportionate with progress of work. The engineer shall establish the percentage payment commensurate with the progress of work. Payment for the lump sum bid item 'Quality Control' on the Bid Schedules shall be for all quality control, sampling and acceptance testing required of the Contractors Testing Agency to comply with Section 01400, ISPWC and City of Post Falls Standards and includes coordination, administration, and reporting. If no bid item is provided, quality control and testing shall be incidental to the other bid items.

END OF SECTION 001400

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LEAKAGE TESTS

PART 1 - GENERAL

1.1 DESCRIPTION.

- A. Work included: All pipelines, precast and cast-in-place concrete structures, and tank structures are required to be watertight and shall be tested for water tightness by the Contractor.
- B. Related work described elsewhere: All specific testing requirements contained in other construction specification sections.
 - 1. Division 400 - Water, of the 2020 edition of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC), as amended and as supplemented or modified herein or on the drawings.

PART 2 - PRODUCTS

No products this Section.

PART 3 - EXECUTION

3.1 TESTS AND PROCEDURES.

- A. General: The Contractor shall notify the Engineer or Resident Project Representative (RPR) when the work is ready for testing and of his intention to commence testing. A minimum of 24 hours notice shall be provided to the Engineer or RPR prior to commencing actual tests. The Contractor shall provide all manpower and testing equipment required to conduct a proper leakage test. Procedures and equipment shall be approved prior to final scheduling of the test.
- B. Testing of liquid holding structures: Leakage tests of tanks and other liquid holding structures shall be made before the exterior of the structure is backfilled, damp-proofed or coated. Tanks shall be filled with water and must maintain a full level of 48 hours as witnesses by the Engineer or RPR. The structures shall not infiltrate or exfiltrate water.

It shall be the Contractor's responsibility to obtain and supply the water necessary for testing and shall coordinate the same with the Engineer or RPR. Following the testing, the water shall be disposed of as approved by the Engineer or RPR.

The exterior surface of the structure will be inspected for leakage. Special attention will be given to construction joints.

Testing will take place prior to the placement of any equipment in the tank. Following testing and approval, the tanks can be damp-proofed, backfilled and equipment placed.

- C. Testing of dry areas: Infiltration tests for buildings, vaults and manholes and other dry structures shall be performed by the Contractor during construction. Any weeping, leaching, or infiltration shall be repaired to the satisfaction of the Engineer or RPR.
- D. Water for testing and flushing: It shall be the Contractor's responsibility to coordinate with the appropriate authorities to obtain water for testing, flushing, and any other required uses.
- E. Water mains and service lines shall be pressure tested, flushed, and disinfected utilizing standards required in ISPWC Section 401 Water Pipe and Fittings and ANSI/AWWA C 651.

3.2 LEAKAGE STANDARDS

The following table provides reference information for determining allowable leakage.

TABLE OF LEAKAGE STANDARDS

<u>ITEM</u>	<u>REFERENCE</u>
Water Pipe and Fittings	ISPWC Section 401
Water Service Line and Meters	ISPWC Section 404

PART 4 - MEASUREMENT AND PAYMENT

No measurement or payment this section, leakage testing shall be considered incidental to work items requiring leakage tests.

END OF SECTION 001430

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TEMPORARY FACILITIES AND CONTROLS

PART 1 — GENERAL

1.1 DESCRIPTION

- A. Work included: Temporary facilities and controls required for this work include, but are not necessarily limited to:
 - 1. Temporary utilities such as heat, water, electricity, and telephone.
 - 2. Field offices and sheds.
 - 3. Sanitary facilities.
 - 4. Enclosures such as tarpaulins, barricades, and canopies.
 - 5. Fencing of the construction area.
 - 6. Haul roads.
- B. Related work described elsewhere:
 - 1. Except that all equipment furnished by Subcontractors shall comply with all requirements of pertinent safety regulations, the ladders, planks, hoists, and similar items normally furnished by the individual trades in execution of their own portions of the work are not part of this Section.
 - 2. Permanent installation and hook-up of the various utility lines are described in the pertinent other Sections of these Specifications.

1.2 PRODUCT HANDLING

Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout progress of the work.

1.3 JOB CONDITIONS

Make all required connections to existing utility systems with minimum disruption to services in the existing utility systems. When disruption of the existing service is required, do not proceed without the Engineer's approval and, when required, provide alternate temporary service.

1.4 SUBMITTALS

- A. Submittals shall comply with requirements of Section 1340.
- B. Material and product submittals shall be forwarded to the Engineer for the following items:
 - i. 6-ft Chain Link Temporary Construction Fence

- ii. Temporary Construction Security Fence
- iii. Park Closure Signage

PART 2 — PRODUCTS

2.1 UTILITIES

- A. General: All temporary facilities shall be subject to the Engineer's approval.
- B. Water: Furnish and install all necessary temporary water lines and water supply and, upon completion of the work, remove all such temporary facilities.
- C. Electricity: Furnish and install all necessary temporary wiring and, upon completion of the work, remove all such temporary facilities.

The Contractor will furnish all electricity needed for construction, at no cost to the Owner.

- D. Heating: Provide and maintain all heat needed for proper conduct of all operations included in the work at no cost to the Owner.
- E. Telephone: Make all necessary arrangements and pay all costs for operation and installation of telephone service to the construction offices.

2.2 FIELD OFFICES AND SHEDS

- A. Contractor's Facilities: If desired, provide a field office building and sheds adequate in size and accommodation for all Contractor's offices, supply and storage. Locate at a site agreed upon by the Contractor and the Engineer.

The entire facility, including furniture, will remain the property of the Contractor and shall be removed from the site after completion of the work.

- B. Sanitary Facilities: Provide temporary sanitary facilities in the quantity required, for use of all personnel. Maintain in sanitary condition at all times.

2.3 ENCLOSURES

Furnish, install, and maintain for the duration of construction all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the work in compliance with all safety and other regulations.

- 2.4 CONSTRUCTION FENCES: Contractor shall provide and install temporary construction fences per the detail outlined in the construction drawings and described in the specifications for security purposes. Contractor is responsible for maintaining the integrity of fence throughout entirety of project. Contractor shall be responsible for keeping the Bay Street gate closed and secured with Park Closure Signage. Park Closure Signage shall adhere to the details outlined in the construction plans.

A. 6-FT CHAIN LINK TEMPORARY CONSTRUCTION FENCE

Temporary Construction Fence shall be a 6 ft tall chain link fence with posts secured by concrete bases. Dimensions of fence post spacing, chain link fence fabric, and concrete bases designated in construction plans. Park closure signage shall be installed on fence.

B. TEMPORARY CONSTRUCTION SECURITY FENCE

Security fencing in the designated locations on the construction plans shall be Hanes #8 4-ft tall heavy duty orange construction fence. Pole spacing and installation shall be per manufacturer's recommendations for high wind areas or 20-ft, whichever is less. Park closure signage shall be installed on fence.

2.5 ACCESS

Provide and maintain all required access to the work in strict accordance with all regulations governing the Contractor's use of the site.

PART 3 — EXECUTION

3.1 MAINTENANCE AND REMOVAL

Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the work. Remove all such temporary facilities and controls as rapidly as progress of the work will permit, or as directed by the Engineer.

3.2 TEMPORARY CONSTRUCTION FENCE

6-ft Chain Link Temporary Construction Fence and Temporary Construction Security Fence shall be installed at the locations designated on the plans. Installation shall be per the manufacturer's recommendations. Temporary Construction Fence shall be installed prior to all construction activities beginning and remain installed until project's substantial completion date.

Park closure signage shall be installed on both fences at 250-ft intervals and shall be visible to the public at all times until project close.

PART 4 — MEASUREMENT AND PAYMENT

Measurement and payment for 6-ft Chain Link Temporary Construction Fence and Temporary Construction Security Fence shall be per linear foot as noted separately in the bid schedule. Park closure signage and installation is considered incidental to both Temporary Construction Fence bid items.

All other work required within this specification section shall be considered incidental.

END OF SECTION 001500

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00 15 05

MOBILIZATION

PART 1 - GENERAL

1.1 DESCRIPTION

Work included: Included in this specification are the project requirements for mobilizing equipment and facilities to the project site in preparation for the work to be accomplished under this contract. In addition, mobilization shall include bond and insurance premiums required for the execution of the work under this contract.

PART 2 - PRODUCTS

No Products are required in this section.

PART 3 - EXECUTION

3.1 MOBILIZATION REQUIREMENTS

- A. Description: Mobilization shall consist of preparatory work and operations, including but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for establishment of Contractor's offices, building, and other facilities necessary for work on the project; and for all other work and operations which must be performed or cost incurred before beginning production work on various contract items.
- B. Excluded Items: Not included in mobilization are expendable supplies such as fuel, lubricants, spare parts and materials which become a part of permanent physical features constructed as part of this contract.
- C. Supplier and Subcontractor Requirement: Mobilization for all subcontracted or supplied work shall be considered to be included in the contract unit price bid by the Contractor.
- D. Staging: It shall be the responsibility of the Contractor to find suitable staging areas and coordinate the approval and acceptance of those locations with City of Post Falls Parks Department.

PART 4 - MEASUREMENT AND PAYMENT

Payment for mobilization shall be made at the contract unit price per lump sum for this item. The contract unit price in the bid schedule for mobilization shall not exceed 5% of the total contract price. If it does exceed 5% of the total contract price, retainage of the amount over 5% of the total contract will be withheld until Final Payment.

The amounts allowable in partial payments under this contract shall be sixty (60) percent of the total contract bid item for mobilization on the first monthly progress payment or estimate and forty (40) percent of the total contract bid price after the certificate of substantial completion for the project is issued by the Engineer and at the next proceeding progress payment following the substantial completion notice

to the Contractor. Interim milestone or phase completion dates shall not be considered in the determination or payment under this section for mobilization and substantial completion shall mean the project's substantial completion date only.

END OF SECTION 001505

00 15 62

DUST CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: The work under this section shall include all equipment, labor, and materials necessary to control dust relating to or resulting from performance of the project work.
- B. Related information: In addition to the requirements described herein, comply with specific requirements for dust control as may be detailed in other Sections of these specifications or as noted on the Drawings.

1.2 QUALITY ASSURANCE

- A. Standards: Comply with all pertinent requirements of Federal, State, and Local agencies which may have jurisdiction over dust control procedures and additives used to aid in dust abatement.
- B. Inspection: The Engineer, Contractor, and Owner shall regularly (weekly) review the adequacy of dust control efforts and procedures to assure they are satisfactorily meeting the needs of the project.

1.3 SUBMITTALS

- A. Dust control procedure: Prior to commencing the project work the Contractor shall meet and submit a written Dust Control Plan to the Owner and Engineer for review and comments. Included in the proposed Dust Control Plan shall be the Contractor's means and methods to assure compliance with the specific project requirements.
- B. Additives: All additives proposed for use as an aid in dust control other than those specified in Section 2.2 shall be reviewed with the Engineer prior to their application. Manufacturer's literature along with recommended application rates shall be provided.

PART 2 - PRODUCTS

2.1 WATER

Water used for dust control shall be clear and free from chemical contaminants.

2.2 CHEMICAL ADDITIVES

Calcium Chloride: Calcium chloride, if required, shall conform to the requirements of AASHTO M 144 (ASTM-D-98) except that either pellet or flake form shall be acceptable.

PART 3 - EXECUTION

3.1 GENERAL

During the performance of the work required by these specifications or any operations appurtenant thereto, the Contractor shall furnish all labor, equipment, materials and means required, and shall carry out proper and efficient measures wherever and as often as necessary or as directed to reduce the dust nuisance, and to prevent dust which has originated from his operations from damaging crops, dwellings, or causing a nuisance or safety hazard.

3.2 WATER

- A. Procurement: The Contractor shall be responsible for arranging for the necessary supply of suitable water for dust abatement.
- B. Application: The Contractor shall apply water and/or water with additives on all access and haul roads, excavations, surfaces of refilled trenches, stockpiles, waste areas and other work areas as may be necessary to adequately control dust.

3.3 WORK AREAS

The Contractor shall make a reasonable effort to keep work areas and adjacent areas free of excessive dirt and mud which may unnecessarily contribute to a dust nuisance.

Pavement or concrete surfaces adjoining work areas shall be kept broomed off and washed clean of excess excavated material.

PART 4 – MEASUREMENT AND PAYMENT

The basis of payment will be lump sum per the various schedules shown in the bid proposal. The contractor shall be paid accordingly for “Dust Control” service as a percent of completion of the actual work performed in each schedule. The Engineer's determination of percent complete of dust control services provided by the Contractor shall be the final assessment for payment.

The lump sum payments by bid schedules for "Dust Control" services shall be full compensation for all cost associated for furnishing labor, tools, equipment and materials necessary for the application of dust control measures as specified and shown on the plans, including all mobilization, traffic control, and demobilization cost.

END OF SECTION 001562

01 56 39

TEMPORARY TREE AND PLANT PROTECTION

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. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.
- B. Related Sections:
 - 1. Section 015000 "Temporary Facilities and Controls" for temporary site fencing.
 - 2. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

- A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100-mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.
- B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
- C. 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.
- D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of the following:
 - 1. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
 - 2. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

- C. 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. Qualification Data: For qualified arborist and tree service firm.
- B. 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.
- C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
- D. 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.

1.6 QUALITY ASSURANCE

- A. Arborist Qualifications: Licensed arborist in jurisdiction where Project is located
- B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
 - a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
 - b. Enforcing requirements for protection zones.
 - c. Arborist's responsibilities.
 - d. Field quality control.

1.7 PROJECT CONDITIONS

- A. The following practices are prohibited within protection zones:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. 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. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 1 inch (25 mm) in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 - 1. Obtain topsoil only from well-drained sites where topsoil is 4 inches (100 mm) deep or more; do not obtain from bogs or marshes.
- B. Topsoil: Imported or manufactured topsoil complying with ASTM D 5268
- C. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - 1. Type: Provided by owner.
- D. 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 (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
 - a. Height: 6 feet (1.8 m)

2. Plywood Protection-Zone Fencing: Plywood framed with four 2-by-4-inch (50-by-100-mm) rails, with 4-by-4-inch (100-by-100-mm) preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.
 - a. Height: 4 feet (1.2 m).
 - b. Plywood and Lumber: Comply with requirements in Section 061000 "Rough Carpentry."
3. Wood Protection-Zone Fencing: Constructed of two 2-by-4-inch (50-by-100-mm) horizontal rails, with 4-by-4-inch (100-by-100-mm) preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart, and lower rail set halfway between top rail and ground.
 - a. Height: 4 feet (1.2 m).
 - b. Lumber: Comply with requirements in Section 061000 "Rough Carpentry."
4. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and weighing a minimum of 0.4 lb/ft. (0.6 kg/m); remaining flexible from minus 60 to plus 200 deg F (minus 16 to plus 93 deg C); inert to most chemicals and acids; minimum tensile yield strength of 2000 psi (13.8 MPa) and ultimate tensile strength of 2680 psi (18.5 MPa); secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 8 feet (2.4 m) apart.
 - a. Height: 4 feet (1.2 m).
 - b. Color: High-visibility orange, nonfading.
5. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches (914 mm).
6. .

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.
- B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

- A. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches (1372 mm) above the ground.

- 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.
 - 1. Apply 4-inch (100-mm) average thickness of organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.

3.3 TREE- AND PLANT-PROTECTION ZONES

- A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - 1. Chain-Link Fencing: Install to comply with ASTM F 567 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; adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 50 feet (15 m) on protection-zone fencing, but no fewer than four signs with each facing a different direction.
- C. Maintain protection zones free of weeds and trash.
- D. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
- E. 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.
 - 1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - 2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

- A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 312000 "Earth Moving."
- B. 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.
- C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.
- D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

- A. Prune 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. Cut Ends: Coat cut ends of roots more than 1-1/2 inches (38 mm) in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist.
 - 3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - 4. Cover exposed roots with burlap and water regularly.
 - 5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."
- B. Root Pruning at Edge of Protection Zone: Prune roots flush with the edge of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
- C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and 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 follows:

1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 2. Pruning Standards: Prune trees according to ANSI A300 (Part 1)
 3. Cut branches with sharp pruning instruments; do not break or chop.
 4. Do not apply pruning paint to wounds.
- B. 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. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
- C. 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.
- D. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with topsoil. Place topsoil 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 be relocated that are damaged by construction operations, in a manner approved by Architect.
1. Submit details of proposed root cutting and tree and shrub repairs.
 2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
 3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 4. Perform repairs within 24 hours.
 5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

- B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.
 - 1. Provide new trees of same size and species as those being replaced for each tree that measures 6 inches (150 mm) or smaller in caliper size.
 - 2. Provide one new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measures more than 6 inches (150 mm) in caliper size.
 - a. Species: To be determined by owner.
 - 3. Plant and maintain new trees as specified in Section 329300 "Plants."
- C. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm)] to tree trunk.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

3.11 METHODS OF MEASUREMENT AND PAYMENT

- A. No separate measurement or payment to the Contractor will be made under this section.

END OF SECTION 015639

00 15 67 TEMPORARY AND PERMANENT WATER POLLUTION, SOIL EROSION, AND SILTATION CONTROL

PART 1 - GENERAL

1.1 DESCRIPTION.

This item shall consist of temporary control measures as shown on the plans or as ordered by the Engineer during the life of the contract to control water pollution, soil erosion, and siltation through the use of berms, dikes, dams, sediment basins, fiber mats, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary control may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites.

Permanent erosion control as specified herein shall comply with Section 206 – Permanent Erosion Control of the Idaho Standards for Public Works Construction (ISPWC) when applicable.

This item shall consist of the Contractor's responsibility for developing and implementing a Storm Water Pollution Prevention Plan (SWPPP) before the start of construction.

PART 2 - MATERIALS

2.1 TEMPORARY EROSION CONTROL

A. SILT FENCES.

Silt fences shall be pre-assembled Propex Geotex 2130 or approved equal.

B. GRASS.

Grass which will not compete with the grasses sown later for permanent cover shall be a quick-growing species (such as ryegrass, Italian ryegrass, or cereal grasses) suitable to the area providing a temporary cover.

C. MULCHES.

Mulches may be hay, straw, fiber mats, netting, bark, wood chips, or other suitable material reasonably clean and free of noxious weeds and deleterious materials.

D. FERTILIZER.

Fertilizer shall be a standard commercial grade and shall conform to all Federal and state regulations and to the standards of the Association of Official Agricultural Chemists.

E. STRAW WATTLE/FIBER WATTLE.

Straw wattles shall consist of certified “noxious weed free” material and be manufactured from straw and shall be wrapped in tubular biodegradable netting.

F. EROSION CONTROL BLANKET.

Erosion control blanket shall be North American Green S75, or approved equal, or as shown on the Project Drawings. Substitutions must be approved by the Engineer before being incorporated into the project.

2.2 PERMANENT EROSION CONTROL.

A. RIPRAP

Riprap is to be classified as loose riprap or other suitable material that is nearly rectangular in shape with approximately 50% having a volume greater than 1 cubic foot. Riprap should be an average of 18” to 30” in diameter. The riprap should be a well graded compacted mass.

B. TOPSOIL

In accordance with Section 203 – Soil Materials of the Idaho Standards for Public Works Construction (ISPWC) when applicable. See Section 32 91 20 – Topsoil for additional information regarding topsoil.

C. SEEDING, MULCH, SOIL CONDITIONER & COMMERCIAL FERTILIZER

In accordance with Section 206 – Permanent Erosion Control of the Idaho Standards for Public Works

D. STAKE PLANTINGS

Stake plantings shall be 4 to 5 feet in length and have a minimum diameter of 0.5 inches. Refer to construction drawings for details.

E. WATER BARS

Water bars shall have a diameter of 12 inches with a depth of 6 inches. Refer to construction drawings for details.

F. ROOT WAD

Root wad shall be a freshly harvested Douglas Fir tree with a diameter at breast height of at least 24 inches. Habitat boulders for anchoring shall have a typical diameter of 36 inches. Refer to construction drawings for details.

G. MSE WALL

The MSE Wall shall consist of Flex MSE GTX Bags, Flex MSE interlocking plates, SG200 Geogrid, ¾” minus crushed/compacted gravel base, and general structural fill.

2.3 OTHER.

All other materials shall meet commercial grade standards and shall be approved by the Engineer before being incorporated into the project.

PART 3 - EXECUTION AND CONSTRUCTION REQUIREMENTS

3.1 GENERAL.

In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The Engineer shall be responsible for assuring compliance to the extent that construction practices, construction operations, and construction work are involved.

3.2 INSTALLATION OF STRAW WATTLES.

Straw wattles shall be installed as indicated as shown on the plans, or as directed. Straw wattle shall be placed in conjunction with inlet protection for all existing drywells as well as all proposed structures that may receive runoff from construction areas.

Straw wattles are used in areas or situations where the gradient is 3:1 or flatter, or the velocity of storm water runoff is anticipated to be low. The fiber wattles shall be staked with 1-inch x 1-inch x 2-foot wooden stakes at 2.5 feet on center. The ends of adjacent wattles shall be over lapped by 1 foot. Terminal ends of wattles shall be doglegged up slope to ensure containment and prevent channeling of sedimentation.

Wattles shall be installed in a trench, ensuring no gaps exist between the soil and the bottom of the wattle.

When sediment deposits begin to impair the filtration capability of the wattle or when the sediment reaches one-third the wattles functional free board height, the deposits shall be removed. Removed sediment shall be deposited within the project in such a way the sediment is not subject to erosion by wind or water, or as directed by the Engineer.

3.3 INSTALLATION OF SILT FENCES.

Construction of silt fences is required at the locations indicated on the plans.

3.4 INSTALLATION OF RIPRAP

In accordance with Section 206 – Permanent Erosion Control of the Idaho Standards for Public Works part 3.2.

3.5 INSTALLATION OF STAKE PLANTINGS, WATER BARS, AND ROOT WAD

Stake plantings, water bars, and root wad shall be installed per the details outlined in the construction drawings.

3.6 CONSTRUCTION OF MSE WALL.

Construction of the MSE Wall shall be per the Contract Documents. Construction includes excavation of the existing native soil, embankment construction and backfill of the required general structural fill, installation of the Flex MSE GTX bags and interlocking plates, installation gravel base, and all other requirements to complete the MSE Wall construction outlined in the construction plans.

3.7 STORM WATER POLLUTION PREVENTION PLAN IMPLEMENTATION.

Contractor shall be responsible for developing, finalizing, submitting, and implementing a Storm Water Pollution Prevention Plan (SWPPP) before the start of construction. The plan shall address the following items:

1. Site Description:
 - a. Description of the construction activity.
 - b. Sequence of major construction activities.
 - c. Estimate of the total area of the site and the area to be disturbed.
 - d. The name of the receiving water.
 - e. Site map.
2. Measures and Controls:
 - a. Sediment and erosion control.
 - b. Stabilization.
 - c. Structural controls.
 - d. Storm water management controls.
 - e. Other controls.
3. Applicable requirements of State and Local programs must be met.
4. The site must be inspected at least once every seven days and within 24 hours of the end of a storm event. Maintenance of the storm water controls must follow the inspection.
5. The plan must be kept at the site during construction.

In the event of conflict between these requirements and pollution control laws, rules, or regulations of other Federal, state, or local agencies, the more restrictive laws, rules, or regulations shall apply.

The Contractor shall be responsible for finalization and implementation of the SWPPP, to include inspections, recordkeeping and actual construction or installation of the storm water control requirements.

The Contractor shall develop and submit a Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under an NPDES General Permit to the United States Environmental Protection Agency. Contractor is responsible for all coordination required of submission and approval of the NOI.

The Contractor shall be responsible for assuring that construction practices and operations comply as required.

3.8 SCHEDULE.

Prior to the start of construction, the Contractor shall submit schedules for accomplishment of temporary and permanent erosion control work, as are applicable for clearing and grubbing; grading; construction; paving; and structures at watercourses. The Contractor shall also submit a proposed method of erosion and dust control on haul roads and borrow pits and a plan for disposal of waste materials. Work shall not be started until the erosion control schedules and methods of operation for the applicable construction have been accepted by the Engineer.

3.9 AUTHORITY OF ENGINEER.

The Engineer has the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, to limit the surface area of erodible earth material exposed by excavation, borrow and fill operations, and to direct the Contractor to provide immediate permanent or temporary pollution control measures to minimize contamination of adjacent streams or other watercourses, lakes, ponds, or other areas of water impoundment.

3.10 CONSTRUCTION DETAILS.

The Contractor will be required to incorporate all permanent erosion control features into the project at the earliest practicable time as outlined in the accepted schedule. Except where future construction operations will damage slopes, the Contractor shall perform the specified slope protection work in stages, as soon as substantial areas of exposed slopes can be made available. Temporary erosion and pollution control measures will be used to correct conditions that develop during construction that were not foreseen during the design stage; that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction practices but are not associated with permanent control features on the project.

Where erosion is likely to be a problem, clearing and grubbing operations should be scheduled and performed so that grading operations and permanent erosion control features can follow immediately thereafter if the project conditions permit; otherwise, temporary erosion control measures may be required between successive construction stages.

The Engineer will limit the area of clearing and grubbing, excavation, borrow, and embankment operations in progress, commensurate with the Contractor's capability and progress in keeping the finish grading, mulching, seeding, and other such permanent control measures current in accordance with the accepted schedule. Should seasonal limitations make such coordination unrealistic, temporary erosion control measures shall be taken immediately to the extent feasible and justified.

In the event that temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled, or are ordered by the Engineer, such work shall be performed by the Contractor at his/her own expense.

The Engineer may increase or decrease the area of erodible earth material to be exposed at one time as determined by analysis of project conditions.

The erosion control features installed by the Contractor shall be maintained by the Contractor in a manner acceptable to the Engineer during the construction period.

Whenever construction equipment must cross watercourses at frequent intervals, and such crossings will adversely affect the sediment levels, temporary structures should be provided.

Pollutants such as fuels, lubricants, bitumen, raw sewage, wash water from concrete mixing operations, and other harmful materials shall not be discharged into or near rivers, streams, and impoundments or into natural or manmade channels leading thereto.

PART 4 - MEASUREMENT AND PAYMENT

4.1 Silt Fence.

Measurement and payment for “Silt Fence” shall be by the linear foot.

4.2 Rip Rap.

Measurement and payment for “Light Loose Rip - Rap (36" Thickness)” work required within the limits of the armoring construction based on neat line dimensions in place will be by the square yard and include installation, equipment, hauling, etc. requirements associated with rip rap and armoring construction.

4.3 Stake Plantings.

Measurement and payment for “Stake Plantings” work required within the limits of the armoring construction shall be per linear foot.

4.4 Root Wad.

Measurement and payment for “Root Wad” shall be per the unit bid item.

4.5 Water Bars.

Measurement and payment for “Water Bars” shall be per the unit bid item.

4.6 Topsoil.

See Specification Section 32 91 20 – Topsoil for measurement and payment for “Topsoil”.

4.7 MSE Wall

Measurement and payment for the MSE Wall shall be paid for on a lump sum basis and shall include all costs associated with furnishing and installing a complete and functioning MSE Wall including but not limited to excavation to embankment, general structural fill, geogrid, Flex MSE Bags and interlocking plates, gravel base, vegetation, installation of rip rap, and all other related construction activities, equipment, handling, hauling, etc. associated with the MSE Wall. Rip Rap material shall be measured and paid per Section 4.2 of this specification.

4.8 CONTROL WORK

Control work performed for protection of construction areas outside the construction limits, such as borrow and waste areas, haul roads, equipment and material storage sites, and temporary plant sites, will not be measured and paid for directly but shall be considered as a subsidiary obligation of the Contractor with costs included in the contract prices bid for the items to which they apply.

4.9 SWPPP IMPLEMENTATION.

Measurement and payment for the Contractor's development, finalizing, submitting, and implementation of the Storm Water Pollution Prevention Plan for the project as well as filing the work required to develop and submit the NOI shall be measured and paid for as a lump sum. No separate payment will be made for inspection or maintenance of erosion and sediment control measures.

Any required removal of erosion and sedimentation control items shall be incidental to this pay item.

END OF SECTION 001567

00 16 00

MATERIAL, EQUIPMENT, AND WORKMANSHIP

PART 1 - GENERAL

1.1 DESCRIPTION

Work under this Section shall establish the general standards for quality of materials, equipment purchase and installation and general project workmanship.

1.2 QUALITY ASSURANCE

- A. All Materials: All materials and equipment supplied for this project shall be new, unused and correctly designed for the intended application. They shall be of standard first grade quality, produced by expert workmen, and be intended for the use for which they are offered. Materials or equipment which, in the opinion of the Engineer, are inferior or of a lower grade than indicated, specified or required will not be accepted.

All materials and equipment supplied shall meet specified performance requirements at the elevation of the project site.

Any two or more pieces of material or equipment of the same kind, type or classification, and being used for similar types of services, shall be made by the same manufacturer.

Where intended for use with potable water, materials and methods shall in general, comply with the appropriate AWWA and NSF standards.

- B. Equipment: Equipment and appurtenances shall be designed in conformity with ANS, ASME, IEEE, NEMA and other generally accepted standards. All equipment supplied shall be of rugged construction and suitable for the intended purpose, under design operating conditions, in the location and climate where they are to be used.

All equipment supplied shall be in accordance with the requirements of the Contract Documents.

Equipment shall be of the approximate dimensions indicated on the Drawings or as specified, shall fit the spaces shown on the drawings with adequate clearances, and shall be capable of being handled through openings provided in the structure for this purpose. Equipment shall be of such design that piping and electrical connections, ductwork and auxiliary equipment can be assembled and installed without causing major revisions to the locations or arrangement of any of the facilities.

Where applicable, all equipment shall bear a brass or stainless steel nameplate giving manufacturer's rated capacity, head, speed, horsepower, service factor and any other pertinent operating data.

Equipment shall be of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation and all conditions of operation. All

bearings and moving parts shall be adequately protected against wear by bushings or other approved means and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers and the like, shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.

- C. Machinery: Machinery parts shall conform exactly to the dimensions shown on the working Drawings. There shall be no more fitting or adjusting in setting up a machine than is necessary in assembling high grade apparatus of standard design. The equivalent parts of identical machines shall be made interchangeable. All grease lubricating fittings on equipment shall be of a uniform type. All machinery and equipment shall be safeguarded in accordance with the safety codes of the ANS, applicable state and local codes and with U.S. Department of Labor, Part 1910 Occupational Safety and Health Standards, promulgated under the Occupational Safety and Health Act of 1980 (PL 91-596) or as amended.

1.3 PRODUCT HANDLING AND STORAGE

All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor in a manner satisfactory to the Engineer and in such a way as to prevent damage or theft of the same.

All materials and equipment subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a building to prevent injury. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Engineer.

All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

All pipe and other materials delivered to the job shall be unloaded and placed in a manner which will not hamper the normal operation of existing facilities or interfere with the flow of necessary traffic or with construction progress.

PART 2 - PRODUCTS

No products this section.

PART 3 - EXECUTION

General requirements for installation of equipment specified for use on the project shall be as follows:

All equipment shall be installed, equipped and serviced as per the manufacturer's recommendations except as supplemented or modified by the requirements of these Specifications or as directed by the Engineer.

All equipment shall be leveled, plumbed, aligned and wedged into position to fit connecting piping and assemblies without transmitting stresses to the equipment.

Where applicable, equipment base frames shall be anchored to concrete pads with cast-in-place anchor bolts. Dimensions for equipment pads shall be determined by the equipment manufacturer and shall be shown on the Shop Drawings. The base frame shall be grouted solid with non-shrink grout.

All inlet and discharge piping connections to equipment shall include unions for ease of removal and repair. Wastewater from packing shall be piped directly to a drain and not allowed to discharge freely on the floor or elsewhere.

All equipment shall be greased, lubed, oiled, and in all ways properly prepared for start-up by the Contractor per the manufacturer's written recommendations. Where required by these Contract Documents, a qualified service technician shall provide the necessary start-up services.

Ceiling lifting hooks shall be installed above plant equipment where practicable. All hooks shall provide a safety factor of 5 against failure for the equipment gross weight.

All concrete work shall be of first grade quality, meeting the requirements of Division 3 or as specified elsewhere in the Contract Documents. All floors shall be free of ponding, irregularities with less than 1/4 of an inch deviation measured with a 10-foot straight edge and shall positively drain to the outlets provided.

The Contractor shall provide all labor, tools, equipment and coordination necessary to provide compliance with the Contract Documents for leakage, performance, quantity, thickness, efficiency, etc. of installed materials and equipment.

PART 4 - MEASUREMENT AND PAYMENT

No separate measurement for payment required under this section.

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MATERIALS-ON-HAND

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: included in this specification are the project requirements that the Contractor shall comply with to receive credit and payment for selected materials-on-hand that have not been incorporated into the work.

1.2 SELECT MATERIALS FOR PAYMENT

- A. Specified Materials: The Contractor shall present for engineer approval particular bid items and/or materials that will be considered for payment of materials-on-hand. These items should be long lead items or materials that the Contractor would normally order in bulk. These items will require the Contractor to reimburse his suppliers or pay interest before it is incorporated into the work and receiving payment from the Owner. By using this specification, the Owner avoids paying extra cost involved in the Contractor's carrying charges to his suppliers of which is passed on to the Owner.

PART 2 - PRODUCTS

No Products are required in this section.

PART 3 - EXECUTION

3.1 NOTIFICATION FOR MATERIALS-ON-HAND

- A. Notification: The Contractor shall submit a written intention for consideration of materials-on-hand including supplier's invoicing on or before the 15th day of the pay period. A pay period is defined as the number of days in the month in question and the first day of the pay period is the first day of the month.
- B. Quantifying: On or about the 25th day of the pay period or at the monthly progress meeting the Engineer and the Contractor shall agree on the actual quantities of materials-on-hand that are not incorporated into the work for payment. All materials-on-hand shall be properly stored at the construction site or at a designated storage facility acceptable to the Engineer before consideration of payment will be made by the Engineer.
- C. Time Requirement for Notification: Any and all request for payment of materials-on-hand after the 15th day of the pay period shall not be considered until the next consecutive pay period, regardless of when the specific material(s) arrive on site or at the designated storage facility.
- D. Submittal: With notification to Engineer and prior to acceptance of Materials-On-Hand, Contractor shall maintain an updated Materials-On-Hand list reflecting Materials-On-Hand released for each application of payment. This list shall be updated and submitted with each pay application for Materials-On-Hand tracking. List shall include at a minimum the Bid Item, Schedule and Materials-On-Hand cost for each item.

PART 4 - MEASUREMENT AND PAYMENT

- A. Measurement: Measurement will be made on actual quantities of materials-on-hand requested by the Contractor in writing on or before the 15th day of the pay period. Only the items of materials-on-hand not incorporated into the product or work shall be considered for payment in the application for monthly progress payments to the Contractor. The actual amount of payment to the Contractor for materials-on-hand shall be the invoiced unit price of the item(s) times the number of unit(s) not incorporated into the product or work at the end of the pay period.

- B. Payment: Payment for materials-on-hand is a temporary or interim payment to the Contractor for materials cost on long lead items as specified in this section. Once the materials are incorporated into the work the actual reimbursement for materials-on-hand payment will be deducted from the Contractor's eligible amount of materials-on-hand extended in the monthly progress payments.

END SECTION 001610

00 17 10

CLEANUP

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: Throughout the construction period and at the completion of the work, the Contractor shall maintain the project site to the standard of cleanliness described in this section.
- B. Related work described elsewhere: In addition to the general standards described in this Section, comply with all specific requirements for cleaning or cleanup as described in various sections of these specifications.

1.2 QUALITY ASSURANCE

- A. Inspection: The Engineer and the Contractor shall conduct regular inspections to verify that requirements of cleanliness are being met.
- B. Codes and Standards: In addition to the standards described in this Section, comply with all pertinent requirements of other agencies having jurisdiction.

PART 2 - PRODUCTS

2.1 CLEANING MATERIALS AND EQUIPMENT

Provide all required personnel, equipment, and materials needed to maintain the specified standards of cleanliness.

2.2 COMPATIBILITY OF CLEANING PRODUCTS

Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as accepted by the Engineer.

PART 3 - EXECUTION

3.1 PERIODIC CLEANUP

Store all items to be used on the project in an orderly arrangement allowing maximum access. Stored materials should not impede drainage or traffic. Stored materials shall be placed and protected per the manufacturer's recommendations.

Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of the project to accumulate on the work site.

At least twice each month, and more often if necessary, all scrap, debris, and waste material shall be collected and removed from the job site and disposed of in an appropriate disposal area.

Storage of all items awaiting removal from the job site, shall be done in such a manner as to minimize fire hazard or environmental damage.

The Engineer may require the Contractor to wash down or broom paved areas periodically during the progress of work.

3.2 FINAL CLEANUP

- A. General: Prior to completion of the work, remove from the work site all tools, surplus materials, equipment, scrap, debris, and waste.
- B. Site: Unless otherwise specifically directed by the Engineer, broom clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all resultant debris.

Graveled parking or driveway areas within or adjacent to the work site which have had excavated or other loose materials stockpiled on them shall be scraped clean down to the original surface. Replacement of gravel materials may be required to restore the surface to its original condition.

Grassed areas within or adjacent to the work site shall be scraped and raked clean to the original grass or soil level. All stones larger than 3/4 inches in diameter and other loose debris shall be picked up and removed.

- C. Timing: Schedule final cleaning and cleanup to enable the Owner to accept a clean, finished project.

PART 4 - MEASUREMENT AND PAYMENT

No measurement or payment this section, cleanup of the work site shall be considered incidental to project work.

END OF SECTION 001710

DIVISION 02 – SITE WORK

00 22 20

SITE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work included: The work under this section shall consist of all site demolition and related activities necessary to prepare the construction for the proposed improvements. Including, but is not limited to, the removal of existing utility structures.
- B. Related information: Work under this section shall conform to the requirements of the Standards for Public Works Construction (ISPWC), Section 201, Clearing and Grubbing and Removal of Obstructions, and as amended, supplemented or modified herein on in the drawings.

The Contractor shall provide and maintain in good condition on the job site a minimum of one complete set of Idaho Standards for Public Works Construction (ISPWC) for reference.

- C. Quality Control. See Specification Section 01400, Quality Control.

PART 2 - MATERIALS

No products are required to complete this section.

PART 3 - EXECUTION

3.1 GENERAL

All work shall comply with Section 201 - Clearing and Grubbing and Removal of Obstructions, of the Idaho Standards for Public Works Construction (ISPWC) when applicable. Prior to all work of this Section, the Contractor shall become thoroughly familiar with the site, the site conditions and all portions of the work contained within this Section. The Contractor shall be responsible for removing and disposing of or salvaging to Owner all items identified on the plans as being removed. All materials removed by the Contractor shall become the property of the Contractor unless otherwise specified on the Plans. The Contractor shall be responsible for disposing of removed materials at an off-site disposal area. The Contractor shall be responsible for obtaining all permits required to complete the work in this Section.

3.2 REMOVAL OF OBSTRUCTIONS.

Existing private signs, bollards and metal roping, vegetation, temporary utility structures, gravel surfacing, concrete, curbs, and any other item that must be removed for completion of the project are shown on plans to be removed and not otherwise designated. All removed obstructions shall be hauled off-site for disposal by contractor, salvaged and replaced, or salvaged to owner as shown on the plans.

An existing sign at the entrance of the park shall be removed and salvaged for the owner.

3.3 REMOVAL OF EXISTING ASPHALT PAVEMENT.

Remove existing 2” - 4” asphalt on south trail to be replaced with asphalt pavement and Bay Street, to be replaced with concrete sidewalk. Asphalt pavement to be removed and disposed of at an approved off-site location. Overexcavate to design subgrade elevation for the 4” concrete sidewalk and paved asphalt south trail improvements utilizing typical sections defined in the construction plans. Haul overexcavated material to approved off-site location. See Specification Section 02221 – Excavation, Embankment, and Site Grading for definition of Undocumented Structural Fill for additional details.

Removed asphalt may be removed in chunks. Pavement to be removed in chunks shall be sawcut to the full depth of the material around the perimeter of the area to be removed. The pavement shall be removed in such a manner that the joint for each layer of pavement replacement is offset one foot from the joint in the preceding layer. This does not apply if the removed pavement is to be replaced with concrete or soil. All removed chunks of existing asphalt pavement shall be hauled off the site for disposal.

See construction plans for areas of the paved entrance walkway and paved South Trail that require removal and replacement for installation of proposed utilities. See Section 02710 for asphalt patch installation requirements.

Before beginning asphalt removal, the Contractor shall notify the Engineer or RPR for coordination of measurement. Measurement shall be performed by the Contractor and Engineer or RPR prior to removal. Final decisions as to definition of asphalt removal shall be made by the Engineer or RPR.

3.4 REMOVAL OF RETAINING WALL.

Existing retaining wall located in the Lawn Area shall be removed per construction drawings. All existing retaining wall material shall be hauled off site to an appropriate disposal area.

3.5 REMOVAL OF CMU BLOCK WALL AND TEMPORARY RESTROOM.

A 1-ft tall CMU wall, bordering the planter located at the entrance shall be removed and disposed of to an appropriate disposal area. An existing temporary restroom located to the west of the entrance walkway shall be removed and salvaged to the owner.

3.6 REMOVAL OF EXISTING AGGREGATE BASE COURSE

Existing aggregate base course or base material under existing asphalt pavement shall be removed and disposed of off-site to an appropriate disposal area. Existing base course shall be removed to the limits of the new crushed aggregate base course as indicated in the Contract Documents.

3.7 REMOVE AND RELOCATE IRRIGATION VALVE BOXES

Irrigation valve boxes located in the proposed Arrival Plaza area shall be removed and relocated to a designated location chosen by the City for their continued use. The City shall stake the preferred location of the relocated irrigation valve boxes prior to the start of construction. Contractor shall coordinate directly with the City for location of irrigation valve boxes. Contractor is responsible for irrigation valve box condition and shall retain and protect all components of the existing irrigation valve boxes throughout removal, relocation, and reinstallation. Contractor is responsible for replacing irrigation valve control boxes, in kind, that are damaged during construction.

3.8 REMOVE AND RELOCATE VEGETATION

Vegetation within the alignment of the domestic water line shall be removed and replaced. Contractor shall replace vegetation in the domestic water line corridor utilizing the Landscaping Plans.

3.9 REMOVE EXISTING GRAVEL – BEACH AREA

Existing gravel in the beach area shall be removed and disposed of off-site. Existing gravel shall be removed to the limits of the existing beach area as indicated by the Contract Documents.

PART 4 - MEASUREMENT AND PAYMENT

4.1 REMOVAL OF OBSTRUCTIONS

Payment for removal of obstructions, including existing private signs, bollards and metal roping, vegetation, temporary utility structures, concrete, curbs and any other item shall be lump sum in the bid schedule. These prices shall be full compensation for furnishing all materials, labor, tools, equipment, haul of waste material, and incidentals necessary to complete the item.

4.2 REMOVAL OF EXISTING ASPHALT PAVEMENT.

The unit of measurement of pavement removal shall be the number of square yards removed by the Contractor. Any pavement removed outside the limits of removal because the pavement was damaged by negligence on the part of the Contractor shall not be included in the measurement for payment. Saw cutting for pavement removal is considered an incidental item. Overexcavation to design subgrade elevation for the 4" concrete sidewalk and paved asphalt south trail improvements shall be incidental to the removal of asphalt pavement. These prices shall be full compensation for furnishing all materials, labor, tools, equipment, haul of asphalt and over excavated, and incidentals necessary to complete the item.

4.3 REMOVAL OF RETAINING WALL.

Measurement and payment for removal of retaining wall shall be in the bid schedule as lump sum. These prices shall be full compensation for furnishing all materials, labor, tools, equipment, haul of waste material, and incidentals necessary to complete the item.

4.4 REMOVAL OF CMU BLOCK WALL AND TEMPORARY RESTROOM.

Measurement and payment for removal of the CMU block wall and temporary restroom shall be in the bid schedule as lump sum. These prices shall be full compensation for furnishing all materials, labor, tools, equipment, haul of waste material, and incidentals necessary to complete the item.

4.5 REMOVE AND RELOCATE IRRIGATION VALVE BOXES

Removal and relocation of the irrigation valve boxes shall not be measured and paid for directly but shall be considered incidental to the project.

4.6 REMOVE AND RELOCATE VEGETATION

See measurement and payment for vegetation removal and replacement within subsequent Landscaping Specifications Sections.

4.7 REMOVE EXISTING GRAVEL – BEACH AREA

Measurement and payment for Removal of Existing Gravel – Beach Area shall be in the bid schedule as lump sum. These prices shall be full compensation for furnishing all materials, labor, tools, equipment, haul of waste material, and incidentals necessary to complete the item.

END OF SECTION 002220

00 22 21

EXCAVATION, EMBANKMENT AND SITE GRADING

PART 1 — GENERAL

1.1 DESCRIPTION

- A. Work Included: The work to be constructed under the requirements of this Section includes:
 - 1. Lawn Area Improvements
 - 2. Nose of the Bay and Beach Improvements.
 - 3. South Trail Improvements.
 - 4. Any other earthwork for this Project.
- B. Related work described elsewhere:
 - 1. “Geotechnical Evaluation, Black Bay Park Improvements” dated August 21, 2020 by AllWest is hereby incorporated by reference.
 - 2. Temporary and Permanent Water Pollution, Soil Erosion and Siltation Control, Section 01567
 - 3. Trench Excavation and Backfill, Section 02227
- C. Definitions:
 - 1. Approved Subgrade: Native sand soil that has been scarified, moisture-conditioned to within 3 percent of optimum moisture content, and recompacted to Structural Fill requirements presented in “Geotechnical Evaluation, Black Bay Park Improvements” report.
 - 2. Type I Crushed Aggregate: Consists of washed ¾” aggregate material placed under cat-in-place and precast concrete structure foundations as well as utilized in the construction of the entrance road, stabilized construction entrance, and temporary park entrance.
 - 3. Clearing and Grubbing Materials: Trees, stumps, brush, roots, down timber, rotten wood, rubbish and other vegetation that exists within the construction limits. This item may also include old fences, buildings or other structures as designated on the Drawings, or as may be discussed elsewhere in the Specifications.
 - 4. Topsoil: Top 4”-6” layer of organic soil that supports grasses, plants and other vegetation and contains the major portion of the plant root systems within the lawn area improvements grading limits. See Specification Section 32 91 13 for Topsoil definition.

5. Structural Backfill: Shall consist of placement of materials adjacent to structures. The backfill shall continue from the structure wall to the excavated trench walls or five feet whichever is greater.
6. On-Site Borrow: Shall consist of approved material excavated from designated areas as noted on the plans. Referred to as General Structural Fill if material meets specification requirements outlined in “Geotechnical Evaluation, Black Bay Park Improvements” dated August 21, 2020 by AllWest.
7. Off-Site Borrow: Shall consist of approved materials obtained from an undesignated location not a part of the project site.
8. Moisture Conditioning: Shall consist of soil dewatering by sub-draining, excavating, aerating, mixing, etc. to obtain the required optimum percent moisture content prior to placement in compacted layers.
9. Reasonable Effort for Moisture Conditioning: For drying purposes shall be defined as placement of material in lifts not exceeding 8 inches in a 48-hour period. Throughout this period the weather shall be favorable and the material shall be worked by plowing, discing, or mixing the material continuously for 6 hours on each of the two days. Small sized earthwork equipment and/or farm tilling equipment shall be used for placement and drying of the material. Lifts and/or subgrade shall be graded for positive drainage and protected from saturation during inclement weather.
10. Rock Excavation: Rock excavation shall include the removal of solid rock in ledges, in bedded deposits, in unstratified masses, and conglomerate deposits which are so firmly cemented they cannot be removed with skillfully operated excavation equipment of the capabilities of a Caterpillar D-7 dozer or a Caterpillar 225 backhoe or equivalent. All boulders containing a volume of more than 1 cubic yard will be classified as "rock excavation".
11. Waste Material: The following materials may be designated waste materials:
 - a. Clear and grub materials.
 - b. Excess topsoil.
 - c. Unsuitable material as confirmed by the Engineer or Resident Project Representative (RPR).
 - d. Excess suitable material.
12. Overburden: Overburden soil consists of sand and gravel. On the project site, most of the overburden soil contain 2-9% silt/clay.
13. Gneiss Bedrock: Very hard rock that overlays the bedrock encountered on-site as well as resides beneath the overburden soil.
14. Excavation to Embankment: Excavation to embankment shall include excavation of material and earthwork construction and all efforts to meet requirements of the contract documents, where applicable.

1.2 PRODUCT HANDLING

Suitable fill materials are to be stockpiled, if necessary, in such a manner so as to not impair drainages or access to the site or create unacceptable erosion conditions. See Section 01567. Stockpiles shall be protected from excessive moisture by covering and grading to drain.

1.3 SUBMITTALS

- A. Submittals shall comply with requirements of Section 1340.
- B. Material and product submittals shall be forwarded to the Engineer for the following items:
 - i. Type I Crushed Aggregate
 - ii. Suitable Fill Material
 - iii. Pipe Bedding

PART 2 — PRODUCTS

2.1 FILL MATERIAL, GENERAL

- A. Acceptance Required: All fill material shall be subject to the review and acceptance of the Engineer or RPR.
- B. Undocumented Fill: The intent of this project is to utilize undocumented material for reuse as structural fill with exception those soils that contain a significant amount of organics. It is the Contractors responsibility to take appropriate measures to protect the undocumented fill from becoming over-saturated during construction.
- C. Notification: For acceptance of imported fill material the Contractor shall notify the Engineer or RPR in writing at least 10 working days in advance of intention to import material, designate the proposed borrow area, and provide the Engineer or RPR a sample and required test results from the borrow area for the purpose of making acceptance tests to prove the quality of the material. The Contractor shall meet the requirements established in Section 01340 entitled "Submittals, Shop Drawings and Samples". Imported materials shall not be used without the prior consent of the Engineer or RPR.

2.2 SUITABLE FILL MATERIAL

- A. Undocumented Structural fill: Undocumented fill material suitable for GENERAL STRUCTURAL FILL shall be well-graded granular soil, free of organics, debris, and other deleterious material. Structural Fill shall contain no rocks or material over 3 inches in greatest dimension. In addition, not more than 10 percent shall pass the number 200 sieve. Not more than 30 percent shall pass the number ¾-inch sieve.
- B. Import Material: All import material (off-site borrow) from an undesignated off-site area shall be well-graded granular soil, free of organics, debris, and other deleterious material. Imported material shall contain no rocks or material over 3 inches in greatest dimension. In addition, not more than 10 percent shall pass the number 200 sieve. Not more than 30 percent shall pass the number ¾-inch sieve. Import material shall include sand designated in the beach area.

- C. **Crushed Aggregate Base:** Crushed aggregate base shall be Type I Crushed Aggregate and utilized for the installation of the curb and gutter, straight curb, south trail improvements, and beach area. Approved Type I crushed aggregate shall be a minimum of 4-inch lifts or otherwise noted. Using the latest Idaho Standards for Public Works Construction (ISPWC) Section 802.2.2 standard, crushed aggregate base shall meet ¾-inch “Type I” aggregate or “¾-inch B” nominal maximum size aggregate gradation. Concrete sidewalk shall utilize Class 5 Aggregate for base course. See construction plans for further detail.
- D. **Pipe Bedding:** Pipe bedding shall be used as utility pipe bedding only. Using the 2020 ISPWC Section 305 standard, pipe bedding must meet “Type I”, “Type II”, or “Type III” bedding material. See Specification Section 02227 – Trenching and Excavation for further information.

2.3 UNSUITABLE MATERIAL

Material not meeting the requirements of SUITABLE FILL MATERIAL as defined above or material having excess moisture following reasonable effort for moisture conditioning.

2.4 OTHER MATERIAL

All other materials, not specifically described but required for a complete and proper installation, shall be as selected by the Contractor subject to the approval of the Engineer or RPR.

PART 3 — EXECUTION

3.1 GENERAL

Prior to all work of this Section, become thoroughly familiar with the site, the site conditions, and all portions of the work falling within this Section.

All site fills shall be to the lines and grades as indicated in the Contract Documents.

Excavations for placement of structures or landscaping boulders shall be timed to provide minimum lag between excavation and material placement.

3.2 PREPARATION FOR GENERAL SITE FILL

- A. **Clearing, grubbing and topsoil removal:** Temporary erosion and sediment control (TESC) measures shall be completed prior to any clearing, grubbing, or topsoil remove begins. The site should be cleared of all obstructions including trees and their associated root systems that are larger than 1 inch diameter, shrubs, and debris apart from those trees marked for approved tree protection on the construction plans. In addition, soft soils or organic materials should be over excavated until solid undisturbed soil or rock is encountered. Organic or saturated material should be removed from the site and shall be disposed of in approved off-site waste areas.
- B. **Subgrade Preparation:** All areas that are at design grade elevation or those area that receive structural fill shall be conditioned to a moisture content within +/-2% of the optimum moisture content for compaction. Compacted surfaces shall be density testing or proof rolling. Equipment shall meet recommended type and weight requirements of the

geotechnical evaluation. Failure of soil to meet compaction requires the upper 12-inches of the subgrade to scarified and moisture conditioned to 95 percent of the maximum laboratory dry density (ASTM D1557).

- C. Removal of unsuitable soils: Soft or wet areas shall be removed and replaced with structural fill. The excavations should be cleared and backfilled with suitable material compacted to a minimum of 95% relative compaction in accordance with ASTM D1557.

3.3 EXCAVATION

- A. General: Excavate to the grades shown on the Drawings.
- B. Overexcavation: Backfill and compact all over excavated areas with suitable fill materials as directed by the Engineer or RPR.
- C. Waste Material: When excess excavated or unsuitable material exists, the Contractor is to haul it off-site to an approved waste facility.
- D. Slope Stabilization: The Contractor is responsible for maintaining safe temporary slopes and must adhere to the recommendations with the aforementioned geotechnical evaluation and OSHA guidelines. All permanent cut or fill slopes in native soils shall be a maximum 2 horizontal to 1 vertical.
- E. Rock Excavation: Rock excavation shall include the excavation, removal and on-site disposal of rock in definite ledge formation (i.e. bedrock) or of oversized material in boulder form with a volume of 1 cubic yard or more.

Before beginning excavation of rock, the Contractor shall notify the Engineer or RPR for coordination of measurement and waste area placement. Measurement shall be performed by the Contractor and Engineer or RPR prior to removal. Final decisions as to definition of rock excavation shall be made by the Engineer or RPR.

All ledge rock encountered in the excavation shall be removed or broken off to a depth of 6 inches below normal grade of excavation, or as indicated on the drawings. Boulders shall be completely removed. The Engineer or RPR shall determine if rock excavation shall be classified as ledge rock or boulders.

Rock excavation material will be required to be utilized for embankment construction. Contractor shall be responsible for blasting and/or crushing excavated material to a size suitable for embankment construction.

3.4 EXCESS WATER CONTROL

- A. Unfavorable Weather: Do not place, spread, or roll fill material during unfavorable weather conditions. Do not resume operations until moisture content and fill density are satisfactory to the Engineer or RPR.
- B. Flooding: Provide berms or channels to prevent flooding of sub-grade. Promptly remove all water collecting in depressions.

- C. Softened Subgrade: Where soil has been softened or eroded by flooding or placement during unfavorable weather, remove all damaged areas and re-compact as specified for the affected area.
- D. Dewatering: Provide and maintain at all times during construction ample means and devices with which to promptly remove and dispose of all water from every source entering the excavations or other parts of the work.

Dewater by means that will ensure reasonable dry excavations and the preservation of the final lines and grades of bottoms of excavations.

- E. Conditioning: Apply all reasonable effort required to adjust the moisture content of fill materials to obtain the required optimum percent moisture content, as determined by proctor testing methods, prior to placement in compacted layers. If the Contractor demonstrates he cannot obtain the required optimum moisture content after applying reasonable effort, the Engineer or RPR shall direct the Contractor to haul the unsuitable material off-site to an approved facility.

3.5 COMPACTION

Refer to the project’s geotechnical report for fill placement and compaction requirements. Lift thicknesses shall be 8-inch lifts unless hand operated compaction equipment is used, then 4-inch lifts shall be used.

ITEM	Modified Proctor*
Structural Fill	95
Structural Backfill	95
Subgrade Preparation	95
Base Course	95

*As determined by ASTM D 1557

3.6 BORROW

- A. On-Site Borrow: On-site borrow shall be excavated from the designated on-site location. Borrow shall be excavated, conditioned, hauled and used as directed as structural fill once designated conditioning is complete. Following removal of all borrow the site shall be smooth graded to prevent ponding. No cut backslopes shall exceed 2 horizontal to 1 vertical. The finished contours shall blend to the surrounding topography.
- B. Off-Site Borrow: The off-site borrow source shall be undesignated. The Contractor shall be responsible for all costs associated with obtaining, taxes, reclamation, etc. associated with off-site borrow.
- C. General Requirements: Borrow shall only be used for construction when native excavated materials run out, are found to be unsuitable, or cannot be dried with reasonable effort and must be hauled to the off-site waste area. Borrow material shall not be used without prior approval of the Engineer or RPR.

3.7 GRADING

- A. General: Except as otherwise directed by the Engineer or RPR, perform all rough and finish grading required to attain the elevations shown on the Drawings.
- B. Tolerances - Rough grade:
 - 1. Granular cushion under concrete slabs: + 0.05 foot
 - 2. Road base and subbase course: + 0.05 foot
 - 3. Site fills, embankments + 0.1 foot
- C. Treatment After Completion of Grading: After grading is completed and the Engineer or RPR has finished his inspection, permit no further excavating, filling, or grading except with the approval of and inspection of the Engineer or RPR.

Use all means necessary to prevent erosion of freshly graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

All disturbed area shall receive a minimum 4-inch dressing of topsoil and be hydroseeded, as indicated on the plans. Seeded areas will not be accepted until the roots have taken hold, and the grass has received two cuttings. See specification Section 32 92 00 for further seeding requirements.

PART 4 — MEASUREMENT AND PAYMENT

- 4.1 Excavation to Embankment. Payment for Excavation to Embankment shall be per cubic yard of the appropriate bid item. Payment is to include subgrade preparation, excavation, excess moisture control, embankment construction, etc., and all work necessary to complete earthwork construction for the project.
- 4.2 General Structural Fill. Measurement and payment shall be per cubic yard of the appropriate bid item.
- 4.3 Topsoil. Measurement and payment for topsoil shall be per Specification Section 32 91 20.
- 4.4 Waste Material. Measurement and payment for waste material shall be per cubic yard. Measurement of waste material shall be per the “Geotechnical Evaluation, Black Bay Park Improvements” dated August 21, 2020 by AllWest and per the definition of waste material outlined in Section 1.1.11. Any material removed outside the limits of removal because of negligence on part of the Contractor shall not be included in the measurement and payment. These prices shall be full compensation for furnishing all materials, labor, loading, hauling, spreading, tools, equipment, and incidentals necessary to complete the item.
- 4.5 Rock Excavation. Measurement and payment for Rock Excavation shall be per cubic yard. Measurement and payment for Rock Excavation shall be per cubic yard.
- 4.6 Crushed Aggregate Base. Measurement and payment for Type I Crushed Aggregate and Class B Aggregate shall be per square yard of the appropriate bid item.
- 4.7 Pipe Bedding. See Section 02227 – Trenching and Excavation for Pipe Bedding measurement and payment.

- 4.8 Import Material. Measurement and payment for Import Material, including sand for the Beach Area, shall be per cubic yard of the appropriate bid item.
- 4.9 Clearing and Grubbing. Measurement and payment for clearing and grubbing shall be per square yard of the appropriate bid item. Shall be full compensation for furnishing all materials, labor, tools, equipment and incidentals necessary to complete the item.

END OF SECTION 002221

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COMPACTION WATERING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: This item shall consist of furnishing and applying water required in the compaction of embankments, subgrades, subbases, base courses, and for other purposes in accordance with the requirements of these specifications or as directed by the Engineer.
- B. Related Information:
 - 1. Dust Control, Section 01562
 - 2. Trench Excavation and Backfill, Section 02227

PART 2 - PRODUCTS

Water shall be clean and free from chemical contaminants.

PART 3 - EXECUTION

3.1 WATER APPLICATION

Water, when required, shall be applied at the locations, in the amounts, and during the hours, including nights, as directed by the Engineer. The equipment used for watering shall be of ample capacity and of such design as to assure uniform application of water in the amounts directed by the Engineer.

3.2 WATER SUPPLY

Provision of an adequate water supply shall be the responsibility of the Contractor.

PART 4 – MEASUREMENT AND PAYMENT

The performance of this work, including providing and maintaining water plant(s), shall not be paid for directly but shall be considered as incidental to other work items in the Bid Schedule.

END OF SECTION 002224

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TRENCH EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: The work under this section shall cover excavation, trenching and backfill necessary for installation of pipelines, ditches, utilities and appurtenances. Utility coordination necessary for this work will also be included within this section.
- B. Related Information: Work under this section shall conform to:
 - 1. The requirements of Division 300 – Trenching of the latest edition of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC) as amended and as supplemented or modified herein or on the drawings.
 - 2. Quality Control Services, Specifications Section 01400

1.2 QUALITY ASSURANCE

- A. The Contractor shall provide and maintain in good condition on the job site a minimum of two complete sets of the most current edition of the ISPWC for reference.

1.3 DEFINITIONS

- A. Classification of Excavated Materials: There shall be two classifications of materials excavated from pipeline trenches.
 - 1. Earth Excavation: This classification shall include all soils and loose, broken and laminated rock or stones and boulders which can be reasonably ripped, broken, and removed with skillfully operated, power-driven excavating equipment of the capacities of a hydraulic excavator with a minimum power rating of 120 fly wheel HP with a minimum bucket curling force of 25,000 pounds and a minimum stick-crowd force of 18,700 pounds, while equipped with a short tip radius rock bucket or equivalent.
 - 2. Rock Excavation: This classification shall include all rock masses which cannot be excavated as specified under “Earth Excavation” and isolated boulders exceeding one (1) cubic yard in size.
- B. Unsuitable Backfill: Native material that is deemed unsuitable for reuse in trench backfill as identified by City personnel.

1.4 SUBMITTALS

- A. Submittals shall comply with requirements of Section 1340.

- B. Material and product submittals shall be forwarded to the Engineer for the following items:
 - i. Pipe Bedding
 - ii. Crushed Stone
 - iii. Clean Gravel
 - iv. Imported Trench Backfill

PART 2 - PRODUCTS

2.1 IMPORTED BEDDING

- A. Pipe bedding shall be Type I, II or III per ISPWC Section 305 shall be IMPORTED and in accordance with City of Post Falls Standard Drawing No. SD-301.
- B. Crushed Stone referred to in details “Stormwater Drain – 1 Outlet” and “Stormwater Drain – 2 Outlets” shall be Type I, II, or III per ISPWC Section 305 shall be IMPORTED and in accordance with City of Post Falls Standard Drawing No. SD-301.
- C. French Drain Pipe Bedding shall be ½” – 1” Clean Gravel imported fill.

2.2 BACKFILL

- A. Native or imported trench backfill shall comply with ISPWC Section 306.
- B. Import Utility Trench Backfill: Imported utility trench backfill must not exceed material sizes greater than 2 inches and not more than 15 percent shall pass the number 200 sieve.

PART 3 - EXECUTION

3.1 DEWATERING

- A. Excavated trenches shall be completely dewatered until pipe is placed and backfilled. The ends of the pipe shall be sealed to prevent water from entering the pipe. Any pipe having its alignment or grade changed as a result of a flooded trench shall be re-laid at no cost to the owner.

3.2 TRENCH EXCAVATION

- A. Topsoil shall be stripped to a 12” depth. Stripped material shall be segregated in spoils piles for later reuse.
- B. Comply with Section ISPWC, Section 301 – Trench Excavation.
- C. Trench shall be excavated to a minimum over-depth of 4” (6” minimum in rock).
- D. The maximum length of an open trench allowed at any one time is 300 feet.

- E. Trench shall be surrounded by engineer approved barriers at all times. If trench is to remain open beyond working hours, 6-foot tall chain-link fence must be installed around the perimeter of the trench.

3.3 ROCK EXCAVATION

- A. Rock Excavation - Determination: Contractor must stop and notify Engineer immediately upon discovery of possible rock excavation and shall not proceed until Engineer and Contractor have agreed upon extents and quantity of rock excavation. The Contractor shall demonstrate to the satisfaction of the Engineer, that the rock excavation he expects to be paid for, conforms to this Specification. The demonstration may be waived, if in the opinion of the Engineer, that the rock location and consistency is well defined. Should the Engineer and the Contractor disagree as to the rock quantities and/or location, it shall be the Contractor's responsibility to demonstrate to the satisfaction of the Engineer, that the rock conforms to these Specifications.
- B. General Requirements: Where rock excavation, as defined hereinafter is required, the rock shall be excavated to a minimum over depth of six inches below the finish grade or trench depths specified. Solid ledge rock excavation shall include the excavation, removal and off-site disposal of rock formations with a volume of 1 cubic yard or more; or of oversized material in boulder form with a volume of 1 cubic yard or more. Rock excavation includes that excavation which cannot be accomplished with skillfully operated power-driven excavating equipment of the capacities of a hydraulic excavator with a minimum power rating of 120 fly wheel HP with a minimum bucket curling force of 25,000 pounds and a minimum stick-crowd force of 18,700 pounds, while equipped with a short tip radius rock bucket or equivalent. . No payment for rock excavation, as defined in this Specification, will be made unless the rock removal requires systematic drilling and blasting, or removal by use of a jackhammer or similar tools.
- C. Construction Requirements: Banks of trenches in rock shall be kept as nearly vertical as possible; and if required, shall be properly sheeted and braced.

Excavation for manholes and other appurtenances shall be sufficient to permit the carrying out of the construction as required. Where forms are required, a clear space of at least one foot shall be provided. When excavation for manhole construction is in solid rock, pay quantities will be computed to a line one foot outside lines of the manhole.

The trench shall be excavated to the limits necessary to carry out the work in an efficient manner. The pipe zone shall be backfilled with material and in the manner specified in this Section.

All rock blasted from or otherwise removed from trenches or other excavations larger than a 12-inch cube or 1 cubic foot volume shall be loaded and hauled to an approved disposal site. Any additional trench backfill that is required to replace the rock that is unsuitable for backfilling the trench shall be imported and placed by the Contractor and the payment for such backfill shall be included in the contractor's unit bid price for Rock Excavation.

- D. Blasting and Explosive Requirements: Excavation which requires the use of explosives shall be carried out in strict conformance to all local, State, and Federal laws pertinent to this type of work.

All shots shall be covered by suitable matting, backfilling, and/or such other precautions as may be necessary for the protection of life and property. The Contractor shall be held responsible for all accidents and/or damages caused by blasting operations.

The Contractor in association of all blasting activities required in the prosecution of rock excavation shall photo record existing conditions of structures and/or facilities in the immediate area that will be affected by the blasting. The photo record of structures and facilities shall be delivered to the Engineer prior to beginning any and all blasting activities by the Contractor and shall be considered incidental to the work.

3.4 BEDDING

- A. Comply with ISPWC, Section 305 – Pipe Bedding. Use Class A-1 Bedding System unless otherwise noted.

3.5 BACKFILL

- A. Comply with ISPWC, Section 306 – Trench Backfill. Backfill shall be Type A-1 unless noted otherwise.
- B. The Contractor shall apply moisture/conditioning efforts required to adjust the moisture content of backfill materials to obtain the required moisture content as determined by proctor testing methods, prior to placement in compacted layers. No extra payment shall be made for this work.
- C. Material requiring immediate replacement which is unsuitable for backfill shall be hauled off site and disposed of in a legal manner.

3.6 UTILITY COORDINATION

Contractor is responsible for all utility coordination required of the project including throughout trenching excavation and backfill construction activities. Utility providers and their representatives shall be notified of all related work with appropriate notice ahead of time via email notification. The City and Project Engineer shall be notified of all such communication throughout project. Contractor shall consult plans for more information on specific coordination requirements.

Trenching excavation and backfill for the Avista provided power connection to the project site shall be completed by the City of Post Falls. The limits for this trenching excavation and backfill are noted in the Contract Documents. Contractor is responsible for coordination with the City and Avista as well as and notifying Avista of work in advance to install the power connection and proposed transformer.

3.7 CONSTRUCTION SAFETY

The Contractor shall meet or exceed Occupational Health and Safety Administration (OSHA) requirements at all times for trench excavation and associated work.

PART 4 - MEASUREMENT AND PAYMENT

- A. Trenching and Backfill: Measurement for payment for Standard trenching and backfill shall be per lineal foot. All trench safety systems shall be incidental to trench excavation and backfill.
- B. Pipe Bedding: Imported pipe bedding material will be measured by the lineal foot installed and in place. Payment shall be made by the appropriate bid items. See Specification Section 0334600 – Landscape Subdrainage for measurement and payment of “Clean Gravel Fill” and “Crushed Stone”.
- C. Rock Excavation: Measurement and payment for Rock Excavation shall be per cubic yard. Payment shall cover all costs for removal, haul, disposal and acquisition and installation of appropriate replacement material.
- D. Utility Coordination: Payment for any utility coordination shall be incidental to the cost of trenching and backfill.
- E. Dewatering: Payment for any dewatering associated with surface or ground water runoff shall be incidental to the cost of trenching and backfill.

END OF SECTION 002227

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PART 1 - GENERAL

1.1 DESCRIPTION

- A. Work Included: This section covers work necessary to construct the water service line; system appurtenances, such as valves; testing; and related items as shown on the drawings and specified here.
- B. Related work described elsewhere:
 - 1. Work under this section shall conform to the requirements of Division 400 of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC), as amended, and as supplemented or modified herein or on the drawings.
 - 2. Leakage Tests, Section 1430.
 - 3. Trench Excavation and Backfill, Section 2227.

1.2 QUALITY ASSURANCE

- A. Standard Specifications: The Contractor shall provide and maintain, in good condition, on the job site, a minimum of two complete sets of the most current edition of the ISPWC for reference.
- B. Material Storage: Current invoices demonstrating that all pipe is new and has received proper storage shall be available for inspection by the Engineer.
- C. Certification Requirement: The Contractor shall furnish certification by the manufacturer that all pipe and fittings furnished on the project comply with the applicable specifications and comply with Section 1340.
- D. Product Identification: All pipe shall be clearly marked with type, class, and/or thickness as applicable. Letter shall be legible and permanent under normal conditions of handling and storage.

1.3 SUBMITTALS

- A. Submittals shall comply with requirements of Section 1340.
- B. Material and product submittals shall be forwarded to the Engineer for the following items:
 - i. 2" HDPE Dr 13.5 Water Pipe
 - ii. 3/4" HDPE DR 9 Water Pipe
 - iii. All associated pipe valves and fittings
 - iv. 2" Drain Line

PART 2 - MATERIALS

2.1 PIPE

- A. Water main and drain line pipe 2-inch diameter shall be high density polyethylene (HDPE) conforming to the provisions of AWWA C-901, DR-13.5. Pipe shall be manufactured from a PE 4710 resin which meets ASTM D 3350 with a minimum cell classification of 445574C. Pipe shall be manufactured to the dimensions of ASTM F 714. Pipe shall have a minimum pressure rating of 300 psi.
- B. Water service pipe ¾ -inch diameter shall be high density polyethylene (HDPE) conforming to the provisions of AWWA C-901, DR-9. Pipe shall be manufactured from a PE 4710 resin which meets ASTM D 3350 with a minimum cell classification of 445574C. Pipe shall be manufactured to the dimensions of ASTM F 714. Pipe shall have a minimum pressure rating of 300 psi.

2.2 HDPE FITTINGS

- A. Butt Fusion Fittings: Fittings shall be made of HDPE pipe resin meeting ASTM D 3350 with a minimum cell classification of 445574C. Molded butt fusion fittings shall have a manufacturing standard of ASTM D 3261. Fabricated fittings must have the same pressure rating as the pipe or higher.
- B. Electrofusion Fittings: Fittings shall be made from resin or pipe meeting ASTM D 3350 with a minimum cell classification of 445574C. Electrofusion fittings shall have a manufacturing standard of ASTM F 1055. Fittings must have the same pressure rating as the pipe or higher.
- C. Flanged and Mechanical Joint Adapters: Flange and mechanical joint adapters shall be made from materials containing resin meeting ASTM D 3350 with a minimum cell classification of 445574C.

2.3 VALVES AND VALVE BOXES

- A. Gate Valves: Buried Gate valves 3” and smaller shall be resilient-wedge gate valves conforming to AWWA C-509 standards and shall be Leemco, Inc. Model LMV-BBHDSS-Series or approved equal. Material shall be ductile iron per ASTM A-536, Grade 65-45-12. Gate valves shall include non-rising stem, open left, 2-inch operating nut, and shall include a shroud around the operating nut to accept an IPS PVC sleeve for access to actuate the valve. Valves shall include double C-clamps and stainless-steel pipe stiffeners for connection to HDPE pipe. Gate valves and all connection hardware shall be rated for 300 psi working pressure.
- B. Valve Boxes: Valve boxes shall be IPS PVC pipe sized as specified in the plans.
- C. Stop and Waste Valve: Irrigation stop and waste valves shall be curb stop and waste valves conforming to AWWA C-800 standards. Material shall be lead-free bronze per ASTM B-584 for components in contact with potable water. Stop and waste valves and all connection hardware shall be rated for 300 psi working pressure.

2.4 TRACER WIRE

- A. Tracer wire shall be No. 12.
- B. Marking tape shall be detectable mylar-encased aluminum, marked “WATER LINE BELOW”.

2.5 THRUST BLOCKS

- A. Concrete shall be a minimum 3,000 psi compressive strength, 6 sacks per cubic yard, Type II, Portland Cement.
- B. Reinforcing steel shall be Grade 40, ASTM A-615.

PART 3 - EXECUTION

3.1 GENERAL

- A. All pipelines and appurtenances shall be installed according to manufacturer's recommendations, and the latest edition of ISPWC, Division 400, Water.

3.2 WATER MAINS

- A. Minimal burial depth for all water mains shall be 5-feet from finish grade to the top of pipe.
- B. Maintain 3-foot minimum horizontal distance to other dry utilities unless otherwise noted on the drawings.
- C. The separation requirements as outlined in Section 405, Non-potable Water Line Separation, of the ISPWC Specifications shall apply to both mainlines and service lines. Where sewer lines and services do not conform to the separation requirements, water class pipe is required. Where specified vertical separation requirements cannot be met at crossings, either the non-potable water line or the water line shall be encased with water class pipe for a distance of 10 horizontal feet on both sides of the crossing. Potable water mains shall have at least ten feet of horizontal separation from sewage force mains. Zone 2 placements are prohibited. Potable water mains must have at least 18 inches of vertical clearance from sewage force mains at Crossings. Zone 2 and 3 placement are prohibited.
- D. Drain Line: Drain line from proposed drinking fountain to existing drywell shall be installed per the latest edition of ISPWC, Division 400, Water. Drain line pipe penetration shall be cored into existing drywell and secured with grout. See Specification Section 02610 – Storm Drains and Culverts for grout specifications.

3.3 FUSION

- A. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be butt fusion and shall be performed in strict accordance with the pipe supplier's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe supplier. The butt fusion joining will produce a joint with weld strength equal to or greater than the

tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records.

- B. Mechanical joining will be used where the butt fusion method cannot be used. Mechanical joining will be accomplished by either using a HDPE flange adapter with a ductile iron back-up ring.
- C. Hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

3.4 TRACER WIRE AND MARKING TAPE

- A. Tracer wire shall be attached along the top of all water main pipe. The tracer wire shall be accessible at all valve boxes and shall be extended along the outside of the lower portion of the valve box and along the inside of the upper portion.
- B. Marking tape shall be placed directly above the pipe a distance of 2 feet above top of pipe.

3.5 THRUST BLOCKS

- A. General: Thrust blocks shall extend from the fitting, valve or hydrant to solid undisturbed earth. Thrust blocks shall be installed so all joints are accessible and the concrete does not come in contact with the joint bolt.

Where undisturbed trench walls are not available for thrust blocking, the Contractor shall furnish and install suitable pipe harnesses or ties designed and manufactured specifically for this purpose, or shall make other provisions as may be discussed with and approved by the Engineer.

Concrete shall be allowed to cure a minimum of 24 hours at no less than 40°F prior to backfilling. No internal water pressure shall be applied to the main until the thrust block has cured for 48 hours.

Thrust block size shall be per the standard drawings.

Restraining pipe joints adjacent to restrained fittings with harness restraint devices may be used in lieu of concrete thrust blocks upon approval by the Engineer. Harness restraint devices shall be installed per the manufacturer's recommendation. All joints located less than 36 feet distance from all change-in-direction fittings or the dead end of a main shall be restrained.

3.6 LONGITUDINAL BENDING

- A. Longitudinal bending or curving of pipe along its length may be conducted to the extent that it does not adversely affect the pressure-carrying or load carrying ability of the pipe. Minimum bending radius and maximum end offset shall be per manufacturers recommendations based on outside diameter and wall thickness.
- B. Longitudinal bending of PVC pipe shall be conducted in such a manner as to minimize axial deflection at the gasketed joints. Pipe joints shall be restrained from excessive axial deflection by backfilling over the joint before bending the pipe body.

- C. If greater curvature or joint deflection than recommended by the manufacturer is necessary, fittings shall be used.

3.7 QUALITY CONTROL

- A. Pressure Testing:
 - a. All water mains and services shall be pressure tested conforming to the standards and processes set in the latest edition of the ISPWC, Division 400, Water, Water Pipe and Fittings for HDPE pipe.

PART 4 - MEASUREMENT AND PAYMENT

- A. Water Pipe: Measurement and payment for furnishing, handling, installation, testing, etc. of the completed, tested, and approved water service pipe and drain line shall be per lineal foot measured along the horizontal centerline of the pipe, per the appropriate bid item.
- B. Water Fittings: Measurement and payment for fittings shall be made per the appropriate fitting bid item. Payment for thrust blocking or joint restraints is to be included in the unit price cost for fitting installation.
- C. Valves: Measurement and payment for valves shall be made per the appropriate valve bid item. Payment for thrust blocking or joint restraints and valve boxes are to be included in the unit price cost for valve installation.
- D. Drain Line Installation: Measurement and payment for installation of the drain line connection to existing drywell and all associated grout, fittings, and appurtenances are considered incidental to the project.
- E. All work necessary to comply with the non-potable water line separation and crossing requirements shall be considered incidental to other bid items.

END SECTION 002665

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PAVEMENT

PART 1 - GENERAL

1.1 DESCRIPTION.

- A. Work Included:
 - 1. This item shall consist of pavement courses composed of mineral aggregate and asphalt binder mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses, and typical cross-sections shown on the plans. Each course shall be constructed to the depth, typical section, and elevation required by the plans and shall be rolled, finished, and approved before the placement of the next course.
 - 2. Work under this section shall cover street and walkway resurfacing and surface repair associated with completion of the project.

- B. Related Work described elsewhere: All specific requirements contained in other construction specification sections:
 - 1. Excavation, Embankment and Site Grading, Section 02221
 - 2. Work under this section shall conform to the requirements of the latest edition of the Idaho Standards for Public Works Construction (ISPWC).
 - a. Division 800 – Aggregates and Asphalt, of the of the latest edition of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC), as amended and as supplemented or modified herein or on the drawings.
 - b. City of Post Falls Standard Drawing No. SD-301, Typical Trench.
 - c. Division 300 – Trenching, Section 307, Street Cuts and Surface Repairs of the of the latest edition of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC), as amended and as supplemented or modified herein or on the drawings.
 - d. Other related sections as amended, supplemented, or modified herein or on the drawings.
 - 3. Trench Excavation and Backfill, Section 02227
 - 4. Quality Control Services, Section 01400

1.2 SUBMITTALS

- A. Submittals: Comply with Submittals, Shop Drawings and Samples, Section 01340.

PART 2 - MATERIALS

2.1 ASPHALT PAVEMENT

- A. Asphalt pavement shall conform with Idaho Transportation Department (ITD) specifications for Superpave. Pavement shall be SP3 PG 58-28 with ½” max aggregate size. Pavements with a Section of 3” or less may be placed with 1 lift.

2.2 AGGREGATE, ANTI-STRIPPING AGENTS, RECYCLED PLANT MIX (RAP).

- A. Aggregate, anti-stripping agents, and Recycled Plant Mix (RAP) shall comply with ISPWC Section 810, Plant Mix Asphalt Pavement for Superpave.

2.3 ASPHALT SURFACE REPAIR

- A. Asphalt Surface repair shall be either Hot Mix Asphalt (HMA) or Cold Mix Asphalt (CMA) as specified on the plans. HMA shall meet ISPWC Section 810, Plant Mix Pavement and shall be ITD SP3. All surface repair locations shall utilize the same mix design.

2.4 CRUSHED AGGREGATE BASE COURSE

- A. Crushed Aggregate Base Course shall be Type I Crushed aggregate and shall meet ISPWC Section 802 and shall be Type I ¾” minus aggregate.

2.5 APPROVED SUBGRADE

- A. Approved Subgrade is outline and defined in specification Section 02221.

2.6 GRAVEL SURFACE REPAIR

- A. Gravel surface repair shall meet ISPWC Section 301 and shall be Type I ¾” minus aggregate.

PART 1 – EXECUTION

3.1 GENERAL.

It is the Contractor’s responsibility to coordinate traffic control, construction timing, and surface restoration with the City of Post Falls. All work shall comply with City standards and the latest edition of ISPWC, whichever is more restrictive.

All permanent patching shall be placed within seven (7) days of the trench excavation on the walkway. A temporary patch, utilizing a minimum of 2-inches of asphalt concrete (Cold Mix) shall be placed the same day as the excavation. The Contractor shall be responsible for the maintenance of all patching.

All required asphalt cuts shall be clean and straight saw cut patterns performed by mechanical methods acceptable to the Owner. Disposal of all removed material shall be offsite at an appropriate site provided by the Contractor.

3.4 ASPHALT SURFACE REPAIR

Comply with the City of Post Falls Standard Drawing No. SD-2001, Typical Street Section, Local Residential. All walkway crossings shall have a minimum of 2” of asphalt.

3.5 CRUSHED AGGREGATE BASE COURSE

Comply with the City of Post Falls Standard Drawing No. SD-2001, Typical Street Section, Local Residential. All surface repair to be paved shall have 4” of crushed aggregate base course.

3.6 GRAVEL SURFACE REPAIR.

Comply with the ISPWC Section 307, Street Cuts and Surface Repairs and ISPWC, Type “C” Surface Restoration and standard drawing number SD-2001 with a 4” thick (minimum) $\frac{3}{4}$ ” minus aggregate surface course.

3.7 ASPHALT PAVEMENT.

Comply with the Standard Detail Typical Asphalt Section in the construction drawings and the City of Post Falls Standard Notes for Streets when installing asphalt pavement. Refer to Section 02221 of the specifications for installation requirements and construction methods for Type I Crushed Aggregate and Approved Subgrade.

Comply with construction drawings and Section 02221 for reference to all site grading and compaction requirements.

3.8 WEATHER LIMITATIONS.

The asphalt shall not be placed upon a wet surface or frozen surfaces, or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the RPR, if requested; however, all other requirements including compaction shall be met.

TABLE 4. BASE TEMPERATURE LIMITATIONS OF UNDERLYING COURSE

Mat Thickness	Base Temperature (Minimum)
	° F
3 in. (7.5 cm) or greater	40
Greater than 2 in. (5.0 cm) but less than 3 in. (7.5 cm)	50

PART 4- COMPOSITION

4.1 JOB MIX FORMULA (JMF).

- A. Job Mix Formula (JMF) shall comply with ISPWC Section 810, Plant Mix Asphalt Pavement for Superpave.

PART 5 METHOD OF MEASUREMENT AND PAYMENT

5.1 ASPHALT PAVEMENT

Asphalt Pavement shall be measured by the number of tons of asphalt pavement used in the accepted work. Recorded batch weights or truck scale weights will be used to determine the basis for the tonnage.

Payment for asphalt pavement meeting all acceptance criteria as specified in paragraph 2.6 shall be made at the contract unit price per ton for asphalt pavement. The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

5.2 CRUSHED AGGREGATE BASE COURSE.

See Specification 02221 – Excavation, Embankment and Site Grading for measurement and payment of Type I Crushed Aggregate.

5.3 SURFACE REPAIRS.

Surface restoration shall be measured for payment shall be considered incidental to Asphalt Pavement work and of actual Type “P” Surface Restoration (Asphalt Surface Repair) as defined above and in the latest edition of ISPWC; or Type “C” Surface Restoration (Gravel Roadway) completed as shown on the plans or as directed by the Engineer.

These prices shall be full compensation for furnishing all materials, including base course, labor, tools, equipment and incidentals necessary to complete the item.

END OF SECTION 002710

DIVISION 03 – CONCRETE

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CONCRETE CURBS AND CURB CUTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Work Included:

1. This item shall consist of concrete curb and gutter, straight curb, and drainage curb cuts constructed in accordance with these specifications at the specified locations in accordance with the dimensions, lines, and grades as shown on the plans.

B. Related Work Described Elsewhere: All specific requirements contained in other construction specification sections:

1. Work under this section shall conform to the requirements of the latest edition of the Idaho Standards for Public Works Construction (ISPWC).
 - a. Division 700 – Concrete, of the of the latest edition of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC), as amended and as supplemented or modified herein or on the drawings.
2. Work under this section shall conform to the requirements of the latest edition of the City of Post Falls Standard Drawings
 - a. Standard Drawing No. SD-2013, Standard Curb and Gutter
 - b. Standard Drawing No. SD-2009, Standard Straight Curb
 - c. Standard drawing No. SD-603, Drainage Curb Cut

1.2 SUBMITTALS

A. Submittals: Comply with Submittals, Shop Drawings and Samples, Section 01340.

B. Submittals shall include informational, qualification, and testing data for all material described Part 2 – Materials of this specification section.

PART 2 - MATERIALS

2.1 CONCRETE.

Plain and reinforced concrete develop a compressive strength of 3000 psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. The concrete shall contain not less than 470 pounds of cement per cubic yard. The concrete shall contain 5 percent of entrained air, plus or minus 1 percent, as determined by ASTM C 231 and shall have a slump of not more than 4 inches as determined by ASTM C 143.

2.2 JOINT FILLER STRIPS.

Expansion joint filler, premolded, shall conform to ASTM D 1751, 1/2 inch thick, unless otherwise indicated.

2.3 FINE GRADED GRANULAR MATERIAL.

Fine graded granular material shall conform to the requirements of ASTM C33 and shall be free of materials with deleterious reactivity to alkali in cement.

2.4 FORM WORK.

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, straight and free from warp, twist, loose knots, splits or other defects. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

A. Curb and Gutter & Standard Straight Curb Forms. Curb and gutter and straight curb outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

2.5 DRAINAGE CURB CUTS

Drainage curb cut material shall conform to the City of Post Falls Standard drawing SD-603. Drainage curb cuts shall include drain rock immediately following the spillway in locations where curb cut outlet is within a stormwater basin.

PART 3 - CONSTRUCTION METHODS

3.1 REMOVAL OF EXISTING SIDEWALK AND CURB.

Prior to removal of existing sidewalk, curb, and gutter, the limits of removal shall be marked in the field and accepted by the Engineer. The existing sidewalk, curb and gutter shall be removed to the limits shown on the plan. All removed material shall be removed from the site and become property of the Contractor.

3.2 SAW CUTTING.

All saw cuts shall be made at the locations shown on detail. The saw cut shall be made to produce a neat vertical face between the pavement and curb area to be removed and the adjacent existing surface.

Concrete must be cut by mechanical means to the full depth in straight lines. The equipment used to perform the saw cutting shall be approved by the Engineer prior to commencement of the work.

3.3 PREPARING SUBGRADE.

Excavation shall be made to the required width and depth, and the subgrade upon which the item is to be built shall be compacted to a firm uniform grade. All soft and unsuitable material shall be removed and replaced with suitable approved material. When required, a layer of approved granular material, compacted to the thickness indicated on the plans, shall be placed to form a subbase. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started.

3.4 PLACING.

The forms for and the mixing, placing, finishing, and curing of concrete shall conform to the following requirements.

A. Formed Curb and Gutter and Straight Curb. Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

1. Curb and Gutter Finishing.

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

2. Concrete Finishing.

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3. Surface and Thickness Tolerances.

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

Forms shall not be removed within 24 hours after the concrete has been placed. Minor defects shall be repaired with mortar containing one part cement and two parts fine aggregate.

The operations of depositing, compacting, and finishing the item shall be conducted so as to build a satisfactory structure. If any section of concrete is found to be porous, other than minor defects which may be plastered, or is otherwise defective, it shall be removed and replaced by the Contractor without additional compensation.

3.5 DRAINAGE CURB CUTS

Drainage curb cut installation shall conform to the City of Post Falls Standard drawing SD-603.

Drain rock shall be installed immediately following the spillway of Drainage Curb Cut and as outlined per Contract Documents.

3.6 JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

- A. Contraction Joints. Contraction joints shall be constructed directly opposite contraction joints in abutting Portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.
1. Contraction joints (except for slip forming) shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.
 2. When slip forming is used, the contraction joints shall be cut in the top portion of the gutter/curb hardened concrete in a continuous cut across the curb and gutter, using a power-driven saw. The depth of cut shall be at least one-fourth of the gutter/curb depth and 1/8 inch in width.

3.7 CURING AND PROTECTION

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.8 BACKFILLING

After the concrete has set sufficiently, the spaces adjacent to the structure shall be refilled to the required elevation with material specified on the plans and compacted by mechanical equipment to at least 90% of the maximum density as determined by ASTM D 698. The in-place density shall be determined in accordance with ASTM D 6938.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS.

- A. Thickness Deficiency. When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.
- B. High Areas. In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.
- C. Appearance. Exposed surfaces of the finished work will be inspected by the Engineer and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced as directed by the Engineer.

3.10 CLEANING AND RESTORATION OF SITE

After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear and in good condition.

Performance of the work described in this section is not payable directly but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for the structure.

PART 4 - MEASUREMENT AND PAYMENT

4.1 GENERAL

Concrete saw cutting, joint filler and joint sealing concrete, including cutting and preparing joints, shall not be measured for payment but shall be considered incidental to other bid items.

4.2 CURB AND GUTTER/STRAIGHT CURB

Measurement and payment shall be per linear foot at the contract unit price for curb and gutter and standard straight curb. This price shall be full compensation for furnishing all materials, including 4" Type I Aggregate base, and for all operations, overexcavation, compaction, subgrade preparation, hauling of materials, disposal, and for all labor, equipment, tools, forms and incidentals necessary to complete concrete work related to curb and gutter/straight curb installation.

4.3 DRAINAGE CURB CUTS

Measurement and payment shall be made per unit bid item. This price shall be full compensation for furnishing all materials, including 4" Type I Aggregate base and outlet rip rap areas, and for all operations, overexcavation, compaction, subgrade preparation, hauling of materials, disposal, and for all labor, equipment, tools, forms and incidentals necessary to complete concrete work related to drainage curb cut installation.

PART 5 - TESTING REQUIREMENTS

ASTM D 698	Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12-in (305 mm) Drop
ASTM D 6938	Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D 1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

END SECTION 003216

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CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 of the Work includes furnishing, placing, shoring, bracing, and anchorage of formwork, concrete reinforcement, accessories, and placing concrete in connection with cast-in-place concrete installation including installation of control and expansion joints, concrete curing and concrete finishing.
 - 1. Footings
 - 2. Seatwalls/Retaining Walls
 - 3. BBQ Walls
 - 4. Concrete finishes and colors
- B. Related Sections:
 - 1. Division 01
 - 2. Division 02 Section “Site Demolition”
 - 3. Division 02 Section “Excavation, Embankment, and Site Grading”
 - 4. Division 32 Section “Concrete Paving”.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- B. Contract Documents: are the design drawings and the specifications.
- C. Contractor: includes any of the following: General Contractor and their sub-contractors, Construction Manager, Concrete Contractor and their sub-contractors.
- D. EOR: the Structural Engineer of Record for the structure in its final condition.
- E. Testing Agency: the independent testing and inspection service engaged by the Owner for quality assurance observation and testing of concrete construction.

1.4 SUBMITTALS

- A. Qualification Data: For Installer, manufacturer and testing agency.

- B. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates

- C. Material Certificates: For each of the following, if used in the project, submit documentation signed by manufacturers and indicating compliance with contract documents:
 - 1. Cementitious materials
 - 2. Admixtures
 - 3. Form materials and form-release agents
 - 4. Steel reinforcement and accessories
 - 5. Fiber reinforcement
 - 6. Curing compounds
 - 7. Floor and slab treatments
 - 8. Bonding agents
 - 9. Adhesives
 - 10. Semi-rigid joint filler
 - 11. Joint-filler strips
 - 12. Repair materials and procedures

- D. Submittal Schedule: The contractor shall submit for approval a schedule at least twenty (20) working days prior to commencing submittals.
 - 1. The schedule shall include a list, in order of date to be submitted, of all drawings, calculations and other required submittal items scheduled to be submitted. After submissions have started any modification or addition to this schedule must be submitted for approval at least twenty (20) working days before the modification or addition is proposed to take place. If a submittal schedule is not submitted, review turnaround time cannot be confirmed.

 - 2. If at any time the total number of shop drawings received in any one week period exceeds the amount in the approved schedule by more than 10% for that week, the Design Professionals have the right to add two days to the average turnaround time for each 20% increment in excess of the scheduled quantity for that week's submissions. For example if the weekly total exceeds the schedule by 10% to 20%, two days may be added; if it is exceeded by 21% to 40%, four days may be added. The return dates for subsequent submittals may be extended based on the additional review time stated above.

- E. Design Mixes: Submit for each concrete mix at least 30 days prior to placing concrete. Submit separate design mixes when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

- F. Mix designs shall be prepared or reviewed by an approved independent testing laboratory retained by the Contractor in accordance with requirements of ACI 301 and ACI 318, signed by a registered design professional licensed to practice as a Professional Engineer in the state where the project is located, and shall be coordinated with design requirements and Contract Documents. The mix designs shall include:
 - 1. The elements on site where the mix shall be used.

 - 2. Data shall be from the same production facility that will be used for this Project.

3. Locations on the Project where each mix design is to be used corresponding to Structural General Notes on the Drawings.
4. Design Compressive Strength: as indicated on the Drawings.
5. Gradation and quality of each type of ingredient including fresh (wet) unit weight, aggregates sieve analysis.
6. Water/cementitious material ratio.
7. Evaluate and classify fly ash in accordance with ASTM D 5759.
8. Report chemical analysis of fly ash in accordance with ASTM C 311.
9. Classify blast furnace slag in accordance with ASTM C 989.
10. Slump: ASTM C 143.
11. Certification and test results of the total water soluble chloride ion content of the design mix - AASHTO T260 or ASTM C 1218.
12. Air content of freshly mixed concrete by the pressure method, ASTM C 231, or the volumetric method, ASTM C 173.
13. Unit Weight of Concrete: ASTM C 138.
14. Design strength at 28, 56 or 90 days, as indicated on contract documents: ASTM C 39.
15. Document strength based on basis of previous field experience or trial mixtures per ACI 301. Proportioning by Water-Cement Ratio is not permitted.
16. Submit strength test records, mix design materials, conditions, and proportions for concrete used for record of tests, standard deviation calculation, and determination of required average compressive strength.
17. Test records to support proposed mixtures shall be no more than 12 months old and use current cement and aggregate sources. Test records to establish standard deviation may be older if necessary to have the required number of samples.
18. Manufacturer's product data for each type of admixture.
19. Manufacturer's certification that all admixtures used is compatible with each other.
20. All information indicating compliance with Contract Documents including method of placement and method of curing.
21. Required for areas indicated on Drawings.
22. Normal weight Concrete: Density per ASTM C 138. Design the mix to produce the strength, modulus of elasticity and density as indicated on the Contract Documents.

23. Lightweight Concrete: Density per ASTM C 138. Design the mix to produce the strength, modulus of elasticity and density as indicated on the Contract Documents.
24. Indicate amounts of mixing water to be withheld for later addition at Project site.

G. Products: 24" x 24" Sample Panel of formliner pattern submitted to architect for approval.

1.5 SHOP DRAWING PROCESS

1. Each shop drawing shall be dated and identified with a unique drawing number. Resubmitted shop drawings shall be given a new revision number with each resubmission, and all changes/additions/deletions from the previous submission shall be clearly and individually identified. Resubmissions received without revision numbers or identification of changes/additions/deletions will be returned un-reviewed.
2. Include a transmittal letter with each submission, clearly labeled with current drawing numbers and revision numbers.
3. Shop drawings shall be clearly initialed by the draftsman and checker responsible for their preparation.
4. Submittal of shop drawings and other submittals by the Contractor shall constitute Contractor's representation that the Contractor has verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each drawing with other drawings and other trades. The Contractor shall place their shop drawing stamp on all submittals confirming the above.
5. Shop drawings: Submit in complete packages so that individual parts and the assembled unit may be reviewed together. This Specification Section and the applicable drawings used in the development of the shop drawings shall be referenced on each shop drawing to facilitate checking.
6. The Contractor shall submit to the Design Professionals one (1) electronic PDF copy for shop drawing review. The naming convention of each drawing must follow the submittal numbering system and include the submittal number, specification number, revision number and drawing number in the prefix of the drawing name.
7. The Contractor shall allow at least ten (10) working days between receipt and release by the EOR for the review of shop drawings and submittals.
8. All modifications or revisions to submittals and shop drawings must be clouded, with an appropriate revision number clearly indicated. The following shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Design Professionals:
 - 1) Failure to specifically cloud modifications
 - 2) Unapproved revisions to previous submittals
 - 3) Unapproved departure from Contract Documents

9. Resubmittals: Completely address previous comments prior to resubmitting a drawing. Resubmit only those drawings that require resubmittal. Do not include new content not previously reviewed.
10. Resubmittals Compensation: The Contractor shall compensate the Design Professionals for submittals that must be reviewed more than twice due to contractors' errors. The Contractor shall compensate the Design Professionals at standard billing rates plus out-of-pocket expenses incurred at cost + 10%.
11. At the completion of all concrete submittals the Contractor shall deliver to the Design Professionals two (2) copies of the electronic version of the final as-built shop drawings on a DVD or other media acceptable to the Architect/Engineer.

B. Shop Drawings Required

1. Formwork drawings to be submitted to the Landscape Architect and Engineer. Indicate formwork dimensions, tied to grid line or other project dimensions. Formwork shop drawings to be stamped and sealed by a Professional Engineer, licensed in the state of the project. Drawings to be accompanied by supporting calculations when requested by the Landscape Architect or Engineer.
2. Shoring and Reshoring drawings to be submitted to the Landscape Architect and Engineer. Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring. Shoring shop drawings to be stamped and sealed by a Professional Engineer, licensed in the state of the project. Drawings to be accompanied by supporting calculations when requested by the Landscape Architect or Engineer.
3. Joint Location Shop Drawings: Submit to Landscape Architect and Engineer for approval. Drawings shall indicate locations and details of all joints, including construction joints and control joints. Joint locations to be shown on steel reinforcement shop drawings.
4. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Drawings shall indicate:
 - 1) Material and grade.
 - 2) Bar schedules, with bar lengths, bent bar diagrams and wire mesh
 - 3) Arrangement, spacing, clear cover, lap locations and lap lengths.
 - 4) Splice details for mechanical splices.
 - 5) Supports of concrete reinforcement.
 - 6) Special reinforcement required for openings through concrete structures.

C. Preconstruction Survey: Where interface with existing construction occurs, before related shop drawings are prepared survey the existing construction and submit the survey prepared by a professional surveyor to the Design Professionals for record.

D. Structural Repairs: Submit procedures and product information.

E. Patching Defective Concrete Finishes: Submit procedures and product information.

1.6 MOCK-UPS

A. The Contractor shall provide a minimum of the following:

1. Prior to starting any concrete work, provide a sample panel using materials indicated for project work for approval by Architect. For each type, color and finish of concrete

specified (one standard gray broom finish, one sand finish with color as specified), build panel at the site of full thickness and approximately four feet x four feet, including control joint. Provide the workmanship proposed for the work. Retain panel(s) during construction as a standard for completed paving work.

2. A 5' length of each type of concrete walls (seatwalls and custom BBQ Table) to indicate quality of formwork, texture, color, chamfers, joints and all specified finishes and standard of workmanship. \

- B. Mock-ups shall be preserved until completion of adequate portion of finished work as deemed necessary by landscape architect and/or owner. Mock-ups shall not be part of the finish work.

1.7 QUALITY CONTROL BY CONTRACTOR

- A. The Contractor shall maintain a program of quality control to ensure that the minimum standards specified herein are attained.
- B. The Owner's Testing Agency services are to inform the Owner of the performance by the Contractor but shall in no way replace or augment the Contractor's quality control program or relieve the Contractor of total responsibility for quality control.
- C. The Contractor shall immediately report to the Design Professionals any deficiencies in the work which are departures from the Contract Documents. The Contractor shall propose corrective actions and their recommendations in writing and submit them for review by the Design Professionals. After proposed corrective action is accepted by the Landscape Architect, EOR and Owner, the Contractor shall correct the deficiency at no cost to the Owner and shall reimburse the Architect/EOR and/or Testing Agency at their standard rates for their time required.
- D. Installer Qualifications: A qualified installer who will employ on this Project, personnel with a minimum of 6 years experience with concrete installations and finishes similar to those specified on this project, qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- E. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- F. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- G. Contractor's Engineer Qualifications: A professional engineer who is legally qualified and licensed in the State of the project location and who is experienced in providing engineering

services of the kind indicated. Experience of engineering services is defined as services performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material design and extent.

- H. Reinforcement Detailer Qualifications: A firm with 8 year minimum experience in the preparation of reinforcement drawings for projects of a similar type, scale and complexity. Firm to have experienced Professional Engineer employed, responsible for review of reinforcement drawings, prior to issue.
- I. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- J. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5. Sections 1 through 5 and Section 7, "Lightweight Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- K. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- L. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - 1) Contractor's superintendent.
 - 2) Independent testing agency responsible for concrete design mixtures.
 - 3) Ready-mix concrete manufacturer.
 - 4) Concrete subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.8 QUALITY ASSURANCE BY TESTING AGENCY

- A. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

- B. Inspections: 100 percent of the following work items shall be inspected for conformance with the contract documents.
1. Steel reinforcement placement and supporting devices. Contractor shall not be permitted to place concrete until reinforcing steel has been inspected and approved, by approved testing agency.
 2. Steel reinforcement welding.
 3. Headed bolts and studs
 4. Embed plates
 5. Verification of use of required design mixture
 6. Concrete placement, including conveying and depositing.
 7. Curing procedures and maintenance of curing temperature.
 8. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. For 28 day mixes mold five cylinders. Test two cylinders at seven days and two cylinders at 28 days. The 7 day and 28 day strength shall be the average of the two representative cylinders. One cylinder shall be retained in reserve for later testing if required.
 2. 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.
 3. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - 1) When frequency of testing will provide 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.
 4. Slump: ASTM C 143/C 143M; 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. Perform additional tests when concrete consistency appears to change.
 5. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 6. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 7. Record total water quantity added to concrete batches.
 8. Obtaining certified mill test results for each load of cement delivered to the concrete producer for use of this project.
 9. Record types and amounts of admixtures added to concrete batches, including that added after departure of concrete trucks from batch plant.
 10. Record amounts of and monitor dosing of high-range water-reducing admixtures added at site for project site added admixtures and redosing for plant-added admixtures.
 11. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 12. Compression Test Specimens: ASTM C 31/C 31M.
 13. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 14. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 15. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

16. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
17. 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.
18. 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.
19. 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.
20. Test results shall be reported in writing to Owner, Landscape Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
21. 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.
22. Additional Tests: 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 or Engineer of Record. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Landscape Architect.
23. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
24. Rejection of concrete not meeting specification requirements and immediate reporting to the Architect and Engineer of Record.

D. Attendance at the Pre-Construction Conference

1.9 PRE-CONSTRUCTION CONFERENCE

1. At least 20 Business days prior to start of the concrete construction schedule, the Contractor shall conduct a meeting to review the proposed mix designs and to discuss the required methods and procedures to achieve the required concrete properties.
2. The Contractor shall require responsible representative of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:
 - a. Contractor's superintendent.
 - b. Laboratory responsible for the concrete design mix.
 - c. Laboratory responsible for field quality control.
 - d. Concrete subcontractor - ready mix concrete producer.
 - e. Admixture manufacturer(s).
 - f. Engineer.
 - g. Owner or Owner's representative.
 - h. Landscape Architect
3. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed to all parties in attendance within 5 days of the meeting.

1.10 REFERENCES

- A. Note: All references below shall be from the most current edition.
- B. American Concrete Institute (ACI):
 - 1. ACI 117 - Standard Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications of Structural Concrete for Buildings.
 - 3. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - 4. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.
 - 5. ACI 315 - Details and Detailing of Concrete Reinforcement.
 - 6. ACI 318 - Building Code Requirements for Reinforced Concrete.
 - 7. ACI 347 - Recommended Practice for Concrete Formwork.
- C. American National Standards Institute (ANSI):
 - 1. ANSI/ASTM A82 - Cold Drawn Steel Wire for Concrete Reinforcement.
 - 2. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- D. American Society for Testing and Materials (ASTM):
 - 1. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
 - 2. ASTM C33 - Concrete Aggregates.
 - 3. ASTM C94 - Ready-Mixed Concrete.
 - 4. ASTM C150 – Portland Cement.
 - 5. ASTM C260 - Air Entraining Admixtures for Concrete.
 - 6. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
 - 7. ASTM C494 - Water Reducing Admixtures for Concrete.
 - 8. ASTM C618 - Fly Ash Mineral Admixture for Concrete.
 - 9. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.
 - 10. ASTM-C800 - Curing Compound, Concrete, for New and Existing Surfaces.
 - 11. ASTM-C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete
- E. Concrete Reinforcing Steel Institute (CRSI) - Manual of Standard Practice.
- F. National Ready Mixed Concrete Association (NRMCA)

1.11 DELIVERY, STORAGE AND HANDLING

- A. General: Materials handling and batching shall conform to applicable provisions of ASTM C94.
- B. Reinforcing: Unload and store reinforcing bars so they are kept free of mud and damage.
- C. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.
- D. Hauling Time for Concrete: Deliver and discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than one and one-half (1-1/2) hours, or three-hundred (300) revolutions of the drum after the initial mixing water has been added, whichever is earliest.

- E. Extra Water:
 - 1. Deliver concrete to site in exact quantities required by design mix.
 - 2. Should extra water be required for workability before depositing concrete, and the water/cement ratio of accepted mix design will not be exceeded, the General Contractor's superintendent shall have the sole authority to authorize addition of water. Additional water shall not exceed one (1) gal/cu. yd. Any additional water added to mix after leaving batch plant shall be indicated on truck ticket and signed by person responsible.
 - 3. Where extra water is added to concrete it shall be mixed thoroughly for thirty (30) revolutions of drum before depositing.
 - 4. Water may be added at the site only once for each batch.
 - 5. A full set of tests shall be performed after addition of water. Excessive slump or other out of range tests will be cause for rejection.

1.12 PROJECT CONDITIONS

- A. Environmental Requirements:
 - 1. Cold Weather Placement:
 - a. When for three successive days prior to concrete placement the average daily outdoor temperature drops below forty degree (40°) F or when the average outdoor temperature is expected to drop below forty degrees forty degree (40°) F on the day of concrete placement, preparation, protection and curing of concrete shall comply with ACI 306R.
 - b. Minimum temperature of concrete upon delivery shall conform to ACI 301 Table 7.6.1.1. Concrete at time of placement shall conform to minimum values of ACI 306R Table 1.4.1, and shall not exceed minimum values by more than twenty degrees (20°) F.
 - c. Subject to acceptance of the Project Manager an accelerating admixture may be used. Admixtures shall meet requirements of Part 2. Calcium Chloride and other chloride-type accelerating admixtures are not allowed.
 - d. Comply with concrete protection temperature requirements of ACI 306R. Record concrete temperatures during specified protection period at intervals not to exceed sixteen (16) hours and no less than twice during any twenty four (24) hour period.
 - 2. Hot Weather Placement:
 - a. When depositing concrete in hot weather, follow recommendations of ACI 305R.
 - b. Temperature of concrete at time of placement shall not exceed eighty-five degrees (85°) F.
 - c. When air temperatures on day of placement are expected to exceed ninety degrees (90°) F, mix ingredients shall be cooled before mixing. Flake ice or well-crushed ice of a size that will melt completely during mixing may be substituted for all or part of mix water.
 - d. Retarding admixture may be used subject to acceptance of the Project Manager. Admixtures shall meet requirements of Part 2.
 - e. Protect to prevent rapid drying. Start finishing and curing as soon as possible.
- B. Protection: Protect newly finished slabs from vandalism and all weather related damage. Protect finished slabs from mortar leakage from pouring of concrete above. Cover masonry walls, glazing, and other finish materials with polyethylene or otherwise protect from damage due to pouring of concrete.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Plastic coated plywood, furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete (Acceptable below grade only): Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
1. Hand Placed Steel Forms: Hand placed steel forms are only to be used for sections that are straight and have no bend, radii, or curvature in the sections to be used.
 2. Plywood Forms: Are to be used on any section of concrete that have bends, radii or curvature. Forms shall be made of Douglas Fir or Spruce species; solid one side grade; sound, undamaged sheets with straight edges.
 - a. Curved elements shown on plans are to be constructed with smooth-curved forms. Faceted forms composed of straight sections will not be accepted.
 3. Lumber: Douglas Fir or Spruce species; construction grade; with grade stamp clearly visible.
 4. Form Coatings: Provide commercial formulation form coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- C. Form Liner for Board Formed Concrete Seat walls and Custom BBQ Table:
1. All concrete surfaces designated in the plans or specifications as "Board Form Concrete" shall be formed using Fitzgerald Formliners Pattern No. 16020, Rough Sawn Plank, as manufactured by:
 - a. Fitzgerald Formliners
 - b. 1500 E. Chestnut Avenue
 - c. Santa Ana, CA 92701
 - d. phone 714-547-6710.
 - e. www.formliners.com
 - f. No substitutions will be allowed without prior written approval from the project architect or engineer. Any substitute product must be submitted two weeks prior to the bid date.
- D. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

- E. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- F. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- G. Chamfer Strips: Wood, metal, PVC, or rubber strips, 1/2 inch by 1/2 inch minimum.
- H. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- I. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- J. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- D. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- E. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.
- F. Plain-Steel Wire: ASTM A 82, as drawn.
- G. Deformed-Steel Wire: ASTM A 496.
- H. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, deformed-steel wire, with less than 2 percent damaged coating in each 12-inch wire length.
- I. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

- J. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- K. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized steel wire into flat sheets.
- L. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, deformed steel.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- C. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
- D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - 2. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
- E. Mechanical Couplers: Provide "Tension-Compression" mechanical couplers where specified to develop a minimum of 125% of the specified yield strength of the connecting reinforcing bars. Detailing and stagger as per CRSI, "Concrete Reinforcing Steel Institute" requirements and manufacturer's recommendations.

2.4 CONCRETE MATERIALS

- A. Provide materials in accordance with ACI 301, unless amended or superseded by requirements of this section or general notes on structural drawings. Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. General: Ready-mixed Concrete: ASTM C94. On-site mixed concrete not allowed.
 - 2. Cement: Portland Cement: ASTM C150. Type II
 - 3. Fly ash: ASTM C618 Class C or F.
 - a. Maximum percent retained on #325 sieve: 28%
 - b. Maximum water requirement, stated as percentage of control, 100%
 - c. Percentage of fly ash in mix design shall be weight not by volume. Water cement ratio will be calculated by as water / cementitious (total cement plus fly ash) ratio.
 - d. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 4. Silica Fume: ASTM C 1240, amorphous silica.
 - 5. Normal Weight Aggregates: ASTM C33.
 - a. Obtain from same source throughout project.

- b. All sand and aggregates to meet C-33 Table 3 for Class 4S “Severe Weathering Region”.
 - 1) Fine Aggregate: Clean, natural sand.
 - 2) Coarse Aggregate: Clean gravel or crushed stone.
6. Water: ASTM C 94/C 94M, clean and not detrimental to concrete.
7. Chloride Ion Content of Mix (including all constituents): Shall not exceed .15 percent chloride ions by weight of cement and comply with ASTM C 1152.

2.5 ADMIXTURES

- A. General: Unless specified, no admixtures may be used without specific approval of the Project Manager.
- B. Prohibited Products: Calcium chloride or admixtures containing more than one half of one percent (0.05%) chloride ions or thiocyanates are not permitted.
- C. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- D. Chemical Surface Retarder (SAND FINISH): Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch.
 1. Products: Subject to compliance with requirements, provide the following or approved equal
 - a. Top-Cast; Grace Construction Products.
 - b. Number: 15
 - c. Etch/Aggregate Size: Up to 1/4”
 - d. Coverage: 250/350 sf/gal
 - e. Product Color Code: Yellow (COB 004)
- E. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
 1. Products: Subject to compliance with requirements, provide one of the following or approved equal:
 - a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
 - b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
 - c. Euclid Chemical Company (The), an RPM company; ARRMATECT, EUCON BCN, or EUCON CIA.
 - d. Grace Construction Products, W. R. Grace & Co.; DCI.
 - e. Sika Corporation; Sika CNI.

- F. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 - 1. Products: Subject to compliance with requirements, provide one of the following or approved equal:
 - a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
 - b. Grace Construction Products, W. R. Grace & Co.; DCI-S.
 - c. Sika Corporation; FerroGard 901.
- G. Air-Entraining Admixture: ASTM C260. Subject to compliance with requirements, provide one of the following:
 - 1. "Air Mix" by Euclid Chemical Co.
 - 2. "Darex ARA" by W. R. Grace.
 - 3. "Micro-Air" by Master Builders.
 - 4. Acceptable substitution.
- H. Water Reducing Admixture: ASTM C494, Type A. Subject to compliance with requirements, provide one of the following:
 - 1. "Eucon WR-75" by Euclid Chemical Co.
 - 2. "Rheobuild 1000" by Master Builders.
 - 3. "Plastocrete 106" by Sika Chemical Co.
 - 4. Acceptable substitution.
- I. Retarding Admixture, ASTM C 494, Type B
 - 1. BASF POZZOLITH 100-XR"
 - 2. The Euclid Chemical Company "EUCON RETARDER 100".
 - 3. Acceptable substitution.
- J. Non Corrosive Accelerating Admixture ASTM C 494, Type C:
 - 1. Acceptable Product: BASF "POZZUTEC 20
 - 2. Acceptable Product: The Euclid Chemical Company "ACCELGUARD 80", "ACCELGUARD NCA" or "ACCELGUARD 90"
 - 3. Acceptable substitution.
- K. Water-Reducing and Retarding Admixture ASTM C 494, Type D:
 - 1. Acceptable Product: BASF "POZZOLITH 100-XR"
 - 2. Acceptable Product: The Euclid Chemical Company "EUCON RETARDER 75" or "EUCON DS".
 - 3. Acceptable substitution.
- L. Water-Reducing and Accelerating Admixture ASTM C 494, Type E:
 - 1. Acceptable Product: BASF "POZZUTEC 20
 - 2. Acceptable Product: The Euclid Chemical Company "ACCELGUARD 80" or "ACCELGUARD 90"
 - 3. Acceptable substitution.
- M. High Range Water Reducing Admixture (Superplasticizer): ASTM C494, Type F or G. Subject to compliance with requirements, provide one of the following:
 - 1. "Eucon 37" by Euclid Chemical Co.
 - 2. "Pozzolite 400N" by Master Builders.
 - 3. "Sikament" by Sika Chemical Co.

4. Acceptable substitution.
- N. Viscosity Modifying Admixture (VMA) for Self-Consolidating Concrete (SCC), ASTM C494/C494M, Type S:
1. Acceptable Product: BASF “Rheomac VMA”
 2. Acceptable Product: Sika Chemical “Sika Stabilizer VMA”
 3. Acceptable Product: W.R. Grace “V-MAR3”
 4. Acceptable Product: “EUCON ABS” or “EUCON WO”, The Euclid Chemical Company
- O. Corrosion Inhibiting Admixtures: ASTM C 494, Type C:
1. Acceptable Product: W.R. Grace’s “DCI or DCI-S”
 2. Acceptable Product: The Euclid Chemical Company’s “EUCON CIA”
 3. Acceptable Product: Sika Chemical “Ferroguard 901”
- P. Shrinkage Reducing Admixtures ASTM C 157:
1. Acceptable Product: W.R. Grace’s “ECLIPSE PLUS”, or “ECLIPSE FLOOR”
 2. Acceptable Product: The Euclid Chemical Company’s “EUCON SRA”
- Q. Cementaid Everdure Caltite System: All concrete that is exposed to continuous water, such as part of fountains or water features shall be made waterproofed by the addition of Cementaid Everdure Caltite and Superplastet as manufactured by Glacier Northwest, (970) 984-3310 or approved equal. Submit shop drawings to Glacier Northwest for review and approval prior to scheduling work. If not indicated on the plans, provide all specified water stop materials and penetration sealers as recommended by the manufacturer. A Glacier Northwest technician must be on site at the time of installation in order to insure that the installation meets their requirements for warranty.
- R. Warm Weather Admixtures: ASTM C494. Use of admixtures will not relax warm weather placement requirements.
- S. Cold Weather Admixtures: ASTM C494. Use of admixtures will not relax cold weather placement requirements.

2.6 ACCESSORIES

- A. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, contain oils or waxes, or impair natural bonding or color characteristics of coating intended for use on concrete. Subject to compliance with requirements, use one of the following:
1. “Pro-Cote” by Protex.
 2. “Cast Off” by Sonneborn.
 3. “Debond” by L&M Construction Chemicals.
- B. Epoxy Adhesive: ASTM C881; two (2)-component material suitable for use on dry or damp surfaces. Subject to compliance with requirements, use one of the following:
1. “Sikadur Hi-Mod LV” by Sika Chemical Corp.
 2. “Patch and Bond Epoxy” by Burke.
 3. “Epoxtite” by A.C. Horn.
 4. “Sure-Poxy” by Kaufman Products, Inc.
 5. “Euco Epoxy 463 or 615” by Euclid Chemical Co.

- C. Expansion Joints:
 - 1. Interior Use or Exterior Use Where Sealants are Specified: Bituminous saturated fiber conforming to ASTM D1751, one half inch (1/2") thick. Provide manufacturer's certification of compatibility with specified sealants where required.
 - 2. Exterior Use Where Sealants are not Specified: Premolded asphalt and fiber conforming to ASTM D994, one half inch (1/2") thick.
- D. Slip Joints:
 - 1. Speed Dowel Model PSD09/#4TX, nine inch (9") long sleeve to accommodate eighteen inch (18") smooth steel round bar. Manufactured by Sika/Greenstreak, (800)325-9504.
 - 2. Dowel, eighteen inch (18") long smooth round steel bar, five eighth inch (5/8") diameter. De-bur cut ends.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, shaped as sized on the drawings.
- G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials. Form-release agent is not to stain or discolor final concrete surface.
- I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete surface.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch (1") to the plane of exposed concrete surface, or as shown on the drawings.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch (1") in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- J. Spray Curing Compound: All spray curing compound shall meet ASTM C-1315, and be prepared by manufacturer's instructions. Use per where required in Section 3.9.

2.7 ANTI-GRAFFITI COATING

- A. Manufacturer: Rain Guard International
- B. Product: VandlGuard™ Non-Sacrificial Anti-Graffiti Coating, or acceptable substitution.

2.8 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.9 CONCRETE MIXES, 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, according to ACI 301.
1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
 2. In areas where acceptable by architectural requirements, the design mixes shall target the maximum percent allowable of Fly Ash, blast-furnace slag, silica fume, and/or similar materials in replacement of Portland cement in order follow LEED green building performance criteria.
 3. Design mixes with higher percentages of Fly Ash, blast-furnace slag and silica fume will require additional time to achieve design strength and will be subject to testing regimes that include a 56 day test as well as additional cylinders in order to justify strength by statistical methods since these mixes are not predesigned.
 4. Concrete mixes shall minimally meet City of Aurora standard. Where discrepancies exist, Contractor shall notify Landscape Architect/Engineer.
- B. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
1. Fly Ash: 25 percent.
 2. Combined Fly Ash and Pozzolan: 25 percent.
 3. Ground Granulated Blast-Furnace Slag: 50 percent.

4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 5. Silica Fume: 10 percent.
 6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to 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 for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.10 CONCRETE MIXTURES FOR STRUCTURAL ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 4 inches, plus or minus 1 inch.
 4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- B. Foundation Abutment Walls / Bents: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
- C. Light Pole Foundations: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
- D. Suspended Slabs: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.40.
 3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.

4. Air Content: 6.0 percent, plus or minus 1.5 percent at point of placement for 3/4-inch nominal maximum aggregate size.

2.11 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice" latest edition.

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
 1. When air temperature is between eighty-five (85°) and ninety degrees (90°) F, reduce mixing and delivery time from one and one-half (1-1/2) hours to seventy-five (75) minutes; when air temperature is above ninety degrees (90°) F, reduce mixing and delivery time to sixty (60) minutes.
 2. Provide batch ticket to Testing Agency for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.
 3. Project-Site Mixing: Not allowed without prior approval from Project Manager. If allowed, submit process description to Project Manager for approval prior to construction.

PART 3 - EXECUTION

3.1 QUALITY CONTROL

- A. Requirements of Regulatory Agencies: Comply with all applicable provisions of the state and local building and safety codes.
- B. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer, unless otherwise approved by Project Manager.
- C. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- D. Testing: All testing shall be completed by the Contractor at their expense unless otherwise specified by the contract.
- E. Testing Agency Qualifications: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures. Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- F. Testing Frequency: Obtain at least one composite sample for each one hundred (100) cubic yards, or fraction thereof of each concrete mixture placed each day.
- a. When frequency of testing will provide fewer than five (5) compressive-strength tests for each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one (1) test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one (1) set of four (4) standard cylinder specimens for each composite sample.
 5. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at twenty-eight (28) days. and keep one for backup in the event a sample should break.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at twenty-eight (28) days.
- G. Strength of each concrete mixture will be satisfactory if 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 two-hundred (200) psi.
- H. Test results shall be reported in writing to Project Manager, concrete manufacturer, and Contractor within forty-eight (48) hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at twenty-eight (28) days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both seven (7) and twenty-eight (28) day tests.
- I. Additional Tests: 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 Project Manager.
- J. Concrete work will be considered defective if it does not pass tests and inspections.
- K. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- L. Prepare test and inspection reports.
- M. Record of Work: A record shall be kept by the Contractor listing the time and date of placement of all concrete for the structure. Such record shall be kept until the completion of the project and shall be available to the Project Manager for examination at any time.
- N. Mockups: Per 1.6 of this specification.

- O. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, concrete repair procedures, and concrete protection.

3.2 FORMWORK ERECTION

- A. Review completed formwork with Landscape Architect and/ or Owner for approval prior to initial pour for all vertical elements.
- B. Construct formwork to maintain tolerances in accordance with ACI 301.
- C. Verify lines, levels, and measurement before proceeding with formwork.
- D. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, one eighth inch (1/8") for smooth-formed finished surfaces.
 - 2. Class B, one-quarter inch (1/4") for rough-formed finished surfaces.
- E. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- F. Form Tie Holes: Form tie holes are to be filled with grout and finished to match adjacent concrete surface
- G. Elements shown as curved on plans are to be formed with flexible form material to form smooth curve transitions. Disjointed, poorly transitioned form alignments will not be accepted. Curved sections formed with straight facets will not be accepted.
- H. Contractor shall notify the Project Manager a minimum of forty eight (48) hours in advance of placing concrete for review of formwork. Contractor shall make correction within twenty four (24) hours of review. If formwork is not in place at time of the scheduled inspection, then the Contractor will be responsible for compensation of the Project Manager's time and expenses per the General Contract Conditions.
- I. Minimize form joints. Symmetrically align form joints and make watertight to prevent leakage of mortar.
- J. Provide chamfer strips on all exposed corners or as indicated on construction documents.
- K. Do not apply form release agent other than specified materials where concrete surfaces receive special finishes or applied coatings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.
- L. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, dowels, anchors, and other inserts and embedded materials.
- M. Do not remove forms, shoring and bracing until concrete has sufficient strength to support its own weight, and construction and design loads which may be imposed upon it.

- N. During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

3.3 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. 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. Install dovetail anchor slots in concrete structures as indicated.
 - 4. Embedded items:
 - 1) Give ample notice and opportunity to introduce, furnish, or install embedded items and work related to concrete or for support before concrete is placed.
 - 2) Position embedded items accurately and support against displacement.
 - 3) Position embedded items to avoid conflicts with reinforcement. Provide ½ inch clear cover between reinforcement and inserts, anchors, and embedded items, and between sleeves and reinforcement. Notify Architect of conflicts between embedded items and reinforcement prior to correction.
 - 4) No embedded items made of aluminum shall be permitted, unless completely coated or covered to prevent aluminum concrete reaction or electrolytic action between aluminum and steel.

3.4 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than fifty degrees (50°) F for twenty four (24) hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for structural elements that supports weight of concrete in place until concrete has achieved at least eighty percent (80%) of its twenty-eight (28) day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Project Manager.

3.5 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.6 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
 - 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 - 2. Face laps away from exposed direction of concrete pour.
 - 3. Lap vapor retarder over footings and grade beams not less than **6 inches (150 mm)**, sealing vapor retarder to concrete.
 - 4. Lap joints **6 inches (150 mm)** and seal with manufacturer's recommended tape.
 - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
 - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
 - 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by **6 inches (150 mm)** on all sides, and sealing to vapor retarder.
- B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder in accordance with manufacturer's written instructions.

3.7 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - 1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.8 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete as indicated in the drawings.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Landscape Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.9 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.10 BONDING:

- 1. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3.11 JOINT SEALANTS: See Division 32 Section “Concrete Paving Joint Sealants”.

3.12 CONCRETE PLACEMENT

- A. Contractor’s Review: Contractor shall inspect forms and reinforcing prior to concrete placement to assure accurate placement of embedded items and overall acceptability.
- B. Project Manager’s Review: Contractor shall provide minimum of forty-eight (48) hours notice to the Project Manager to allow review of forms and reinforcement before concrete is placed and to observe placing of concrete.
- C. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- D. Do not add water to concrete during delivery, at Project site, or during placement. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least six inches (6”) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. 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.
- E. Deposit and consolidate concrete for concrete pavements in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces as indicated on drawings.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
 - 6. Allow time for bleed water to appear, then scrape or push off all bleed water. Do not work water into surface.
 - 7. Final level, light bull float, but do not trowel surface.
 - 8. Broom or drag surface or other specified finish, per Subsection 3.8 this Section.
 - 9. Do not use evaporative retarders as finishing aid.
- F. Cold-Weather Placement: Comply with ACI 301, ACI 304, ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below forty degrees (40°) F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301, ACI 304, ACI 305R, and as follows:
1. Maintain concrete temperature below ninety degrees (90°) F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is prohibited.
 2. Spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- H. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- I. Drilled shafts: Contractor shall place concrete as close to the bottom of the drilled shaft with the reinforcing cage in position within the drilled shaft. All drilled shaft requirements shall follow CDOT Section 503 Drilled Caissons.

3.13 FINISHING

- A. Rough Form Finish: All texture imparted by form facing material, including tie holes and defective areas, shall be repaired and patched, and all fins and other projections exceeding one-quarter inch (1/4") shall be removed.
- B. Smooth Form Finish: Use form material to impart smooth, hard, uniform texture, and arrange form panels in orderly and symmetrical pattern with minimum seams. Repair and patch defective areas and completely remove and smooth all fins and other projections.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.14 CONCRETE CURING, PROTECTION, AND SURFACE TREATMENTS

- A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.
 2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete unless test cylinders, made and kept adjacent to the structure and cured by the same methods, are tested with the average compressive strength equal to seventy percent (70%) of the specified twenty-eight (28) day strength.
 3. Curing shall be in accordance with ACI 301 procedures. Avoid rapid drying at the end of the curing period. During hot and cold weather, cure concrete in accordance with ACI 305R and ACI 306R.
- B. Curing Methods: Perform curing of concrete by moisture curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof, as herein specified and in accordance with ACI 308.1. Coordinate with and choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.
1. Provide moisture retaining cover curing as follows: Cover concrete surfaces with a moisture-retaining cover for curing concrete, placed in widest practical width with sides and ends lapped at least three inches (3”) and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 2. Provide curing and sealing compound to interior slabs left exposed, and to exterior slabs, walks and curbs as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within thirty (30) minutes). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer’s directions. Recoat areas subjected to rainfall within three hours after initial application.
 - b. Maintain continuity of coating and repair damage during period.
 - c. Do not use membrane curing compounds on surfaces which are to be covered with materials applied directly to concrete: liquid floor hardener, waterproofing, dampproofing, painting, and other coating and finish materials.
- C. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above for specified curing time.
- D. Curing Unformed Surfaces:
1. Cure unformed surfaces, such as slabs, floor topping, and other flat surfaces by application of appropriate curing method.

3.15 ANTI-GRAFFITI COATING

- A. Apply to surfaces/elements indicated on drawings. Install per manufacturer’s instructions following manufacturer-recommended concrete cure period.

3.16 TOLERANCES

- A. Formed Surfaces and Building Lines: Conform to ACI 301 4.3.

- B. Slab Finishing Tolerances: See Division 32 Section “Concrete Paving”.
- C. Embedded Items: Unless noted otherwise on drawings, tolerances shall be as follows:
 - 1. Anchor Bolts:
 - a. Adjacent anchor bolts in a group receiving a single fabricated setting piece: Plus or minus one-eighth inch (1/8”).
 - b. Location and alignment of anchor bolt groups from designated location and alignment: Plus or minus one-eighth inch (1/8”).

3.17 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Project Manager. Remove and replace concrete that cannot be repaired and patched to Project Manager's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a Number sixteen (#16) sieve, using only enough water for handling and placing. Achieve approval of Project Manager prior to any patching as to location of patches and patch material.
- C. Patch Testing: On a portion of the work which will, in the finished condition, be concealed, test patch materials and methods and obtain Project Manager’s approval prior to patching concrete surfaces needing repair that will be visible in the final construction.
- D. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than one half inch (1/2”) in any dimension to solid concrete. Limit cut depth to three quarter inch (3/4”). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color and texture. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Project Manager.
- E. Repairing Unformed Surfaces: Test unformed surfaces, such tops of walls, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped for trueness of slope and smoothness; use a sloped template.
 - 1. After obtaining approval of Project Manager, repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of one-one hundredths inch (0.01”) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

- a. If, after repairs are complete, the Project Manager deems the repairs did not successfully correct the original deficiencies, the pavement or concrete element in question is to be removed and replaced per Subsection 3.13.E.1. above.
 2. After concrete has cured at least fourteen (14) days, test for low and high spots in finished surface. Areas that do not conform to the tolerances set forth in Division 32 and in other reference standards identified in this specification are to be sawcut to the nearest joint as approved by the Project Manager, defective concrete removed, and new conforming paving reinstalled. Color and finish is to match adjacent concrete.
 3. If approved by Project Manager, repair random cracks and single holes one inch (1”) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least seventy-two (72) hours.
- F. Perform structural repairs of concrete, subject to Project Manager’s approval, using epoxy adhesive and patching mortar.
- G. Repair materials and installation not specified above may be used, subject to Project Manager approval.

3.18 METHOD OF MEASURE AND PAYMENT

- A. Completed and accepted work will be measured as follows:
1. Footings
 - a. All footings are included in the measurement and payment for their associated site amenity/fixture.
 2. Seatwalls
 - a. Seatwalls will be measured and paid by linear foot.
 - b. The contract unit price paid as listed on the contract bid form for Seat Walls include full compensation for furnishing all labor, materials, equipment, tools, shop drawings, supplies and incidentals and shall perform all labor necessary to complete all of the work of Seat Walls including: mock-ups, excavation, drainage, concrete footings/support walls with reinforcing, preparation, installation, finishing and Seat Walls to provide each wall complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
 3. Concrete for Custom BBQ table will be included in the measurement and payment for BBQ Grill in Site Furnishings 129300.

END OF SECTION 03 30 00

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METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fence
- B. Products furnished, but not installed, under this Section:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.
- C. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
 - 2. 061063 "Exterior Rough Carpentry" for wood.

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 SUBMITTALS

- A. Product Data: For the following:
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.

1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- C. Samples for Verification: Powder coat color sample
- D. Qualification Data: For qualified professional engineer.
- E. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
- F. Welding certificates.
- G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

2.2 FERROUS METALS

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25percent.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304
- E. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- F. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum.
 - 2. Provide stainless-steel fasteners for fastening stainless steel.
 - 3. Provide stainless-steel fasteners for fastening nickel silver.
 - 4. Provide bronze fasteners for fastening bronze.

- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy [**Group 1 (A1)**] [**Group 2 (A4)**].
- E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Eyebolts: ASTM A 489.
- G. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- H. Lag Screws: ASME B18.2.1 (ASME B18.2.3.8M).
- I. Wood Screws: Flat head, ASME B18.6.1.
- J. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- K. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- L. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- M. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- N. Post-Installed Anchors: [**Torque-controlled expansion anchors**] [**or**] [**chemical anchors**].
 - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy [**Group 1 (A1)**] [**Group 2 (A4)**] stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).
- O. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with **[Division 09 painting Sections.] [Division 09 Section "High-Performance Coatings."]** **[Division 09 painting Sections and Division 09 Section "High-Performance Coatings."]**
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- F. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as **indicated** Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.

2.8 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.10 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.11 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning. Retain or revise any of four subparagraphs below to suit Project service conditions of installed work. Insert other exposures and preparation requirements where applicable. Refer to SSPC's painting manual.
 - 1. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.13 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 ADJUSTING AND CLEANING

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

1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.4 Build America, Buy America

- A. Metal products that are required to meet the Build America, Buy America material and manufacturing requirements for this project will be verified to meet those standards. The relevant metal products will be sourced and produced in the United States

3.5 METHOD OF MEASUREMENT AND PAYMENT

- A. FENCE : Screening fence will be measured and paid by linear foot.
 1. The contract unit price paid as listed on the contract bid form for Fence include full compensation for furnishing all labor, materials, equipment, tools, shop drawings, supplies and incidentals and shall perform all labor necessary to complete all of the work of Fence including: structural footings/bases, wood, preparation, installation, finishing and cleaning of Fence to provide each wall complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

END OF SECTION 055000

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EXTERIOR ROUGH CARPENTRY

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. Wood Fence for Propane Enclosure
- B. Related Requirements:
 - 1. Section 32 91 00 Landscape Systems
 - 2. Section 055000 Metal Fabrications

1.3 DEFINITIONS

- A. Boards: Lumber of less than 2 inches nominal (38 mm actual) in thickness and 2 inches nominal (38 mm actual) or greater in width.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association
 - 3. NLGA: National Lumber Grades Authority.
 - 4. RIS: Redwood Inspection Service.
 - 5. SPIB: The Southern Pine Inspection Bureau.
 - 6. WCLIB: West Coast Lumber Inspection Bureau.
 - 7. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For all specified material contained within this section. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates:
 - 1. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.
- C. Evaluation Reports: For preservative-treated wood products, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. Lumber Manufacturer Qualifications: A qualified manufacturer with 5 years of experience with specified lumber.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
 - 1. Factory mark each item with grade stamp of grading agency.
 - 2. For items that are exposed to view in the completed Work, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.

- B. Maximum Moisture Content:
 - 1. Boards: 5 percent.
 - 2. Dimension Lumber: **5 percent**

2.2 LUMBER

- A. Hand select wood for Fences for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.
- B. Dimension Lumber:
 - 1. Thermally Modified Northern White Ash
 - 2. 1" x 4" nominal, 0.75" x 3.5" actual

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
 - 1. Use fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329 unless otherwise indicated.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Carbon-Steel Bolts: ASTM A 307 (ASTM F 568M) with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- F. Stainless-Steel Bolts: ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or Grade A4); with ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or Grade A4) hex nuts and, where indicated, flat washers.
- G. Postinstalled Anchors: Stainless-steel anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing according to ASTM E 488, conducted by a qualified independent testing and inspecting agency.
 - 1. Stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or Grade A4).

2.4 METAL ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. R. H. Tamlyn & Sons LP.
 - 5. Simpson Strong-Tie Company, Inc.
 - 6. USP Structural Connectors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G90 (Z270) coating designation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prime wood including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Section 099113 "Exterior Painting."
- B. Stain wood, including both faces and edges. Cut to required lengths and stain ends. Comply with requirements in Section 099300 "Staining and Transparent Finishing."

3.2 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Install metal framing anchors to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- F. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

- G. Apply copper naphthenate field treatment to comply with AWP4 M4, to cut surfaces of preservative-treated lumber.
- H. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. ICC-ES AC70 for power-driven fasteners.
 - 2. "Fastening Schedule" in ICC's International Building Code.
- I. Use common wire nails unless otherwise indicated. Select fasteners of size that do not fully penetrate members where opposite side is exposed to view. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

3.3 METHOD OF MEASUREMENT AND PAYMENT

- A. Measurement and Payment for items in this section are included in the Fence Unit Price called out in 055000 "Metal Fabrication". No additional payment will be provided.

END OF SECTION 061063

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SITE FURNISHINGS

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

- 1. Section Includes:
 - a. Adirondack Chair
 - b. Bench – Freestanding
 - c. Bench – Wood Topper for CIP Walls
 - d. Chaise Lounge Chair
 - e. Drinking Fountain
 - f. Firepit
 - g. Harvest Table – standard
 - h. Harvest Table - ada
 - i. Litter Receptacle
 - j. Recycling Receptacle

- B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for footings.
- 2. Division 02 Section "Site Demolition"
- 3. Division 02 Section "Excavation, Embankment, and Site Grading"

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: As indicated in detail drawings, and in Part 2.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For each type of exposed finish, not less than 6-inch- (152-mm-) long linear components and 4-inch- (102-mm-) square sheet components.
- F. Product Schedule: For site furnishings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For site furnishings.
 - 1. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For site furnishings to include in maintenance manuals.

1.6 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. Bench Replacement Slats: No fewer than two full-size units for each size indicated.
 - 2. Trash Receptacle Inner Containers: Five full-size units for each size indicated, but no fewer than two units.
 - 3. Anchors: Minimum two of each type.

PART 2 - PRODUCTS

2.1 ADIRONDACK CHAIR

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Loll Designs, 5912 Waseca Street, Duluth, MN 55807, 877.740.3387.
www.lolldesigns.com
 - 1. 4 slat Compact Adirondack Chair, Flat back
 - a. Model: AD-4SFC-CG
 - 1) Dimensions
 - a) Width: 28.5"
 - b) Depth: 34.75"
 - c) Height: 33.25"
 - d) Seat Depth: 17.75"
 - 2) Weight: 39 lbs
 - 3) Quantity: 9, as per layout plan
 - 4) Color:
 - a) 6 Charcoal Gray
 - b) 3 Apple Red

2.2 BENCH – FREESTANDING

- A. Products: Subject to compliance with requirements, provide the following:

- B. Manufacturer: Forms and Surfaces, 30 Pine Street, Pittsburgh, PA 15223, 800.451.0410.
www.forms-surfaces.com
 - 1. Knight Bench, backless, 6'
 - a. Model: SBKNI-072N
 - 1) Dimensions
 - a) Length: 72"
 - b) Width: 17.8"
 - c) Height: 18"
 - 2) Slats: FSC 100% Cumaru hardwood
 - 3) Aluminum Frame Finish:
 - a) Powder coat finish: RAL aluminum texture
 - 4) Mounting: Surface Mounted, per manufacturer's specifications
 - 5) Options: Custom Logo, Branded Iron Text, regarding detail

2.3 BENCH -WOOD TOPPER

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Forms and Surfaces, 30 Pine Street, Pittsburgh, PA 15223, 800.451.0410.
www.forms-surfaces.com
 - 1. Knight Bench, backless, wall topper, 6'
 - a. Model: SBKNI-072N-W
 - 1) Dimensions
 - a) Length: 72"
 - b) Width: 19.8"
 - c) Height: 3.3"
 - 2) Slats: IPE hardwood
 - 3) Aluminum Frame Finish:
 - a) Powder coat finish: RAL aluminum texture
 - 4) Mounting: Surface Mounted, per manufacturer's specifications
 - 5) Options: Custom Logo, Branded Iron Text, regarding detail

2.4 CHAISE LOUNGE CHAIR

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Loll Designs, 5912 Waseca Street, Duluth, MN 55807, 877.740.3387.
www.lolldesigns.com
 - 1. Lollygagger Chaise HD
 - a. Model: LC-LCHD-AR
 - 1) Dimensions:
 - a) Length: 74"
 - b) Width: 26"
 - c) Height: 29.75"
 - 2) Weight: 60 lbs
 - 3) quantity 3, as per layout plan
 - 4) Color:
 - a) Apple red

2.5 DRINKING FOUNTAIN

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Most Dependable Fountain Inc., 5705 Commander Dr., Arlington, TN 38002, 800.552.6331, www.mostdependable.com
 - a. Model 10145 SMSSFA
 - b. Finish: Stainless Steel model, with Chrome Powdercoat Color.
 - 1) Powder coat color: Textured Pyrite
 - c. Options:
 - 1) Internal Surface Mounts

2.6 FIREPIT

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Manufacturer: The Outdoor Plus

Supplier: Woodland Direct, 844.301.1154
 - a. Pismo Steel Fire Pit, item # M48200351
 - b. Dimensions:
 - 1) Length: 72"
 - 2) Width: 24"
 - c. Finish: Steel
 - 1) Color Black Vein
 - d. Fireglass: Reflective Black Fire Glass
 - e. Options
 - 1) Ignition Type: Propane
 - a) (1) at beach with 20lb tank, secured within firepit housing with secured access door and sliding tray
 - b) (1) at entry plaza with 33lb tank, located across from plaza in screened fencing, min 12' distance from firepit location (re: layout for location.
 - 2) Electronic Ignition/ E-Stop/ Coach's Button - Controlled by Baseline Program
 - a) Manufacturer: BaseLine, Inc, 10259 W Emerald Street, Suite 160, Boise, ID 83704, 866.294.5847, www.baselinesystems.com
 - b) Model: BL-5401 Coach's Button biCoder

2.7 HARVEST TABLE - standard

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Forms and Surfaces, 30 Pine Street, Pittsburgh, PA 15223, 800.451.0410. www.forms-surfaces.com
 - 1. Knight Table Ensemble
 - a. model: STKNI-72NW
 - 1) Dimensions:
 - a) Table Length: 72"

- b) Table Width: 37"
- c) Table Height: 30.4"
- d) bench length: 72"
- e) bench width: 19.8"
- f) bench height: 18"
- 2) Slats: Slats: FSC 100% IPE hardwood
- 3) Aluminum Frame Finish:
 - a) Powder coat finish: RAL aluminum texture
- 4) Quantity: 3, as per layout plans
- 5) Mounting: Surface Mount per manufacturer's recommendations

2.8 HARVEST TABLE - ADA

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Forms and Surfaces, 30 Pine Street, Pittsburgh, PA 15223, 800.451.0410.
www.forms-surfaces.com
 - 1. Knight Table Ensemble ADA
 - a. model: STKNI-72NW-ADA
 - 1) Dimensions:
 - a) Table Length: 72"
 - b) Table Width: 37"
 - c) Table Height: 30.4"
 - d) bench length: 72"
 - e) bench width: 19.8"
 - f) bench height: 18"
 - g) ADA bench length: 36"
 - h) ADA bench width: 19.8"
 - i) ADA bench height: 18"
 - 2) Slats: Slats: FSC 100% IPE hardwood
 - 3) Aluminum Frame Finish:
 - a) Powder coat finish: RAL aluminum texture
 - 4) Quantity: 1, as per layout plans
 - 5) Mounting: Surface Mount per manufacturer's recommendations

2.9 LITTER RECEPTACLES

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Forms and Surfaces, 30 Pine Street, Pittsburgh, PA 15223, 800.451.0410.
www.forms-surfaces.com
 - 1. Bevel Litter Receptacle
 - a. Model: SLBVL-122
 - 1) Dimensions:
 - a) Length: 25"
 - b) Width: 14"
 - c) Height: 40"

- d) Capacity: 22 gal.
- 2) Weight: 160lbs
- 3) Aluminum Frame Construction
 - a) Powder coat finish main body: RAL aluminum texture
- 4) Stainless steel door and back
 - a) Powder coat finish exterior door: RAL aluminum texture
- 5) Graphic: litter/landfill
- 6) Mounting: Surface Mount per manufacturer's recommendations

2.10 RECYCLING RECEPTACLES

- A. Products: Subject to compliance with requirements, provide the following:
- B. Manufacturer: Forms and Surfaces, 30 Pine Street, Pittsburgh, PA 15223, 800.451.0410.
www.forms-surfaces.com
 1. Bevel Litter Receptacle
 - a. Model: SLBVL-122
 - 1) Dimensions:
 - a) Length: 25"
 - b) Width: 14"
 - c) Height: 40"
 - d) Capacity: 22 gal.
 - 2) Weight: 160lbs
 - 3) Aluminum Frame Construction
 - a) Powder coat finish main body: RAL aluminum texture
 - 4) Stainless steel door and back
 - a) Powder coat finish exterior door: RAL aluminum texture
 - 5) Graphic: recycling
 - 6) Mounting: Surface Mount per manufacturer's recommendations

2.11 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
 1. Rolled or Cold-Finished Bars, Rods, and Wire: ASTM B 211 (ASTM B 211M).
 2. Extruded Bars, Rods, Wire, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 3. Structural Pipe and Tube: ASTM B 429/B 429M.
 4. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 5. Castings: ASTM B 26/B 26M.
- B. Steel and Iron: Free of surface blemishes and complying with the following:
 1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 2. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53/A 53M, or electric-resistance-welded pipe complying with ASTM A 135/A 135M.
 3. Tubing: Cold-formed steel tubing complying with ASTM A 500/A 500M.

4. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500/A 500M; zinc coated internally and externally.
 5. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
- C. Stainless Steel: Free of surface blemishes and complying with the following:
1. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
 2. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
 3. Tubing: ASTM A 554.
- D. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
1. Wood Species: Manufacturer's standard.
 2. Finish: Manufacturer's standard
- E. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and with manufacturer's standard finish.
- F. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
1. Polyethylene: Fabricated from virgin plastic HDPE resin.
- G. Anchors, Fasteners, Fittings, and Hardware: Stainless steel commercial quality, tamperproof, vandal and theft resistant.
- H. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M; recommended in writing by manufacturer, for exterior applications.
- I. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
- J. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
1. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of 0.9 oz./sq. ft. (0.27 kg/sq. m) of zinc after welding, a chromate conversion coating, and a clear, polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than 0.3 mil (0.0076 mm) thick.
 2. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.

2.12 FABRICATION

- A. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
- B. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
- C. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- D. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces.
- E. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
- F. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

2.13 GENERAL FINISH REQUIREMENTS

- A. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.14 ALUMINUM FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.15 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.16 IRON FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2.17 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- B. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

2.18 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run directional finishes with long dimension of each piece.
 - 2. Directional Satin Finish: No 4.
 - 3. Dull Satin Finish: No. 6.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
- C. Install site furnishings level, plumb, true, and positioned at locations indicated on Drawings.

3.3 METHOD OF MEASURE AND PAYMENT

- A. Adirondack chair will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Adirondack Chair shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Adirondack Chair including but not limited to receiving delivery, placement and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- B. Bench - Freestanding will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Bench - Freestanding shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Bench - Freestanding including but not limited to receiving delivery, placement and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- C. Bench – Wood Topper will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Bench – Wood Topper shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Bench – Wood Topper including but not limited to receiving delivery, placement, installation on Concrete Seatwalls and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- D. Chaise lounge chair will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Chaise lounge shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Chaise lounge including but not limited to receiving delivery, placement and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- E. Drinking fountain will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Drinking fountain shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Drinking fountain including but not limited to receiving delivery, connection to water service, footings, placement, testing, and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- F. Firepit will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Fire Pit shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Fire Pit including but not limited to receiving delivery, connection and supply of propane tank, timers, emergency shut-offs and placement, testing, and cleaning to provide each

furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- G. Harvest table will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Large harvest table shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Large harvest table including but not limited to receiving delivery, placement and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- H. ADA harvest table will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Small harvest table shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Small harvest table including but not limited to receiving delivery, placement and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- I. Litter receptacle will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Litter receptacle shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Litter receptacle including but not limited to all excavation, structural concrete footings, backfill, and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- J. Recycling receptacle will be measured and paid by each.
 - 1. The contract unit price paid as listed on the contract bid form for Recycling receptacle shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Recycling receptacle including but not limited to all excavation, structural concrete footings, backfill, and cleaning to provide each furnishing complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

END OF SECTION 129300

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1038 W. Davidson Avenue | Coeur d'Alene, ID 83814
208.666.4001 | Fax 208.666.4021 | www.aei-engineering.com

DATE:	February 26, 2021
CLIENT:	T-O Engineers
PROJECT:	City of Post Falls Black Bay Park

<u>SPECIFICATION SECTION</u>	<u>SECTION DESCRIPTION</u>
26 01 00	ELECTRICAL GENERAL
26 06 00	GROUNDING AND BONDING
26 07 50	ELECTRICAL IDENTIFICATION
26 08 00	ELECTRICAL TESTING
26 12 00	CONDUCTORS AND CABLES
26 13 00	RACEWAYS AND BOXES
26 21 10	SERVICE AND METERING
26 44 20	PANELBOARDS
26 51 10	EXTERIOR LIGHTING

The technical specification sections listed above have been prepared under the direction of the Professional Engineer, licensed in the State of Idaho, whose seal and signature appear below:



Original Signed By: Scott R. Jacobson, P.E.
Date Original Signed: 2/26/2021
Original Stored at: AEI Engineering, Inc.

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 GENERAL DESCRIPTION OF WORK

- A. The Contractor shall provide all labor, material, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment, devices and components as indicated and implied by the plans and these specifications.
- B. Complete the wiring to, connection to, adjustment and calibration of, testing of equipment having electric motors and/or built-in or furnished electrical components. Install electrical components that are furnished with mechanical equipment.
- C. Complete the procurement, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical devices, components, accessories, and equipment which is not shown or specified but which is nonetheless required to make the systems shown and specified function properly.
- D. The Contractor shall install and make all connections to the equipment furnished by the Owner except and shown on the drawings.
- E. Provide the size, type and rating of motor control devices, equipment and wiring necessary to match the ratings of motors furnished with mechanical equipment.
- F. Provide adequate space for the electrical installation, including but not limited to, determination of accessways and doorways, shipping sections, wall and floor space, and space occupied by mechanical equipment. Provide electrical equipment that fits in the areas shown on the drawings. All equipment shall be readily accessible for maintenance, shall have electrical clearances in accordance with NEC and shall be installed in locations that will provide adequate cooling.
- G. Check electrical equipment prior to installation so that defective equipment is not installed. Acceptance testing for electrical equipment shall be performed as discussed in Sections 26 08 00 and 26 92 10.
- H. Provide start-up, follow-up and training of the Owner's personnel for electrical systems. Make all corrective measures required during start-up. See specific requirements for training and start-up in other specification sections.
- I. Provide field services of qualified technicians to supervise and check out the installation of the equipment, to supervise and check out interconnecting wiring, to conduct start-up of operation of the equipment, and to correct any problems, which occur during start-up.
- J. Provide circuit breakers, conduit, wire and installation for all items which require 120 VAC power.

1.03 DEFINITIONS

- A. The words “plans” and “drawings” are used interchangeably in this specification and in all cases shall be interpreted to mean “drawings”.
- B. The word “provide” shall be interpreted to mean furnish and install.

- C. “Owner” shall be the City of Post Falls.
- D. “Contractor” is the party who furnishes and installs all tools, materials and equipment. This includes the Prime Contractor, the Electrical Contractor, Control System Integrator, and all other Contractors and Sub Contractors.
- E. “Control System Integrator” (CSI) also referred to as the System Integrator or Integrator is the Party that furnishes all control components and designs the detailed control wiring diagrams plus the layout and assembly of the custom control panels.
- F. “Control System” includes all equipment, instruments and wiring for control and monitoring of all operating pumps and equipment. This includes custom control panels, motor control center, packaged control panels, and control equipment furnished with other systems and mechanical equipment. All sensing, transmitting, indicating, control and recording of all functions as specified and shown are also included in the control system.

1.04 PROJECT DESCRIPTION

- A. In general, the project consists of construction of a new entry plaza.
- B. The following statements highlight the main portion of the electrical work:
 - 1. Coordinate with the utility company to provide power to the site per utility requirements.
 - 2. Provide electrical construction for the new structures as indicated on the drawings.
 - 3. Provide propane tanks, piping, and connections for the new fire pits as indicated on the drawings.
 - a. GAS PIPING: Provide all required regulators, piping, connections and supports per local code requirements. Steel Pipe: ASTM A 53/A 53M; Type E or S; Grade B; black. Wall thickness of wrought-steel pipe shall comply with ASME B36.10M. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends. Furnish pipe and fittings with factory-applied, corrosion-resistant polyethylene coating for use in contact with materials that may corrode the pipe. Flexible Connectors: ANSI Z21.24, copper alloy. Gas Valves: ASME B16.33 and CSA International-listed bronze body and 125-psig pressure rating.

1.05 PROJECT CONDITIONS

- A. Do not install electrical or control equipment and hardware that are wet, moisture damaged, or mold damaged.
- B. Environmental Limitations: Do not deliver or install electrical distribution, motor control, control panels, and other electrical apparatus until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings 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.
- C. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit work to be performed according to manufacturer's written instructions and warranty requirements.

D. Field Measurements: Verify actual dimensions of openings and available space by field measurements before fabrication.

1.06 COORDINATION

A. Equipment Coordination

1. The Contractor is responsible to coordinate the equipment supplied from various manufacturers. This includes but is not limited to:
 - a. Obtaining specific information on equipment ratings and sizes and verifying the electrical components supplied meet, or match the requirements such as voltage, phase, frequency, starter types, etc.
 - b. Verifying the equipment supplied will fit within the space allocated.
 - c. Coordination of equipment and the electrical power and control requirements. Provided in all sections of the specifications and drawings.
 - d. Providing power and control equipment, wiring, and raceways to meet the requirements of the mechanical equipment supplied.
 - e. Providing all necessary control wiring and components for any special requirements from an equipment manufacturer.
 - f. Owner provided equipment.
2. The Contractor shall verify as a minimum:
 - a. Correct voltage, phase and frequency
 - b. Size and space requirements
 - c. Mounting requirements
 - d. Correct motor starter type
 - e. Proper coordination with the controls and control system Integrator.
3. Any discrepancies between the electrical and other equipment shall be brought to the immediate attention of the Engineer.

1.07 FINAL ACCEPTANCE

A. Prior to final acceptance the Engineer will perform one or more site observation trips to develop a “punch list” of items deemed incomplete. The Electrical Contractor and Control System Integrator shall be present while these inspections are taking place and shall be available for opening cabinets and operating and adjusting the system as is necessary for the Engineer to verify all equipment is installed and operates to the requirements of the contract documents. The contractor shall anticipate a minimum of 16 hours to complete the final acceptance testing.

- B. Prior to the Contractor calling for this observation, the Contractor shall have completed all items of work, including wire markers, nameplates, final tests and final test reports. All equipment shall be checked for proper operation and all signals verified for correct calibration and wiring.
- C. Final acceptance will not be given until:
 - 1. All work is complete.
 - 2. All punch-lists are checked off and returned to the Engineer.
 - 3. All test reports are received.
 - 4. All O&M manuals are received.
 - 5. All spare parts are received.
 - 6. All instrument test forms are received.
 - 7. All project record drawings are received.
- D. Punch Lists
 - 1. Each punch list item shall be completed by the Contractor and checked off of the list. When all of the items on the list are completed or commented on, the list shall be signed by the Contractor and returned to the Engineer for verification.

1.08 PROJECT RECORD DRAWINGS

- A. A set of drawings shall be maintained at the job site (by the Electrical Contractor) showing any deviations in the electrical systems from the original design.
- B. This set of drawings shall be readily available for inspection by the Engineer at all times.
- C. Another complete set of drawings shall be marked up in the office showing the changes made on the field set of drawings. All changes shall be clearly marked in red on the drawings. Drawings shall be submitted to the Engineer at the completion of the project.
- D. A set of electrical drawings marked in red to indicate the routing of conduit runs, shall be submitted to the Engineer for review at the completion of conduit rough-in and prior to cover or pouring of concrete.

1.09 GUARANTEE

- A. The Contractor shall guarantee his work and all components thereof, excluding incandescent and fluorescent lamps for a period of 1 year from date of acceptance of installation. The Contractor shall remedy any defects in workmanship and repair or replace any faulty equipment that shall appear within the guarantee period without additional cost to the Owner. Reference Section 01 7450 for additional requirements.

1.10 CLEANUP

- A. The premises must be kept free of accumulated materials, rubbish and debris at all times. Surplus material, tools and equipment must not be stored at the job site. At the completion of the job, all equipment and fixtures shall be left clean and in proper condition for their intended use.

- B. All motor control equipment (MCE), panelboards, control panels, junction boxes, raceways, and enclosures shall be cleaned inside and out at the completion of the project.

1.11 TESTS

- A. Testing for installed feeder cables and motors is required as specified in Sections 26 08 00 and 26 12 00. Instrumentation devices and wiring shall be tested as specified in Sections 26 08 00 and 26 92 10. Test reports shall be submitted to the Engineer prior to final acceptance. All tests shall be performed in accordance with the applicable sections of NETA.

1.12 SHOP DRAWINGS AND SAMPLES

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with Section 01 30 00 and other Division 26 Sections. Each submittal will be identified as Engineer may require.

1. Shop Drawings

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 1.13.D.

2. Samples

- a. Submit number of Samples specified in the Specifications.
- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require enabling Engineer to review the submittal for the limited purposes required by Paragraph 1.13.D.

- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related work performed prior to Engineers review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. Submittal Procedures

- 1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:
 - a. All field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - b. The suitability of all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work;
 - c. All information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto; and

- d. Shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations, that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.
4. Provide cut sheets for all products with a Bill of materials showing quantity, manufacturer, catalog number, and the supplier name and phone number and relevant spec. paragraph number. Number each item in the bill of materials and relate the bill of materials to the submitted product index.
5. Identify on the cut sheets the exact model number, including any options, and the intended use of each item. Identification shall be by tag number of the equipment as shown on the drawings or a description of where it will be used. Submittals that are not clear as to the intended use of each item it contains will be rejected.

D. Engineer's Review

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
2. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique sequence, or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions.
3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 1.14.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 1.14.C.1.

E. Resubmitted Procedures

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

1.13 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall prepare and assemble detailed operation and maintenance manuals in accordance with the project general requirements and other requirements in Section 01 7300. The manuals shall be bound in a 3-ring binder and tabbed with an index, in general the O&M manual format shall meet that of the submittal data in Division 26 sections. The manuals shall include, but not be limited to, the following:

1. Catalog data and complete parts list for all equipment and devices.
2. All cut sheets of equipment and components.
3. Preventative maintenance procedures
4. Trouble-shooting
5. Calibration
6. Testing
7. Replacement of components
8. Automatic mode operation
9. Manual mode operation
10. System schematics / shop drawings and record drawings.
11. As-built wiring diagrams of cabinet and enclosure contained assemblies
12. As-built wiring diagrams of overall system
13. Listing of recommended spare parts
14. Listing of recommended maintenance tools and equipment.

1.14 OPERATION AND MAINTENANCE TRAINING (OWNER INSTRUCTION)

A. General:

1. The Contractor and appropriate factory-trained representatives shall instruct the Owner's representative in the proper operation and maintenance of all electrical and control systems and equipment and shall explain all warranties.

B. Training Agenda Outline:

1. Prior to instruction of Owner Personnel, the Contractor shall prepare a typed outline, listing the subjects that will be included in this instruction, and shall submit the outline for review by the Engineer at least 2 weeks prior to the time of the training.

C. Training Requirements:

1. Training shall be provided per the specific requirements in other sections of these specifications. In addition to training required in other sections of the specifications, the Contractor shall conduct

specifically organized training sessions in the overall operation and maintenance of the electrical and control system for personnel employed by the Owner. The training sessions shall be conducted to educate and train the personnel in operations and maintenance of all components of the electrical system outside the training requirements in the other Sections.

2. Training shall include, but not be limited to, the following:
 - a. Preventative maintenance procedures
 - b. Trouble-shooting
 - c. Calibration
 - d. Testing
 - e. Replacement of components
 - f. Equipment operation
3. At a minimum, 1 training session, each at least 6 hours in duration, shall be conducted at the facility after start-up of the electrical and control systems. The Contractor shall prepare and assemble specific instruction materials for each training session and shall supply such materials to the Owner at least 2 weeks prior to the time of the training.

D. Certification:

1. At the conclusion of the instruction period, the Contractor shall obtain the signature of each person being instructed on each copy of the approved training outline to signify that the personnel have a proper understanding of the operation and maintenance of the systems and resubmit the signed outlines.

E. Other Requirements:

1. Refer to other Division 26 Sections for additional Operator Training requirements for specific pieces of equipment or specific systems.
2. The Contractor shall coordinate the Operator Training requirements listed above with the Owner Instruction requirements of Division 1.

1.15 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment to the job site at the appropriate time for installation. Equipment items shall be crated or affixed to pallets with protective wrappings. Exercise care to prevent damage from handling. Store mechanical and electrical components off the ground in weathertight enclosures. Keep equipment dry at all times.
- B. Reference Division 1.

2.00 PRODUCTS

2.01 NOT USED

3.00 EXECUTION

3.01 NOT USED

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This section includes methods and materials for grounding systems and equipment.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Test wells.
 - 2. Ground rods.
 - 3. Ground rings.
 - 4. Grounding for building foundation/steel.
 - 5. Grounding for water distribution pipe.
 - 6. Grounding for sensitive electronic equipment.
- C. Qualification Data: For qualified testing agency and testing agency's field supervisor.
- D. Field quality-control reports.
- E. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
 - 1. Instructions for periodic testing and inspection of grounding features at ground rings, grounding connections for separately derived systems based on NFPA 70B.
 - a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - b. Include recommended testing intervals.

1.04 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that acceptable to authorities having jurisdiction and the Engineer.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with UL 467 for grounding and bonding materials and equipment.
- D. ANSI/IEEE Standard 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- E. Comply with Article 250 of the NEC (NFPA 70) for grounding.
- F. Approval: All grounding shall be in accordance with the requirements of, and shall be subject to the approval of the Engineer and the local electrical inspection.

2.00 PRODUCTS

2.01 CONDUCTORS

- A. Insulated Conductors: 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. Lexan or PVC, impulse tested at 5000 V.

2.02 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory 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, pressure type with at least two bolts.
- C. Pipe Connectors: Clamp type, sized for pipe.

- D. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- E. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
- F. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- G. Conduit Hubs: Mechanical type, terminal with threaded hub.
- H. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex-head bolt.
- I. Straps: Solid copper, copper lugs. Rated for 600A.

2.03 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch in diameter by 10 feet (19mm by 3m) in length.

3.00 EXECUTION

3.01 APPLICATIONS

- A. Conductors: Install stranded conductor for No. 8 AWG and smaller; and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 4 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 and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - 1. Install bus on insulated spacers 1-inch (25mm) minimum from wall, 6 inches (150mm) above finished floor unless otherwise indicated.
 - 2. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down to specified height above floor; connect to horizontal bus.
- 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.

3.02 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. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
- C. 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.
- D. 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.
- E. Signal and Communication Equipment: In addition to grounding and bonding required by NFPA 70, provide a separate grounding system complying with requirements in TIA/ATIS J-STD-607-A.
 1. For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 2. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a 1/4-by-4-by-12-inch grounding bus.

3. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
- F. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to the grounding conductor installed with the branch circuit conductors.
- G. Separately Derived System Grounding: Bond the case and neutral of each transformer directly to the nearest available effectively grounded structural metal member of the structure, the nearest available effectively grounded metal water pipe, or in accordance with the local electrical inspection department. Flexible conduit shall not be used as a ground path to a transformer.
- H. Standby Electric Power System: This is a separately derived system and shall have its neutral grounded to the generator frame and extended to the standby service equipment and bonded to the grounding electrode system.

3.03 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 (50mm) 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 two 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 26 1300 and shall be at least 12 inches (300mm) 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, but 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.

I. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column, extending around the perimeter of building.

1. Install 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 inches from building's foundation, unless otherwise indicated on drawings.

3.04 LABELING

A. Comply with requirements in Division 26 Section "Electrical Identification" Article for instruction signs. The label or its text shall be green.

B. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.

1. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

3.05 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:

B. Perform the following tests and inspections and prepare test reports:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.

2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells, and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance not less 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.
3. 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. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
5. Substations and Pad-Mounted Equipment: 5 ohms.
6. Manhole Grounds: 10 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

3.06 COORDINATION:

- A. General: Coordinate installation of grounding connections for equipment with equipment installation work. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Connections: Use exothermic welds or irreversible compression products for connecting bonding and grounding conductors to ground rods, to counterpoise, structural steel, piping systems, and elsewhere where shown on Drawings. Provide all accessories required for a complete installation.

3.07 TESTING:

- A. Perform tests per section 26 08 00.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 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.

1.03 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and IEEE C2.
- 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.

1.05 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

2.00 PRODUCTS

2.01 RACEWAY IDENTIFICATION MATERIALS

- A. Tags: Stainless steel 2-inch by ½-inch, with stamped/engraved legend, punched for use with stainless steel cable.

2.02 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Tags: Stainless steel 2-inch by ½-inch, with stamped/engraved legend, punched for use with stainless steel cable.

2.03 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. Heat Shrink Sleeves
 - 1. Field installed wire makers shall be pre-printed, heat shrink type sleeves, Thomas & Betts Type HVM, TYTON HELLERMAN Type THS, or approved equal.

2.04 UNDERGROUND-LINE WARNING TAPE

- A. Tape:
 - 1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications 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.
 - 4. Tape shall be detectable.
- 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: Type I:

1. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Thickness: 4 mils.
3. Weight: 18.5 lb per 1000 sq. ft.
4. 3 Inch Tensile According to ASTM D 882: 30 lbf, and 2500 psi.

2.05 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. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4 inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1mm) galvanized steel backing and with colors, legend and size required for application.
2. 1/4-inch (6.4mm) grommets in corners for mounting.
3. Nominal size, 10 by 14 inches (250 by 360mm).

E. 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."

2.06 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16-inch thick for signs up to 20 sq. in. and 1/8-inch thick for larger sizes.

1. Engraved legend with black letters on white face.
2. Punched or drilled for mechanical fasteners.
3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

B. 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.

2.07 EQUIPMENT IDENTIFICATION LABELS

A. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.08 CABLE TIES

A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self-extinguishing, one piece, self-locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength: 100 lbs.
3. Temperature Range: Minus 40 to plus 185 degrees F.
4. Color: Black except where used for color-coding.

2.09 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in Division 9 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location.

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

3.00 EXECUTION

3.01 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Heat Shrink Identification Products: Clean Surfaces before application, using materials and methods recommended by manufacturer of identification device.

- F. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- G. 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.
- H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- I. Cable Ties: For attaching tags. Provide UV-stabilized nylon.
- J. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400mm) overall.
- K. Painted Identification: Comply with requirements in Division 9 painting Sections for surface preparation and paint application.
- L. Conduit Markers: Provide conduit markers at each end for all conduit identified in conduit and wire schedules. Locate markers at penetrations of walls, floors, enclosures, vaults and handholes.

3.02 IDENTIFICATION SCHEDULE

- A. Power-Circuit and Control Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, control panels, equipment enclosures, motor control centers use color-coding conductor tape to identify the phase.
 - 1. Color-Coding:
 - a. Color shall be factory applied. Color for sizes larger than No. 8 AWG shall be factory applied or field applied if authorities having jurisdiction permit.
 - b. Insulation on phase conductor sizes AWG No. 10 and smaller shall be colored, No.8 AWG and larger may have black insulation with plastic tape of the appropriate color from the table below.
 - c. Insulation on the grounded conductor (neutral) sizes AWG No. 8 and smaller shall be colored, AWG No. 6 and larger may have black insulation with plastic tape of white or gray in accordance with the table below.
 - d. All control wiring in control panels or other enclosures that is powered from an external source and is not disconnected by the control panel disconnect shall be terminated at a disconnecting terminal block upon entering the enclosure. The color of the wire shall then be changed to yellow to identify it as being powered from an external source. Provide identification nameplate on exterior of enclosure to indicate sources of external power.
 - e. All wiring in industrial machines and equipment shall be in accordance with NFPA 79. Notify Owner of any deficiencies noted during installation.
 - f. Wiring shall conform to the following color code.

Description	120/208V	277/480V	Control
Phase A (Left)	Black	Brown	--
Phase B (Center)	Red	Orange	--
Phase C (Right)	Blue	Yellow	--
Neutral	White	Gray	White
Ground	Green	Green	Green
120 VAC Control	--	--	Red
120 VAC Control	Neutral	--	White
DC Control (+)	--	--	Blue
DC Control (-)	--	--	Gray
External Source	--	--	Yellow

- g. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) 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.

B. Wire Marking:

1. All power and control conductors (including conductors in instrument and relay compartments of motor control centers, in control panels, instrument panels, field panels and control stations, as well as connections to mechanical equipment), shall be tagged at each end with legible, permanently coded tight-fitting wire-marking sleeve showing the complete wire designation.
2. Wire marking lettering shall be bold and type written.
3. Wiring within a single enclosure shall be marked with the basic wire and terminal number at each end.
4. All field wiring shall have wire labels at each end. The labels shall be marked with the output terminal number at the original equipment (control panel, MCP, or MCC) and the remote device terminal number (if applicable) and tag name separated by a slash.
 - a. EXAMPLE for a control cable from the Main Control Panel (MCP) terminal #x102 to the pump 101 check valve limit switch (ZS-101) the wire tag number at both ends shall be x102 / ZS-101.
 - b. EXAMPLE for a control cable from the MCP to a local control panel terminal #y102, to terminal # 24 in LCP-200, the wire tag number at both ends shall be y102 / 24-lcp200
 - c. EXAMPLE for a control cable from the MCP terminal #h32 to the NMCC1 terminal #6 the tag number at both ends shall be h32 / 6-nmcc1.
 - d. EXAMPLE for a control cable from the NMCC1 terminal #c4 to device ZS-101, the wire tag number at both ends shall be c4 / zs-101.
5. Spare wiring shall be identified at each end with "SP#", and remote equipment number.
 - a. EXAMPLE for two spare control cables from the Main Control Panel (MCP) terminal to the local control panel (LCP-202), the wire tag number at the LCP shall be SP1 / MCP and SP2 / MCP. The tag at the MCP shall be SP1 / lcp202 and SP2 / lcp202

- 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. 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- (10-mm-) 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: Engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) 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.

2. Equipment to Be Labeled:

- a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be engraved, laminated acrylic or melamine label.
- b. Enclosures and electrical cabinets.
- c. Access doors and panels for concealed electrical items.
- d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- e. Motor-control equipment.
- f. Enclosed switches.
- g. Enclosed circuit breakers.
- h. Enclosed controllers.
- i. Power transfer equipment.
- j. Monitoring and control equipment.
- k. UPS equipment.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS:

- A. The Conditions of the Contract and applicable requirements of the “General Conditions”, and Section 26 01 00, “Electrical General Provisions”, govern this Section.
- B. Copies of NETA tables 100.1 and 100.2 are available at the office of the Engineer.

1.02 SUMMARY

A. Related Sections

- 1. Sections 26 12 00 and 26 92 10.

1.03 DESCRIPTION OF WORK:

A. General: Provide testing of electrical work installed under division 26, as specified herein and in other Division 26 sections. Feeders and equipment shall not be placed in service until they have been checked out and tested as applicable.

B. The following will be tested as indicated in this section:

- 1. Panelboards
- 2. Distribution and motor feeders.
- 3. Molded-case circuit breakers.
- 4. Grounding systems.
- 5. Motors.
- 6. Motor Controls, Motor Starters and Motor Control Equipment.
- 7. Surge Arresters.
- 8. System Function.

1.04 QUALITY ASSURANCE:

- A. Personnel: Submit evidence to show that personnel who will actually test the systems are qualified.
- B. The Engineer reserves the right to require that the originally approved personnel be replaced with other qualified personnel if, in his opinion, the original personnel are not qualified or are not properly conducting the system testing.

1.05 DIVISION OF RESPONSIBILITY

A. The Owner’s Representative

- 1. The owner’s representative shall provide the testing organization with the following:

- a. A complete set of electrical plans and specifications, including all change orders.
 - b. Drawings and instruction manuals applicable to the scope of work.
 - c. An itemized description of equipment to be inspected and tested.
 - d. A determination of who shall provide a suitable and stable source of electrical power to each test site.
 - e. A determination of who shall perform certain preliminary low-voltage insulation-resistance, continuity, and/or low-voltage motor rotation tests prior to and in addition to tests specified herein.
 - f. Notification of when equipment becomes available for acceptance tests. Work shall be coordinated to expedite project scheduling.
 - g. Site-specific hazard notification and safety training.
2. The testing organization shall provide the following:
- a. All field technical services, tooling, equipment, instrumentation, and technical supervision to perform such tests and inspections.
 - b. Specific power requirements for test equipment.
 - c. Notification to the user prior to commencement of any testing.
 - d. A timely notification of any system, material, or workmanship that is found deficient based on the results of the acceptance tests.
 - e. A written record of all tests and a final report.

1.06 SAFETY AND PRECAUTIONS

- A. All parties involved must be cognizant of applicable safety procedures. This document does not include any procedures, including specific safety procedures. It is recognized that an overwhelming majority of the tests and inspections recommended in these specifications are potentially hazardous. Individuals performing these tests shall be capable of conducting the tests in a safe manner and with complete knowledge of the hazards involved.
- B. Safety practices shall include, but are not limited to, the following requirements:
1. All applicable provisions of the Occupational Safety and Health Act, particularly OSHA 29CFR 1910.
 2. Accident Prevention Manual for Industrial Operations, National Safety Council.
 3. Applicable state and local safety operating procedures.
 4. Owner's safety practices.
 5. ANSI/NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces.

- C. A safety lead person shall be identified prior to commencement of work.
- D. A safety briefing shall be conducted prior to the commencement of work.
- E. All tests shall be performed with the apparatus de energized and grounded except where otherwise specifically required to be ungrounded or energized for certain tests.
- F. The testing organization shall have a designated safety representative on the project to supervise operations with respect to safety.

1.07 SUITABILITY OF TEST EQUIPMENT

- A. All test equipment shall be in good mechanical and electrical condition.
- B. Field test metering used to check power system meter calibration must be more accurate than the instrument being tested.
- C. Accuracy of metering in test equipment shall be appropriate for the test being performed. Wave shape and frequency of test equipment output waveforms shall be appropriate for the test and the tested equipment.

1.08 TEST INSTRUMENT CALIBRATION

- A. Testing organization shall have a calibration program which assures that all applicable test instruments are maintained within rated accuracy for each test instrument calibrated.
- B. The firm providing calibration service shall maintain up to date instrument calibration instructions and procedures for each test instrument calibrated.
- C. The accuracy shall be directly traceable to the National Institute of Standards and Technology (NIST).
- D. Instruments shall be calibrated in accordance with the following frequency schedule:
 - 1. Field instruments: Analog, 6 months maximum. Digital, 12 months maximum.
 - 2. Laboratory instruments: 12 months maximum.
 - 3. Leased specialty equipment: 12 months maximum.
- E. Dated calibration labels shall be visible on all test equipment.
- F. Records, which show date and results of instruments calibrated or tested, must be kept up to date.
- G. Calibrating standard shall be of better accuracy than that of the instrument tested.

1.09 TEST REPORT

- A. The test report shall include the following:
 - 1. Summary of project.
 - 2. Description of equipment tested.

3. Description of tests.
4. Test data.
5. Analysis and recommendations.

B. Test data records shall include the following minimum requirements:

1. Identification of the testing organization.
2. Equipment identification.
3. Humidity, temperature, and other conditions that may affect the results of the tests and/or calibrations.
4. Date of inspections, tests, maintenance, and/or calibrations.
5. Identification of the testing technician.
6. Indication of inspections, tests, maintenance, and/or calibrations to be performed and recorded.
7. Indication of expected results when calibrations are to be performed.
8. Indication of “as-found” and “as-left” results, as applicable.
9. Sufficient spaces to allow all results and comments to be indicated.

C. The testing organization shall furnish a copy or copies of the complete report to the owner as specified in the acceptance testing contract.

1.10 SUBMITTALS:

- A. Testing Procedures: Submit 2 copies of all proposed testing procedures to the Engineer for review at least 30 days prior to conducting any testing on the project.
- B. Reporting Forms: Submit 2 copies of the proposed forms to be used in recording testing data and results to the Engineer for review at least 30 days prior to conducting any testing on the project.
- C. Test Data and Results: Submit four copies of complete data and certified test results for each test performed, including, but not limited to:
 1. Test performed.
 2. Test procedure.
 3. System and area tested.
 4. Date(s) and time(s) of test.
 5. Weather conditions.
 6. Test criteria.

7. Test results.
 8. Additional pertinent information.
- D. Operational Certification: Submit four certified copies of an operational certification which documents that all equipment and systems have been fully tested to verify proper operation in accordance with the design shown in the Contract documents and manufacturer's recommendations.
- E. Certification: Certifications stating that submitted test data and results are true and correct shall be provided for all submittals under this section. Certification shall be executed by an authorized officer if the Contractor is a corporation, by a partner if the Contractor is a partnership, by the owner if the Contractor is a sole proprietorship or by the authorized representative if the Contractor is a joint venture.
- F. Calibration List: Submit four copies of a listing of testing devices to be used for the project to the Engineer for approval. Listing shall include documentation that the devices are properly calibrated.
- G. Test Log: The Contractor shall maintain a test log at the site to document the results of all successful and unsuccessful testing and balancing at it is performed. This log shall be available for review by the Engineer and a copy of the log shall be submitted to the Engineer prior to the Substantial Completion inspection. A space shall be provided on the test log signoff by the Engineer or Owners representative.
- 1.11 NOTICE:
- A. General: Notify the Engineer in writing two weeks prior to all scheduled testing to allow time for Engineer to schedule witnessing of testing, where elected by Engineer.

2.00 PRODUCTS

2.01 TESTING MATERIALS:

- A. General: Provide all materials and test equipment required for testing of specified electrical systems, including re-testing until acceptable results are obtained.
- B. Products: Tested products which fail to provide acceptable test results shall be repaired or replaced with suitable materials as required to obtain acceptable results.

3.00 EXECUTION

3.01 TESTING

- A. General: Tests shall be made during the course of the construction as specified and as required by authorities having jurisdiction. Such tests shall be conducted by this Division as part of the Work and shall include all personnel, material, and equipment required to perform test until satisfactory results are obtained. Any defects detected during testing shall be satisfactorily repaired or the equipment involved shall be replaced and the test re-executed.
- B. Test: Testing forms included:
1. Electrical System Test Report.
 2. Electrical Ground Rod Test Report.
 3. Motor Data and Test Report.

4. Instrument Test Report.

MOTOR DATA AND TEST REPORT

EQUIPMENT NAME AND NUMBER: _____

EQUIPMENT SPECIFICATION SECTION: _____

MOTOR STARTER LOCATION _____

CONTRACTORS REPRESENTATIVE _____ Date _____

MOTOR NAMEPLATE DATA

MFR Name/Model No. _____

Voltage/Phase/HP _____

FLA/LRA _____

Service Factor _____

Efficiency Index (or percent) _____

NEMA Design _____

Code Letter _____

Insulation Type _____

Temperature Rise _____

Ambient Temperature _____

RPM _____

Enclosure _____

Thermal Trip Setting _____

Space HTR: Watts/Volts _____

Other Data _____

MOTOR STARTER INFORMATION

Manufacturer/Type _____

Overload Heater No _____

* RECORDED FULL LOAD DATA VOLTS A-G _____ B-G _____ C-G _____

FULL LOAD OPERATING VOLTAGE VOLTS A-B _____ B-C _____ C-A _____

FULL LOAD OPERATING CURRENT AMPS A _____ B _____ C _____

INSULATION RESISTANCE MEGOHMS A-G _____ B-G _____ C-G _____

MOTOR CIRCUIT RESISTANCE OHMS A-B _____ B-C _____ C-A _____

*VOLTAGE & CURRENT READINGS SHALL BE TAKEN AT THE CLOSEST ACCESSIBLE POINT TO THE LOAD

TRANSMITTER CALIBRATION / TEST DATA FORM

Tag. No. and/or Description: _____ Serial No. _____

Make and Model No.: _____

Associated Panel: _____

Type of testing equipment used: _____

Input: _____

Output: _____

Range: _____ Scale: _____

Calibrated Value (flow/pressure/turbidity etc.) at 4mA _____

Calibrated Value (flow/pressure/turbidity etc.) at 20mA _____

Simulate process variable (flow, pressure, turbidity, etc.) and measure output with appropriate meter. Related value is (example: the level associated with the pressure).

<u>% Range</u>	<u>Input (engr. units)</u>	<u>Related value</u>	<u>Expected Output</u>	<u>Actual Output</u>
0	_____	_____	_____	_____
25	_____	_____	_____	_____
50	_____	_____	_____	_____
75	_____	_____	_____	_____
100	_____	_____	_____	_____

COMMENTS:

TESTED BY _____ DATE: _____

OWNERS REPRESENTATIVE _____ DATE: _____

ELECTRICAL SYSTEM TEST REPORT - 600V CABLE

**ELECTRICAL SYSTEM
DESCRIPTION DATA**

SERVICE DESCRIPTION:

Nominal Voltage, Phase To Phase _____
Phase To Neutral - Single Or Three Phases- _____
Number Of Conductors _____

SERVICE CONDUCTORS:

Phase Size And Insulation Type _____
Neutral Size And Insulation Type _____
Ground Size And Insulation Type _____

SERVICE DISCONNECT DESCRIPTION:

Circuit Breaker Or Disconnect Switch _____
Size (amps) _____
Fuse (amps) _____

MEASURED CONDITIONS

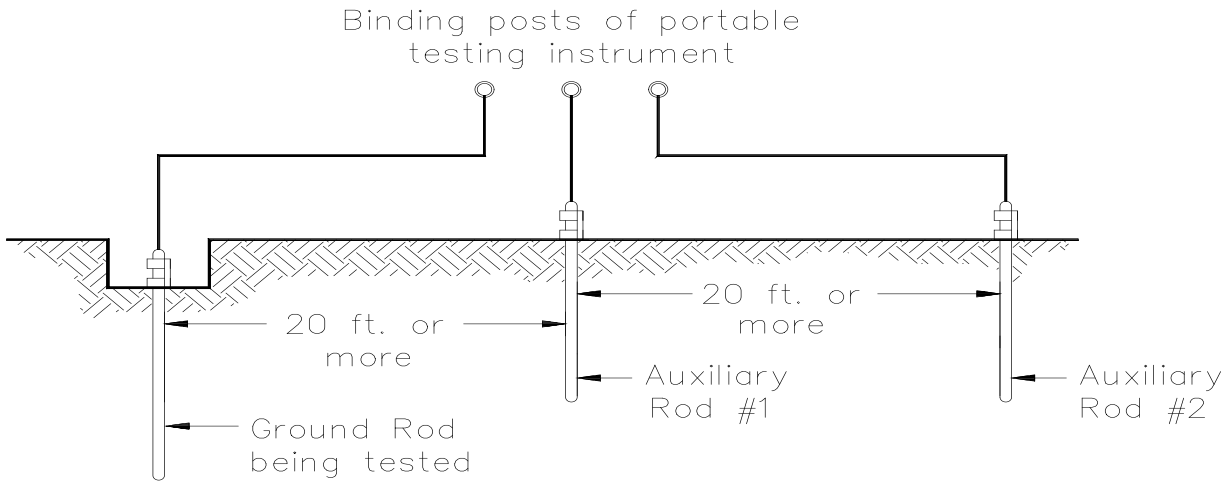
DATA

Operating Load Voltage	Volts	Vab _____	Vbc _____	Vca _____
		Van _____	Vbn _____	Vcn _____
Operating Load Feeder Current	Amps	la _____	lb _____	lc _____
		a-b _____	b-c _____	c-a _____
Conductor Insulation Mega ohms	Mega Ω	a-g _____	b-g _____	c-g _____

Resistance - record the indicated measurement for each of the following circuits:

Service Feeder _____
Pump Feeders _____
Motor Feeders _____
480V Feeders _____

ELECTRICAL GROUND ROD TEST REPORT



GROUND ROD RESISTANCE TESTING

PROCEDURE:

To measure ground resistance, two additional temporary grounds, consisting of short rods 2 or 3 feet long, shall be driven in the ground at least 20 feet away from the rod being tested. A direct-reading ground resistance tester shall then be connected to the three ground rods by means of insulated leads. The battery operated ground resistance tester reads the resistance of the ground rod being tested directly in ohms. The ground rod location / designation and its measured ohm value shall be recorded in chart below.

GROUND ROD LOCATION / DESIGNATION	OHM VALUE
1.	*
2.	*
3.	*
COMPOSITE GROUND	*

*Ohm value of a single ground rod shall not exceed 25 Ohms. If additional ground rod(s) are added, the "composite" ground electrode shall have a maximum acceptable reading of 15 Ohms which shall be recorded in chart above.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:

- 1. Building wires and cables rated 600 V and less.
- 2. Connectors, splices, and terminations rated 600 V and less.

- B. Related Sections include the following:

- 1. Division 26 Section “Electrical Identification” for cable tags and nameplates.

1.03 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.

- B. NBR: Acrylonitrile-butadiene rubber.

1.04 SUBMITTALS

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

1.05 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- B. Comply with NFPA 70.

1.06 COORDINATION

- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

2.00 PRODUCTS

2.01 POWER CONDUCTORS AND CABLES

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

- 1. American Insulated Wire Corp.; a Leviton Company.
- 2. General Cable Corporation.
- 3. Senator Wire & Cable Company.

4. Southwire Company.

5. Belden, Inc.

6. Okonite Company.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

D. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC metal-clad cable, Type MC mineral-insulated, metal-sheathed cable, Type MI Type SO and Type USE with ground wire.

E. Unshielded Power Cable

1. XLPE/HYP unshielded 600V, UL Type TC-ER power cable, UL 44 Type XHHW-2, 90 Degrees C wet or dry, three-conductor cable with ground. Gage per conduit and wire schedule. General Cable Type CHTC Spec 4100 or approved equal.

2.02 SIGNAL AND CONTROL SYSTEM CABLE

A. Shielded Signal Cable

1. Signal conductor cable shall be 16 AWG individually twisted, shielded pairs, Belden 9342, or equal. Conductors shall be tinned copper with color coded 194 Degrees F PVC insulation and individual conductor jacket of nylon. Shielding shall be aluminum polyester 100 percent shield coverage with drain wire. The cable shall have an overall PVC jacket. The insulation system shall be tray cable rated for 600V.

2. Multi-pair signal conductor cable shall be 18 AWG (unless otherwise noted) individually twisted, shielded pairs, Belden 1048A through 1054A, and 1038A, or equal. Conductors shall be tinned copper with color coded 194 Degrees F PVC insulation and individual conductor jacket of nylon. Shielding shall be aluminum polyester 100 percent shield coverage with drain wire. The cable shall have an overall PVC jacket. The insulation system shall be tray cable rated for 600V.

B. Unshielded Multiconductor Control Cable

1. XLPE/PVC Industrial grade sunlight and oil resistant, 600V type TC, UL control cable. Tinned copper conductors. Number of conductors and gage per conduit and wire schedule. Belden 27000CD series or equal.

2.03 DATA COMMUNICATIONS CABLE

A. Telephone Communications Cable

1. Telephone communications cable shall be AWG No. 22, solid tinned copper conductors, PVC insulated with chrome PVC jacket. Conductors shall be rated for 150V, 80 Degrees C. Provide 4 pair minimum to individual phone outlet locations. Provide 4 pair minimum to individual phone outlet locations. Provide 6 pair service cable, or as indicated in the telephone riser diagram or on the drawings. Cable to be as manufactured by BELDEN (Type 8740) or approved equal.

B. UTP Communication Cable

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Belden CDT Inc.; Electronics Division.
 - b. Berk-Tek; a Nexans company.
 - c. CommScope, Inc.
 - d. Draka USA.
 - e. Genesis Cable Products; Honeywell International, Inc.
 - f. KRONE Incorporated.
 - g. Mohawk; a division of Belden CDT.
 - h. Nordex/CDT; a subsidiary of Cable Design Technologies.
 - i. Superior Essex Inc.
 - j. SYSTIMAX Solutions; a CommScope, Inc. brand.
 - k. 3M.
 - l. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
2. Description: 100-ohm, 4-pair UTP, formed into 25-pair, binder groups covered with a blue, yellow, grey or white thermoplastic jacket, per Owners color convention.
 - a. Comply with ICEA S-90-661 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.1 for performance specifications.
 - c. Comply with TIA/EIA-568-B.2, Category 5e.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70

C. PLC Network Communication Cable

1. Ethernet: Belden 1583A.
2. For applications where 600V insulation is required, 600V insulated signal wire shall only be used where required by Code. Belden 1120A or equal.

2.04 CONNECTORS AND SPLICES

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

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.

3. O-Z/Gedney; EGS Electrical Group LLC.
 4. 3M; Electrical Products Division.
 5. Tyco Electronics Corp.
 6. Raychem
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.
- C. Motor Terminal Splice Insulation:
1. Provide motor terminal splice insulation in the motor connection box that will withstand constant vibration and abrasion without degrading the insulation of the splice. A product shall be used that is specifically designed for the purpose of motor terminations.
 2. For motor splices in general purpose areas use a bolted splice with a TY-RAP boot type insulator, Thomas & Betts splice insulator series MSC. For splices using wire larger than AWG No. 8 it is also acceptable to use a heat shrinkable motor connection stub splices, RAYCHEM, MCK-V series or equal.
 3. For motors in outdoor, damp, or corrosive environments, use a water proof motor stub insulator, Thomas & Betts multi splice insulator MSLT112-4 or equal. For splices using wire larger than AWG No. 8 it is also acceptable to use a heat shrinkable motor connection stub splices, RAYCHEM, MCK-V series or equal.

3.00 EXECUTION

3.01 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper Stranded for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Stranded No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Control Conductors: Copper Stranded.

3.02 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW, single conductors in raceway.
- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THWN, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway.

- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
- I. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- J. Class 2 Control Circuits: Type THHN-THWN, in raceway.
- K. Variable Frequency Drive Motor Feeders: Shielded Power Cable.

3.03 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- C. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
- E. Identify and color-code conductors and cables according to Division 26 Section "Electrical Identification."
- F. Conductor Spacing:
 - 1. Unless specifically shown otherwise on the drawings, in all areas maintain a minimum 2-inch separation between all conductors of different voltages. For parallel runs over 6 feet maintain the following minimum separation between conductors:
 - a. Signal (12/24) VDC and 120 VAC - 6 inches
 - b. Signal (12/24) VDC and 480 VAC - 12 inches
 - c. 120 VAC control wire and 480 VAC - 2 inches
- G. Wire Bending Radius:
 - 1. The radius of bends in all wire (conductors and cables) shall not be less than five (5) times the outside diameter of the wire. Any wire installed with bends less than five times the diameter which the Engineer deems has caused that insulation to be damaged shall be removed and new wire shall be installed.

3.04 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 and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - 1. Use compression type splices with oxide inhibitor in each splice and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 12 inches of slack.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform tests and inspections and prepare test reports.
- C. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance, feeder conductors, and motor 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 Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - 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. General Tests:
 - 1. Test Scope:
 - a. The Contractor shall provide all material, equipment, labor and technical supervision to perform tests and inspections as specified herein.
 - b. It is the intent of these tests to assure that all electrical equipment as supplied and installed by the Contractor is operational within the industry and manufacturer's tolerances and is installed in accordance with the design documents.

- c. The tests and inspection shall determine the suitability for energization.
 - d. If the test results indicate corrective measures are required, the Contractor shall undertake all such corrective measures. No additional compensation will be paid for corrective measures.
2. Control and Signal Wiring:
- a. Each individual control and signal wire shall be tested by the Contractor from the field device back to the control panel or point to point to verify correct wiring.
 - b. For control and signal wiring terminating at a PLC, the Contractor shall force or jumper each input at the field device and verify that the PLC has received the signal at the correct input. Each output shall be forced and checked at the field device.
3. Power Conductor Tests:
- a. Following the completion of installation; test the following:
 - 1 All 480V Power Feeders scheduled in Conduit & Cable Schedule.
 - 2 Service feeder and pump feeder power cabling.
 - 3 All new grounding; measure ground resistance at each ground rod.
 - 4 Motor feeders
4. The Contractor shall perform voltage, current and resistance tests as required to complete the Electrical System Test Report form included herein. Test reports must be submitted to the Engineer prior to start up. The Contractor shall inform the Engineer when testing is taking place a minimum of 5 days in advance. Testing shall not take place unless the Engineer or other Owner representative is present to witness the testing.
5. Visual and Mechanical Inspections:
- a. Inspect exposed section for physical damage.
 - b. Verify cable is supplied and connected in accordance with specifications and one-line diagrams, and that phases are labeled correctly.
6. Electrical Tests:
- a. Perform insulation resistance test on each cable with respect to ground and adjacent cables.
 - b. Perform continuity test to ensure proper cable connection.
7. Test Values:
- a. Insulation resistance tests shall be performed at 500V DC for one minute.
 - b. Minimum megger readings at 68 Degrees F shall be one megaohm.

- c. The maximum acceptable reading for an individual ground rod shall be 25 ohms as required by the NEC and measured by the three-rod method. The composite ground electrode shall have a maximum acceptable reading of 15 ohms

- E. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- F. Remove and replace malfunctioning units and retest as specified above.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.
- B. Hangers and supports for electrical equipment and systems.
- C. Construction requirements for concrete bases.

1.03 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LTFMC: Liquidtight flexible metal conduit.
- F. LFNC: Liquidtight flexible nonmetallic conduit.
- G. NBR: Acrylonitrile-butadiene rubber.
- H. RNC: Rigid nonmetallic conduit.
- I. RMC: Rigid metal conduit (Galvanized Rigid Steel).

1.04 AREA CLASSIFICATIONS:

- A. The following classification of areas shall be used as a reference in determining application of material covered by this Section unless specifically shown otherwise on the drawings. Areas which fall under two or more of the following classifications shall conform to the minimum requirements of all of the area classifications listed for that area. Hazardous area classifications shall be defined by NFPA 70 and 820.
- B. Hazardous Areas (reference area classification drawing):
 - 1. None.
- C. Corrosive areas:
 - 1. None.
- D. Outdoor Wet and/or Damp Areas:

1. All outdoor areas.

E. Indoor Wet and/or Damp Areas:

1. None.

F. General Purpose Areas:

1. None.

1.05 SUBMITTALS

A. Product Data: For raceways, surface raceways, wire ways and fittings, floor boxes, hinged-cover enclosures; steel slotted support systems, and cabinets.

B. Shop Drawings: For the following raceway components. Contractor shall submit raceway layouts during submittal process including but not limited to plans, elevations, sections, details, and attachments to other work.

1. Custom enclosures and cabinets.

2. For handholes and boxes for underground wiring, including the following:

a. Duct entry provisions, including locations and duct sizes.

b. Frame and cover design.

c. Grounding details.

d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

e. Joint details.

3. Trapeze hangers. Include Product Data for components.

4. Steel slotted channel systems. Include Product Data for components.

5. Equipment supports.

C. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members in the paths of conduit groups with common supports.

2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.

D. For each area, submit a tabbed section for raceway, boxes, support materials, etc. to be used in each of the designated areas defined above in "Area Classifications".

E. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section "Electrical Supports and Seismic Restraints." Include the following:

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified."
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.

F. Qualification Data: For professional engineer and testing agency.

G. Source quality-control test reports.

1.06 CONDUIT SCHEDULE

A. Refer to conduit and cable schedule on plans for raceway sizing and routing description.

1.07 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as de-fined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

2.00 PRODUCTS

2.01 METAL CONDUIT AND TUBING

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

1. AFC Cable Systems, Inc.
2. Alflex Inc.
3. Allied Tube & Conduit; a Tyco International Ltd. Co.
4. Anamet Electrical, Inc.; Anaconda Metal Hose.
5. Electri-Flex Co.
6. Manhattan/CDT/Cole-Flex.
7. Maverick Tube Corporation.
8. O-Z Gedney; a unit of General Signal.
9. Wheatland Tube Company.

B. Rigid Metal Conduit: ANSI C80.1.

- C. IMC: ANSI C80.6.
- D. PVC-Coated Rigid Metal Conduit:
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch, minimum.
- E. EMT: ANSI C80.3.
- F. FMC: Zinc-coated steel.
- G. LTFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: Steel, compression type.
 - 3. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, 0.040 inch, with overlapping sleeves protecting threaded joints.
 - 4. Fittings for LTFMC: Malleable iron or stainless steel
- I. Joint Compound for Rigid Metal Conduit or IMC: Listed for use in cable connector assemblies and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.02 NONMETALLIC CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 3. Arnco Corporation.
 - 4. CANTEX Inc.
 - 5. J.M. Eagle.
 - 6. Condux International, Inc.
 - 7. ElecSYS, Inc.
 - 8. Electri-Flex Co.
 - 9. Lamson & Sessions; Carlon Electrical Products.
 - 10. Manhattan/CDT/Cole-Flex.

11. RACO; a Hubbell Company.
 12. Thomas & Betts Corporation.
- B. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
- C. LFNC: UL 1660.
- D. Fittings for RNC: NEMA TC 3; match to conduit or tubing type and material.
- E. Fittings for LFNC: UL 514B.
- F. Expansion Fittings:
1. Expansion fittings in exposed runs shall be of the weatherproof type and shall be provided with an external bonding jumper. The expansion fittings shall allow for 4 inches longitudinal movement and shall be designed so that when completely assembled the end of each conduit entering the fitting is bushed. Fittings shall be O.Z. GEDNEY Type EX.
 2. Expansion fittings in embedded runs shall be of the watertight type and shall be provided with an internal bonding jumper. The expansion material shall be neoprene and shall allow for 3/4-inch movement in any direction. Fittings shall be O.Z. GEDNEY Type DX

2.03 COMMUNICATIONS CABLE RACEWAY AND FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Arnco Corporation.
 2. Endot Industries Inc.
 3. IPEX Inc.
 4. Lamson & Sessions; Carlon Electrical Products.
- B. Description: Comply with UL 2024; flexible type, approved for plenum, riser, or general-use installation as required.

2.04 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Cooper B-Line, Inc.
 2. Hoffman.
 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 12, unless otherwise indicated.
- C. Fittings and Accessories: Include 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 or as indicated.

E. Finish: Manufacturer's standard enamel finish.

2.05 NONMETALLIC WIREWAYS

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

1. Hoffman.
2. Lamson & Sessions; Carlon Electrical Products.

B. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.

C. Fittings and Accessories: Include 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.

2.06 SURFACE RACEWAYS

A. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected by Engineer.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Thomas & Betts Corporation.
 - b. Walker Systems, Inc.; Wiremold Company (The).
 - c. Wiremold Company (The); Electrical Sales Division.

2.07 BOXES, ENCLOSURES, AND CABINETS

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

1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
2. EGS/Appleton Electric.
3. Erickson Electrical Equipment Company.
4. Hoffman.
5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
6. O-Z/Gedney; a unit of General Signal.
7. RACO; a Hubbell Company.

8. Robroy Industries, Inc.; Enclosure Division.
 9. Scott Fetzer Co.; Adalet Division.
 10. Spring City Electrical Manufacturing Company.
 11. Thomas & Betts Corporation.
 12. Walker Systems, Inc.; Wiremold Company (The).
 13. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary.
- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, aluminum, Type FD, with gasketed cover.
- D. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
- E. Metal Floor Boxes: Cast or sheet metal, fully adjustable, rectangular.
- F. Nonmetallic Floor Boxes: Nonadjustable, round.
- G. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- H. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- I. Hinged-Cover Enclosures: NEMA 250, Type 12, with continuous-hinge cover with flush latch, unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- J. Cabinets:
1. NEMA 250, Type 12, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel, unless otherwise indicated.
 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.
- K. Fittings and boxes in WET or DAMP areas shall be:
1. Fittings:
 - a. Hot-dipped galvanized.
 - b. All metallic hardware (hinges, screws, bolts, etc.) shall be stainless steel.
 2. Boxes:

- a. NEMA 4, stainless steel.
- b. All metallic hardware (hinges, screws, bolts, etc.) shall be stainless steel.

2.08 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Allied Tube & Conduit.
 - b. Cooper B-Line, Inc.; a division of Cooper Industries.
 - c. ERICO International Corporation.
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation.
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 2. Stainless Steel.
 3. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 4. Channel Dimensions: Selected for applicable load criteria.
- B. Conduit and Cable Support Devices: Hot-dipped malleable-iron hangers, clamps with backing spacer, and associated fittings, designed for types and sizes of raceway or cable to be supported.
1. Two-hole metal straps are not permissible.
- C. 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 hot dipped malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
1. Powder-Actuated Fasteners: Threaded-stainless 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; a division of Illinois Tool Works, Inc.
- 3 MKT Fastening, LLC.
- 4 Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless 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; a division of Illinois Tool Works, Inc.
- 5 MKT Fastening, LLC.

3. Concrete Inserts: Hot dipped 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. Stainless Steel.

6. Toggle Bolts: All-stainless steel springhead type.

7. Hanger Rods: Threaded stainless steel.

2.09 SLEEVES FOR RACEWAYS

- 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 waterstop, unless otherwise indicated.

- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052-inch or 0.138-inch thickness as indicated and of length to suit application.

2.10 SLEEVE SEALS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide or a product by one of the following:
1. Advance Products & Systems, Inc.
 2. Calpico, Inc.
 3. Metraflex Co.
 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
1. 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.
 2. Pressure Plates: Stainless steel. Include two for each sealing element.
 3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

3.00 EXECUTION

3.01 SUPPORT 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 scheduled in NECA 1, where it's Table 1 lists maximum spacing less than stated in 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 single-bolt conduit clamps.

3.02 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
- B. 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.

3.03 RACEWAY APPLICATION

- A. All materials shall be new, free from defects, of current manufacture, of quality specified or shown. Each type of material shall be of the same manufacturer throughout the work.

- B. Field bending of raceways shall be done by an approved and listed method.
1. The use of an open flame (weed burner) for PVC conduit field bends shall not be permitted.
 - a. Any conduit found to be burnt or damaged will void UL listing and shall be replaced.
- C. Outdoor Wet and/or Damp Areas:
1. Apply raceway products as specified below, unless otherwise indicated.
 2. Conduit entrances shall be threaded and fittings shall have gasketed covers.
 3. Threaded fastening hardware and rods shall be stainless steel. Raceway supports such as channel, clamps, and brackets shall be stainless steel.
 4. Exposed Conduit: Rigid metal conduit (RMC).
 5. Concealed Conduit, Aboveground: Rigid metal conduit (RMC).
 6. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 - a. Sweeps and risers for transition of PVC from below grade to above grade shall be rigid metal conduit wrapped with corrosion resistant tape.
 7. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment) shall be LTFMC.
 8. Panels and boxes shall be NEMA 4X – stainless steel (or as shown on the drawings). Device boxes shall be cast, copper free aluminum.
- D. Indoor Wet and/or Damp Areas:
1. Comply with the following indoor applications, unless otherwise indicated:
 2. Conduit entrances shall be threaded and fittings shall have gasketed covers.
 3. Threaded fastening hardware and rods shall be stainless steel. Raceway supports such as channel, clamps, and brackets shall be stainless steel.
 4. Boxes and Enclosures: NEMA 250, Type 4X, stainless steel.
 5. Device boxes shall be cast, copper free aluminum.
 6. Exposed, Not Subject to Physical Damage: RMC.
 7. Exposed, Not Subject to Severe Physical Damage: RMC.
 8. Exposed and Subject to Severe Physical Damage: Rigid metal (RMC) conduit. Includes raceways in the following locations:
 - a. Areas below 6'0".
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.

9. Concealed in Ceilings and Interior Walls and Partitions: EMT or RNC Schedule 40.
 10. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LTFMC in damp or wet locations.
 11. Raceways for Optical Fiber or Communications Cable: EMT or RMC if exposed to severe physical damage.
- E. Minimum Raceway Size:
1. Above Grade: 3/4-inch trade size.
 2. Below Grade: 1-inch trade size.
- F. Raceway Fittings: Compatible with raceways and suitable for use in area classification and location.
1. Rigid and Intermediate metal conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 2. PVC Externally Coated, Rigid metal conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
- G. Install nonferrous conduit or tubing for circuits operating above 60 Hz.

3.04 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- 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. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- E. Install no more than the equivalent of three 90 Degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- F. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- G. 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.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Change from RNC, Type EPC-40-PVC to rigid metal conduit before rising above the floor.

- H. 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.
- I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- J. 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.
- K. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet.
 2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 3. Install with a maximum of two 90 Degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- L. Install raceway sealing fittings at suitable, approved, and accessible locations 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 at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- M. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed 30 Degrees F, and that has straight-run length that exceeds 25 feet.
1. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 Degrees F temperature change.
 - b. Outdoor Locations Exposed to Direct Sunlight: 155 Degrees F temperature change.
 - c. Indoor Spaces: Connected with the Outdoors without Physical Separation: 125 Degrees F temperature change.
 2. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per Degree F of temperature change.
 3. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
- N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

1. Use LTFMC in damp or wet locations subject to severe physical damage.
 2. Use LTFMC or LFNC in damp or wet locations not subject to severe physical damage.
- O. 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.
- P. Set metal floor boxes level and flush with finished floor surface.
- Q. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.

3.05 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 Division 2 Section "Earthwork" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Division 2 Section "Earthwork."
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 Division 2 Section "Earthwork."
4. Install manufactured rigid metal conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
 - b. For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
5. Exposed threads on rigid metal and PVC coated rigid metal conduits located below grade shall be coated in the field following installation with either BITUMASTIC or brush applied ROB-ROY coating. Spray-on coating is not allowed.
6. Underground electrical power feeders shall be separated by a minimum of 7-1/2 inches spacing on center. Control and instrumentation conduits shall maintain a minimum of 2 inches separation between conduit walls.
7. Underground electrical conduit shall be kept 3'-0" horizontally and 1'-0" vertically at crossings from other underground utilities except telephone. Minimum cover shall be 2'-0". After trench excavation, the bottom of the trench shall be trimmed by hand to prepare a smooth, even bed.
8. Excavated material shall be examined to be acceptable for backfill by the Engineer. If deemed not acceptable, then borrow material which possess a 1/2-inch screen shall be used. Six inches of backfill shall be required above and below conduit or direct buried cable installation. After 12 inches of compacted backfill is installed above the conduit, a yellow warning tape shall be placed

in the trench. The warning tape shall be of a non-biodegradable material and shall have the words "caution buried electrical conductors below."

9. A separate foil type warning tape is to be installed directly above PVC conduits which have been installed as spares, for future location of the conduit.
10. Exercise the necessary precautions to prevent the lodging of dirt, concrete or trash in the conduit, fittings and boxes during the course of installation.
11. After the conduit has been installed, the conduit shall be tested for obstructions or flattening by pulling a mandrel of appropriate size through the conduit. If an obstruction is found, that section is to be replaced. Cleaning conduits shall be performed by drawing a brush with stiff bristles and a swab through each duct and conduit to make certain no foreign materials are left in the conduit. Cleaning and mandrelling operations may be performed simultaneously.
12. Where conduit enters the facility below grade, the conduit shall be sealed with a waterproof sealant.
13. When rigid metal and PVC coated rigid metal conduit is threaded in the field, the threads shall be re-galvanized by the GALV-A-WELD process or by GAL-VAN-IZE as manufactured by LAWSON Products, Inc.
14. Where conduit rises from below grade to above grade, the transition from Schedule 40 PVC conduit to schedule 80 PVC or rigid metal conduit shall be rigid metal conduit for the sweep and riser.
15. Rigid metal conduit installed below grade and not encased in concrete shall be wrapped.

3.06 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 Division 3.
- 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.

3.07 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. 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.
- B. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- C. Rectangular Sleeve Minimum Metal Thickness:

1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- 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 unless sleeve seal is to be installed or unless seismic criteria require different clearance.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 7 Section "Joint Sealants" for materials and installation.
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 7 Section "Through-Penetration Firestop Systems."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using 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 "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between race-way and sleeve for installing mechanical sleeve seals.

3.08 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.?
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.09 FIRESTOPPING

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

3.10 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

3.11 FIELD INSPECTION:

- A. Prior to backfilling and encasing conduits installed underground or covering conduits concealed in walls and ceilings, all raceways shall be inspected by the Engineer. Engineer shall be contacted a minimum of one week in advance for field inspection of concealed raceway. No raceway shall be concealed or backfilled until inspected by the Engineer.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Electric Power, work consists of:

1. Installation of a new 200 ampere, 120/240 volt, 1-phase service.

1.03 DEFINITIONS

- A. CT: Current transformer.

1.04 SUBMITTALS

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

- B. Shop Drawings: For electricity-metering equipment.

1. Dimensioned plans and sections or elevation layouts.
2. Wiring Diagrams: For power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation, operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features.

- C. Prior to submittal to the Engineer, the Contractor shall submit all equipment and construction details (such as size, mounting height, location of equipment, etc.) to the serving utility for verification of compliance to the utility's requirements.

1. Meter Enclosure
2. Service Entrance

- D. Coordinate with Utility to provide information for the required short circuit contribution to each site primary disconnect per NFPA 70 requirements.

1. Obtain Utility Transformer nameplate data.
 - a. Primary Voltage.
 - b. Secondary Voltage.
 - c. Transformer Impedance.
 - d. Transformer Short Circuit Contribution.

2. Obtain the servicing utility secondary conductor length, conductor type and installation method to the primary disconnect.

1.05 SCHEDULING WORK WITH THE UTILITY COMPANIES:

- A. The Contractor shall be fully and completely responsible for all scheduling and coordination with the utility company. The Contractor shall coordinate and schedule power outages, power service for operation and construction, and power service as may be required by the facility prior to Certificate of Occupancy.
- B. The Contractor shall make all necessary applications for service with the utility and shall notify the Owner in writing of any obligations that the Owner must fulfill for service to be started, installed, or modified.

1.06 CONTRACTOR/UTILITY INTERFACE RESPONSIBILITIES:

- A. The electrical utility providing service to these facilities is Avista Utilities. Coordinate with Todd Neu at 208-769-1890 or Todd.Neu@avistacorp.com.
- B. The division of responsibilities stated below has been determined by coordination with the utility. The Contractor shall comply with all utility company standards and requirements.
- C. All utility company charges for and related to the final permanent service to the facility will be paid by the Owner, directly to the utility company and shall not be included in the Contractors bid price.

1. The Contractor Shall:

- a. Provide trenching and backfill material for the secondary electric service.
- b. Provide secondary conduit to utility meter.
- c. Provide utility electric meter enclosure.

2. The Utility Company Will:

- a. Provide and terminate new secondary conductors from utility transformer to new Contractor supplied meter enclosure.
- b. Provide and install meter in Contractor supplied enclosure.

1.07 CONSTRUCTION POWER

- A. Provide a separately metered temporary power service for construction power. Provide power for operation of all equipment during testing. Provide power for operation of all equipment until certificate of occupancy is obtained. All coordination with the utility and associated construction costs for temporary construction power shall be paid for by the Contractor. The Contractor shall pay for the energy costs as billed by the utility.

1.08 QUALITY ASSURANCE

- 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 all serving utility company standards and requirements.
- C. Service equipment shall be listed and labeled by UL as “suitable for use as service equipment.”

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Receive, store, and handle modular meter center according to NECA 400.

1.10 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.
 - 3. Notify Owner in writing and submit a detailed outage plan for approval prior to beginning work. Reference Section 01 01 40 for additional requirements for continuity of operations.

1.11 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
 - 1. Comply with requirements of utilities providing electrical power services.
 - 2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

2.00 PRODUCTS

2.01 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.
- B. Meter Sockets:
 - 1. Comply with requirements of electrical power utility company.
 - 2. Steady-state and short-circuit current ratings shall meet indicated circuit ratings.

3.00 EXECUTION

3.01 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide conduits and conductors for metering leads and extend grounding connections as required by utility company.

3.02 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 26 Section "Electrical Identification."
 - 1. Series Combination Warning Label: Self-adhesive type, with text as required by NFPA 70.

3.03 UTILITY REQUIREMENT VERIFICATION

- A. The Contractor shall coordinate and submit all equipment, materials, etc. related to the utility work to the serving utility to verify conformance to the Utility's requirements for service. The Contractor shall also submit any plans for the installation of the primary and secondary service for approval by the Utility prior to excavation. Any discrepancy between the Utility requirements and Contract documents shall be brought to the immediate attention of the Engineer.

3.04 TESTING

- A. Comply with requirements of sections 26 06 00 and 26 08 00.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

1. Distribution panelboards.
2. Mini-Power Center

1.03 DEFINITIONS

- A. SVR: Suppressed voltage rating.
- B. TVSS: Transient voltage surge suppressor.

1.04 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each panelboard and related equipment.
1. Include dimensioned plans, elevations, sections, and details. Show tabulations of installed devices, equipment features, and ratings.
 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 3. Detail bus configuration, current, and voltage ratings.
 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 5. Include evidence of NRTL listing for series rating of installed 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. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
- C. Field Quality-Control Reports:
1. Test procedures used.

2. Test results that comply with requirements.
 3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing.
- E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 1 Section "Operation and Maintenance Data," include the following:
1. 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.

1.05 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- 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.

1.06 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.

1.07 PROJECT 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 minus 22 deg F to plus 104 deg F.

- b. Altitude: Not exceeding 3300 feet.

1.08 COORDINATION

- A. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.

1.09 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

1.10 EXTRA MATERIALS

- 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.
 - 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard or loadcenter.
 - 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

2.00 PRODUCTS

2.01 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Fabricate and test panelboards according to IEEE 344.
- B. Enclosures: Surface-mounted cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Outdoor Locations: NEMA 250, Type 3R.
 - 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
 - 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.

4. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
 5. Finishes:
 - a. Panels and Trim: galvanized 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.
 6. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- C. Incoming Mains Location: Bottom.
- D. Phase, Neutral, and Ground Buses:
1. Material: Tin-plated aluminum.
 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 3. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
 4. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and UL listed as suitable for nonlinear loads.
 5. Split Bus: Vertical buses divided into individual vertical sections.
- E. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Main and Neutral Lugs: Mechanical type.
 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 6. Gutter-Tap Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
 7. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- F. Service Equipment Label: NRTL labeled for use as service equipment for panelboards or load centers with one or more main service disconnecting and overcurrent protective devices.

- G. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- H. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.02 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, power and feeder 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. Mains: Circuit breaker or Lugs only as indicated.
- E. Branch Overcurrent Protective: Bolt-on circuit breakers.
- F. Basis of Design: Square D, I-Line Panelboard with all appurtenances as indicated on drawings, or equal.

2.03 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 - 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D; a brand of Schneider Electric.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: Circuit breaker or lugs only.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.
- F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.04 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. For less than 250A -Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits.
 - a. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - b. Application Listing: Appropriate for application.
 2. For 250A and larger - Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I²t response.
 3. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 4. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip).
 5. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.

2.05 UNIT SUBSTATION (MINI-POWER CENTER)

1. Copper bus work.
2. Enclosure: NEMA Type 3R.
3. Circuit Breakers: Panelboard style breakers.
4. Transformer Type and Size: As indicated on plans.
5. Basis of Design: Square D, Mini Power-Zone Unit Substation, or approved equal.

2.06 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
- B. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

3.00 EXECUTION

3.01 EXAMINATION

- A. Receive, inspect, handle, and store panelboards according to NEMA PB 1.1.
- B. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- C. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install panelboards and accessories according to NEMA PB 1.1.
- B. Equipment Mounting: Install panelboards on concrete bases, 4-inch nominal thickness. Comply with requirements for concrete base specified in Division 3 Section "Cast-in-Place Concrete."
 - 1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 - 2. For panelboards, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4. Install anchor bolts to elevations required for proper attachment to panelboards.
 - 5. Attach panelboard to the vertical finished or structural surface behind the panelboard.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- D. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- E. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.

- G. Install filler plates in unused spaces.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- I. Comply with NECA 1.

3.03 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 26 Section "Electrical Identification."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate Owner's final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 26 Section "Electrical Identification."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 26 Section "Electrical Identification."

3.04 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. Acceptance Testing Preparation:
 - 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- D. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. 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 Substantial Completion, 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 Substantial Completion.
- c. Instruments and Equipment:
 - 1 Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

E. Panelboards will be considered defective if they do not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.05 ADJUSTING

A. Adjust moving parts and operable component to function smoothly and lubricate as recommended by manufacturer.

B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.

1. Measure as directed during period of normal system loading.
2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

3.06 PROTECTION

A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions.

****END OF SECTION****

1.00 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. Section Includes:

- 1. luminaires.

1.03 DEFINITIONS

- A. CCT: Correlated color temperature.
- B. CRI: Color Rendering Index.
- C. Fixture: See "Luminaire."
- D. IP: International Protection or Ingress Protection Rating.
- E. LED: Light-emitting diode.
- F. Lumen: Measured output of lamp and luminaire, or both.
- G. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.04 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - 1. Physical description of lighting fixture including dimensions.
 - 2. Emergency lighting units including battery and charger.
 - 3. Ballast, including BF.
 - 4. Energy-efficiency data.
 - 5. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - a. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - b. Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.

- c. **Manufacturer Certified Data:** Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
- 6. **Shop Drawings:** For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. **Wiring Diagrams:** For power, signal, and control wiring.
- B. **Warranty:** Sample of special warranty.

1.05 QUALITY ASSURANCE

- A. **Luminaire Photometric Data Testing Laboratory Qualifications:** Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. **Luminaire Photometric Data Testing Laboratory Qualifications:** Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
- 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.

1.06 COMPLY WITH NFPA 70.

1.07 WARRANTY

- A. **Warranty:** Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.
- B. **Warranty Period:** Five years from date of Substantial Completion.
- C. **Special Warranty for Emergency Lighting Batteries:** Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. **Warranty Period for Emergency Lighting Unit Batteries:** 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine (9) years.
 - 2. **Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries:** Seven (7) years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six (6) years.

1.08 EXTRA MATERIALS

- A. **Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.**

- B. Lamps: Ten for every 100 of each type and rating installed. Furnish at least one of each type.
- C. Glass, Acrylic, and Plastic Lenses, Covers, and Other Optical Parts: One for every 100 of each type and rating installed. Furnish at least one of each type.
- D. Diffusers and Lenses: One for every 100 of each type and rating installed. Furnish at least one of each type.
- E. Globes and Guards: One for every 20 of each type and rating installed. Furnish at least one of each type.

2.00 PRODUCTS

2.01 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated on Drawings.

3.00 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for luminaire to verify actual locations of luminaire and electrical connections before luminaire installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 TEMPORARY LIGHTING

- A. Permanent luminaires shall not be used for temporary lighting.

3.03 LUMINAIRE INSTALLATION

- A. Comply with NECA 1.
- B. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
- C. Install lamps in each luminaire.
- D. Supports:
 - 1. Sized and rated for luminaire weight.
 - 2. Able to maintain luminaire position after cleaning and relamping.
 - 3. Provide support for luminaire without causing deflection of ceiling or wall.
 - 4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.
- E. Flush-Mounted Luminaires:

1. Secured to outlet box.
2. Attached to ceiling structural members at four points equally spaced around circumference of luminaire.
3. Trim ring flush with finished surface.

3.04 FIELD QUALITY CONTROL

- A. Inspect each installed fixture for damage. Replace damaged fixtures and components.
- B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 1. Verify operation of photoelectric controls.

3.05 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaire lowering devices.

****END OF SECTION****

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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. Concrete Walks.
 - 2. 4" Concrete Paving (Integral Color).
- B. Related Sections:
 - 1. Section 033000 "Cast-in-Place Concrete for general building applications of concrete.
 - 2. Section 321373 "Concrete Paving Joint Sealants" for joint sealants in expansion and contraction joints within concrete paving and in joints between concrete paving and asphalt paving or adjacent construction.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
- C. Samples for Initial Selection: For each type of product, ingredient, or admixture requiring color selection.
- D. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified ready-mix concrete manufacturer testing agency.
- B. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Fiber reinforcement.
 - 4. Admixtures.
 - 5. Curing compounds.
 - 6. Applied finish materials.
 - 7. Bonding agent or epoxy adhesive.
 - 8. Joint fillers.
- C. Material Test Reports: For each of the following:
 - 1. Aggregates Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.
- B. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
- D. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
- E. ACI Publications: Comply with ACI 301 (ACI 301M) unless otherwise indicated.
- F. Mockups: Refer to Section 03 30 00 "Cast-In-Place Concrete".
- G. Preinstallation Conference: Conduct conference at Project site. Refer to Section 03 30 00 "Cast-In-Place Concrete".

1.7 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

- A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - 1. Use flexible or uniformly curved forms for curves with a radius of 100 feet (30.5 m) or less. Do not use notched and bent forms.
- B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
- D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized steel wire into flat sheets.
- E. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A, deformed steel.
- F. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420); deformed.
- G. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, Grade 60 (Grade 420) deformed bars.
- H. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- I. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars; assembled with clips.
- J. Plain-Steel Wire: ASTM A 82, as drawn.

- K. Deformed-Steel Wire: ASTM A 496/A 496M.
- L. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A, Type 1 coated, deformed-steel wire, with less than 2 percent damaged coating in each 12-inch wire length.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420) plain-steel bars Cut bars true to length with ends square and free of burrs.
- B. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars.
- C. Tie Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- D. Hook Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - 1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - 2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
- F. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- G. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.

2.4 CONCRETE MATERIALS

- A. Provide materials in accordance with ACI 301, unless amended or superseded by requirements of this section or general notes on structural drawings. Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. General: Ready-mixed Concrete: ASTM C94. On-site mixed concrete not allowed.
 - 2. Cement: Portland Cement: ASTM C150. Type II
 - 3. Fly ash: ASTM C618 Class C or F.
 - a. Maximum percent retained on #325 sieve: 28%
 - b. Maximum water requirement, stated as percentage of control, 100%
 - c. Percentage of fly ash in mix design shall be weight not by volume. Water cement ratio will be calculated by as water / cementitious (total cement plus fly ash) ratio.
 - d. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

4. Silica Fume: ASTM C 1240, amorphous silica.
5. Normal Weight Aggregates: ASTM C33.
 - a. Obtain from same source throughout project.
 - b. All sand and aggregates to meet C-33 Table 3 for Class 4S “Severe Weathering Region”.
 - 1) Fine Aggregate: Clean, natural sand.
 - c. Coarse Aggregate: Clean gravel or crushed stone.
6. Water: ASTM C 94/C 94M, clean and not detrimental to concrete.
7. Chloride Ion Content of Mix (including all constituents): Shall not exceed .15 percent chloride ions by weight of cement and comply with ASTM C 1152.

B. Chemical Admixtures: Refer to Section 03 30 00 “Cast-In-Place Concrete”

C. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

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

- a. ChemMasters.
- b. Davis Colors.
- c. Dayton Superior Corporation.
- d. Elementis Pigments.
- e. Hoover Color Corporation.
- f. Lambert Corporation.
- g. LANXESS Corporation.
- h. QC Construction Products.
- i. Scofield, L. M. Company.
- j. Solomon Colors, Inc.
- k. Stampcrete International, Ltd.
- l. SureCrete Design Products.

2. Color: Design intent to be Charcoal in color. Final color to be selected by Architect from Contractors selected manufacturer.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following

- a. Axim Italcementi Group, Inc.; Caltexol CIMFILM.

- b. BASF Construction Chemicals, LLC; Confilm.
 - c. ChemMasters; Spray-Film.
 - d. Conspec by Dayton Superior; Aquafilm.
 - e. Dayton Superior Corporation; Sure Film (J-74).
 - f. Edoco by Dayton Superior; BurkeFilm.
 - g. Euclid Chemical Company (The), an RPM company; Eucobar.
 - h. Kaufman Products, Inc.; VaporAid.
 - i. Lambert Corporation; LAMBCO Skin.
 - j. L&M Construction Chemicals, Inc.; E-CON.
 - k. Meadows, W. R., Inc.; EVAPRE.
 - l. Metalcrete Industries; Waterhold.
 - m. Nox-Crete Products Group; MONOFILM.
 - n. Sika Corporation, Inc.; SikaFilm.
 - o. SpecChem, LLC; Spec Film.
 - p. Symons by Dayton Superior; Finishing Aid.
 - q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
 - r. Unitex; PRO-FILM.
 - s. Vexcon Chemicals Inc.; Certi-Vex EnvioAssist.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- 1. Products: Subject to compliance with requirements, provide one of the following
 - a. Anti-Hydro International, Inc.; A-H Curing Compound #2 DR WB.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec by Dayton Superior; [**D.O.T. Resin Cure**] [**DSSCC Clear Resin Cure**].
 - d. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
 - e. Edoco by Dayton Superior; [**DSSCC Clear Resin Cure**] [**Resin Emulsion Cure V.O.C. (Type I)**].
 - f. Euclid Chemical Company (The), an RPM company; Kurez W VOX.
 - g. Kaufman Products, Inc.; Thinfilm 420.
 - h. Lambert Corporation; AQUA KURE - CLEAR.
 - i. L&M Construction Chemicals, Inc.; L&M CURE R.
 - j. Meadows, W. R., Inc.; 1100-CLEAR SERIES.
 - k. Nox-Crete Products Group; Resin Cure E.
 - l. SpecChem, LLC; PaveCure Rez.
 - m. Symons by Dayton Superior; Resi-Chem Clear.
 - n. Tamms Industries, Inc., Euclid Chemical Company (The); TAMMSCURE WB 30C.
 - o. TK Products, Division of Sierra Corporation; [**TK-2519 WB**] [**TK-2519 DC WB**].
 - p. Vexcon Chemicals Inc.; Certi-Vex EnvioCure 100.

2.6 RELATED MATERIALS

- A. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiberin preformed strips.
- B. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less

than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.

- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of 1/8 to 1/4 inch (3 to 6 mm).
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ChemMasters; Exposee.
 - b. Conspec by Dayton Superior; Delay S.
 - c. Dayton Superior Corporation; Sure Etch (J-73).
 - d. Edoco by Dayton Superior; True Etch Surface Retarder.
 - e. Euclid Chemical Company (The), an RPM company; Surface Retarder Formula S.
 - f. Kaufman Products, Inc.; Expose.
 - g. Meadows, W. R., Inc.; TOP-STOP.
 - h. Metalcrete Industries; Surfard.
 - i. Nox-Crete Products Group; CRETE-NOX TA.
 - j. Scofield, L. M. Company; LITHOTEX Top Surface Retarder.
 - k. Sika Corporation, Inc.; Rugasol-S.
 - l. SpecChem, LLC; Spec Etch.
 - m. TK Products, Division of Sierra Corporation; TK-6000 Concrete Surface Retarder.
 - n. Unitex; TOP-ETCH Surface Retarder.
 - o. Vexcon Chemicals Inc.; Certi-Vex Envioset.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures, proportioned according to ACI 301 (ACI 301M), for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
- B. Proportion mixtures to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 4000 psi (27.6 MPa)
 - 2. Maximum Water-Cementitious Materials Ratio at Point of Placement: **0.45**
 - 3. Slump Limit: 4 inches (100 mm) plus or minus 1 inch (25 mm).

- C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - 1. Air Content: 5percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- E. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture, 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.
- F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Pozzolan: 25 percent.
 - 2. Ground Granulated Blast-Furnace Slag: 50 percent.
 - 3. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
- G. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.5 lb/cu. yd. (0.90 kg/cu. m).
- H. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M. Furnish batch certificates for each batch discharged and used in the Work.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.

1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Section 312000 "Earth Moving."

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

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required 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.

C. No straight forms for curving walks or elements.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.

F. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.

G. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

3.5 JOINTS

- A. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - 1. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
- B. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - 1. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - 2. Provide tie bars at sides of paving strips where indicated.
 - 3. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
- C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - 1. Locate expansion joints at intervals of 50 feet (15.25 m) unless otherwise indicated.
 - 2. Extend joint fillers full width and depth of joint.
 - 3. Terminate joint filler not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished surface if joint sealant is indicated.
 - 4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - 5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - 6. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
- 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, as follows,
 - 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - a. Tolerance: Ensure that sawed joints are within 3 inches (75 mm) either way from centers of dowels.
- E. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
- B. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
- C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- D. Comply with ACI 301 (ACI 301M) requirements for measuring, mixing, transporting, and placing concrete.
- E. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
- F. 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.
- G. Consolidate concrete according to ACI 301 (ACI 301M) by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - 1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement dowels and joint devices.
- H. Screed paving surface with a straightedge and strike off.
- I. 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.
- J. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
- K. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - 1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
- L. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - 1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture

temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

M. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

3.8 SPECIAL FINISHES

A. Medium Broom Finish: Provide a medium broom finish for all exterior concrete unless otherwise noted. Immediately after float finishing and tool work, roughen surface with fiber-bristle broom to match the approved mockup panel. Confirm direction or pattern of broom finish with the Project Manager prior to commencing slab placement

B. Monolithic Exposed-Aggregate Finish (Sand Finish): Expose coarse aggregate in paving surface as follows:

1. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
2. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
3. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
4. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

- B. Comply with ACI 306.1 for cold-weather protection.
- C. 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 (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
- D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- E. Curing Methods: Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm) and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
 - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.10 PAVING TOLERANCES

- A. Comply with tolerances in ACI 117 and as follows:
 - 1. Elevation: 1/4 inch
 - 2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 - 3. Surface: Gap below 10-foot- (3-m-) long, unlevelled straightedge not to exceed 1/2 inch (13 mm).
 - 4. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: 1/2 inch per 12 inches (13 mm per 300 mm) of tie bar.
 - 5. Lateral Alignment and Spacing of Dowels: 1 inch (25 mm).
 - 6. Vertical Alignment of Dowels: 1/4 inch (6 mm).
 - 7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: 1/4 inch per 12 inches (6 mm per 300 mm) of dowel.
 - 8. Joint Spacing: 3 inches (75 mm).
 - 9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.
 - 10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide 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 C 143/C 143M; 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. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
- C. Strength of each concrete mixture will be satisfactory if 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 (3.4 MPa).
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. 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.
- F. Additional Tests: 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.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.

- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.12 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

3.13 METHOD OF MEASURE AND PAYMENT

- A. Concrete Sidewalk shall be measured on a square foot basis.
 - 1. The contract unit price paid as listed on the contract bid form for Concrete Sidewalk shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Concrete Sidewalk including: sub-base prep, mixing, forming, curing, jointing, banding, finishing and cleaning of Concrete Sidewalk to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- B. 4” Concrete Paving (Integral Color) shall be measured on a square foot basis.
 - 1. The contract unit price paid as listed on the contract bid form for 4” Concrete Paving (Integral Color) shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of 4” Concrete Paving (Integral Color) including: sub-base prep, integral color additives, mixing, forming, curing, jointing, finishing and cleaning of 4” Concrete Paving (Integral Color) to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

END OF SECTION 321313

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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. Cold-applied joint sealants.
- B. Related Sections:
 - 1. Division 32 Section "Concrete Paving" for constructing joints in concrete pavement.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, Samples of materials that will contact or affect joint sealants.
 - 1. 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.
 - 2. Submit no fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint-preparation data that are based on previous testing, not older than 24 months, of sealant products for compatibility with and adhesion to joint substrates and other materials matching those submitted.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

- 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. Qualification Data: For qualified Installer.
- E. Product Certificates: For each type of joint sealant and accessory, from manufacturer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for joint sealants.
- G. Preconstruction Compatibility and Adhesion Test Reports: From joint-sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility with and adhesion to joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each type of joint sealant from single source from single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

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: To match natural grey concrete. Obtain Architect's approval of color and type prior to construction..

2.2 EXPANSION JOINT SEALANT: Shall be a Sonolastic Sealant as manufactured by BASF or a silicone material that is on CDOT's approved silicone sealant list. Where color additive is used, color to match.

2.3 JOINT-SEALANT BACKER MATERIALS

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

2.4 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 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Test sealant in inconspicuous location approved by the Architect for tendency to bleed or stain adjacent surfaces. Mask adjacent areas.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. 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. Install only where indicated on drawings and details.
 - 2. Do not leave gaps between ends of joint-sealant backings.
 - 3. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 4. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed (where backing is indicated on drawings and details):
 - 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.
- E. 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.
- F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

3.4 CLEANING

- A. 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.

3.5 PROTECTION

- A. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

3.6 PAVEMENT-JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Joints within cement concrete pavement, where located on plans.
 - 1. Joint Location:
 - a. Expansion joints in cast-in-place concrete pavement.
 - 2. Polyether Joint Sealant for Concrete: Single component, nonsag, as specified above.

3.7 METHOD OF MESUREMENT AND PAYMENT

- A. Concrete Paving Joint Sealants. Measurement and Payment for Concrete Paving Joint Sealants shall be included in Concrete Sidewalk and 4” Concrete Paving (Integral Color) per spec section 311313 Concrete Paving.

END OF SECTION 321373

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PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the contract and bid documents.

1. All submittals shall be accepted in writing prior to installation.

1.2 SUMMARY

A. Section includes:

1. Irrigation system requirements.
2. Irrigation component requirements.
3. Component installation requirements.
4. Cleaning and adjusting.
5. Owner demonstration.

B. Related work

1. Section 32 91 00 “Landscape Systems”
2. Section 32 91 13 “Soil Preparation”
3. Section 32 91 20 “Topsoil”
4. Section 32 92 00 “Turf and Grasses”
5. Section 32 92 00 “Native Seeding”
6. Section 32 93 00 “Plants”
7. Section 32 93 00 “Landscape Maintenance”

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. Minimum Water Coverage: 100 percent head to head on all turf and planting areas.
- B. The irrigation system shall be designed to efficiently deliver water to maintain the managed landscape's function and purpose while complying with any local limitations and requirements.
- C. Location of Sprinklers and Specialties: Make minor adjustments necessary to avoid plantings and obstructions such as signs, trees, and light standards.
- D. All products shall be installed per the manufactures instructions and recommendations. Any drawing discrepancies shall be brought to the project manager's attention for direction to proceed.

1.4 SUBMITTALS

A. Product Data

1. Manufacturer's cut sheets for each element of the system.
2. Parts lists for operating elements of the system.

B. Closeout Submittals

1. Record Drawings- As installation occurs, prepare accurate record drawing to be submitted before final inspection, including:
 - a. Detail and dimension changes made during construction.
 - b. Significant details and dimensions not shown in original contract documents.

- c. Field dimensioned locations of valve boxes, manual drains, automatic drain valves, quick-coupler valves, control wire runs not in mainline ditch, and both ends of sleeves.
 - d. Take dimensions from permanent constructed surfaces or edges located at or above finish grade.
 - e. Take and record dimensions at the time of installation.
 - f. Submit record drawings to the project manager for approval.
 - g. Drawings shall be complete with line sizes, automatic valve types, wire, sprinkler heads, nozzle sizes, power, and controller locations.
2. Operations & Maintenance Manual Data
 - a. Instruction manual which lists complete instructions for system operation and maintenance, including winterizing.
 - b. Complete winterization instructions for the entire system, including compressed air blowout procedures.
 - c. Submit Operations and Maintenance Manual to the project manager for approval.

1.5 QUALITY CONTROL

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of irrigation components and are based on specific types and models indicated.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- C. Comply with requirements of utility supplying water and authorities having jurisdiction for preventing backflow and back-siphonage.
- D. Comply with ASTM F 645, "Guide for Selection, Design, and installation of Thermoplastic Water Pressure Piping Systems."
- E. Comply with NFPA 70, "National Electrical Code, "for electrical connections between wiring and electrically operated devices.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves according to the following:
 1. Ensure that valves are dry and internally protected against rust and corrosion.
 2. Protect valves against damage to threaded ends and flange faces.
 3. Set valves in the best position for handling. Set valves closed to prevent rattling.
- B. During Storage: Use precautions for valves according to the following:
 1. Do not remove end protectors unless necessary for inspection; then, reinstall for storage.
 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural
- D. Protect flanges, fittings, and specialties from moisture and dirt.
- E. Store plastic piping protected from direct sunlight—support to prevent sagging and bending.

1.7 WARRANTY

- A. Refer to Division 1 for details of 2-year warranty.

- B. Special Warranty: Installer agrees to repair or replace any portion of the landscape irrigation system that fails in materials or workmanship within 2 year
 - 1. Warranty includes the following:
 - a. Fill and repair depression and replace plantings due to settlement of irrigation trenches for 2 years following the project's acceptance.
 - b. Adequately drain the system to protect it from freeze damage.
 - c. Adjust and balance the system to supply proper coverage of areas to receive water.
 - d. System must be completed in each area before planting that area.
 - e. Winterize the irrigation system the first fall after project acceptance to Parks and turn the system back on the following spring while instructing the Owner in proper operation and maintenance of the system.

1.8 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations.
- B. Investigate and determine available water supply pressure and flow characteristics.
- C. Install irrigation system for each turf/landscaped area shown on the drawings.

1.9 SEQUENCING AND SCHEDULING

- A. Arrange for temporary water shutoff with the Owner, if needed.
- B. Coordinate irrigation work with other project-specific landscaping tasks.
- C. Coordinate irrigation with utility work.
- D. Coordinate irrigation control wire with electrical conduit installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Cast-Iron, Gate Valves for Underground Installation:
 - a. NIBCO
 - 2. Bronze Corporation Stops and Valves for Underground Installation:
 - a. NIBCO
 - 3. Automatic Control Valves:
 - a. Hunter Industries
 - 4. Control-Valve Boxes:
 - a. Carson-Brooks Plastics, Inc.
 - 5. Quick Couplers:
 - a. Hunter Industries
 - 6. Sprinklers:
 - a. Hunter Industries
 - 7. Emitter and Drip-Tube Specialties:
 - a. Netafim Techline CV .6 GPH 12" emitter spacing
 - b. Rain Bird XQF1018100: XQF 1" Dripline Header
 - 8. Controller:
 - a. Baseline

- 9. Flow Meter:
 - a. Baseline
- 10. Backflow Enclosure
 - a. Guard Shack

2.2 BACKFLOW PREVENTION

- A. Per drawings

2.3 FLOW METER

- A. Baseline Hydrometer BFM or BHM – Size per drawings

2.4 CONTROLLER

- A. Baseline BaseStation 3200

2.5 WIRE AND CONNECTORS

- A. Two-Wire, 12 or 14 gauge Dependent on Wire Length
- B. BiCoders:
 - 1. Baseline BL biCoder – size per drawings
- C. Direct Bury Connectors
 - 1. All connectors shall be a DBR/Y or equivalent direct bury splice, made for full submersion proof, and shall effectively seal moisture from two or more conductors and installed per manufacturer's specifications.
 - 2. Connector installation Details
 - a. All connectors shall be installed per the manufacturer's specifications.
 - b. The installer shall make all connections per the manufacturer's specifications.
 - c. The installer shall verify that no loose, unshielded wiring shall touch the ground, water, or other copper conductors, causing a leakage of current to the ground or a short circuit across wires.
 - d. The installer shall make all connections fully submersion proof.
 - e. All splices shall be made inside a valve box.

2.6 PIPES AND TUBES

- A. PVC Pipe: schedule 40 Mainlines
- B. PVC Pipe: schedule 40 laterals
- C. PVC Pipe: schedule 40 sleeve

2.7 PIPE AND TUBE FITTINGS

- A. PVC Socket Fittings, Schedule 40
- B. PVC Socket Fittings, Schedule 80
- C. PVC Threaded Fittings
- D. Swing Joints:
 - 1. Rotors: Sch 80 PVC Nipple with Marlex Street Ells

2. Rotator/Spray: Swing Pipe Tubing

2.8 VALVES AND VALVE SPECIALTIES

- A. Automatic Control Valves:
 - 1. PGV – Size per drawings
 - 2. ICV – Size per drawings
- B. Drip Control Zone Kit:
 - 1. ICZ – Size per drawings
- C. Control-Valve Boxes: PE ABS, fiberglass, polymer concrete, or precast concrete box and cover, with open bottom, openings for piping, and designed for installing flush with grade. Include size as required for valves and service.
 - 1. Drainage Backfill: Cleaned gravel or crushed stone, graded from 3 inches maximum to $\frac{3}{4}$ inch minimum, or as indicated in drawing details.
- D. Quick Coupler:
 - 1. HQ44-LRC

2.9 SPRINKLERS

- A. Pop-up, Rotor:
 - 1. PGJ – nozzle size per drawings
 - 2. PGP – nozzle size per drawings
 - 3. I20 – nozzle size per drawings
 - 4. I25 – nozzle size per drawings
 - 5. I40 – nozzle size per drawings
- B. Pop-up, MP Rotator – nozzle size per drawings
- C. Pop-up, Pro-Spray – nozzle size per drawings

2.10 DRIP IRRIGATION

- A. Drip Header/Footer:
 - 1. Field-installed PVC header with 12" Spacing
 - 2. Rainbird QF Dripline Header - XQF1012100
- B. Dripline:
 - 1. Netafim Techline CV - TLCV6-12
- C. Flush Valve:
 - 1. Netafim TLSOV

PART 3 – EXECUTION

3.1 PREPARATION

- A. Set metal flag markers to identify proposed lawn sprinkler locations. Obtain the project manager's approval before excavation.

3.2 TRENCHING AND BACKFILLING

- A. Provide minimum cover over top of underground piping according to the following:

1. Sleeves: 24 inches.
2. Mainline Piping: 24 inches.
 - a. Apply coarse sand bedding of 4 inches below mainline and 4 inches above and then backfill with native soil and compact to 90% density.
3. Lateral Piping: 12 inches.
4. Dripline Supply and Exhaust Header: 4 inches.
5. Dripline: On soil surface, below mulch.

3.3 PIPING APPLICATIONS

- A. Mainline Piping: Use the following:
 1. 4-inch NPS and Smaller; Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and cemented joints.
 2. 5 inch NPS and Larger: Schedule 80 PVC pipe, Schedule 80 PVC socket fittings, and solvent-cemented joints.
- B. Lateral Piping: Use the following:
 1. 4-inch NPS and Smaller: Schedule 40 PVC pipe, Schedule 40 PVC socket fittings, and solvent-cemented joints.
 2. 5 inch NPS and Larger: Schedule 80 PVC pipe, Schedule 80 PVC socket fittings, and solvent-cemented joints.

3.4 VALVE APPLICATIONS

- A. Control Valves: Installation per drawing details.

3.5 JOINT CONSTRUCTION

- A. Locations and Arrangements: Drawings indicate the location and arrangement of piping systems used to size pipe and calculate friction loss and other design considerations. Install piping as shown, unless deviations are approved on Coordination Drawings.
- B. Install piping free of sags and bends.
- C. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- D. Install fittings for changes in direction and branch connections.
- E. Install unions adjacent to valves and final connections to other components with 2-inch NPS or smaller pipe connections.
- F. Install flanges adjacent to valves and final connections to other components with 2 ½-inch NPS or larger pipe connection.
- G. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- H. Install PVC piping in dry weather when the temperature is above 40°F. Allow joints to cure at least 24 hours at a temperature above 40°F before testing unless otherwise recommended by the manufacturer.

3.6 VALVE INSTALLATION

- A. Underground Gate Valves: Install in valve box with top flush with grade.
 1. Install valves and PVC pipe with restrained, gasketed joints.
- B. Underground Curb Stops: Install in service box with top flush with grade.
- C. Underground, Manual Control Valves: Install in manual, control-valves service box.
- D. Control Valves: install in control-valves service box

3.7 SPRINKLER INSTALLATION

- A. Flush piping with a full head of water and install sprinklers after the hydrostatic test is completed.
- B. Install sprinklers at the manufacturer's recommended heights.
- C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches from walls and 2 inches from other boundaries, unless otherwise indicated.

3.8 DRIP INSTALLATION

- A. Trench in supply header and install Netafim dripline. The supply headers shall be installed perpendicular to the longest portion of the planting area to allow for the dripline's longest straight runs.
- B. Install exhaust header at the end of the drip line runs. Each exhaust header shall receive a manual flush valve. Install per the drawing details.
- C. Fittings and Misc.:
 - 1. Netafim 17mm barbed insert fittings.
 - 2. 6" soil staples installed every 4 feet on dripline.
 - 3. TLSOV – Manual flush valve.

3.9 AUTOMATIC CONTROL SYSTEM INSTALLATION

- A. Install controllers according to the manufacturer's written instructions and as indicated.
- B. Install freestanding controllers on poured-in-place concrete bases not less than 36 by 24 by 4 inches thick and not less than 6 inches greater in each direction than overall dimensions of the controller over (2) two compacted lifts of ¾" minus gravel sub-base material.
- C. Install control wiring in the same trench with piping.

3.10 FIELD QUALITY CONTROL

- A. Testing: Hydrostatically test piping and valves before backfilling trenches. Piping may be tested in sections.
 - 1. Underground Pressure Piping- Leave all system joints, connections, etc., exposed until after completion and acceptance of pressure test. Cap and subject piping system to a hydrostatic water pressure of 100 psi for 1 hour. Isolate test source and allow stand for 4 hours, no more than 5psi loss. Provide pressure gauges at two locations to demonstrate pressure. Leaks and loss of test pressure constitute defects that must be repaired. Repair leaks, however minor. Do not exceed the pressure rating of piping, fittings, or other equipment during testing. Repair or replace any system components damaged during testing.
 - 2. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.
 - 3. Test the system before the final test with the project manager. Notify 48 hours minimum before the test.
 - 4. Lateral Piping – Cap all risers and/or triple swing joints in preparation for static pressure test of lateral lines. Maintain static pressure without leaks for 1 hour, as demonstrated on an installed pressure gauge. Repair leaks and defects with new materials and retest system or portion thereof until satisfactory results are obtained.

- B. Coverage Test: Perform a water coverage test to determine if the system's water coverage and operation are complete and satisfactory. The coverage test is critical in the interface areas between the revised system layout and the existing field sprinklers. Head-to-head coverage must be demonstrated to the Post Falls Parks Department during testing. Repair or replace any defective work.
- C. Drip irrigation: Perform a drip irrigation operational test before mulching and acceptance—clean drip filters at final approval and the end of the maintenance period. Ensure proper operation of vacuum relief valves and flushing valves.
- D. Final approval for the system will be contingent upon, but not necessarily limited to:
 - 1. Approval of all testing
 - 2. Fully completed and approved Project Record Drawings.

3.11 CLEANING AND ADJUSTING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.
- B. Adjust automatic control valves to provide the flow rate of rated operating pressure required for each sprinkler circuit.
- C. Carefully adjust lawn sprinklers so they will be at the manufactures recommended grade.

3.12 DEMONSTRATION

- A. Demonstrate to the Owner's maintenance personnel operation of equipment, sprinklers, specialties, and accessories—review maintenance information.

PART 4 - MEASUREMENT AND PAYMENT

- A. Landscape Irrigation: Measurement and payment for prepping, trenching, backfilling, installation, all landscape irrigation products and appurtenances, automatic control center material and installation, sawcutting and asphalt repair, and all required field quality control including testing of the completed and approved landscape irrigation shall be per lump sum per the appropriate bid item.

END OF SECTION 32 84 00

SECTION 32 91 00

LANDSCAPE 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. All submittals shall be accepted in writing prior to installation.

1.2 SUMMARY

A. Section Includes:

1. Mineral mulches.
2. Organic mulches.
3. Crushed Stone Paving
4. Tackified Soil Stabilizer
5. Weed Barrier Fabric
6. Landscape edgings.
7. Boulders.
8. Boulder Stepping Stones
9. Natural Logs

B. Related Work:

1. Division 12 Section "Site Furnishings".
2. Division 02 Section "Site Demolition"
3. Division 02 Section "Excavation, Embankment, and Site Grading"
4. Division 32 Section "Concrete Walks, Curbs, and Miscellaneous Flatwork".
5. Division 32 Section "Turf and Grasses".
6. Division 33 Section "Subdrainage".

1.3 REFERENCES

A. ASTM C117 – Test Method for Materials Finer than No. 200 (75-um) Sieve in Mineral Aggregates by Washing.

B. ASTM C136 – Method for Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D1557 – Moisture Density Relations of Soils and Soil-Aggregate Mixture using 10-lb. Rammer and 18-in. Drop.

D. ASTM D4318 – Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

E. USP – U.S. Pharmacopeial Convention (1995).

1.4 DEFINITIONS

- A. ANSI. American National Standards Institute. Z60.1 is the national standard for nursery stock.
- C. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- D. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- E. Finish Grade: Elevation of finished surface of planting soil.
- F. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- G. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- H. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- I. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
- J. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.5 SUBMITTALS

- A. Analysis and standards: Wherever applicable, for non-packaged materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
 - 1. Include quantities, sizes, quality, and sources for materials.
- B. Samples for Verification: For each of the following:
 - 1. Mineral Mulch: 2 pound of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on the site; provide an accurate indication of color, texture, and makeup of the material.
 - 2. Edging Materials and Accessories: Manufacturer's standard size, 18" in length, to verify material and color selected.
- C. Analysis of existing soils has been completed by Owner's Representative. Results are included as an appendix to the Project Manual.

D. Qualification Data: For qualified landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

E. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

1.6 QUALITY CONTROL

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.

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: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."
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. Certified Landscape Technician - Exterior, with installation, maintenance and irrigation specialty areas, designated CLT-Exterior.

B. Pre-installation Conference: Conduct conference at the project site.

C. Mock-up: Provide field constructed sample installation of crushed stone paving with tactifier, including fabric and prepared setting bed.

1. Mock-up to be 10' x 10' and located where directed by Architect. Mock-up shall include proposed edge, and surface stabilization if specified.
2. Allow 2 weeks following mock-up installation prior to review by Architect.
3. Make necessary adjustments as directed by Architect.
4. Obtain approval from Architect before proceeding with the Work.
5. Retain and protect mock-up during construction as a standard for judging completed crushed stone paving work. Do not remove or destroy mock-up until work is completed.
6. Accepted and properly maintained sample installations may remain in completed work if approved in writing by architect.
7. All work shall match accepted field mock-up.
8. Owner reserves the right to retain an independent testing laboratory for inspection and testing of crushed stone paving.

D. Inspection: Contractor shall arrange for Owner's Representative to select and/or inspect plant material prior to delivery at the nursery(s) or upon delivery to the site, for compliance with requirements for genus, species, variety, cultivar, size, and quality. Selection and approval of plant material shall be at the discretion of the Owner's Representative.

E. Owner's Representative reserves the right to reject, at any time or place prior to final acceptance, all plant materials that fail to meet these specifications in the Owner's Representative's opinion. Inspection of materials is primarily for quality, size, and variety, but other requirements are not waived even though visual inspection results in approval. Plants are to be inspected where available; however, inspection at the places of supply shall not preclude the right of rejection at the site or at a later time prior to final acceptance. Rejected material shall be removed from the site within 24 hours.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.

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.
4. Exercise care in the storage of mulches on site to avoid mixing soil with mulch.

C. Rejection of material.

1. Evidence of inadequate protection or improper handling or storage shall be cause for rejection.
2. Any product or material exhibiting signs of damage due to nonconformity to specifications or due to delivery, storage or handling shall be rejected by the Engineer. Contractor shall be responsible for hauling off-site and disposing of according to general conditions and codes of the governing jurisdiction.

1.8 PROJECT/SITE CONDITIONS

A. Utilities: Contractor shall be responsible locating utilities and repair of utilities damaged during the work. Determine location of overhead and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain markings until their removal is mutually agreed upon by the Contractor and Parks Project Manager.

B. Interruption of Existing Services or Utilities: Do not interrupt services or utilities to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary services or utilities according to requirements indicated:

1. Notify Owner's Representative no fewer than two days in advance of proposed interruption of each service or utility.
2. Do not proceed with interruption of services or utilities without Owner's Representative's written permission.

C. Environmental requirements: Work shall occur only when weather and soil conditions permit in accordance with locally accepted practice

D. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

E. Existing Conditions:

1. Utilities: Determine location of existing and proposed underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
2. Excavation:
 - a. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned.
 - b. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Parks Project Manager before planting.

F. Weather Limitations: Proceed with installation 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 and warranty requirements.

1.9 WARRANTY

A. Refer to Division 1 for details of 2-year warranty period.

1.10 MAINTENANCE SERVICE

A. General: Maintain Work in accordance with standard industry practice or as directed by the Engineer.

1. Maintenance Period: Begin maintenance immediately after Work is completed. Maintain areas until the end of the Warranty period.

1.11 WARRANTY

A. Warranty: The warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 WATER

- A. Clean, potable and free of substances or matter that could inhibit vigorous growth of plant material or stain or otherwise damage paving or other constructed surfaces.
- B. Available on-site from Owner's water sources, and is to be paid for by Contractor. Owner's water meter is to be used for measuring water use on a monthly basis.
- C. Water charges to the contractor will be calculated based on bulk-water rates

2.2 MULCHES

- A. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:
 - 1. Type: Locally sourced, rounded riverbed or smooth-faced stone.
 - 2. Size Range: 4" to 6" range..
 - 3. Color: Uniform gray color range as acceptable to Architect.
- B. Organic Mulch: Arborist wood chip mulch provided by Owner.

2.3 CRUSHED STONE PAVING

- A. Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of following type, size range, and color:
 - 1. Type: 5/8" Basalt. Locally sourced, crushed, angular stone.
 - 2. Type: Crushed stone. Shall be unused material free of shale, lay, friable materials, organics and debris.
 - 3. Size Range: 5/8 inch maximum
 - 4. Color: Uniform gray color range acceptable to Architect.

2.4 SOIL STABILIZER

- A. Soil stabilizer or binder: Stabilizer® for Stabilized Aggregate surfaces provided by the following manufacturer:
 - 1. Stabilizer Solutions, Inc. 33 South 28th St., Phoenix, AZ 85034; phone (602) 225-5900, (800) 336-2468; fax (602) 225-5902; website stabilizersolutions.com; email info@stabilizersolutions.com
 - a. Patented, non-toxic, organic binder that is a colorless and odorless concentrated powder that binds decomposed granite aggregate.
 - b. Color: Amber
- B. Factory blended stabilized Crusher fines paving. Provide in all locations.

1. Stabilizer® shall be thoroughly pre-mixed with aggregate at the rate of 15-lbs of Stabilizer® per 1-ton of aggregate. Verify with manufacturer correct Stabilizer® rate for your project and climate. Drop spreading of Stabilizer® over pre-placed aggregate or mixing by rototilling is not acceptable. Stabilizer shall be mechanically pre-mixed per manufacturer's recommendations using an approved mechanical blending unit to adequately blend Stabilizer® with aggregate (Bucket blending is not an approved blending apparatus). Always blend Stabilizer® and aggregate DRY.
2. Aggregate must be washed prior to applying stabilizer.
3. Handseed 100% coverage of washed stone over wet stabilizer. Hand sweep after stabilizer cures.
4. Provide 5' x 5' mockup prior to beginning site installation.

2.5 WEED BARRIER FABRIC

- A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. (101g/sq. m) minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.
- B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd. (162 g/sq. m).

2.6 LANDSCAPE EDGING

- A. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
 1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Border Concepts, Inc.
 - b. Collier Metal Specialties, Inc.
 - c. J. D. Russell Company.
 - d. Sure-Loc Edging Corporation.
 2. Edging Size: 1/8 inch (3.2 mm) wide by 6 inches (150 mm) deep.
 3. Stakes: Tapered steel, a minimum of 15 inches (380 mm) long.
 4. Accessories: Standard tapered ends, corners, and splicers.
 5. Finish: Zinc coated.

2.7 BOULDERS

- A. Natural grey quarried granite fractured boulders free of excessive scars and marks as approved by landscape architect.
 1. Sizes: approximate
 - a. Type A: 6' x 6' x 5'
 - b. Type B: 5' x 4' x 4'

- c. Type C: 3' x 3' x 3'
2. Rip-rap boulders not acceptable.

2.8 BOULDER STEPPING STONES

A. Natural grey quarried granite fractured boulders free of excessive scars and marks as approved by landscape architect.

1. Sizes: approximate
 - a. Type A: 30" to 42" flat top surface
 - b. Type B: 18" to 24" flat top surface
2. Rip-rap boulders not acceptable.

2.9 NATURAL LOGS

A. Natural Log.

1. Sizes:
 - a. Lengths: Minimum 12'; maximum 20'
 - b. Diameter: Minimum 24"; maximum 42"
 - c. Species: As available. Must be approved by Landscape Architect prior to delivery to site. Notify Landscape Architect as to location of logs and schedule site visit for acceptance or rejection by LA.
2. Source: Owner.
3. Bark is to be left on.
4. Grind smooth any sharp edges and cut ends or branch stubs.
5. Apply Anchorseal or similar to cut ends of logs. Submit product information for approval prior to application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.

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. Verify that final grades are completed in accordance with the drawings.

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

C. Cooperate with any other contractors and trades, who may be working in and adjacent to the landscape work areas. Examine drawings which show the development of the entire site and become familiar with the scope of all work required.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- 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.
- C. Verify that Herbicide Treatment has been successfully completed in all landscaped areas as specified in this Section or in Sections 329200 or 329300.
- D. Lay out edging and planting bed locations in accordance with the drawings. Obtain Engineer's acceptance of layout before excavating or installing. Make minor adjustments as required.

3.3 ROCK MULCH INSTALLATION

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Verify that subgrade exhibits positive drainage.
 - 2. Rock Mulch in Planting Areas: Apply 4-inch average thickness of rock mulch [over whole surface of planting area and other areas shown], at a uniform slope and finish level with adjacent finish grades. Do not place mulch within 6 inches (150 mm) of trunks or stems.
 - 3. Tolerances: Variations in smoothness of finished gravel mulch shall be less than or equal to 1/4-in. when tested with a 10 ft. straightedge, applied both parallel and at right angles to centerline of paved areas. Irregularities exceeding these amounts of which retain water on surface shall be corrected by removing defective work and replacing with new material conforming to this specification.

3.4 ORGANIC MULCH INSTALLATION

- A. Mulch backfilled surfaces of planting areas, at bases of trees and other areas indicated.
 - 1. Verify that subgrade exhibits positive drainage.
 - 2. Organic Mulch in Planting Areas: Apply 4-inch minimum thickness of organic mulch over entire surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches (75 mm) of trunks or stems.

3.5 CRUSHED STONE PAVING INSTALLATION

- A. Re-compact sub-grade of areas to receive crushed stone to bring top 4 inches of material to a compaction of at least 95% of maximum density, as determined by ASTM D1557. Extend sub-grade compaction at least 1 foot beyond proposed edge of crushed stone paving.
- B. Complete excavation required in sub-grade before fine grading and final compaction of sub-grade are performed.

1. Where excavation must be performed in completed sub-grade subsequent backfill and compaction shall be performed as directed by the Architect as specified in Section 312000: Earth Moving. Completed sub-grade after filling such areas shall be uniformly and properly graded.
 2. Keep areas being graded or compacted shaped and drained during construction. Ruts greater than or equal to 1 inch deep in sub-grade shall be graded out and reshaped as required, and re-compacted before crushed stone paving placement.
- C. Install crushed stone paving only after excavation and construction work which might injure it have been completed, and after edging has been completely installed on the compacted sub-grade. Install steel edger crushed stone paving, and filter fabric over compacted base course in areas indicated on plan.
- D. Spread crushed stone evenly over filter fabric to an initial depth of 3 inches. Avoid segregation of aggregate and contamination with lower courses or sub-grade.
- E. Roll with a 3 to 5 ton steel roller, and compact to 95% of maximum density as determined by ASTM D1557.
1. Maintain surface course moisture content within $\pm 3\%$ of optimum. Add water to quarry fines paving as required to achieve optimum moisture content and a uniform, compacted surface conforming to the finish grades indicated.
 2. Compact areas inaccessible to rolling by mechanical tamping.
- F. Protect crushed stone paving from soil or other contaminants.
- G. Spread and compact additional crushed stone paving to minimum compacted thickness of 5 inches just prior to clean up of surrounding work.
- H. Form a firm, uniform, accurate and unyielding crushed stone paving at required elevations and to required lines.
- I. Tolerances: Mulch backfilled surfaces of planting areas and other areas indicated.
1. Variations in slope and grade of finished gravel mulch shall be less than or equal to 1/8-in. when tested with a 10 ft. straightedge, applied both parallel and at right angles to centerline of paved areas.
 2. Variations in smoothness shall be less than 1/4 inch when tested with a 10 foot straightedge. Irregularities exceeding these amounts of which retain water on surface shall be corrected by removing defective work and replacing with new material conforming to this specification.
- J. Maintenance and repairs:
1. If excessive loose aggregate over 1/4" in depth appears, reapply soil stabilizer and redistribute stabilized crushed stone aggregate over the entire surface, water thoroughly and re-compact with a minimum one-ton roller. Repeat process as needed.
 2. To repair, excavate damaged area leaving a minimum one inch depth of existing stabilized crushed stone paving, water and scarify to prevent a cold joint layer between the existing and newly imported crushed stone aggregate. Apply soil stabilizer to lifts as described

above, and add water to activate soil stabilizer. Compact with a walk behind drum roller. Do not allow traffic on stabilized crushed stone paving for one to two days or until paving has fully cured.

3.6 EDGING INSTALLATION

- A. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches (760 mm) apart, driven below top elevation of edging.
 - 1. Secure edging at beginning and end points to adjacent structure or pavement where this is possible as shown on Drawings. Repair damage to concrete or other structures if damage occurs.
 - 2. Set edging plumb and vertical at required line and grade. Straight sections shall not be wavy; curved sections shall be smooth and shall have no kinks or sharp bends; transitions between radii at compound curves shall be smooth and continuous, without straight tangent sections, as shown on the Drawings.
 - 3. Weld together cut pieces at corners.
 - 4. Drill ½" diameter holes 12" on center where layout constricts drainage flows.

3.7 BOULDERS

- A. Landscape architect to review placement prior to work commencing
- B. Bury 1/3 of boulder below finish grade, set on compacted subgrade.
- C. For Cave features, contractor to add dowels and mortar as necessary to ensure permanent fixed position.

3.8 BOULDER STEPPING STONES

- A. Landscape architect to review placement prior to work commencing
- B. Set boulder so the flat top is level with adjacent grade, set on compacted road-base with polymeric sand levelling bed.
- C. Backfill gaps with mineral mulch to match adjacent landscape areas.

3.9 NATURAL LOG INSTALLATION

- A. Install natural logs per Contract Documents with supervision and approval by Landscape Architect.
- B. Logs are to be installed to be stable, with no rocking or overturning.

3.10 CLEANUP AND PROTECTION

- A. During landscape installation, keep adjacent paving and construction clean and work area in an orderly condition. All areas shall be clean at the end of each workday.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
 - 1. Erect temporary fencing or barricades and warning signs as required protecting newly planted grass areas from traffic, other trades, and trespassers. Maintain fencing and barricades throughout initial maintenance period and remove after grasses have been established.
- C. Project completion: All debris, soil, trash, and excavated and/or stripped material resulting from landscape operations and unsuitable for or in excess of requirements for completing work of this Section shall be disposed of off-site. All paved areas shall be washed down
- D. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.

3.11 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of off Owner's property.

3.12 METHODS OF MEASUREMENT AND PAYMENT

- A. Mineral mulch will be measured and paid by delivery ticket volume, in cubic yards.
 - 1. The contract unit price paid as listed on the contract bid form for Mineral mulch shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Mineral mulch including: sub-base prep, weed barrier fabric install, placing, and levelling of mulch, finishing and cleaning to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- B. Organic mulches will be measured and paid by delivery ticket volume, in cubic yards.
 - 1. The contract unit price paid as listed on the contract bid form for Organic mulch shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Organic mulch including: sub-base prep, placing, and levelling of mulch, finishing and cleaning to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- C. Crushed stone paving with stabilizer will be measured and paid by square foot.
 - 1. The contract unit price paid as listed on the contract bid form for Crushed Stone Paving with Stabilizer shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Crushed Stone Paving with Stabilizer including: sub-base prep, weed

barrier fabric, placing, levelling, stabilizing, surface seeding of aggregate, finishing and cleaning to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- D. Steel edging will be measured and paid per lineal foot installed.
1. The contract unit price paid as listed on the contract bid form for Steel Edging shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Steel Edging including: sub-base prep, placing, and levelling, and welding all corners, finishing and cleaning to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- E. Boulders – Type A: 6' x 6' x 5' will be measured and paid by each.
1. The contract unit price paid as listed on the contract bid form for Boulders – Type A: 6' x 6' x 5' shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Boulders – Type A: 6' x 6' x 5' including: delivery, transport on site, sub-base prep, placing, levelling, finishing and cleaning to provide each area including cave features complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- F. Boulders – Type B: 5' x 4' x 4' will be measured and paid by each.
1. The contract unit price paid as listed on the contract bid form for Boulders – Type B: 5' x 4' x 4' shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Boulders Type B: 5' x 4' x 4' including: delivery, transport on site, sub-base prep, placing, levelling, finishing and cleaning to provide each area including cave features complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- G. Boulders – Type C: 3' x 3' x 3' will be measured and paid by each.
1. The contract unit price paid as listed on the contract bid form for Boulders – Type C: 3' x 3' x 3' shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Boulders – Type C: 3' x 3' x 3' including: delivery, transport on site, sub-base prep, placing, levelling, finishing and cleaning to provide each area including cave features complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.
- H. Boulders Stepping Stones will be measured and paid by each.
1. The contract unit price paid as listed on the contract bid form for Boulders Stepping Stones shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Boulders Stepping Stones including: delivery, transport on site, sub-base prep, placing, levelling, finishing, backfilling with mineral mulch and cleaning to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

- I. Natural logs will be measured and paid by each.
 1. The contract unit price paid as listed on the contract bid form for Natural Logs shall include full compensation for furnishing all labor, materials, equipment, tools, supplies and incidentals and shall perform all labor necessary to complete all of the work of Natural Logs including: transport on site, sub-base prep, placing, levelling, finishing and cleaning to provide each area complete and ready for operation; complete in place, as shown on the Drawings and as specified in these Technical Specifications.

END OF SECTION 32 91 00

SECTION 32 91 13

SOIL PREPARATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 requirements for the preparation of soil for the purpose of seeding, sodding, or planting operations.
 - 1. Soil preparation consists of ripping, fertilizing, soil conditioning and fine grading the topsoil. Soil preparation as specified herein MUST precede all seeding, sodding, and planting.
- B. Related Sections:
 - 1. Division 01 Section “Erosion and Sedimentation Control”.
 - 2. Division 02 Section “Site Demolition”
 - 3. Division 02 Section “Excavation, Embankment, and Site Grading”
 - 4. Division 32 Section “Topsoil”.
 - 5. Division 32 Section “Turfgrass Seeding”.
 - 6. Division 32 Section “Native Seeding”.
 - 7. Division 32 Section “Sodding”.
 - 8. Division 32 Section “Trees, Plants, and Groundcovers”.

1.3 DEFINITIONS

- A. Fertilizer: A substance that is added to soil to help the growth of plants.
- B. Soil Amendment: Any substance which is intended to improve the physical, chemical, or other characteristics of the soil
- C. Soil Conditioner: Combination of slow-release fertilizer, hummate, and Mycorrhiza

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Soils Test Data: See Sections 1.6 through 1.11 of this specification.
- C. Product Data: For each type of product.
 - 1. Include recommendations for application and use.
 - 2. Include test data substantiating that products comply with requirements.
 - 3. Material Certificates: For each type of soil conditioner, soil amendment and fertilizer before delivery to the site, according to the following:
 - a. Manufacturer's qualified testing agency's certified analysis of standard products.

- D. Samples: For each bulk-supplied material, one (1) quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.
- E. Quality Control Submittals:
 - 1. Certificates: State, Federal and other inspection certificates shall accompany invoice for materials showing source or origin. Submit to Project Manager prior to acceptance of material.
 - 2. Material Analysis: Provide soil conditioner analysis performed no more than three months prior to delivery to site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, chemical name, trade name, trademark and conformance to state law, bearing name and warranty of producer.
- B. Notify Project Manager of delivery schedule in advance so material can be inspected upon arrival at project site. Immediately remove unacceptable material from project site.

1.6 PROJECT/SITE CONDITIONS

- A. General: Do not perform work when climate and existing site conditions will not provide satisfactory results.
- B. Vehicular site access shall be limited to the area(s) indicated on the Contract Drawings or as defined by the Project Manager.
- C. Damage to turf, natural areas, pavements, irrigation systems, underground utilities, and other improvements shall be repaired by the contractor at no additional cost to the City.

1.7 QUALITY CONTROL

- A. Testing Agency Qualifications: Retain an independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.
 - 1. Laboratories: Subject to compliance with requirements, provide testing of materials in the Section by a qualified testing laboratory approved by the Project Manager. Submit Testing Agency qualifications to Project Manager for approval prior to construction.
 - 2. Multiple Laboratories: Work may be divided among qualified testing laboratories specializing in physical testing, chemical testing, and fertility testing. Submit Testing Agency qualifications to Project Manager for approval prior to construction.

1.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Contractor is responsible for specified tests.

- C. Soil will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.
- F. Inspection: Provide notice to the Project Manager requesting inspection at least seventy-two (72) hours prior to anticipated date of completion.
- G. Contractor shall be responsible for coordinating soil preparation inspections with Denver Water, call (303) 628-6682 at least seventy-two (72) hours prior to installing sod, seed or plantings.
- H. Deficiencies: The Project Manager will specify deficiencies to Contractor who shall make satisfactory adjustments and shall again notify Project Manager for final inspection.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency, approved by the Project Manager, to perform preconstruction soil analyses on existing, on-site soil, imported topsoil and pre-amended imported soil.
 - 1. Notify Project Manager seventy-two (72) hours in advance of the dates and times when laboratory samples will be taken.
- B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment, soil-conditioner and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.
 - 1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.10 SOIL-SAMPLING REQUIREMENTS

- A. General: Extract soil samples according to requirements in this article.
- B. Sample Collection and Labeling: Have samples taken and labeled by Contractor in presence of Project Manager and under the direction of the testing agency.
 - 1. Number and Location of Samples: Minimum of five (5) samples per acre collected randomly throughout the areas to receive similar soil preparation, including seed/sod, native seeding, planting beds, and gardens. Provide a map to the Project Manager of sampling locations prior to sampling for approval.
 - 2. Procedures and Depth of Samples: Collect samples to a depth of six inches (6") and combine in a clean plastic container.
 - 3. Mixing of Samples: Mix samples together thoroughly, removing plant debris and breaking up clods.
 - 4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.11 TESTING REQUIREMENTS

- A. General: Perform tests on soil samples according to requirements in this article.
- B. Physical Testing:
 - 1. Soil Texture: Soil-particle, size-distribution analysis by the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
 - a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.
 - b. Hydrometer Method: Report percentages of sand, silt, and clay.
- C. Fertility Testing: Soil-fertility analysis shall, include the following:
 - 1. Percentage of organic matter.
 - 2. CEC, calcium percent of CEC, and magnesium percent of CEC.
 - 3. Soil reaction (acidity/alkalinity pH value).
 - 4. Buffered acidity or alkalinity.
 - 5. Lime estimate.
 - 6. Soil texture estimate.
 - 7. Nitrogen ppm.
 - 8. Phosphorous ppm.
 - 9. Potassium ppm.
 - 10. Manganese ppm.
 - 11. Zinc ppm.
 - 12. Iron ppm.
 - 13. Boron ppm.
 - 14. Copper ppm.
 - 15. Sodium ppm, and sodium absorption ratio.
 - 16. Soluble-salts ppm.
 - 17. Presence and quantities of problem materials including salts and metals cited in the Standard protocol. If such problem materials are present, provide additional recommendations for corrective action.
 - 18. Other deleterious materials, including their characteristics and content of each.
- D. Recommendations: Based on the test results, state recommendations for soil treatments, soil amendments, and soil conditioners to be incorporated to produce satisfactory planting soil suitable for healthy, viable plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and potassium fertilization, and for micronutrients.
 - 1. Fertilizers and Soil Amendment Rates: State recommendations in weight per one thousand (1,000) sq. ft. for six inch (6”) depth of soil.
 - 2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering pH according to the buffered acidity or buffered alkalinity in weight per one thousand (1,000) sq. ft. for six inch (6”) depth of soil.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and compliance with state and Federal laws if applicable.

- 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. Do not move or handle materials when they are wet or frozen.
 - 4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate certificates.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: Shall be as specified under Division 32 Section “Topsoil”.
- B. Soil Amendments:
 - 1. For the purpose of bidding the Contractor shall assume all areas to receive soil amendments will be at four (4) cubic yards per one thousand (1,000) square feet. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Amendment.
 - 2. Composted material shall consist of aged organic matter, free of weed or other noxious plant seeds, lumps, stones, or other foreign contaminants harmful to plant life, and having the following characteristics based on a nutrient test performed no longer than 3 months prior to its incorporation into the project:
 - a. Organic matter: twenty five percent (25%) maximum.
 - b. Salt content: Five (5.0) mmhos/cm maximum.
 - c. pH: 7.5, maximum.
 - d. Carbon to nitrogen ratio shall be less than 20:1.
 - 3. Mountain peat, aspen humus, gypsum and sand will not be accepted.
 - 4. Acceptable product: Class I compost, such as Ecogro or Bio-comp, as produced by A1 Organics, Eaton, CO, or approved equal.
- C. Soil Conditioners:
 - 1. For the purpose of bidding the Contractor shall assume all areas to receive Soil Conditioners will be applied at the rate specified by the manufacturer for each specific planting type. Once soils tests have been received and determination is made on the proper amount to be added the site specific soils the rate to be applied may be adjusted per the price based on the Schedule of Values for Soil Conditioner.
 - a. Organic slow release fertilizer (6-1-1), acceptable product: “Biosol” or approved equal.
 - b. Granular Humic Acid soil conditioner, acceptable product: “Menefee Humate Soil Conditioner”.
 - c. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, thirty three percent (33%) hydrogel, and a maximum of five and one half percent (5.5%) inert material.

- d. Mycorrhizal Inoculant: AM-120, as manufactured by Reforestation Technologies International, locally available from Pawnee Buttes Seed, Greeley, CO, (970)356-7002.
- e. Acceptable substitution.

2.2 FERTILIZER

A. General:

- 1. Fertilizer shall conform to applicable State fertilizer laws. It shall be uniform in composition, dry, and free flowing, and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's guaranteed analysis. Fertilizer that has become caked or damaged will not be accepted.

B. Turf Grass Lawns:

- 1. Diamonium phosphate (18-46-0). Nitrogen shall be composed of sulphur-coated Urea only. Provide in sufficient quantity to apply at the rate of one hundred (100) pounds nitrogen per acre, unless otherwise indicated by the soils tests.

C. Native Grass Areas:

- 1. Fertilizer shall not be applied to areas to receive native grass seeding.

2.3 PESTICIDE

- A. Post Emergent Pesticide: Roundup (Glyphosate) or approved equal as manufactured by Monsanto Company or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. General: Verify that existing site conditions are as specified and indicated on Contract Drawings before beginning work under this Section.

- 1. Grades: Inspect to verify rough grading is within +/-one tenth of one foot (0.1') of grades indicated and specified.
- 2. 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 the work area.
- 3. Damaged Earth: If, upon inspection, the soil is found to be unfit to support planting as described in article 2. above, it is to be removed and replaced with clean soil from a source approved by the Project Manager.

B. Unsatisfactory Conditions: Report in writing to General Contractor with copy to Project Manager.

C. Acceptance: Beginning of installation means acceptance of existing conditions by installer.

3.2 PREPARATION

A. Areas of Newly Placed or Existing Topsoil:

1. Protection:
 - a. Locate sewer, water, irrigation, gas, electric, phone and other pipelines or conduits and equipment prior to commencing work.
 - b. Contractor shall be responsible for proper repair to landscape, utilities, walls, pavements and other site improvements damaged by operations under this section.

B. Weed Control: Perform pesticide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire pesticide treatment process before proceeding with planting. Repeat procedure as needed as weed growth becomes evident throughout the duration of construction.

1. Pesticide treatment must be completed during the growing season.
2. Water surface one half inch (1/2") per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
3. Treat site with pesticide in accordance with manufacturer's recommendations.
 - a. Two days after application water surface one half inch (1/2") per week if natural precipitation does not supply this amount to encourage weed seed germination.
 - b. Ten (10) days after the first Pesticide application, review surface for evidence of plant growth.
 - c. Repeat steps 2, 3, 4, and 5, up to three (3) applications, until there is no evidence of plant growth after a ten (10) day period.
 - d. Obtain Project Manager approval of surface conditions fourteen (14) days after last pesticide application.
 - e. Pesticide treatments beyond the three (3) applications shall be considered additional to the contract and will be performed at the directed of Project Manager after the City has approved the cost. Additional pesticide treatments required for imported topsoil shall be borne solely by the Contractor.
 - f. Remove plant debris from treated area.
 - g. Contact Project Manager forty eight (48) hours in advance to review the site after each pesticide treatment. Do not proceed with additional planting until the results are approved and accepted by the Project Manager.
4. Surface Grade: Establish grades as indicated on Contract Drawings, and as required in Division 31 Section "Earth Moving".
5. Remove weeds, debris, clods and rocks larger than one inch (1"). Remove and dispose of accumulated materials at direction of Project Manager.
6. Erosion Control: Take measures and furnish equipment and labor necessary to control the flow, drainage and accumulation of water, and prevent soil erosion, blowing soil and accumulation of wind-deposited material on the site throughout duration of work. Insure that all excess water will run off the grades or will percolate within twelve (12) hours.
7. Soil Testing: Soil Amendments, Soil Conditioners and Fertilizers shall meet the minimum amounts as specified in Article 3.3, "Installation", below. Unless determined by the Project Manager the Contractor shall be responsible for performing horticultural soil tests on a minimum of four (4) current soil samples for each source of topsoil to be used in the project. Reference Division 32 Section "Topsoil", Article 1.4, "Quality Control" for soil analysis report information. Soil test will be used to determine the type and amount of Soil Amendment, Soil Conditioner, and Fertilizer to be applied prior to

- seeding, sodding and planting. Locations for testing shall be approved by the Project Manager.
8. Timing: Perform soil preparation just prior to planting operations and in accordance with final planting schedule. Coordinate with irrigation system installation to avoid damage.
- C. Areas of Compacted Topsoil: Areas within the work limits or as defined on Contract Drawings or by the Project Manager that have vegetation that is sparse, stunted, anemic, weedy or was used as a construction staging, parking area and/or subjected to heavy use will require removal and replacement of 12" existing soil to prepare the soil for revegetation.
- D. Areas of Disturbed Topsoil: Areas disturbed but not severely compacted as determined by the Parks Project Manager, shall be deep tine aerated or shattered to prepare the soil for revegetation.
- E. Areas of Undisturbed Natural Topsoil: Undisturbed sites that are or were supporting healthy plant growth need only surface seedbed preparation prior to sowing seed.

3.3 INSTALLATION

- A. Install topsoil as required in Division 31 section "Earth Moving" and Division 32 Section "Topsoil".
- B. Soil Preparation in Turf Grass and Planting Bed Areas:
1. Apply Soil Amendments at the following rates:
 - a. Soil Amendments: Bid quantity to be four (4) cubic yards per one thousand (1,000) square feet, or per soil test recommendations.
 - b. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 - c. Fertilizer: Diamonium phosphate, Bid quantity to be two (2) pounds of nitrogen per one thousand (1,000) square feet. Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 - d. Mycorrhizal inoculants: Apply per manufacturer's instructions and quantities appropriate to the planting type.
 2. After applying Soil Amendments, thoroughly till area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. Soil Conditioners and Fertilizer shall be applied topically once final grade has been established and just prior to sodding or seeding.
- C. Soil Preparation in Native Grass Areas:
1. Soil Conditioners: Apply per manufactures recommendations for the type of planting area, or per soil test recommendations.
 2. Mycorrhizal inoculants: Apply per manufacturer's instructions and quantities appropriate to the planting type.
 3. Thoroughly till the area to depth of six inches (6") minimum by plowing, rototilling, harrowing, or disking until soil is well pulverized and thoroughly mixed. If a soil conditioner is to be applied ensure that the product is spread evenly over the surface of the soil and not tilled into the soil.
 4. Soil Conditioner Installation:

- a. Apply Soil Conditioner only as directed by per soils tests performed for the areas to be seeded. Apply topically once fine grade has been established and just prior to seeding per the manufactures recommendations for native seed areas.

D. Fine Grading in all Landscape Areas:

1. Complete fine grading for all areas prior to seeding or planting. Allow for natural settlement.
2. For ground surface areas surrounding buildings to be landscaped, maintain required positive drainage away from buildings.
3. Establish finish grades to within plus or minus one tenth (0.10') foot of grades indicated, in order to prevent "bird-baths" or ponding.
4. Finish grade shall be below edge of pavement prior to sodding, seeding or planting.
 - a. Sodded Areas: Allow one and one half inches (1-1/2") for sod.
 - b. Seeding Areas: Allow one inch (1") for seed.
 - c. Planting Beds: Allow four inches (4") for mulch.
5. Noxious weeds or parts thereof shall not be present in the surface grade prior to seeding.
6. Compaction of Surface Grade Prior to Landscape Installation: Firm, but not hard, eighty five percent (85%) standard Proctor density within two percent (2%) optimum moisture.
7. Hand Raking:
 - a. Turfgrass Lawn Areas: Prior to acceptance of grades, hand rake to smooth, even surface, free of debris, clods, rocks and organic matter greater than one inch(1").
 - b. Native Seed Areas: Area shall not be raked smooth but left in a uniform condition after tilling. Rough raking may occur parallel to the contours only.
8. Restore planting areas to specified condition if eroded or otherwise disturbed after fine grading and prior to planting.

3.4 CLEANING

- A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.
- B. Remove debris and excess materials from site. Clean out drainage inlet structures. Clean paved and finished surfaces soiled as a result of work under this Section, in accordance with Section 208 of the General Specifications or as directed by the Project Manager.

3.5 PROTECTION

- A. Provide and install barriers as required and as directed by Project Manager to protect completed areas against damage from pedestrian and vehicular traffic until acceptance by City.
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 1. Storage of construction materials, debris, or excavated material.
 2. Parking vehicles or equipment.
 3. Vehicle traffic.
 4. Foot traffic.
 5. Erection of sheds or structures.

6. Impoundment of water.
 7. Excavation or other digging unless otherwise indicated.
- C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Project Manager and replace contaminated planting soil with new planting soil.

3.6 METHOD OF MEASUREMENT AND PAYMENT

- A. Soil preparation measurement and payment shall be included as part of the unit costs associated with Turf Grass Seeding (Section 329200 “Turf and Grasses”), Native Seeding (Section 329220 “Native Seeding”), and all shrub, perennial, and ornamental grass planting (Section 329300 “Plants”). No additional measurement and payment shall be applied to Soil Preparation.

END OF SECTION 32 91 13

SECTION 32 91 20

TOPSOIL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 requirements for furnishing, stockpiling, and placing topsoil on a previously prepared subgrade.
- B. Related Sections:
 - 1. Division 01 Section “Erosion and Sedimentation Control”.
 - 2. Division 02 Section “Excavation, Embankment, and Site Grading”
 - 3. Division 32 Section “Soil Preparation”.
 - 4. Division 32 Section “Turf and Grasses”.
 - 5. Division 32 Section “Native Seeding”.
 - 6. Division 32 Section “Trees, Plants, and Groundcovers”.

1.3 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- E. Planting Area: Areas to be planted.
- F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Soil Analysis Report: As indicated in Article 1.5 “Quality Control”, below.

1.5 QUALITY CONTROL

- A. Existing On-Site Topsoil:
 - 1. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
 - 2. A minimum of five (5) sample locations per acre are required, with individual tests completed for each sample.
 - 3. A map of the site illustrating the locations of each sample location is to be submitted to Project Manager for approval prior to collecting samples.
 - 4. Follow instructions from soil testing laboratory when collecting samples.
 - 5. Testing will be at the expense of the Contractor.
 - 6. Submit a one (1) quart sample along with analysis results.
- B. Imported Topsoil:
 - 1. Submit source location for topsoil to be imported to site for approval by Project Manager.
 - 2. Submit soil analysis report for topsoil imported to site, from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter), and shall include additive recommendations.
 - a. One 1-quart sample per five hundred (500) cubic yards of imported soil is required, with individual tests completed for each sample.
 - b. Follow instructions from soil testing laboratory when collecting samples.
 - 3. Testing will be at the expense of the Contractor.
 - 4. Submit a one (1) quart sample along with analysis results.
- C. Manufactured Topsoil:
 - 1. Submit source of manufactured topsoil to be imported to site for approval by Project Manager.
 - 2. Submit soil analysis report for stockpiled on-site topsoil from the State University Agricultural Extension Service or other approved soil testing laboratory. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH, percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).
 - a. Test is to be completed within sixty (60) days preceding delivery to site. Report shall cover soil textural classification (percentages of sand, silt, and clay), pH,

percentage organic matter, and soluble salts (electric conductivity in millimos/centimeter).

- b. Submit a one (1) quart sample along with analysis results.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver or place topsoil in a frozen, wet, or muddy condition.
- B. Protect stored and placed topsoil from vehicular traffic, equipment storage, material storage, or from contaminants or pollution sources. Topsoil that is compacted or tainted during construction is to be removed from site and disposed of at a licensed landfill at no additional cost to the City.

PART 2 - PRODUCTS

2.1 ON-SITE TOPSOIL

- A. Topsoil previously stripped and stockpiled prior to earthwork operations. See Division 31 Section “Earth Moving”.

2.2 IMPORTED TOPSOIL

- A. All topsoil shall be a loam or sandy loam conforming to ASTM D 5268. At least ten (10) days prior to topsoil delivery, notify Project Manager of the source(s) from which topsoil is to be furnished. Topsoil shall be furnished by the Contractor and shall be a natural, friable soil representative of productive soils and shall meet the following conditions.
- B. It shall be obtained from the top six-inches (6”) of well drained areas.
- C. Fertile, friable, loamy soil, reasonably free from subsoil, refuse, roots, heavy or stiff clay, stones larger than one-inch (1”), coarse sand, noxious seeds, sticks, brush, litter, and other deleterious substances; suitable for the germination of seeds and the support of vegetative growth. The pH value shall be between 6.5 and 7.5.
- D. Soil Texture:
 1. Sand: thirty percent (30%) – fifty percent (50%)
 2. Silt: thirty percent (30%) – fifty percent (50%)
 3. Clay: five percent (5%) – thirty percent (30%)
- E. Additives: As determined by soil fertility tests.
- F. Percent Organic Content:
 1. Turf grass shall be three percent (3%) maximum after amending or conditioning.
 2. Native grass shall be one percent (1%) maximum after amending or conditioning.
- G. Soluble Salts: Electric conductivity (EC) shall be less than two (2.0) mmhos/cm for turfgrass areas, dryland areas, and planting beds.

2.3 MANUFACTURED TOPSOIL

- A. “Amended Topsoil” as manufactured by Rockhound Landscape Supply, 2591 N. Hwy 41, Post Falls, ID, 208.773.4346, or substitution as approved by Project Manager.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where the Work of this Section will be performed for compliance with requirements and conditions affecting installation and performance.
 - 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 the work area.
 - 2. Verify that final grades are completed in accordance with the Contract Drawings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.

3.2 PLACING TOPSOIL

- A. Scarify compacted subgrade to a six-inch (6”) depth in all areas, (with the exception of planting areas adjacent to the existing parking lot and entry drive), to bond topsoil to subsoil. Place topsoil to a minimum depth of six-inches (6”) after settlement. Topsoil shall be free from weeds, sod, and material larger than 1-inch (1”), toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown on Contract Drawings. Hand rake areas inaccessible to machine grading.
 - 1. In all planting areas adjacent to the existing parking lot and entry drive, remove existing soil entirely to a depth of 12”. Scarify compacted subgrade to a six-inch (6”) depth in all areas, to bond topsoil to subsoil. Place topsoil to a minimum depth of twelve-inches (12”) after settlement. Topsoil shall be free from weeds, sod, and material larger than 1-inch (1”), toxic substances, litter or other deleterious material. Spread evenly and grade to elevations and slopes shown on Contract Drawings. Hand rake areas inaccessible to machine grading.
- B. Topsoil shall mixed thoroughly with the salvaged topsoil prior to placement.
- C. Utilize manufactured topsoil as the top layer, placing over scarified subgrade to a depth of six-inches (6”).

3.3 PROTECTION AND REPAIR

- A. Protect completed areas where topsoil has been spread from traffic which will compact the soil volume. Any areas that, as determined by Project Manager, become compacted due to Contractor’s construction traffic shall be reconstructed to specified requirements and approved by Project Manager.

3.4 METHOD OF MEASUREMENT AND PAYMENT

- A. The volume of topsoil, in cubic yards, for which payment shall be made shall be computed by multiplying the area of ground actually covered by the nominal depth of topsoil as indicated on the Plans or as directed by the landscape architect. No payment shall be made for any area where the average depth in place measured in the field is significantly less than the nominal depth indicated on the Plans or as directed by the landscape architect. Payment shall be made only for that yardage actually used and required in accordance with the requirements and provisions set out in these Specifications or as directed by the Engineer.
- B. Topsoil will be measured based on the volume of delivery ticket, in cubic yards.

END OF SECTION 32 91 20

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SECTION 32 92 00

TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Turf grass seeding.
2. Erosion-control measures

B. Related Requirements:

1. Section 329300 "Plants" for trees, shrubs, ground covers, and other plants as well as border edgings and mow strips.

1.2 DEFINITIONS

- A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
- B. Finish Grade: Elevation of finished surface of planting soil.
- C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
- D. 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.
- E. 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.
- F. 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 329113 "Soil Preparation" and drawing designations for planting soils.
- G. 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.
- H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- J. Weeds: Including but not limited to Goathead, Bindweed, Twitch, Dandelion, Jimsonweed, Knapweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Weed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broom Grass.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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 suppliers.
- C. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- D. Material Test Reports: For existing in-place surface soil.
 - 1. Soil analysis for each topsoil to be used.
 - 2. Analysis for each soil amendment.
 - 3. Analysis for each amended planting soil.
- E. Analysis and standards: Wherever applicable, for non packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.
- F. Planting schedule: Submit in writing two copies of proposed planting schedule, indicating dates for topsoil placing, site preparation, herbicide treatments, soil preparation, sodding, seeding, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- G. The Owner's Representative reserves the right to reject the seed at anytime prior to acceptance and that fails to meet specification requirements. Promptly remove rejected seed from site as specified.
- H. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of turf during a calendar year. Submit before expiration of required maintenance periods.

1.5 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 Land care Network or the American Nursery and Landscape Association.
 - 2. Experience: Five years' experience in turf installation in addition to requirements in Section 014000 "Quality Requirements."
 - 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 all of the following categories from the Professional Land care Network:
 - a. Landscape Industry Certified Technician - Exterior.
 - 5. Pesticide Applicator: State licensed, commercial.
- B. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- C. Soil-Testing Laboratory Qualifications: An independent laboratory or university 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.
- D. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report 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 the soil.
- E. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
- F. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Landscape Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
- G. Report suitability of tested soil for turf growth.
- H. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. (92.9 sq. m) or volume per cu.

yd. (0.76 cu. m) for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.

- I. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
- J. Preinstallation Conference: Conduct conference at Project site to coordinate the process with other trades, to coordinate equipment movement within planting areas and to avoid soil compaction, to review proposed methods of installation, performance criteria, and maintenance procedures. Review underground utility location maps and plans. Equipment having low unit pressure ground contact shall be utilized within planting areas. This meeting shall be coordinated by the construction project manager, and comply with requirements in Division 1.
- K. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All seed shall be free from insects and disease. Species shall be true to their scientific name as specified.
- L. Materials: The Landscape Contractor shall submit to the Owner's Representative for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Owner's Representative.
- M. Plant species substitutions shall be approved by the Landscape Architect.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.
- B. 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.
- C. 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.

- D. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- E. Material will be inspected upon arrival at project site. Owner's Representative will reject any opened or unacceptable materials as described above.
- F. Immediately remove unacceptable material from job site.

1.7 FIELD CONDITIONS

- A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion
 - 1. Spring Planting: tbd by Owner
 - 2. Fall Planting: tbd by Owner
- B. Seeding Season: Seeding shall occur as specified below. The following are typical Colorado schedules. Modify the following for appropriate region. Verify with local producers and contractors prior to finalizing.

<u>Seed Type</u>	<u>Spring Planting</u>	<u>Fall Planting</u>
Dryland Grasses	April 1-June 15	Oct 15-Nov15

- C. Sodding Season: Sodding shall be installed only after April 1 and before October 1 unless written approval is received from Landscape Architect.
- D. 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.
- E. Existing conditions:
 - 1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Landscape Architect.
 - 2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
 - 3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Landscape Architect before planting.
 - 4. If weeds are present on site, treat with herbicide prior to preparing soil for installing seed or sod as specified below.

- F. Coordination:
1. Coordinate with construction of utilities on site. Do not begin placing topsoil until underground work and adjacent structures (pavilions, site walls, headers, mow bands, etc.) are completed in the area.
 2. Coordinate with seeding, sodding and landscape Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed if placement is completed more than 3 days prior to commencement of landscaping in the area. Limit fine grading to areas that can be prepared for planting within 24 hours after fine grading.
 3. Coordinate with Contractors work requiring access to site over sod areas.
 4. Coordinate with installation of underground irrigation system.

1.8 WARRANTY

- A. Warranty for Seeded Turf Areas: Warrant areas in seed to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of two years from date of Substantial Completion as a full stand of grass. After seed germination, re-seed any spots where seed has not germinated within the total seeded area. Continue this procedure until a successful stand of grass is growing and accepted by Owner's Representative.
- B. During the original warranty period, reseed at once with comparable blend/mix, those areas that have failed to achieve a stand of grass or which in the Owner's Representative's opinion are unhealthy.
- C. Reseeding will not be allowed in any season considerable unfavorable for seeding by the Owner's Representative.
- D. Reseed in a manner to achieve quality as originally specified.

1.9 MAINTENANCE SERVICE

- A. General: The maintenance period shall begin immediately after each area is seeded and continue until Final Acceptance of entire project, or a minimum of 90 days, whichever is longer. Final Acceptance of seeded areas will not be given until Landscape Architect is satisfied with germination and a full stand of grass, is in a vigorous growing condition, with consistent and complete coverage. During this time, be responsible for watering, mowing, spraying, weeding, fertilizing and all related work as necessary to ensure that seeded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to develop and maintain seeded areas. After Final Acceptance, maintenance shall become the responsibility of the Owner's Representative.
- B. The seeded areas shall be accepted on the basis of having a uniform plant growth over the entire seeded area. Two (2) months after seeding, the seeded areas shall be reviewed by the Owner's Representative and the Contractor. Any areas (as determined by the Owner's Representative) where the seed has failed to germinate shall be reseeded and raked to cover the seed. In any area where the seed has failed to grow, reseeded shall be at the Contractor's expense until grass

is established and accepted. Acceptable uniform plant growth shall be defined as when the scattered bare spots, not greater than one (1) square foot, and do not exceed two percent (2%) of the seeded area.

- C. Mowing and Trimming: When turfgrasses reach three and one-half inches (3-1/2") height, begin weekly mowing program to maintain turf at two and one-half inches (2-1/2")¹/₂" height. Do not remove more than one-third the height of the grass blade in single mowing. Do not mow when grass is wet. Remove clippings from adjacent paved areas shall be removed and clippings from mowed turf areas shall be removed at the direction of Owner's Representative.
- D. Fertilizing: Within forty-fives days of seeding and every sixty (60) days thereafter until final acceptance, apply specified fertilizer to maintain optimal sod turf vigor or per the direction of the Owner's Representative.
- E. Weed Control: Control annual weeds by mowing. Do not use herbicides unless approved by the Owner's Representative.
- F. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the Owner's Representative. Contractor to provide four (4) insecticide/fungicide applications under the work of this contract.
- G. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3 and Division 32 9600. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
- H. Sodded Turf: Until Final Acceptance (One year).
- I. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 TURFGRASS SOD

- A. Turfgrass Sod: Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects], complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.
- B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Include at least three (3) improved and drought-resistant Kentucky bluegrass cultivars, each of a different type classification. At least one cultivar shall be an aggressive type. Submit list of proposed varieties to Owner's Representative a minimum of ten (10) days prior to seeding.
- C. Harvesting: Sod shall be fertilized 2–3 weeks prior to harvesting. Mow sod to a height of 1-1/2 inches before the sod is lifted. Sod shall be harvested in rolls, and shall not be cut more than 24 hours prior to planting.
- D. Size: Machine cut to a minimum pad thickness of 3/4 inch, excluding top growth and thatch. Provide sod of uniform pad sizes 18" maximum width by 24" minimum length, with maximum 5% deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically from upper 10% of pad will be rejected. Sod which has dried out, sod with adhering soil which breaks, tears, or crumbles away will not be accepted. Sod cut for more than twenty-four (24) hours will not be accepted.
- E. Netting: Plastic netting within sod mat, if present as used by the sod grower, is to be removed during planting operations. Sod will not be accepted if plastic matting is present in final installation.

2.2 TURFGRASS SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
- B. Turfgrass Species: Species as follows, with, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

STANDARD PARK SEED SHALL BE "HARDY LAWN MIX" COMPOSED OF THE FOLLOWING GRASS SPECIES:

<u>GRASS SPECIES</u>	<u>PERCENTAGE</u>
SPF 30 KENTUCKY BLUEGRASS	30%
CHARIOT HARD FESCUE	30%
VNS SHEEP FESCUE	30%
ORACLE CREEPING FESCUE	10%

- C. Application rate:
 1. As recommended by supplier
- D. Mulch:
 1. Wood cellulose fiber suitable for hydromulching
- E. Fertilizer: Inorganic mixture with following chemical composition: (20-5-10) with fifty percent (50%) sulfur coated urea (no iron), or as recommended by testing lab based on soil sample results.
- F. Water: Free of substances harmful to seed growth. Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not

available then the contractor is responsible for watering. Refer to Watering – Section 02233. Water shall be free of substances that may be harmful to seed growth. Water will be furnished by City, available through quick coupler or previously installed automatic irrigation system. Hoses and other watering equipment necessary to water the seed to be furnished by Contractor.

2.3 INORGANIC SOIL AMENDMENTS

- A. Perlite: Horticultural perlite, soil amendment grade.
- B. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.
- C. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
- D. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
- E. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1 inch sieve; soluble salt content of 5-10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
- B. Organic Matter Content: 40 percent of dry weight.
- C. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste

2.5 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. Composition: 1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m) of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
- 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.

2.6 PLANTING SOILS

- A. PLANTING SOIL: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 5 percent organic material content; free of stones 1 inch or larger in any dimension and other extraneous materials harmful to plant growth. Mix ASTM D 5268 topsoil with the following soil amendments in the following quantities to produce planting soil; do not obtain from agricultural land, bogs or marshes.
1. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones 1 inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass; not infested with nematodes, grubs, other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled, pore-space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.
 2. Mix imported topsoil or manufactured topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Ratio of Loose Compost to Topsoil by Volume: 1:3.
 - b. Weight of Superphosphate per 1000 Sq. Ft. : TBD .
 - c. Weight of Commercial Fertilizer per 1000 Sq. Ft.: TBD.
 - d. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: TBD.
- B. TOPSOIL: Existing, native surface topsoil formed under natural conditions. On-site topsoil was not stockpiled during overlot grading operations (now complete). Conduct soil testing per this Section to verify suitability of native surface topsoil to produce viable planting soil and to establish soil amendment mixes and quantities. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.
1. Mix existing, native surface topsoil with soil amendments per the soil agronomy test results as approved by the Landscape Architect.
 - a. Weight of Commercial Fertilizer per 1000 Sq. Ft.: As recommended by soil tests.
 - b. Weight of Slow-Release Fertilizer per 1000 Sq. Ft.: As recommended by soil tests.
- C. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for

watering. Water shall be free of substances that may be harmful to seed growth. Hoses and other watering equipment necessary to water the seed to be furnished by Contractor.

2.7 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.

2.8 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 inches (150 mm) long.

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 Architect and replace with new planting soil.

3.2 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations, Contractor shall repair any damage at no additional cost to the Owner.
- B. Restrict vehicular and pedestrian traffic from seeded areas until grass is established. Erect signs and barriers as required or directed by the Owner's Representative at no additional cost to the Owner.
- C. Locate, protect and maintain the irrigation system during seeding operations. Repair irrigation system components damaged during seeding operations shall be replaced or repaired to current Owner's irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.3 PREPARATION

- A. Work notification: Notify the Owner's Representative at least seven (7) working days prior to start of seeding operations.
- B. Limit preparation to areas that can be seeded within twenty four (24) hours of preparation.
- C. 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.
- D. 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.
- E. Weed Control: If weeds are present in the area to be planted, perform herbicide treatment over the entire area to be planted. Allow sufficient time to successfully complete the entire herbicide treatment process before proceeding with planting. Repeat procedure as needed as weed growth becomes evident throughout the duration of landscape construction.
 - 1. Herbicide treatment must be completed during the growing season.
 - 2. Water surface 1/2" per week for two weeks prior to application if natural precipitation does not supply this amount to encourage weed seed germination.
 - 3. Treat site with "Roundup" herbicide in accordance with manufacturer's recommendations.
 - 4. Two days after application water surface 1/2" per week if natural precipitation does not supply this amount to encourage weed seed germination.
 - 5. Ten (10) days after the first "Roundup" application, review surface for evidence of plant growth.

6. Repeat steps 2, 3, 4, and 5, up to three (3) applications, until there is no evidence of plant growth after a 10-day period.
7. Obtain Construction Manager's approval of surface conditions fourteen (14) days after last herbicide application.
8. Herbicide treatments beyond the three applications shall be considered additional to the contract and will be performed at the directed of the Construction Manager after the City has approved the cost. Additional herbicide treatments required for imported topsoil shall be borne solely by the Contractor.
9. Remove plant debris from treated area.
10. Contact Landscape Architect Engineer 48 hours in advance to review the site after each herbicide treatment. Do not proceed with additional planting until the results are approved and accepted by the Landscape Architect Engineer

3.4 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 2. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
 3. Remove stones larger than ½ inch in any dimension and sticks, roots, trash, and other extraneous matter.
 4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's Representative's property.
- C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation indicated in the drawings and adjacent to paving and curbs. Limit finish grading to areas that can be planted in the immediate future.
 1. Remove foreign materials, stones, exceeding 1 inch, weeds and undesirable plants and their roots that can to the surface during soil amendment.
 2. Roll and rake, remove ridges, and fill depressions to meet finish grades. Compact area to 85% in accordance with 312000- Earth Moving.
 3. Leave stockpile area and site clean and raked, ready to receive planting.
- D. Placing Planting Soil: Place and mix planting soil in place over exposed subgrade, where turf is on grade per drawings. Place manufactured planting soil over structure where turf is on structure.
 1. Reduce elevation of planting soil to allow for soil thickness of sod.

- E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- F. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.5 DRYLAND GRASS AREA PREPARATION

- A. Limit dryland grass area subgrade preparation to areas to be planted.
- B. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
- C. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
- D. Loosen surface soil to a depth of at least 8 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches (100 mm) of soil. Till soil to a homogeneous mixture of fine texture.
- E. Remove stones larger than 1 inch in any dimension and sticks, roots, trash, and other extraneous matter.
- F. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's Representative's property.
- G. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation indicated in the drawings and adjacent to paving and curbs. Limit finish grading to areas that can be planted in the immediate future.
- H. Remove foreign materials, stones, exceeding 1 inch, weeds and undesirable plants and their roots that can to the surface during soil amendment.
- I. Roll and rake, remove ridges, and fill depressions to meet finish grades. Compact area to 85% in accordance with 312000.
- J. Leave stockpile area and site clean and raked, ready to receive planting.
- K. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- L. Verify that all areas are graded to drain at a minimum of 2% or as indicated on the drawings. Verify that subsurface drainage system and drain inlets if any, are operative.
- M. Verify that irrigation system is operable and provides adequate coverage prior to planting.

- N. All finish grading shall be inspected by Engineer before planting. Repair any discrepancies, erosion, or otherwise disturbed areas prior to planting

3.6 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.

3.7 SODDING

- A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
- 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 joint. . in adjacent courses. 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. Lay sod across slopes exceeding 1:3.
 - 2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples 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. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod.

3.8 INSTALLATION OF SEEDED TURF AND DRYLAND GRASSES

- A. Seed within twenty-four (24) hours after preparation of seed bed. Seeding at other times may only be done if approved by the Landscape Architect.

- B. Areas outside Contract Limits disturbed as a result of construction operations shall be seeded at Contractor's expense
- C. Seed shall be uniformly applied, (half in one direction and the other half at right angles to the first application). The direction of the final application shall always be at right angle to the slope or running in the direction of the contour. Seed shall be installed at a depth between one-quarter (1/4") inch and one-half (1/2") inch. Accomplish seeding by a rangeland grass drill with double disk openers and depth bands.
- D. Areas that are too small or steep for mechanical seeding may be hand seeded. Seed shall be uniformly applied utilizing a broadcast spreader and then hand rake in to a depth of no more than one-half (1/2") inch, then roll seed bed to ensure proper contact to the soil.
- E. Restore grade if eroded or otherwise disturbed after finish grading and before planting.
- F. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- G. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- H. Roll seeded areas with cultipacker type roller and water with fine spray. Roll perpendicular to slope to discourage erosion.
- I. Sow seed at rates shown in Part 2 above.
- J. Do not use wet seed or seed that is moldy or otherwise damaged.
- K. Install seed only when soil moisture is appropriate.
- L. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets, installed and stapled according to manufacturer's written instructions.

3.9 MULCHING:

- A. Protect all seeded areas by spreading specified certified weed-free straw mulch. Spread uniformly at a minimum rate of 2 tons/acre (42 kg/92.9 sq. m) to form a continuous blanket 1-1/2 inches (38 mm) in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- B. Mulching shall not be installed when surface water is present resulting from rains, melting snow irrigation or other causes.
- C. Areas not properly mulched, or any damage that may occur during construction is the responsibility of the Contractor and shall be repaired and re-mulched in an acceptable manner at the Contractor's expense. Mulching removed by wind, rain or other causes prior to acceptance shall be re-established by the Contractor at his own expense.

- D. The seeded area shall be mulched within eight (8) hours of seeding. Areas not mulched within twenty-four (24) hours after seeding must be re-prepped and re-seeded with the specified seed mix at the Contractor's expense.

3.10 SEEDING SEASONS:

- A. Fall Seeding (preferred method):
 1. Seed forbs, grasses, and shrubs together when days become cooler in the fall months, generally from October 15 until the ground begins to freeze. No seeding in July and August. Avoid muddy conditions while seeding. Carefully select the day and week.
 2. Add a hydro-mulch tackifier on top of the seeds as a light mulch.
 3. Use coconut haul fiber as a mulch at the bottom of drainage channels where Riparian Grass seed mix is being planted to reduce seed loss from water runoff.
- B. Spring and Fall Seeding (bid separately.)
 1. Seed the grasses only in the spring, starting around April 1st. No seeding in July and August. Avoid muddy conditions while seeding. Carefully select the day and week.
 2. Add a hydro-mulch tackifier on top of the seeds as a light mulch.
 3. Use coconut haul fiber as a mulch at the bottom of drainage channels where Riparian Grass seed mix is being planted to reduce seed loss from water runoff.
 4. Increase irrigation rates for optimal seed germination during plant establishment.
 5. Apply a broadleaf herbicide across all seeded areas in the summer months after the seeded grasses have begun to establish. Apply herbicide at least three to four times during the growing season until the weeds have been eradicated.
 6. In the fall, generally from October 15 until the ground begins to freeze, hand broadcast the forbs and shrubs. Limit damage to establishing grasses as much as possible. See seed mix legend for rates and species.
- C. Spring Seeding (to be done only if the previous two seeding conditions are not possible):
 1. Seed all grasses, forbes, and shrubs in the spring starting around April 1st. There shall be no seeding in July and August. Avoid muddy conditions while seeding. Carefully select the day and week.
 2. Add a hydro-mulch tackifier on top of the seeds as a light mulch.
 3. Use coconut haul fiber as a mulch at the bottom of drainage channels where Riparian Grass seed mix is being planted to reduce seed loss from water runoff.
 4. Increase irrigation rates for optimal seed germination during plant establishment.
 5. Spot Spray for weeds with glyphosate after plant establishment to limit damage of seeded forbs and shrubs. Do not broadcast spray the herbicide
- D. Dormant Seeding: Upon approval of the Parks Project Manager, dormant seeding may be accomplished between October 15 and March 31. No seeding shall be done when the ground is frozen, muddy, covered with snow, or otherwise in a condition unsuitable for seeding. Dormant seeding will not relieve the Contractor from the warranty or the acceptance requirements specified elsewhere in this section.

3.11 TURF MAINTENANCE

- 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, regrade, and replant bare or eroded areas and 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. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. 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 (100 mm).
 - 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 inch (25 mm) per week unless rainfall precipitation is adequate.
- C. Mow turf as soon as top growth is tall enough to cut. 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 1-1/2 to 2 inches (38 to 50 mm).
- D. Turf Postfertilization: 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. (0.45 kg/92.9 sq. m) to turf area.

3.12 SATISFACTORY TURF

- 1. Turf installations shall meet the following criteria as determined by Architect:
- 2. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm)
- 3. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

4. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
5. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.
6. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory

3.13 DRYLAND GRASS MAINTENANCE

- A. Maintain and establish dryland grass seed areas by weeding, mowing, trimming, replanting, watering and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a full coverage stand of grass. 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 meadow damaged or lost in areas of subsidence.
 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 3. Apply treatments as required to keep meadow 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 meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
 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 dryland grasses with fine spray at a minimum rate of 1/2 inch (13 mm) per week for six weeks after planting unless rainfall precipitation is adequate.
- C. Mowing: Allow to grow to a minimum height of 12” prior to mowing. Cut no more than 4” at a cutting. Monitor weed growth and mow to prevent seed distribution. Mow monthly during the first season.
 1. Year One: Mow the planting area 2-4 times during the early growing season to a height of 6”to 8”. Mowing prior to or when non-native and weedy species are flowering to prevent seed-set. Control undesirable plant species by hand-pulling prior to the development and maturation of the plant. Hand-removal shall include the removal of all above-ground and below-ground stems, roots and flower masses prior to the development of seed. If necessary, Round-up herbicide may be selectively applied by a licensed applicator trained in plant identification.
 2. Year Two, or longer period as arranged with Owner’s Representative: Control undesirable plant species as necessary by mowing, hand-pulling, selective herbicide application, and/or prescribed burning.
 3. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

4. 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.
5. Watering: Provide and maintain temporary or permanent irrigation system to convey water from sources and to keep seeded area uniformly moist to a depth of 4 inches (100 mm) or as determined necessary to promote proper germination. Monitor the watering of the seeded areas to not overwater or stress plant material. Replacement of stressed or dead plant material caused by the watering or establishing of the seeded areas shall be at the Contractor's expense.

3.14 SATISFACTORY DRYLAND GRASSES

- A. Dryland grass seed installations shall be minimally established to meet the following criteria by Substantial Completion as determined by Engineer:
 1. Within three months, total vegetation cover in all zones seeded with cover crop shall exceed 70% (by aerial cover). Dryland grass shall be free of weeds, foreign grasses, disease and harmful insects.
 2. By the end of the first full growing season after seeding, total vegetation cover including cover crop shall exceed 90% (by aerial cover) and 10% of all species present shall be native.
 3. By the end of the first full growing season, seedling from 20% of planted forb species shall be present.
- B. At any time during the contract period no more than 10% (by aerial cover) of the seeded area should be dominated by aggressive exotic species such as, but not limited to, red clover (*Trifolium* spp.), white or yellow sweet clover (*Melilotus* spp.), Canada thistle (*Cirsium arvense*), tall fescue (*Festuca elatior*), bindweed (*Convolvulus arvensis*) etc. At the end of the fifth year no more than 50% (by aerial cover) of the seeded area shall be dominated by non-natives.
- C. Until final acceptance seeded areas that fail after having been replaced previously, shall be replaced until it meets establishment as required above. Replacement materials shall be identical to those originally specified. Provide seed tags to the Engineer for verification.
- D. Remedial action: If seeded areas greater than 10 square feet fail to meet the terms of the guarantee shown above, the Landscape Contractor will develop and submit to the Owner's Representative a remedial action plan that takes into consideration the site goals and specific deficiencies causing the remedial action. The Landscape Contractor will implement the remedial action plan and submit a report that describes the remedial action taken. If remedial seeding or planting is required, the Landscape Contractor will not be required to perform additional remedial seeding or planting in the same area for a minimum of two growing seasons. After two growing seasons following the remedial planting, the performance criteria must be met for the second growing season or additional remedial action must be taken. This guarantee remains in effect until all zones meet the third growing season criteria.

- E. Seeded areas will not be accepted in parts. Each time any portion or section of the entire seeded area requires replacement or remedial action, the maintenance period shall extend until all seeded areas meet the minimum establishment requirements stated above.
- F. All expense incurred including repairs from vandalism for the replacement and or establishment of the seed areas are the responsibility of the Contractor.
- G. If seeded in the fall, review for establishment shall be no later than June 15 of the following year.

3.15 PESTICIDE 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 Owner's operations and others in proximity to the Work. Notify Owner 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.

3.16 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 Owner'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 nondegradable erosion-control measures after grass establishment period.

3.17 MAINTENANCE SERVICE

- A. Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in "Turf Maintenance" Article. Begin maintenance 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 Substantial Completion

3.18 METHOD OF MEASUREMENT AND PAYMENT

- A. Turf grass seeding will be measured and paid by square foot.
 - 1. Turf Grass Seeding shall be the actual number of square feet based on the drawings and technical specifications. Payment for this item shall include soil testing, amending, soil preparation, fine grading, seeding, maintenance and warranty in accordance with the construction drawings and technical specifications. Any areas disturbed by the contractor outside the limits of construction as indicated on the drawings will require soil preparation, fine grading, seeding and mulching at the contractor's expense.

END OF SECTION 329200

SECTION 32 92 20

NATIVE SEEDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 requirements for the installation of native seed, mulch, erosion control material (if applicable), and maintenance of the seeded areas, to be achieved as outlined in the “Maintenance” section below.
- B. Related Sections:
 - 1. Division 01 Section “Erosion and Sedimentation Control”.
 - 2. Division 01 Section “Tree Retention and Protection”.
 - 3. Division 02 Section “Site Demolition”
 - 4. Division 02 Section “Excavation, Embankment, and Site Grading”
 - 5. “Irrigation Drawings”, provided by City
 - 6. Division 32 Section “Soil Preparation”.
 - 7. Division 32 Section “Topsoil”.
 - 8. Division 32 Section “Trees, Plants, and Groundcovers”.

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. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, herbicide, defoliant, or desiccant.
- C. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
- D. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

- G. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. Weeds: Including but not limited to Goathead, Bindweed, Twitch, Dandelion, Jimsonweed, Knapweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnsongrass, Poison Ivy, Nut Sedge, Nimble Weed, Bent Grass, Wild Garlic, Perennial Sorrel, and Broom Grass.

1.4 REFERENCES

- A. Comply with U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and be equal to or better in quality than the standards for Certified Seed.
- B. Colorado Department of Transportation (CDOT) – Standards Specifications for Road and Bridge Construction.

1.5 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Materials: The Contractor shall submit to the Project Manager for approval a complete list of all materials to be used during this portion of the work prior to delivery of any materials to the site. Include complete data on source, amount and quality. This submittal shall in no way be construed as permitting substitution for specific items described on the plans or in these specifications unless approved in writing by the Project Manager.
 - 1. Certification of Seed: From seed vendor for each 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.
 - 2. Native Grass Species (supplied as pure live seed): Submit lab germination test results for all grass species. Submit an affidavit that describes estimated purity for all forb species that are not typically tested.
 - 3. Pesticides: Include product label and manufacturer's application instructions specific to this Project.
 - 4. Product Certificates: For soil amendments and fertilizers, from manufacturer.
- C. Qualification Data: For qualified landscape Installer.
- D. Material Test Reports: For existing in-place surface soil.
 - 1. Soil Analysis: See Division 32 Section “Soil Preparation”
 - 2. Analysis for each soil amendment.
 - 3. Analysis for each amended planting soil.
- E. Analysis and standards: Wherever applicable, for non-packaged materials, provide two copies of analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists.

- F. Seeding schedule: Submit, in writing, two (2) copies of proposed seeding schedule, indicating dates for site preparation, seeding, mulching, erosion control, and coordination with plant procurement, planting soil preparation, plant delivery and planting. Schedule all Work during specified planting seasons. Once accepted, revise dates only as approved in writing, after documentation of reasons for delays.
- G. Maintenance Instructions: Recommended procedures for maintenance of irrigated and dryland grasses during a calendar year. Submit before expiration of required initial maintenance periods.
- H. Contract Closeout Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit one (1) digital copy and two (2) hard copies to the Project Manager in accordance with Division 01 Section “Contract Closeout”. Include directions for irrigation, aeration, mowing, fertilizing, and spraying as required for continued and proper maintenance through full growing season and dormant period.
 - 2. Warranty for Native Seed Areas: At completion of work, furnish written warranty to Parks Project Manager based upon specified requirements.
- I. The Project Manager reserves the right to reject the seed at any time prior to acceptance and that fails to meet specification requirements. Promptly remove rejected seed from the site.

1.6 QUALITY CONTROL

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf and dryland grass 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: Five years' experience in turf installation in addition to requirements in Division 01 Section “Quality Control”.
 - 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 4. Sod Producer: Company specializing in sod production and harvesting with minimum 5 years' experience, and certified by the State of Colorado Department of Agriculture.
 - 5. Personnel Certifications: Installers shall have certification the following categories from the Professional Landcare Network:
 - a. Certified Landscape Technician - Exterior, with installation maintenance irrigation specialty area(s), designated CLT-Exterior.
 - 6. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
 - 7. Pesticide Applicator: State licensed, commercial.
- B. Soil-Testing Laboratory Qualifications: An independent laboratory or university 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.
- C. Preinstallation Conference: Conduct conference at Project site to coordinate the process with other trades, to coordinate equipment movement within planting areas and to avoid soil compaction, to review proposed methods of installation, performance criteria, and maintenance

procedures. Review underground utility location maps and plans. This meeting shall be coordinated by the Contractor, and comply with requirements in Division 01.

- D. Standards: All materials and methods used during this portion of the work shall meet or exceed applicable federal, state, county, and local laws and regulations. All seed shall be free from insects and disease. Species shall be true to their scientific name as specified.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Seed: Shall be furnished in bags or containers clearly labeled to show the name and address of the supplier, the seed name, the lot number, net weight, origin, the percent of weed seed content, the guaranteed percentage of purity and germination, pounds of pure live seed (PLS) of each seed species, and the total pounds of PLS in the container. Seed that has become wet, moldy or damaged in transit or in storage will not be acceptable.
- B. Other Packaged Materials: Deliver packaged materials in original unopened containers bearing weight, analysis and name of supplier.
- C. Fertilizer: Deliver organic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- D. 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 fertilizers and soil amendments with appropriate certificates.
 - 4. Seed: Deliver seed materials in original unopened containers, showing bearing weight, analysis and name of supplier.
 - 5. Fertilizer: Deliver inorganic or chemical fertilizer to site in original unopened container bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark and conformance to state law, and bearing name and warranty of producer.
- E. Material will be inspected upon arrival at project site. Project Manager will reject any opened or unacceptable materials as described above. Store all materials in a manner to prevent wetting and deterioration.
- F. Immediately remove unacceptable material from job site.

1.8 PROJECT/SITE CONDITIONS

- A. Work scheduling: Proceed with and complete landscape work rapidly, as portions of the site become available, working within the specified planting season and approved schedule.
- B. Planting Restrictions: Planting is preferred in spring but may be performed during one of the periods noted below. Variance from the schedule shall be permitted only with written approval

from the Project Manager. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

- C. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- D. Do not drill or sow seed during windy, rainy weather or when ground is frozen or otherwise unable to be tilled.
- E. Seeding Season: Seeding shall occur as specified below. The following are typical Colorado schedules. Modify the following for appropriate region. Verify with local producers and contractors prior to finalizing.

<u>Seed Type</u>	<u>Irrigated Areas Only</u>	<u>Non-irrigated Areas</u>
Dryland Grasses	April 15-Sept.1	April 1-May 15 Oct 15-Nov15

- F. Existing conditions:
 1. Existing Plants: Install sod only after all other landscape and irrigation items have been installed and accepted by the Project Manager.
 2. Utilities: Determine location of underground utilities. Perform work in a manner to avoid possible damage. Hand excavate, as required.
 3. Excavation: Maintain grade stakes set by others until removal is mutually agreed upon by parties concerned. When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, noxious materials or obstructions, notify Project Manager before planting.
 4. If weeds are present on site, treat with pesticide prior to preparing soil for installing seed or sod as specified below.
- G. Coordination:
 1. Coordinate with construction of utilities on site. Do not begin placing topsoil until underground work is completed in the area.
 2. Coordinate with seeding and landscape Contractor(s) approved schedule. Limit construction access to areas where topsoil has been placed if placement is completed more than three (3) days prior to commencement of landscaping in the area. Limit fine grading to areas that can be prepared for planting within twenty-four (24) hours after fine grading.
 3. Coordinate with Contractors work requiring access to site over seeded areas.
 4. Coordinate with installation of underground irrigation system.

1.9 WARRANTY

- A. Warranty for Native Seed Areas: Warrant areas in seed to be in a healthy, vigorous growing condition, and for consistency and completion of coverage for a period of two (2) years from date of substantial acceptance as a full stand of grass. After seed germination, re-seed any spots where seed has not germinated within the total seeded area. Continue this procedure until a successful stand of grass is growing and accepted by the Project Manager.

1. During the original warranty period, reseed at once with comparable blend/mix, those areas that have failed to achieve a stand of grass or which in the Project Manager’s opinion are unhealthy.
2. Reseeding will not be allowed in any season considerable unfavorable for seeding by the Project Manager.
3. Reseed in a manner to achieve quality as originally specified.

B. Warranty for Native Seed in Non-irrigated Areas: No warranty will be required unless otherwise specified under Division 01 Section “Warranties and Bonds”.

1.10 MAINTENANCE

A. General: The maintenance period shall begin immediately after each area is seeded and continue until Final Acceptance of entire project. Final Acceptance of seeded areas will not be given until Project Manager is satisfied with germination and a full stand of grass, in a vigorous growing condition, with consistent and complete coverage. During this time, be responsible for watering, mowing, spraying, weeding, fertilizing and all related work as necessary to ensure that seeded areas are in a vigorous growing condition. Provide all supervision, labor, material and equipment to develop and maintain seeded areas. After Final Acceptance, maintenance shall become the responsibility of the City.

B. Irrigated Areas: The seeded areas shall be accepted on the basis of having a uniform plant growth over the entire seeded area. Two (2) months after seeding, the seeded areas shall be reviewed by the Project Manager and the Contractor. Any areas (as determined by the Project Manager) where the seed has failed to germinate shall be reseeded and raked to cover the seed. In any area where the seed has failed to grow, reseeding shall be at the Contractor’s expense until grass is established and accepted. Acceptable uniform plant growth shall be defined as when scattered bare spots, not greater than one (1) square foot, do not exceed five percent (5%) of the seeded area.

C. Non-irrigated Areas: The seeded areas shall be accepted on the basis of showing evidence of growth of specified seed material over the entire seeded area within three (3) months of seeding during weather conditions that are favorable for seed germination and growth.

D. Mowing and Trimming: Mow native grasses after the grass has gone to seed, cutting back to not less than four inches (4”) in height. Remove clippings from adjacent pavement or irrigated turf areas and remove from site.

E. Fertilizing: Within forty-five (45) days of seeding and every sixty (60) days thereafter until final acceptance, apply specified fertilizer to maintain optimal turf vigor or per the direction of the Project Manager.

F. Weed Control: Control annual weeds by mowing prior to seed development. Control perennial weeds through use of selective pesticides approved by the Project Manager only after grass stand has matured sufficiently that it will not be harmed by application of pesticides. Any plant material that is harmed due to over spraying, wind drift or improper application shall be replaced by the Contractor at no cost to the City.

G. Insect and Disease Control: As needed, apply insecticide and fungicide approved by the Project Manager.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil: See Division 32 Section “Topsoil”.
- B. General:
 - 1. The selected seed mix must be approved by the City Naturalist, and the Parks Project Manager prior to its incorporation into the project.
 - 2. All seed brands shall be free from Colorado prohibited noxious weed seeds such as Russian or Canada Thistle, Field Bindweed, Johnsongrass, and Leafy Spurge. The Contractor shall furnish to the Project Manager a signed statement certifying that the seed is from a lot that has been tested by a recognized laboratory for seed testing within six months prior to the date of delivery.
 - 3. Computation for quantity of seed required on the project is based on Pure Live Seed (PLS).
 - 4. The formula used for determining the quantity of PLS shall be:

$$\text{Pounds of Seed} \times (\text{Purity} \times \text{Germination}) = \text{Pounds of PLS}.$$
 - 5. If seed available on the market does not meet the minimum purity and germination specified, the Contractor must compensate for a lesser percentage of purity or germination by furnishing sufficient additional seed to equal the specified product. Product comparison shall be made on the basis of PLS in pounds, stated on each seed bag.
- C. Seed Mixes:
 - 1. Upland Grass Mix: Must be approved by City of Post Falls

Common Name	Scientific Name	Cultivar	Rate (lbs/acre)
Basin Wildrye	Leymus cinereus		14
Bluebunch Wheatgrass	Pseudoroegneria spicata	Anatone	12
Mountain Brome	Bromus marginatus		7
Sandberg Bluegrass	Poa secunda	Mtn. Hone	7
Slender Wheatgrass	Elymus trachycaulus		12
Streambank Wheatgrass	Elymus lanceolatus ssp spammophilus	Sodar	10
Western Wheatgrass	Pascopyrum smithii		18
Western yarrow	Achillea millefolium		2
Fernleaf Biscuitroot	Lomatium dissectum		2

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- D. Mulch: All native seed to be hydromulched.
- E. Fertilizer: None required unless otherwise specified by soils test.
- F. Water: Contractor to utilize the existing irrigation system and or quick coupler(s) when available. If irrigation or quick coupler(s) are not available then the contractor is responsible for

watering. Water shall be free of substances that may be harmful to seed growth. Hoses and other watering equipment necessary to water the seed to be furnished by Contractor.

2.2 PESTICIDES

- A. General: Pesticide, registered and approved by 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 Project Manager and authorities having jurisdiction.
- B. Pre-Emergent Pesticide (Selective and Non-Selective): Journey pesticide, as manufactured by BASF, 800-545-9525, or equal as approved by Project Manager. Use only with approval by Project Manager and in strict compliance with manufacturer's instructions.
- C. Post-Emergent Pesticide: "Round-up" by Monsanto, or approved equal.

2.3 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 inches long.
- 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 inches (6") long.
- C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3 inch (3") nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Invisible Structures, Inc.; Slopetame 2.
 - b. Presto Products Company, a business of Alcoa; Geoweb.
 - c. Tenax Corporation - USA; Tenweb.

2.4 SUBSTITUTIONS

- A. All substitutions shall be submitted to and approved by the Project Manager prior to construction.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to be seeded for compliance with requirements and other conditions affecting performance.
 - 1. Verify that finish grades are consistent with the slopes and grades indicated on the Contract Drawings. Verify grades are in conformance with Division 31 Section "Earth

Moving”. Obtain Project Manager’s approval of finished grade prior to proceeding with seeding operations.

2. Verify soil prepare of all areas to be seeded is in accordance with the requirements of Division 32 Section “Soil Preparation”. When completed, the soil shall be firmed by float dragging, followed by steel raking, to provide for the proper seeded surface. The seed bed shall be totally free from rock or clay clods over one inch (1”) in diameter.
3. 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 seeding area. If contamination is present in soil, remove the soil and contamination as directed by the Project Manager and replace with new soil.

- B. Verify that irrigation system is operable and provides adequate coverage prior to seeding.
- C. Proceed with seeding only after unsatisfactory conditions have been corrected and approved by the Project Manager.
- D. Acceptance: Beginning of installation means acceptance of existing conditions by the Contractor.

3.2 PREPARATION

- A. Notify the Project Manager at least seven (7) working days prior to start of seeding operations.
- B. Protect existing utilities, paving, planting and other facilities from damage caused by seeding operations. Contractor shall repair any damage at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during seeding operations. Repair irrigation system components damaged during seeding operations shall be replaced or repaired to current City irrigation standards at Contractor’s expense.
- D. Utilize equipment having low unit pressure ground contact within seeding areas.
- E. Limit preparation to areas that can be seeded within twenty-four (24) hours of preparation.
- F. Moisten prepared area before seeding if soil is dry. Water thoroughly and allow surface to dry before seeding. Do not create muddy soil.
- G. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.

3.3 SEEDING

- A. Seed within twenty-four (24) hours after preparation of seed bed. Seeding at other times may only be done if approved by the Project Manager.
- B. Areas outside Contract Limits disturbed as a result of construction operations shall be restored at Contractor’s expense.

- C. Seed shall be uniformly applied at the specified rate, (half in one direction and the other half perpendicular to the first application). The direction of the final application shall always be perpendicular to the slope or running in the direction of the contour. Seed shall be installed at a depth between one-quarter inch (1/4") and one-half inch (1/2"). Accomplish seeding by a rangeland grass drill with double disk openers and depth bands.
- D. Areas that are too small or steep for mechanical seeding may be hand seeded. Seed shall be uniformly applied at the specified rate utilizing a broadcast spreader and then hand raked in to a depth of no more than one-half inch (1/2"), then roll seed bed to ensure proper contact to the soil.
- E. Dormant Seeding: Upon approval of the Project Manager, dormant seeding may be accomplished between October 15 and March 31. No seeding shall be done when the ground is frozen, muddy, covered with snow, or otherwise in a condition unsuitable for seeding. Dormant seeding will not relieve the Contractor from the warranty or the acceptance requirements specified elsewhere in this specification.

3.4 EROSION CONTROL MATERIALS

- A. Review erosion control measures with Project Manager prior to installation.
- 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. Install erosion control blanket on slopes exceeding 4:1, and in swales or other areas of concentrated runoff. As shown on the Contract Drawings or as directed by the Project Manager. Install in accordance with manufacturer's instructions.
- E. 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.

3.5 MULCHING

- A. Straw Mulch Application: Comply with Section 213 – Mulching of the CDOT Standards and Specifications for Road and Bridge Construction.
- B. Hydromulch Application: Utilize an approved hydromulcher to apply cellulose fiber at a rate of two-thousand (2,000) pounds per acre. Apply tackifier to comply with CDOT Section 213.02 – Mulching. Contractor shall provide verification of application rates in the form of ship tickets.
- C. Mulching shall not be installed when surface water is present resulting from rains, melting snow irrigation or other causes.
- D. Areas not properly mulched, or any damage that may occur during construction is the responsibility of the Contractor and shall be repaired and re-mulched in an acceptable manner at

the Contractor's expense. Mulching removed by wind, rain or other causes prior to acceptance shall be re-established by the Contractor at its own expense.

- E. The seeded area shall be mulched within eight (8) hours of seeding. Areas not mulched within twenty-four (24) hours after seeding must be re-prepped and re-seeded with the specified seed mix at the Contractor's expense.
- F. Contractor shall remove all hydromulch from surface areas not specified for seeding, including but not limited to plant materials, fences, paved areas, signs, mulch beds, irrigation components and all other objects as directed by the Project Manager.

3.6 PROTECTION

- A. Restrict vehicular and pedestrian traffic from seeded areas until vegetation is established. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.

3.7 DRYLAND GRASS MAINTENANCE

- A. Maintain and establish dryland grass seed areas by weeding, mowing, trimming, replanting, watering and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a full coverage stand of grass. 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 meadow damaged or lost in areas of subsidence.
 - 2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - 3. Apply treatments as required to keep meadow 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. **[Choose one of three]** Watering: Install and maintain temporary piping, hoses, and watering equipment to convey water from sources and to keep soil uniformly moist.
 - 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. Obtain approval of Project Manager of irrigation system and schedule proposed for use.
 - 2. Water dryland grasses with fine spray at a minimum rate of one-half inch (1/2 ") per week for six (6) weeks after planting unless rainfall precipitation is adequate.
 - 3. Do not over-water in a manner which kills drought-tolerant components of the seed mix.
- C. Mowing: Allow to grow to a minimum height of twelve inches (12") prior to mowing. Cut no more than four inches (4") at a cutting. Monitor weed growth and mow to prevent seed distribution. Mow monthly during the first season.
 - 1. Year One: Mow the planting area 2-4 times during the early growing season to a height of six inches (6") to eight inches (8"). Mowing prior to or when non-native and weedy species are flowering to prevent seed-set. Control undesirable plant species by hand-pulling prior to the development and maturation of the plant. Hand-removal shall include the removal of all above-ground and below-ground stems, roots and flower masses prior to the development of seed. If necessary, Round-up pesticide may be selectively applied

by a licensed applicator trained in plant identification at no additional cost to the City. Obtain Project Manager's approval prior to applying pesticide. Apply per manufacturer's instructions.

2. Year Two, or longer period as arranged with Project Manager: Control undesirable plant species as necessary by mowing, hand-pulling, selective pesticide application, and/or prescribed burning.
3. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
4. 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.

3.8 SATISFACTORY DRYLAND GRASSES

A. Dryland grass seed installations shall be minimally established to meet the following criteria by Substantial Completion as determined by Project Manager:

1. Within three (3) months, total vegetation cover in all zones seeded with cover crop shall exceed seventy percent (70%) by aerial cover. Dryland grass shall be free of weeds, foreign grasses, disease and harmful insects.
2. By the end of the first full growing season after seeding, total vegetation cover including cover crop shall exceed ninety percent (90%) by aerial cover and ten percent (10%) of all species present shall be native.
3. By the end of the first full growing season, seedling from twenty percent (20%) of planted forb species shall be present.
4. At any time during the contract period no more than ten percent (10%) by aerial cover of the seeded area should be dominated by aggressive exotic species such as, but not limited to, red clover (*Trifolium* spp.), white or yellow sweet clover (*Melilotus* spp.), Canada thistle (*Cirsium arvense*), tall fescue (*Festuca elatior*), bindweed (*Convolvulus arvensis*) etc. At the end of the fifth year no more than fifty percent (50%), by aerial cover, of the seeded area shall be dominated by non-natives.
5. Until final acceptance seeded areas that fail after having been replaced previously, shall be replaced until it meets establishment as required above. Replacement materials shall be identical to those originally specified. Provide seed tags to the Project Manager for verification.
6. Remedial action: If seeded areas greater than ten (10) square feet fail to meet the terms of the guarantee shown above, the Landscape Contractor will develop and submit to the Owner's Representative a remedial action plan that takes into consideration the site goals and specific deficiencies causing the remedial action. Contractor will implement the remedial action plan and submit a report that describes the remedial action taken. If remedial seeding or planting is required, Contractor will not be required to perform additional remedial seeding or planting in the same area for a minimum of two growing seasons. After two growing seasons following the remedial planting, the performance criteria must be met for the second growing season or additional remedial action must be taken. This guarantee remains in effect until all zones meet the third growing season criteria.
7. Seeded areas will not be accepted in parts. Each time any portion or section of the entire seeded area requires replacement or remedial action, the maintenance period shall extend until all seeded areas meet the minimum establishment requirements stated above.
8. All expense incurred including repairs from vandalism for the replacement and or establishment of the seed areas are the responsibility of the Contractor.

9. If seeded in the fall, review for establishment shall be no later than June 15 of the following year.

3.9 CLEANING

- A. Perform cleaning during installation of the work and upon completion of the work. Remove from all excess materials, debris and equipment from site. Repair any damage resulting from seeding operations.
- B. 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.
- C. Remove non-degradable erosion-control measures after grass establishment period.

3.10 METHOD OF MEASUREMENT AND PAYMENT

- A. Native seeding will be measured and paid by square foot.
 1. Native Seeding shall be the actual number of square feet based on the drawings and technical specifications. Payment for this item shall include soil testing, amending, preparation, fine grading, seeding, maintenance and warranty in accordance with the construction drawings and technical specifications. Any areas disturbed by the contractor outside the limits of construction as indicated on the drawings will require soil preparation, fine grading, seeding and mulching at the contractor's expense.

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SECTION 32 93 00

PLANTS

PART 1–

GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 requirements for furnishing, installing, and maintaining live woody plant material.
- B. Related Sections:
 - 1. Division 01 Section “Tree Retention and Protection”.
 - 2. Division 02 Section “Site Demolition”
 - 3. Division 02 Section “Excavation, Embankment, and Site Grading”
 - 4. Division 02 Section “Compaction Watering”.
 - 5. “Irrigation Drawings” provided by City
 - 6. Division 32 Section “Landscape Systems”
 - 7. Division 32 Section “Soil Preparation”.
 - 8. Division 32 Section “Landscape Maintenance”.

1.3 DEFINITIONS

- A. ANSI: American National Standards Institute. Z60.1 is the national standard for nursery stock.
- B. Backfill: The earth used to replace or the act of replacing earth in an excavation.
- C. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
- D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
- E. Caliper: Trunk diameter is measured six-inches (6”) from the ground; if the caliper is greater than four-inches (4”), the measurement is taken at twelve-inches (12”) from the ground.

- F. Cane: A cane shall be considered a primary stem which starts from the ground or at a point close to the ground at a point not higher than one-fourth (1/4) the height of the plant, and which reaches the minimum height stated in the plant size specification.
- G. Central leader: Also referred to as leader or the dominant leader. A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main scaffold branch and extending to the top of the tree.
- H. Circling root(s): One or more roots whose diameter is greater than ten percent (10%) of the trunk caliper circling more than one-third of the trunk. Circling roots are unacceptable.
- I. Clear Trunk: The portion of the trunk below the main crown which may include shortened temporary branches.
- J. Co-dominant: Two or more vigorous, upright branches or stems of relatively equal diameter that originate from a common point, usually where the leader was lost or removed. Co-dominant stems are unacceptable.
- K. Container-Grown: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
- L. Critical Root Zone (CRZ): Shall be defined as the tree protection area encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every-inch diameter of the trunk, whichever is greater. Review the extent of the CRZ for impacted trees with Project Manager prior to start of work.
- M. Crown: The portion of a tree beginning at the lowest main scaffold branch extending to the top of the tree. On younger trees, the crown may be comprised of temporary branches.
- N. Cultivar: A named plant selection from which identical or nearly identical plants can be produced, usually by vegetative propagation or cloning.
- O. Drip Zone: The outermost edge of the tree's canopy or branch spread. The area within a tree's drip line is all the ground under the total branch spread.
- P. Finish Grade: Elevation of finished surface of planting soil.
- Q. Included Bark: Bark embedded in the union between a branch and the trunk or between two or more stems that prevents the formation of a normal branch bark ridge. Included bark is unacceptable.
- R. Kinked Root: A main root that is sharply bent. Kinked roots are unacceptable.
- S. 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. Some sources classify herbicides separately from pesticides.

- T. 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.
- U. Root Collar: Also referred to as the root flare. The base of a tree where the main roots and trunk meet.
- V. Scaffold Branches: Large main branches that form the main structure of the crown.
- W. Stem-girdling Root: A circling, bent, or straight root that touches or rests on the trunk or root flare that can become a permanent root. Stem-girdling roots are unacceptable.
- X. 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.
- Y. Temporary Branch: A small branch that is temporarily retained along the lower trunk of young trees.
- Z. Trunk: The main stem of a tree, beginning at the root collar and ending at the lowest main scaffold branch.
- AA. Taper: The thickening of a trunk or branch toward its base.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Product Data: For each type of product.
 - 1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
 - 2. Plant Photographs:
 - a. Include color photographs in digital format of each required species and size of plant material as it will be furnished to the Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
 - b. Digital Format: Digital photos are to be in .JPG format, 4”x6” image size, with a minimum of 200 dpi resolution. Provide photos to Engineer on DVD, or web-based delivery system such as the project website, as agreeable to Engineer.
- C. Product Samples: At a minimum provide the following samples for approval by the Project Manager, additional product samples may be required at the direction of the Project Manager.
 - 1. Mulch: one(1) gallon bag minimum of each type of mulch.
- D. Pesticides: Product label, Safety Data Sheet (SDS) labels and manufacturer's application instructions specific to Project.

- E. Proper Identification: All plants shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by species and cultivar (as appropriate).
- F. Planting Schedule: Submit in writing two copies of the proposed planting schedule, indicating dates for topsoil placement, soil preparation, herbicide treatments, sodding, seeding and coordination with plant procurement, plant delivery and installation. Schedule all work during specified planting seasons. Once accepted, revise dates only as approved in writing. Provide to Engineer reasonable purpose for accelerated or delayed schedule for review and approval.
- G. Contractor shall provide a complete list of all plant material and grower nurseries of all plants for approval by the Project Manager a minimum of ten (10) days prior to delivery. Any substitutions of plant material, including but not limited to size, type, species and variety or nursery shall be listed and submitted to the Project Manager for approval.
- H. Qualification Data: For qualified landscape Installer.
 - 1. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons. Refer to Part 3.11 QUALITY CONTROL for additional qualification information.
- I. Contractor shall provide the following certificates:
 - 1. State Inspection Certificate from the origin nursery.
 - 2. Certificate from origin state.
 - 3. Quarantine Certificate from origin state.
 - 4. Any Certificates required by the USDA Animal and Plant Health Inspection Service (APHIS) and ANSI-Z-160 and accompanying Rules and Regulations.
- J. Analysis of existing soil shall be per Division 32 Section "Soil Preparation".
- K. Contract Close Out Submittals:
 - 1. Operating and Maintenance Data: At completion of work, submit One (1) digital copy and two (2) hard copies to the Project Manager in accordance with Division 01 Section "Contract Closeout". Include recommended procedures for continued and proper maintenance during a full calendar year.
 - 2. Warranty for Trees, Plants, and Groundcovers: At completion of work, furnish written warranty to the Project Manager based upon specified requirements.

1.5 QUALITY CONTROL

- A. The Project Manager reserves the right to reject, at any time or place prior to final acceptance, all plant materials that fail to meet these specifications in the Project Manager's opinion. Inspection of materials is primarily for quality, size, and variety, but other requirements are not waived even though visual inspection results in approval. Plants are to be inspected where available; however, inspection at the places of supply shall not preclude the right of rejection at the site or at a later time prior to final acceptance. Rejected material shall be removed from the site within twenty-four (24) hours.
- B. For nursery stock inspection/selection requirements, refer to Part 3.11 QUALITY CONTROL.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Materials: Deliver materials in original containers with tags showing genus, species and size. Protect materials from damage during delivery and while stored at site. The Project Manager reserves the right to inspect containers before or after installation to verify compliance with Specifications.
- B. Bulk Materials:
 - 1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants or critical root zone.
 - 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.
- C. Plants: Nursery stock shall be harvested and planted during the same growing season. Do not prune, except as approved by the City Forester and Project Manager. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or tie plants in such a manner as to destroy natural shape. Provide protective covering during delivery. Plant materials delivered without protective covering may be rejected. Do not drop plants during delivery. All plants shall be labeled with a securely attached waterproof tag bearing a legible plant name. Remove all tags and flagging as directed by the Project Manager.
- D. Deliver bare-root stock plants within twenty-four (24) hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- E. Store bulbs, corms, and tubers in a dry place at sixty degrees to sixty-five degrees (60° to 65°) F until planting.
- F. Apply antidesiccant to shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again (2) two weeks after planting.
- G. Handle planting stock by the root ball only.
- H. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery, set planting materials in shade, protect from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with wood chips, or other acceptable material.
 - 2. Do not remove container-grown stock from containers before planting.
 - 3. Water root systems of plants stored on site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

1.7 PROJECT/SITE CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Vehicular accessibility on site shall be as directed by Project Manager. Repair damage to prepared topsoil and existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the City.
- C. Utilities: Contractor shall be responsible locating utilities and, repair of utilities damaged during the work. Determine location of overhead and underground utilities and perform work in a manner that will avoid damage. Hand excavate, as required. Maintain markings until their removal is mutually agreed upon by the Contractor and Project Manager.
- D. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify the Project Manager before planting.
- E. 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 and warranty requirements.
- F. Protection: Erect and maintain barricades, warning signs and lights, and provide guards as necessary or required to protect all persons on the site from exposed excavations.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of planting materials during normal planting seasons for each type of plant material required. Planting materials should be planted between April 15 and October 1, or at the direction of the Project Manager. If irrigation is not available at the time of planting then the Contractor is responsible for watering of all plant material and no additional cost to the City, refer to Division 32 Section "Watering".
- B. Plant after final grades have been accepted and prior to seeding or sodding, unless otherwise authorized by Project Manager.

1.9 WARRANTY

- A. Warranty: The warranty specified in this Article shall not deprive the City of other rights the City may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Trees, Plants, and Groundcovers shall be warranted for a period of one (1) year after date of Substantial Completion, against defects including death, structural failures, dieback as determined by the City Forester and or Project Manager. Warranty shall not cover defects resulting from lack of adequate maintenance, neglect or abuse by City staff, hail, or incidents that are beyond Contractor's control.

- C. The warranty shall not be enforced should any plant die due to vandalism after Final Acceptance.
- D. Remedial Actions:
 - 1. Replace any plant materials that have been excessively pruned, more than twenty percent (20%) percent dead, or in an unhealthy or declining condition immediately upon notice from the Project Manager during warranty period.
 - 2. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - 3. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
 - 4. Provide extended warranty for period equal to original warranty period for replaced material.
 - 5. Provide record plan to Engineer that shows each replaced plant and the date of its replacement
- E. All plants shall be true to name and meet all conditions of these specifications. Any plant that is not true to name as indicated by form, leaf, flower, or fruiting characteristics shall be replaced at the Contractor's expense.

PART 2 - PRODUCTS

2.1 PLANT MATERIALS

- A. General: Furnish and install nursery-grown shrubs conforming to the requirements of ANSI-Z-160, with healthy root systems developed by transplanting or root pruning. Provide well shaped, symmetrical, fully branched, healthy, and vigorous stock free of disease, insects, eggs, larvae, girdling, and defects such as sun scald, injuries, abrasions, and disfigurement. Plants of a larger size than that specified in the plant list may be used with a proportionate increase in size of roots and balls, if acceptable to the Project Manager. The use of larger plants shall be covered by the Contractor at no additional cost to the City.
- B. Label all plants of each size, caliper and variety and caliper with a securely attached waterproof tag bearing legible designation of botanical and common name.
- C. All plants shall be the genus, species, and variety designated on the Contract Drawings. No substitutions will be accepted without the prior written approval of the City Forester and or the Project Manager. Contractor must provide proof of non-availability.

2.2 SHRUBS

- A. Container Grown Shrubs: All specifications for container grown plants shall include both plant size and container size. Plant size intervals and reference to height or spread shall be in accordance with the guidelines for the appropriate plant type set forth in ANSI Z60.1; Section 2.2 - Types of Deciduous Shrubs.
- B. Container size shall be by container classification (i.e., not by container volume) as set forth in the ANSI Z60.1 Container Class Table.

- C. In all cases, container grown nursery stock shall meet the following general requirement:
 - 1. All container grown nursery stock shall be healthy, vigorous, well rooted, and established in the container in which it is growing. Container grown nursery stock shall have a well-established root system reaching the sides of the container to maintain a firm ball when the container is removed, but shall not have excessive root growth encircling the inside of the container.
- D. The container shall be sufficiently rigid to hold the ball shape and to protect the root mass during shipping.
- E. Minimum shrub sizes shall conform to the following standards:
 - 1. Tender shrubs (Type 0) that do not produce top growth that is winter hardy:

Height or Spread	Minimum number of canes	Minimum spread of roots
fifteen-inches (15")	three (3) canes	Nine-inches (9")

- 2. Small shrubs (Type 1) that grow to a mature height of not more than three feet (3'):

Height or Spread	Minimum number of canes	Minimum spread of roots
fifteen-inches (15")	four (4) canes	Nine-inches (9")

- 3. Intermediate shrubs (Type 2) that grow to a mature height between three feet (3') and seven feet (7'):

Height or Spread	Minimum number of canes	Minimum spread of roots
Two feet (2')	four (4) canes	twelve-inches (12")

- 4. Large shrubs (Type 3) that grow to a mature height exceeding seven feet (7'):

Height or Spread	Minimum number of canes	Minimum spread of roots
four feet (4')	six canes (6)	twenty-inches (20")

2.3 PERENNIALS, GRASSES, GROUNDCOVERS, AND VINES

- A. All container grown plants shall be healthy, vigorous, well rooted, and established in the container in which they are growing, and be in conformance with ANSI Z60.1. A container grown plant shall have a well-established root system reaching the sides of the container to maintain a firm root ball, but shall not have excessive root growth encircling the inside of the container. Top growth is to be in conformance with established nursery standards.

2.4 TREE-STABILIZATION MATERIALS

- A. Trunk-Stabilization Materials:
 - 1. Deciduous Tree Stakes: Rough-sawn, sound, new softwood with specified wood preservative treatment by pressure process, free of knots, holes, cross grain, and other defects, two-inch (2") diameter by six feet (6'), pointed at one end.
 - 2. Evergreen Tree Stakes: Two foot (2') steel T-posts; green color.
 - 3. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, #14 galvanized-steel wire, two-strand, twisted.

4. Tree-Tie Webbing: UV-resistant nylon webbing with brass grommets, size as indicated.
5. Safety signals for guy and staking wire: one-half-inch (1/2") diameter PVC pipe, length as indicated.

B. Tree-Wrap:

1. Two layers of crinkled paper cemented together with bituminous material, four-inches (4") wide minimum, with stretch factor of thirty-three percent (33%).
2. Tree wrap tape: Tape as approved by the City Forester and or the Project Manager.

2.5 PLANT PIT BACKFILL MATERIAL

- A. Unless otherwise directed by the Project Manager, the plant pit backfill material shall consist of the following, thoroughly mixed:
1. Soil originally excavated from the pit: two thirds (2/3) proportion of total mix.
 2. Soil Amendment as specified in Division 32 Section "Soil Preparation"; one-third (1/3) proportion of total mix.

2.6 WATER

- A. During the irrigation season (generally May through September), water will be available from on-site quick couplers. When the system is not charged, it shall be the Contractor's responsibility to supply adequate amounts of water from a water truck or other approved source. Hoses and other watering equipment shall be supplied by Contractor.
1. Watering Amount: Ten (10) gallons per caliper-inch.
- B. Watering: Refer to Division 32 Section "Watering".
- C. Maintenance: Refer to Division 32 Section "Landscape Maintenance".

2.7 MISCELLANEOUS MATERIALS

- A. Refer to Section 32 91 00 "Landscape Systems" for mulches, fabrics and other related landscape products.
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for plants, as approved by the City Forester and or the Project Manager. Deliver in original, sealed, and fully labeled containers. Mix and apply according to manufacturer's instructions.
- C. Pre-Emergent Pesticide: As approved by the City Forester and or the Project Manager.
- D. Pesticides: EPA registered and approved, and as approved by the City Forester and the Project Manager.
- E. Subdrainage: See Division 33 Section "Subdrainage Systems".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive landscaping for compliance with requirements and for conditions affecting performance of work of this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 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 the work area.
 - 2. Verify that adequate overhead clearance exists to planting locations.
 - 3. Suspend planting operations during periods of excessive moisture until acceptable planting conditions exist.
 - 4. Uniformly moisten excessively dry soil that is not workable.
- B. If contamination is present in the soil within a planting area, notify Project Manager immediately.
 - 1. If contamination is discovered during Construction the Project Manager will determine the best course of action to remediate the contamination, which may include requesting the Contractor perform the removal of contamination and replacement of clean material.
 - 2. If contamination is determined to be the result of construction operations, Contractor is to remove contaminated material and replace with clean material at the direction of the Project Manager.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and approved by Project Manager.
- D. Cooperate with any other contractors and trades, who may be working in and adjacent to the landscape work areas. Examine Contract Drawings which show the development of the entire site and become familiar with the scope of all work required.

3.2 FINISH AND FINE GRADING

- A. See Division 31, Sections “Earth Moving and 32 Section “Soil Preparation”.

3.3 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities, turf areas and existing plants from damage caused by planting operations. Repair damage to surrounding areas and site elements noted above resulting from planting operations at no additional cost to the City.
- B. Outline planting beds and mark plant locations within the bed(s) for approval by the Project Manager prior to installing any plant material or mow bands. Make adjustments as directed at no additional cost to the City.

1. If formal arrangements or consecutive order of plants is indicated on Contract Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

- C. Prepare planting area for soil placement and mix planting soil according to Division 32 Section “Soil Preparation”.

3.4 WEED CONTROL

- A. Do not proceed with landscape work until weed growth has been controlled and eliminated, per Division 32 Section “Soil Preparation”.
- B. See Division 32 Section “Soil Preparation” for detailed weed control measures.
- C. Use pesticides only with the written approval of Project Manager, and in strict accordance with manufacturer’s instructions.

3.5 EXCAVATION FOR SHRUBS

- A. Planting Pits: Excavate by hand or with a backhoe. Scarify sides of tree pit. Tree spade may not be used to dig tree pits.
 1. Balled and Burlapped Shrubs: Excavate a minimum two times (2X) as wide as ball diameter at base of pit. The base of the root collar shall be three-inches (3”) higher than the grade at which the tree originally grew and finished grade. Slope sides of the pit as shown on the detail.
 2. Container-Grown Shrubs: Excavate approximately two times (2X) times as wide as container diameter. Plants shall be set one-inch (1”) higher than finished grade.
 3. Do not excavate deeper than depth of the root ball, measured from the base of the root flare to the bottom of the root ball.
 4. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly compact the added soil to prevent settling.
- B. Obstructions:
 1. Utilities: Notify Project Manager immediately of utilities that conflict or may potentially conflict with proposed plant locations. In such cases, alternative plant locations will be determined by Project Manager.
 2. Notify the Project Manager prior to planting if unexpected rock or obstructions detrimental to shrubs are encountered in excavation.
- C. Drainage: Notify the Project Manager if subsoil conditions show evidence of water seepage or retention in tree or shrub pits.
 1. Fill the pit with water and allow it to completely drain before planting occurs.
 2. If water does not drain out of pit within twenty-four (24) hours, notify Project Manager.

3.6 PLANTING SHRUBS

- A. Balled and Burlapped Stock:
 1. Set balled and burlapped stock plumb and in center of pit with base of root flare three-inches (3”) above adjacent finish grades as indicated.

2. Remove burlap from top two-thirds (2/3) of balls and partially from sides, but do not remove from under balls. Remove wire baskets and all twine entirely. Remove pallets, if any, before setting. Do not use planting stock if ball is cracked or broken before or during planting operation.
3. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

B. Container Grown Stock:

1. Carefully remove containers so as not to damage root balls.
2. Lightly scratch sides of exposed root ball to loosen surface roots.
3. Set plants plumb and in center of pit with top of ball raised one-inch (1") above adjacent finish grades or as indicated.
4. Place backfill around ball in layers, tamping to settle backfill and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly, then place remainder of backfill. Repeat watering until no more is absorbed. Water again after placing and tamping final layer of backfill.

C. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare two-inches (2") above adjacent finish grade.

1. Backfill: As specified in Part 2 of this Section.
2. Spread roots laterally without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
3. Carefully work backfill in layers around roots by hand eliminating air pockets. Bring roots into close contact with the soil.
4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.7 PRUNING OF PLANTS

- A. Prune only damaged or dead branches as directed by the City Forester and or the Project Manager.

3.8 MULCHING

A. Shrubs:

1. Mulch backfilled surfaces of pits, planting beds areas, and other areas indicated or as directed by the Project Manager.
2. Mulch in shrub bed areas: Apply three-inch (3") thick layer of mulch and finish level with adjacent finish grades. Do not place mulch against stems of plants.

3.9 INSTALLATION OF MISCELLANEOUS MATERIALS

- A. Apply antidesiccant using power spray to provide an adequate film over trunks, branches, stems, twigs, and foliage.

- B. When deciduous plants are moved in full-leaf, Project Manager may direct the use of an antidesiccant at nursery before moving and again two (2) weeks after planting. Antidesiccant to be supplied and applied by Contractor at no additional cost to the City.

3.10 QUALITY CONTROL

- A. Provide quantity, size, genus, species, and variety of plants indicated, complying with current applicable requirements of ANSI Z60.1 “American Standard for Nursery Stock”, and all applicable state and local rules and regulations. . The Landscape Contractor is to provide only “Specimen” quality [as identified in the plant list in the drawings] for this project. See Part 1, subsection 1.3 for definition.
 - 1. Selection of plants purchased under allowances will be made by Engineer, who will tag plants at their place of growth before they are prepared for transplanting.
- B. Inspection: Contractor shall arrange for the Landscape Architect to select and/or inspect plant material at the nursery/grow site or upon delivery to the site, for compliance with requirements for genus, species, variety, cultivar, size, and quality. For nursery stock that is not inspected at the grow site, the Contractor must provide digital photographs per Part 1.4 SUBMITTALS for pre-approval by the Landscape Architect. Selection and approval of plant material shall be at the discretion of the Landscape Architect.
 - 1. At least forty-five (45) days prior to the expected planting date (for spring or fall planting) or at least sixty (60) days prior to the expected planting date (for summer planting), the Contractor shall request, in writing, that the Landscape Architect/Engineer provide a representative to select and tag stock to be planted under this Section. This request shall be made at least fifteen (15) days prior to the date on which stock selections are to be made. The Letter of Request shall also have attached a Letter of Certification from the supplier attesting to the fact that the stock to be selected from is, in fact, the patented tree or plant required under this Section or a substitution approved by the Landscape Architect.
 - 2. The Contractor shall schedule inspection of the plants with the Landscape Architect, at either the supplier or on-site, to be completed in one visit. Any further inspection required due to plants being unavailable, rejected, and or not meeting specifications shall be charged to the Contractor at the current hourly rate for the City personnel performing the inspection.
 - 3. The Landscape Architect shall supply the necessary tags or seals which shall be durable and capable of accepting weather-resistant ink or an embossed process. The tags or seals shall be attached directly and securely to each selected plant.
 - 4. For plant sources outside the Denver metropolitan area, The Contractor shall pay all expenses necessary personnel to visit the source for plants including airfare, taxi, hotels and meals.
- C. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful establishment of plants.
 - 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: Five years' experience in landscape installation in addition to requirements in Division 01 Section "Quality Requirements."

3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress. The supervisor shall be permanently assigned to the project and not changes or replaced without prior approval from the Engineer.
 4. Personnel Certifications: Installer's field supervisor shall have certification in the following categories from the Professional Landcare Network:
 - a. Certified Landscape Technician - Exterior, with installation, maintenance and irrigation specialty areas, designated CLT-Exterior.
 5. Pesticide Applicator: State licensed, commercial.
- D. Perishability: Regardless of the Engineer's acceptance of a tree at the source nursery, the Contractor remains fully responsible for the tree's health, including current or latent defects, incompatibility of rootball soil with site soils, appropriate rootball size, delivery and/or transplant shock, or any other plant stress or death what so ever.

3.11 PROTECTION

- A. Protect existing utilities, paving and other facilities from damage caused by seeding operations, Contractor shall repair any damage at no additional cost to the City.
- B. Restrict vehicular and pedestrian traffic from planted areas. Erect signs and barriers as required or directed by the Project Manager at no additional cost to the City.
- C. Locate, protect and maintain the irrigation system during seeding operations. Repair irrigation system components damaged during seeding operations shall be replaced or repaired to current City irrigation standards at Contractor's expense.
- D. Erosion Control: Take measures and furnish equipment and labor necessary to control and prevent soil erosion, blowing soil and accumulation of wind-deposited materials on the site throughout the duration of work.
- E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.12 CLEANING

- A. General: Provide and install barriers as required and as directed by Project Manager to protect sodded areas against damage from pedestrian and vehicular traffic until Final Acceptance.

3.13 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus soil including excess subsoil and unsuitable soil, waste material, including, trash, and debris generated during installation off site at no additional cost to the City.

3.14 METHOD OF MEASUREMENT AND PAYMENT

- A. Shrubs 1 Gal. will be measured and paid by each.
 - 1. Shrubs 1. Gal shall be per each plant as shown on the drawings and technical specifications. Payment for this item shall include soil testing, amending, soil preparation, fine grading, planting, maintenance and warranty in accordance with the construction drawings and technical specifications.
- B. Shrubs 5 Gal. will be measured and paid by each.
 - 1. Shrubs 5. Gal shall be per each plant as shown on the drawings and technical specifications. Payment for this item shall include soil testing, amending, soil preparation, fine grading, planting, maintenance and warranty in accordance with the construction drawings and technical specifications.
- C. Perennials 1 Gal. will be measured and paid by each.
 - 1. Perennials 1. Gal shall be per each plant as shown on the drawings and technical specifications. Payment for this item shall include soil testing, amending, soil preparation, fine grading, planting, maintenance and warranty in accordance with the construction drawings and technical specifications.
- D. Ornamental Grasses 1 Gal. will be measured and paid by each.
 - 1. Ornamental Grasses 1. Gal shall be per each plant as shown on the drawings and technical specifications. Payment for this item shall include soil testing, amending, soil preparation, fine grading, planting, maintenance and warranty in accordance with the construction drawings and technical specifications.

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SECTION 32 96 00

LANDSCAPE MAINTENANCE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract 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 requirements for furnishing of all supervision, labor, materials, equipment and transportation required to maintain the landscape areas called for under this contract for the time period specified. The work includes but is not limited to: weed control, re-seeding, re-sodding, mowing, weed control, watering of plant material and pruning, irrigation system repair and maintenance, fence installation and maintenance, maintenance of erosion control measures (BMP's) including storm water features and coordination with City staff.
- B. Related Sections:
 - 1. Division 01 Section "Erosion and Sedimentation Control".
 - 2. Division 02 Section "Watering".
 - 3. "Irrigation Drawings" provided by City.
 - 4. Division 32 Section "Trees, Plants, and Groundcovers".

1.3 INSPECTION AND ACCEPTANCE

- A. Formal Inspections: The project will be inspected during the Maintenance and Guarantee Period at the following points:
 - 1. Substantial Completion Inspection
 - 2. Establishment Inspection
 - 3. Quarterly Inspections
 - 4. Final Inspection
- B. Additional inspections and observations to monitor maintenance and landscape conditions will be done throughout the Maintenance and Guarantee Period by the Project Manager, City Forester, and City Naturalist.
- C. Substantial Completion Inspection: At the completion of operations under this contract, and prior to the beginning of the maintenance and guarantee period, the substantial completion inspection will be performed. At the time of this inspection, the Contractor shall have all planted and landscape areas complete and irrigation system operational. All fencing and protection shall be in place. All debris and litter shall be cleaned up and all walkways and curbs shall be cleaned of soil and debris left from installation operations. The inspection will not occur until these conditions are met. Also see Division 01 Section "Contract Closeout".
- D. Establishment Inspection: Shall occur approximately ninety (90) days after Substantial Completion. The review will consist of a review of sodded and seeded areas and plant material. The inspection will be to review proper rooting of sod, germination of seed areas and to check for signs of stress in plant materials.

- E. Quarterly Inspections: Shall occur quarterly from the date of Substantial Completion. The review will consist of a review of all maintenance contract responsibilities. The Contractor shall keep a quarterly report to be turned in at inspections to review work done to date, including any subcontracting, frequency of schedule, notifications made, materials list, equipment list etc.
- F. Final Inspection and Acceptance: The Contractor must give seven (7) days notice to the Project Manager requesting a Final Inspection in conformance of Division 1 requirements. During the inspection the Project Manager shall prepare a list of any defects discovered during such final inspection (“Punch List”) and submit the punch list to the Contractor. If in the opinion of the Project Manager that all work has been completed or performed per the contract documents the Project Manager will provide the Contractor with written notice of Final Acceptance. Final acceptance by the Project Manager will not be given until all deficiencies are corrected.

1.4 SUBMITTALS

- A. See Division 01 Section “Submittals” for submittal requirements.
- B. Maintenance Reports: Submit detailed maintenance quarterly reports and schedules for the Maintenance and Guarantee Period for review and approval by the Project Manager, Denver City Forester, and Denver City Naturalist.
- C. Material List: Submit a detailed list of materials, to be used for seeding, fertilization, pesticides, pesticides that are to be used for seeding, weed control, plant health and mulching.
- D. Equipment List: submit a detailed list of equipment and chemical controls to be used for weed control, seeding and mulching operations. Include brand and model number of all equipment to be used for soil preparation and seeding activities.
- E. Work Examples: submit list of three projects completed in the last two years of similar complexity to this project with name and location of project, Project Manager’s name and telephone number, name of project landscape architect and telephone number. Include certifications held by contractor and subcontractor employees who will oversee the work during the maintenance period.

1.5 CONTRACTUAL REQUIREMENTS

- A. Maintenance Period: The maintenance period shall commence from the date of work startup of the contract work in accordance with these Specifications and continue for the period of one (1) year from Date of Substantial Completion.
- B. Warranty Period: The Warranty period shall commence from the date of work startup of the contract work in accordance with these Specifications and continue for the period of two (2) years from Date of Substantial Completion.
- C. Limits of Work Area: All improvements and maintenance within the project work area are included unless otherwise indicated on the Contract Drawings or directed by the Project Manager. Areas outside defined areas, as illustrated on the Contract Drawings, will be maintained by the City.

- D. Performance of Work: The Contractor’s work force and equipment shall be accepted by Project Manager prior to the commencement of the maintenance period. The Contractor shall submit to the Project Manager an outline of the equipment and crew sizes to be utilized throughout the maintenance period. Maintenance work shall not be divided among several Contractors but shall be done by one entity. In the event that Project Manager finds any items identified as unacceptable, Contractor shall make the revisions noted by the Project Manager at no cost to the City.
- E. Scheduling / Progress Reports:
1. Scheduling: Prior to the beginning of the Maintenance and Warranty Period, Contractor shall submit for approval to the Project Manager a detailed schedule identifying all activities which are to be performed. Examples of such commitments include the regular intervals for weed control, fertilization, pesticide applications and mowings and other operations and the month and week which are scheduled for other major activities such as reseeding and mulching. It is not the Project Manager’s intent to require the Contractor to meet each deadline on a specific day, but merely to identify the general time periods for such activities. The Contractor may modify the schedule due to weather conditions, providing that Project Manager is notified in advance of any changes.
 2. Notification: Contractor shall be required to notify the Project Manager a minimum forty-eight (48) hours in advance of all major work so the Project Manager has the option of being present at the time of the work. Examples of such work are: clean cultivation, mowing, spraying, seeding, mulching or other activities relating to the repair of landscape items. In the event that proper notification is not given by the Contractor, the Project Manager shall have the right to require the Contractor to reschedule any such work until such time that the Project Manager is available. The above provision applies only to work which could be perceived as normal or regularly scheduled maintenance; emergency repairs do not apply.
 3. Progress Reports: The Contractor shall submit quarterly progress reports during the growing season and quarterly progress reports through the winter. The written progress reports shall be sent to the Project Manager outlining work completed, damage incurred, and problems encountered. Progress reports shall contain digital photo documentation of work.
 4. Site Meetings: Contractor shall meet, on site, with the Project Manager and City staff on a quarterly basis to review the project status.
 5. After Hours Contact: Contractor shall provide one afterhours contact and telephone number.
- F. Maintenance Coordination: Contractor shall coordinate maintenance operations and activities with Project Manager. Failure to Perform: In the event that, in the Project Manager’s opinion, action has not been taken on the part of the Contractor to properly maintain the project, the Project Manager may take whatever action that is deemed necessary to affect such repairs and any costs incurred will be deducted from the Contract amount.
- G. Licenses, Taxes, and Insurance:
1. Licenses: Contractor agrees to obtain and pay for all licenses required by the City, State and Federal governments that are necessary for legally conducting business. Contractor shall maintain all licenses and permits required for maintenance activities (e.g. pesticide application).
 2. Taxes: Contractor shall pay all applicable taxes, including sales taxes on materials supplied.

3. Insurance: Contractor shall maintain all insurance policies in accordance with the General Conditions of the contract through the entire term of the maintenance and guarantee period.

H. Payment Schedule: Payments shall be made as indicated in Measurement and Payment section.

PART 2 - PRODUCTS

2.1 Pesticides:

- A. For Native Grass areas: “Milestone”, as manufactured by Dow AgroSciences.
- B. For cultivated landscape areas: As approved by Project Manager.

PART 3 - EXECUTION

3.1 IRRIGATED TURF CARE (Bluegrass Sod and Seed)

- A. Watering: All watering shall be done in such a way as to encourage establishment, deep root growth and drought tolerance. See “Irrigation & Water Management”, Section 3.5 below.
- B. Fertilization: Turf areas shall be fertilized with accepted material (20-5-10) two (2) times per growing season at a rate of 1 pound of nitrogen per 1,000 square feet, once between April 15 and June 1 and once again between August 1st and September 15th.
- C. IPM (Integrated Pest Management): Apply approved pesticides as needed to control establishment and growth of annual and perennial weeds. Spot applications shall be required in areas of excessive growth. Contractor is responsible for ensuring turf establishment and that turf is not adversely affected by pesticide applications. No pesticides will be allowed until seedlings are at least three months old. After establishment, pesticide applications shall be done as required and directed by the Project Manager during the maintenance period.
- D. Insect and Disease Control: Insects and disease treatment shall be by application of necessary insecticides and fungicides as plant condition require.
- E. Topdressing.
 1. Soil used as topdressing material is to be consistent with existing soil texture where it is to be applied. Organic materials used are to meet Denver Park’s organic material specifications.
 2. Topdressing is to be used in non-athletic fields when soil tests or leveling needs determine the application.
 3. Filling Low Spots: Fill low spots with matching existing soil when filling noticeable depressions or holes. Compact per Division 31 Section “Earth Moving”.
- F. Repair all bare areas or dead areas of grass greater than 1 square foot. Repairs shall occur within five (5) calendar days of notice to repair the condition. Upon the Project Manager’s written approval, the Contractor may repair turf at a later date mutually agreed upon.

1. Seeding: If the original installation was by seed, repairs to such areas are to be reseeded. Replacement products and installation shall comply with specifications for original seeding.
2. Sodding: If the original installation was sodded, repairs to such areas are to be resodded. Replacement products and installation shall comply with specifications for original sodding.

G. Mowing, Trimming and Edging:

1. Contractor shall be responsible for mowing of all areas defined by the contract and Contract Drawings until final acceptance.
2. When turfgrasses reach three and one-half-inch (3-1/2") height, begin weekly mowing and trimming program to maintain turf at 3-inch (3") height. Do not remove more than thirty-three percent (33%) of grass leaf in single mowing. Do not mow when soil is wet. Remove clippings from adjacent paved areas. Mower blades are to be sharp to avoid tearing grass blades.
3. Areas not accessible to riding mowers shall be string line trimmed each mowing if necessary to match the mowing height. Limit string line trimming as much as possible around trees and objects (i.e., posts, utility boxes), by using Roundup and/or pre-emergent pesticides six- to twelve-inch (6"-12") radius kept clear, and base of shrubs and trees require twenty-four (24)-inch minimum radius clear of turf (bare soil/mulch).
4. Turf along concrete edges will be removed in cool season turf areas to the edge of the concrete curb or walkway using the appropriate edging equipment. The edge of the concrete surface should be visible after edging.

3.2 NATIVE SEEDING AREAS

A. Watering: All watering shall be done in such a way as to encourage establishment, deep root growth and drought tolerance. See Article 3.4 "Irrigation & Water Management", below.

1. Non Irrigated Native: Irrigation in non irrigated native areas shall consist of watering of all existing trees and shrubs as well as any new trees or shrubs that are to be watered for establishment. Refer to Division 31 Section "Watering" for requirements.

B. Weed Control:

1. Weed Control Prior to Initial Installation per Division 32 Section "Soil Preparation".
2. Weed control shall be done for the duration of the Maintenance and Warranty Period and when weed density meets or exceeds twelve (12) plants per square yard. Weed control shall be completed by one of the following methods:
 - a. Clean Cultivation: Prior to finish grading and final soil preparation work all areas to be seeded areas shall be clean cultivated with approved equipment. Clean cultivate using a rod weeder or other approved equipment tilling the ground no more than 2-inches (2") deep. Contractor shall coordinate timing of clean cultivations with the vegetative conditions on the site. Exact timing of cultivations shall be adjusted to control weed germination on the site. It is the responsibility of the Contractor to clean cultivate as necessary to prevent excessive growth of vegetation. Undesirable species shall not be allowed to seed on the site. Bindweed shall not be clean cultivated but removed by pesticide spot applications.
 - b. Mowing: Mowing of annual undesirable species shall be done as a weed control method. Undesirable species shall not be allowed to seed on the site. Existing grass stands to remain shall not be mowed until late fall or early spring to encourage seed drop.

- c. Chemical Control: Apply approved pesticides as needed to control establishment of annual and perennial weeds. Spot applications may be required. Contractor is responsible for ensuring seed establishment and that seed is not adversely affected by pesticide applications. Contractor shall use pesticides for specific species as recommended by CSU Agricultural Extension Service or City Naturalist.
- d. Spot Application Chemical Control: Apply pesticide by hand applicator directly to invasive annual and perennial weeds. Allow a minimum two weeks between application and any seeding activities.

C. Reseeding:

1. Evaluate native grass areas every ninety (90) days during the Maintenance and Warranty Period as to success of germination and coverage. Use the following criteria:
 - a. Reseed all areas that meet the following conditions:
 - 1) Areas of bare or dead grass greater than twenty-four inches (24") by twenty-four inches (24") square.
 - 2) Areas of weed density greater than twelve (12) plants per square foot.
 - 3) Areas with general density of specified grasses less than twelve (12) plants per square foot.
2. Reseed unacceptable areas as defined above. Reseeding, soil preparation and mulching shall comply with Division 32 Sections "Turfgrass Seeding" and "Soil Preparation". Seed mixes may be revised (% of species) to better suit site conditions. If requested by Project Manager or Denver City Naturalist, mix shall be revised at no additional cost to the Contract. Where drill seeding is not feasible, hand broadcast seed and rake into the soil to achieve 1/4- to 1/2-inch coverage of soil. The seed application rate shall be doubled in all areas where it is mechanically broadcast and quadrupled in areas requiring hand broad casting. Hydroseeding is not allowed.
3. Timing of reseeded shall be as specified herein. Upon the Project Manager's written approval, the Contractor may reseed at a later date mutually agreed upon.

3.3 TREE, SHRUB, AND PLANT CARE

- A. Pruning: Refer to Division 32 Section "Trees, Shrubs, and Groundcovers" for maintenance requirements.
- B. Replacement of Plants: Remove and replace dead, diseased, dying or damaged plants (including material damaged by vehicles or vandalism) within fourteen (14) calendar days of notification by Project Manager or Denver City Forester. Upon Project Manager's written approval, the Contractor may replace rejected plants at a later date, mutually agreed upon, provided that the Contractor removes all rejected plants within fourteen (14) calendar days of the notice to replace such plants. If the rejected plants are not removed in fourteen (14) calendar days, the City may remove and replace these plants and any costs associated with the removal and replacement shall be deducted from the Contract price. All areas damaged by replacement operations are to be fully restored to their original condition as specified. Plant material damaged by vehicles or vandalism shall be replaced by the Contractor at no cost to the City. Guarantee all plantings to be true to name and to meet all conditions of these specifications. Any plant which is not true to name as indicated by leaf, flower form or fruiting characteristics revealed within maintenance period shall be replaced by Contractor at Contractor's expense.

- C. Transplanted Material: Refer to Division 32 Section “Tree Transplanting”.
- D. Non-Irrigated Plant Material (trees): all plant material that not served by an automatic underground irrigation system shall be watered by Contractor for the duration of the maintenance and guarantee period. Water all plant material at a rate of ten (10) gallons per inch of tree caliper (e.g. a two-inch (2”) tree requires twenty (20) gallons) to maintain optimum growth. Watering frequency shall be adjusted based on rainfall, season and plant performance. Maintain a large enough water basin around plants so that enough water can be applied to establish moisture through the major root zone. When hand watering; use a water wand to break the water force. Winter watering is the responsibility of the Contractor throughout the maintenance period as many times as required to prevent the plant material from desiccation. Watering may be done by water truck, but must not promote or cause erosion or displacement of mulch or erosion control items.

3.4 IRRIGATION SYSTEM AND WATER MANAGEMENT

- A. Contractor shall check all irrigation systems for proper operation after each mowing, and any deficiencies or adjustments shall be repaired prior to the next watering cycle. Any damage to system caused by Contractor’s operations shall be repaired without charge to City.
- B. Contractor shall be responsible for providing an Establishment Watering Schedule, Transition Watering Schedule and a Maintenance Watering Schedule to the Project Manager, Operation Supervisor and the Toro Field Representative (when applicable).
 - 1. All irrigation schedules and zone controller charts shall ensure that there will be no ponding or runoff of water during any of the scheduled times.
 - 2. Prior to any plant material being installed all schedules shall be provided to the Project Manager and Operations Supervisor.
 - 3. The water schedule templates are available from Water Conservation and the Project Manager.
 - 4. Contractor shall make any modifications to the programming as requested by Project Manager.
 - 5. Initial Irrigation (Days 1-21):
Plants shall be adequately watered for the first twenty-one (21) days after installation or until seeds have germinated and emerged or sod has become firmly rooted.
 - a. Exact timing of irrigation cycles will depend on weather conditions, soil conditions, and speed of emergence of grass seed.
 - b. Short, frequent irrigation cycles shall be used.
 - c. Split cycles or the ‘cycle and soak’ feature must be employed to reduce erosion or run off in seeded areas.
 - d. Do not exceed three inches (3”) of total water per week.
 - e. Coordinate with irrigation system schedule and programming with the Project Manager, and City staff. Project Manager may choose to involve other parties from the City or irrigation equipment manufacturer.
 - f. Do not over-water native seeded areas in a manner which adversely impacts germination and growth of any components of the seed mix.
 - g. Contractor shall submit a meter reading before and after establishment to verify water use.
 - 6. Transition Irrigation (Days 21-60):

- a. Less frequent, but longer watering cycles will provide moisture at depths that will encourage seedlings to continue to develop and sod to develop deeper roots.
 - b. Allow the surface soils to dry slightly between watering to encourage deeper rooting.
 - c. Watering shall be done utilizing historic evapotranspiration rates for the current watering month(s).
 - d. Do not over-water native seeded areas in a manner which adversely impacts germination and growth of any components of the seed mix.
7. Maintenance Irrigation (Days 61 – End of Maintenance Period):
- a. Irrigate as needed to maintain an optimum stand of turf while minimizing water use.
 - b. Irrigation frequency shall be adjusted at a minimum, based on monthly historical evapotranspiration rates and plant (turf and tree) water requirements.
 - c. It is the responsibility of the Contractor to coordinate with Project Manager, Operations Staff, and local Toro Field Representative the programming of irrigation controllers, to properly irrigate plant materials and turfgrass.
 - d. Do not over-water native seeded areas in a manner which adversely impacts germination and growth of any components of the seed mix.
8. Once sod has been laid, begin watering to build up the sub-soil moisture. This will be the most critical time to apply water.
- a. Water up to one and one-half inches (1-1/2”) of water per day for the first two (2)-to three (3)-days.
 - b. Probe the soil to determine if the moisture has penetrated down to a minimum of four inches (4”).
 - c. During the next three (3) weeks the amount of water needed will be similar to that of the historical evapotranspiration rates for the season per day.
 - d. Each day may require more than one application depending on wind and temperature in order to keep the root zone and blades moist.
- C. All damage to irrigation system during the landscape and irrigation maintenance period shall be repaired by the Contractor with identical materials.
- D. Time of Irrigation: Watering shall be done during the approved City and Denver Water-allowed water window. Coordinate times with the Project Manager.
- E. Winterization of Irrigation System: Under the maintenance period, the Contractor shall be responsible for winterizing irrigation pumps, if applicable, and draining irrigation system for the full maintenance period.
1. Remove water from system by use of compressed air.
 2. Remove water from drip lines by opening flushing plugs.
 3. Submit a meter reading after winterization of the system has occurred to Parks Water Conservation.
 4. Winterization shall occur no later than October 15th unless a variance has been granted from the Project Manager.
- F. Spring Start-Up: The Contractor shall be responsible for starting up the irrigation system in the spring (April 15).

1. Fully activate the system including controller start-up, in order to demonstrate that it is in full working order.
 - a. Any repairs that are needed as a result of improper winterization shall be corrected by the Contractor at no additional cost to the City.
 2. Correct all deficiencies and make any adjustments to ensure proper system function.
 3. Submit a meter reading prior to spring start-up to the Project Manager.
- G. It shall be the responsibility of the Contractor to ensure the satisfactory operation of the entire irrigation system and workmanship within the project area. The entire system, including materials, shall be maintained to be complete and remain operable in every detail by the Contractor throughout the maintenance period, and the Contractor agrees to make any adjustments or repair any defects occurring within the maintenance period within 7 calendar days of notification by the Project Manager.
1. Contractor shall replace any materials with manufacturer's defects at no additional cost to City.
 2. Replacement of any equipment shall match that installed and designed on the irrigation plans unless a variance is granted from Project Manager.
 3. Problems resulting in leakage or water waste shall be repaired within 12 hours of notification.
 4. Contractor is responsible for emergency repairs and or shut downs.
 - a. If Contractor neglects to perform these duties within the specified time, the City may make such repairs at the Contractor's expense.
 - b. In the case of an emergency, where in the judgment of the City, delay would cause serious loss or damage, repairs or replacement may be made by verbal communication and without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.
- H. Any settling of irrigation trenches/backfill material during the maintenance period shall be repaired by Contractor's at no additional cost to the City.
1. Contract documents shall govern irrigation replacement during maintenance period the same as new work.
 2. Replacements are to be made at no additional cost to the City.
- I. Any vandalism to the irrigation system prior to Final Acceptance shall be repaired and/or replaced at Contractor's expense.

3.5 METHOD OF MEASUREMENT AND PAYMENT

- A. Landscape Maintenance and warranty shall be included unit prices for Turf Grass Seeding (Section 329200 "Turf and Grasses"), Native Seeding (Section 329220 "Native Seeding"), and all shrub, perennial, and ornamental grass planting (Section 329300 "Plants"). No separate measurement or payment to the Contractor will be made under this section.

END OF SECTION 32 96 00

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SECTION 33 4600

LANDSCAPE SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid PVC Pipe
 - 2. Landscape Drain Catch Basins & Grates
 - 3. Trench Drains & Covers.
 - 4. Geotextile filter fabrics.
- B. This section shall consist of the construction of a trench drain, perforated drainpipe, and drywells in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.
- C. Related work described elsewhere:
 - 1. Work under this section shall conform to the requirements of Division 400 of the IDAHO STANDARDS FOR PUBLIC WORKS CONSTRUCTION (ISPWC), as amended, and as supplemented or modified herein or on the drawings.
 - 2. Excavation, Embankment, and Site Grading, Section 02221.
 - 3. Trenching Excavation and Backfill, Section 02227.

1.2 SUBMITTALS

- A. Product Data: For drainage conduit, drainage panels, and geo-textile fabrics.
 - 1. Perforated PVC Piping
 - 2. HDPE Corrugated Storm Pipe
 - 3. Stormwater Drain Outlets
 - 4. Geotextile Liner
 - 5. Concrete
 - 6. Precast Concrete Grade Rings
 - 7. Frames, Covers and Grates
 - 8. Grout
 - 9. Drain Rock
 - 10. Single and Double Barrel Drywell

1.3 COORDINATION

- A. Coordinate installation of subsurface drainage system with the landscape grading, plantings, utilities, irrigation system, pavements, and site walls.
- B. Coordinate the installation of subsurface drainage with trenching and backfilling operations covered in other sections. Minimize the length of time that trenches remain open.
- C. Only install enough drainage panels that can be backfilled with sand by the end of the workday. Panels that have been installed in trenches that have been washed out or flooded before the sand

installation shall be removed and discarded. Remove all dirt or debris above the panel that does not comply with the sand backfill material required. Reshape the trench to properly comply with the specifications.

- D. If necessary, coordinate installation of subsurface drainage with outflow connections, including storm sewer connections covered under this or other sections to ensure that the connections are completed prior to the subsurface drainage installation.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Pipe

1. Perforated PVC Piping for French Drain: French drainpipe 4-inch diameter and larger shall be perforated D3034 PVC pipe or as otherwise approved by the Engineer or RPR. French drainpipe sizes specified in construction plans.
2. HDPE Corrugated Storm Pipe for Stormwater Drain: Stormwater drain pipe 4-inch diameter or larger shall be high density polyethylene (HDPE) corrugated storm pipe or otherwise approved by the Engineer or RPR.

B. Geotextile Liner

1. Manufacturer Tencate Geosynthetics or approved equal
 - a. 365 South Holland Drive, Pendergrass, Georgia 30567, 706.693.2226
 - b. G200N G-Series Drainage Composite
2. Material: polypropylene core with Mirafi 140N nonwoven filter geotextile bonded to both sides
3. Dimensions: in roll of 4' x 50'

C. Concrete

1. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of ISPWC Section 704 – Precast Concrete.

D. Stormwater Drain Outlets

1. Storm drain outlets shall accommodate a 4-inch diameter storm drain pipe. Outlets shall adhere to the standard detail provided in the construction drawings.

E. Single and Double Barrel Drywell

1. Drywells shall include both single and double depth design. Drywell shall be precast and adhere to the detail standards outlined in the City of Post Falls Standards for Public Works Construction Standard Detail SD-601 outlined in the construction plans.

F. Precast Concrete Grade Rings

1. Precast concrete manhole grade rings shall conform to the requirements of ASTM C478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches (90 cm) nor more than 48 inches (120 cm). There shall be a gasket between individual sections and sections cemented together with mortar on the inside of the manhole. Gaskets shall conform to the requirements of ASTM C443.

- G. Frames, Covers and Grates
 - 1. The castings shall conform to one of the following requirements:
 - a. ASTM A48, Class 35B: Gray iron castings
 - b. ASTM A47: Malleable iron castings
 - c. ASTM A27: Steel castings
 - d. ASTM A283, Grade D: Structural steel for grates and frames
 - 2. All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.
 - 3. Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.
 - 4. All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.
- H. Grout
 - 1. Grout shall be packaged dry, hydraulic-cement non-shrink grout that shall conform to the requirements of ASTM C1107.
- I. Drain Rock
 - 1. Drain rock shall be clean, free-draining coarse rock of uniform size. Maximum rock size shall be two inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Verify that drainage panels installed as part of foundation wall waterproofing is properly positioned to drain into subdrainage system.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in:
 - 1. Section 02221 – Excavation, Embankment and Site Grading
 - 2. Section 02227 – Trenching Excavation and Backfill

- B. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe. Trench widths shall be as shown on the Plans.
- C. Excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

3.3 LAYING PIPE

- 1. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.
 - a. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of 36 inches unless otherwise indicated.
 - b. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of 0.5 percent and with a minimum cover of 36 inches unless otherwise indicated.
 - c. Lay perforated pipe with perforations down.
 - d. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- 2. Elliptical and elliptically reinforced pipes shall be placed with the manufacturer's top of pipe mark within five degrees of a vertical plane through the longitudinal axis of the pipe.

B. JOINING PIPE

- 1. Joints shall be made with (1) rubber gaskets, (2) plastic gaskets, or (3) coupling bands.
 - a. PVC, Polyethylene, and Polypropylene Pipe. Joints for PVC, Polyethylene, and Polypropylene pipe shall conform to the requirements of ASTM D 3212 when water tight joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M 304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M 252 or ASTM M 294. Fittings for polypropylene pipe shall conform to ASTM F 2881, ASTM F 2736, or ASTM F 2764.

C. CONNECTIONS

- 1. When the plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made so that a smooth uniform flow line will be obtained throughout the drainage system.
- 2. At drainage structures, pipe ends shall be flush with the inside face of the structure. Alternatively, pipe may extend up to 2 inches inside the structure. Mortar and grout shall be applied around the exposed pipe end, finished reasonably flush and even.
- 3. Wrap connections of pipe outlets to underdrains with filter fabric. Cap existing underdrains in the locations shown on the plans and wrap with filter fabric. All connections to other drainage pipes or structures shall be made as required and in a satisfactory manner.

D. CLEANING

- 1. All (new and existing) storm sewer pipes and drainage structures inside the project limits require cleaning. They shall be cleaned by a combination jet rodding/vacuum truck. All (new and existing) catch basin sumps, manholes, inlet and outlet structures, and debris

racks shall be free of all dirt, rock, and other debris. The Contractor shall hydraulically flush and collect debris with a vacuum truck.

2. Structure excavation and compacting backfill will meet requirements of Section 02227 – Trench Excavation and Backfill.

E. IDENTIFICATION

1. Arrange for installation of green warning tapes directly over piping. Comply with requirements for underground warning tapes specified in specified in Division 31 Section "Earth Moving."
2. Install PE warning tape or detectable warning tape over ferrous piping.
3. Install detectable warning tape over nonferrous piping and over edges of underground structures.

F. DRYWELL CONSTRUCTION

1. Drywell construction will conform to all of the aforementioned materials specifications and include installation as described in the plans and specifications.
2. Structure excavation and compacting backfill will meet requirements of Section 02227 – Trench Excavation and Backfill.

G. TESTING

1. Unless otherwise shown on the Plans, lines connecting catch basins, drywells and inlets, including the connecting lines to manholes and oil-water separators need not be pressure tested.
2. Where required on the Plans, pressure testing to water-class pipe standards shall be conducted per ISPWC Section 331400.3.7, Hydrostatic Pressure Test.

H. INSPECTION REQUIREMENTS

1. An initial post installation inspection shall be performed by the Resident Project Representative (RPR) no sooner than 30 days after completion of installation and final backfill. The Contractor shall clean or flush all lines prior to inspection.
2. Use a camera with lighting suitable to allow a clear picture of the entire periphery of the pipe interior. Center the camera in the pipe both vertically and horizontally and be able to pan and tilt to a 90 degree angle with the axis of the pipe rotating 360 degrees. Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image shall be clear, focused, and relatively free from roll, static, or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe.
3. For pipe sizes larger than 48 inches, a walk-through visual inspection shall be performed.
4. Reinforced concrete pipe shall be inspected, evaluated, and reported on in accordance with ASTM C1840, "Standard Practice for Inspection and Acceptance of Installed Reinforced Concrete Culvert, Storm Drain, and Storm Sewer Pipe." Any issues reported shall include still photo and video documentation. The zoom ratio shall be provided for all still or video images that document any issues of concern by the inspection firm.
5. Flexible pipes shall be inspected for rips, tears, joint separations, soil migration, cracks, localized buckling, settlement, alignment, and deflection.

I. DRAIN ROCK

1. Installation of drain rock shall be at the inlets of the "Drainage Curb Cuts" within the proposed stormwater basins #1 and #2 as per the Contract Documents.

PART 4 – MEASUREMENT AND PAYMENT

- A. GENERAL
 - 1. Trench excavation, backfill, dewatering, cleaning, and testing will not be measured for payment, as this work is considered incidental to other bid items.

- B. FRENCH DRAIN SYSTEM
 - 1. Measurement and payment for the French drain shall be by lump sum. All items required of the French drain system including the 4” perforated D3034 PVC pipe, geotextile fabric liner, and the clean gravel fill are considered incidental to the French Drain bid item. This price shall be full payment for supplying the required tools, labor, equipment, haul of waste material, and materials required to furnish and install the system as specified.

- C. STORMWATER DRAIN SYSTEM
 - 1. Measurement and payment for the Stormwater drain shall be by lump sum. All items required of the Stormwater drain system including the 4” HDPE corrugated storm pipe, stormwater outlet, stormwater basin, 6” sewer and drain riser, 6” round grate, and the clean gravel fill are considered incidental to the Stormwater Drain bid item. This price shall be full payment for supplying the required tools, labor, equipment, haul of waste materials, and materials required to furnish and install the system as specified.

- D. SINGLE OR DOUBLE BARREL DRYWELL
 - 1. Payment for single or double barrel drywells shall be on a per each unit price basis. These prices shall be full compensation for furnishing and installing all materials and appurtenances. Final grade adjustments of drywell grates shall be the Contractors responsibility and shall be done at no extra cost to the Owner.

- E. DRAIN ROCK
 - 1. Measurement and payment for drain rock shall be considered incidental to “Drainage Curb Cuts”. See Specification Section 03216 for measurement and payment of “Drainage Curb Cuts”.

- F. PRECAST CONCRETE GRADE RINGS
 - 1. Measurement and payment for Precast Concrete Grade Rings shall be considered incidental to the Single and Double Barrel Drywell bid item.

END OF SECTION