South Valley

WATER RECLAMATION FACILITY

# PROJECT 5 LANDSCAPING

## CONTRACT DOCUMENTS

## BIDDING REQUIREMENTS, CONTRACT FORMS,

## CONDITIONS OF THE CONTRACT,

## TECHNICAL SPECIFICATIONS AND DRAWINGS

August 12, 2021


**Bids will be received at the office of Carollo Engineers Inc. located at**

**7090 South Union Park Avenue, Suite 600**

**Salt Lake City, UT 84047**

**until 2:00 PM Friday, September 3rd, 2021.**

**SECTION 00020**
**CONTRACT DOCUMENTS TABLE OF CONTENTS**

**BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT**

**VOLUME 1**

DIVISION 2 - SITE CONSTRUCTION



DIVISION 3 - CONCRETE

## SECTION 00030 - NOTICE INVITING BIDS

RECEIPT OF BIDS: Sealed Bids will be received at the office of the Carollo Engineers Inc.; ENGINEER of the WORK located at 7495 South 1300 West, West Jordan, Utah 84084, **until 2:00 PM on September 3rd**, **2021**, for construction of South Valley Water Reclamation Facility's Project 5 Landscaping. Any Bids received after the specified time and date will not be considered.

OPENING OF BIDS: The Bids will be publicly opened and read at 2:30 PM on **September 3rd**, **2021**, at the above-mentioned office of the ENGINEER.

COMPLETION OF WORK: The WORK shall be completed as described below:

a) Contractor shall procure and install new landscaping, including, sprinklers, sod, landscaping rock, and concrete flatwork. Contractor shall design sprinkler system and provide all materials required for the Work described. The Work shall be completed by the date set forth in the Agreement (00500).

DESCRIPTION OF WORK: The project consists of the following Items:

a) Design new sprinkler system, including piping, valving, and sprinkler locations. Contractor to submit drawings and AutoCAD files for approval prior to installing the work.
b) Provide and install new sod grass, landscaping rock, curb and gutter and landscaping curb as shown in the contract documents.

SITE OF WORK: The site of the WORK is located at the OWNER's water reclamation facility at 7495 South 1300 West, West Jordan, Utah.

OBTAINING CONTRACT DOCUMENTS: The Contract Documents are entitled "South Valley Water Reclamation Facility – Project 5 Landscaping".

Interested parties desiring emailed electronic files should contact Jacob Baer via email at jbaer@carollo.com. There will be no charge for emailed bid documents.

BID SECURITY: Each Bid shall be accompanied by a certified check or cashier's check or Bid Bond in the amount of 5 percent of the Total Bid Price payable to the OWNER as a guarantee that the Bidder, if its Bid is accepted, will promptly execute the Agreement. A bid shall not be considered unless one of the forms of Bidder's security is enclosed with it.

BIDS TO REMAIN OPEN: The Bidder shall guarantee the Total Bid Price for a period of 60 calendar days from the date of bid opening.

PROJECT ADMINISTRATION: Technical communications relative to this WORK shall be directed to the ENGINEER prior to opening of the Bids.

ENGINEER
Carollo Engineers, Inc.,
7090 S. Union Park Avenue, Suite 600
Telephone: (801)233-2500
Attention: Jacob Baer
e-mail: jbaer@carollo.com

SOUTH VALLEY WATER RECLAMATION FACILITY
7495 South 1300 West
West Jordan, Utah 84084
Telephone: 801-495-5469
e-mail: tworthen@svwater.com
Attention: Taigon Worthen, P.E.

OWNER'S RIGHTS RESERVED: The OWNER reserves the right to reject any or all bids, to waive any informality in a bid, and to make awards to the lowest responsive, responsible bidder as the OWNER in its sole discretion shall determine may best serve the interest of the OWNER.

- END OF NOTICE INVITING BIDS -

## SECTION 00100 - INSTRUCTIONS TO BIDDERS

1. DEFINED TERMS. Terms used in these Instructions to Bidders and the Notice Inviting Bids which are defined in the General Conditions have the meanings assigned to them in the General Conditions. The term "Bidder" means one who submits a Bid directly to OWNER, as distinct from a sub-bidder, who submits a price or quote to a Bidder.

2. INTERPRETATIONS AND ADDENDA.

2.1 All questions about the meaning or intent of the Contract Documents are to be directed to the ENGINEER. Additions, deletions, or revisions to the Contract Documents considered necessary by the ENGINEER in response to such questions will be issued by Addenda, mailed, emailed, or delivered to all parties recorded by the OWNER as having received the Contract Documents. Questions received less than 5 days prior to the date of Bids may not be answered. Only answers to such questions issued by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

2.2 Addenda may also be issued to make other additions, deletions, or revisions to the Contract Documents.

2.3 Bidders shall make no special interpretation or inference of intent from differing formats in the Technical Specifications.

3. BIDDER'S EXAMINATION OF CONTRACT DOCUMENTS AND SITE.

3.1 It is the responsibility of each Bidder before submitting a Bid:

A. To examine thoroughly the Contract Documents and other related data identified in the Bidding Documents (including "technical" data referred to below);

B. To visit the site to become familiar with local conditions that may affect cost, progress, or performance, of the WORK;

C. To consider federal, state, and local Laws and Regulations that may affect cost, progress, or performance of the WORK;

D. To study and carefully correlate the Bidder's observations with the Contract Documents; and

E. To notify the OWNER of all conflicts, errors, ambiguities, or discrepancies in or between the Contract Documents and such other related data.

3.2 The OWNER has provided sprinkler system record drawings included in Appendix A Specification Section 00810 – Supplemental General Conditions. These drawings are to be used as information only and are to be field verified. Drawings are 4C drawing L-03 and Sprinkler Supply Company As-Built Drawing by Allied Pacific.

3.3 It is also the responsibility of each Bidder before submitting a Bid to examine thoroughly those reports of physical conditions in or relating to existing surface and subsurface conditions (except underground utilities as defined in Article 1 of the General Conditions) which are at or adjacent to the site and which were utilized by the OWNER in the preparation of the Contract Documents. Copies of such report and drawings are available for information at the office of the OWNER.

3.4 Information and data reflected in the Contract Documents with respect to Underground Utilities at or contiguous to the site are based upon information and data furnished to the OWNER by the owners of such Underground Utilities or others, and the OWNER does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary General Conditions or Section 01530 - Protection of Existing Facilities.

3.5 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders on subsurface conditions, Underground Utilities, and other physical conditions, and possible changes in the Contract Documents due to differing conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions.

3.6 Before submitting a Bid, each Bidder will, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface, and Underground Utilities) at or contiguous to the site or otherwise which may affect cost, progress, or performance of the WORK and which the Bidder deems necessary to determine its Bid for performing the WORK in accordance with the time, price, and other terms and conditions of the Contract Documents.

3.7 On reasonable request in advance, the OWNER will provide each Bidder access to the site to conduct such examinations, investigations, explorations, tests, and studies as each Bidder deems necessary for submission of a Bid. Location of any excavation or boring shall be subject to prior approval of OWNER and applicable agencies. Bidder shall fill all holes, restore all pavement to match existing structural section, and shall clean up and restore the site to its former condition upon completion of such explorations. OWNER reserves the right to require Bidder to execute an Access Agreement with the OWNER prior to accessing the site.

3.8 The lands upon which the WORK is to be performed, rights-of-way, and easements for access thereto and other lands designated for use by the CONTRACTOR in performing the WORK are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by the CONTRACTOR. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by the OWNER unless otherwise provided in the Contract Documents.

3.9 The submission of a Bid will constitute an absolute representation by the Bidder that the Bidder has complied with every requirement of this Paragraph 3 and the following:

A. That the Bid is premised upon performing the WORK required by the Contract Documents without exception and such means, methods, techniques, sequences, or procedures of construction (if any) as may be required by the Contract Documents;

B. That Bidder has given the OWNER written notice of all conflicts, errors, ambiguities, and discrepancies in the Contract Documents and the written resolution thereof by the OWNER is acceptable to the Bidder; and

C. That the Contract Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance of the WORK.

4. BID FORMS. The Bid shall be submitted on the Bid Forms bound herein. All blanks on the Bid Forms shall be completed in ink. All names must be printed below the signatures.

The Bid shall be submitted in a sealed envelope which shall be plainly marked in the upper left hand corner with the name and address of the Bidder and shall bear the words "BID FORM" followed by the title of the Contract Documents for the WORK, the name of the OWNER, the address where Bids are to be delivered or mailed to, and the date and hour of opening of Bids.

5. CERTIFICATES.

5.1 Bids by corporations must be executed in the corporate name by the president, a vice-president, or other corporate officer. Such Bid shall be accompanied by the enclosed Certificate of Authority to sign, attested by the secretary or assistant secretary, and with the corporate seal affixed. The corporate address and state of incorporation must appear below the signature.

5.2 Bids by partnerships must be executed in the partnership name and be signed by a managing partner, accompanied by the enclosed Certificate of Authority to sign, and his/her title must appear under the signature and the official address of the partnership must appear below the signature.

5.3 Bids by joint ventures must be executed in the joint venture name and be signed by a joint venture managing partner, accompanied by the enclosed Certificate of Authority to sign, and his/her title must appear under the signature and the official address of the joint venture must appear below the signature.

6. DISQUALIFICATION OF BIDDERS. More than one Bid from an individual, firm, partnership, corporation, or association under the same or different names will not be considered. If the OWNER believes that any Bidder has financial interest in more than one Bid for the WORK contemplated, all Bids in which such Bidder is interested will be rejected. If the OWNER reasonably believes that collusion exists among the Bidders, all Bids will be rejected. A party who has quoted prices to a Bidder is not hereby disqualified from quoting prices to other Bidders, but is disqualified from submitting a Bid directly for the WORK.

7. QUANTITIES OF WORK. The quantities of work or material stated in unit price items of the Bid are supplied only to give an indication of the general scope of the WORK; the OWNER does not expressly or by implication agree that the actual amount of work or material will correspond therewith, and reserves the right after award to increase or decrease the quantity of any unit price item of the WORK by an amount up to and including 25 percent of any Bid item, without a change in the unit price, and shall include the right to delete any Bid item in its entirety, or to add additional Bid items up to and including an aggregate total amount not to exceed 25 percent of the Bid price.

8. COMPETENCY OF BIDDERS. Only qualified CONTRACTORS specializing in landscaping may submit a bid for the performance of the WORK.

9. SUBMISSION OF BIDS. The Bid shall be delivered by the time and to the place stipulated in the Notice Inviting Bids. It is the Bidder's sole responsibility to see that its Bid is received in proper time and at the proper place.

10. BID SECURITY, BONDS, AND INSURANCE. Each Bid shall be accompanied by a certified or cashier's check or approved Bid Bond in the amount stated in the Notice Inviting Bids. Said check or bond shall be made payable to the OWNER and shall be given as a guarantee that the Bidder, if awarded the WORK, will enter into an Agreement with the OWNER, and will furnish the necessary insurance certificates, Payment Bond,

and Performance Bond; each of said bonds to be in the amount stated in the Supplementary General Conditions. In case of refusal or failure to enter into said Agreement, the check or Bid Bond, as the case may be, shall be forfeited to the OWNER. If the Bidder elects to furnish a Bid Bond as its Bid security, the Bidder shall use the Bid Bond form bound herein, or one conforming substantially to it in form. Bid Bonds shall comply with the requirements applicable to payment and performance bonds in the General Conditions.

11. DISCREPANCIES IN BIDS. In the event there is more than one Bid item in a Bid Schedule, the Bidder shall furnish a price for all Bid items in the Schedule, and failure to do so will render the Bid non-responsive and shall cause its rejection. In the event there are unit price Bid items in a Bidding schedule and the amount indicated for a unit price Bid item does not equal the product of the unit price and quantity, the unit price shall govern and the amount will be corrected accordingly, and the BIDDER shall be bound by said correction. In the event there is more than one Bid item in a Bid Schedule and the total indicated for the Schedule does not agree with the sum of the prices Bid on the individual items, the prices Bid on the individual items shall govern and the total for the Schedule will be corrected accordingly, and the BIDDER shall be bound by said correction.

12. MODIFICATIONS AND UNAUTHORIZED ALTERNATIVE BIDS. Unauthorized conditions, limitations, or provisos attached to the Bid shall render it informal and may cause its rejection as being non-responsive. The Bid forms shall be completed without interlineations, alterations, or erasures in the printed text. Alternative Bids will not be considered unless called for. Oral, telegraphic, telephonic or electronic Bids or modifications will not be considered.

13. WITHDRAWAL OF BID. The Bid may be withdrawn by the Bidder by means of a written request, signed by the Bidder or its properly authorized representative. Such written request must be delivered to the place stipulated in the Notice Inviting Bids for receipt of Bids prior to the scheduled closing time for receipt of Bids.

14. AWARD OF CONTRACT. Award of the contract, if awarded, will be made to the lowest responsive, responsible Bidder whose Bid complies with the requirements of the Contract Documents. Unless otherwise specified, any such award will be made within the period stated in the Notice Inviting Bids that the bids are to remain open. Unless otherwise indicated, a single award will be made for all the Bid items in an individual Bid Schedule.

15. RETURN OF BID SECURITY. Within 14 days after award of the contract, the OWNER will, if requested, return the Bid securities accompanying such Bids that are not being considered in making the award. All other Bid securities will be held until the Agreement has been finally executed. They will then be returned, if requested, to the respective Bidders whose Bids they accompany.

16. EXECUTION OF AGREEMENT. The Bidder to whom award is made shall execute a written Agreement with the OWNER on the form of agreement provided, shall secure all insurance, and shall furnish all certificates and bonds required by the Contract Documents within 14 calendar days after receipt of the agreement forms from the OWNER. Failure or refusal to enter into an Agreement as herein provided or to conform to any of the stipulated requirements in connection therewith shall be just cause for annulment of the award and forfeiture of the Bid security. If the lowest responsive, responsible Bidder refuses or fails to execute the Agreement, the OWNER may award the Contract to the second lowest responsive, responsible Bidder. If the second lowest responsive, responsible Bidder refuses or fails to execute the Agreement, the OWNER may award the contract to the third lowest responsive, responsible Bidder. On the failure or refusal of

such second or third lowest Bidder to execute the Agreement, each such Bidder's Bid securities shall be likewise forfeited to the OWNER.

17. LIQUIDATED DAMAGES. Provisions for liquidated damages, if any, are set forth in the Agreement.

18. PREFERENCE FOR RESIDENT CONTRACTORS. The OWNER will apply the provisions of Utah Procurement Code 63G-6-405. titled Preference for Resident Contractors (Utah Code -- Title 63G -- Chapter 6) wherein it is stated “(2) (a) When awarding contracts for construction, a public procurement unit shall grant a resident contractor a reciprocal preference as against a nonresident contractor from any state that gives or requires a preference to contractors from that state. (b) The amount of the reciprocal preference shall be equal to the amount of the preference applied by the state of the nonresident contractor.”

- END OF INSTRUCTIONS TO BIDDERS -

## SECTION 00300 – BID FORMS

### BID

BID TO: South Valley Water Reclamation Facility

1. The undersigned Bidder proposes and agrees, if this Bid is accepted to enter into an Agreement with the OWNER in the form included in the Contract Documents to perform the WORK as specified or indicated in said Contract Documents entitled "South Valley Water Reclamation Facility - Project 5 Landscaping."
2. Bidder accepts all of the terms and conditions of the Contract Documents, including without limitation those in the Notice Inviting Bids and Instructions to Bidders, dealing with the dispositions of the Bid security.
3. This Bid will remain open for the period stated in the "Notice Inviting Bids" unless otherwise required by law. Bidder will enter into an Agreement within the time and in the manner required in the "Notice Inviting Bids" and the "Instructions to Bidders", required by the Contract Documents.
4. Bidder has examined copies of all the Contract Documents including the following Addenda (receipt of all of which is hereby acknowledged):

Number_____ Date _____

_____ _____

_____ _____

_____ _____

Failure to acknowledge addenda shall render the bid non-responsive and shall be cause for its rejection.

5. Bidder has familiarized itself with the nature and extent of the Contract Documents, WORK, site, 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.

To all the foregoing, and including all Bid Forms contained in the Bid, said Bidder further agrees to complete the WORK required under the Contract Documents within the Contract Time stipulated in said Contract Documents, and to accept in full payment therefore the Contract Price based on the Total Bid Price(s) named in the aforementioned Bid forms.

Dated: _____ Bidder: _____

By: _____

Title: _____

**BID CERTIFICATE**

**(if Corporation)**

STATE OF )

) SS:

COUNTY OF )

I HEREBY CERTIFY that a meeting of the Board of Directors of the _____

_____

_____
a corporation existing under the laws of the State of _____, held on _____, 20 _____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of this Corporation, be and is hereby authorized to execute the Bid dated _____, 20___, to the South Valley Water Reclamation Facility by this Corporation and that his/her execution thereof, attested by the Secretary of this Corporation, and with the Corporate Seal affixed, shall be the official act and deed of this Corporation."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the corporation this _____, day of _____, 20___.

_____
Secretary

(SEAL)

**BID CERTIFICATE**

**(if Partnership)**

STATE OF )

) SS:

COUNTY OF )

I HEREBY CERTIFY that a meeting of the Partners of the _____

_____

_____
a partnership existing under the laws of the State of _____, held on _____, 20 _____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Partnership, be and is hereby authorized to execute the Bid dated_____, 20___, to the South Valley Water Reclamation Facility by this Partnership and that his/her execution thereof, attested by the _____ shall be the official act and deed of this Partnership."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20___.

_____

**BID CERTIFICATE**

**(if Joint Venture)**

STATE OF )

) SS:

COUNTY OF )

I HEREBY CERTIFY that a meeting of the Principals of the _____

_____

_____
a joint venture existing under the laws of the State of _____, held on _____, 20 _____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____of the Joint Venture, be and is hereby authorized to execute the Bid dated_____, 20___, to the "South Valley Water Reclamation Facility by this Joint Venture and that his/her execution thereof, attested by the _____ shall be the official act and deed of this Joint Venture."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the corporation this _____, day of _____, 20___.

_____

## LIST OF SUBCONTRACTORS

The Bidder shall list below the name and the location of the place of business of each Subcontractor who will perform work or labor or render service to the prime contractor in or about the construction of the work or improvement, or a Subcontractor who, under subcontract to the prime contractor, specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications, in an amount in excess of one-half of 1 percent of the prime contractor's total bid or ten thousand dollars ($10,000), whichever is greater. The Bidder shall also list below the portion of the WORK which will be performed by each Subcontractor under its contract. The prime contractor shall list only one Subcontractor for each portion as is defined by the prime contractor in its bid.

The Bidder's attention is directed to the provisions of Paragraph entitled "Subcontract Limitations," of the Supplementary General Conditions which stipulates the percent of the WORK to be performed with the Bidder's own forces. Failure to comply with this requirement will render the Bid non-responsive and may cause its rejection.

| Work to be Performed | Subcontr. License Number | Percent of Total Bid | Subcontractor's Name and Address |
|---|---|---|---|
| 1. _____ | _____ | _____ | _____ |
| 2. _____ | _____ | _____ | _____ |
| 3. _____ | _____ | _____ | _____ |
| 4. _____ | _____ | _____ | _____ |

Note: Attach additional sheets if required.

## INFORMATION REQUIRED OF BIDDER

The Bidder shall furnish the following information. Additional sheets shall be attached as required. Failure to complete Item Nos. 1, 3, and 6, will cause the Bid to be non-responsive and may cause its rejection.

(1) CONTRACTOR's name and address:

_____

_____

_____

(2) CONTRACTOR'S telephone number and contact email:

_____

(3) CONTRACTOR's fax number: _____

(1) CONTRACTOR's license: Primary Classification _____

State License No. and Expiration Date _____

Specialty classifications held, if any: _____

Name of Licensee, if different from (1) above: _____

_____

_____

(2) Name, address, and telephone number of surety company and agent who will provide the required bonds on this contract:

_____

_____

_____

(3) ATTACH TO THIS BID a financial statement, references, and other information, sufficiently comprehensive to permit an appraisal of CONTRACTOR's current financial condition.

(4) ATTACH TO THIS BID a list of the 3 most recent landscaping contracts completed by the CONTRACTOR involving Work of similar type and comparable value. The list shall include the following information as a minimum:

- Names, address, and telephone number of owner.
- Name of Project.
- Location of Project.
- Brief description of the work involved.
- Contract amount.
- Date of completion of the contract.

**NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER**

**AND SUBMITTED WITH BID**

STATE OF )

) SS:

COUNTY OF )

_____, being first duly sworn, deposes and says that he or she is _____ of_____ the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the 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 sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit or cost element of awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

Signed: _____

Subscribed and sworn to before me

this _____day of _____, 20____

_____

Notary Public in and for the
County of _____
State of _____

(SEAL)

**BID BOND**

KNOW ALL MEN BY THESE PRESENTS,

That _____as Principal, and _____as Surety, are held and firmly bound unto the South Valley Water Reclamation Facility hereinafter called "OWNER," in the sum of _____dollars, for the payment of which sum, well and truly to be made, we jointly and severally bind ourselves, our heirs, executors, administrators, successors, and assigns firmly by these presents.

WHEREAS, said Principal has submitted a Bid to said OWNER to perform the WORK required under the bidding schedule(s) of the OWNER's Contract Documents entitled "South Valley Water Reclamation Facility - Project 5 Landscaping."

NOW THEREFORE, if said Principal is awarded a contract by said OWNER and, within the time and in the manner required in the "Notice Inviting Bids" and the "Instruction to Bidder" enters into a written Agreement on the form of agreement bound with said Contract documents, furnishes the required certificates of insurance, and furnishes the required Performance Bond and Payment Bond, and performs in all other respects the agreement created by this bid, then this obligation shall be null and void, otherwise it shall remain in full force and effect. The Surety stipulates and agrees that the obligation of said Surety shall in no way be impaired or affected by an extension of the time within which the OWNER may accept such bid and Surety further waives notice of any such extension. In the event suit is brought upon this bond by said OWNER and OWNER prevails, said Principal and Surety shall pay all costs incurred by said OWNER in such suit, including reasonable attorney's fees and costs to be fixed by the court.

SIGNED AND SEALED, this _____day of _____, 20_____

_____ (SEAL) _____ (SEAL)

(Principal) (Surety)

By: _____ By: _____

(Signature) (Signature)

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

- END OF BID FORMS -

# 00310 – BID SCHEDULES

## PART 1 - GENERAL

### 1.01 CONSTRUCTION CONTRACT

A. This Bid is submitted to:

Carollo Engineers Inc. (ENGINEER)
7090 South Union Park Avenue, Suite 600
Midvale, UT 84047

Name of Project: SOUTH VALLEY WATER RECLAMATION FACILITY - PROJECT 5 LANDSCAPING

### 1.02 SCHEDULES TO BE ADDED TO THE AGREEMENT

A. This Bid Schedules contain the schedules of prices which will be incorporated into the Agreement by reference.

### 1.03 TAXES

A. The Bidder agrees that all sales, consumer, use, and other similar taxes are included in the stated bid prices for the Work, unless provision is made herein for the Bidder to separately itemize the estimated amount of tax.

### 1.04 SCHEDULES OF PRICES

A. Lump Sum Bid & Basis of Award: Schedule of Prices for South Valley Water Reclamation Facility - Project 5 Landscaping as specified and shown on the Drawings. Bidder shall complete Schedule A in its entirety.

B. Schedule A contains prices for the landscaping WORK related to the improvements shown in South Valley Water Reclamation Facility Project 5 Landscaping Contract Documents.

C. Bid Prices: Bidder will complete the WORK in accordance with the Contract Documents for the Lump Sum Bid Prices indicated in the Bid Schedules hereafter.

D. BID SCHEDULE:

**SCHEDULE A - LANDSCAPING**

| Line Item No. | Description | Amount |
|---|---|---|
| 1. | Lump Sum Amount for all WORK related to Project 5 Landscaping | |
| (Schedule A Total in Words) | | |

ATTACHMENTS TO THIS BID

a. The following documents are attached to and made a condition of this Bid:

   i. Required Bid security in the form of a certified or cashier's check, or a Bid Bond as specified in Document 00300 - Bid Forms.

   ii. Document 00300 - Bid Forms, and other individuals and entities required to be identified in this Bid.

   iii. Document 00444 - Experience Modification Rate.

   iv. Document 00453 - Bid Preference.

   v. Document 00454 - Bid Certification of the Payment of State and Local Taxes.

   vi. Document 00458 - Certification of Drug-Free Workplace Requirements

- END OF BID SCHEDULES

**DOCUMENT 00444**

**EXPERIENCE MODIFICATION RATE**

## ARTICLE 1 - CONTRACTOR'S SAFETY PERFORMANCE AND PROGRAM

1.01 WORKERS' COMPENSATION INSURANCE - EXPERIENCE MODIFICATION RATE (EMR)

A. Provide the following data:

| | Policy Year | Modification Rate |
|---|---|---|
| Most Recent Policy Year | _____ | _____ |
| 1 year previously | _____ | _____ |
| 2 years previously | _____ | _____ |

B. Answer the following questions.
   1. Are the above rates interstate or intrastate? _____.
   2. If intrastate, which state? _____.
   3. If your EMR is exactly 1.0 for any policy year, it is because your firm is (or was) too new or too small to have an EMR calculated?

      Yes _____ No _____

C. Provide documentation by one of the following methods:
   1. Furnish a letter from your insurance agent, insurance carrier, or state fund (on their letterhead) verifying the EMR data for the last 3 rating periods.
      a. If you do not have an interstate rating, obtain your intrastate EMR's.
   2. Furnish a copy of the last 3 years' Experience Rating Calculation Sheets from your insurance carrier.
   3. If you are in a "state fund", such as Ohio or West Virginia, furnish a copy of the state's last 3 years annual statement page that shows the modification rate and the coverage period.

END OF DOCUMENT

**DOCUMENT 00453**

**BID PREFERENCES**

1. Did you claim a bid preference under Utah Procurement Code 63G-6-404 - Preference for Providers of State Products?

   [ ] Yes [ ] No

   If so, are you submitting proof that the goods, supplies, equipment, materials, or printing offered are produced, manufactured, mined, grown or performed in Utah?

   [ ] Yes [ ] No

2. Did you claim a bid preference under Utah Procurement Code 63G-6-405 - Preference for Resident Contractors?

   [ ] Yes [ ] No

   If so, are you submitting proof of qualifications as a Resident Contractor?

   [ ] Yes [ ] No

3. Did you claim a bid preference under Utah Procurement Code 63G-6-406 - Preference for Recycled Paper and Paper Products?

   [ ] Yes [ ] No

   If so, are you submitting proof of entitlement under this Code section?

   [ ] Yes [ ] No

BIDDER

_____
(Signature)

_____
(Date)

END OF DOCUMENT

**DOCUMENT 00454**

**BID CERTIFICATION FOR THE PAYMENT OF UTAH STATE AND LOCAL TAXES**

KNOW ALL MEN BY THESE PRESENTS, THAT the Bidder does hereby stipulate and certify that the Bidder has paid Utah state and local taxes for 5 successive years before submitting this Bid to Owner.

[ ] Yes [ ] No

BIDDER

_____

(Signature)

_____

(Date)

END OF DOCUMENT

## DOCUMENT 00458

## CERTIFICATION OF DRUG-FREE WORKPLACE REQUIREMENTS

### ARTICLE 1 - BIDDER CERTIFICATIONS

1.01 The Bidder certifies that it will or will continue to provide a drug-free workplace by:

A. Publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the Bidder's workplace and specifying the actions that will be taken against employees for violation of such prohibition.
   1. Making it a requirement that each employee to be engaged in the performance of the contract be given a copy of the statement.
   2. Notifying the employee in the statement that, as a condition of employment under the Contract, the employee will:
      a. Abide by the terms of the statement.
      b. Notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than 5 calendar days after such conviction.
         1) Notifying the Owner in writing within 10 calendar days after receiving notice from an employee or otherwise receiving actual notice of such conviction.
         2) Taking 1 of the following actions, within 30 calendar days of receiving notice, with respect to any employee who is so convicted:
            a) Taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of Federal and State law.
            b) Requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purpose by a Federal, State or local health, law enforcement, or other appropriate agency.
      c. Notify the employee that in the event of a major accident/incident resulting in loss of life, injury or damage to the facility, or equipment, all personnel involved shall be required to submit to substance testing as soon as possible after the incident, but not more than 4 hours after the incident.

B. Establishing an ongoing drug-free awareness program to inform employees about:
   1. The dangers of drug abuse in the workplace.
   2. The Bidder's policy of maintaining a drug-free workplace.
   3. Any available drug counseling, rehabilitation, and employee assistance programs.
   4. The penalties that may be imposed upon employees for drug abuse violations occurring in the workplace.

C. Making a good faith effort to continue to maintain a drug-free workplace through implementation of the requirements stated in this Document.

**ARTICLE 2 - WORK LOCATIONS**

2.01 The Bidder may insert in the space provided below the site(s) for the performance of work done in connection with this Contract:

A. Place(s) of Performance: (Street address, city, county, state, zip code):

_____

_____

_____

BIDDER

_____
(Signature)

_____
(Date)

END OF DOCUMENT

**SECTION 00500**

**AGREEMENT**

THIS AGREEMENT is dated as of the _____day of _____ in the year 2021 by and between South Valley Water Reclamation Facility (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 the WORK as specified or indicated in the OWNER's Contract Documents entitled "South Valley Water Reclamation Facility – Project 5 Landscaping". The WORK is generally described in Specification Section 01110 - Summary of Work.

ARTICLE 2. CONTRACT TIMES

COMPLETION OF WORK: The WORK shall be completed as follows:

1. Contractor shall begin WORK as soon as the Notice to Proceed is issued following award of WORK. Notice to Proceed is planned for September 30th, 2021. Work shall be substantially complete by December 1st, 2021.

ARTICLE 3. LIQUIDATED DAMAGES

OWNER and the CONTRACTOR recognize that time is of the essence of this Agreement and that the OWNER will suffer financial loss if the WORK is not completed within the time specified in Article 2 herein, plus any extensions thereof allowed in accordance with Article 12 of the General Conditions. They also recognize the delays, expense, and difficulties involved in proving in a legal proceeding the actual loss suffered by the OWNER if the WORK is not completed on time. Accordingly, instead of requiring any such proof, the OWNER and the CONTRACTOR agree that as liquidated damages for delay (but not as a penalty) the CONTRACTOR shall pay the OWNER $500.00, or as otherwise specified in the Supplementary General Conditions for each day that expires after the deadlines specified in Article 2 herein.

ARTICLE 4. CONTRACT PRICE

OWNER shall pay CONTRACTOR for completion of the WORK in accordance with the Contract Documents in current funds the amount set forth in the Bid Schedule.

ARTICLE 5. PAYMENT PROCEDURES

CONTRACTOR shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by OWNER as provided in the General Conditions.

ARTICLE 6. CONTRACT DOCUMENTS

The Contract Documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the WORK consist of this Agreement (pages 00500-1 to 00500-6, inclusive) and the following attachments to this Agreement:

- Notice Inviting Bids (pages 00030-1 to 00030-2, inclusive).
- Instructions to Bidders (pages 00100-1 to 00100-5, inclusive).
- Bid Forms including the Bid, Bid Schedule(s), information required of Bidder, Bid Bond, and all required certificates and affidavits (pages 00300-1 to 00300-9 and 00310-1 to 00310-2, inclusive).
- Performance Bond (pages 00610-1 to 00610-1, inclusive).
- Payment Bond (pages 00620-1 to 00620-1, inclusive).
- General Conditions (pages 00700-1 to 00700-36, inclusive).
- Supplementary General Conditions (pages 00800-1 to 00800-7, inclusive).
- Supplementary General Conditions (Utah) (pages 00810-1 to 00810-4, inclusive).
- Technical Specifications consisting of Divisions and pages, as listed in the Table of Contents.
- Drawings, as listed in the Table of Contents/List of Drawings.
- Any such Addenda issued during the bidding process.
- Notice to Proceed.
- Change Orders which may be delivered or issued after Effective Date of this Agreement and are not attached hereto.

There are no Contract Documents other than those listed in this Article 6. The Contract Documents may only be amended by Change Order as provided in Paragraph 3.03 of the General Conditions.

ARTICLE 7. ASSIGNMENTS

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 monies that may become due and monies 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.

OWNER and CONTRACTOR each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns, and legal representatives in respect of all covenants, agreements and obligations contained in the Contract Documents.

IN WITNESS WHEREOF, OWNER and CONTRACTOR have caused this Agreement to be executed the day and year first above written.

OWNER:
South Valley Water Reclamation Facility
By _____
(Jerry Knight, Board Chairman)

Attest _____

Address for giving notices:
South Valley Water Reclamation Facility
7495 South 1300 West
West Jordan, Utah 84084

Approved as to Form:

_____
(Signature)

_____
(Facility Attorney)

CONTRACTOR:
_____
By_____

[CORPORATE SEAL]

Attest_____

Address for giving notices:
_____
_____
_____

Agent for service of process: _____
_____

Telephone No. for Agent
_____

**AGREEMENT CERTIFICATE**

**(if Corporation)**

STATE OF )

) SS:

COUNTY OF )

I HEREBY CERTIFY that a meeting of the Board of Directors of the _____

_____

_____

a corporation existing under the laws of the State of _____, held on _____, 20 _____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of this Corporation, be and is hereby authorized to execute the Agreement dated _____, 20___, to the South Valley Water Reclamation Facility by this Corporation and that his/her execution thereof, attested by the Secretary of this Corporation, and with the Corporate Seal affixed, shall be the official act and deed of this Corporation."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the official seal of the corporation this _____, day of _____, 20___.

_____

Secretary

(SEAL)

**AGREEMENT CERTIFICATE**

**(if Partnership)**

STATE OF )

) SS:

COUNTY OF )

I HEREBY CERTIFY that a meeting of the Partners of the _____

_____

_____

a partnership existing under the laws of the State of _____, held on _____, 20 _____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____ of the Partnership, be and is hereby authorized to execute the Agreement dated_____, 20___, by and between this Partnership and South Valley Water Reclamation Facility by this Partnership and that his/her execution thereof, attested by the _____ shall be the official act and deed of this Partnership."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20___.

_____

**AGREEMENT CERTIFICATE**

**(if Joint Venture)**

STATE OF )

) SS:

COUNTY OF )

I HEREBY CERTIFY that a meeting of the Principals of the _____

_____

_____
a joint venture existing under the laws of the State of _____, held on _____, 20 _____, the following resolution was duly passed and adopted:

"RESOLVED, that _____, as _____of the Joint Venture, be and is hereby authorized to execute the Agreement dated_____, 20___, by and between this Joint Venture and South Valley Water Reclamation Facility and that his/her execution thereof, attested by the _____ shall be the official act and deed of this Joint Venture."

I further certify that said resolution is now in full force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand this _____, day of _____, 20___.

_____

## DOCUMENT 00510

## NOTICE OF AWARD

| | | | |
|---|---|---|---|
| **Issue Date:** | MM/DD/YYYY | **Owner's Contract No.:** | **Project 5 - Landscaping** |
| **Owner:** | South Valley Water Reclamation Facility | **Contractor's Project No.:** | Enter ## |
| **Engineer:** | Carollo Engineers, Inc. | | |
| **Project:** | Project 5 Landscaping | | |
| **Bidder:** | Click here to enter text. | | |
| **Bidder's Address:** | Click here to enter text. | | |

**Notice of Award To Bidder**

You are notified that Owner has accepted your Bid dated , 2021, for the above Contract, and that you are the Successful Bidder and are awarded a contract for:

(describe Work awarded)

The Contract Price of the awarded Contract is: $_____

Two unexecuted counterparts of the Document 00500 - Agreement accompany this Notice of Award, and the Contract Documents have been made available to Bidder electronically.

You must comply with the following conditions precedent within 14 days of the date of receipt of this Notice of Award:

1. Deliver to Owner two counterparts of the Agreement, fully executed by Bidder.
2. Deliver with the executed Agreement(s) the Contract security and insurance documentation as specified in the Instructions to Bidders and General Conditions, Articles 2 and 6.
3. Other conditions precedent (if any):

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Agreement, together with any additional copies of the Contract Documents as indicated in Paragraph 2.02 of the General Conditions.

Owner: _____

Authorized Signature: _____

By: _____ Title: _____

Copy: Engineer

END OF DOCUMENT

## DOCUMENT 00550

## NOTICE TO PROCEED

| | | | |
|---|---|---|---|
| **Owner:** | South Valley Water Reclamation Facility | | |
| **Owner's Contract No.:** | Project 5 – Landscaping | **Effective Date of Contract:** | Click here to enter a date. |
| **Contractor:** | Click here to enter text. | **Contractor's Project No.:** | Click here to enter text. |
| **Project Name:** | Project 5 Landscaping | | |
| **Contract Name:** | Click here to enter text. | | |
| **Engineer:** | Carollo Engineers, Inc. | **Engineer's Project No.:** | 10548A.20 |

**To Contractor**

Owner hereby notifies Contractor that the Contract Times under the above Contract will commence to run on
Enter Notice To Proceed Date.

On that date, Contractor shall start performing its obligations under the Contract Documents. No Work shall be done at the Site prior to such date. In accordance with the Contract, the date of Substantial Completion is _____, and the date of readiness for final payment is_____ *or* the number of days to achieve Substantial Completion is _____, and the number of days to achieve readiness for final payment is _____.

Before starting any Work at the Site, Contractor must comply with the following:

- A Preconstruction conference to be held at **() on** _____ at South Valley Water Reclamation Facility. Representatives of Owner and Engineer will be present to discuss project. Contractor is required to attend and participate in the conference.

Owner Authorized Signature: _____

Printed Name: _____

Title: _____

Date Issued: _____

Copy: Engineer

END OF SECTION

**SECTION 00620**

**PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS,

That _____ as CONTRACTOR,

and _____ as Surety,

are held and firmly bound unto South Valley Water Reclamation Facility hereinafter called "OWNER," in the sum of _____ dollars, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITIONS OF THIS OBLIGATION ARE SUCH that said CONTRACTOR has been awarded and is about to enter into the annexed Agreement with said OWNER to perform the WORK as specified or indicated in the Contract Documents entitled "South Valley Water Reclamation Facility – Project 5 Landscaping".

NOW THEREFORE, if said CONTRACTOR, or subcontractor, fails to pay for any materials, equipment, or other supplies, or for rental of same, used in connection with the performance of work contracted to be done, or for amounts due under applicable State law for any work or labor thereon, said Surety will pay for the same in an amount not exceeding the sum specified above, and, in the event suit is brought upon this bond, reasonable attorney's fees to be fixed by the court. This bond shall inure to the benefit of any persons, companies, or corporations entitled to file claims under applicable State law so as to give a right of action to them or their assigns in any suit brought upon this bond.

PROVIDED, that any alterations in the WORK to be done or the materials to be furnished, or changes in the time of completion, which may be made pursuant to the terms of said Contract Documents, shall not in any way release said CONTRACTOR or said Surety thereunder, nor shall any extensions of time granted under the provisions of said Contract Documents release either said CONTRACTOR or said Surety, and notice of such alterations or extensions of the Agreement is hereby waived by said Surety.

IN WITNESS WHEREOF, we have hereunto set our hands and seals this_____ day of _____, 20____.

_____(SEAL) _____(SEAL)
(CONTRACTOR) (Surety)

By: _____ By: _____
(Signature) (Signature and SEAL)

(SEAL AND NOTARIAL ACKNOWLEDGEMENT OF SURETY)

- END OF BID FORMS -

## DOCUMENT 00632

## REQUEST FOR INFORMATION OR INTERPRETATION (RFI)

| | | | |
|---|---|---|---|
| **Owner:** | Click here to enter text. | **Date:** | XX/XX/XXXX |
| **Contractor:** | Click here to enter text. | **Project No.:** | 00000.00 |
| **Project Name:** | Click here to enter text. | **RFI No.:** | 000 |
| **RFI Title:** | Click here to enter text. | **Spec/Dwg. Reference:** | 00000 |

| **Information or Interpretation and Reason Requested** | | |
|---|---|---|
| Click here to enter text. | | |
| **Authored By:** Click here to enter text. | **Date Submitted:** | XX/XX/XXXX |

| **Response to Request:** | | |
|---|---|---|
| Click here to enter text. | | |
| In the event, Contractor believes the RFI response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order. | | |
| **Firm Name:** Click here to enter text. | **Date Returned:** | XX/XX/XXXX |
| **Signature:** | **Printed Name:** | |

END OF DOCUMENT

## SECTION 00700

## GENERAL CONDITIONS

### ARTICLE 1 - DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents and printed with initial or all capital letters, the following terms have the meanings indicated:

Addenda - Written or graphic instruments issued prior to the opening of Bids which make additions, deletions, or revisions to the Contract Documents.

Agreement - The written contract between the OWNER and the CONTRACTOR for the performance of the WORK pursuant to the Contract Documents. Documents incorporated into the contract by reference become part of the contract and of the Agreement.

Application for Payment - The form furnished by the ENGINEER and completed by the CONTRACTOR to request progress or final payment including supporting documentation to substantiate the amounts for which payment is requested.

Bid - The offer or proposal of a Bidder, submitted on the prescribed form, setting forth the price or prices for the WORK to be performed.

Bidder - Any person, firm or corporation submitting a Bid for the WORK.

Bonds - Bid, Performance and Payment Bonds and other instruments which protect the OWNER against loss due to inability or refusal of the CONTRACTOR to perform pursuant to the Contract Documents.

Change Order - A document recommended by the OWNER'S REPRESENTATIVE, which is signed by the CONTRACTOR and the OWNER and authorizes an addition, deletion, or revision in the WORK, or an adjustment in the Contract Price or the Contract Time, issued on or after the Effective Date of the Agreement.

Contract Documents - The documents which comprise the entire agreement between OWNER and CONTRACTOR concerning the WORK, consisting of the Drawings, Technical Specifications, General Conditions, Supplementary General Conditions, Notice Inviting Bids, Instructions to Bidders, Addenda, CONTRACTOR's Bid, Information Required of Bidder, Agreement, Performance Bond, Payment Bond, Notice To Proceed and Change Orders. Only printed or hard copies of the documents listed above are Contract Documents.

Contract Price - The total monies payable by the OWNER to the CONTRACTOR for completion of the WORK under the terms and conditions of the Contract Documents.

Contract Time - The number of successive Days or the date stated in the Contract Documents for Substantial Completion of the WORK. The Contract Time begins to run on the date specified in the Notice to Proceed.

CONTRACTOR - The person, firm, or corporation with whom the OWNER has executed the Agreement.

Day - A calendar day of 24 hours measured from midnight to the next midnight.

Defective Work - Work that: is unsatisfactory, faulty, or deficient; does not conform to the Contract Documents; does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents; has been damaged prior to the ENGINEER's recommendation of final payment.

Drawings - The drawings, plans, maps, profiles, diagrams, and other graphic representations which show the character, location, nature, extent, and scope of the WORK.

Effective Date of the Agreement - The date indicated in the Agreement on which it was executed.

ENGINEER - The person, firm or corporation named as such in the Contract Documents.

Field Order - A written order issued by the OWNER which requires minor changes in the WORK, but which does not involve a change in the Contract Price or Contract Time.

General Requirements - Division 1 of the Technical Specifications.

Laws and Regulations; Laws or Regulations - Includes any and all applicable state, federal and local statutes, common law, rules, regulations, ordinances, codes, and/or orders.

Notice of Award - The OWNER's written notice to the apparent successful Bidder stating that upon compliance with the conditions precedent enumerated therein by the apparent successful Bidder within the time specified, the OWNER will enter into the Agreement.

Notice to Proceed - The OWNER's written notice to the CONTRACTOR authorizing the CONTRACTOR to proceed with the work and establishing the date of commencement of the Contract Time.

OWNER - SOUTH VALLEY WATER RECLAMATION FACILITY.

OWNER'S REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the site or any part thereof.

Partial Utilization - Placing a portion of the WORK in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion of the WORK.

Project - A unit of total construction of which the WORK to be provided under the Contract Documents, may be the whole, or a part thereof.

Shop Drawings - All drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the CONTRACTOR to illustrate some portion of WORK and all illustrations, brochures, standard schedules, performance charts, instruction, and diagrams to illustrate material or equipment for some portion of the WORK.

Specifications - (Same definition as for Technical Specifications hereinafter).

Subcontractor - An individual, firm, or corporation having a direct contract with the CONTRACTOR or with any other Subcontractor for the performance of a part of the WORK.

Substantial Completion - That state of construction when the WORK has progressed to the point where, in the opinion of the OWNER as evidenced by the Notice of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the WORK can be

utilized for the purposes for which it is intended. The terms "substantially complete" and "substantially completed" as applied to any work refer to substantial completion thereof.

Supplementary General Conditions - The part of the Contract Documents which makes additions, deletions, or revisions to these General Conditions.

Supplier - A manufacturer, fabricator, supplier, distributor, materialman, or vendor.

Technical Data - The factual information contained in reports describing physical conditions, including: exploration method, plans, logs, laboratory test methods and factual data. Technical Data does not include conclusions, interpretations, interpolations, extrapolations or opinions contained in reports or reached by the CONTRACTOR.

Technical Specifications - Those portions of the Contact Documents consisting of the General Requirements and written technical descriptions of products and execution of the WORK.

Underground Utilities - All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: water, sewage and drainage removal, electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, traffic, or other control systems.

WORK - The entire construction required to be furnished under the Contract Documents. WORK is the result of performing services, furnishing labor and supervision, and furnishing and incorporating materials and equipment into the construction, all as required by the Contract Documents.

**ARTICLE 2 - PRELIMINARY MATTERS**

2.01 DELIVERY OF BONDS/INSURANCE CERTIFICATES

A. The CONTRACTOR shall deliver to the OWNER the Bonds and insurance certificates required by the Contract Documents within ten (10) days after receiving the Notice of Award from the OWNER.

2.02 COPIES OF DOCUMENTS

A. The OWNER shall furnish the CONTRACTOR five copies of the Contract Documents (Specifications and reduced Drawings), together with two sets of full-scale Drawings. Additional quantities of the Contract Documents will be furnished at reproduction cost.

2.03 STARTING THE PROJECT

A. The CONTRACTOR shall begin construction of the WORK within 10 days after the commencement date stated in the Notice to Proceed but shall not commence construction prior to the commencement date.

2.04 BEFORE STARTING CONSTRUCTION

A. Before undertaking each part of the WORK, the CONTRACTOR shall carefully study and compare the Contract Documents to check and verify pertinent figures and dimensions shown thereon with all applicable field measurements. The CONTRACTOR shall promptly report in writing to the OWNER any conflict, error, or discrepancy which

the CONTRACTOR may discover and shall obtain a written interpretation or clarification from the OWNER before proceeding with any work affected thereby.

B. The CONTRACTOR shall submit to the OWNER for review those documents called for under the Section entitled “Contractor Submittals” in the General Requirements.

2.05 PRECONSTRUCTION CONFERENCE

A. The CONTRACTOR shall attend a preconstruction conference with the OWNER, the ENGINEER and others as appropriate to discuss the construction of the WORK in accordance with the Contract Documents.

2.06 FINALIZING SCHEDULES

A. At least 7 days before the CONTRACTOR's submittal of its first Application for Payment, the CONTRACTOR, the OWNER, and others as appropriate will meet to finalize the schedules submitted in accordance with the General Requirements.

**ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE**

3.01 INTENT

A. The Contract Documents comprise the entire agreement between OWNER and CONTRACTOR concerning the WORK. The Contract Documents are complementary, what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

B. It is the intent of the Contract Documents to describe the WORK, as completely as possible and in a functional manner. The WORK is intended to be constructed in accordance with the Contract Documents. All work, materials, or equipment that may be reasonably inferred from the Contract Documents as being required to produce the completed work shall be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe work, materials, or equipment such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals, or codes or any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids, except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual, or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the OWNER, the CONTRACTOR, or the ENGINEER or any of their consultants, agents, or employees from those set forth in the Contract Documents.

C. If, during the performance of the WORK, the CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, the CONTRACTOR shall immediately report it to the OWNER in writing and before proceeding with the work affected thereby. The OWNER shall then make a written interpretation, clarification, or correction.

3.02 ORDER OF PRECEDENCE OF CONTRACT DOCUMENTS

A. In resolving issues resulting from conflicts, errors, or discrepancies in any of the Contract Documents, or the order of precedence shall be as follows:

1. Change Orders
2. Agreement
3. Addenda
4. Supplementary General Conditions
5. General Conditions
6. Technical Specifications
7. Referenced Standard Specifications
8. Drawings
9. Contractor's Bid (Bid Form).

B. With reference to the Drawings the order of precedence is as follows:

1. Figures govern over scaled dimensions
2. Detail drawings govern over general drawings
3. Addenda/change order drawings govern over general drawings
4. Contract Drawings govern over standard drawings.

3.03 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS

A. The Contract Documents may be amended by a Change Order (pursuant to Article 10) to provide for additions, deletions or revisions in the WORK or to modify terms and conditions.

3.04 REUSE OF DOCUMENTS

A. Neither the CONTRACTOR, Subcontractor, Supplier, nor any other person or organization performing any of the WORK under a contract with the OWNER shall have or acquire any title to or ownership rights in any of the Drawings, Technical Specifications, or other documents used on the WORK, and they shall not reuse any of them on the extensions of the Project or any other project without the written consent of the OWNER and the ENGINEER.

**ARTICLE 4 - AVAILABILITY OF LANDS: PHYSICAL CONDITIONS, REFERENCE POINTS**

4.01 AVAILABILITY OF LANDS

A. The OWNER shall furnish the lands, rights-of-way and easements upon which the

WORK is to be performed and for access thereto, together with other lands designated for the use of the CONTRACTOR in the Contract Documents. Easements for permanent structures or permanent changes in existing major facilities will be obtained and paid for by the OWNER, unless otherwise provided in the Contract Documents. Nothing contained in the Contract Documents shall be interpreted as giving the CONTRACTOR exclusive occupancy of the lands or rights-of-way provided. The CONTRACTOR shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment. The CONTRACTOR shall not enter upon nor use any property not under the control of the OWNER until a written temporary construction easement agreement has been executed by the CONTRACTOR and the property owner, and a copy of the easement furnished to the ENGINEER prior to its use. Neither the OWNER nor the ENGINEER shall be liable for any claims or damages resulting from the CONTRACTOR's unauthorized trespass or use of any properties.

4.02 PHYSICAL CONDITIONS - SUBSURFACE AND EXISTING STRUCTURES

A. Explorations and Reports: The Supplementary General Conditions may identify exploration reports and subsurface conditions tests at the site that have been utilized by the OWNER in the preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the Technical Data contained in these reports. The CONTRACTOR is responsible for the interpretation, extrapolation or interpolation of all technical as well as nontechnical data and its reliance on the completeness, opinions and interpretation of the reports.

B. Existing Structures: The Supplementary General Conditions identify the drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Utilities referred to in Paragraph 4.04 herein) which are at or contiguous to the site that have been utilized by the OWNER in the preparation of the Contract Documents. The CONTRACTOR is responsible for the interpretation, extrapolation or interpolation of all technical as well as nontechnical data and its reliance on the completeness, opinions and interpretation of the reports.

4.03 DIFFERING SITE CONDITIONS

A. The CONTRACTOR shall notify the OWNER upon encountering any of the following unforeseen conditions, hereinafter called "differing site conditions," during the prosecution of the WORK. The CONTRACTOR's notice to the OWNER shall be in writing and delivered before the differing site conditions are disturbed, but in no event later than 14 days after their discovery.

1. Subsurface or latent physical conditions at the site of the WORK which could not reasonably have been discovered through diligent inspection by CONTRACTOR before his Bid was submitted which differs materially from those indicated, described, or delineated in the Contract Documents including those reports and documents discussed in Paragraph 4.02; and

2. Physical conditions at the site of the WORK of an unusual nature which could not reasonably have been discovered through diligent inspection by CONTRACTOR before his Bid was submitted and which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents including those reports and documents discussed in Paragraph 4.02.

B. The OWNER will review the alleged differing site conditions; determine the necessity of obtaining additional explorations or tests with respect to verifying their existence and extent.

C. If the OWNER concludes that because of newly discovered conditions a change in the Contract Documents is required, a Change Order will be issued as provided in Article 10 to reflect and document the consequences of the differing site conditions.

D. In each such case, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to the differing site conditions. If the OWNER and the CONTRACTOR are unable to agree as to the amount or length of the Change Order, a claim may be made as provided in Articles 11 and 12.

E. The CONTRACTOR's failure to give written notice of differing site conditions within 14 days of their discovery and before they are disturbed shall constitute a waiver of all claims in connection therewith, whether direct or consequential in nature.

4.04 PHYSICAL CONDITIONS - UNDERGROUND UTILITIES

A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Utilities at or contiguous to the site are based on information and data furnished to the OWNER by the owners of Underground Utilities or by others. Unless it is expressly provided in the Supplementary General Conditions, the OWNER and the ENGINEER shall not be responsible for the accuracy or completeness of any Underground Utilities information or data. The CONTRACTOR's responsibility relating to underground utilities are: review and check all information and data, locate all Underground Utilities shown or indicated in the Contract Documents, coordinate the WORK with the owners of Underground Utilities during construction, safeguard and protect the Underground Utilities, and repair any damage to Underground Utilities resulting from the WORK. The cost of all these activities will be considered as having been included in the Contract Price.

B. Not Shown or Indicated: If an Underground Utility not shown or indicated in the Contract Documents is uncovered or revealed at or contiguous to the site and which the CONTRACTOR could not reasonably have been expected to be aware of, the CONTRACTOR shall identify the owner of the Underground Utility, give written notice of the location to that owner and notify the OWNER.

4.05 REFERENCE POINTS

A. The OWNER will provide one bench mark, near or on the site of the WORK, and will provide two points near or on the site to establish a base line for use by the CONTRACTOR in laying out the WORK. Unless otherwise specified in the General Requirements, the CONTRACTOR shall furnish all other lines, grades, and bench marks required for proper execution of the WORK.

B. The CONTRACTOR shall preserve all bench marks, stakes, and other survey marks. In case of their removal or destruction by its own employees or by its subcontractor's employees, the CONTRACTOR shall be responsible for the accurate replacement of reference points by professionally qualified personnel at no additional cost to the OWNER.

## ARTICLE 5 - BONDS AND INSURANCE

5.01 PERFORMANCE, PAYMENT AND OTHER BONDS

A. The CONTRACTOR shall furnish Performance and Payment Bonds, each in the amount of 100% of the Contract Price as security for the faithful performance and payment of all the CONTRACTOR's obligations under the Contract Documents. The Performance Bond shall remain in effect at least until one year after the date of Notice of Completion, except as otherwise provided by Law or Regulation or by the Contract Documents. After the OWNER issues the Notice of Completion, the amount of the Performance Bond may be reduced to 10 percent of the Contract Price, or $1,000, whichever is greater. The CONTRACTOR shall also furnish such other Bonds as are required by the Supplementary General Conditions.

B. If the surety on any Bond furnished by the CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the WORK is located, the CONTRACTOR shall within 7 days after written approval by the OWNER of a substitute Bond and Surety substitute the approved Bond and Surety.

5.02 INSURANCE

A. The CONTRACTOR shall purchase and maintain the insurance required under this paragraph. This insurance shall include the specific coverages set out herein and be written for not less than the limits of liability and coverages provided in the Supplementary General Conditions, or required by law, whichever is greater. The CONTRACTOR's liabilities under the Agreement shall not be deemed limited in any way to the insurance coverage required.

B. The CONTRACTOR shall furnish the OWNER with certificates indicating the type, amount, class of operations covered, effective dates and expiration dates of all policies. All insurance policies purchased and maintained (or the certificates or other evidence thereof) shall 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 the OWNER by certified mail. Contract or certificate terms which state that reasonable efforts will be made to notify the OWNER prior to cancellation, change or renewal of the policy are not acceptable. All insurance shall remain in effect until the OWNER issues the Notice of Final Completion and at all times thereafter when the CONTRACTOR may be correcting, removing, or replacing defective work in accordance with Paragraph 13.01B or completing punch list items required by the Notice of Substantial Completion. In addition, the insurance required herein (except for Worker's Compensation and Employer's Liability) shall name the OWNER, the ENGINEER, and their officers, agents, and employees as "additional insured" under the policies. All liability insurance policies shall be occurrence and not claims made policies.

1. Workers' Compensation and Employer's Liability: This insurance shall protect the CONTRACTOR against all claims under applicable state workers' compensation laws. The CONTRACTOR shall also be protected against claims for injury, disease, or death of employees which, for any reason, may not fall within the provisions of a workers' compensation law. This policy shall include an "all states" endorsement. The CONTRACTOR shall require each subcontractor similarly to provide Workers' Compensation Insurance for all of the latter's employees to be engaged in the WORK unless its employees are covered by the protection afforded by the CONTRACTOR's Workers' Compensation Insurance.

In the event a class of employees is not protected under the Workers' Compensation Statute, the CONTRACTOR or Subcontractor, as the case may be, shall provide adequate employer's liability insurance for the protection of its employees not protected under the statute.

2. Comprehensive General Liability: This insurance shall be written in comprehensive form and shall protect the CONTRACTOR against all claims arising from injuries to persons other than its employees and damage to property of the OWNER or others arising out of any act or omission of the CONTRACTOR or its agents, employees or subcontractors. The policy shall include the following endorsements: (1) Protective Liability endorsement to insure the contractual liability assumed by the CONTRACTOR under the indemnification provisions in these General Conditions; (2) Broad Form Property Damage endorsement; (3) Personal Injury endorsement to cover personal injury liability for intangible harm. The Comprehensive General Liability coverage shall contain no exclusion relative to blasting, explosion, collapse of building, or damage to underground structures.

3. Comprehensive Automobile Liability: This insurance shall be written in comprehensive form. The policy shall protect the CONTRACTOR against all claims for injuries to employees, members of the public and damage to property of others arising from the use of CONTRACTOR's motor vehicles, whether they are owned, non-owned, or hired, and whether used or operated on or off the site. The motor vehicle insurance required under this paragraph shall include: (a) motor vehicle liability coverage; (b) personal injury protection coverage and benefits; (c) uninsured motor vehicle coverage; and (d) underinsured motor vehicle coverage.

4. Subcontractor's Insurance: The CONTRACTOR shall require each of its subcontractors to procure and to maintain Comprehensive General Liability Insurance and Comprehensive Automobile Liability Insurance of the type and in the amounts specified in the Supplementary General Conditions or insure the activities of its subcontractors in the CONTRACTOR's own policy, in like amount.

5. Builder's Risk: This insurance shall be of the "all risk" type, shall be written in completed value form, and shall protect the CONTRACTOR, the OWNER, and the ENGINEER against damage to buildings, structures, materials and equipment. The amount of this insurance shall not be less than the insurable value of the WORK at completion. Builder's risk insurance shall provide for losses to be payable to the CONTRACTOR, the OWNER, and the ENGINEER as their interests may appear. The policy shall contain a provision that in the event of payment for any loss under the coverage provided, the insurance company shall have no rights of recovery against the CONTRACTOR, the OWNER, or the ENGINEER. The Builder's Risk policy shall insure against all risks of direct physical loss or damage to property from any external cause including flood and earthquake. Allowable exclusions, if any, shall be as specified in the Supplementary General Conditions.

## ARTICLE 6 - CONTRACTOR RESPONSIBILITIES

6.01 SUPERVISION AND SUPERINTENDENCE

A. The CONTRACTOR shall supervise and direct the WORK competently and efficiently, devoting the attention and applying the skills and expertise necessary to perform the WORK in accordance with the Contract Documents. The CONTRACTOR shall be solely responsible for the means, methods, techniques, sequences, and procedures of construction and safety precautions and programs incidental thereto. The CONTRACTOR shall be responsible to see that the finished WORK complies accurately with the Contract Documents.

B. The CONTRACTOR shall employ the superintendent named in "Information Required of Bidder" on the work site at all times during the progress of the WORK. The superintendent shall not be replaced without the OWNER's written consent. The superintendent will be the CONTRACTOR's representative at the site and shall have authority to act on behalf of the CONTRACTOR. All communications given to the superintendent shall be as binding as if given to the CONTRACTOR. The CONTRACTOR shall issue all its communications to the OWNER.

C. The CONTRACTOR's superintendent, or OWNER approved representative shall be present at the site of the WORK at all times while work is in progress. Failure to observe this requirement shall be considered suspension of the WORK by the CONTRACTOR until the superintendent is again present at the site.

6.02 LABOR, MATERIALS, AND EQUIPMENT

A. The CONTRACTOR shall provide skilled, competent and suitably qualified personnel to survey and lay out the WORK and perform construction as required by the Contract Documents. The CONTRACTOR shall at all times maintain good discipline and order at the site.

B. Except in connection with the safety or protection of persons at the WORK, or property at the site or adjacent thereto, all work at the site shall be performed during regular working hours (7:00 a.m. - 6:00 p.m., Monday through Friday), and the CONTRACTOR will not permit overtime work or the performance of work on Saturday, Sunday or any legal holiday observed by the OWNER without the OWNER's written consent given after prior written notice to the OWNER. Except as otherwise provided in this Paragraph, the CONTRACTOR shall receive no additional compensation for overtime work, i.e., work in excess of 8 hours in any one calendar day or 40 hours in any one calendar week, even though such overtime work may be required under emergency conditions and may be ordered by the OWNER in writing. Additional compensation will be paid the CONTRACTOR for overtime work in the event extra work is ordered by the OWNER and the Change Order specifically authorizes the use of overtime work, but only to the extent that the CONTRACTOR pays overtime wages on a regular basis being paid (>40 hours per week) for overtime work of a similar nature in the same locality.

C. All costs of inspection and testing performed during overtime work approved solely for the convenience of the CONTRACTOR shall be borne by the CONTRACTOR. The OWNER shall have the authority to deduct the costs of all inspection and testing from any partial payments otherwise due to the CONTRACTOR.

D. Unless otherwise specified in the Contract Documents, the CONTRACTOR shall furnish, erect, maintain and remove the construction plant, and temporary works and assume full responsibility for all materials, equipment, labor, transportation, construction equipment, machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities and all other facilities and incidentals necessary for the furnishing, performance testing, start-up and completion of the WORK.

E. All materials and equipment incorporated into the WORK shall be of new and good quality, except as otherwise provided in the Contract Documents. If required by the OWNER, the CONTRACTOR shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. The CONTRACTOR shall apply, install, connect, erect, use, clean, and condition all material and equipment in accordance with the instructions of the manufacturer and Supplier except as otherwise provided in the Contract Documents.

6.03 ADJUSTING PROGRESS SCHEDULE

A. The CONTRACTOR shall submit any adjustments in the progress schedule to the OWNER for acceptance in accordance with the provisions for "Contractor Submittals" in the General Requirements.

6.04 SUBSTITUTES AND "OR-EQUAL" ITEMS

A. The CONTRACTOR shall submit proposed substitutes and "or-equal" items in accordance with the provisions for "Contractor Submittals" in the General Requirements.

6.05 SUBCONTRACTORS, SUPPLIERS, AND OTHERS

A. The CONTRACTOR shall be responsible to the OWNER and the ENGINEER for the acts and omissions of its subcontractors and their employees to the same extent as the CONTRACTOR is responsible for the acts and omissions of its own employees. Nothing contained in this paragraph shall create any contractual relationship between any subcontractor and the OWNER or the ENGINEER nor relieve the CONTRACTOR of any liability or obligation under the Agreement.

6.06 PERMITS

A. Unless otherwise provided in the Supplementary General Conditions, the CONTRACTOR shall obtain and pay for all construction permits and licenses from the agencies having jurisdiction, including furnishing the insurance and bonds required by such agencies. The costs incurred by the CONTRACTOR in compliance with this paragraph shall not be made the basis for claims for additional compensation. The OWNER shall assist the CONTRACTOR, when necessary, in obtaining such permits and licenses. The 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, including all utility connection charges for utilities required by the WORK.

B. The CONTRACTOR shall pay all license fees and royalties and assume all costs when any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others when issued in the construction of the WORK or incorporated into the WORK. If a particular invention, design, process, product, or device is specified in the Contract Documents for incorporation into or use in the construction of the WORK

and if to the actual knowledge of the OWNER or the 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 these rights shall be disclosed by the OWNER in the Contract Documents. The CONTRACTOR shall indemnify, defend and hold harmless the OWNER and the ENGINEER and anyone directly or indirectly employed by either of them from and against all claims, damages, losses, and expenses (including attorneys' fees and court costs) arising out of 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.

6.07 LAWS AND REGULATIONS

A. The CONTRACTOR shall observe and comply with all Laws and Regulations which in any manner affect those engaged or employed on the WORK, the materials used in the WORK, or the conduct of the WORK. If any discrepancy or inconsistency should be discovered in the Contract Documents in relation to any Laws or Regulations, the CONTRACTOR shall report the same in writing to the OWNER. Notwithstanding any immunity otherwise provided by applicable workers' compensation statutes, the CONTRACTOR shall indemnify, defend and hold harmless the OWNER, the ENGINEER and their officers, agents, and employees against all claims arising from violation of any Laws or Regulations, by CONTRACTOR or by its employees or subcontractors. This indemnity provision is intended to provide the greatest protection of the OWNER and ENGINEER allowed by law. Any particular law or regulation specified or referred to elsewhere in the Contract Documents shall not in any way limit the obligation of the CONTRACTOR to comply with all other provisions of federal, state, and local laws and regulations.

6.08 EQUAL OPPORTUNITY

A. The CONTRACTOR agrees not to discriminate against anyone because of race, national origin, ancestry, color, religion, sex, age, or disability. The CONTRACTOR agrees to abide by all applicable civil rights Laws and Regulations.

6.09 TAXES

A. The CONTRACTOR shall pay all sales, consumer, use, and other similar taxes required to be paid by the CONTRACTOR in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the WORK.

6.10 USE OF PREMISES

A. The CONTRACTOR shall confine construction equipment, stored materials and equipment, and other operations of workers to (1) the Project site, (2) the land and areas identified for the CONTRACTOR's use in the Contract Documents, and (3) other lands whose use is acquired by Laws and Regulations, rights-of-way, permits, and easements. The CONTRACTOR shall be fully responsible to the owner and occupant of such lands for any damage to the lands or areas contiguous thereto, resulting from the performance of the WORK or otherwise. Should any claim be made against the OWNER or the ENGINEER by owner or occupant of lands because of the performance of the WORK, the CONTRACTOR shall promptly settle the claim by agreement, or resolve the claim through litigation. The CONTRACTOR shall, to the fullest extent permitted by Laws and Regulations, indemnify, defend, and hold the OWNER and the ENGINEER harmless

from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers, architects, attorneys, and other professionals and court costs) arising directly, indirectly, or consequentially out of any action, legal or equitable, brought by any owner or occupant of land against the OWNER or the ENGINEER to the extent the claim is based or arises out of the CONTRACTOR's performance of the WORK.

6.11 SAFETY AND PROTECTION

A. The CONTRACTOR shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the WORK. The 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 or near the work site and other persons and organizations who may be affected by activities on or near the work site.

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, and utilities not designated for removal, relocation, or replacement in the course of construction.

B. The CONTRACTOR shall comply with all applicable Laws and Regulations (whether referred to herein or not) of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss and shall erect and maintain all necessary safeguards for such safety and protection. The CONTRACTOR shall notify owners of adjacent property and utilities when prosecution of the WORK may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property.

C. Unless the CONTRACTOR otherwise designates in writing a different individual as the responsible individual, the CONTRACTOR's superintendent shall be CONTRACTOR's representative at the site whose duties shall include providing all persons on the work site with a reasonably safe environment and the prevention of accidents.

6.12 SHOP DRAWINGS AND SAMPLES

A. After checking and verifying all field measurements and after complying with the applicable procedures specified in the General Requirements, the CONTRACTOR shall submit all shop drawings to the OWNER for review and approval in accordance with the approved schedule for shop drawing submittals specified in the General Requirements.

B. The CONTRACTOR shall also submit to the OWNER for review and approval all samples in accordance with the approved schedule of sample submittals specified in the General Requirements.

C. Before submitting shop drawings or samples, the CONTRACTOR shall determine and verify all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto and review or coordinate each shop drawing or sample with other shop drawings and samples and with the requirements of the WORK and the Contract Documents. The CONTRACTOR shall stamp each shop drawing, certifying his review. If the same shop drawings require

re-submittal more than two times, the CONTRACTOR shall pay for the costs of ENGINEER's and OWNER's subsequent review(s).

6.13 CONTINUING THE WORK

A. The CONTRACTOR shall carry on the WORK and adhere to the progress schedule during all disputes or disagreements with the OWNER. No work shall be delayed or postponed pending resolution of any dispute or disagreement, except as the CONTRACTOR and the OWNER may otherwise mutually agree in writing.

6.14 INDEMNIFICATION

A. To the fullest extent permitted by Laws and Regulations, and notwithstanding any immunity the CONTRACTOR might otherwise have under applicable workers' compensation statutes, the CONTRACTOR shall indemnify, defend, and hold harmless the OWNER, the ENGINEER, and their officers, agents, and employees, against and from all claims and liability arising under or by reason of, or claimed by others to arise under or by reason of, the Agreement or any performance of the WORK, but not from the sole negligence or willful misconduct of the OWNER and/or the ENGINEER. Such indemnification by the CONTRACTOR shall include but not be limited to the following:

1. Liability or claims resulting in whole or in part, directly or indirectly from, or claimed by others to result in whole or in part, directly or indirectly from, the negligence, carelessness or other fault of the CONTRACTOR or its employees, Subcontractors, Suppliers or agents in the performance of the WORK, or in guarding or maintaining the same, or from any improper materials, implements, or appliances used in its construction;

2. Liability or claims arising in whole or in part, directly or indirectly, from or based on, or claimed by others to arise in whole or in part, directly or indirectly, from or based on, the violation of any Laws or Regulations by the CONTRACTOR or its employees, Subcontractors, Suppliers or agents;

3. Liability or claims arising in whole or in part, directly or indirectly, from, or claimed by others to arise in whole or in part, directly or indirectly from, the use or manufacture by the CONTRACTOR, or its Subcontractors, Suppliers or agents in the performance of this Agreement of any copyrighted or uncopyrighted composition, secret process, patented or unpatented invention, article, or appliance, unless otherwise specifically stipulated in this Agreement.

4. Liability or claims arising in whole or in part, directly or indirectly, from, or claimed by others to arise in whole or in part, directly or indirectly from, the breach of any warranties, whether express or implied, made by the CONTRACTOR or its Subcontractors, Suppliers or agents;

5. Liabilities or claims arising in whole or in part, directly or indirectly, from, or claimed by others to arise in whole or in part, directly or indirectly from, the willful misconduct of the CONTRACTOR or its Subcontractors, Suppliers or agents; and,

6. Liabilities or claims arising in whole or in part, directly or indirectly, from, or claimed by others to arise in whole or in part, directly or indirectly from, any

breach of the obligations assumed herein by the CONTRACTOR or its Subcontractors, Suppliers or agents.

7. If for any reason the OWNER is required to pay damages in proportion to the fault of the OWNER notwithstanding the above indemnity provisions, CONTRACTOR shall, notwithstanding any workers' compensation immunity, indemnify and hold OWNER harmless from the payment of any increased damages OWNER is required to pay which result from a reapportionment of the fault of the CONTRACTOR, or any of its employees, Subcontractors or Suppliers pursuant to Utah Code Annotated section 78b-5-818, Comparative negligence.

B. The CONTRACTOR shall reimburse the OWNER, and the ENGINEER for all costs and expense, (including but not limited to fees and charges of engineers, architects, attorneys, and other professional and court costs) incurred by the OWNER, and the ENGINEER in enforcing the provisions of this Paragraph.

C. The indemnification obligation under this Paragraph shall not be limited in any way by any limitation of the amount or type of damages, compensation, or benefits payable by or for the CONTRACTOR or any such subcontractor or other person or organization under workers' compensation acts, disability benefit acts, or other employee benefit acts.

6.15 CONTRACTOR'S DAILY REPORTS

A. The CONTRACTOR shall complete a daily report indicating manpower, major equipment, subcontractors, weather conditions, etc., involved in the performance of the WORK. The daily report shall be completed on forms prepared by the CONTRACTOR and acceptable to the OWNER, and shall be submitted to the OWNER at the conclusion of each workday.

6.16 ASSIGNMENT OF CONTRACT

A. The CONTRACTOR shall not assign, sublet, sell, transfer, or otherwise dispose of the Agreement or any portion thereof, or its right, title, or interested therein, or obligations thereunder, without the written consent of the OWNER except as imposed by law. If the CONTRACTOR violates this provision, the Agreement may be terminated at the option of the OWNER. In such event, the OWNER shall be relieved of all liability and obligations to the CONTRACTOR and to its assignee or transferee, growing out of such termination.

**ARTICLE 7 - OTHER WORK**

7.01 RELATED WORK

A. The OWNER may perform other work related to the Project at the site by the OWNER's own forces, have other work performed by utility owners, or let other direct contracts for the performance of the other work which may contain General Conditions similar to these. If the fact that such other work is to be performed was not noted in the Contract Documents written notice thereof will be given to the CONTRACTOR prior to commencing any other work.

B. The CONTRACTOR shall afford each utility owner and other contractor who is a party to a direct contract (or the OWNER, if the OWNER is performing the additional work with the OWNER's employees) proper and safe access to the site and a reasonable

opportunity for the introduction and storage of materials and equipment and the execution of the other work. The CONTRACTOR shall properly connect and coordinate the WORK with the other work. The CONTRACTOR shall do all cutting, fitting, and patching of the WORK that may be required to make its several parts come together properly and integrate with the other work. The CONTRACTOR shall not endanger any work of others by cutting, excavating, or otherwise altering their work and shall only cut or alter their work with the written consent of the OWNER and the others whose work will be affected.

C. If the proper execution or results of any part of the CONTRACTOR's work depends upon the integration of work with the completion of other work by any other contractor or utility owner (or the OWNER), the CONTRACTOR shall inspect and report to the OWNER in writing all delays, defects, or deficiencies in the other work that renders it unavailable or unsuitable for proper integration with the CONTRACTOR's work. Except for the results or effects of material latent defects and deficiencies in the other work which could not reasonably have been discovered by the CONTRACTOR, the CONTRACTOR's failure to report will constitute an acceptance of the other work as fit and proper for integration with the CONTRACTOR's work and as a waiver of any claim for additional time or compensation associated with the integration of the CONTRACTOR's work with the other work.

7.02 COORDINATION

A. If the OWNER contracts with others for the performance of other work on the Project at the site, a coordinator will be identified to the extent that the coordinator can be identified at this time, in the Supplementary General Conditions and delegated the authority and responsibility for coordination of the activities among the various contractors. The specific matters over which the coordinator has authority and the extent of the coordinator's authority and responsibility will be itemized in the Supplementary General Conditions or in a notice to the CONTRACTOR at such time as the identity of the coordinator is determined.

**ARTICLE 8 - OWNER'S RESPONSIBILITIES**

8.01 COMMUNICATIONS

A. The OWNER shall issue all its communications directly to the CONTRACTOR.

8.02 PAYMENTS

A. The OWNER shall make payments to the CONTRACTOR as provided in Article 14.

8.03 LANDS, EASEMENTS, AND SURVEYS

A. The 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. The OWNER shall identify and make available to the CONTRACTOR copies of exploration reports and subsurface conditions tests at the site and in existing structures which have been utilized in preparing the Drawings and Technical Specifications as set forth in Paragraph 4.02

8.04 CHANGE ORDERS

A. The OWNER shall execute approved Change Orders for the conditions described in Paragraph 10.01D.

B. When funds are not budgeted to support continuation of performance in a subsequent fiscal period, the contract shall be canceled and the contractor shall be reimbursed for the reasonable value of any non-recurring costs incurred but not amortized in the price of the supplies or services delivered under the contract.

8.05 INSPECTIONS AND TESTS

A. The OWNER's responsibility with respect to inspection, tests, and approvals is set forth in Paragraph 13.03B.

8.06 SUSPENSION OF WORK

A. In connection with the OWNER's right to stop work or suspend work, see Paragraphs 13.04 and 15.01, Paragraphs 15.02 and 15.03 deal with the OWNER's right to terminate services of the CONTRACTOR under certain circumstances.

**ARTICLE 9 - ENGINEER'S STATUS DURING CONSTRUCTION**

9.01 OWNER'S REPRESENTATIVE

A. The OWNER will designate a representative during the construction period. The duties, responsibilities and the limitations of authority of the OWNER's representative during construction are summarized hereafter.

9.02 VISITS TO SITE

A. The ENGINEER will make visits to the site during construction to observe and inspect the progress and quality of the WORK and to determine, in general if the WORK is proceeding in accordance with the Contract Documents.

9.03 PROJECT REPRESENTATIVE

A. The OWNER'S Representative will observe and inspect the performance of the WORK. The Owner's Representative and/or other authorized agents of the OWNER shall serve as the primary contact(s) with the Contractor during the construction phase. All submittals shall be delivered to, and communications between the OWNER and the CONTRACTOR shall be handled by, the Owner's Representative and/or other authorized agents. The Owner's Representative shall be the primary authorized representative of the OWNER in all on-site relations with the CONTRACTOR.

9.04 CLARIFICATIONS AND INTERPRETATIONS

A. The OWNER will issue, with reasonable promptness written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as the OWNER may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

9.05 AUTHORIZED VARIATIONS IN WORK

A. The OWNER may authorize minor variations in the WORK as described in the Contract Documents when such variations do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These variations shall be accomplished by issuing a Field Order. The issuance of a Field Order requires the CONTRACTOR to perform the work described in the order promptly. If the CONTRACTOR believes that a Field Order justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, the CONTRACTOR may make a claim therefor as provided in Article 11 and 12.

9.06 REJECTION OF DEFECTIVE WORK

A. The OWNER is authorized to reject work which the OWNER believes to be defective and require special inspection or testing of the WORK as provided in Paragraph 13.03G, whether or not the WORK is fabricated, installed, or completed.

9.07 CONTRACTOR SUBMITTALS, CHANGE ORDERS, AND PAYMENTS

A. The OWNER will review for approval all CONTRACTOR submittals, including shop drawings, samples, substitutes, and "or equal" items, etc., in accordance with the procedures set forth in the General Requirements.

B. In connection with the OWNER's REPRESENTATIVE responsibilities as to Change Orders, see Articles 10, 11, and 12.

C. In connection with the OWNER responsibilities as to Applications for Payment, see Article 14.

9.08 DISPUTES, CLAIMS AND OTHER MATTERS

A. All claims, disputes, and other matters concerning the acceptability of the WORK, the interpretation of the requirements of the Contract Documents pertaining to the performance of the WORK, and claims for changes in the Contract Price or Contract Time under Articles 11 and 12 will be referred to the OWNER in writing with a request for formal decision in accordance with this paragraph. The OWNER will render a decision in writing within 30 days of receipt of the request. Written notice of each claim, dispute, or other matter will be delivered by the CONTRACTOR to the OWNER promptly (but in no event later than 30 days) after the occurrence of the event. Written supporting data will be submitted to the OWNER with the written claim unless the OWNER allows an additional period of time to ascertain more accurate data in support of the claim.

B. When reviewing the claim or dispute, the OWNER'S REPRESENTATIVE will not show partiality to the OWNER or the CONTRACTOR and will incur no liability in connection with any interpretation or decision rendered in good faith. The OWNER'S REPRESENTATIVE rendering of a decision with respect to any claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in Paragraph 14.12) shall be a condition precedent to the OWNER's or the CONTRACTOR's exercise of their rights or remedies under the Contract Documents or by Law or Regulations with respect to the claim, dispute, or other matter.

9.09 LIMITATION ON ENGINEER'S RESPONSIBILITIES

A. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," as allowed," "as reviewed," "as approved," or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review, or judgment of the OWNER as to the WORK, it is intended that such requirement, direction, review, or judgment will be solely to evaluate the WORK for compliance with the Contract Documents, unless there is a specific statement indicating otherwise. The use of any such term or adjective shall not be effective to assign to the OWNER any duty or authority to supervise or direct the performance of the WORK.

B. Neither the OWNER nor the ENGINEER will be responsible for the CONTRACTOR's means, methods, techniques, sequences, or procedures of construction not specified in the Contract Documents. Neither the OWNER nor the ENGINEER shall have any responsibility for safety precautions or programs on site or for the safety of CONTRACTOR'S employees, Subcontractors, employees of Subcontractors, Suppliers, employees of Suppliers or others on site.

C. Neither the OWNER nor the ENGINEER will be responsible for the acts or omissions of the CONTRACTOR nor of any Subcontractor, Supplier, or any other person or organization performing any of the WORK to the extent that such acts or omissions are not reasonably discoverable considering the level of observation and inspection required by the ENGINEER's agreement with the OWNER.

**ARTICLE 10 - CHANGES IN THE WORK**

10.01 GENERAL

A. Without invalidating the Agreement and without notice to any surety, the OWNER may at any time or from time to time, order additions, deletions, or revisions in the WORK; these will be authorized by a written Field Order and/or a Change Order issued by the OWNER. Upon receipt of any of these documents, the CONTRACTOR shall promptly proceed with the work involved pursuant to the applicable conditions of the Contract Documents.

B. If the OWNER and the CONTRACTOR are unable to agree upon the increase or decrease in the Contract Price or an extension or shortening of the Contract Time, if any, that should be allowed as a result of a Field Order, a claim may be made therefor as provided in Articles 11 and 12.

C. The CONTRACTOR shall not be entitled to an increase in the Contract Price nor an extension of the Contract Time with respect to any work performed that is not required by the Contract Documents as amended, modified, or supplemented by Change Order, except in the case of an emergency and except in the case of uncovering work provided in the Paragraph 13.03G.

D. The OWNER and the CONTRACTOR shall execute appropriate Change Orders covering:

1. Changes in the WORK which are ordered by the OWNER pursuant to Paragraph 10.01A;

2. Changes required because of acceptance of defective work under Paragraph 13.06;

3. Changes in the Contract Price or Contract Time which are agreed to by the parties; or

4. Any other changes agreed to by the parties.

5. Any construction contract change order which increases the contract amount shall have the prior written certification of the District's controller that the expenditure of the change order amount is properly authorized by the District's board of trustees consistent with the District's budget and financial management policies and the instructions of the board of trustees.

E. If the provisions of any Bond require notice of any change to be given to a surety, the giving of these notices will be the CONTRACTOR's responsibility. The CONTRACTOR shall provide for the amount of each applicable Bond to be adjusted accordingly.

10.02 ALLOWABLE QUANTITY VARIATIONS

A. Whenever a unit price and quantity have been established for a bid item in the Contract Documents, the quantity stated may be increased or decreased to a maximum of 25 percent with no change in the unit price. An adjustment in the quantity in excess of 25 percent will be sufficient to justify a change in the unit price. All changes in the quantities of bid items shall be documented by Change Order.

B. In the event a part of the WORK is to be entirely eliminated and no lump sum or unit price is named in the Contract Documents to cover the eliminated work, the price of the eliminated work shall be agreed upon in writing by the OWNER and the CONTRACTOR. If the OWNER and the CONTRACTOR fail to agree upon the price of the eliminated work, the price shall be determined in accordance with the provisions of Article 11.

**ARTICLE 11 - CHANGE OF CONTRACT PRICE**

11.01 GENERAL

A. The Contract Price constitutes the total compensation payable to the CONTRACTOR for performing the WORK. Except as directed by Change Orders, all duties, responsibilities, and obligations assigned to or undertaken by the CONTRACTOR shall be at its expense without change in the Contract Price.

B. The Contract Price may only be changed by a Change Order. Any claim for an increase in the Contract Price shall be based on written notice delivered by the CONTRACTOR to the OWNER promptly (but in no event later than 30 days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered with the claim, unless the OWNER allows an additional period of time to ascertain more accurate data in support of the claim, and shall be accompanied by the CONTRACTOR's written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the CONTRACTOR is entitled as a result of the occurrence of the event. If the OWNER and the CONTRACTOR cannot otherwise agree on the amount involved, all claims for adjustment in the Contract Price shall be determined by the OWNER in

accordance with Paragraph 9.08A. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph.

C. The value of any work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:

1. Where the work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved.

2. Mutual acceptance of a lump sum, which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 11.04.

3. On the basis of the cost of work (determined as provided in Paragraphs 11.02 and 11.03) plus a CONTRACTOR's fee for overhead and profit (determined as provided in Paragraph 11.04).

11.02 COST OF WORK (BASED ON TIME AND MATERIALS)

A. General: The term "cost of work" means the sum of all costs necessarily incurred and paid by the CONTRACTOR for labor, materials, and equipment in the proper performance of work. Except as otherwise may be agreed to in writing by the OWNER, such costs shall be in amounts no higher than those prevailing in the locality of the Project.

B. Labor: The cost of labor used in performing work by the CONTRACTOR, a Subcontractor, or other forces will be the sum of the following:

1. The actual wages paid plus any employer payments to, or on behalf of workers for fringe benefits including health and welfare, pension, vacation, and similar purposes. The cost of labor may include the rates paid to foremen when determined by the OWNER that the services of foremen do not constitute a part of the overhead allowance.

2. All payments imposed by state and federal laws including, but not limited to, compensation insurance, and social security payments.

3. The amount paid for subsistence and travel required by collective bargaining agreements, or in accordance with the regular practice of the employer.

4. At the beginning of the extra work and as later requested by the OWNER, the CONTRACTOR shall furnish the OWNER proof of labor compensation rates being paid.

C. Materials: The cost of materials used in performing work will be the cost to the purchaser, whether CONTRACTOR or Subcontractor, from the Supplier thereof, except as the following are applicable:

1. Trade discounts available to the purchase shall be credited to the OWNER notwithstanding the fact that such discounts may not have been taken by the CONTRACTOR.

2. For materials secured by other than a direct purchase and direct billing to the purchaser, the cost shall be deemed to be the price paid to the actual Supplier as

determined by the OWNER. Markup except for actual costs incurred in the handling of such materials will not be allowed.

3. Payment for materials from sources owned wholly or in part by the purchaser shall not exceed the price paid by the purchaser for similar materials from these sources on extra work items or current wholesale price for the materials delivered to the work site, whichever is lower.

4. If, in the opinion of the OWNER, the cost of material is excessive, or the CONTRACTOR does not furnish satisfactory evidence of the cost of the material, then the cost shall be deemed to be the lowest current wholesale price for the quantity concerned, delivered to the work site less trade discount. The OWNER reserves the right to furnish materials for the extra work and no claim shall be made by the CONTRACTOR for costs and profit on such materials.

D. Equipment: The CONTRACTOR will be paid for the use of equipment at the rental rate listed for the equipment specified in the Rental Rate Blue Book published by Dataquest, Inc. The rental rate will be used to compute payments for equipment whether the equipment is under the CONTRACTOR's control through direct ownership, leasing, renting, or another method of acquisition. The rental rate to be applied for use of each item of equipment shall be the rate resulting in the least total cost to the Owner for the total period of use.

1. All equipment shall, in the opinion of the OWNER, be in good working condition and suitable for the purpose for which the equipment is to be used.

2. Before construction equipment is used on the extra work, the CONTRACTOR shall plainly stencil or stamp an identifying number thereon at a conspicuous location, and shall furnish to the OWNER, in duplicate, a description of the equipment and its identifying number.

3. Unless otherwise specified, manufacturers' ratings and manufacturer-approved modifications shall be used to classify equipment for the determination of applicable rental rates. Equipment which has no direct power unit shall be powered by a unit of at least the minimum rating recommended by the manufacturer.

4. Individual pieces of equipment or tools having a replacement value of $100 or less, whether or not consumed by use, shall be considered to be small tools and no payment will be made therefore.

5. Rental time will not be allowed while equipment is inoperative due to breakdowns.

E. Equipment on the Work: The rental time to be paid for equipment used on the WORK shall be the time the equipment is in productive operation on the extra work being performed and, in addition, shall include the time required to move the equipment to the location of the extra work and return it to the original location or to another location that requires no more moving time than that required to return it to its original location. Moving time will not be paid if the equipment is used on other than the extra work, even though located at the site of the extra work. Loading and transporting costs will be allowed, in lieu of moving time, when the equipment is moved by means other than its own power. However, no payment will be made for loading and transporting costs when

the equipment is used on other than the extra work even though located at the site of the extra work. The following shall be used in computing the rental time of equipment on the WORK.

1. When hourly rates are listed, any part of an hour less than 30 minutes of operation shall be considered to be 1/2-hour of operation, and any part of an hour in excess of 30 minutes will be considered one hour of operation.

2. When daily rates are listed, any part of a day less than 4 hours operation shall be considered to be 1/2-day of operation. When owner-operated equipment is used to perform extra work to be paid for on a time and materials basis, the CONTRACTOR will be paid for the equipment and operator, as set forth in Paragraph (3), (4), and (5), following.

3. Payment for the equipment will be made in accordance with the provisions in Paragraph 11.02D, herein.

4. Payment for the cost of labor and subsistence or travel allowance will be made at the rates paid by the CONTRACTOR to other workers operating similar equipment already on the WORK, or in the absence of such labor, established by collective bargaining agreements for the type of workmen and location of the extra work, whether or not the operator is actually covered by such an agreement. A labor surcharge will be added to the cost of labor described herein in accordance with the provisions of Paragraph 11.02B, herein, which surcharge shall constitute full compensation for payments imposed by state and federal laws and all payments made to on behalf of workers other than actual wages.

5. To the direct cost of equipment rental and labor, computed as provided herein, will be added the allowances for equipment rental and labor as provided in Paragraph 11.04, herein.

11.03 SPECIAL SERVICES

A. Special work or services are defined as that work characterized by extraordinary complexity, sophistication, or innovation or a combination of the foregoing attributes which are unique to the construction industry. The following may be considered by the OWNER in making estimates for payment for special services:

1. When the OWNER and the CONTRACTOR, by agreement, determine that a special service or work is required which cannot be performed by the forces of the CONTRACTOR or those of any of its Subcontractors, the special service or work may be performed by an entity especially skilled in the work to be performed. After validation of invoices and determination of market values by the OWNER, invoices for special services or work based upon the current fair market value thereof may be accepted without complete itemization of labor, material, and equipment rental cost.

2. When the CONTRACTOR is required to perform work necessitating special fabrication or machining process in a fabrication or a machine shop facility away from the job site, the charges for that portion of the work performed at the off-site facility may by agreement, be accepted as a special service and accordingly, the invoices from the work may be accepted without detailed itemization.

3. All invoices for special services will be adjusted by deducting all trade discounts offered or available, whether the discounts were taken or not. In lieu of the allowances for overhead and profit specified in Paragraph 11.04, herein, an allowance of 5 percent will be added to invoices for special services.

B. All work performed hereunder shall be subject to all of the provisions of the Contract Documents and the CONTRACTOR's sureties shall be bound with reference hereto as under the original Agreement. Copies of all amendments to surety bonds or supplemental surety bonds shall be submitted to the OWNER for review prior to the performance of any work hereunder.

11.04 CONTRACTOR'S FEE

A. Work ordered on the basis of time and materials will be paid for at the actual necessary cost as determined by the OWNER, plus allowances for overhead and profit. For extra work involving a combination of increases and decreases in the WORK, the actual necessary cost will be the arithmetic sum of the additive and deductive costs. The allowance for overhead and profit shall include full compensation for superintendence, bond and insurance premiums, taxes, office expenses, and all other items of expense or cost not included in the cost of labor, materials, or equipment provided for under Paragraphs 11.02B, C, and D herein, including extended overhead and home office overhead. The allowance for overhead and profit will be made in accordance with the following schedule:

OVERHEAD AND PROFIT ALLOWANCE

| | |
|---|---|
| Labor …… | 10 percent |
| Materials …….. | 10 percent |
| Equipment ……... | 10 percent |

B. It is understood that labor, materials, and equipment may be furnished by the CONTRACTOR or by a Subcontractor, and that the allowance specified herein shall be applied to the labor, materials, and equipment costs of the Subcontractor, to which the CONTRACTOR may add 5 percent of the Subcontractor's total cost of work. Regardless of the number of hierarchical tiers of Subcontractors, the 5 percent markup may be applied one time only for each separate work transaction.

**ARTICLE 12 - CHANGE OF CONTRACT TIME**

12.01 GENERAL

A. The Contract Time may only be changed by a Change Order. Any claim for an extension of the Contract time shall be based on written notice delivered by the CONTRACTOR to the OWNER promptly (but in no event later than 30 days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within 30 days after such occurrence (unless the OWNER allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the CONTRACTOR's written statement that the adjustment claimed is the entire adjustment to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. Claims for adjustment in the Contract Time shall be determined by the OWNER in accordance with Paragraph 9.08 if the OWNER's representative and the CONTRACTOR cannot otherwise agree. No claim for an

adjustment in the Contract Time will be valid if not submitted in accordance with the requirements of this paragraph.

B. The Contract Time will be extended in an amount equal to time lost if the CONTRACTOR makes a claim as provided in Paragraph 12.01A and the OWNER determines that the delay was caused by events beyond the control of the CONTRACTOR. Examples of events beyond the control of the CONTRACTOR include acts or neglect by the OWNER or others performing additional work as contemplated by Article 7, or by acts of God or of the public enemy, fire, floods, epidemics, quarantine restrictions, strikes, labor disputes, sabotage, or freight embargoes.

C. All time limits stated in the Contract Documents are of the essence.

D. None of the aforesaid time extensions shall entitle the CONTRACTOR to any adjustment in the Contract Price or any damages for delay. Furthermore, the CONTRACTOR hereby indemnifies and holds harmless the OWNER and ENGINEER, their officers, agents and employees from and against all claims, damages, losses and expenses (including lost property and attorney's fees) arising out of or resulting from the temporary suspension of work whether for the OWNER's convenience as defined in Article 15.01A or for whatever other reasons including the stoppage of work by the OWNER for the CONTRACTOR's failure to comply with any order issued by the OWNER.

12.02 EXTENSIONS OF THE TIME FOR DELAY DUE TO INCLEMENT WEATHER

A. "Inclement weather" is any weather condition or conditions resulting immediately therefrom, causing the CONTRACTOR to suspend construction operations or preventing the CONTRACTOR from proceeding with at least 75 percent of the normal labor and equipment force engaged on the WORK.

B. Should the CONTRACTOR prepare to begin work at the regular starting time at the beginning of any regular work shift on any day on which inclement weather, or its effects on the condition of the WORK prevents work from beginning at the usual starting time and the crew is dismissed as a result thereof, the CONTRACTOR will not be charged for a working day whether or not conditions change thereafter during the day and the major portion of the day could be considered to be suitable for construction operations.

C. The CONTRACTOR shall base its construction schedule upon the inclusion of the number of days of inclement weather specified in the Supplementary General Conditions. No extension of the Contract Time due to inclement weather will be considered until after the stated number of days of inclement weather has been reached. However, no reduction in Contract Time will be made if the number of inclement weather days is not reached.

12.03 EXTENSIONS OF TIME FOR OTHER DELAYS

A. If the CONTRACTOR is delayed in completion of the WORK beyond the Contract Time, by acts of God or of the public enemy, fire, floods, epidemics, quarantine restrictions, strikes, labor disputes, industry-wide shortage of raw materials, sabotage or freight embargoes, the CONTRACTOR shall be entitled to an adjustment in the Contract Time. No such adjustment will be made unless the CONTRACTOR shall notify the OWNER in writing of the causes of delay within 15 calendar days from the beginning of any such delay. The OWNER shall ascertain the facts and the extent of the delay. No adjustment in time shall be made for delays resulting from noncompliance with the Contract

Documents, accidents, failure on the part of the CONTRACTOR to carry out the provisions of the Contract Documents including failure to provide materials, equipment or workmanship meeting the requirements of the Contract Documents; the occurrence of such events shall not relieve the CONTRACTOR from the necessity of maintaining the required progress.

B. If the CONTRACTOR is delayed in completing the WORK beyond the Contract Time by reason of shortages of raw materials required for CONTRACTOR-furnished items, the CONTRACTOR shall be entitled to an adjustment in the Contract Time in like manner as if the WORK had been suspended for the convenience and benefit of the OWNER; provided, however, that the CONTRACTOR shall furnish documentation acceptable to the OWNER that he placed or attempted to place firm orders with Suppliers at a reasonable time in advance of the required date of delivery of the items in question, that such shortages shall have developed following the date such orders were placed or attempts made to place same, that said shortages are general throughout the affected industry, that said shortages are shortages of raw materials required to manufacture CONTRACTOR furnished items and not simply failure of CONTRACTOR's Suppliers to manufacture, assemble or ship items on time, and that the CONTRACTOR shall, to the degree possible, have made revisions in the sequence of his operations, within the terms of the Contract Documents, to offset the expected delay. The CONTRACTOR shall notify the OWNER, in writing, concerning the cause of delay, within 15 calendar days of the beginning of such delay. The validity of any claim by the CONTRACTOR to an adjustment in the Contract Time shall be determined by the OWNER, and his findings thereon shall be based on the OWNER's knowledge and observations of the events involved and documentation submitted by the CONTRACTOR, showing all applicable facts relative to the foregoing provisions. Only the physical shortage of raw materials will be considered under these provisions as a cause for adjustment of time and no consideration will be given to any claim that items could not be obtained at a reasonable, practical, or economical cost or price, unless it is shown to the satisfaction of the OWNER that such items could have been obtained only at exorbitant prices entirely out of line with current rates taking into account the quantities involved and the usual practices in obtaining such quantities.

C. If the CONTRACTOR is delayed in completion of the WORK by any act of the OWNER not authorized by the Contract Documents, an adjustment in the Contract Time will be made by the OWNER in like manner as if the WORK had been suspended for the convenience and benefit of the OWNER. In the event of such delay, the CONTRACTOR shall notify the OWNER in writing of the causes of delay within 15 calendar days from the beginning of any such delay.

## ARTICLE 13 - WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

13.01 WARRANTY, GUARANTEE AND CORRECTION PERIOD

A. The CONTRACTOR warrants and guarantees to the OWNER and the ENGINEER that all work, equipment, materials and workmanship are in accordance with the Contract Documents and are not defective. Reasonably prompt notice of defects discovered by the OWNER or ENGINEER shall be given to the CONTRACTOR. All defective work, whether or not in place, may be rejected, corrected, or accepted as provided in this Article 13.

B. If within one (1) year after the date of final completion, as set by the Contractor's Certificate of Final Completion, or a longer period of time prescribed by Laws or Regulations or by the terms of any applicable special guarantee or specific provisions of the Contract Documents, any part of the WORK is found to be defective, the OWNER shall notify the CONTRACTOR in writing and the CONTRACTOR shall promptly, without cost to the OWNER and in accordance with the OWNER's written notification, either correct the defective work, or, if it has been rejected by the OWNER, remove it from the site and replace it with non-defective work. In the event the CONTRACTOR does not promptly comply with the notification, or in an emergency where delay would cause serious risk of loss or damage, the OWNER may have the defective work corrected or rejected work removed and replaced. All direct, indirect, and consequential costs of the removal and replacement including but not limited to fees and charges of engineers, architects, attorneys and other professionals will be paid by the CONTRACTOR. This paragraph shall not be construed to limit nor diminish the CONTRACTOR's absolute guarantee to complete the WORK in accordance with the Contract Documents.

13.02 ACCESS TO WORK

A. The ENGINEER, other representatives of the OWNER, testing agencies, and governmental agencies with jurisdictional interests shall have access to the work at reasonable times for their observation, inspections, and testing. The CONTRACTOR shall provide proper and safe conditions for their access.

13.03 TESTS AND INSPECTIONS

A. The CONTRACTOR shall give the OWNER timely notice of readiness of the WORK for all required inspections, tests, or approvals.

B. If Laws or Regulations of any public body other than the OWNER, with jurisdiction over the WORK require any work to be specifically inspected, tested, or approved, the CONTRACTOR shall pay all costs in connection therewith. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with the OWNER's acceptance of a Supplier of materials or equipment proposed as a substitution or "or-equal" to be incorporated in the WORK and of materials or equipment submitted for review prior to the CONTRACTOR's purchase for incorporation in the WORK. The cost of all inspections, tests, and approvals, with the exception of the above which are required by the Contract Documents, shall be paid by the OWNER (unless otherwise specified).

C. The OWNER will make, or have made, such inspections and tests as the OWNER deems necessary to see that the WORK is being accomplished in accordance with the Contract Documents. The CONTRACTOR, without additional cost to the OWNER, shall provide the labor and equipment necessary to make the WORK available for inspections. Unless otherwise specified in the Supplementary General Conditions, all other costs of inspection and testing will be borne by the OWNER. In the event the inspections or tests reveal non-compliance with the requirements of the Contract Documents, the CONTRACTOR shall bear the cost of corrective measures deemed necessary by the OWNER, as well as the cost of subsequent re-inspection and retesting. Neither observations by the OWNER nor inspections, tests, or approvals by others shall relieve the CONTRACTOR from the CONTRACTOR's obligation to perform the WORK in accordance with the Contract Documents.

D. All inspections, tests, or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by properly licensed organizations selected by the OWNER.

E. If any work (including the work of others) that is to be inspected, tested, or approved is covered without the OWNER's written authorization, it must, if requested by the OWNER, be uncovered for testing, inspection, and observation. The uncovering shall be at the CONTRACTOR's expense unless the CONTRACTOR timely notified the OWNER of the CONTRACTOR's intention to cover the same and the OWNER failed to act with reasonable promptness in response to the notice.

F. If any work is covered contrary to the written request of the OWNER, it must, if requested by the OWNER, be uncovered for the OWNER's observation at the CONTRACTOR's expense.

G. If the OWNER considers it necessary or advisable that covered work be observed, inspected or tested by the OWNER or others, the OWNER shall direct the CONTRACTOR to uncover, expose, or otherwise make available for observation, inspection, or testing that portion of the work in question. The CONTRACTOR shall comply with the OWNER's direction and furnish all necessary labor, material, and equipment. If the work is defective, the CONTRACTOR shall bear all direct, indirect and consequential costs of uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction of the work, including, but not limited to, fees and charges for engineers, architects, attorneys, and other professionals. However, if the work is not defective, the CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both. The increase in Contract Time and Contract Price shall be the CONTRACTOR's actual time and costs directly attributable to uncovering and exposing the work. If the parties are unable to agree as to the amount or extent of the changes, the CONTRACTOR may make a claim therefor as provided in Articles 11 and 12.

13.04 OWNER MAY STOP THE WORK

A. If the WORK is defective, or the CONTRACTOR fails to perform work in such a way that the completed WORK will conform to the Contract Documents, the OWNER may order the CONTRACTOR to stop the WORK, or any portion thereof, until the cause for the order has been eliminated. This right of the OWNER to stop the WORK shall not give rise to any duty on the part of the OWNER to exercise this right for the benefit of the CONTRACTOR or any other party.

13.05 CORRECTION OR REMOVAL OF DEFECTIVE WORK

A. When directed by the OWNER, the CONTRACTOR shall promptly correct all defective work, whether or not fabricated, installed, or completed, or, if the work has been rejected by the OWNER, remove it from the site and replace it with non-defective work. The CONTRACTOR shall bear all direct, indirect and consequential costs of correction or removal, including but not limited to fees and charges of engineers, architects, attorneys, and other professionals made necessary thereby. If the CONTRACTOR does not correct the defective work within 30 days, the OWNER may correct the WORK and charge the CONTRACTOR for the cost of correcting the defective WORK.

13.06 ACCEPTANCE OF DEFECTIVE WORK

A. If, instead of requiring correction or removal and replacement of defective work, the OWNER prefers to accept the work, the OWNER may do so. The CONTRACTOR shall bear all direct, indirect, and consequential costs attributable to the OWNER's evaluation of and determination to accept the defective work. If any acceptance of defective work occurs prior to final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the WORK, and the OWNER shall be entitled to an appropriate decrease in the Contract Price.

**ARTICLE 14 - PAYMENTS TO CONTRACTOR, LIQUIDATED DAMAGES AND COMPLETION**

14.01 LUMP SUM BID

A. A schedule of values or lump sum price breakdown will serve as the basis for progress payments for a lump sum Bid and will be incorporated into the form of Application for Payment included in the Contract Documents.

14.02 UNIT PRICE BID

A. Progress payments for a unit price Bid will be based on the number of units completed.

14.03 APPLICATION FOR PROGRESS PAYMENT

A. Unless otherwise prescribed by the OWNER, on the 25th of each month, the CONTRACTOR shall submit to the OWNER for review and approval, an Application for Payment completed and signed by the CONTRACTOR covering the WORK completed as of the date of the Application and accompanied by such supporting documentation as required by the Contract Documents.

B. The Application for Payment shall identify, as a sub-total, the amount of the CONTRACTOR's Total Earnings to Date, plus the Net Value of Materials On-site which have not yet been incorporated in the WORK.

C. The Net Payment Due to the CONTRACTOR shall be the above-mentioned sub-total, from which shall be deducted the retainage amount and the total amount of all previous payments made to the CONTRACTOR.

D. The OWNER may retain five percent of the amount otherwise due to the Contractor as retainage. Monies retained shall be placed in an interest-bearing account for the benefit of the CONTRACTOR.

E. Except as otherwise provided in the Supplementary General Conditions, the value of materials stored at the site shall be valued at 95 percent of the value of the materials. This amount shall be based upon the value of all acceptable materials and equipment stored at the site or at another location agreed to in writing by the OWNER; provided, each individual item has a value of more than $5000 and will become a permanent part of the WORK. The Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that the CONTRACTOR has received the materials and equipment free and clear of all liens, charges, security interests, and encumbrances (which are hereinafter referred to as "Liens") and evidence that the materials and equipment are covered by appropriate property insurance and

other arrangements to protect the OWNER's interest therein, all of which will be satisfactory to the OWNER.

14.04 CONTRACTOR'S WARRANTY OF TITLE

A. The CONTRACTOR warrants and guarantees that title to all work, materials, and equipment covered by an Application for Payment, whether incorporated in the WORK or not, will pass to the OWNER no later than the time of final payment, free and clear of all liens.

14.05 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT

A. The OWNER will, within 7 days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to the OWNER, or return the Application to the CONTRACTOR indicating in writing the OWNER's reasons for refusing to recommend payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the Application. Thirty days after presentation of the Application for Payment with the OWNER's REPRESENTATIVE recommendation, the amount recommended will (subject to the provisions of Paragraph 14.05B) become due and when due will be paid by the OWNER to the CONTRACTOR.

B. The OWNER may refuse to make payment of the full amount recommended by the OWNER's REPRESENTATIVE to compensate for claims made by the OWNER on account of the CONTRACTOR's performance of the WORK or other items entitling the OWNER to a credit against the amount recommended, but the OWNER must give the CONTRACTOR written notice within 7 days stating the reasons for such action.

14.06 PARTIAL UTILIZATION

A. The OWNER may utilize or place into service any item of equipment or other usable portion of the WORK at any time prior to completion of the WORK. The OWNER shall notify the CONTRACTOR in writing of its intent to exercise this right. The notice will identify the equipment or specific portion or portions of the WORK to be utilized or otherwise placed into service.

B. It shall be understood by the CONTRACTOR that until such written notification is issued, all responsibility for care and maintenance of all items or portions of the WORK to be partially utilized shall be borne by the CONTRACTOR. Upon the issuance of a notice of partial utilization, the OWNER's REPRESENTATIVE will deliver to the OWNER and the CONTRACTOR a written recommendation as to division of responsibilities between the OWNER and the CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities and insurance.

C. The CONTRACTOR shall retain full responsibility for satisfactory completion of the WORK, regardless of whether a portion thereof has been partially utilized by the OWNER, and the CONTRACTOR's one-year correction period shall commence only after the date of Final Completion for the WORK.

14.07 DAMAGES

A. The CONTRACTOR shall pay to the OWNER the amount specified in the Supplementary General Conditions, not as a penalty but as liquidated damages, if he

fails to complete the WORK or specified parts of the WORK within the Contract Time. The periods for which these damages shall be paid shall be the number of Days from the Contract Time as contained in the Agreement, or from the date of termination of any extension of time approved by the OWNER, to the date or dates on which the OWNER issues the Notice of Substantial Completion as provided in Article 14.08, herein. The OWNER may deduct the amount of said damages from any monies due or to become due the CONTRACTOR. After Substantial Completion, if the CONTRACTOR fails to complete the remaining WORK within 45 days or any proper extension thereof granted by OWNER, CONTRACTOR shall pay OWNER the amount stated in the Supplementary General Conditions as liquidated damages for each day that expires after the 45 days, until readiness for final payment.

B. The said amount is fixed and agreed upon by and between the CONTRACTOR and the OWNER because of the impracticability and extreme difficulty of fixing and ascertaining the actual damages the OWNER would sustain; and said amount is agreed to be the amount of damages which the OWNER would sustain.

C. If actual damages are assessed, they will include all costs incurred by the OWNER as a result of a delay in the completion time of the work beyond the contract time.

D. All times specified in the Contract Documents are hereby declared to be of the essence.

14.08 SUBSTANTIAL COMPLETION

A. When the CONTRACTOR considers the WORK ready for its intended use, the CONTRACTOR will notify the OWNER in writing that the WORK is Substantially Complete. Within a reasonable time thereafter, the OWNER and the CONTRACTOR, shall make an inspection of the WORK to determine the status of completion. If the OWNER does not consider the WORK Substantially Complete, the OWNER will notify the CONTRACTOR in writing giving the reasons therefor. If the OWNER considers the WORK Substantially Complete, the OWNER will execute the Notice of Substantial Completion signed by the CONTRACTOR, which shall fix the date of Substantial Completion.

B. The Notice of Substantial Completion shall be a release by the CONTRACTOR of the OWNER and its agents from all claims and liability to the CONTRACTOR for anything done or furnished for, or relating to, the WORK or for any act or neglect of the OWNER or of any person relating to or affecting the WORK, to the date of Substantial Completion, except demands against the OWNER for the remainder of the amounts kept or retained from progress payments and excepting pending, unresolved claims filed in writing prior to the date of Substantial Completion. At the time of delivery of the Notice of Substantial Completion, the OWNER’s REPRESENTATIVE will deliver to the OWNER and the CONTRACTOR, if applicable, a written recommendation as to division of responsibilities between the OWNER and the CONTRACTOR with respect to security, operation, safety, maintenance, heat, utilities and insurance. Upon the OWNER's acceptance of these recommendations, the recommendation will be binding on the OWNER and the CONTRACTOR until final payment.

C. The OWNER, upon written notice to the CONTRACTOR, shall have the right to exclude the CONTRACTOR from the WORK after the date of Substantial Completion, and complete all or portions of the WORK at the CONTRACTOR's expense.

14.09 COMPLETION AND FINAL PAYMENT

A. Upon written certification from the CONTRACTOR that the WORK is complete (if a Notice of Substantial Completion has been issued this certification must occur within 45 days of that date), the OWNER will make a final inspection with the CONTRACTOR. If the OWNER does not consider the WORK complete, the OWNER will notify the CONTRACTOR in writing of all particulars in which this inspection reveals that the WORK is incomplete or defective. The CONTRACTOR shall immediately take the measures necessary to remedy these deficiencies. If the OWNER considers the WORK complete, the CONTRACTOR may proceed to file its application for final payment pursuant to this Article. At the request of the CONTRACTOR, the OWNER's REPRESENTATIVE may recommend to the OWNER that certain minor deficiencies in the WORK that do not prevent the entire WORK from being used by the OWNER for its intended use, and the completion of which will be unavoidably delayed due to no fault of the CONTRACTOR, be exempted from being completed prerequisite to final payment. These outstanding items of pickup work, or "punch list items", shall be listed on the Notice of Substantial Completion, together with the recommended time limits for their completion, and extended warranty requirements for those items and the value of such items.

B. After the issuance of the Notice of Completion and after the CONTRACTOR has completed corrections that have not been exempted to the satisfaction of the OWNER and delivered to the OWNER all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, marked-up record documents and other documents, all as required by the Contract Documents; and after the OWNER has indicated that the WORK is acceptable, the CONTRACTOR may make application for final payment following the procedure for progress payments. The final application for payment shall be accompanied by all documentation called for in the Contract Documents and other data and schedules as the OWNER may reasonably require, including an affidavit of the CONTRACTOR that all labor, services, material, equipment and other indebtedness connected with the WORK for which the OWNER or his property might in any way be responsible, have been paid or otherwise satisfied, and a consent of the payment bond surety to final payment, all in forms approved by the OWNER.

14.10 FINAL APPLICATION FOR PAYMENT

A. If, on the basis of the OWNER's observation of the WORK during construction and final inspection, and the OWNER's review of the final application for payment and accompanying documentation, all as required by the Contract Documents, the OWNER is satisfied that the WORK has been completed and the CONTRACTOR has fulfilled all of his obligations under the Contract Documents, the OWNER's REPRESENTATIVE will, within ten days after receipt of the final application for payment, indicate in writing his recommendation of payment and present the application to the OWNER for payment. Thereupon, the OWNER's REPRESENTATIVE will give written notice to the OWNER and the CONTRACTOR that the WORK is acceptable by executing the Notice of Completion. Otherwise, the OWNER will return the application to the CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case the CONTRACTOR shall make the necessary corrections and resubmit the application.

B. Within 45 calendar days after the Notice of Completion, the OWNER will make final payment including all deducted retainage and interest to the CONTRACTOR. The OWNER's remittance of final payment shall be the OWNER's acceptance of the WORK

if formal acceptance of the WORK is not indicated otherwise. The final payment shall be that amount remaining after deducting all prior payments and all amounts to be kept or retained under the provisions of the Contract, including the following items:

1. Liquidated or actual damages, as applicable.

2. Two times the value of any outstanding items of pickup work or "punch list items", indicated on the OWNER's Notice of Completion as being yet uncompleted.

14.11 CONTRACTOR'S CONTINUING OBLIGATIONS

A. The CONTRACTOR's obligation to perform and complete the WORK in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by the OWNER, nor the issuance of a Notice of Substantial Completion or Notice of Completion, nor payment by the OWNER to the CONTRACTOR under the Contract Documents, nor any use or occupancy of the WORK or any part thereof by the OWNER, nor any act of acceptance by the OWNER nor any failure to do so, nor any review of a shop drawing or sample submittal, will constitute an acceptance of work or materials not in accordance with the Contract Documents or a release of the CONTRACTOR's obligation to perform the WORK in accordance with the Contract Documents.

14.12 FINAL PAYMENT TERMINATES LIABILITY OF OWNER

A. Final payment is defined as the last progress payment made to the CONTRACTOR for earned funds, less deductions listed in Paragraph 14.10B herein. The acceptance by the CONTRACTOR of the final payment referred to in Paragraph 14.10 herein, shall be a release of the OWNER and its agents from all claims of liability to the CONTRACTOR for anything done or furnished for, or relating to, the work or for any act or neglect of the OWNER or of any person relating to or affecting the work, except demands against the OWNER for the remainder, if any, of the amounts kept or retained under the provisions of Paragraph 14.10 herein; and excepting pending, unresolved claims filed prior to the date of the Notice of Substantial Completion.

**ARTICLE 15 - SUSPENSION OF WORK AND TERMINATION**

15.01 SUSPENSION OF WORK BY OWNER

A. The OWNER may, by written notice to the Contractor, temporarily suspend the WORK, in whole or in part, for a period or periods of time, but not to exceed 90 days, for the convenience and benefit of the OWNER upon the occurrence of any one or more of the following: (1) unsuitable weather; (2) delay in delivery of OWNER- furnished equipment or materials, or such other conditions as are considered unfavorable for prosecution of the work; (3) Shortfall in construction funds; (4) Constraints imposed by public entities, public utilities, property owners or legal proceedings; (5) Failure or delay in acquisition of easements or right-of-way by the OWNER; or (6) Other conditions which, in the opinion of the OWNER, warrant a delay in the WORK. Suspended WORK shall be resumed by the CONTRACTOR within 10 calendar days of receipt from the OWNER of written notice to resume work. Whenever the OWNER temporarily suspends work for any conditions enumerated in this Article, the CONTRACTOR shall be entitled to an adjustment in the Contract Time as specified in Article 12.03 C.

B. The suspension of work shall be effective upon receipt by the CONTRACTOR of a written order suspending the work and shall be terminated upon receipt by the Contractor of a written order terminating the suspension.

C. The CONTRACTOR hereby indemnifies and holds harmless the OWNER, their officers, agents and employees, from and against all claims, damages, losses and expenses, including lost profits and attorney's fees, arising out of or resulting from the temporary suspension of the WORK, whether for the OWNER's convenience described in this Article or for whatever other reasons, including the stoppage of work by the OWNER for the CONTRACTOR's failure to comply with any order issued by the OWNER.

15.02 TERMINATION OF AGREEMENT BY OWNER (CONTRACTOR DEFAULT)

A. In the event of default by the CONTRACTOR, the OWNER may give written notice to the CONTRACTOR of OWNER's intent to terminate the Agreement. The notice shall state the event of default and the time allowed to remedy the default. It shall be considered a default by the CONTRACTOR whenever the CONTRACTOR shall: (1) declare bankruptcy, become insolvent, or assign its assets for the benefit of its creditors; (2) fail to provide materials or workmanship meeting the requirements of the Contract Documents; (3) disregard or violate provisions of the Contract Documents or OWNER's instructions, (4) fail to prosecute the WORK according to the approved progress schedule; or, (5) fail to provide a qualified superintendent, competent workmen, or materials or equipment meeting the requirements of the Contract Documents. If the CONTRACTOR fails to remedy the conditions constituting default within the time allowed, the OWNER may then issue a Notice of Termination.

B. In the event the Agreement is terminated in accordance with Paragraph 15.02A, the OWNER may take possession of the WORK and may complete the WORK by whatever method or means the OWNER may select. The cost of completing the WORK shall be deducted from the balance which would have been due the CONTRACTOR had the Agreement not been terminated and the WORK completed in accordance with the Contract Documents. If such cost exceeds the balance which would have been due, the CONTRACTOR shall pay the excess amount to the OWNER. If such cost is less than the balance which would have been due, the CONTRACTOR shall have no claim to the difference.

15.03 TERMINATION OF AGREEMENT BY OWNER (FOR CONVENIENCE)

A. The OWNER may terminate the Agreement at any time if it is found that reasons beyond the control of either the OWNER or CONTRACTOR make it impossible or against the OWNER's interests to complete the WORK. In such a case, the CONTRACTOR shall have no claims against the OWNER except: (1) for the value of the work, as determined by the OWNER, performed by the Contractor up to the date the Agreement is terminated; and, (2) for the cost of materials and equipment on hand, in transit, or on definite commitment, as of the date the Agreement is terminated, which would be needed in the WORK and which meet the requirements of the Contract Documents. The value of work performed and the cost of materials and equipment delivered to the site, as mentioned above, shall be determined by the OWNER in accordance with the procedure prescribed from making the final application for payment and final payment under Paragraphs 14.09 and 14.10.

15.04 TERMINATION OF AGREEMENT BY CONTRACTOR

A. The CONTRACTOR may terminate the Agreement upon 10 days written notice to the OWNER, whenever: (1) the WORK has been suspended under the provisions of Paragraph 15.01, for more than 90 consecutive days through no fault or negligence of the CONTRACTOR, and notice to resume work or to terminate the agreement has not been received from the OWNER within this time period; or, (2) the OWNER should fail to pay the CONTRACTOR any monies due him in accordance with the terms of the Contract Documents and within 60 days after presentation to the OWNER by the CONTRACTOR of a request therefore, unless within said 10-day period the OWNER shall have remedied the condition upon which the payment delay was based. In the event of such termination, the CONTRACTOR shall have no claims against the OWNER except for those claims specifically enumerated in Paragraph 15.03, and as determined in accordance with the requirements of that paragraph.

**ARTICLE 16 - NOTICE**

16.01 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 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 if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

16.02 TITLE TO MATERIALS FOUND ON THE WORK

A. The OWNER reserves the right to retain title to all soils, stone, sand, gravel, and other materials developed and obtained from excavations and other operations connected with the WORK. Unless otherwise specified in the Contract Documents, neither the CONTRACTOR nor any Subcontractor shall have any right, title, or interest in or to any such materials. The CONTRACTOR will be permitted to use in the WORK, without charge, any such materials which meet the requirements of the Contract Documents.

16.03 RIGHT TO AUDIT

A. If the CONTRACTOR submits a claim to the OWNER for additional compensation, the OWNER shall have the right, as a condition to considering the claim, and as a basis for evaluation of the claim, and until the claim has been settled, to audit the CONTRACTOR's books. This right shall include the right to examine books, records, documents, and other evidence and accounting procedures and practices, sufficient to discover and verify all direct and indirect costs of whatever nature claimed to have been incurred or anticipated to be incurred and for which the claim has been submitted. The right to audit shall include the right to inspect the CONTRACTOR's plants, or such parts thereof, as may be or have been engaged in the performance of the WORK. The CONTRACTOR further agrees that the right to audit encompasses all subcontracts and is binding upon subcontractors. The right to examine and inspect herein provided for shall be exercisable through such representatives as the OWNER deems desirable during the CONTRACTOR's normal business hours at the office of the CONTRACTOR. The CONTRACTOR shall make available to the OWNER for auditing, all relevant accounting records and documents, and other financial data, and upon request, shall submit true copies of requested records to the OWNER.

16.04 HAZARDOUS MATERIALS

A. If the CONTRACTOR during the course of work observes the existence of hazardous material, the CONTRACTOR shall promptly notify the OWNER. The OWNER shall consult with others regarding removal or encapsulation of the hazardous material and the CONTRACTOR shall not perform any work pertinent to the hazardous material prior to receipt or special instruction from the OWNER.

**ARTICLE 17 - SUBCONTRACT LIMITATIONS**

17.01 SUBCONTRACT LIMITATIONS

A. In addition to the provisions of Paragraph 6.05 of the General Conditions, the CONTRACTOR shall perform not less than 30 percent of the WORK with its own forces (i.e., without subcontracting). The 30 percent requirement shall be understood to refer to the WORK, the value of which totals not less than 30 percent of the Contract Price.

**ARTICLE 18 - PATENTS AND COPYRIGHTS**

18.01 PATENTS AND COPYRIGHTS

A. The CONTRACTOR shall indemnify and save harmless the OWNER, the ENGINEER, and their officers, agents, and employees, against all claims or liability arising from the use of any patented or copyrighted design, device, material, or process by the CONTRACTOR or any of his subcontractors in the performance of the WORK.

-END OF SECTION-

## SECTION 00800

## SUPPLEMENTARY GENERAL CONDITIONS

### PART 1 - GENERAL

These Supplementary General Conditions make additions, deletions, or revisions to the General Conditions as indicated herein. All provisions which are not so added, deleted, or revised remain in full force and effect. Terms used in these Supplementary General Conditions which are defined in the General Conditions have the meanings assigned to them in the General Conditions.

SGC-1 DEFINITIONS

Add the following definitions to Article 1:

OWNER - The OWNER is further defined as South Valley Water Reclamation Facility, 7495 South 1300 West, West Jordan, Utah 84084. Telephone No.: (801) 566-7711.

OWNER'S REPRESENTATIVE - The OWNER'S REPRESENTATIVE is defined in SGC - 9.03 on page 00800-5. The OWNER'S REPRESENTATIVE for this project shall be Taigon Worthen.

BIDDER - The person, firm, or corporation, partnership or joint venture or LLC submitting a Bid for the Work.

CONTRACTOR - The person, firm, or corporation, partnership or joint venture or LLC with whom the OWNER has executed the Agreement.

ENGINEER - Defined as Carollo Engineers, Inc. 7090 South Union Park Avenue, Suite 600, Midvale, Utah 84047.

SGC-2.02 COPIES OF DOCUMENTS

The OWNER shall furnish to the CONTRACTOR 1 copies of the Contract Documents which may include bound reduced drawings, if any, together with 1 sets of full-scale Drawings if requested. Additional quantities of the Contract Documents will be furnished at reproduction cost plus mailing costs if copies are mailed.

SGC-4.02 REPORTS OF PHYSICAL CONDITIONS

In the preparation of the Contract Documents, the OWNER has relied upon:

A. The following drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground utilities) which are at or contiguous to the site of the WORK.

1. Drawings dated January 2006 prepared by James M. Montgomery, Consulting Engineers, Inc., entitled "SVWRF - Project 4C."

B. Copies of these drawings may be examined at the office of the OWNER, during regular business hours. As provided in Paragraph 4.02 of the General Conditions and as identified and established above, the CONTRACTOR may rely upon the accuracy of the technical data contained in such reports and drawings, except for such physical dimensions that can be field verified; however, the interpretation of such technical data, including any interpolation or extrapolation thereof, and opinions contained in such reports and drawings are not to be relied on by the CONTRACTOR.

SGC-5.01 BONDS

Delete the first sentence of Paragraph 5.1A and add the following:

The CONTRACTOR shall furnish a satisfactory Performance Bond in the amount of 100 percent of the Contract Price and a satisfactory Payment Bond in the amount of 100 percent of the Contract Price as security for the faithful performance and payment of all the CONTRACTOR's obligations under the Contract Documents.

SGC-5.02 INSURANCE

A. Substitute for Paragraph 5.02.B. the following:

All insurance required by the Contract Documents to be purchased and maintained by the CONTRACTOR shall be obtained from insurance companies that are duly licensed, admitted, and authorized to issue insurance policies for the limits and coverage so required in the State in which the Project is located. Such insurance companies shall have a current Best's Rating of at least an "A" (Excellent) general policy holder's rating and a Class VIII financial size category and shall also meet such additional requirements and qualifications as may be provided in the Supplementary General Conditions.

B. Add the following to Paragraph 5.02.B.5:

If the OWNER finds it necessary to occupy or use a portion or portions of the project prior to Substantial Completion, the OWNER shall provide notice of occupancy without the need for mutual agreement between the OWNER and the CONTRACTOR and to which the insurance company providing the Builder's Risk Insurance has consented by endorsement to the policy or policies.

C. The limits of liability for the insurance required by Paragraph 5.2 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations. Limits may be provided by a combination of primary and excess liability policies or through a single policy. If the limits are provided by a combination of primary and excess liability policies, then the excess or umbrella liability coverages shall include commercial general, comprehensive automobile, and employer's liability and shall provide coverage at least as broad as the underlying policies.

1. Workers' Compensation:

| | | |
|---|---|---|
| a. | State: | Statutory |
| b. | Applicable Federal (e.g. USHL&H): | Statutory |
| c. | Employer's Liability: | $1,000,000 |

2. Comprehensive or Commercial General Liability:

Combined Single Limit:

a. Premises/operations

| | |
|---|---|
| $ 1,000,000 | Each Occurrence |
| $ 2,000,000 | Annual Aggregate |

b. Products/completed operations

| | |
|---|---|
| $ 1,000,000 | Each Occurrence |
| $ 2,000,000 | Annual Aggregate |

c. Personal Injury

| | |
|---|---|
| $ 1,000,000 | Each Occurrence |
| $ 2,000,000 | Annual Aggregate |

d. Policies shall include premises/operations, products, completed operations, independent contractors, owners' and contractors' protective, explosion, collapse, underground hazards, broad form contractual, personal injury with employment contractual exclusions deleted, and broad form property damage.

e. If policies are written on a Commercial General Liability form, the General Aggregate shall be at least two times the each occurrence limit or be written on a "per project" basis.

f. All policies shall be written on an occurrence basis. If the CONTRACTOR would like to substitute any "claims made" liability policies, then these must be pre-approved in writing according to the terms and conditions they may impose.

g. If policies are written for split limits, limits shall be equal for bodily injury and property damage liability.

3. Comprehensive Automobile Liability (including owned, hired, and non-owned vehicles):

Combined Single Limit:

a. Bodily Injury and Property Damage: $2,000,000 each accident.

b. If policies are written for split limits, limits shall be equal for bodily injury per person, bodily injury per accident and property damage.

4. Excess Liability Insurance:

a. $4,000,000 over all underlying coverage lines.

5. Builder's Risk Insurance:

a. In an amount equal to the replacement cost of the completed value of the

project or $4,000,000 whichever is greater.

b. Any deductibles of self-insured retentions shall be as agreed to by the OWNER and CONTRACTOR.

c. The CONTRACTOR shall include flood and earthquake coverage in the Builder's Risk Insurance requirements under Paragraph 5.02.B.5 of the General Conditions, with a minimum limit of $4,000,000 per event or occurrence.

D. All policies shall provide that the CONTRACTOR agrees to waive all rights of subrogation against the OWNER, the ENGINEER, and their subconsultants, employees, officers and directors, for WORK performed under the Agreement. Endorsements shall be provided with certificates of insurance.

E. All policies shall also specify that the insurance provided by the CONTRACTOR will be considered primary and not contributory to another insurance available to the OWNER or ENGINEER.

F. All policies except Workers' Compensation and Builders Risk shall name the OWNER, including their officers, directors or board members, employees agents or any others associated with the management or operations of South Valley Water Reclamation Facility; Engineer, their consultants, subconsultants, shall be additional insureds on the Auto Liability and Commercial General Liability policies. The Builders Risk insurance shall name the CONTRACTOR, OWNER, and ENGINEER as named insureds and subcontractors and additional insureds. The Workers' Compensation policy shall name the OWNER as additional insured by means of an alternative employer endorsement, with respect to the employer's liability coverage only.

G. All policies shall provide for 60 days' notice prior to any cancellation, reduction in coverage or nonrenewal.

H. The deductible or self-insured retention on Comprehensive or Commercial General Liability shall not be greater than $25,000. All deductibles are the responsibility of the CONTRACTOR.

SGC-6.05 SUBCONTRACT LIMITATIONS

Add the following as paragraph 6.05.B of the General Conditions

B. The CONTRACTOR shall perform not less than 30 percent of the WORK with its own forces (i.e., without subcontracting). The 30 percent requirement shall be understood to refer to the WORK, the value of which totals not less than 30 percent of the Contract Price.

SGC-6.06 PERMITS

A. The CONTRACTOR shall acquire and comply with the following permits if applicable:

1. State permits to construct and/or operate sources of air pollution.

2. Certificates and permits are required for sources such as, but not limited to, the following:
   a. Land disturbing activities.
   b. Processing equipment (sand, gravel, concrete batch plant, etc.).

3. Encroachment Permit.

SGC-9.03 PROJECT REPRESENTATION

A. The OWNER's Representative, will act as directed by and under the supervision of the OWNER and will confer with the OWNER regarding its actions. The OWNER's REPRESENTATIVE dealings in matters pertaining to the WORK shall, in general, be only with the OWNER and the CONTRACTOR, and dealings with Subcontractors shall only be through or with the full knowledge of the CONTRACTOR.

B. The OWNER's REPRESENTATIVE shall have the duties and responsibilities set forth in this paragraph.

1. Review the progress schedule of Shop Drawing submittals and schedule of values prepared by the CONTRACTOR and consult with the ENGINEER concerning their acceptability, as applicable.

2. Attend preconstruction conferences. Arrange a schedule of progress meetings and other job conferences as required and notify in advance those expected to attend.
   Attend meetings and maintain and circulate copies of minutes thereof.

3. Serve as the OWNER's liaison with the CONTRACTOR, working principally through the CONTRACTOR's superintendent and assist said superintendent in understanding the intent of the Contract Documents.

4. Receive Shop Drawings and samples furnished by the CONTRACTOR.

5. Conduct on-site observations of the WORK in progress to assist the OWNER in determining if the WORK is proceeding in accordance with the Contract Documents.

6. Transmit to the CONTRACTOR the OWNER's or ENGINEER's clarifications and interpretations of the Contract Documents.

7. Consider and evaluate the CONTRACTOR's suggestions for modifications in the Contract Documents and report them with recommendations to the OWNER.

8. Review applications for payment with the CONTRACTOR for compliance with the established procedure for their submittal and forward them with recommendations to the OWNER, noting particularly their relation to the schedule of values, work completed, and materials and equipment delivered at the Site but not incorporated in the WORK.

9. During the course of the WORK, verify that certificates, maintenance and operation manuals, and other data required to be assembled and furnished by the CONTRACTOR are applicable to the items actually installed.

10. Before the OWNER prepares a Notice of Completion, as applicable, submit to the CONTRACTOR a list of observed items requiring completion or correction.

11. Conduct final inspection in the company of the ENGINEER, the OWNER, and the CONTRACTOR, and prepare a punch list of items to be completed or corrected.

12. Verify that all items on the punch list have been completed or corrected and make recommendations concerning acceptance.

SGC-11.03D EQUIPMENT

The CONTRACTOR will be paid for the use of equipment at the rental rate listed for such equipment specified in the current edition of the following reference publication:

A. "Rental Rate Blue Book for Construction Machinery" as published by the Machinery Information Division of the K-III Directory Corporation, telephone number (800) 669-3282.

SGC-12.02 WEATHER DELAYS

The CONTRACTOR's construction schedule shall anticipate 5 days of delay due to unusually severe weather.

SGC-14.03C AMOUNT OF RETENTION

Add the following to Paragraph 14.03C of the General Conditions:

Unless otherwise prescribed by law, the OWNER may retain a portion of the amount otherwise due to the CONTRACTOR, as follows:

1. Retention of 5 percent of each approved progress payment until the WORK is certified as having reached substantial completion.

SGC-14.03D VALUE OF MATERIALS STORED AT THE SITE

Unless otherwise prescribed by law or prescribed in Assigned Purchase Order Agreements, the value of materials stored at the SVWRF shall be 95 percent of the value of such materials.

SGC-14.05.A REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT

Replace the last sentence with the following: "Forty-Five days after presentation of the Application for Payment with the ENGINEER'S recommendation, the amount recommended will (subject to the provisions of Paragraph 14.05B) become due and when due will be paid by the OWNER to the CONTRACTOR."

SGC-14.07.A DAMAGES

Add the following sentence: "The amount of liquidated damages shall be $500 per calendar day."

-END OF SECTION-

## SECTION 00810

## SUPPLEMENTARY GENERAL CONDITIONS (UTAH)

SGC-18 UTAH STATE REQUIREMENTS

A. Retainage of Compensation to CONTRACTOR: Pursuant to Utah Code Ann. 13-8-5, any retainage of CONTRACTOR's compensation hereunder shall be placed in an interest-bearing escrow account and the interest which accrues thereon shall do so for the benefit of CONTRACTOR and Subcontractors. Release of the retainage shall be as contemplated by the General Conditions and Supplementary General Conditions, Article 14 – Payments to Contractor, Liquidated Damages and Completion. Any interest which has accrued on the retainage and which is released to the CONTRACTOR shall be promptly disbursed by CONTRACTOR to itself and/or to Subcontractors on a pro rata basis.

B. Certification of Change Orders: Pursuant to Utah Code Ann. Section 63G-6-602, no change order shall be authorized without a written certification, signed by an official representative of the OWNER responsible for monitoring and reporting the status of the costs of the total Project or the contract budget, stating that funds are available for the subject change order.

C. Adjustments in Price: Pursuant to Utah Code Ann. Section 63G-6-601, any adjustment in compensation due CONTRACTOR under this agreement shall be computed in one or more of the following ways:

1. By agreement on a fixed-price adjustment before commencement of the pertinent performance or as soon as practicable;

2. By unit prices specified in the contract or subsequently agreed upon;

3. By the costs attributable to the events or situations with adjustment of profit or fee, all as specified in the contract or subsequently agreed upon;

4. In any other manner as OWNER and CONTRACTOR may mutually agree;

5. In the absence of agreement between CONTRACTOR and OWNER, by a unilateral determination by OWNER of the costs attributable to the events or situations with adjustment of profit or fee, all as computed by the OWNER in accordance with Utah Code Ann. Section 63G-6-415 and/or the rules and regulations promulgated thereunder.

D. Cost Principles: CONTRACTOR shall comply in all respects with applicable provisions of Utah Code Ann. Section 63G-6-415, and the rules and regulations promulgated thereunder. To the extent that such provisions are inconsistent with the other terms and conditions of this agreement, the former shall prevail. OWNER may, at reasonable times and places, audit the books and records of CONTRACTOR, any Subcontractor, or any other person who has submitted cost or pricing data pursuant to said section. The books and records of CONTRACTOR shall be maintained for 3 years following the end of the fiscal year in which final payment is made under the Contract. The books and records of the Subcontractor and all other persons shall be maintained for 3 years following the end of the fiscal year in which final payment is made under the subcontract and/or to the person, unless a shorter period is otherwise authorized in writing.

E. Project Safety: CONTRACTOR shall comply in all respects with the Utah Occupational Safety and Health Act, Utah Code Ann. Sections 34A-6-101 et seq., and the rules, regulations and standards promulgated thereunder by the Utah State Industrial Commission, as such act, rules, regulations or standards now exist or may be amended during the term of this agreement. Specifically, but not in limitation, CONTRACTOR shall comply with Construction Standards, Rules and Regulations, promulgated by the Utah Occupation and Safety and Health Division, Utah State Industrial Commission.

F. Protection of Underground Utility Facilities: CONTRACTOR shall comply in all respects with Utah Code Ann. Section 54 Chapter 8a et seq. and the rules and regulations promulgated thereunder, as it now exists or may be amended during the term of this agreement, with regard to the protection of underground utility facilities. Specifically, but not in limitation, CONTRACTOR shall notify the appropriate public utility(s) when making an excavation with power equipment. CONTRACTOR shall further refrain from proceeding with excavation until such time as the appropriate public utility(s) have advised CONTRACTOR of the location of any underground facilities in the area proposed for excavation by marking such facilities with stakes, paint, or other customary way, indicating horizontal location within 24 inches of the outside dimensions of both sides of the underground facility.

G. Review of Construction by OWNER: OWNER may, at its option, assign a field representative to review the construction of the Project in progress. Said representative will cooperate with the ENGINEER/OWNER in attempting to note deviations from, or necessary adjustments to, the Contract Documents or deficiencies or defects in the construction. Said representative's presence on the Project, however, shall in no way relieve CONTRACTOR of its primary responsibility for construction of the Project in accordance with the Contract Documents.

H. OWNER Inspection: Pursuant to Utah Code Ann. Section 63G-6-418, OWNER may, at reasonable times, inspect the plant or place of business of the CONTRACTOR or any Subcontractor which is related to the performance of this contract or any subcontract entered into hereunder.

I. Code Requirements: The provisions of the latest editions of the International Building Code, National Electric Code, and Utah Plumbing Code, as adopted or followed in Utah, including standards adopted in relation thereto, as supplemented or amended, shall apply to the Project except as specific variances may be expressly authorized by the OWNER. If the Contract Documents fail to meet the minimum standards of the referenced codes, CONTRACTOR shall be responsible to bring such information to the attention of the architect/OWNER associated with the Project. Subcontractors shall also inform CONTRACTOR of any infractions of the above-referenced codes regarding their own particular trades. In the event that workmanship or incidental materials are not specified or indicated, they shall at least conform to the above-referenced codes and shall be incorporated into the Work without any additional cost to the OWNER. If the Contract Documents call for items or workmanship which exceed code requirements, the Contract Documents shall take precedence over such requirements.

J. Workers Compensation: CONTRACTOR shall comply in all respects with Utah Code Ann. Section 34A-2-101, et seq. and the rules and regulations promulgated thereunder by the Utah State Industrial Commission, as such law, rules or regulations now exist or may be amended during the term of this agreement.

K. Archaeological, Anthropological, or Paleontological Findings: CONTRACTOR shall comply with Utah Code Ann. Section 9-8-301 et seq., with respect to the discovery of archaeological, anthropological, or paleontological findings at or on the Project site.

Specifically, but not in limitation, CONTRACTOR shall promptly notify the Utah Division of State History of any such findings.

L. Nondiscrimination Equal Employment Opportunity: CONTRACTOR shall comply in all respects with the Utah Anti-Discrimination Act of 1965, Utah Code Ann. Section 34A-5-101 et seq., and the rules and regulations promulgated thereunder by the Utah State Industrial Commission and/or its Anti-Discrimination Division, as such act, rules or regulations now exist or may be amended during the term of this agreement, specifically:

1. CONTRACTOR shall not discriminate against any employee or applicant for employment because of race, color, sex, religion, ancestry or national origin.

2. In all solicitations or advertisements for employees, CONTRACTOR shall state that all qualified applicants shall receive consideration without regard to race, color, sex, religion, ancestry or national origin.

3. CONTRACTOR shall send to each labor union or worker's representative notices to be provided, stating the CONTRACTOR's responsibilities under the statute.

4. CONTRACTOR shall furnish such information or reports as are requested by the Utah State Industrial Commission and/or its Anti-Discrimination Division, for the purpose of determining compliance with the statute.

5. CONTRACTOR shall include the provisions of paragraphs 1 through 4 above in all subcontracts for this Project.

6. Failure of the CONTRACTOR to comply with the statute, the rules and regulations promulgated thereunder, and this provision, shall be deemed a breach of contract entitling OWNER, in its discretion, to cancel, terminate, or suspend this agreement in whole or in part.

M. Affirmative Action: CONTRACTOR shall take affirmative action to insure that applicants are employed and that employees are treated during employment without regard to their race, color, religion, sex or national origin. Such action shall include, but shall not be limited to: employment; upgrading; demotion or transfer; recruitment or recruitment advertising; layout or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

At its discretion, OWNER may perform a compliance review at CONTRACTOR's place of business and/or the Project site to verify CONTRACTOR's compliance with this provision. Such compliance verifications may be conducted with such frequency as is needed to assure CONTRACTOR's compliance with this provision.

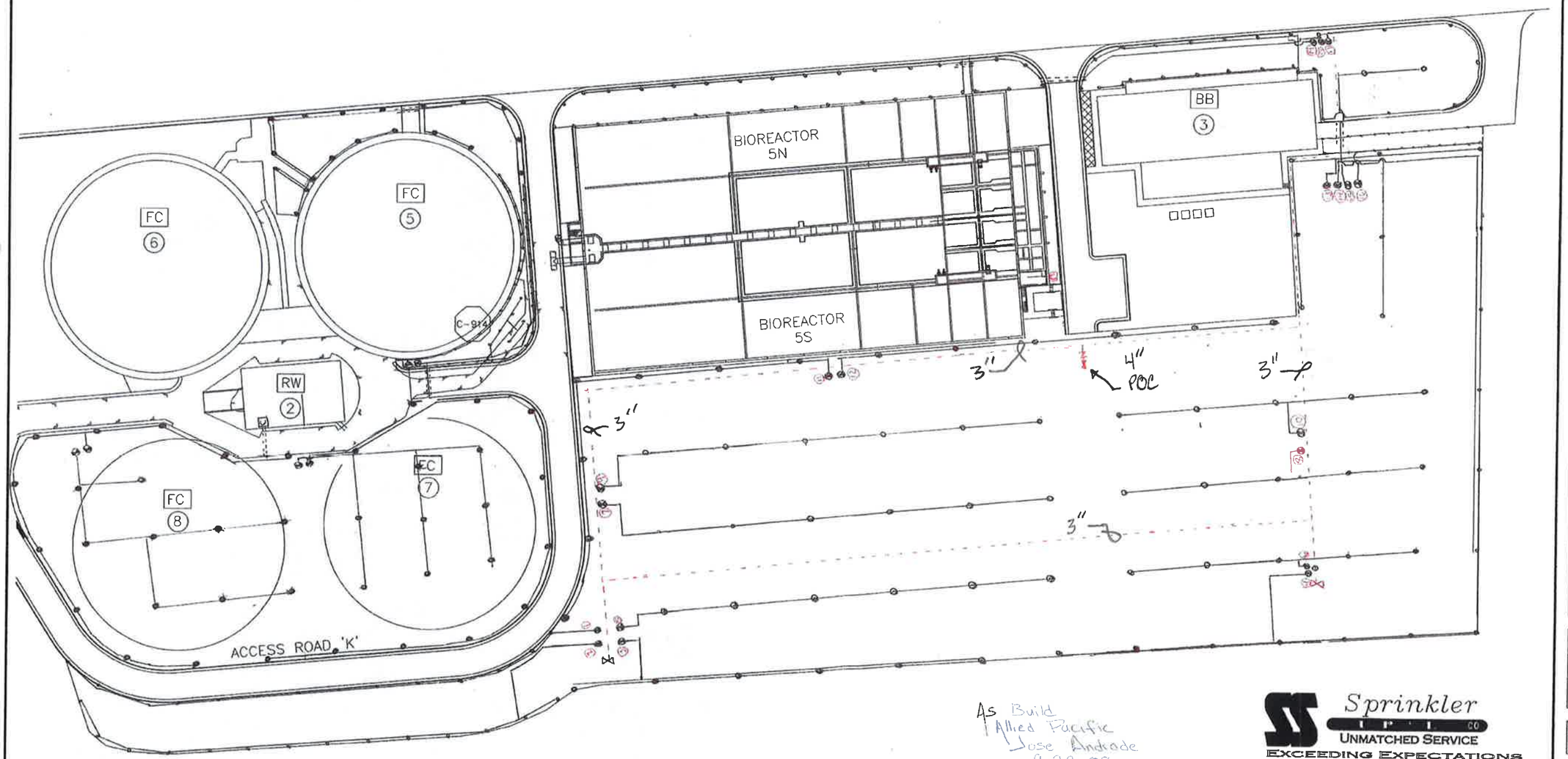
N. Citizens Preferred: Pursuant to Utah Code Ann. Section 34-30-1, CONTRACTOR shall give preference in hiring to citizens of the United States or those having declared their intention to become citizens; failure to comply may render this contract null and void at the discretion of OWNER.

O. Veterans' Preference: Pursuant to Utah Code Ann. Section 71-10-2, CONTRACTOR shall give preference in hiring to honorable discharged veterans who have served in the Armed Forces of the United States during a period of conflict, war, or other national emergencies as defined by Congress, and to any un-remarried surviving spouse of an honorably discharged veteran, if they possess qualifications for that employment and if the honorably discharged veteran is or, if deceased, was a resident of the State of Utah.

P. Specific OWNER Requirements: CONTRACTOR shall comply with the specific rules and regulations promulgated by OWNER pursuant to authority granted or retained under the Utah Procurement Code, Utah Code Ann. Section 63G-6-101, et seq.

-END OF SECTION-

## APPENDIX A - SPRINKLER RECORD DRAWING




As Build
Allied Pacific
Jose Andrade
9-29-08
435-688-2734

Sprinkler Supply Co.
Unmatched Service
Exceeding Expectations

SPRINKLER SUPPLY CO.
1410 WEST 7878 SOUTH
(801)566-8102

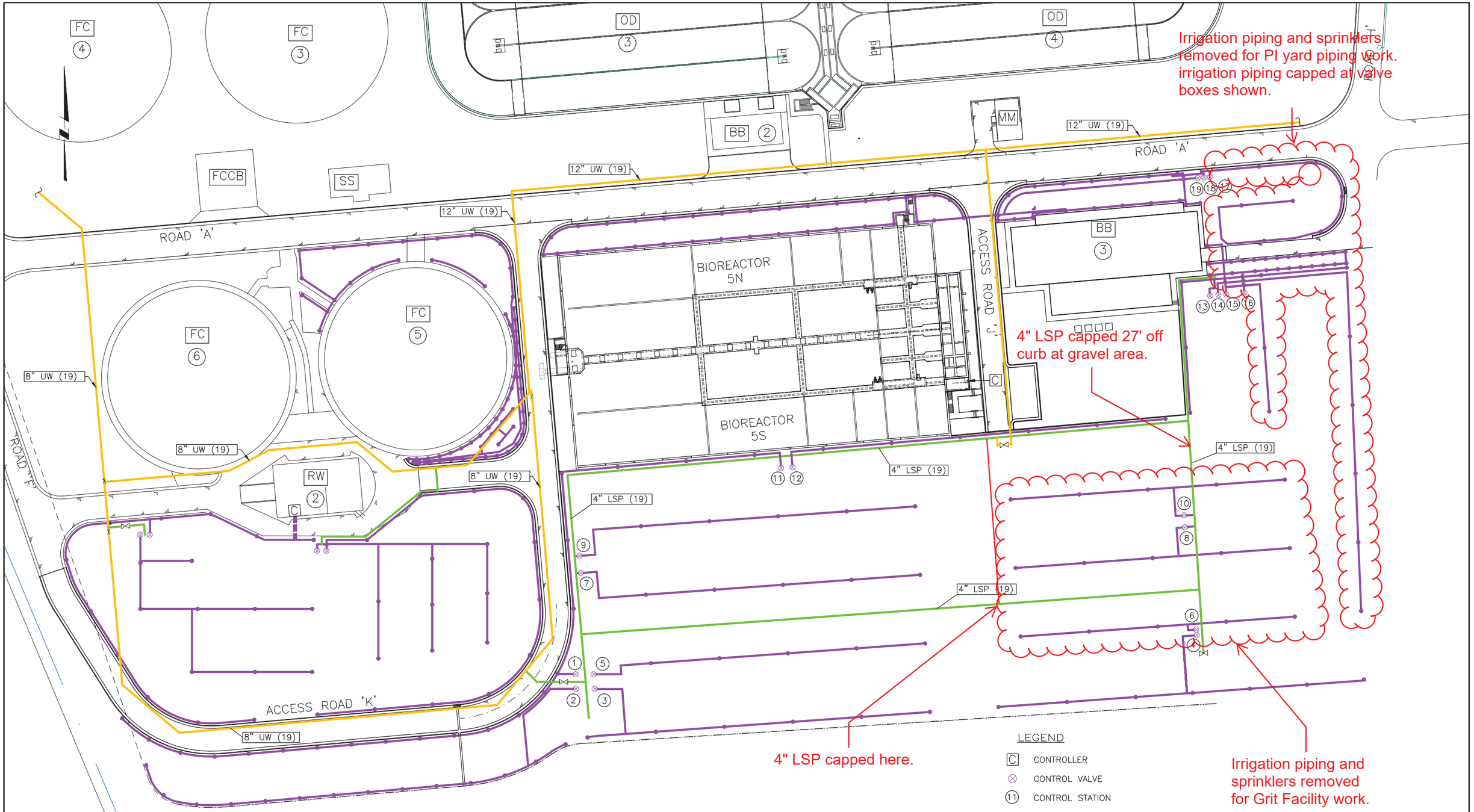
SHEET DESCRIPTION: IRRIGATION DESIGN

PROJECT:
SOUTH VALLEY
WATER RECLAMATION FACILITY

DATE: 05/10/08

SCALE: 1"/40'

SHEET: 1 OF 1




RECORD DRAWING

THESE RECORD DRAWINGS HAVE BEEN PREPARED BASED IN PART ON INFORMATION PROVIDED BY OTHERS

THIS DRAWING WAS PREPARED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON AND IS NOT TO BE USED ELSEWHERE

Date _____

By _____

| REV | DATE | BY | DESCRIPTION |
|---|---|---|---|
| 2 | 9/13/12 | JH | RECORD DRAWING |
| 1 | 7/5/07 | LE | PER CHANGE ORDER NO.17 |

SCALE 1" = 40'

WARNING 0 1/2 1 IF THIS BAR DOES NOT MEASURE 1" THEN DRAWING IS NOT TO SCALE

DESIGNED D. MIKLAS
DRAWN R. ANDERSON
CHECKED S. LACY

SUBMITTED BY

| | | |
|---|---|---|
| DAVE MIKLAS (PROJECT MANAGER'S NAME) | 340650 LICENSE NO. | 01/25/06 DATE |
| STAN POSTMA (COMPANY OFFICER'S NAME) | 5149 LICENSE NO. | 01/25/06 DATE |

MWH Salt Lake City Utah

SOUTH VALLEY WATER RECLAMATION FACILITY

PROJECT 4C

SPRINKLER PLAN

SHEET L-3

DWG OF

# DOCUMENT 00823

# ESCROW BID DOCUMENTS

## ARTICLE 1 - SCOPE

1.01 The 3 lowest Bidders shall submit, within the specified time after receipt of Bids, 1 copy of all documentary information generated in preparation of Bid prices for this Project. This material is hereinafter referred to as "Escrow Bid Documents." The Escrow Bid Documents of the Successful Bidder will be held in escrow for the duration of the contract.

1.02 The Successful Bidder agrees, as a condition of award of the contract, that the Escrow Bid Documents constitute the complete, only, and all documentary information used in preparation of his Bid. No other Bid preparation information shall be considered in resolving disputes.

1.03 Nothing in the Escrow Bid Documents shall change or modify the terms or conditions of the Contract Documents.

## ARTICLE 2 - OWNERSHIP

2.01 The Escrow Bid Documents are, and shall always remain, the property of Contractor, subject only to joint review by Owner and Contractor, as provided in this Document.

2.02 Owner stipulates and expressly acknowledges that the Escrow Bid Documents, as defined in this Document, constitute trade secrets. This acknowledgment is based on Owner's express understanding that the information contained in the Escrow Bid Documents is not known outside the Bidder's business, is known only to a limited extent and only by a limited number of employees of the Bidder, is safeguarded while in Bidder's possession, is extremely valuable to Bidder, and could be extremely valuable to Bidder's competitors by virtue of it reflecting Bidder's contemplated techniques of construction. Owner acknowledges that the Bidder expended substantial sums of money in developing the information included in the Escrow Bid Documents and further acknowledges that it would be difficult for a competitor to replicate the information contained therein. Owner further acknowledges that the Escrow Bid Documents and the information contained therein are made available to Owner only because such action is an express prerequisite to award of the contract. Owner further acknowledges that the Escrow Bid Documents include a compilation of information used in the Bidder's business, intended to give the Bidder an opportunity to obtain an advantage over competitors who do not know of or use the contents of the documentation. Owner agrees to safeguard the Escrow Bid Documents, and all information contained therein, against disclosure to the fullest extent permitted by law.

## ARTICLE 3 - PROGRAM

3.01 Escrow Bid Documents will be used to assist in the negotiation of price adjustments and Change Orders and in the settlement of disputes, claims, and other controversies. They will not be used for pre-award evaluation of Contractor's anticipated methods of construction or to assess Contractor's qualifications for performing the Work.

## ARTICLE 4 - FORMAT AND CONTENTS

4.01 Bidders may submit Escrow Bid Documents in their usual cost-estimating format. It is not the intention of this section to cause the Bidder extra work during the preparation of the Bid, but to ensure that the Escrow Bid Documents will be adequate to enable complete understanding and proper interpretation for their intended use. The Escrow Bid Documents shall be in the language of the Specifications.

4.02 It is required that the Escrow Bid Documents clearly itemize the estimated costs of performing the work of each Bid item contained in the Bid schedule. Bid items should be separated into subitems as required to present a complete and detailed cost estimate and allow a detailed cost review. The Escrow Bid Documents shall include all quantity takeoffs; crew; equipment; calculations of rates of production and progress; copies of quotations from equipment manufacturers, Subcontractors, and Suppliers; and memoranda, narratives, consultants' reports, add/deduct sheets, and all other information used by the Bidder to arrive at the prices contained in the Bid Form. Estimated costs should be broken down into the Bidder's usual estimate categories, such as direct labor, repair labor, equipment operation, equipment ownership, expendable materials, permanent materials, and subcontract costs as appropriate. Plant and equipment and indirect costs should be detailed in the Bidder's usual format. Contractor's allocation of plant and equipment, indirect costs, contingencies, markup, and other items to each Bid item shall be included.

4.03 All costs shall be identified. For Bid items amounting to less than $10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included, and provided that indirect costs, contingencies, and markup, as applicable, are allocated.

4.04 Bidding Documents provided by the Owner should not be included in the Escrow Bid Documents unless needed to comply with the requirements of this section.

## ARTICLE 5 - SUBMITTAL

5.01 The Escrow Bid Documents shall be submitted in a sealed container within 72 hours after the time of receipt of Bids. The container shall be clearly marked on the outside with the Bidder's name, date of submittal, project name, and the words "Escrow Bid Documents."

5.02 The Escrow Bid Documents shall be accompanied with the Bid Documentation Certification, signed by an individual authorized by the Bidder to execute the Bid Form, stating that the material in the Escrow Documentation constitutes the complete, only, and all documentary information used in preparation of the Bid and that he has personally examined the contents of the Escrow Bid Documents container and has found that the documents in the container are complete.

5.03 Prior to award, Escrow Bid Documents of the apparent Successful Bidder will be unsealed, examined, organized, and inventoried by representatives of Owner, together with members of Contractor's staff who are knowledgeable in how the Bid was prepared.

5.04 This examination is to ensure that the Escrow Bid Documents are authentic, legible, and complete. It will not include review of, and will not constitute approval of, proposed construction methods, estimating assumptions, or interpretations of Contract Documents. This examination is subject to the condition that, as trade secrets, the Escrow Bid Documents are proprietary and confidential as described in this Document. Examination will not alter any condition(s) or term(s) of the contract.

5.05 If all the documentation required in this Document has not been included in the original submittal, additional documentation shall be submitted, at Owner's discretion, prior to award of the contract. The detailed breakdown of estimated costs shall be reconciled and revised, if appropriate, by agreement between Contractor and Owner before making the award.

5.06 If the contract is not awarded to the apparent Successful Bidder, the Escrow Bid Documents of the Bidder next to be considered for award shall be processed as described above.

5.07 Timely submission of complete Escrow Bid Documents is an essential element of the Bidder's responsibility and a prerequisite to contract award. Failure to provide the necessary Escrow Bid Documents will be sufficient cause for Owner to reject the Bid.

5.08 If the Bidder's proposal is based on subcontracting any part of the Work, each Subcontractor whose total subcontract price exceeds 5 percent of the total Contract Price proposed by the Bidder shall provide separate Escrow Bid Documents to be included with those of the Bidder. These documents will be opened and examined in the same manner and at the same time as the examination described above for the apparent Successful Bidder.

5.09 If Contractor subcontracts any portion of the Work after award, Owner retains the right to require Contractor to submit Escrow Bid Documents from the Subcontractor before the subcontract is approved.

5.10 Escrow Bid Documents submitted by unsuccessful Bidders will be returned unopened, unless opened as provided above, as soon as they are no longer needed by Owner and no later than immediately following award of the contract.

## ARTICLE 6 - STORAGE

6.01 The Escrow Bid Documents of the Successful Bidder will be placed in escrow prior to award of the contract, for the life of the contract, in a mutually agreeable institution. The cost of storage will be paid by Owner.

## ARTICLE 7 - EXAMINATION AFTER AWARD OF CONTRACT

7.01 The Escrow Bid Documents shall be examined by both Owner and Contractor, at any time deemed necessary after award of the contract by either Owner or Contractor, to assist in the negotiation of price adjustments and Change Orders, or the settlement of disputes.

7.02 Examination of the Escrow Bid Documents after award of the contract is subject to the following conditions:

1. As trade secrets, the Escrow Bid Documents are proprietary and confidential as described in this Document.
2. Owner and Contractor shall each designate, in writing to the other party and a minimum of 10 days prior to examination, representatives who are authorized to examine the Escrow Bid Documents. No other person shall have access to the Escrow Bid Documents.
3. Access to the Escrow Bid Documents will take place only in the presence of duly designated representatives of both Owner and Contractor.

## ARTICLE 8 - FINAL DISPOSITION

8.01 The Escrow Bid Documents will be returned to Contractor at such time as the contract has been completed and final settlement has been achieved.

BID DOCUMENTATION

---- CERTIFICATION ----

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THE BID DOCUMENTATION CONTAINED IN THIS DOCUMENT CONSTITUTES THE COMPLETE, ONLY, AND ALL DOCUMENTARY INFORMATION USED IN PREPARATION OF THE BID AND THAT I HAVE PERSONALLY EXAMINED THESE CONTENTS AND HAVE FOUND THAT THIS BID DOCUMENTATION IS COMPLETE.

BY: _____

TITLE: _____

FIRM: _____

DATE: _____

END OF DOCUMENT

## SECTION 01110

## SUMMARY OF WORK

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Detailed description of the Work.

### 1.02 THE WORK

A. The Work consists of landscaping around the new grit facility, including design of the yard sprinkler system with suppling the piping and sprinklers. Lay new sod grass, landscaping rock, curb and gutter, and pour new concrete landscape curbing.

B. Upon substantial completion of the work, Contractor to care for the sprinkler system and new landscaping for 30 days after the substantial completion date.

### 1.03 LOCATION OF PROJECT

A. The Work is located at South Valley Water Reclamation Facility at 7495 South 1300 West, West Jordan, Utah 84084.

### 1.04 ACTIVITIES BY OTHERS

A. Activities by others which may affect performance of work include:
   1. Project 5 punch list items and close out procedures. This work includes commissioning and starting up the new grit facility.

### 1.05 SUBSTAINAL COMPLETION OR OCCUPANCY

A. Substantial Completion on the following portions of Work for Owner's occupancy including specified testing, training of Owner's personnel, and other preparations necessary for Owner's occupancy or use:
   1. The complete sprinkler system is ready for full use of Owner’s personnel.
   2. All sod and landscaping rock is laid and installed per drawings.
   3. All concrete landscaping curb is complete

B. Following occupancy, Owner will:
   1. Provide power to operate equipment and systems.

C. Following substantial completion, Contractor will:
   1. Coordinate and complete any punch list items.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01116

## CONTRACT DOCUMENT LANGUAGE

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section Includes: Explanation of arrangement, language, reference standards, and format.

### 1.02 REFERENCES

A. Construction Specifications Institute (CSI):
   1. MasterFormat™.
   2. SectionFormat™.
   3. PageFormat™.

### 1.03 PROJECT MANUAL ARRANGEMENT

A. Document and Section numbers used in Project Manual, and Project Manual arrangement are in accordance with CSI MasterFormat™, except where departures have been deemed necessary.

B. Sections are written in CSI SectionFormat™, Three-Part Section Format, except where departures have been deemed necessary.

C. Page format for Sections in the Project Manual is in PageFormat™, except where departures have been deemed necessary.

### 1.04 CONTRACT DOCUMENT LANGUAGE

A. Specification Section Paragraphs entitled "Section Includes" summarize briefly what is generally included in the section.
   1. Requirements of Contract Documents are not limited by "Section Includes" paragraphs.

B. Specifications have been partially streamlined by intentionally omitting words and phrases, such as "the Contractor shall," "in conformity therewith," "shall be" following "as indicated," "a," "an," "the" and "all."
   1. Assume missing portions by inference.

C. Phrase "by Engineer" modifies words such as "accepted," "directed," "selected," "inspected," and "permitted," when they are unmodified.

D. Phrase "to Engineer" modifies words such as "submit," "report," and "satisfactory," when they are unmodified.

E. Colons (:) are used to introduce a list of particulars, an appositive, an amplification, or an illustrative quotation:
   1. When used as an appositive after designation of product, colons are used in place of words "shall be."

F. Word "provide" means to manufacture, fabricate, deliver, furnish, install, complete, assemble, erect in place, test, or render ready for use or operation, including necessary related material, labor, appurtenances, services, and incidentals.

G. Words "Contractor shall" are implied when direction is stated in imperative mood.

H. Term "products" includes materials and equipment as specified in Section 01600 - Product Requirements.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01140

## WORK RESTRICTIONS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Requirements for scheduling the Work affected by existing site and facility, work restrictions, and coordination between construction operations and plant operations.

### 1.02 GENERAL CONSTRAINTS ON WORK AND SCHEDULING OF WORK

A. Plant access for Contractor will be provided at the front gate**.**

B. Perform abandoned pipe Work as specified in Section 01738 - Selective Alterations and Demolition.

C. Wastewater projects:
   1. The South Valley Water Reclamation Facility treats wastewater for the surrounding cities and is the only means of treating domestic and industrial wastewater prior to discharging to Jordan River. Impairing the operational capabilities of this treatment plant will result in serious environmental damage and monetary fines.
   2. Conduct Work in a manner that will not impair the operational capabilities of essential elements of the treatment process or reduce the capacity of the entire treatment plant below levels sufficient to treat the quality of raw wastewater to the water quality limitations specified in the discharge permit.

### 1.03 SHUTDOWN AND CONSTRUCTION CONSTRAINTS

A. General shutdown constraints:
   1. Execute the Work while the existing facility is in operation.
   2. All activities may be accomplished without a shutdown.
   3. Apply to activities of construction regardless of process or work area.

B. Working Schedule Constraints:
      a. Working hours on site are from 7 a.m. to 5 p.m. each day
      b. Working days are Monday through Friday
      c. Scheduling
         1) If work is required outside of the times/dates indicated, coordinate with the Owner.
   2. Scheduling:
   3. Unplanned shutdowns due to emergencies are not defined in this Section.

## 1.04 REQUIREMENTS FOR OPERATION OF PLANT AND MAINTAINING CONTINUOUS OPERATION OF EXISTING FACILITIES

A. Facilities or conditions required to keep the existing plant operational include, but are not limited to, the following:
   1. Electrical power including transformers, distribution wiring, and motor control centers.
   2. Fencing and gates**.**
   3. Instrumentation, meters, controls, and telemetry equipment.
   4. Safety equipment and features.
   5. Parking for District's employees and vehicles required for operation and maintenance of the
   6. Telephone system.
   7. Storm drainage.
   8. Natural gas service.

## 1.05 OPERATIONS AND MAINTENANCE ACCESS

A. Provide safe, continuous access to process control equipment for plant operations personnel.

## 1.06 UTILITIES

A. Provide advance notice to and utilize services of Blue Stake for location and marking of underground utilities operated by utility agencies other than the Owner.

B. Maintain electrical, telephone, water, gas, sanitary facilities, and other utilities within existing facilities in service. Provide temporary utilities when necessary.

C. New yard utilities were designed using existing facility drawings.
   1. Field verification of utilities locations was not performed during design.
   2. Services crossed or located nearby by new yard utilities may require relocation and possible shutdowns.
   3. Pipe alignments as indicated on the Drawings.

# PART 2 PRODUCTS

Not Used.

# PART 3 EXECUTION

Not Used.

END OF SECTION

## ATTACHMENT D - SAFETY CHECKLIST

**SAFETY CHECKLIST**
(Just prior to commencing work)

Checklist provided as a guide but is not all inclusive.

1. Location awareness:
   a. Emergency exits: _____
   b. Emergency shower and eyewash: _____
   c. Telephones and phone numbers: _____
   d. Shut-off valve: _____
   e. Electrical disconnects: _____
2. Inspect work area:
   a. Take time to survey the area you are working in. Ensure that what you want to do will work. Do you have enough clearance? Is your footing secure? Do you have adequate lighting and ventilation? Are surrounding utilities out of the way for you to perform your work?
3. SDS (Safety Data Sheets):
   a. Understand the chemicals and substances in the area you are working in by reading the SDS.
4. Lockout/Tagout Procedure:
   a. Lockout/tagout energy sources before beginning work.
   b. Make sure all valves associated with the work are locked out and tagged out on each side of the penetration.
   c. Make sure the lines are depressurized.
5. Overhead work:
   a. Use appropriate personal protective equipment; i.e., safety harness, lifeline, etc.
   b. Select appropriate tie-off points; i.e., structurally adequate, not a pipe or conduit, etc.
   c. Spotter assigned and in position.
   d. Pipe rack access; i.e., check design capacity, protective decking or scaffolding in place, exposed valves or electrical switches identified and protected.
6. Safety equipment:
   a. Shepherd's hook.
   b. ARC flash protection.
   c. Fire extinguisher.
   d. Other: _____.
7. Accidents:
   a. Should accidents occur, do not shut off and do not attempt to correct the situation, unless you are absolutely positive that your action will correct the problem and not adversely affect other people or equipment.
8. Review process start-up documents:
   a. In the event the system is shutdown, the Control Center should have a working knowledge of the process start-up procedures in order to deal effectively with unforeseen events.
9. Evacuation procedures:
   a. Do not obstruct evacuation routes.
   b. Take time to survey the area for evacuation routes.

## SECTION 01220

## MEASUREMENT AND PAYMENT

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Procedures for measurement and payment of Work under this Contract for lump sum items.

### 1.02 REFERENCES

A. Occupational Safety and Health Administration (OSHA).

### 1.03 LUMP SUM ITEMS

A. Line Item 1: Lump Sum Amount for Work of Project 5 Landscaping Project
   1. Measurement:
      a. Includes costs including Contractor's fee for overhead and profit for continuous, full-time management of the Contract as described in the Contract Documents, covering a period of time not less than from the Notice to Proceed through the entire length of the allowable Contract Times specified in the Contract Documents.
      b. Includes individual Bid Items specified in this Section.
   2. Payment:
      a. Lump sum.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01260

## CONTRACT MODIFICATION PROCEDURES

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section Includes:
   1. Administrative and procedural requirements for executing a change in the Work.

## 1.02 PRELIMINARY REQUIREMENTS

A. Change Order Cost Basis Summary Form:
   1. Submit a sample to Engineer for review within 15 calendar days following Notice to Proceed.
      a. Items will be reviewed, and their value, percentage, or calculation method mutually agreed to by the Contractor and Owner prior to executing a Change Order on the Project.
   2. Used by the Contractor for pricing each Change Order required for additions, deletions, or revisions in the Work.
   3. Include the following information:
      a. Agreed upon markups, percentages, and procedures for calculating all surcharges, etc. associated with the Cost of the Change Order Work.
      b. References for unit price information and special unit price information.
      c. Attachments with the following information:
         1) Certified labor rates breakdown.
         2) Equipment rates.
         3) Bond and insurance rates (PI&I).

## 1.03 REQUEST FOR INFORMATION OR INTERPRETATION (RFI)

A. Contractor may issue RFIs to request interpretation of the documents or to request for information that may be missing.

B. General Instructions:
   1. Number RFIs consecutively.
      a. Add a consecutive letter to the RFI number on modified submittals of the same RFI (i.e., RFI 4B).
   2. Provide RFI for 1 item.
      a. There may be exceptions when multiple items are so functionally related that expediency indicates review of the group of items as a whole.
      b. RFIs with multiple items will be rejected without review.
   3. Contractor sign and date RFIs indicating review and approval.
      a. Contractor’s signature indicates that they have satisfied RFI review responsibilities and constitutes Contractor's written approval of RFI.
      b. RFIs without Contractor's signature will be returned to the Contractor unreviewed. Subsequent submittal of this information will be counted as the first resubmittal.

C. Engineer will render a written clarification, interpretation, or decision on the issue submitted or initiate an amendment or supplement to the Contract within 14 days.
   1. In the event the Contractor identifies an RFI as critical to the progress of the project, Engineer will make every effort to reduce the RFI response time.

## 1.04 PRELIMINARY PROCEDURES

A. Owner or Engineer may initiate changes by submitting a Request for Proposal (RFP) to Contractor including the following information:
   1. Detailed description of the Change, Products, and location of the change in the Project.
   2. Supplementary or revised drawings or specifications.
   3. Projected time span for making the change, and a specific statement if overtime work is authorized.
   4. A specific period of time during which the requested price will be considered valid.
   5. Such request is for information only, and is not an instruction to execute the changes, or to stop work in progress.

B. Contractor may initiate changes by submitting a Change Proposal to Engineer containing the following:
   1. Description of proposed changes.
   2. Reason for making changes.
   3. Specific period of time during which requested price will be considered valid.
   4. Effect on Total Contract Cost and/or Contract Time.
   5. Documentation supporting any change in Total Contract Cost and/or Contract Time, as appropriate.

## 1.05 WORK CHANGE DIRECTIVE AUTHORIZATION

A. In lieu of a Request for Proposal (RFP), Engineer may issue a Work Change Directive Authorization for Contractor to proceed with a change for subsequent inclusion in a Change Order.

B. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate method of determining any change in the Contract Sum and/or the Contract Time, as appropriate.

C. Owner and Engineer will sign and date the Work Change Directive Authorization as authorization for the Contractor to proceed with the changes.

D. Contractor may sign and date the Work Change Directive Authorization to indicate agreement with the terms.

## 1.06 DOCUMENTATION OF CHANGE PROPOSALS

A. Change proposal:
   1. Support with sufficient substantiating data to allow Engineer to evaluate the quotation.
      a. Lump sum.
      b. Unit prices: Use previously established unit prices.

c. Time-and-material/force account basis:
    1) Name of the Owner's authorized agent who ordered the work, and date of the order.
    2) Dates and times work was performed, and by whom.
    3) Time record, summary of hours worked, and hourly rates paid.
    4) Receipts and invoices for:
        a) Equipment used, listing dates and times of use.
        b) Products used, listing of quantities.
        c) Subcontracts.

2. Provide additional data to support time and cost computations:
    a. Labor required.
    b. Equipment required.
    c. Products required:
        1) Recommended source of purchase and unit cost.
        2) Quantities required.
    d. Taxes, insurance, and bonds.
    e. Credit for work deleted from Contract, similarly documented.
    f. Overhead and profit.
    g. Justification for change to Contract Time.

## 1.07 PREPARATION OF CHANGE ORDERS AND FIELD ORDERS

A. Engineer will prepare each Change Order and Field Order.

B. Change Orders:
1. Will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
2. Will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.
3. Recommendation of Change Proposal is indicated by Engineer's signature.
4. Upon signature and execution by Owner, the Change Proposal becomes a Change Order altering the Contract Time and Total Contract Cost, as indicated.
    a. Owner's Representative will transmit one signed copy each to Contractor and Engineer.
5. Contractor may only request payment for changes in the Work against an approved Change Order.
6. If either Engineer or Owner's Representative disapproves the Change Proposal, the reason for disapproval will be stated.
    a. A request for a revised proposal or cancellation of the proposal will be shown.

C. Field Orders:
1. Order minor changes in the Work without changes in Contract Price or Contract Times.

## 1.08 LUMP-SUM/FIXED PRICE CHANGE ORDER

A. Content of Change Orders will be based on, either:
1. Engineer's Proposal Request and Contractor's responsive Change Proposal as mutually agreed between Owner and Contractor.
2. Contractor's Change Proposal for a change, as recommended by Engineer.

B. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.

C. Contractor will sign and date the Change Order to indicate agreement with the terms.

## 1.09 UNIT PRICE CHANGE ORDER

A. Content of Change Orders will be based on, either:
   1. Engineer's definition of the scope of the required changes.
   2. Contractor's Change Proposal for a change, recommended by Engineer.
   3. Survey of completed work.

B. The amounts of the unit prices to be:
   1. Those stated in the Contract.
   2. Those mutually agreed upon between Owner and Contractor.

C. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:
   1. Owner and Engineer will sign and date the Change Order as authorization for Contractor to proceed with the changes.
   2. Contractor will sign and date the Change Order to indicate agreement with the terms.

D. When quantities of the items cannot be determined prior to start of the work:
   1. Engineer or Owner will issue a Work Change Directive authorization directing Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.
   2. At completion of the change, Engineer will determine the cost of such work based on the unit prices and quantities used.
   3. Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.

E. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.

F. Contractor will sign and date the Change Order to indicate their agreement with the terms.

## 1.10 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/WORK CHANGE DIRECTIVE AUTHORIZATION

A. Engineer will issue a Work Change Directive for the Owner's signature authorizing Contractor to proceed with the changes.

B. At completion of the change, Contractor shall submit itemized accounting and supporting data as specified in this Section.

C. Engineer will determine the allowable cost of such work, as provided in the Contract Documents.

D. Owner and Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time and serve as authorization for the Contractor to proceed with the changes.

E. Contractor will sign and date the Change Order to indicate their agreement.

## 1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

A. Periodically revise Schedule of Values and Applications for Payment forms to record each Change Order as a separate item of Work, and to record the adjusted Contract Sum.

B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise subschedules to show changes for other items of work affected by the changes.

C. Upon completion of work under a Change Order, enter pertinent changes in Record Documents.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

# SECTION 01292

# SCHEDULE OF VALUES

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Requirements for preparation, format, and submittal of Schedule of Values.

### 1.02 PREPARATION

A. Schedule of Values shall be a listing of all cost loaded, on-site construction activities from the progress schedule, listed in numerical order, showing that the sum total of all cost-loaded activities equal the Contract value.

B. When the schedule is changed or revised to include added or deleted work, the Schedule of Values shall also be revised such that the sum total of all cost-loaded activities continuously equal the current Contract value.
   1. Equate the aggregate of these costs to the Lump Sum Contract Price.

C. Prepare Schedule of Values identifying costs of Major Items of Work.

### 1.03 SUBMITTALS

A. Submit Schedule of Values for the Preliminary Schedule as specified in, Section 01321 - Schedules and Reports.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01294

## APPLICATIONS FOR PAYMENT

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Procedures for preparation and submittal of Applications for Payment.

### 1.02 FORMAT

A. Develop satisfactory spreadsheet-type form generated by downloading cost data from the Progress Schedule.
   1. Submit payment requests and attach spreadsheet with cost data related to Progress Schedule.

B. Fill in information required on form.

C. When Change Orders are executed, add Change Orders at end of listing of scheduled activities:
   1. Identify change order by number and description.
   2. Provide cost of change order in appropriate column.

D. After completing, submit Application for Payment.

E. Engineer will review application for accuracy. When accurate, Engineer will transmit application to Owner for processing of payment.

F. Execute application with signature of responsible officer of Contractor.

### 1.03 SUBSTANTIATING DATA

A. Provide Substantiating Data identifying:
   1. Project.
   2. Application number and date.
   3. Cost flow summary.
   4. Updated schedule of values.
   5. Progress schedule.
   6. Detailed list of enclosures.
   7. For stored products with item number and identification on application, description of specific material, and proof of insurance coverage for offsite stored products.
   8. Submit “certified” payroll, if applicable.

### 1.04 SUBMITTALS

A. Submit 1 copy of Application for Payment and Substantiating Data with cover letter.

## 1.05 PAYMENT REQUESTS

A. Prepare progress payment requests on a monthly basis. Base requests on the breakdowns of costs for each scheduled activity and the percentage of completion for each activity.

B. Indicate total dollar amount of work planned for every month of the project. Equate sum of monthly amounts to Lump Sum Contract Price.

C. Generate Progress Payment request forms by downloading cost data from the schedule information to a spreadsheet type format.

D. Identify each activity on the Progress Schedule that has a cost associated with it, the cost for each activity, the estimated percent complete for each activity, and the value of work completed for both the payment period and job to date.

E. Prepare summary of cost information for each Major Item of Work listed in the Schedule of Values. Identify the value of work completed for both the payment period and job to date.

F. Payment period:
   1. Monthly Application for Payment period shall begin on the 1st day of each month, and end on the last day of each month.
   2. Submit Application for Payment to Engineer no later than the 5th day of each month for work completed the previous month.
   3. Engineer will finalize and submit recommendation for Application for Payment to Owner by the 15th day of each month to allow time for processing and approval.

## 1.06 COST SUMMARIES

A. Prepare Summary of Cost Information for each Major Item of Work listed in the Schedule of Values. Identify the Value of Work Completed for both the payment period and job to date.

B. Cash flow summary: Prepare cash flow summary, indicating total dollar amount of work planned for each month of the project. Equate sum of monthly amounts to Lump Sum contract price.

# PART 2 PRODUCTS

Not Used.

# PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01312

## PROJECT MEETINGS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Requirements for conducting conferences and meetings for the purposes of addressing issues related to the Work, reviewing and coordinating progress of the Work and other matters of common interest, and includes the following:
   1. Qualifications of Meeting Participants.
   2. Pre-construction Conference.
   3. Progress Meetings.
   4. Close-out meeting.

### 1.02 QUALIFICATIONS OF MEETING PARTICIPANTS

A. Representatives of entities participating in meetings shall be qualified and authorized to act on behalf of entity each represents.

### 1.03 BASIC MEETING REQUIREMENTS

A. Attendees:
   1. Meeting leader shall require attendance of parties directly affecting, or affected by, Work being discussed at the meeting.

B. Notification:
   1. Meeting leader shall notify attendees of meeting a minimum of 3 days prior to meeting.

C. Agenda:
   1. Meeting leader shall submit meeting agenda to attendees a minimum of 3 days prior to meeting.
   2. Meeting leader shall prepare copies of agenda for participants and distribute at the meeting.

D. Meeting minutes:
   1. Meeting leader shall provide draft minutes within 3 days of meeting and send to all attendees for comment within 3 days.
   2. Meeting leader shall incorporate comments from attendees and submit final meeting minutes to attendees within 3 days of receipt of comments.

### 1.04 PRE-CONSTRUCTION CONFERENCE

A. Engineer leads the meeting.

B. Timing:
   1. Upon issuance of Notice to Proceed, or earlier when mutually agreeable.

C. Location:
   1. In location convenient for most invitees.

D. Attendees:
   1. Contractor's project manager and superintendent, Owner, Engineer, representatives of utilities, major subcontractors and others involved in performance of the Work, and others necessary to agenda.

E. Purpose of conference:
   1. To establish working understanding between parties and to discuss Construction Schedule, shop drawing and other submittals, cost breakdown of major lump sum items, processing of submittals and applications for payment, and other subjects pertinent to execution of the Work.

F. Agenda minimum requirements:
   1. Adequacy of distribution of Contract Documents.
   2. Distribution and discussion of list of major subcontractors and suppliers.
   3. Proposed progress schedules and critical construction sequencing.
   4. Major equipment deliveries and priorities.
   5. Project coordination.
   6. Designation of responsible personnel.
   7. Procedures and processing of:
      a. Field decisions.
      b. Proposal requests.
      c. Submittals.
      d. Change Orders.
      e. Request for Information/Interpretations.
      f. Applications for Payment.
      g. Record Documents.
   8. Use of premises:
      a. Office, construction, and storage areas.
      b. Owner's requirements.
   9. Construction facilities, controls, and construction aids.
   10. Temporary utilities.
   11. Safety and first aid procedures.
   12. Security procedures.
   13. Housekeeping procedures.

## 1.05 PROGRESS MEETINGS

A. Engineer will lead the meeting.

B. Timing:
   1. Hold meetings throughout progress of the Work at monthly intervals.

C. Attendance required:
   1. Owner, Engineer, Contractor, Contractor’s Project Manager, superintendent, quality control manager, project scheduler, major subcontractors and suppliers as appropriate to agenda topics for each meeting.

D. Additional invitees:
   1. Owner utility companies when the Work affects their interests, and others necessary to agenda.

E. Agenda minimum requirements:
   1. Review minutes of previous meeting/minutes.
   2. Safety and security.
   3. Construction schedule summary.
   4. Review of 6 weeks schedule.
   5. Review of off-site fabrication and delivery schedules.
   6. Review of submittals schedule and status of submittals.
   7. Request for information (RFI's) status.
   8. MOP's/shutdown coordination.
   9. Change order management status.
   10. Maintenance of quality standards (QA/QC).
   11. Field observations, problems, and conflicts.
   12. Commissioning.
   13. Partnering recognition status (optional).
   14. General Items.
   15. Action items.
   16. Next meeting.

## 1.06 CLOSE-OUT MEETING

A. Engineer leads the meeting.

B. Attendees:
   1. Owner, Engineer, Contractor, Contractor's Project Manager, and Superintendent.

C. Agenda minimum requirements:
   1. Review punch list completion.
   2. Transfer of record documents.
   3. Finalize payment.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01321

## SCHEDULES AND REPORTS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Schedules and reports.

### 1.02 SUBMITTAL REQUIREMENTS

A. Submit preliminary and baseline schedule of values.

B. Submit, on a monthly basis, updated schedules as specified.

C. Submit revised schedules as specified.

### 1.03 SCHEDULER

A. Designate, in writing and within 5 calendar days after Notice of Award, the person responsible for preparation, maintenance, updating, and revision of all schedules.

B. Qualifications of scheduler:
   1. Authority to act on behalf of Contractor.
   2. A minimum of 5 years verifiable experience in preparation of construction schedules for projects of similar value, size, and complexity.
   3. Knowledge of critical path method (CPM) scheduling utilizing Primavera P6 Professional or SureTrak or Microsoft Project software.

C. Owner reserves the right to disapprove scheduler when submitted by Contractor if not qualified.

D. Owner reserves the right to remove scheduler from the project if found to be unqualified.

### 1.04 SCHEDULING FORMAT AND SOFTWARE

A. Schedule format: Utilize CPM format.

B. Prepare computerized schedule utilizing Primavera P6 Professional or SureTrak or Microsoft Project software, most current version.
   1. The provided copy of the software shall be a standalone version for installation on a standalone computer.

C. Contractor and Engineer must agree on the format.

## 1.05 PRECONSTRUCTION SCHEDULING MEETING

A. Engineer will conduct Preconstruction Scheduling Meeting with Contractor's Project Manager, General Superintendent, and scheduler within 5 calendar days after Notice to Proceed.

B. Filing: Post submitted files to Owner's construction document control system.

## 1.06 REVIEW AND ACCEPTANCE OF SCHEDULES

A. Engineer will review Baseline Schedule, Schedule Updates, Schedule Revisions and Time Impact Analyses to ascertain compliance with specified project constraints, compliance with milestone dates, reasonableness of durations and sequence, accurate inter-relationships, and completeness.

B. Engineer and Owner will issue written comments following completion of review of Baseline Schedule within 14 calendar days after receipt.

C. Written comments on review of Schedule Updates and Schedule Revisions and Time Impact Analyses will be returned to Contractor within 7 calendar days after receipt by Engineer.

D. Revise and resubmit schedule in accordance with Engineer's comments within 7 calendar days after receipt of such comments, or request joint meeting to resolve objections.

E. If Engineer requests a meeting, the Contractor and all major subcontractors must participate in the meeting with Engineer.
   1. Revise and resubmit schedule within 7 calendar days after meeting.

F. Use accepted schedule for planning, organizing, and directing the work and for reporting progress.

G. Engineer's submittal review response:
   1. When schedule reflects Owner's and Contractor's agreement of project approach and sequence, schedule will be accepted by Owner.
   2. Engineer's submittal review response for schedule submittal will be "Receipt Acknowledged - Filed for Record" including applicable comments.
   3. Acceptance of the schedules by the Owner is for general conformance with the Contract Documents and for Owner's planning information, and does not relieve the Contractor of sole responsibility for planning, coordinating, and executing the Work within the contract completion dates. Omissions and errors in the accepted schedules shall not excuse performance less than that required by the Contract Documents. Acceptance by the Owner in no way constitutes an evaluation or validation of the Contractor's plan, sequence or means, methods, and techniques of construction.

## 1.07 SCHEDULE UPDATES

A. Any update:
   1. Prepare update using most recent accepted version of schedule including:
      a. Actual start dates of activities that have been started.
      b. Actual finish dates of activities that have been completed.

c. Percentage of completion of activities that have been started but not finished.
d. Actual dates on which milestones were achieved.
e. Update activities by inputting percent complete figures with actual dates.
f. Use retained logic in preparing Schedule Updates.
g. When necessary, input remaining durations for activities whose finish dates cannot be calculated accurately with a percent complete figure only.
h. Revisions to the schedule may be included that have been previously approved as specified in this Section under Revisions to Schedule.

B. Monthly updates:
1. Submit written narrative report in conjunction with each Schedule Update including descriptions of the following:
a. Activities added to or deleted from the schedule are to adhere to cost and other resource loading requirements.
1) Identify added activities in manner distinctly different from original activity designations.
b. Changes in sequence or estimated duration of activities.
c. Current or anticipated problems and delays affecting progress, impact of these problems and delays and measures taken to mitigate impact.
d. Assumptions made and activities affected by incorporating change order work into the schedule.
2. Submit updated schedule and materials specified under Submittal of Progress Schedules, 5 calendar days before the monthly schedule update meeting.
3. Since Monthly Schedule Update is the application for progress payment required as specified in Section 01294 - Applications for Payment, submittal and acceptance of the monthly Schedule Update is a condition precedent to the making of any progress payments.

## 1.08 ADJUSTMENT OF CONTRACT TIMES

A. Contract Time will be adjusted only for causes specified in Contract Documents.
1. Non-excusable delay:
a. Non-excusable delays include actions or inactions of the Contractor, or events for which the Contractor has assumed contractual responsibility (including actions or inactions of subcontractors, suppliers, or material manufacturers at any tier) that would independently delay the completion of the Work beyond the current Contract completion date).
b. No time extensions will be granted for non-excusable delays.
2. Excusable delay:
a. Events which are unforeseeable, outside the control of, and without the fault or negligence of either the Owner or the Contractor (or any party for whom either is responsible), which would independently delay the completion of the Work beyond the current Contract completion date.
b. The Contractor is entitled to a time extension only.
c. No other damages will be approved.
3. Compensable delay:
a. Actions or inactions of the Owner, or events for which the Owner has assumed contractual responsibility, which would independently delay the completion of the Work beyond the current Contract completion date.
b. The Contractor is entitled to a time extension and delay damages.

4. Concurrent delay:
    a. Concurrent delay is any combination of the above 3 types of delay occurring on the same calendar date.
    b. Exception to concurrent delay: Cases where the combination consists of 2 or more instances of the same type of delay occurring on the same calendar date. When one cause of delay is Owner-caused or caused by an event which is beyond the control and without the fault or negligence of either the Owner or the Contractor and the other Contractor-caused, the Contractor is entitled only to a time extension and no delay damages.

B. If the Contractor believes that the Owner has impacted its work, such that the project completion date will be delayed, the Contractor must submit proof demonstrating the delay to the critical path.
    1. This proof, in the form of a Time Impact Analysis, may entitle the Contractor to an adjustment of Contract Time.

C. Time Impact Analysis:
    1. Use the accepted schedule update that is current relative to the time frame of the delay event (change order, third party delay, or other Owner-caused delay). Represent the delay event in the schedule by:
        a. Inserting new activities associated with the delay event into the schedule.
        b. Revising activity logic.
        c. Revising activity durations.
    2. If the project schedule’s critical path and completion date are impacted as a result of adding this delay event to the schedule, a time extension equal to the magnitude of the impact may be warranted.
    3. The Time Impact Analysis submittal must include the following information:
        a. A fragment of the portion of the schedule affected by the delay event.
        b. A narrative explanation of the delay issue and how it impacted the schedule.
        c. A schedule file used to perform the Time Impact Analysis.

D. When a delay to the project as a whole can be avoided by revising preferential sequencing or logic, and the Contractor chooses not to implement the revisions, the Contractor will be entitled to a time extension and no compensation for extended overhead.

E. Indicate clearly that the Contractor has used, in full, all project float available for the work involved in the request, including any float that may exist between the Contractor's planned completion date and the Contract completion date.
    1. Utilize the latest version of the Schedule Update accepted at the time of the alleged delay, and all other relevant information, to determine the adjustment of the Contract Time.

F. Adjustment of the Contract Times will be granted only when the Contract Float has been fully utilized and only when the revised date of completion of the Work has been pushed beyond the Contract completion date.
    1. Adjustment of the Contract Times will be made only for the number of days that the planned completion of the work has been extended.

G. Actual delays in activities which do not affect the critical path work or which do not move the Contractor's planned completion date beyond the Contract completion date will not be the basis for an adjustment to the Contract Time.

H. If completion of the project occurs within the specified Contract Time, the Contractor is not entitled to jobsite or home office overhead beyond the Contractor's originally planned occupancy of the site.

I. Notify Engineer of a request for Contract Time adjustment.
   1. Submit request as specified in the Contract Documents.
   2. In cases where the Contractor does not submit a request for Contract Time adjustment for a specific change order, delay, or Contractor request within the specified period of time, then it is mutually agreed that the particular change order, delay, or Contractor request has no time impact on the Contract completion date and no time extension is required.

J. The Engineer will, within 30 calendar days after receipt of a Contract Time adjustment, request any supporting evidence, review the facts, and advise the Contractor in writing.
   1. Include the new Progress Schedule data, if accepted by the Owner, in the next monthly Schedule Update.
   2. When the Owner has not yet made a final determination as to the adjustment of the Contract Time, and the parties are unable to agree as to the amount of the adjustment to be reflected in the Progress Schedule, reflect that amount of time adjustment in the Progress Schedule as the Engineer may accept as appropriate for such interim purpose.
   3. It is understood and agreed that any such interim acceptance by the Engineer shall not be binding and shall be made only for the purpose of continuing to schedule the Work, until such time as a final determination as to any adjustment of the Contract Time acceptable to the Engineer has been made.
   4. Revise the Progress Schedule prepared thereafter in accordance with the final decision.

## 1.09 WEATHER DAY ALLOWANCE

A. Definition:
   1. Weather conditions that prevent or inhibit the Contractor’s performance of the Work and affect the Critical Path indicated on the Schedule shall be referred to as a Weather Day.
   2. A Weather Day is defined as the Contractor being unable to perform at least 4 hours of work on the Critical Path.

B. Allowance:
   1. Include as a separate identifiable activity on the critical path, an activity labeled "Weather Days Allowance".

C. Actual weather day:
   1. Insert a weather delay activity in critical path to reflect actual weather day occurrences when weather days are experienced and accepted by Engineer.
   2. Reduce duration of Weather Days Allowance activity as weather delays are experienced and inserted into the Schedule. Remaining weather days in Weather Day Allowance at completion of project is considered float.

3. The Contractor shall provide a written notice to the Engineer of the occurrence of a weather day within 2 days after the onset of such weather and shall describe in reasonable detail the type of weather encountered and the Work interfered with or interrupted.
    a. A schedule update will not suffice as a written notice.
    b. The Engineer will determine if the weather day constitutes a use of a portion of the Weather Day Allowance.
    c. After use of all the Weather Day Allowance, the Engineer will determine if the Contractor is entitled to an extension of the Contract Time due to weather conditions.
    d. Weather days are considered excusable delay as defined in this Section.

## 1.10 SCHEDULE OF SUBMITTALS

A. Schedule of Submittals shall include submittals required in the Contract Documents but not limited to test plans, training plans, test procedures, operation and maintenance manuals, shop drawings, samples, record documents, and specifically required certificates, warranties, and service agreements.
    1. Data for “Or Equals” or substitutions shall be submitted with the Schedule of Submittals.

B. Preliminary Schedule of Submittals:
    1. Due date: After Preliminary Schedule has been submitted and accepted by Owner.
    2. Format:
        a. Include submittals anticipated in the first 90 calendar days after award of contract using early start dates.
        b. Indicate week and month anticipated for submittal to Engineer.
        c. Indicate “Priority” submittals where review time can impact Contractor’s schedule.
            1) “Priority” indication will not alter review times specified in Section 01330 - Submittal Procedures.
            2) Engineer will endeavor to provide early review of “Priority” submittals where possible.
        d. List of “Or Equals” or substitutions.
    3. Submittal of Preliminary Schedule of Submittals shall be a condition precedent to Owner making progress payments during the first 90 calendar days after award of contract.

C. Final Schedule of Submittals:
    1. Due date: 30 days after Baseline Schedule has been submitted and accepted by Owner.
    2. Format:
        a. Include submittals using early start dates.
        b. Include all submittals, including those required in the Preliminary Schedule of Submittals.
        c. Indicate week and month anticipated for submittal to Engineer.
        d. Indicate “Priority” submittals where review time can impact Contractor’s schedule.
            1) “Priority” indication will not alter review times specified in Section 01330 - Submittal Procedures.

2) Engineer will endeavor to provide early review of “Priority” submittals where possible.

e. Data for “Or Equals” or substitutions.

3. Submittal of Final Schedule of Submittals shall be a condition precedent to Owner making progress payments after the first 90 calendar days after Notice to Proceed.

D. Provide updated Schedule of Submittals with updated schedules if schedule revisions change listing and timing of submittals.

## 1.11 BASELINE SCHEDULE AND BASELINE SCHEDULE OF VALUES

A. Due date: No more than 45 calendar days after Notice to Proceed.

B. Format:
1. Schedule: Show sequence and interdependence of all activities required for complete performance of all Work, beginning with date of Notice to Proceed and concluding with date of final completion of Contract.
2. Schedule of Values: As specified in Section 01292 - Schedule of Values.

## 1.12 PROGRESS SCHEDULE AND UPDATED SCHEDULE OF VALUES

A. Due date: Submit on a monthly basis as specified in Section 01294 - Applications for Payment.

B. Format: Schedule of Values: As specified in Section 01292 - Schedule of Values.

C. Retainage will not be released until final Schedule Update is provided.

# PART 2 PRODUCTS

Not Used.

# PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01330

## SUBMITTAL PROCEDURES

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes: Requirements and procedures for submittals.

## 1.02 GENERAL INSTRUCTIONS

A. Contractor is responsible to determine and verify field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and check and coordinate each item with other applicable approved shop drawings and Contract Document requirements.

B. Provide submittals:
   1. That are specified or reasonably required for construction, operation, and maintenance of the Work.
   2. That demonstrate compliance with the Contract Documents.

C. Where multiple submittals are required, provide a separate submittal for each specification section.
   1. In order to expedite construction, the Contractor may make more than 1 submittal per specification section, but a single submittal may not cover more than 1 specification section:
      a. The only exception to this requirement is when 1 specification section covers the requirements for a component of equipment specified in another section.
      b. For example, circuit breakers are a component of switchgear. The switchgear submittal must also contain data for the associated circuit breakers, even though they are covered in a different specification section.

D. Prepare submittals in the English language. Do not include information in other languages.

E. Present measurements in customary American units (feet, inches, pounds, etc.).

F. Must be clear and legible, and of sufficient size for presentation of information.

G. Page size other than drawings:
   1. Minimum page size will be 8 1/2 inches by 11 inches:
   2. Maximum page size will be 11 inches by 17 inches.

H. Drawing sheet size:
   1. Maximum sheets size: 22-inch by 34-inch.
      a. Minimum plan scale: 1/8-inch equals 1 foot-0 inches.
      b. Minimum font size: 1/8 inch minimum.

2. 11-inch by 17-inch sheet:
    a. Minimum plan scale: 1/8-inch equals 1 foot-0 inches.
    b. Minimum font size: 1/8 inch minimum.

I. If submittal is more than 80 pages, additionally provide hardcopy.

J. Show dimensions, construction details, wiring diagrams, controls, manufacturers, catalog numbers, and all other pertinent details.

K. Provide submittal information from only 1 manufacturer for a specified product. Submittals with multiple manufacturers for 1 product will be rejected without review.

## 1.03 SUBMITTAL ORGANIZATION

A. Organize submittals in exactly the same order as the items are referenced, listed, and/or organized in the specification section.

B. For submittals that cover multiple devices used in different areas under the same specification section, the submittal for the individual devices must list the area where the device is used.

C. Bookmarks:
1. Bookmarks shall match the table of contents.
2. Bookmark each section (tab) and heading.
3. Drawings: Bookmark at a minimum, each discipline, area designation, or appropriate division.
4. At file opening, display all levels of bookmarks as expanded.

D. Where applicable (i.e. except for drawings, figures, etc.) submittal content shall be electronically searchable utilizing the PDF file as submitted.

E. Thumbnails optimized for fast web viewing.

F. Sequentially number pages within the tabbed sections:
1. Submittals that are not fully indexed and tabbed with sequentially numbered pages, or are otherwise unacceptable, will be returned without review.

G. Attachments:
1. Specification section: Include with each submittal a copy of the relevant specification section.
    a. Indicate in the left margin, next to each pertinent paragraph, either compliance with a check (√) or deviation with a consecutive number (1, 2, 3).
    b. Provide a list of all numbered deviations with a clear explanation and reason for the deviation.
2. Drawings: Include with each submittal a copy of the relevant Drawing, including relevant addendum updates.
    a. Indicate either compliance with a check (√) or deviation with a consecutive number (1, 2, 3).
    b. Provide a list of all numbered deviations with a clear explanation and reason for the deviation.
    c. Provide field dimensions and relationship to adjacent or critical features of the Work or materials.

H. Contractor: Prepare submittal information in sufficient detail to show compliance with specified requirements.
   1. Determine and verify quantities, field dimensions, product dimensions, specified design and performance criteria, materials, catalog numbers, and similar data.
   2. Coordinate submittal with other submittals and with the requirements of the Contract Documents.
   3. Check, verify, and revise submittals as necessary to bring them into conformance with Contract Documents and actual field conditions.

I. Contractor: Prepare “Or Equal” submittal information.
   1. Provide standard submittal requirements.
      a. In addition, provide in sufficient detail to show reason for variance from specified product and impacts.
   2. Provide reason the specified product is not being provided.
   3. Explain the benefits to the Owner for accepting the “Or Equal”.
   4. Itemized comparison of the proposed “Or Equal” with product specified including a list of significant variations:
      a. Design features.
      b. Design dimensions.
      c. Installation requirements.
      d. Operations and maintenance requirements.
      e. Availability of maintenance services and sources of replacement materials.
   5. Reference projects where the product has been successfully used:
      a. Name and address of project.
      b. Year of installation.
      c. Year placed in operation.
      d. Name of product installed.
      e. Point of contact: Name and phone number.
   6. Define impacts:
      a. Impacts to other contracts.
      b. Impacts to other work or products.
   7. Contractor represents the following:
      a. Contractor bears the burden of proof of the equivalency of the proposed “Or Equal”.
      b. Proposed “Or Equal” is equal or superior to the specified product.
      c. Contractor will provide the warranties or bonds that would be provided on the specified product on the proposed “Or Equal”, unless Owner requires a Special Warranty.
      d. Contractor will coordinate installation of accepted “Or Equal” into the Work and will be responsible for the costs to make changes as required to the Work.
      e. Contractor waives rights to claim additional costs caused by proposed “Or Equal” which may subsequently become apparent.

J. Contractor: Prepare substitution submittal information.
   1. Provide standard submittal requirements.
      a. In addition, provide in sufficient detail to show reason for variance from specified product and impacts.
   2. Provide reason the specified product is not being provided.
   3. Explain the benefits to the Owner for accepting the substitution.

4. Itemized comparison of the proposed substitution with product specified including a list of significant variations:
    a. Design features.
    b. Design dimensions.
    c. Installation requirements.
    d. Operations and maintenance requirements.
    e. Availability of maintenance services and sources of replacement materials.
5. Reference projects where the product has been successfully used:
    a. Name and address of project.
    b. Year of installation.
    c. Year placed in operation.
    d. Name of product installed.
    e. Point of contact: Name and phone number.
6. Define impacts:
    a. Impacts to Contract Price.
        1) Required license fees or royalties.
        2) Do not include costs under separate contracts.
        3) Do not include Engineer's costs for redesign or revision of Contract Documents.
    b. Impacts to Contract Time.
    c. Impacts to Contract Scope.
    d. Impacts to other contracts.
    e. Impacts to other work or products.
7. Contractor represents the following:
    a. Contractor shall pay associated costs for Engineer to evaluate the substitution.
    b. Contractor bears the burden of proof of the equivalency of the proposed substitution.
    c. Proposed substitution does not change the design intent and will have equal performance to the specified product.
    d. Proposed substitution is equal or superior to the specified product.
    e. Contractor will provide the warranties or bonds that would be provided on the specified product on the proposed substitution, unless Owner requires a Special Warranty.
    f. Contractor will coordinate installation of accepted substitution into the Work and will be responsible for the costs to make changes as required to the Work.
    g. Contractor waives rights to claim additional costs caused by proposed substitution which may subsequently become apparent.

## 1.04 SUBMITTAL METHOD AND FORMAT

A. Submittal identification numbering:
   1. Number each submittal using the format defined below:

| | Spec Section Number | Dash | Initial Submittal - Sequential Number | Decimal Point | Subsequent Submittal Revisions Sequential Number |
|---|---|---|---|---|---|
| *Example 1 Description* | *Cast-In-Place Concrete* | | *8th initial submittal* | | |
| | 03300 | - | 0008 | | |
| *Example 2 Description* | *Cast-In-Place Concrete* | | *8th initial submittal* | | *First revision to the 8th initial submittal* |
| | 03300 | - | 0008 | . | 1 |

B. Submittals in electronic media format:
   1. General: Provide all information in PC-compatible format using Windows® operating system as utilized by the Owner and Engineer.
   2. Text: Provide text documents and manufacturer's literature in Portable Document Format (PDF).
   3. Graphics: Provide graphic submittals (drawings, diagrams, figures, etc.) utilizing Portable Document Format (PDF).

## 1.05 SUBMITTAL PROCEDURE

A. Engineer: Review submittal and provide response:
   1. Review description:
      a. Engineer will be entitled to rely upon the accuracy or completeness of designs, calculations, or certifications made by licensed professionals accompanying a particular submittal whether or not a stamp or seal is required by Contract Documents or Laws and Regulations.
      b. Engineer's review of submittals shall not release Contractor from Contractor's responsibility for performance of requirements of Contract Documents. Neither shall Engineer's review release Contractor from fulfilling purpose of installation nor from Contractor's liability to replace defective work.
      c. Engineer's review of shop drawings, samples, or test procedures will be only for conformance with design concepts and for compliance with information given in Contract Documents.
      d. Engineer's review does not extend to:
         1) Accuracy of dimensions, quantities, or performance of equipment and systems designed by Contractor.
         2) Contractor's means, methods, techniques, sequences, or procedures except when specified, indicated on the Drawings, or required by Contract Documents.
         3) Safety precautions or programs related to safety which shall remain the sole responsibility of the Contractor.

e. Engineer can Approve or Not Approve any exception at their sole discretion.

2. Review timeframe:
   a. Except as may be provided in technical specifications, a submittal will be returned within 30 days.
   b. When a submittal cannot be returned within the specified period, Engineer will, within a reasonable time after receipt of the submittal, give notice of the date by which that submittal will be returned.
   c. Engineer's acceptance of progress schedule containing submittal review times less than those specified or agreed to in writing by Engineer will not constitute Engineer's acceptance of review times.
   d. Critical submittals:
      1) Contractor will notify Engineer in writing that timely review of a submittal is critical to the progress of Work.
3. Schedule delays:
   a. No adjustment of Contract Times or Contract Price will be allowed due to Engineer's review of submittals, unless all of the following criteria are met:
      1) Engineer has failed to review and return first submission within the agreed upon time frame.
      2) Contractor demonstrates that delay in progress of Work is directly attributable to Engineer's failure to return submittal within time indicated and accepted by Engineer.
4. Review response will be returned to Contractor with one of the following dispositions:
   a. Approved:
      1) No Exceptions:
         a) There are no notations or comments on the submittal and the Contractor may release the equipment for production.
      2) Make Corrections Noted - See Comments:
         a) The Contractor may proceed with the Work, however, all notations and comments must be incorporated into the final product.
         b) Resubmittal not required.
      3) Make Corrections Noted - Confirm:
         a) The Contractor may proceed with the Work, however, all notations and comments must be incorporated into the final product.
         b) Submit confirmation specifically addressing each notation or comment to the Engineer within 15 calendar days of the date of the Engineer's transmittal requiring the confirmation.
   b. Not approved:
      1) Correct and resubmit:
         a) Contractor may not proceed with the Work described in the submittal.
         b) Contractor assumes responsibility for proceeding without approval.
         c) Resubmittal of complete submittal package is required within 30 calendar days of the date of the Engineer's submittal review response.
      2) Rejected - See Remarks:
         a) Contractor may not proceed with the Work described in the submittal.

b) The submittal does not meet the intent of the Contract Documents. Resubmittal of complete submittal package is required with materials, equipment, methods, etc. that meet the requirements of the Contract Documents.

c. Receipt acknowledged - Filed for record:
   1) This is used in acknowledging receipt of informational submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health and safety plans, etc.

d. Receipt acknowledged with comments - Resubmit:
   1) This is used in acknowledging receipt of informational submittals that address means and methods of construction such as schedules and work plans, conformance test reports, health and safety plans, etc. Feedback regarding missing information, conflicting information, or other information that makes it incomplete can be made with comments.

B. Contractor: Prepare resubmittal, if applicable:
   1. Clearly identify each correction or change made.
   2. Include a response in writing to each of the Engineer's comments or questions for submittal packages that are resubmitted in the order that the comments or questions were presented throughout the submittal and numbered consistent with the Engineer's numbering.
      a. Acceptable responses to Engineer's comments are listed below:
         1) "Incorporated" Engineer's comment or change is accepted and appropriate changes are made.
         2) "Response" Engineer's comment not incorporated. Explain why comment is not accepted or requested change is not made. Explain how requirement will be satisfied in lieu of comment or change requested by Engineer.
      b. Reviews and resubmittals:
         1) Contractor shall provide resubmittals which include responses to all submittal review comments separately and at a level of detail commensurate with each comment.
         2) Contractor responses shall indicate how the Contractor resolved the issue pertaining to each review comment. Responses such as "acknowledged" or "noted" are not acceptable.
         3) Resubmittals which do not comply with this requirement may be rejected and returned without review.
         4) Contractor shall be allowed no extensions of any kind to any part of their contract due to the rejection of non-compliant submittals.
         5) Submittal review comments not addressed by the Contractor in resubmittals shall continue to apply whether restated or not in subsequent reviews until adequately addressed by the Contractor to the satisfaction of the reviewing and approving authority.
      c. Any resubmittal that does not contain responses to the Engineer's previous comments shall be returned for Revision and Resubmittal. No further review by the Engineer will be performed until a response for previous comments has been received.
   3. Resubmittal timeframe:
      a. Contractor shall provide resubmittal within 15 days.
      b. When a resubmittal cannot be returned within the specified period, Contractor shall notify Engineer in writing.

4. Review costs:
    a. Costs incurred by Owner as a result of additional reviews of a particular submittal after the second time it has been reviewed shall be borne by Contractor.
    b. Reimbursement to Owner will be made by deducting such costs from Contractor's subsequent progress payments.

## 1.06 PRODUCT DATA

A. Edit submittals so that the submittal specifically applies to only the product furnished.

B. Neatly cross out all extraneous text, options, models, etc. that do not apply to the product being furnished, so that the information remaining is only applicable to the product being furnished.

## 1.07 SHOP DRAWINGS

A. Contractor to field verify elevation, coordinates, and pipe material for pipe tie-in to pipeline or structure prior to the preparation of shop drawings.

B. Indicate project designated equipment tag numbers for submittal of devices, equipment, and assemblies.

# PART 2 PRODUCTS

Not Used.

# PART 3 EXECUTION

Not Used.

END OF SECTION

## ATTACHMENT A - CONTRACTOR SUBMITTAL TRANSMITTAL FORM

## CONTRACTOR SUBMITTAL TRANSMITTAL FORM

| | | | |
|---|---|---|---|
| **Owner:** | Click here to enter text. | **Date:** | MM/DD/YYYY |
| **Contractor:** | Click here to enter text. | **Project No.:** | XXXXX.XX |
| **Project Name:** | Click here to enter text. | **Submittal Number:** | 000 |
| **Submittal Title:** | Click here to enter text. | | |
| **To:** | Click here to enter text. | | |
| **From:** | Click here to enter text. | Click here to enter text. | |
| | Click here to enter text. | Click here to enter text. | |

| **Specification No. and Subject of Submittal / Equipment Supplier** | | | |
|---|---|---|---|
| **Spec ##:** | Spec ##. | **Subject:** | Click here to enter text. |
| **Authored By:** | Click here to enter text. | **Date Submitted:** | XX/XX/XXXX |

| **Submittal Certification** |
|---|
| **Check Either (A) or (B):**<br>☐ (A) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings with no exceptions.<br>☐ (B) We have verified that the equipment or material contained in this submittal meets all the requirements specified in the project manual or shown on the contract drawings except for the deviations listed. |
| Certification Statement: By this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements. |
| **General Contractor's Reviewer's Signature:** |
| **Printed Name:** |
| In the event, Contractor believes the Submittal response does or will cause a change to the requirements of the Contract, Contractor shall immediately give written notice stating that Contractor considers the response to be a Change Order. |
| **Firm:** Click here to enter text. **Signature:** **Date Returned:** XX/XX/XXXX |

| **PM/CM Office Use** | |
|---|---|
| Date Received GC to PM/CM: | |
| Date Received PM/CM to Reviewer: | |
| Date Received Reviewer to PM/CM: | |
| Date Sent PM/CM to GC: | |

## SECTION 01340

## PHOTOGRAPHIC AND VIDEOGRAPHIC DOCUMENTATION

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes requirements for photographs and videos.

B. The purpose of the photographs and videos is to document the condition of the facilities prior to the Contractor beginning work at the Project site, the progress of the Work, and the Project site after Substantial Completion of the Work.

C. The scope of the photographic and videographic documentation shall be the sole responsibility of the Contractor but shall be acceptable to the Engineer.

### 1.02 SUBMITTALS

A. Photographer qualifications.

B. Pre-construction photographs and videos: Submit prior to beginning work at the Project site or prior to the Preconstruction Conference specified in Section 01312 - Project Meetings, whichever occurs earlier.

C. Construction photographs and videos: Submit with each application for payment.

D. Post-construction photographs and videos: Submit with project closeout documents as specified in Section 01770 - Closeout Procedures.

### 1.03 PHOTOGRAPHER

A. Photographer qualified and equipped to photograph either interior or exterior exposures, with lenses ranging from wide angle to telephoto.

B. Submit example work of previous photographs and video recording meeting the requirements of this Section.
   1. Provide to Engineer no later than the pre-construction conference.
   2. Provide photographs used for site examination.
   3. Provide video of site examination.
   4. Provide samples that used same camera and lighting equipment proposed for the Work.
   5. Engineer will review work examples to determine if the quality of the images is acceptable.
   6. Contractor is responsible for modifications to equipment and/or inspection procedures to achieve report material of acceptable quality.
   7. Do not commence Work prior to approval of the material by the Engineer.
   8. Once accepted, the standard report material shall serve as a standard for the remaining work.

## 1.04 KEY PLAN

A. Submit key plan of Project site with notation of vantage points marked for location and direction of each photograph.

B. Include the same label information as the corresponding set of photographs.

## 1.05 PHOTOGRAPHS

A. Provide prints of each photograph for each area of Work.

B. Provide a digital copy of each photograph for each area of Work.
   1. Monthly: Indexed digital flash drive.
   2. Project record documents:
      a. Catalog and index prints in chronological sequence.
      b. Include typed table of contents.

## 1.06 PRE-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

A. Provide photographs and video of the condition entire site including each area of Work prior to the start of Work.
   1. Areas to be photographed and videoed shall include the site of the Work and all existing facilities, either on or adjoining the Project site, including the interior of existing structures, that could be damaged as a result of the Contractor's Work.
   2. Include general condition, structures, vegetation, staging, storing, working, parking areas and excavation areas.

## 1.07 CONSTRUCTION PHOTOGRAPHS AND VIDEOS

A. Provide photographs and videos of construction in each area of Work throughout progress of Work including a key plan designating where each photograph was taken.

B. Take site and interior photographs and videos from differing directions of building demolition, pre-excavation, footing excavation, soil testing, utility crossings, installation of bypass piping, excavation of access pits, installation of lining system in pipes, rehabilitation of manholes, building modifications, utilities, electrical and instrumentation modifications, and other applicable activities indicating relative progress of the work.

C. Take photos a maximum of 7 calendar days prior to submittal.

## 1.08 POST-CONSTRUCTION PHOTOGRAPHS AND VIDEOS

A. Provide photographs of the entire site including each area of Work at the completion of Work.
   1. Include general condition, structures, vegetation, staging, storing, working, parking areas and excavation areas.
   2. Take photos and video from same points in same direction as pre-construction examination.

B. Submittal of photos and videos is a condition of final payment.

## PART 2 PRODUCTS

### 2.01 MEDIA

A. Paper media:
   1. Commercial grade, glossy surface, acid-free photographic paper.
   2. Submit 3 prints of each photographic view within 7 days of taking photographs.
   3. Format:
      a. Ground photos: Color, matte finish, 8-1/2-inch by 11-inch size, mounted on soft card stock.
      b. Aerial photos: Color, matte finish, 11-inch by 17-inch size, mounted on soft card stock.
      c. Mount each print in a separate, archival type, non-glare, 3-hole punched protector.
   4. Identification: On photograph, provide the following information:
      a. Name of project.
      b. Date stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
      c. Description of vantage point, indicating location and direction by compass point.
   5. Provide a suitably sized 3-ring binder for each set of prints.
      a. Furnish binders in sufficient quantities to hold entire set of prints taken for the duration of the Contract.
      b. Label binder spine and front with project name.

B. Digital media:
   1. Flash drive compatible with current Microsoft Windows.
   2. Provide photos as individual, indexed JPG files with the following characteristics:
      a. Compression shall be set to preserve quality over file size.
      b. Highest resolution JPG images shall be submitted. Resizing to a smaller size when high resolution JPGs are available shall not be permitted.
      c. JPG image resolution shall be 5 megapixels at 2,400 by 1,800 or higher.
      d. Images shall have rectangular clean images. Artistic borders, beveling, drop shadows, etc., are not permitted.
   3. Identification: On photograph, provide the following information:
      a. Name of project.
      b. Date stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
      c. Description of vantage point, indicating location and direction by compass point.

C. Videos:
   1. Video quality shall be 720p HD or greater in MPG, AVCHD, AVI, or MP4 format.
   2. Digital color video format.
   3. Provide audio portion of the composite video sufficiently free from electrical interference and background noise to provide complete intelligibility of oral report.
   4. Identification: On each copy provide a label with the following information:
      a. Name of project.
      b. Date video was recorded.

5. Submit 1 copy of each video within 7 days of recording.
6. Display continuous running time.
7. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01410

## REGULATORY REQUIREMENTS

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Regulatory authorities and codes.

### 1.02 AUTHORITIES HAVING JURISDICTION (AHJ)

A. Also referred to as the permitting agency.

B. Building Department: West Jordan City.

C. Fire Department: West Jordan City.

### 1.03 APPLICABLE CODES

A. International Code Council (ICC):
   1. Electrical code:
      a. National Fire Protection Association (NFPA), NFPA 70: National Electrical Code (NEC), 2020.
   2. Fire code:
      a. International Fire Code (IFC), 2021.
   3. Mechanical code:
      a. International Mechanical Code (IMC), 2021.
   4. Plumbing code:
      a. International Plumbing Code (IPC), 2021.

B. Products in contact with drinking water:
   1. Materials in contact with drinking waters: In accordance with NSF 61 and NSF 372.
      a. Certification by an independent ANSI accredited third party, including, but not limited to, NSF International, as being lead-free.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01500

## TEMPORARY FACILITIES AND CONTROLS

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes:
   1. Furnishing, maintaining, and removing construction facilities and temporary controls, including temporary utilities, construction aids, barriers and enclosures, security, access roads, temporary controls, project sign, field offices and sheds, and removal after construction.

## 1.02 REFERENCE

A. American National Standards Institute (ANSI).

B. Occupational Safety and Health Administration (OSHA).

## 1.03 SUBMITTALS

A. Submit as specified in Section 01330 - Submittal Procedures.

## 1.04 TEMPORARY UTILITIES

A. Temporary electrical power:
   1. Owner provides the power.
      a. The Contractor is responsible for providing breakers, switches, transformers, and cables required to obtain temporary power from Owner's location(s).
      b. The Owner will pay charges for construction power obtained from these locations.

B. Temporary electrical lighting:
   1. In work areas, provide temporary lighting sufficient to maintain lighting levels during working hours not less than lighting levels required by OSHA and state agency which administers OSHA regulations where Project is located.
   2. When available, permanent lighting facilities may be used in lieu of temporary facilities:
      a. Prior to final completion of the Work, replace bulbs, lamps, or tubes used by Contractor for lighting.

C. Temporary water:
   1. Non-potable water is available from hydrants or hose valves within plant without cost. When combined demand of the Work and plant exceeds plant supply capacity, provide additional temporary supply capacity.

D. Temporary sanitary facilities:
   1. Provide suitable and adequate sanitary facilities that are in compliance with applicable Laws and Regulations.

2. Existing facility use is not allowed.
3. At completion of the Work, remove sanitary facilities and leave site in neat and sanitary condition.

E. Temporary fire protection:
1. Provide fire protection required to protect the Work and ancillary facilities.

F. First aid: Post first aid facilities and information posters conforming to requirements of OSHA and other applicable Laws and Regulations in readily accessible locations.

G. Utilities in existing facilities: As specified in Section 01140 - Work Restrictions.

H. Temporary piping systems:
1. Submit layout drawings showing proposed routing of piping, including proposed pipe support and pipe restraint locations.
2. Submit product data for piping, fittings, appurtenances, restraints, supports, and other components of the temporary piping system.
3. Submit information at least 28 days prior to when each temporary piping system is scheduled to be installed and allow 14 days for review and comment.

## 1.05 CONSTRUCTION AIDS

A. Provide railings, kick plates, enclosures, safety devices, and controls required by Laws and Regulations and as required for adequate protection of life and property.

B. Use construction hoists, elevators, scaffolds, stages, shoring, and similar temporary facilities of ample size and capacity to adequately support and move loads.

C. Design temporary supports with adequate safety factor to ensure adequate load bearing capability:
1. When requested, submit design calculations by professional registered engineer prior to application of loads.
2. Submitted design calculations are for information and record purposes only.

D. Accident prevention:
1. Exercise precautions throughout construction for protection of persons and property.
2. Observe safety provisions of applicable Laws and Regulations.
3. Guard machinery and equipment, and eliminate other hazards.
4. Make reports required by authorities having jurisdiction, and permit safety inspections of the Work.
5. Before commencing construction work, take necessary action to comply with provisions for safety and accident prevention.

E. Barricades:
1. Place barriers at ends of excavations and along excavations to warn pedestrian and vehicular traffic of excavations.
2. Provide barriers with flashing lights after dark.
3. Keep barriers in place until excavations are entirely backfilled and compacted.
4. Barricade excavations to prevent persons from entering excavated areas in streets, roadways, parking lots, treatment plants, or other public or private areas.

F. Warning devices and barricades: Adequately identify and guard hazardous areas and conditions by visual warning devices and, where necessary, physical barriers:
   1. Provide devices in accordance with minimum requirements of OSHA and State agency which administers OSHA regulations where Project is located.

G. Hazards in public right-of-way:
   1. Comply with local jurisdiction standards and requirements for right-of-way barricades and other safety devices.
   2. Mark at reasonable intervals, trenches, and other continuous excavations in public right-of-way, running parallel to general flow of traffic, with traffic cones, barricades, or other suitable visual markers during daylight hours:
      a. During hours of darkness, provide markers with torches, flashers, or other adequate lights.
   3. At intersections or for pits and similar excavations, where traffic may reasonably be expected to approach head on, protect excavations by continuous barricades:
      a. During hours of darkness, provide warning lights at close intervals.

H. Hazards in protected areas: Mark or guard excavations in areas from which public is excluded, in manner appropriate for hazard.

I. Above grade protection: On multi-level structures, provide safety protection that meets requirements of OSHA and State agency which administers OSHA regulations where Project is located.

J. Protect existing structures, trees, shrubs, and other items to be preserved on Project site from injury, damage, or destruction by vehicles, equipment, worker or other agents with substantial barricades or other devices commensurate with hazards.

K. Fences:
   1. Enclose temporary offices and storage areas with fence adequate to protect temporary facilities against acts of theft, violence, and vandalism.
   2. Protect temporary and permanent openings and close openings in existing fences to prevent intrusion by unauthorized persons.
      a. Bear responsibility for protection of plant and material on site of the Work when openings in existing fences are not closed.
   3. During night hours, weekends, holidays, and other times when no work is performed at site, provide temporary closures or enlist services of security guards to protect temporary openings.
   4. Fence temporary openings when openings are no longer necessary.

## 1.06 SECURITY

A. Make adequate provision for protection of the work area against fire, theft, and vandalism, and for protection of public against exposure to injury.

## 1.07 ACCESS ROADS

A. General:
   1. Build and maintain access roads to and on site of the Work to provide for delivery of material and for access to existing and operating plant facilities on site.

2. Build and maintain dust free roads which are suitable for travel at 10 miles per hour.

B. Off-site access roads:
   1. Build and maintain graded earth roads.
   2. Build roads only in public right-of-way or easements obtained by Owner.
   3. Obtain rights-of-way or easements when electing to build along other alignment.

C. On-site access roads:
   1. Maintain access roads to storage areas and other areas to which frequent access is required.
   2. Maintain similar roads to existing facilities on site of the Work to provide access for maintenance and operation.
   3. Protect buried vulnerable utilities under temporary roads with steel plates, wood planking, or bridges.
   4. Maintain on-site access roads free of mud.
   5. Provide controls to prevent vehicles leaving the site from tracking mud off the site onto the public right-of-way.

## 1.08 TEMPORARY CONTROLS

A. Dust control:
   1. Prevent dust nuisance caused by operations, unpaved roads, excavation, backfilling, demolition, or other activities.
   2. Control dust by sprinkling with water, use of dust palliatives, modification of operations, or other means acceptable to agencies having jurisdiction.

B. Noise control:
   1. Comply with noise and work hours regulations by local jurisdiction.
   2. In or near inhabited areas, particularly residential, perform operations in manner to minimize noise.
   3. In residential areas, take special measures to suppress noise during night hours.

C. Mud control:
   1. Prevent mud nuisance caused by construction operations, unpaved roads, excavation, backfilling, demolition, or other activities.

## 1.09 REMOVAL

A. Remove temporary facilities and controls before inspection for final completion or when directed.

B. Clean and repair damage caused by installation or use of temporary facilities.

C. Remove underground installations to minimum depth of 24 inches and grade to match surrounding conditions.

D. Restore existing facilities used during construction to specified or original condition.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01600

## PRODUCT REQUIREMENTS

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes: Requirements for tangible materials, raw or manufactured, that become part of the project.

## 1.02 REFERENCES

A. NSF International (NSF):
   1. 60 - Technical Requirements.
   2. 61 - Drinking Water System Components - Health Effects.

## 1.03 DEFINITIONS

A. Certificates: Documents that the work is in accordance with the Contract Documents.

B. Extra stock materials: Extra stock materials provided for the Owner's use in facility operation and maintenance.

C. Manufacturer's instructions:
   1. Stipulations, directions, and/or recommendations issued form by the manufacturer of the product addressing handling, installation, erection, and/or application of the product.

D. Products:
   1. Raw materials, finished goods, equipment, systems, and shop fabrications.

E. Product data:
   1. Public information about the product which is found in the manufacturer's catalogs or on their web site including catalog pages, data sheets, bulletins, layout drawings, exploded views, and brochures.

F. Samples:
   1. As defined in the General Conditions and Supplementary Conditions.
   2. Full-size actual products or pieces of products intended to illustrate the products to be incorporated into the project. Sample submittals are often necessary for such characteristics as colors, textures, and other appearance issues.

G. Schedules:
   1. Product parts and materials lists.

H. Shop drawings:
   1. As defined in the General Conditions and Supplementary Conditions.

2. Shop drawings are prepared specifically for the project to illustrate details, dimensions, and other data necessary for satisfactory fabrication or construction that are not shown in the contract documents. Shop drawings could include graphic line-type drawings and single-line diagrams.

I. Spare parts:
   1. Duplicate parts necessary to replace a damaged or worn part of the product.
   2. Consumables such as operating fluids.

J. Special tools:
   1. Special wrenches, gauges, circuit setters, and other similar devices required for the proper operation or maintenance of a system that would not normally be in the Owner's tool kit and that have been specifically made for use on a product for assembly, disassembly, repair, or maintenance.

K. Submittals:
   1. As defined in the General Conditions and Supplementary Conditions.
   2. Samples, product data, shop drawings, and others that demonstrate how Contractor intends to conform to the Contract Documents.

## 1.04 SUBMITTALS

A. Products in contact with drinking water:
   1. Provide certification for by an independent ANSI accredited third party.
      a. In accordance with NSF 61.
      b. Weighted average lead content of less than 0.25 percent in accordance with NSF 372.

## 1.05 GENERAL REQUIREMENTS

A. Provide products by same manufacturer when products are of similar nature, unless otherwise specified.

B. Provide like parts of duplicate units that are interchangeable.

C. Provide equipment or product that has not been in service prior to delivery, except as required by tests.

D. Provide products produced by manufacturers regularly engaged in the production of these products.

# PART 2 PRODUCTS

## 2.01 MATERIAL

A. Dissimilar metals:
   1. Separate contacting surfaces with dielectric material.
   2. Neoprene, bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other materials as specified.

B. Products in contact with drinking water or water in the process of becoming drinking water in accordance with NSF 60 or NSF 61 by an independent ANSI accredited third party.

C. Edge grinding:
   1. Sharp projections of cut or sheared edges of ferrous metals which are not to be welded shall be ground to a radius required to ensure satisfactory paint adherence.

D. Use anti-galling compound on threads of stainless steel fasteners during factory assembly.

E. Provide anti-galling compound with stainless steel fasteners shipped for field assembly.

F. Aluminum in contact with concrete or masonry: Apply epoxy mastic as specified in Section 09960 - High-Performance Coatings, coating system EPX-M-5.

G. Provide new pipe manufactured for the project, not from manufacturer's inventory, under the following conditions:
   1. Pipes 24-inch diameter and larger.
   2. Pipe manufactured more than 6 months prior to delivery if the pipe material or its coating is subject to UV degradation.
   3. Ductile iron pipe with cement-mortar lining manufactured more than 6 months prior to delivery to the project.
   4. Steel pipe 6-inch diameter and larger.

H. Mark each length of pipe in accordance with applicable standards.

## 2.02 PRODUCT SELECTION

A. Provide products with Engineer approved submittals.

B. When products are specified by standard or specification designations of technical societies, organizations, or associations only, provide products that meet or exceed reference standard and Specifications.

C. When products are specified with names of manufacturers but no model numbers or catalog designations, provide Products by one of named manufacturers that meet or exceed Specifications.

D. When products are specified with names of manufacturers and model numbers or catalog designations, provide Products with model numbers or catalog designations by one of named manufacturers.

E. When products are specified with names of manufacturers, but with brand or trade names, model numbers, or catalog designations by one manufacturer only, provide:
   1. Products specified by brand or trade name, model number, or catalog designation.
   2. Products by one of named manufacturers proven, in accordance with requirements for an "or equal", including Engineer’s approval, to meet or exceed quality, appearance and performance of specified brand or trade name, model number, or catalog designation.

F. When Products are specified with only one manufacturer followed by "or Equal," provide:
   1. Products meeting or exceeding Specifications by specified manufacturer.
   2. Engineer deemed "or equal" evidenced by an approved shop drawing or other written communication.

## 2.03 SHIPMENT

A. Requirements prior to shipment of equipment:
   1. Engineer approved shop drawings.
   2. Engineer approved Manufacturer’s Certificate of Source Testing as specified in the Technical Sections.
   3. Draft operations and maintenance manuals, as specified in Section 01782 - Operation and Maintenance Manuals, when required by specifications.

B. Prepare products for shipment by:
   1. Tagging or marking to agree with delivery schedule or shop drawings.
   2. Including complete packing lists and bills of material with each shipment.
   3. Packaging products to facilitate handling and protection against damage during transit, handling, and storage.
   4. Securely attach special instructions for proper field handling, storage, and installation to each piece of equipment before packaging and shipment.

C. Transport products by methods that avoid product damage.

D. Deliver products in undamaged condition in manufacturer's unopened containers or packaging.

## 2.04 SPARE PARTS, MAINTENANCE PRODUCTS, AND SPECIAL TOOLS

A. Provide spare parts and maintenance products as required by Technical Sections.
   1. Submit completed Attachment A - Spare Parts, Maintenance Products, and Special Tools Inventory List.

B. Provide one set of special tools required to install or service the equipment.

C. Box, tag, and clearly mark items.

D. Contractor is responsible for spare parts, maintenance products, and special tools until acceptance by Owner.

# PART 3 EXECUTION

## 3.01 DELIVERY AND HANDLING

A. Handle equipment in accordance with manufacturer's instructions.

B. Provide construction equipment and personnel to handle products by methods to prevent soiling or damage.

C. Upon delivery, promptly inspect shipments:
   1. Verify compliance with Contract Documents, correct quantities, and undamaged condition of products.
   2. Acceptance of shipment does not constitute final acceptance of equipment.

D. Spare parts, maintenance products, special tools.
   1. Immediately store in accordance with the manufacturer's instructions.
   2. Store spare parts, maintenance products, and special tools in enclosed, weather-proof, and lighted facility during the construction period.
      a. Protect parts subject to deterioration, such as ferrous metal items and electrical components with appropriate lubricants, desiccants, or hermetic sealing.
   3. With Owner's written request for advanced delivery of spare parts, maintenance products, and special tools.
      a. Deliver requested items and deduct them from the inventory list.
      b. Provide transmittal documentation.
   4. Store large items individually:
      a. Weight: Greater than 50 pounds.
      b. Size: Greater than 24 inches wide by 18 inches high by 36 inches long.
      c. Clearly labeled:
         1) Equipment tag number.
         2) Equipment manufacturer.
         3) Subassembly component, if appropriate.
         4) Store smaller items in spare parts box:
      d. Weight: Less than 50 pounds.
      e. Size: Less than 24 inches wide by 18 inches high by 36 inches long.
      f. Clearly labeled:
         1) Equipment tag number.
         2) Equipment manufacturer.
         3) Subassembly component, if appropriate.
         4) Spare parts and special tools box:
      g. Box material: Waterproof, corrosion resistant.
      h. Hinged cover:
         1) Locking hasp.
      i. Spare parts inventory list taped to underside of cover.
      j. Clearly labeled:
         1) The words “Spare Parts and/or Special Tools”.
         2) Equipment tag number.
         3) Equipment manufacturer.
         4) Subassembly component, if appropriate.

## 3.02 STORAGE AND PROTECTION

A. Immediately store and protect products until installed in Work.

B. Furnish covered, weather-protected storage structures providing a clean, dry, noncorrosive environment for mechanical equipment, valves, architectural items, electrical and instrumentation equipment and special equipment to be incorporated into this project.
   1. Storage of equipment shall be in strict accordance with the “instructions for storage” provided by the manufacturer.
      a. Including connection of heaters, lubrication, rotating shafts, etc.

2. The Contractor shall furnish a copy of the manufacturer's instructions for storage to the Engineer prior to storage of equipment and materials.

C. Store products with seals and legible labels intact.

D. Protect painted or coated surfaces against impact, abrasion, discoloration, and damage.
   1. Repaint or recoat damaged painted or coated surfaces.

E. Exterior storage of fabricated products:
   1. Place on aboveground supports that allow for drainage.
   2. Cover products subject to deterioration with impervious sheet covering.
   3. Provide ventilation to prevent condensation under covering.

F. Store moisture sensitive products in watertight enclosures.

G. Store loose granular materials on solid surfaces in well-drained area.
   1. Prevent materials mixing with foreign matter.
   2. Provide access for inspection.

H. Payment will not be made for equipment and materials improperly stored or stored without providing Engineer with the manufacturer's instructions for storage.

I. Provide an equipment log and stored products log with monthly pay applications.
   1. Data includes as a minimum: The storage location, equipment or product identification, date stored, date of inspection/maintenance, date removed from storage, copy of manufacturer's recommended storage guidelines, description of inspection/maintenance activities performed, and signature of party performing inspection/maintenance.

## 3.03 INSTALLATION

A. Inspect hardware or fittings prior to product installation.

B. se anti-galling compound on stainless steel threads used for field assembly.

## 3.04 PROTECTION AFTER INSTALLATION

A. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations.
   1. Remove covering when no longer needed.
   2. Replace corroded, damaged, or deteriorated equipment, product, or parts before acceptance of the project.

B. Update equipment log with monthly pay applications.
   1. Data includes as a minimum: Description of maintenance activities performed in accordance with the manufacturer's recommendation and industry standards and signature of party performing maintenance.

END OF SECTION

## APPENDIX A - SPARE PARTS, MAINTENANCE PRODUCTS, AND SPECIAL TOOLS INVENTORY LIST

## SPARE PARTS, MAINTENANCE PRODUCTS, AND SPECIAL TOOLS INVENTORY LIST

**Owner:** _____ **Date:** _____

**Contractor:** _____ **Project No.:** _____

**Project Name:** _____

| Inventory List | | | | |
|---|---|---|---|---|
| Spec Number: _____ | | Spec Title _____ | | |
| Equipment Tag No.: _____ | | Equipment Manufacturer: _____ | | |
| **Quantity** | **Subassembly Component** | **Description** | **Manufacturer's Part Number** | **Storage Location** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

## SECTION 01610

## PROJECT DESIGN CRITERIA

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Project design criteria such as temperature and site elevation.

### 1.02 PROJECT DESIGN CRITERIA

A. Equipment and materials for the project are to be suitable for performance in wastewater treatment plant environment and under following conditions:
   1. Design temperatures are:
      a. Outdoor temperatures: 0 to 105 degrees Fahrenheit.
   2. Design groundwater depth: 5 feet.
   3. Freeze-thaw conditions**.**
   4. Moisture conditions: Defined in individual equipment sections.
   5. Site elevation: Approximately 4,300 feet above mean sea level.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01738

## SELECTIVE ALTERATIONS AND DEMOLITION

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes:
   1. Cutting or modifying of existing and new work.
   2. Partial demolition of structures.
   3. In-place abandonment of pipe.

## 1.02 REFERENCES

A. American National Standards Institute (ANSI):
   1. A10.6 - Safety and Health Program Requirements for Demolition Operations.

B. International Concrete Repair Institute (ICRI):
   1. Guideline No. 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.
   2. Guideline No. 310.3R - Guide for the Preparation of Concrete Surfaces for Repair Using Hydrodemolition Methods.

## 1.03 DEFINITIONS

A. Chipping hammer: A hand-operated electrical or pneumatic demolition device for removal of hardened concrete or masonry materials having a weight of less than 15 pounds and an impact frequency of greater than 2,000 blows/minute.

B. Concrete breaker: A hand-operated electrical or pneumatic demolition device for removal of hardened concrete or masonry materials having a weight greater or impact frequency less than the limits defined for a chipping hammer.

C. Coring equipment: Non-impact rotary drill with diamond cutting edges.

D. Heavy abrasive blast: Cleaning procedure by which various abrasives materials, or steel shot, are forcibly propelled by high pressure against a surface to remove loose material and produce a concrete surface roughened to ICRI Surface Profile CSP-7, or higher, as specified in ICRI 301.3R.

## 1.04 DESCRIPTION OF WORK

A. The work includes partial demolition, cutting, and modifying of existing facilities, utilities, and/or structures.

B. These facilities may be occupied and/or operational. Satisfactory completion of the work will require that the Contractor plan activities carefully to work around unavoidable obstacles and to maintain overall stability of structures and structural elements. It will further require restoration of existing facilities, utilities, and

structures that are to remain in place and that are damaged by demolition or removal operations.

## 1.05 SUBMITTALS

A. General:
   1. Submit specified in Section 01330 - Submittal Procedures.

B. Shop drawings: Include:
   1. The location of all embedded items shall be documented using diagrams and/or other media that clearly show dimensions and locations of existing structural elements, existing embedded items and any new embedded items and their relationship to each other.

C. Submittals for information only:
   1. Permits and notices authorizing demolition.
   2. Certificates of severance of utility services.
   3. Permit for transport and disposal of debris.
   4. Selective Demolition Plan.
   5. Pipe Abandonment Plan.

D. Quality assurance submittals:
   1. Qualifications of non-destructive testing agency/agencies.

E. Project record documents.

F. Drawings and/or other media documenting locations of service lines and capped utilities.

## 1.06 QUALITY ASSURANCE

A. Qualifications:
   1. Assign relocation, removal, cutting, coring and patching to trades and workers qualified to perform the Work in manner that causes the least damage and that provides means of returning surfaces to an appearance at least equal to that of the surrounding areas unaffected by the Work.
   2. Non-destructive testing agencies: Minimum of 5 years' experience performing non-destructive testing for location of steel reinforcement in existing concrete under conditions similar to that required for this Work.

## 1.07 SEQUENCING

A. Perform Work in sequences and within times specified in Section 01140 - Work Restrictions.

B. If the facility or utility to be modified cannot be removed from service, perform the Work while the facility is in operation using procedures and equipment that do not jeopardize operation or materially reduce the efficiency of that facility.

C. Coordinate the Work with operation of the facility:
   1. Do not begin alterations of designated portions of the Work until specific permission for activities in each area has been granted by Owner in writing.
   2. Engineer will coordinate the planned procedure with facility manager.

3. Complete Work as quickly and with as little delay as possible.

D. Owner will cooperate in every way practicable to assist in expediting the Work.

E. When necessary for the proper operation or maintenance of portions of the facility, reschedule operations so the Work will not conflict with required operations or maintenance.

## 1.08 REGULATORY REQUIREMENTS

A. Dispose of debris in accordance with governing regulatory agencies.

B. Comply with applicable air pollution control regulations.

C. Obtain permits for building demolition, transportation of debris to disposal site and dust control.

## 1.09 PREPARATION

## 1.10 PROJECT CONDITIONS

A. Do not interfere with use of adjacent structures and elements of the facility not subject to the Work described in this Section. Maintain free and safe passage to and from such facilities.

B. Provide, erect, and maintain barricades, lighting, guardrails, and protective devices as required to protect building occupants, general public, workers, and adjoining property:
   1. Do not close or obstruct roadways without permits.
   2. Conduct operations with minimum interference to public or private roadways.

C. Prevent movement, settlement, or collapse of structures adjacent services, sidewalks, driveways and trees
   1. Provide and place bracing or shoring.
   2. Cease operations and notify Engineer immediately when safety of structures appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.
   3. Assume liability for movement, settlement, or collapse. Promptly repair damage.

D. Arrange and pay for capping and plugging utility services. Disconnect and stub off.
   1. Notify affected utility company in advance and obtain approval before starting demolition.
   2. Place markers to indicate location of disconnected services.

E. Unknown conditions:
   1. The drawings may not represent all conditions at the site and adjoining areas. Compare actual conditions with drawings before commencement of Work.
   2. Existing utilities and drainage systems below grade are located from existing documents and from surface facilities such as manholes, valve boxes, area drains, and other surface fixtures.
   3. If existing active services encountered are not indicated or otherwise made known to the Contractor and interfere with the permanent facilities under

construction, notify the Engineer in writing, requesting instructions on their disposition. Take immediate steps to ensure that the service provided is not interrupted, and do not proceed with the Work until written instructions are received from the Engineer.

## PART 2 EXECUTION

### 2.01 EXAMINATION

A. Prior to beginning selective demolition operations, perform a thorough inspection of the facility and site, and report to the Engineer defects and structural damage to or deterioration of existing construction to remain.

B. Examine areas affected by the Work and verify the following conditions prior to commencing demolition:
   1. Disconnection of utilities as required.
   2. That utilities serving occupied or active portions of surrounding facilities will not be disturbed, except as otherwise indicated.

C. If unsatisfactory conditions exist, notify the Engineer, and do not begin demolition operations until such conditions have been corrected.

### 2.02 PREPARATION

A. Protection:
   1. Erect weatherproof closures to protect the interior of facilities and elements or equipment that are not designed for exposure to the weather. Provide temporary heat, cooling, and humidity control as necessary to prevent damage to existing and new construction. Maintain existing exiting paths and/or provide new paths in compliance with Building Code requirements.
   2. Erect and maintain dustproof partitions as required to prevent spread of dust, to other parts of building. Maintain negative pressure in the area where the Work is being performed to prevent the accidental spread of dust and to minimize the spread of fumes related to the Work.
   3. Upon completion of Work, remove weatherproof closures and dustproof partitions, and repair damaged surfaces to match adjacent surfaces.
   4. Provide and maintain protective devices to prevent injury from falling objects.
   5. Locate guardrails in stairwells and around open shafts to protect workers. Post clearly visible warning signs.
   6. Cause as little inconvenience to adjacent building areas as possible.
   7. Protect landscaping and existing construction to remain from damage or displacement.
   8. Carefully remove designated materials and equipment to be salvaged by Owner or reinstalled.
   9. Store and protect materials and equipment to be reinstalled.

### 2.03 DEMOLITION

A. General:
   1. Perform demolition work in accordance with ANSI A10.6.
   2. Conduct demolition and removal work in a manner that will minimize dust and flying particles.

a. Use water or dust palliative when necessary to prevent airborne dust.
b. Provide and maintain hoses and connections to water main or hydrant.

3. Sawcut concrete to establish the edges of demolition, wherever possible.
   a. Do not use a concrete breaker within 6 inches of reinforcing or structural metals that are designated to remain.
   b. At edges that are not sawcut, remove the final 6 inches of material with a chipping hammer as defined herein. At surfaces where material is removed with a chipping hammer, follow with a heavy abrasive blast to remove all loose material and microcracking.
   c. Alternate techniques to remove concrete may be used if acceptable to the Engineer; however, techniques other than those deemed by ICRI Guideline No. 310.2R to provide a low risk of introducing microcracking will require a subsequent procedure to remove loose material.

4. Remove materials carefully, to the extent indicated and as required.
   a. Provide neat and orderly junctions between existing and new materials.
   b. Use methods that terminate surfaces in straight lines at natural points of division.
5. Do not remove anything beyond the limits of Work indicated without prior written authorization of the Engineer. If in doubt about whether to remove an item, obtain written authorization of the Engineer prior to proceeding.
6. Perform work so as to provide the least interference and most protection to existing facilities to remain.

B. Immediately upon discovery, remove and dispose of contaminated, vermin-infested, or dangerous materials using safe means that will not endanger health of workers and public.

C. Remove trees and shrubs within marked areas; clear undergrowth and dead plant material as specified in Section 02300 - Earthwork.

D. Backfill open pits and holes caused by demolition as specified in Section 02300 - Earthwork.

E. Rough grade areas affected by demolition.

F. Remove demolished materials, tools, and equipment upon completion of demolition.

## 2.04 RESTORATION

A. General:
   1. Repair damage caused by demolition to conditions equal to those that existing prior to beginning of demolition.
      a. Patch and replace portions of existing finished surfaces that are damaged, lifted, and discolored with matching material. Refinish patched portion surfaces in a manner which produces uniform color and texture to entire surface.
      b. When existing finish cannot be matched, refinish entire surface to nearest change of plane where angle of change exceeds 45 degrees.
   2. The cost of repairs shall be at the Contractor’s expense at no increase in the Contract Price.

3. When new construction abuts or finishes flush with existing construction, make smooth transitions. Match finish of existing construction.
4. Where partitions are removed, patch floors, walls, and ceilings with finish materials that match existing materials.
5. Where removal of partitions results in adjacent spaces becoming one, rework floors, walls, and ceilings to provide smooth planes without breaks, steps, or bulkheads.
6. Where changes of plane exceed 2 inches, request instructions for making transition.
7. Trim and refinish existing doors as necessary to clear new floors.
8. Match patched construction with adjacent construction in texture and appearance so that patch or transition is invisible at 5-foot distance.
9. When finished surfaces are cut so that smooth transition is impossible, terminate existing surface in neat manner along straight line at natural line of division and provide appropriate trim.

## 2.05 FIELD QUALITY CONTROL

A. Do not proceed with demolition without Engineer's inspection of lay out.

B. Do not deviate from the submitted demolition plan without notifying the Engineer prior to Work.

END OF SECTION

## SECTION 01770

## CLOSEOUT PROCEDURES

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Contract closeout requirements.

### 1.02 REFERENCES

A. American Water Works Association (AWWA).

### 1.03 FINAL CLEANING

A. Perform final cleaning prior to inspections for Final Completion

B. Employ skilled workers who are experienced in cleaning operations.

C. Use cleaning materials which are recommended by manufacturers of surfaces to be cleaned.

D. Prevent scratching, discoloring, and otherwise damaging surfaces being cleaned.

E. Remove dust, cobwebs, and traces of insects and dirt.

F. Clean grease, mastic, adhesives, dust, dirt, stains, fingerprints, paint, blemishes, sealants, plaster, concrete, and other foreign materials from sight-exposed surfaces, and fixtures and equipment.

G. Remove non-permanent protection and labels.

H. Polish waxed woodwork and finish hardware.

I. Wax and buff hard floors, as applicable.

J. Wash and polish glass, inside and outside.

K. Wash and shine mirrors.

L. Polish glossy surfaces to clear shine.

M. Vacuum carpeted and soft surfaces.

N. Clean permanent filters and replace disposable filters when heating, ventilation, and air conditioning units were operated during construction.

O. Clean ducts, blowers, and coils when units were operated without filters during construction.

P. Clean light fixtures and replace burned-out or dim lamps.

Q. Probes, elements, sample lines, transmitters, tubing, and enclosures have been cleaned and are in like-new condition.

## 1.04 WASTE DISPOSAL

A. Arrange for and dispose of surplus materials, waste products, and debris off-site:
   1. Prior to making disposal on private property, obtain written permission from Owner of such property.

B. Do not fill ditches, washes, or drainage ways which may create drainage problems.

C. Do not create unsightly or unsanitary nuisances during disposal operations.

D. Maintain disposal site in safe condition and good appearance.

E. Complete leveling and cleanup prior to Final Completion of the Work.

## 1.05 TOUCH-UP AND REPAIR

A. Touch-up or repair finished surfaces on structures, equipment, fixtures, and installations that have been damaged prior to inspection for Final Completion

B. Refinish or replace entire surfaces which cannot be touched-up or repaired satisfactorily.

## 1.06 CLOSEOUT DOCUMENTS

A. Submit the following Closeout Submittals before Substantial Completion:
   1. Punch list of items to be completed or corrected with the request for issuance of Substantial Completion.
   2. Evidence of Compliance with Requirements of Governing Authorities.
   3. Project Record Documents.
   4. Approved Operation and Maintenance Manuals.
   5. Approved Warranties and Bonds.
   6. Keys and Keying Schedule.
   7. Completed contract requirements for commissioning and process start-up.

B. Submit the following Closeout Submittals before final completion of the Work and at least 7 days prior to submitting Application for Final Payment:
   1. Punch list of items have been completed and Engineer and Owner are satisfied that all deficiencies are corrected.
   2. Evidence of Payment and Release of Liens or Stop Payment Notices as outlined in Conditions of the Contract.
   3. Release of claims as outlined in Conditions of the Contract.
   4. Submit certification of insurance for products and completed operations, as specified in the General Conditions.
   5. Final statement of accounting.
   6. Submit Final (As-Built) Schedule as specified in Section 01321 - Schedules and Reports.

## 1.07 PROJECT RECORD DOCUMENTS

A. Maintain at Project site, available to Owner and Engineer, 1 copy of the Contract Documents, shop drawings, and other submittals in good order:
   1. Mark and record field changes and detailed information contained in submittals and change orders.
   2. Record actual depths, horizontal and vertical location of underground pipes, duct banks, and other buried utilities. Reference dimensions to permanent surface features.
   3. Identify specific details of pipe connections, location of existing buried features located during excavation, and the final locations of piping, equipment, electrical conduits, manholes, and pull boxes.
   4. Identify location of spare conduits including beginning, ending, and routing through pull boxes and manholes. Record spare conductors, including number and size, within spare conduits and filled conduits.
   5. Provide schedules, lists, layout drawings, and wiring diagrams.
   6. Make annotations in electronic format conforming to the following color code:

| | |
|---|---|
| Additions: | Red |
| Deletions: | Green |
| Comments | Blue |
| Dimensions: | Graphite |

B. Maintain documents separate from those used for construction:
   1. Label documents "RECORD DOCUMENTS."

C. Keep documents current:
   1. Record required information at the time the material and equipment is installed and before permanently concealing.
   2. Engineer will review Record Documents weekly to ascertain that changes have been recorded.

D. Affix civil engineer's or professional land surveyor's signature and registration number to Record Drawings to certify accuracy of information shown.

E. Deliver Record Documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.

F. Record Documents will be reviewed monthly to determine the percent complete for the monthly pay application.

G. Updated Record Documents are a condition for Engineer’s recommendation for progress payment.

H. Final Schedule Submittal as specified in Section 01321 - Schedules and Reports.

## 1.08 MAINTENANCE SERVICE

A. Maintenance service as specified in technical specifications.

## 1.09 SUBSTANTIAL COMPLETION

A. Obtain Certificate of Substantial Completion.

## 1.10 FINAL COMPLETION

A. When Contractor considers the Work is complete, submit written certification that:
   1. Work has been completed in accordance with the Contract Documents:
   2. Punch list items have been completed or corrected.
   3. Work is ready for final inspection.

B. Engineer will make an inspection to verify the status of completion with reasonable promptness.

C. Should the Engineer consider that the Work is incomplete or defective:
   1. Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
   2. Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to the Engineer that the Work is complete.
   3. Engineer shall re-inspect the Work.

## 1.11 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer at least 7 days prior to final Application for Payment.

B. Statement shall reflect all adjustments to the Contract amount.
   1. The original Contract amount.
   2. Additions and deductions resulting from:
      a. Change Orders.
      b. Units installed and unit prices.
      c. Set-offs for uncorrected or incomplete Work.
      d. Set-offs for liquidated damages.
      e. Set-offs for reinspection payments.
      f. Extended engineering and/or inspection services and inspection overtime.
      g. Excessive shop drawings review cost by the Engineer.
      h. Other adjustments.
   3. Total Contract amount, as adjusted.
   4. Previous payments.
   5. Remaining payment due.

C. Engineer will prepare a final Change Order reflecting approved adjustments to the Contract amount which were not previously made by Change Orders.

## 1.12 FINAL APPLICATION FOR PAYMENT

A. Contractor shall submit the final Application for Payment reflecting the agreed upon information provided in the final statement of accounting.

## PART 2 PRODUCTS

### 2.01 SPARE PARTS

A. Owner may request advanced delivery of spare parts, maintenance products, and special tools.
   1. Deduct the delivered items from the inventory list and provide transmittal documentation.

B. Prior to Substantial Completion, arrange to deliver spare parts, maintenance products, and special tools to Owner at a location on site chosen by the Owner.
   1. Provide itemized list of spare parts and special tools that matches the identification tag attached to each item.
   2. Owner and Engineer will review the inventory and the itemized list to confirm it is complete and in good condition prior to signing for acceptance.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 01782

## OPERATION AND MAINTENANCE MANUALS

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Preparation and submittal of Operation and Maintenance Manuals.

### 1.02 GENERAL

A. Submit Operation and Maintenance Manuals as specified in technical sections.

### 1.03 SUBMITTALS

A. Make approved manuals available at project site for use by construction personnel and Owner.

B. Draft Operation and Maintenance Manuals:
   1. Submit prior to shipment of equipment or system to site.
   2. Shipment will be considered incomplete without the draft Operation and Maintenance Manuals.

C. Final Operation and Maintenance Manuals:
   1. Make additions and revisions in accordance with Owner's and Engineer's review comments on draft manuals.
   2. Submit approved Operation and Maintenance Manuals at least 30 days prior to Functional Testing and at least 60 days prior to Owner Training.

### 1.04 PREPARATION

A. General requirements:
   1. Provide dimensions in English units.
   2. Assemble material, where possible, in the same order within each volume.
   3. Reduce drawings and diagrams to 8 1/2 by 11-inch size, if possible unless otherwise specified.
   4. Complete forms on computer, handwriting not acceptable.
   5. Delete items or options not provided in the supplied equipment or system.
   6. Provide package control system annotated ladder logic for PLC, if applicable.

B. Hard copy requirements:
   1. Binders: 3-ring with rigid covers.
      a. Break into separate binders as needed to accommodate large size.
   2. Utilize numbered tab sheets to organize information.
   3. Provide original and clear text on reproducible non-colored paper, 8 1/2 by 11-inch size, 24-pound paper.
   4. Drawings larger than 8 1/2 by 11 inch:
      a. Fold drawings separately and place in envelope bound into the manual.
      b. Label each drawing envelope on the outside regarding contents.

C. Electronic requirements:
    1. File format:
        a. Entire manual in PDF format.
            1) Include text and drawing information.
            2) Provide a single PDF file even if the hard copy version is broken into separate binders due to being large.
            3) Create PDF from the native format of the document (Microsoft Word, graphics programs, drawing programs, etc.).
                a) If material is not available in native format and only available in paper format, remove smudges, fingerprints, and other extraneous marks before scanning to PDF format.
                b) Hard copy record drawing requirements:
                    (1) Provide a single multipage PDF file of each set of the scanned drawings.
                    (2) Page 1 shall be the cover of the drawing set.
                c) At file opening, display the entire cover.
                    (1) Scan drawings at 200 to 300 dots per inch (DPI), black and white, Group IV Compression, unless otherwise specified.
                    (2) Scan drawings with photos in the background at 400 dots per inch (DPI), black and white, Group IV Compression.
            4) Pagination and appearance to match hard copy.
            5) Searchable.
            6) Scanned images are not acceptable.
            7) Bookmarks:
                a) Bookmarks shall match the table of contents.
                b) Bookmark each section (tab) and heading.
                c) Drawings: Bookmark at a minimum, each discipline, area designation, or appropriate division.
                d) At file opening, display all levels of bookmarks as expanded.
            8) Thumbnails optimized for fast web viewing.
        b. Drawing requirements:
            1) Provide additional copy of drawings in most current version of MicroStation or AutoCAD format.
            2) Drawings shall have a white background.
            3) Drawing shapes shall not degrade when closely zoomed.
            4) Screening effects intended to de-emphasize detail in a drawing must be preserved.
            5) Delete items or options not provided in the supplied equipment or system.
    2. Media:
        a. USB flash drive.
        b. Secure File Transfer Protocol (SFTP).
    3. Label media with the following information:
        a. Operation and Maintenance Manual.
        b. Equipment name.
        c. Specification Section Number
        d. Equipment tag number.
        e. Owner's name.
        f. Project number and name.
        g. Date.
    4. If multiple submittals are made together, each submittal must have its own subdirectory that is named and numbered based on the submittal number.

## 1.05 CONTENTS

A. Label the spines:
   1. Equipment name.
   2. Tag number.
   3. Project name.
   4. Owner name.

B. Cover page:
   1. Operation and Maintenance Manual.
   2. Equipment name.
   3. Specification Section Number
   4. Equipment tag number.
   5. Owner's name.
   6. Project number and name.
   7. Date.

C. Table of Contents: General description of information provided within each tab section.

D. Complete Attachment A - Equipment Summary Form.

E. Complete Attachment B - Electric Motor Technical Data Form.

F. Description of system and components.

G. Description of equipment function, normal operating characteristics, and limiting conditions.

H. Manufacturer's product data sheets:
   1. Where printed material covers more than 1 specific model, indicate the model number, calibrated range, and other special features.
   2. Equipment with bearings:
      a. Include manufacturer and model number of every bearing.
      b. Include calculated ball pass frequencies of the installed equipment for both the inner and outer raceways.

I. Assembly, installation, alignment, adjustment, and checking instructions.

J. Storage instructions.

K. Control diagrams:
   1. Internal and connection wiring, including logic diagrams, wiring diagrams for control panels, ladder logic for computer based systems, and connections between existing systems and new additions, and adjustments such as calibrations and set points for relays, and control or alarm contact settings.
   2. Complete set of 11-inch by 17-inch drawings of the control system.
   3. Complete set of control schematics.

L. Programming: Copies of Contractor furnished programming.

M. Start-up procedures: Recommendations for installation, adjustment, calibration, and troubleshooting.

N. Operating procedures:
   1. Step-by-step instructions including but not limited to the following:
      a. Safety precautions and applicable Safety Data Sheets.
      b. Guidelines.
      c. Manual keyboard entries.
      d. Entry codes.
      e. System responses.
      f. Other information as needed for safe system operation and maintenance.
   2. Modes:
      a. Startup.
      b. Routine and normal operation.
      c. Regulation and control.
      d. Shutdown under specified modes of operation.
      e. Emergency operating shutdown.

O. Preventative maintenance procedures:
   1. Recommended steps and schedules for maintaining equipment.
   2. Troubleshooting.

P. Lubrication information: Required lubricants and lubrication schedules.

Q. Overhaul instructions: Directions for disassembly, inspection, repair and reassembly of the equipment; safety precautions; and recommended tolerances, critical bolt torques, and special tools that are required.

R. Parts list:
   1. Complete parts list for equipment including but not limited to the following information:
   2. Catalog data: Generic title and identification number of each component part of equipment.
   3. Include bearing manufacturer, model and ball or roller pass frequencies for every bearing.
   4. Availability.
   5. Service locations.

S. Spare parts list: Recommended number of parts to be stored at the site and special storage precautions.

T. Engineering data:
   1. Drawings: Complete set of 11-inch by 17-inch equipment drawings.
   2. Exploded view or plan and section views with detailed callouts.
   3. Outline, cross-section, and assembly drawings.
   4. System drawings: Provide interconnection and wiring diagrams, plan views, panel layouts, bill of materials, etc.
   5. Packaged equipment system drawings: Provide instrumentation loop drawing, control schematic diagrams, interconnection and wiring diagrams, plan views, panel layouts, bill of materials, etc.
   6. System drawings and data sheets: Include drawings and data furnished by the Engineer and the Supplier; provide "as installed" version.
   7. Provide electrical and instrumentation schematic record drawings.

U. Test data and performance curves, when applicable.

V. Manufacturer's technical reference manuals.

W. Source (factory) Test results: Provide copies of Source Tests reports as specified in technical sections.

X. Functional Test results: After Functional Tests are completed, insert Functional Test reports as specified in technical sections.

## 1.06 ARCHIVAL DOCUMENTATION

A. Typically does not require updating to remain valid and should be stored in a format that preserves the document and limits one's ability to make changes.

B. Types of archival documents include the following:
   1. Record drawings.
   2. Reports.
   3. Specifications.
   4. Shop drawings.
   5. Vendor Equipment O & M Manuals.
   6. Photos.
   7. Demonstration and training videos.
   8. Other.

## 1.07 LIVING DOCUMENTATION

A. Requires periodic updates to remain valid and should be stored in formats that are easy to update.

B. Types of living documents include the following:
   1. Facility O&M Manuals.
   2. Standard Operating Procedures.
   3. Other.

# PART 2 PRODUCTS

Not Used.

# PART 3 EXECUTION

Not Used.

END OF SECTION

## ATTACHMENT A - EQUIPMENT SUMMARY FORM

## EQUIPMENT SUMMARY FORM

1. EQUIPMENT ITEM _____

2. MANUFACTURER _____

3. EQUIPMENT IDENTIFICATION NUMBER(S) _____
(maps equipment number)

4. LOCATION OF EQUIPMENT _____

5. WEIGHT OF INDIVIDUAL COMPONENTS (OVER 100 POUNDS) _____

_____

_____

_____

6. NAMEPLATE DATA -
   - Horsepower _____
   - Amperage _____
   - Voltage _____
   - Service Factor (S.F.) _____
   - Speed _____
   - ENC Type _____
   - Capacity _____
   - Other _____

7. MANUFACTURER'S LOCAL REPRESENTATIVE

   Name _____

   Address _____

   Telephone Number _____

8. MAINTENANCE REQUIREMENTS:

| Maintenance Operation | Frequency | Lubricant (if applicable) | Comments |
|---|---|---|---|
| (List each operation required. Refer to specific information in Manufacturer's Manual, if applicable) | (List required frequency of each maintenance operation) | (Refer by symbol to lubricant list as required) | |
| | | | |
| | | | |

9. LUBRICANT LIST:

| Reference Symbol | Conoco Phillips | Exxon/Mobil | BP/Amoco | Other (List) |
|---|---|---|---|---|
| (Symbols used in Item 7 above) | (List equivalent lubricants, as distributed by each manufacturer for the specific use recommended) | | | |
| | | | | |
| | | | | |
| | | | | |

10. SPARE PARTS (recommendations)_____

_____

11. COMMENTS_____

12. GENERAL INFORMATION:

Date Accepted*: _____

Expected Life*: _____

Project Name & Number: _____

Design Engineer: _____

13. WARRANTY:

Start Date: _____

Expiration Date: _____

Prorated: _____

## SECTION 01783

## WARRANTIES AND BONDS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Warranty and bonds requirements.

### 1.02 SUBMITTALS

A. For each item of material or equipment furnished under the Contract:
   1. Submit manufacturer's warranty prior to fabrication and shipment of the item from the manufacturer's facility.
   2. Submit manufacturer's special warranty when specified.

B. Provide consolidated warranties and bonds within 15 calendar days of Substantial Completion.
   1. Contents:
      a. Organize warranty and bond documents:
         1) Include Table of Contents organized by specification section number and the name of the product or work item.
      b. Include each required warranty and bond in proper form, with full information, certified by manufacturer as required, and properly executed by Contractor, or subcontractor, supplier, or manufacturer.
      c. Provide name, address, phone number, and point of contact of manufacturer, supplier, and installer, as applicable.

   2. Electronic copy in PDF format:
      a. Submit 1 copy.

### 1.03 OWNER'S RIGHTS

A. Owner reserves the right to reject warranties.

B. Owner reserves the right to refuse to accept Work for the project if the required warranties have not been provided.

### 1.04 RELATIONSHIP TO GENERAL WARRANTY AND CORRECTION PERIOD

A. Warranties specified for materials and equipment shall be in addition to, and run concurrent with, both Contractor's general warranty and the correction period requirements.

B. Disclaimers and limitations in specific materials and equipment warranties do not limit Contractor's general warranty, nor does such affect or limit Contractor's performance obligations under the correction period.

## 1.05 MANUFACTURER'S WARRANTY MINIMUM REQUIREMENTS

A. Written warranty issued by item's manufacturer.

B. Project-specific information, properly executed by product manufacturer, and expressly states that its provisions are for the benefit of the Owner.

C. Covers all costs associated with the correction of the defect, including but not limited to removal of defective parts, new parts, labor, and shipping.
   1. When correcting warranted Work that has failed, remove and replace other Work that had been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

D. Provides a timely response to correct the defect.
   1. Manufacturer shall provide, in a timely fashion, temporary equipment as necessary to replace warranted items requiring repair or replacement, when warranted items are in use and are critical to the treatment process, as defined by Owner.
   2. In the case that Owner has to provide temporary equipment to replace function of warranted item requiring repair or replacement, manufacturer shall reimburse Owner for such costs associated with the temporary equipment.

E. Warranty commence running on the date of substantial completion.
   1. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit warranty within 10 calendar days after acceptance, listing date of acceptance as beginning of warranty period.

F. Duration of Warranty: 1 year.

## 1.06 MANUFACTURER'S SPECIAL WARRANTY

A. Manufacturer's special warranty is a written warranty published by the manufacturer which includes the requirements specified in the section where the item is specified.
   1. Includes Project-specific information and requirements, properly executed by product manufacturer, and expressly states that its provisions are for the benefit of the Owner. Technical sections indicate Project-specific requirements that differ from the minimum warranty requirements for that item.
      a. Examples include extending the duration of manufacturer's warranty or to provide increased rights to Owner.
   2. Manufacturer's warranties commence on the date that the associated item is certified by Engineer as substantially complete.

## 1.07 WARRANTY WORK

A. Contractor's responsibilities:
   1. Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the product, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with Contractor.

B. Replacement cost:
   1. Upon determination that work covered by warranty has failed, replace or rebuild the work to an acceptable condition complying with requirement of the Contract Documents.
      a. Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether Owner has benefited from the use of the work through a portion of its anticipated useful service life.

C. Related damages and losses:
   1. When correcting warranted work that has failed, remove and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

D. Owner's recourse:
   1. Written warranties are in addition to implied warranties, and shall not limit the duties, obligations, rights, and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitation on time in which Owner can enforce such other duties, obligations, rights, or remedies.

E. Reinstatement of warranty:
   1. When work covered by a warranty has failed and has been corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
      a. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

## 1.08 IMPLIED WARRANTIES

A. Warranty of title and intellectual rights:
   1. Except as may be otherwise indicated in the Contract Documents, implied warranty of title required by Laws and Regulations is applicable to the Work and to materials and equipment incorporated therein.
   2. Provisions on intellectual rights, including patent fees and royalties, are in the General Conditions, as may be modified by the Supplementary Conditions.

B. Implied warranties: Duration in accordance with Laws and Regulations.

## 1.09 BONDS

A. Equipment bond and other bond requirements as specified in the technical sections.

B. Bonds commence running on the date of substantial completion.
   1. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit warranty within 10 calendar days after acceptance, listing date of acceptance as beginning of bond period.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 02050

## SOILS AND AGGREGATES FOR EARTHWORK

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes: Material requirements for soils and aggregates.

## 1.02 REFERENCES

A. ASTM International (ASTM):
   1. C117 - Standard Test Method for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing.
   2. C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
   3. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
   4. D422 – Standard Test Method for Particle-Size Analysis of Soils.
   5. D2419 - Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
   6. D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   7. D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
   8. D4829 - Standard Test Method for Expansion Index of Soils.

B. Utah Department of Transportation (UDOT):
   1. Standard Specifications for Road and Bridge Construction (Standard Specifications).

C. American Public Works Association (APWA):
   1. Manual of Standard Specifications.

## 1.03 SUBMITTALS

A. Product data:
   1. Material source.
   2. Gradation.
   3. Testing data.

B. Quality control for aggregate base course:
   1. Test reports: Reports for tests required by Sections of Standard Specifications
   2. Certificates of Compliance: Certificates as required by Sections of Standard Specifications.

## 1.04 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection: Protect from segregation and excessive moisture during delivery, storage, and handling.

B. Comply with Standard Specifications storage requirements, if applicable.

## PART 2 PRODUCTS

### 2.01 MATERIALS - GENERAL

A. Provide material having maximum particle size not exceeding 4 inches and that is free of trash, lumber, debris, leaves, grass, roots, stumps, and other organic matter.

B. Materials derived from processing demolished or removed asphalt concrete are not acceptable.

C. Comply with soil and aggregate material requirements in the Standard Specifications., unless specified otherwise.

### 2.02 NATIVE MATERIAL

A. Native soil:
   1. Sound, earthen material.
   2. Expansion index less than 35 when tested in accordance with ASTM D4829.
   3. Conforms to size and grade within the following limits when tested in accordance with ASTM C117 and ASTM C136:

| Sieve Sizes (Square Openings) | Percent by Weight Passing Sieve |
|---|---|
| 2-inch | 100 |
| Number 200 | 30 maximum |

### 2.03 AGGREGATE BASE COURSE

A. Material requirements:
   1. Crushed gravel as specified in the Utah Manual of Standard Specifications.
   1. Untreated base course.
   2. Consists of hard durable particles of fragments of stone or gravel; screened or crushed to required size and grading; and free from organic matter, contamination from chemical or petroleum products, or other deleterious matter.
   3. Materials derived from processing demolished or removed asphalt concrete are not acceptable.
   4. Aggregate base course for structures:
      a. Consists of crushed or fragmented particles.
   5. When sampled and tested in accordance with specified test methods, material shall comply with following requirements:
      a. Percentage of wear: Not to exceed 50 percent after 500 revolutions when tested in accordance with AASHTO TP 95.
      b. Plasticity index: Not be more than 6 when tested in accordance with AASHTO T 90.

c. Conforms to size and grade within the following limits when tested in accordance with AASHTO T 11 and AASHTO T 27:

| Sieve Sizes (Square Openings) | 1 inch | 3/4 inch |
|---|---|---|
| | Percent by Weight Passing Sieve | |
| 1 1/2 inch | - | - |
| 1 inch | 100 | - |
| 3/4 inch | - | 100 |
| 1/2 inch | 79 - 91 | - |
| 3/8 inch | - | 78-92 |
| Number 4 | 49 - 61 | 55-67 |
| Number 16 | 27 - 35 | 28-38 |
| Number 200 | 7 - 11 | 7-11 |

## 2.04 GRAVEL

A. Material requirements:
   1. Consists of hard, durable particles or fragments of stone or gravel; screened or crushed to specified sizes and gradations; and free from organic matter, lumps or balls of clay, alkali, adobe, or other deleterious matter.
   2. When sampled and tested in accordance with specified test methods, material shall comply with following requirements:
      a. Durability: Percentage of wear:
         1) Class C: Not greater than 37 when tested in accordance with ASTM C131.
         2) Class D: Not greater than 40 when tested in accordance with ASTM C535.
   3. Conforms to sizes and grade within the following limits when tested in accordance with ASTM C117 and C136.

| Sieve Size (Square Openings) | Percent by Weight Passing Sieve | | |
|---|---|---|---|
| | Class C (Pea Gravel) | Class D (Rock) | 1-inch Crushed Stone |
| 3 inch | -- | -- | -- |
| 2 inch | -- | 100 | -- |
| 1-1/2 inch | -- | 90 - 100 | 100 |
| 1 inch | 100 | 20 - 50 | 95 - 100 |
| 3/4 inch | 90 - 100 | 0 - 15 | -- |
| 1/2 inch | 20 - 55 | -- | 25 - 60 |
| 3/8 inch | 0 - 15 | 0 - 5 | -- |
| Number 4 | 0 - 5 | -- | 0 - 10 |
| Number 200 | -- | -- | 0 - 5 |

## 2.05 SAND

A. Clean, coarse, natural sand. Free of loam and organic matter.

B. Non-plastic when tested in accordance with ASTM D4318.

C. Conforms to size and grade within the following limits when tested in accordance with ASTM D 2487:

| Sieve Size (Square Openings) | Percent by Weight Passing Sieve |
|---|---|
| 3/4 inch | 100 |
| 1/2 inch | 95 - 100 |
| Number 4 | 0 - 10 |
| Number 200 | 0 - 5 |

## 2.06 ROCK

A. Rock to be used for landscaping is to be per Section 02981 - Decorative Stone Landscaping. Other rock needed will be per gravel as listed above as 1-inch crushed stone.

## PART 3 EXECUTION

Not Used.

END OF SECTION

# SECTION 02300

# EARTHWORK

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes:
   1. Loosening, excavating, filling, grading, borrow, hauling, preparing subgrade, compacting in final location, wetting and drying, and operations pertaining to site grading for buildings, basins, reservoirs, boxes, roads, and other facilities.
   2. Backfilling and compacting under and around structures.

### 1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):
   1. Standard Specifications for Highway Bridges.

B. ASTM International (ASTM):
   1. D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

### 1.03 DEFINITIONS

A. Backfill adjacent to structure: Backfill within volume bounded by the exterior surfaces of structure, the surface of undisturbed soil in the excavation around structure, and finish grade around structure.

B. Embankments: Dikes, levees, berms, and similar facilities.

C. Excavation: Consists of loosening, removing, loading, transporting, depositing, and compacting in final location, wet and dry materials, necessary to be removed for purposes of construction of structures, ditches, grading, roads, and such other purposes as are indicated on the Drawings.

### 1.04 SUBMITTALS

A. Copy of Property Owner’s Agreement allowing placement of surplus soil material on their property.

### 1.05 QUALITY ASSURANCE

A. Initial compaction demonstration:
   1. Adequacy of compaction equipment and procedures: Demonstrate adequacy of compaction equipment and procedures before exceeding any of following amounts of earthwork quantities:
      a. 50 cubic yards of fill.
   2. Compaction sequence requirements: Until specified degree of compaction on previously specified amounts of earthwork is achieved, do not perform additional earthwork of the same kind.

3. After satisfactory conclusion of initial compaction demonstration and at any time during construction, provide confirmation tests as specified under "FIELD QUALITY CONTROL."

B. Contractor shall perform work related to this Section in accordance with the approved Stormwater Pollution Prevention Plan (SWPPP).

## 1.06 SEQUENCING AND SCHEDULING

A. Schedule earthwork operations to meet requirements specified in this Section for excavation and uses of excavated material.

B. If necessary, stockpile excavated material in order to use it at specified locations.

C. Excavation, backfilling, and filling: Perform excavation, backfilling, and filling during construction in manner and sequence that provides drainage at all times.

# PART 2 PRODUCTS

## 2.01 DESIGN AND PERFORMANCE CRITERIA

A. Performance requirements:
1. Where mud or other soft or unstable material is encountered, remove such material and refill space with stabilization material. Wrap stabilization material with stabilization fabric.
2. Obtain acceptable import material from other sources if surplus obtained within Project site does not conform to specified requirements or are not sufficient in quantity.
3. No extra compensation will be made for hauling of fill materials nor for water required for compaction.

## 2.02 MATERIALS

A. Water for compacting: Use water from source acceptable to Engineer.

B. Soil and rock materials:
1. General:
   a. Provide aggregate base course, rock, gravel, native material, sand, where specified or indicated on the Drawings.
   b. If suitable surplus materials are available, obtain native material and select material from cut sections or excavations or imported materials.
2. Aggregate base course materials: As specified in Section 02050 - Soils and Aggregates for Earthwork.
3. Class 2 permeable: As specified in Section 02050 - Soils and Aggregates for Earthwork.
4. Drain rock: As specified in Section 02050 - Soils and Aggregates for Earthwork.
5. Gravel: As specified in Section 02050 - Soils and Aggregates for Earthwork.
6. Native material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
7. Sand: As specified in Section 02050 - Soils and Aggregates for Earthwork.

8. Select material: As specified in Section 02050 - Soils and Aggregates for Earthwork.
9. Stabilization material: As specified in Section 02050 - Soils and Aggregates for Earthwork.

C. Controlled low-strength material: As specified in Section 02312 - Controlled Low Strength Materials (CLSM).

D. Geotextile fabrics:
1. Filter fabric: As specified in Section 02620 - Filter Fabric.
2. Stabilization fabric: As specified in Section 02621 - Stabilization Fabric.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verification of conditions:
1. Character and quantity of material:
a. Verify character and quantity of rock, gravel, sand, silt, water, and other inorganic or organic materials to be encountered in work to be performed.
b. Determine gradation, shrinkage, and swelling of soil, and suitability of material for use intended in work to be performed.
c. Determine quantity of material, and cost thereof, required for construction of backfills, cuts, embankments, excavations, fills, and roadway fills, whether from onsite excavations or imported materials. Include in cost of work to be performed.
d. Include wasting of excess material, if required, in cost of work to be performed.

### 3.02 PREPARATION

A. Backfills:
1. After clearing and excavation are completed, scarify entire areas that underlie backfills or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
2. Recompact scarified areas to density specified before placing backfill material or concrete.
3. Do not place backfill against walls until:
a. Walls have been cast full height of structure and concrete has reached the specified strength.
b. Connecting slabs and beams have been cast, and concrete has reached the specified strength.
4. Prior to backfilling:
a. Remove forms.
b. Clean trash and debris from the excavation site.
5. After inspection of foundation, walls, and pipes, place backfill symmetrically around structures to prevent eccentric loading of structures.

B. Embankments:
   1. After clearing is completed, scarify entire areas that underlie embankments to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
   2. Recompact scarified areas to density specified for embankments before placing of embankment material.

C. Fills:
   1. After clearing is completed, scarify entire areas that underlie fill sections or structures to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
   2. Recompact scarified areas to density specified for compacted fills before placing of fill material or concrete.

D. Roadway fills:
   1. After clearing is completed, scarify entire areas that underlie roadway fills to a depth of 6 inches and until surface is free of ruts, hummocks, and other features that would prevent uniform compaction by equipment to be used.
   2. Recompact scarified areas to density specified for roadway fills before placing of roadway fill material.

E. Sloped surfaces for fill or foundations:
   1. Foundations for fill having slopes in excess of 1 vertical to 4 horizontal:
      a. Bench or terrace to adequately key existing ground and fill built thereon.
   2. Slopes of original hillsides and old fills: Bench minimum of 10 feet horizontally as fill is placed.
   3. Provision of new benches:
      a. Start new bench wherever vertical cut of next lower bench intersects existing grade.
      b. Recompact material thus cut out along with new embankment material at no additional cost to the Owner.

## 3.03 INSTALLATION

A. General:
   1. Dispose of excavated materials that are not required or are unsuitable for fill and backfill in lawful manner.
   2. Dispose of surplus material on private property only when written permission agreement is furnished by owner of property. Submit copies of such agreements.
   3. Rocks, broken concrete, or other solid materials larger than 4 inches in greatest dimension: Remove from project site at no additional cost to the Owner.
   4. Stabilization of subgrade: Provide materials used, or perform work required, to stabilize subgrade so it can withstand loads that may be placed upon it by Contractor's equipment.

B. Compaction:
   1. Provide specified compaction for backfills, cuts, embankments, fills, roadway fills, and other earthwork.

2. Perform confirmation tests to verify and confirm that work has complied, and is complying at all times, with compaction requirements specified in this Section for initial compaction demonstration and field quality control testing.
3. In-place density of compacted backfills, cuts, embankments, fills, and roadway fills determined in accordance with ASTM D1556, or with ASTM D6938.
4. Maximum density, laboratory compaction: Soil maximum density and optimum water content when tested in accordance with ASTM D6938.
5. To prevent damage to structures due to backfilling operations, place backfill with equipment that does not exceed AASHTO Standard Specifications for Highway Bridges, H-20 vehicle loading, within a distance from the face of the structure of not less than 1/2 the depth of backfill. The depth of backfill is the distance between the level being compacted and the bottom of the excavation. Outside this distance, heavier compaction equipment may be used.
6. Compact to percentage of maximum density as follows:
    a. Fills and trenches: 85 percent.

C. Excavation:
1. Excavations for trenching:
    a. As required for installation of irrigation piping and appurtenances per Specification Section 02810 – Irrigation.
2. Excavation of ditches and gutters:
    a. Cut ditches and gutters accurately to cross sections and grades indicated on the Drawings.
    b. Take care not to excavate ditches and gutters below grades indicated on the Drawings.
    c. Backfill excessive ditch and gutter excavations to grade with suitable material acceptable to the Engineer.
    d. Do not deposit any material within 3 feet of edge of ditch unless otherwise indicated on the Drawings.
3. Necessary over excavation:
    a. Where it becomes necessary to excavate beyond normal lines of excavation in order to remove boulders or other interfering objects, backfill voids remaining after removal as specified in backfilling of voids below, or as acceptable to the Engineer.
    b. Backfill voids with material acceptable to the Engineer:
        1) With acceptance of the Engineer, backfill with one of the following:
            a) Aggregate base course.
            b) Controlled low-strength material.

D. Materials for backfills, embankments, fills, and roadway fills:
1. General:
    a. Obtain import material from other sources if surplus materials from cuts and excavations obtained from within Project site do not conform to specified requirements or are not sufficient in quantity for construction of Project.
2. Backfills:
    a. Backfill adjacent to structures, slabs, or walls: Native material or imported material meeting the requirements of native material, unless otherwise specified or indicated on the Drawings.
    b. Backfill material under concrete structures: Aggregate base course material, except in areas where controlled low-strength material or concrete encasement are indicated on the Drawings.

c. Extend backfill in any area under concrete structures from undisturbed soil or rock to the bottom aggregate base course material layer.

3. Fills:
   a. Native material or imported material meeting the requirements of native material, unless otherwise specified or indicated on the Drawings.
   b. Extend fill in any area under concrete structures from undisturbed soil or rock to the bottom aggregate base course material layer.

E. Placement:
1. General:
   a. Lines and grades:
      1) Construct backfills, embankments, fills, and road fills, at locations and to lines and grades indicated on the Drawings.
      2) Overbuild permanent fill slopes by at least 1 foot and then cut to final grade to provide adequate compaction of the remaining fill.
2. Backfills:
   a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
   b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
   c. Defective compacted backfills: Remove and recompact.
3. Fills:
   a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
   b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
   c. Defective compacted fills: Remove and recompact.
4. Embankments:
   a. Place loose material in successive layers that do not exceed 8 inches in depth after compaction.
   b. Bring each layer to a moisture content between optimum moisture content and 3 percent above optimum moisture content before compacting.
   c. Defective compacted embankments: Remove and recompact.
   d. Defective compacted roadway fills: Remove and recompact.

## 3.04 FIELD QUALITY CONTROL

A. Confirmation tests:
1. Contractor's responsibilities:
   a. Adequacy of compaction equipment and procedures:
      1) Demonstrate adequacy of compaction equipment and procedures.
      2) At each test location include tests for each type or class of backfill from bedding to finish grade.
   b. Compaction sequence requirements:
      1) Do not perform additional earthwork of the same kind until specified degree of compaction has been demonstrated.
   c. Cost of confirmation tests: Paid for by the Contractor.
   d. Qualifications of Contractor's testing laboratory: Acceptable to Engineer.
   e. Copies of confirmation test reports: Submit promptly to the Engineer.
   f. Cost of confirmation tests:
      1) Paid for by the Contractor.

g. Qualifications of Contractor's testing laboratory:
1) Perform confirmation testing by soils testing laboratory acceptable to the Engineer. Copies of confirmation test reports: Submit promptly to the Engineer.

B. Tolerances:
1. Finish grading of backfills, cuts, embankments, fills, and roadway fills:
a. Perform fine grading under concrete structures such that finish surfaces are never above the grade or cross section indicated on the Drawings and are never more than 0.10 feet below.
b. Provide finish surface for areas outside of structures that are within 0.10 feet of grade or cross section indicated on the Drawings.
2. Areas which are not under structures, concrete, asphalt, roads, pavements, sidewalks, dikes, and similar facilities:
a. Provide finish graded surfaces of either undisturbed soil, or cohesive material not less than 6 inches deep.
b. Intent of proceeding is to avoid sandy or gravelly areas.
3. Finish grading of surfaces:
a. Reasonably smooth, compacted, and free from irregular surface changes.
b. Provide degree of finish that is ordinarily obtainable from blade grader operations, except as otherwise specified.
c. Uniformly grade areas that are not under concrete.
d. Finish ditches and gutters so that they drain readily.

C. Compliance tests:
1. Frequency of testing: Periodic compliance tests will be made by the Engineer to verify that compaction is meeting requirements previously specified.

## 3.05 ADJUSTING

A. Finish grades of excavations, backfills, and fills:
1. Repair and reestablish grades to required elevations and slopes due to any settlement or erosion that may occur from action of the elements or any other cause prior to final acceptance.

## 3.06 PROTECTION

A. Finish grades of backfills, cuts, excavations, and fills:
1. Protect newly graded areas from erosion and deterioration by action of the elements.

B. Ditches and gutters:
1. Maintain ditches and gutters free from detrimental quantities of debris that might inhibit drainage until final acceptance.

END OF SECTION

## SECTION 02620

## FILTER FABRIC

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Nonwoven filter fabric and weed barrier fabric

### 1.02 REFERENCES

A. ASTM International (ASTM):
   1. D4355 - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus.
   2. D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity.
   3. D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles.
   4. D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
   5. D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
   6. D5261 - Standard Test Method for Measuring Mass per Unit Area of Geotextiles.
   7. D6241 - Standard Test Method for the Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe.

### 1.03 DEFINITIONS

A. Filter fabric: Nonwoven geotextile fabric manufactured from polypropylene fibers.

### 1.04 SUBMITTALS

A. Product data.

B. Samples.

C. Quality control submittals:
   1. Certificates of Compliance.
   2. Manufacturer's Instructions.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Storage and protection:
   1. Furnish filter fabric in protective covers capable of protecting the fabric from ultraviolet rays, abrasion, and water.

### 1.06 PROJECT CONDITIONS

A. Take field measurements to determine the lengths and dimensions of the surfaces to receive the fabric.

## PART 2 PRODUCTS

### 2.01 GEOTEXTILE

A. Manufacturers
   1. One of the following or equal:
      a. Propex, Geotex 401.
      b. Ten Cate Geosynthetics, Mirafi 140N.

B. Material requirements
   1. Physical properties: Meet the following minimum requirements:

| Property (1) | Test Method | Unit | Requirements (1) |
|---|---|---|---|
| Minimum Weight | ASTM D5261 | oz | 4.0 |
| Grab Tensile Strength | ASTM D4632 | lbs | 100 |
| Grab Elongation | ASTM D4632 | % | 50 |
| Trapezoid Tear Strength | ASTM D4533 | lbs | 50 |
| CBR Puncture Resistance | ASTM D6241 | lbs | 300 |
| UV Resistance (strength retained at 500 hrs) | ASTM D4355 | % | 70 |
| Apparent Opening Size (AOS) | ASTM D4751 | US sieve | 70 |
| Permittivity | ASTM D4491 | $sec^{-1}$ | 1.7 |
| Flow Rate | ASTM D4491 | $gpm/ft^2$ | 130 |
| (1) Minimum average roll values. | | | |

### 2.02 WEED BARRIER FABRIC

A. Material Requirements
   1. 3.2 oz or greater, Non woven weed barrier.

B. Manufacturers
   1. Agfabric.
   2. DeWitt.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verification of conditions: Verify that conditions are satisfactory for the installation of filter fabric.

### 3.02 PREPARATION

A. Surface preparation:
   1. During grading operations, take care not to disturb the subgrade.
   2. This may require use of lightweight dozers for low strength soils such as saturated, cohesionless, or low cohesion soils.

B. Prior to placement of fabric: Prepare surface to smooth condition free of debris, depressions, or obstructions that may damage the fabric.

## 3.03 INSTALLATION

A. Follow manufacturer's installation instructions and as complimented in this Section.

B. Place the filter fabric smoothly without folds or wrinkles.

C. Use special care when placing the filter in contact with the soil so that no void spaces occur between the filter and the prepared surface.

D. Overlap the parallel rolls and ends of rolls a minimum of 24 inches and not less than manufacturer's instructions.

E. Do not drag filter fabric across subgrade.

F. Make overlaps at ends of rolls in the direction of the aggregate placement with the previous roll on top.

G. Use lightweight dozers if necessary. Do not allow equipment directly on filter fabric.

## 3.04 FIELD QUALITY CONTROL

A. Inspection:
   1. Before covering, the condition of the fabric will be observed by the Engineer to determine that no holes or rips exist in the fabric.
   2. Repair all holes and rips by placing a new layer of fabric extending beyond the defect in all directions a distance equal to the minimum overlap required for adjacent rolls.

END OF SECTION

## SECTION 02778

## MOWING CURBS

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Concrete mowing curbs.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Concrete: Class A concrete as specified in Section 03300 - Cast-in-Place Concrete.

B. Curb finishing mortar: 1 part portland cement to 2 parts sand.

C. Form release material: Light oil or other releasing agent of type which does not discolor concrete or interfere with the application of finishing mortar to curb tops and faces.

D. Expansion joints:
   1. Place expansion joints every 20 linear feet.

E. Construction tanks: Steel dividers or plastic inserts.

F. Concrete reinforcement: As specified in Section 03200 - Concrete Reinforcing.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify field conditions, including subgrade condition and interferences, before beginning construction.

### 3.02 PREPARATION

A. Construct subgrade and compact true to grades and lines indicated on the Drawings and requirements as specified in Section 02050 - Soils and Aggregates for Earthwork.

B. Remove soft or unsuitable material to depth of not less than 6 inches below subgrade elevation and replace with satisfactory material.

C. Water forms and subgrade immediately in advance of placing concrete.

## 3.03 FORMWORK

A. Carefully set formwork to line and grade. Securely stake in position to conform to dimensions.

B. Thoroughly clean formwork prior to each use and coat with form releasing material.

C. Install expansion joints filler vertically and at right angles to centerline of curb and at radius points, driveways, alley entrances, and at adjoining structures.

D. Install contraction joints at maximum 15 feet on center.

E. Make joints of construction joint material, scoring or saw cutting to depth of not less than 1-1/2 inches and matching joints in adjacent pavement or sidewalk.

## 3.04 CONCRETE PLACEMENT

A. Place concrete as specified in Section 03300 - Cast-in-Place Concrete.

B. Thoroughly spade concrete away from forms so no rock pockets exist next to forms and so no coarse aggregate will show when forms are removed.

C. Compact concrete with mechanical vibrators acceptable to the Engineer. Continue tamping or vibrating until mortar flushes to surface and coarse aggregate is below concrete surface.

D. Remove forms from faces after concrete has taken initial set and has sufficient strength to not slump.

E. Finish and cure concrete as specified in Section 03300 - Cast-in-Place Concrete except as modified below:
   1. As soon as curb face forms are stripped, apply finishing mortar to the top and face of curb and trowel to a smooth, even finish.
   2. Finish with fine haired broom in direction of work.
   3. Extend finish 2 inches below grade.
   4. Edge concrete at expansion joints to 1/4-inch radius.

F. Backfill behind curbs with topsoil to lines and grades indicated on the Drawings.

## 3.05 FIELD QUALITY CONTROL

A. Test face and top with 10-foot straightedge or curve template longitudinally along surface.

B. Correct deviations in excess of 1/4 inch.

## 3.06 ADJUSTING

A. Repair portion of concrete damaged while stripping forms.
   1. Replace when damage is severe.
   2. Evidence of repairs shall not be noticeable in the finished product.

B. Remove and replace sections of curb not conforming to requirements of the Contract Documents. Remove complete sections between joints and replace with new curbs.

END OF SECTION

## SECTION 02810

## IRRIGATION

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes:
   1. Requirements for the provision of automatic irrigation system, including but not limited to the following:
      a. Removal and/or restoration of existing improvements.
      b. Excavation and backfill.
      c. Furnishing and installing, and testing of mains, laterals, risers, and fittings.
      d. Furnishing and installing of sprinkler heads, gate valves, control valves, automatic valves, and automatic controllers.
      e. All other work in accordance with requirements indicated on the Drawings and specified in this Section.

### 1.02 REFERENCES

A. ASTM International (ASTM):
   1. D1869 - Standard Specification for Rubber Rings for Fiber-Reinforced Cement Pipe.
   2. D2564 – Specification for Solvent Cements for Polyvinyl Chloride (PVC) Plastic Pipe and Fittings
   3. F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

B. American Water Works Association (AWWA):
   1. C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 Inch - 60 Inch.

C. National Electric Code (NEC).

D. Underwriters Laboratories Inc. (UL).

### 1.03 SUBMITTALS

A. Product data: Provide for components.

B. Shop drawings: Provide for automatic valves and controllers. Include wiring diagrams and circuit breaker information for controllers. Samples: Provide as requested.

C. Equipment for Operation: The Contractor shall provide the following equipment, in addition to what is shown.
   1. 1. Two keys for locking automatic controller door.
   2. 2. One stop and waste valve key. (Gate valve Key).

D. Quality control submittals:
   1. Certificates of Compliance.
   2. Manufacturer's Instructions.

E. Contract closeout submittals:
   1. Project record documents as specified in Section 01770 - Closeout Procedures and as follows:
      a. Immediately upon installation of any piping, valves, or sprinkler head, in locations other than indicated, clearly indicate such changes including locations on record drawings.
      b. After final acceptance of project, turn over record documents to the Engineer.
   2. Operation and maintenance: Provide operation and maintenance manuals covering the system and its components as specified in Section 01782 - Operation and Maintenance Manuals.

## 1.04 QUALITY ASSURANCE

A. Qualifications: Installing company and its jobs site superintendent shall have at least 3 years immediate and continuous experience installing systems of similar design and type of equipment.

B. Regulatory requirements:
   1. Local, municipal, and state laws, rules, and regulations governing or relating to any portion of work of this Section are hereby incorporated into and made a part of this Section, and perform work of this Section in accordance with such provisions:
      a. Do not construe anything contained in this Section to conflict with any of above rules and regulations or requirements of same. However, when this Section and/or drawings call for or describe materials, workmanship, or construction of better quality, higher standard, or larger size, such requirements take precedence over requirements of such rules and regulations.

C. In addition to other inspection, as provided by the Owner, the Contractor shall give at least 72 hours' notice to the Owner for scheduling the following special inspections:
   1. Layout of the system.
   2. Inspection of trenches, backfilling, and equipment.
   3. Pressure tests.
   4. Coverage adjustment.
   5. Automatic operation.

D. The Contractor shall notify the Owner at least 72 hours prior to performing the tests. All tests shall be performed in the presence of the Owner. Test requirements shall be as follows:
   1. After assembly and installation, all water pipes, fittings, automatic equipment, and appurtenances shall be tested at a hydrostatic pressure of 150 psi at the lowest point of the system for not less than 60 minutes.
   2. The first test shall be made in such a manner that all valves in the new water pipe sprinkler lines will be tested for watertight closure. Valves may be tested

in groups or singly while subjected to 150 psi water pressure for a period of not less than 60 minutes.

3. The second test shall be made by forcing all air from the pipes with water and capping or plugging pipe risers. After the pipe risers have been plugged or capped, all line valves shall be fully opened and the pipelines subjected to the full static water pressure for a period of not less than 120 minutes. Pressure pipelines 150 psi).
4. The third test required that lateral lines be tested at 100 psi for 120 minutes.
5. The fourth test requires that all pressure lines be tested at 120 psi for 24 hours.
6. Water lines and valves which show evidence of leakage or fail to be watertight shall be repaired or replaced. After all repairs or replacements have been made, the above-required tests shall be performed again.
7. When the sprinkler system is completed, the Contractor, in the presence of the Owner, shall perform test coverage of water afforded the lawn and planting areas. The Contractor shall furnish all material and perform all work required to correct any inadequacies of coverage disclosed. The Contractor shall inform the Owner of any deviation from the Drawings required due to wind, planting, soil, or site conditions that bear on proper coverage.
8. Upon completion of each phase of the work, the Contractor shall check and adjust each sprinkler head to meet the site requirements and the requirements of the Contract Documents.

(Testing as noted in 1 through 5 is at the Owner's option, and generally will not be required unless verification of the Contractor's workmanship and quality is required.)

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and shipping:
   1. Deliver plastic pipe, fittings, and connectors to project site in unbroken bundles or rolls, packaged in such manner as to provide adequate protection for pipe ends, threaded or plain.

B. Storage and protection:
   1. Store cover pipes, fittings, and connections to protect them from exposure to sunlight, excessive heat, deleterious materials, and damage.

C. Field measurements: Make measurements necessary to layout work.

## 1.06 SEQUENCING AND SCHEDULING

A. Closing in uninspected work:
   1. Do not allow nor cause any Work to be covered or enclosed until it has been inspected, tested, and accepted by the Engineer.
   2. Should any Work be enclosed or covered before such inspection and test, uncover such Work at no additional cost to the Contract.
      a. After it has been inspected, tested, and accepted, make repairs with like materials necessary to restore work to its original condition at no additional cost to the Contract.

B. Cutting or breaking of sidewalks, pavement, and concrete work:
   1. Obtain permission to cut or break from those having proper jurisdiction prior to cutting or breaking.

C. Inspection schedule:
   1. Weekly construction inspections will be conducted by the Owner or Owner's Representative during the Landscape and Irrigation work and installation with the Landscape Contractor.

## 1.07 WARRANTY

A. Warranty materials and system for period of 1 year against material defects, workmanship, errors in layout, and inadequate coverage.

## 1.08 INSTRUCTION

A. The Contractor shall, upon completion of the maintenance period of the irrigation instruct the Owner and the Owner's personnel as to the proper operation and maintenance of the system.

## 1.09 EXISTING UTILITIES AND CONDITIONS

A. Prior to cutting into the soil, the Contractor shall locate all cables, conduits, sewers, septic tanks, and other such underground utilities, and shall take proper precautions not to damage or disturb such improvements. If a conflict exists between such obstacles and the proposed work, the Contractor shall promptly notify the Owner.

B. The Contractor shall be responsible for coordinating its work with the operation of existing utilities and new utilities on the Project. The Contractor shall notify the Owner or its representative when utilities which are in operation require shut-off.

C. Due to the scale of Drawings, it is not possible to indicate all offset, fittings, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all its work, and plan its work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. The Contract Documents are generally diagrammatic and indicative of the work to be installed. The work shall be installed in the most direct and workmanlike manner, so that conflicts between sprinkler systems, planting, structures, piping, and etc. will be avoided.

D. The Contractor shall verify the water pressure available at the site before installation of the system to make sure there is adequate pressure (design pressure 80 psi) to properly operate sprinkler heads and valves, and shall also provide pressure reducing valves if required before commencement of any work. Minor additions and adjustments of heads, piping, and circuits shall be made at no additional cost to Owner where it is necessary to make the irrigation system operate properly.

## PART 2 PRODUCTS

### 2.01 GENERAL

A. Brand names specified for materials are supplied for the purpose of describing the type, size, quality, and performance of materials. The Contractor may propose, as substitutions, other manufacturers' materials of equal quality and performance to the Owner for review in accordance with Section, "Contractor Submittals."

B. The Contractor shall furnish, at no additional charge, all samples necessary for testing as outlined in the Specifications or, when requested, certified evidence of off-site testing.

C. Equipment compatibility: automatic controller and automatic (remote) control valves shall be products of the same manufacturing company. Existing automatic controller and other components are of the following manufacturer:
   1. Rain Bird

### 2.02 DESIGN AND PERFORMANCE CRITERIA

A. Design requirements:
   1. Design a sprinkler system to provide the necessary coverage of the sod area as indicated on the Drawings. Submit sprinkler system layout to be approved by Engineer.
   2. Said irrigation system shall include but not be limited to all pipes, fittings, sprinklers, valves, automatic control valves, controllers, valve boxes, drain valves, hose bib valves, operating wrenches, riser assemblies, direct burial wires, electrical connections, wiring and other appurtenances, piping, connections, testing, cleaning-up, maintenance and adjustments necessary for a complete operating system, ready for immediate use upon completion. Contractor to provide minor items necessary for proper construction and functional operation of this irrigation system, not specifically described in the Contract Documents, shall be included as a part of the work of this Section.
   3. Sprinkler system is to tie-in to the existing 4” main line in the location as indicated on the Drawings.

B. Performance requirements:
   1. Sprinkler system:
      a. Construct sprinkler system to sizes, grades, and locations as required for a complete system.
      b. Sprinkler lines to be essentially diagrammatic.
      c. Establish locations of sprinkler heads, shrub heads, and similar type items, at time of construction.
      d. Do not exceed typical spacings of sprinkler heads.

### 2.03 PLASTIC PIPE AND FITTINGS

A. Pipe shall be continuously and permanently marked with the following information: manufacturer's name, nominal pipe size, PVC type, pressure rating, and extrusion date.

B. All plastic pipes for lateral lines shall be PVC (polyvinyl chloride) SDR 21, Schedule 40, NSF approved.

C. Materials for pressure main lines shall be PVC (polyvinyl chloride) SDR 21, Schedule 40, NSF approved, or galvanized steel pipe.

D. Rubber gasket PVC pipe, couplings, and fitting: Conform to ASTM D-1784 Type I, Grade I, 2,000 PSI design stress. Standard dimensional ratio for the pipe shall be SDR 21 class 200. All pipe shall conform to commercial standard CS-256-64 (pressure rated pipe), and National Sanitation Foundation ASTM 1869. Coupling and fittings shall be furnished by the pipe manufacture.

E. All fittings shall be PVC (polyvinyl chloride) Schedule 40, Type II, NSF, and Schedule 80 mainline fitting up to valve on mainline as called for in the Contract Documents.

F. Ductile iron fitting shall be grade 65-45-12 in accordance with ASTM A-536. Fitting shall be deep bell push-on joints with gaskets meeting ASTM F-477. Fittings shall be HARCO DEEP BELL as manufactured by Harrington Corporation of Lynanburg, VA. Transition gaskets are not allowed.

G. Swing joint ells and nipples shall be Schedule 80 PVC or galvanized as noted on plan.

H. Piping and tubing sleeves under walks and pavement: Polyvinyl chloride, Schedule 40.

## 2.04 VALVES

A. Isolation valves shall be resilient seated wedge valves.

B. Isolation valves for valve manifolds shall be brass ball valves as manufactured by Apollo, or approved equal.

C. Remote Control Valves: Remote control valves for the irrigation system shall conform to the following requirements:

D. Control valves shall be plastic, for 24-volt electrically controlled solenoids for operation. They shall be of heavy duty plastic construction with cross or slotted type wheel for operation with key and bleed fitting.

E. Control valves shall be by the same manufacturer as the controller.

F. Remote control valves shall be Rain Bird as noted in this Specification.

G. Quick-coupling valves shall be Rain Bird Model per plan or approved equal.

## 2.05 AUTOMATIC CONTROLLER

A. The existing automatic controller located in the Electrical Room of Bioreactor No. 5 is to be used for the new system. An additional card is to be added to the Rain Bird controller.

B. The automatic controllers shall be electrically timed devices for automatically opening and closing remote control valves. All controllers and remote control valves

supplied under this contract shall be of the same manufacturer and have similar operational and adjustment

C. The controller shall be enclosed in a weatherproof metal housing having locking cover or covers to protect all adjustment and breakable equipment from vandalism. Exterior controllers shall be provided with locking covers. Keys for covers shall be interchangeable keys. The controllers shall be wall and pedestal mounted.

D. Control as noted on the plan or approved equal.

## 2.06 SPRINKLER HEADS

A. Sprinkler heads shall be the model and type indicated on the Drawings.

B. Rotor pop-up sprinkler heads as manufactured by Rain Bird Model 6504 and 7005 series or approved equal.

C. Lawn pop-up and Shrubbery adapter spray heads shall be Rain Bird 1800 MPR-PRS-U-Series, or approved equal.

D. Drip irrigation products to be Rain Bird and Netafim products and drip line tubing with pressure compensating emitters or approved equal.

## 2.07 CONTROL WIRING

A. Control wire shall be red insulation, stranded copper direct burial copper wire, Type UF Bearing; UL approved for direct underground burial in National Electrical Code Class II circuits, AWG sizes.

B. Conductor of electrical conductivity shall be grade copper meeting requirement of ASTM B3

C. All splices shall be made with wire connectors, such as manufactured by Rainbird, Pen Tit, Scotch Lock, or equal

## 2.08 PVC SOLVENT CEMENT AND PRIMERS

A. Solvent Cement shall be NSF approved and shall meet requirements of ASTM D2564.

B. Primer shall be NSF approved and shall be Weld-On, P-70 Industrial Polychemical Service, or approved equal.

## 2.09 VALVE AND CONTROLLER VAULTS

A. Boxes for valves shall be heavy duty plastic Rain Bird, Carson or Brooks complete

B. With locking lids or approved equal.

C. Boxes for valves shall be sized per equipment, depth of installation and operation and maintenance space as required.

D. When valve boxes are placed in gravel mulch areas, the valve box body and lid to match the surrounding gravel color.

## 2.10 REDUCED PRESSURE BACK FLOW PREVENTION

A. Backflow prevention as noted on the plan or approved equal.

## 2.11 OTHER MATERIALS

A. Other materials required or necessary shall be as shown and/or as required for best quality work.

# PART 3 EXECUTION

## 3.01 GENERAL

A. Installation of the irrigation system shall be performed after the finish grading, but prior to landscaping.

B. All valves, fittings, heads, and piping shall be installed as shown and all connections made to permit the irrigation system to function properly through its entire length.

C. All materials and equipment shall be installed in strict accordance with manufacturer's written instructions and recommendations and all local and state codes, laws, ordinances, and regulations.

D. Before proceeding with the installation of any section or unit of the irrigation system, the Contractor shall check and verify the correlation between ground measurements and Drawings and shall advise the Owner of any discrepancies.

E. The total number of sprinkler heads and circuits and size of pipes shall be not less than shown unless otherwise approved. The stated maximum spacing for each type of sprinkler head shall not be exceeded.

## 3.02 EXCAVATION

A. Trenches shall be dug as wide and as deep as necessary to properly install the irrigation pipe.

B. Pipe trenches shall be straight, or "snaked" slightly allowing for expansion and contraction of PVC pipe.

C. Subsoil shall be kept separate from topsoil, where possible.

D. Minimum cover depth shall be as follows:
   1. Supply pressure lines from water source to control valves: 18 inches unless otherwise shown.
   2. Lateral lines from control valves to sprinkler heads; 12 and 16 inches unless otherwise shown. Lateral lines under paving, roadways, and driveways shall have 18 inches of cover and located in Schedule 40 PVC sleeves. All poly feeder lines to have 6 inches of soil cover.

3. Trenches for control wire only shall be 18 inches deep unless otherwise shown. Control wires under concrete walks and slabs, paving, roadways, and driveways shall be installed in Schedule 40 PVC sleeves

E. A trench of sufficient width shall be provided to allow for proper tamping around pipe.

## 3.03 PIPING-GENERAL

A. Piping shall be laid out and installed in accordance with manufacturer's printed recommendations and industry standards. Substantial support shall be provided at all points, and pipes shall be snaked slightly allowing for expansion and contraction.

B. Minimum 1-inch vertical clearance shall be between lines crossing at angles greater than 45 degrees.

C. Minimum 3 inches horizontal and vertical clearances shall be between all other lines.

D. All swing or swivel joints shall provide a leak-resistant joint with freedom of movement.

E. Teflon thread sealant 3/4-inch wide (tape or liquid), Rectorseal No. 5, or equal shall be used at all threaded joints.

F. Galvanized steel and copper pipes shall have clean standard threads of standard lengths. Joints shall be made up with pipe compound applied to male threads only and not more than 2 threads shall show at the joints when connected.

G. Pipe sleeves shall be provided under all paving and where necessary for passage under finish surface material, future replacement, and for protection of PVC piping and control wire

## 3.04 PLASTIC PIPE

A. The pipe shall be guaranteed by the manufacturer to be suitable for operation under the conditions of this installation and shall be guaranteed free from defects in workmanship and quality.

B. The pipe shall be connected by O-ring type or by solvent-weld joints as outlined below. Joints shall be made in strict accordance with the manufacturer's printed recommendation.

C. The plastic pipe sections shall be placed accurately to line and grade in the prepared trenches. The inside of all pipe shall be clean and free from foreign matter and shall be end-reamed to remove burrs and provide full inside diameter of the nine end.

D. Pipe assembly shall have a firm, uniform bearing for the entire length of each pipeline to prevent uneven settlement. All adjustments to grade shall be made by scraping away or filling in with clean earth backfill material, well compacted under the body of the pipe. Wedging of pipe will not be permitted. The inside of all pipes shall be clean and free from foreign materials before joints are assembled.

E. Sealant tape shall be used on all threaded joints.

F. All pipeline open ends upon which the WORK has been stopped shall be closed at the end of each day's construction work with a suitable temporary plug to prevent entrance of any foreign materials into the assembled pipeline.

G. Pressure pipe shall be defined as all piping lying "upstream" from remote control valves and quick-coupling lines.

H. O-ring type flexible coupling pipe shall be used on pressure pipes 3-inch diameter and larger.

I. Two and one half inch and smaller mainlines and fittings of pressure piping shall be solvent-weld type.

J. Pressure piping 3-inch and larger shall be provided with Portland cement concrete thrust blocks. Thrust blocks shall be constructed at the following places:
   1. Where pipe changes direction at fittings.
   2. Where pipe changes size.
   3. Where line terminates.

K. Thrust blocks shall be constructed of 4000 psi concrete with a 10-mill barrier between concrete and pipe or fitting, as noted on plans and details.

L. The areas noted on the details table shall be measured in a place perpendicular to the longitudinal axis of the pipe or to the longitudinal axis of the thrust developed. The thrust block bearing area shall be against undisturbed around.

M. Compression fitting (compression by compression slip joint PVC) shall be provided on mainline at 250 on center for expansion and contraction of mainline on straight runs on solvent welded pipe.

## 3.05 VALVES

A. Piping systems shall be supplied with valves at all points as shown or specified herein so arranged to give complete regulating control throughout. The automatic control valves and gate valves shall are detailed in the Contract Documents or as otherwise directed by the Owner

B. Valves shall be the full size of the line in which they are installed, unless otherwise shown.

C. Remote control valves shall be adjusted so the most remote sprinkler heads operate at the pressure recommended by the head manufacturer. Remote control valves shall be adjusted so a uniform distribution of water is applied by the sprinkler heads to the planting areas for each individual valve system. A union fitting shall be provided on the discharge side of the control valve. They shall be wired to operate in the order as shown. They shall be capable of being operated manually entirely independent of the controller.

D. Quick couplers shall be installed as shown.

E. Gate valves shall be pipeline size, shall be installed where shown, in a valve box.

F. Quick-coupling valves shall be provided, located, and installed as shown.

## 3.06 REDUCED PRESSURE BACKFLOW PREVENTION

A. A. Provide back flow assembly at point of water connection per code along all necessary, equipment, piping, fittings, etc.

## 3.07 VALVE BOXES

A. Valve boxes shall be set 1/2 inch above the designated finish grade in lawn areas and 2 inches above finish grade in ground cover areas. Install only one valve per valve box.

B. All remote control sprinkler valves shall be encased in a valve box as shown.

## 3.08 SPRINKLER HEADS & DRIP IRRIGATION

A. All nozzles on sprinklers shall be tightened after installation. All sprinklers having an adjustment stem shall be adjusted on a lateral line for the proper radius diameter and/or flow

B. All sprinkler heads shall be set perpendicular to finished grades and at finish ground level.

C. All sprinkler heads shall be installed as detailed on the Drawings.

D. The sprinkler system shall be thoroughly flushed as so to remove all possible foreign prior to installation of the sprinkler heads.

E. The Contractor shall protect against re-entry of contaminated water into risers or piping. After flushing, the Contractor shall immediately install sprinkler heads or cap risers until sprinkler heads are installed.

F. Provide drip irrigation to all plants per plans and details.

## 3.09 CONTROLLER

A. The Contractor shall install controller as shown complete with required waterproof circuit breaker type disconnect switch, per manufacturer's printed recommendations.

B. Controller location is essentially diagrammatic, and the actual installation shall be as specifically located by the Owner

C. All local and applicable codes shall be followed in furnishing and/or connecting a 110-volt electrical service to the controller.

D. The controller shall be wall and pedestal mounted as shown, in such a manner that all normal adjustments can be conveniently reached by the operator while in a standing position.

E. Adjustment of the controller shall be such that each control valve in the circuit will remain open for a readily adjustable period of 5 or less minutes to 60 minutes.

Readily made field adjustments shall include a provision whereby any number of days in a week can be skipped and whereby one or more positions on the controller may be skipped. When any or all of the above adjustments have been made, the controller shall continue to operate automatically as set until further adjustments are made. Provision shall be made for conveniently resetting the start of the irrigation cycle at any time and also for advancing from one position to any other position at will.

F. The Contractor shall properly ground the control boxes to copper ground rods driven into the ground.

G. Timing, sequence and period will be supplied to the Contractor by the Owner At this time, the Contractor shall adjust the controller for normal operation.

H. The controller shall be single-phase; 110-volt (approx.) ac operated and shall contain an "On-Off" switch and fuse assembly. The controllers shall be equipped with a transformer to reduce voltage to a 24-volt system. Controller station shall be provided where shown.

## 3.10 WIRING AND ELECTRICAL WORK

A. All electrical equipment and wiring shall comply with local and state codes and shall be installed by those skilled and licensed in the trade. Unless the governing codes specify otherwise, low voltage control wire may be installed by the Contractor when code allows.

B. All 110-volt wire shall be installed in conduit and taken from appropriate sources as shown. Contractor shall coordinate manufacturer and installer.

C. The Contractor shall provide low voltage, 24-volt direct burial wires. Wire size shall be as shown but shall be not less than No. 14. Where sizes are not shown, they shall be sized per wire manufacturer's sizing charts and specifications.

D. The Contractor shall provide all wiring, conduits, sleeves, and connection for the low voltage electrical system between controller and valves, and where else shown and necessary for a complete and operable irrigation system.

E. Wires shall be color coded as follows:
   1. Common wire white.
   2. Valve wire red.
   3. Spare wire orange.
   4. Tracer wire yellow.
   5. Master valve wire blue.

F. All splices shall be moisture proof using specified electrical connectors.

G. Wires shall be bundled together and wrapped with electrical tape similar to PVC at 20-ft intervals. Install wire at the bottom side of the irrigation main line pipe.

H. An expansion curl should be provided within 3 ft of each wire connection and at pull box locations.

I. All conduits and sleeves necessary for running wires under concrete, walks, and paving shall be furnished and installed before said concrete, walks, and paving work is installed.

J. Wire shall be continuous without splices except at control valves, and shall be routed in main line trench whenever possible.

K. All wire under paving shall be encased in PVC pipe; changes in direction under paving shall be made with sweep ells.

L. Run one extra valve wire for every five valves installed to the furthest valve group through all valve boxes in all directions to each irrigation controller along with the specified extra wires for future irrigation system expansion.

## 3.11 PIPE TRENCH BACKFILL

A. After pipe and wires have been installed, the trenches shall be backfilled. The backfill operation must provide a firm continuous support for the pipe.

B. Backfill material shall be free of rocks and other materials that may damage the piping.

C. Bottom of trenches shall be smooth and free of sharp rocks and other object that may damage pipe.

D. The initial backfill shall be accomplished by carefully tamping selected material (from material excavated from the trench) under the pipe and between the pipe and the trench.

E. The pipes shall be filled with water and pressurized during backfilling operations if necessary, to prevent drainage to piping.

F. The backfill shall be carefully installed around and over the pipe to approximately 10 inches of the ground surface, then water shall be allowed to flow in the trench. After this puddling operation has been completed and allowed to stand for 24 hours, the balance of the materials shall be placed in the trench to the sub-grade line (leaving room for topsoil) Rocks and other materials found in the backfill shall be removed. The backfill shall be compacted carefully and thoroughly.

G. Couplings and fittings shall be left exposed until leakage tests have been completed.

H. Topsoil shall be installed prior to planting.

## 3.12 TESTING AND ADJUSTMENTS

A. The Owner shall be notified by the Contractor prior to performing hydrostatic tests on the irrigation system in place. This test shall be done by the Contractor in the presence of the Owner. The test results will be acceptable to the Owner when no leakage or loss of pressure is evident during the test period. Defects shall be detected and repaired prior to retesting.

B. The sprinkler heads shall be adjusted and balanced for optimum and uniform coverage without excessive fogging and overthrow on walks, paving, and structures. The height and elevations of risers and sprinkler heads shall be adjusted.

C. Following adjusting and balancing of the sprinkler heads, an operating test of the entire system shall be performed by the Contractor in the presence of the Owner at normal operating pressures. The test will be considered as acceptable if the system operates in a satisfactory manner providing uniform coverage of irrigated areas for a one week period of automatic operation with no leaks.

END OF SECTION

## SECTION 02910

## SODDING

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes: Sodding.

## 1.02 REFERENCES

A. American Sod Producers Association (ASPA).

## 1.03 QUALITY ASSURANCE

A. Sodding work shall be performed by a firm specializing in sodding.
   1. Do not make substitutions.
      a. If specified sod is not obtainable, submit proof of non-availability to Engineer, together with proposal for use of equivalent material.

B. Analysis and standards:
   1. Package standard products with manufacturer have certified analysis.
   2. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

## 1.04 SUBMITTALS

A. Plant and material certifications:
   1. Certificate of inspection as required by governmental authorities.
   2. Manufacturer's or vendor's certified analysis for soil amendments or fertilizer materials.

## 1.05 DELIVERY, STORAGE AND HANDLING

A. Packaged materials:
   1. Deliver packaged materials in containers showing weight, analysis, and name of manufacturer.
   2. Protect materials from deterioration during delivery, and while stored at site.

B. Sod:
   1. Time delivery so that sod will be placed within 24 hours after stripping.
   2. Protect sod against drying.

C. Transporting:
   1. Sod transported to the project in open vehicles shall be covered with tarpaulin or other suitable covers securely fastened to the body of the vehicle to prevent injury to the sod material.
   2. Closed vehicles shall be adequately ventilated to prevent overheating of the sod.

3. Evidence of inadequate protection against drying out in transit shall be cause for rejection.
4. Sod shall be kept moist, fresh and protected at all times.
    a. Such protection shall encompass the entire period during which the sod is in transit, being handled, or in temporary storage.
5. Upon arrival at the temporary storage location or the site of work, sod shall be inspected for proper shipping procedures.
    a. Should the roots be dried out, the Engineer will reject the sod.
    b. Remove rejected sod at once from the area of the work and replace it.
6. Unless otherwise authorized by the Engineer, the Contractor shall notify the Engineer at least 48 hours in advance of the anticipated delivery date of sod material.
7. Submit to Engineer a legible copy of the invoice, showing species and variety of sod included for each shipment.
8. Certificate of Inspection must accompany each sod shipment.

## 1.06 JOB CONDITIONS

A. Begin installation of sod after preceding related work is accepted.

B. Environmental Requirements:
    1. Install sod during months acceptable to the Engineer.
    2. Do not install sod on saturated soil.

C. Protection: Erect signs and barriers to control vehicular traffic.

D. Utilities:
    1. Determine location of underground utilities and perform work in a manner which will avoid possible damage.
    2. Hand excavate, as required.
    3. Maintain grade stakes set by others until parties concerned mutually agree upon removal.

## 1.07 SEQUENCING AND SCHEDULING

A. Correlate planting with specified maintenance periods to provide maintenance from date of substantial completion.

B. Coordination with sodding:
    1. Plant trees, palms and shrubs after final grades are established and prior to planting of sod, unless otherwise acceptable to Engineer.
    2. If planting of trees, palms and shrubs occurs after sod work, protect sod areas and promptly repair damage to lawns resulting from planting operations.

# PART 2 PRODUCTS

## 2.01 PLANTING SOIL

A. Provide new planting soil that is fertile, friable, natural loam, surface soil, reasonably free of subsoil, clay lumps, brush, weeds and other litter, and free of roots, stumps, stones larger than 1 inch in any dimension, and other extraneous or toxic matter harmful to plant growth.

B. Obtain planting soil from local sources or from areas having similar soil characteristics to that found at project site.

## 2.02 SOD

A. Provide strongly rooted sod, not less than 2 years old, free of weeds and undesirable native grasses, and machine cut to pad thickness of 1-1/2 inch (plus or minus 1/4 inch), excluding top growth and thatch.

B. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).

C. Provide sod uniform pad sizes with maximum 5 percent deviation in either length or width.
   1. Broken pads with uneven ends will not be acceptable.
   2. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.

D. Provide sod composed of the following:
   1. Kentucky Bluegrass

E. Sod shall be nursery grown on cultivated mineral agricultural soils.
   1. Sod shall have been mowed regularly and carefully maintained from planting to harvest.

F. ASPA Grade: Nursery Grown or Approved.
   1. Field grown sod is not acceptable.

G. Furnished in pads:
   1. Size:
      a. Length: 24 inches within 5 percent.
      b. Width: 18 inches within 5 percent.
      c. Thickness: 1-1/2 inches excluding top growth and thatch.
   2. Not stretched, broken or torn.

H. Uniformly mowed height when harvested: 2 inches.

I. Thatch: Maximum 1/2 inch uncompressed.

J. Inspected and found free of disease, nematodes, pests, and pest larvae, by entomologist of State Department of Agriculture.

K. Weeds:
   1. Free of Bermuda grass, nut grass, or other objectionable weeds.

L. Uniform in color, leaf texture, and density.

## 2.03 WATER

A. Plant utility water will be provided by the Owner for sod

## 2.04 FERTILIZER

A. Federal Specification Type O-F-241c (1), Grade A or B.

B. The chemical designation shall be 1-8-8, with at least 50 percent of the nitrogen from a non-water-soluble organic source.

## 2.05 HERBICIDES

A. As recommended by the State Department of Agriculture.

## 2.06 STAKES

A. Softwood, 3/4-inch diameter, 8-inch length.

# PART 3 EXECUTION

## 3.01 SHIPPING

A. Ship sod with certificates of inspection as required by governing authorities.

## 3.02 PREPARATION OF GROUND SURFACE

A. Before mixing, clean planting soil of roots, plants, sods, stones, clay lumps, and other extraneous material harmful or toxic to plant growth.

B. Mix specified fertilizers with planting soil as necessary at rates specified.
   1. Delay mixing fertilizer if planting will not allow placing of planting soil within a few days.

C. For sod, mix planting soil either prior to planting or apply on surface of topsoil and mix thoroughly before planting.

## 3.03 PREPARATION OF PLANTING BEDS

A. Loosen subgrade of lawn areas to a minimum depth of 4 inches.
   1. Remove stones measuring over 1 1/2 inches in any dimension.
   2. Remove sticks, stones, rubbish, and other extraneous matter.
   3. Limit preparation to areas, which will be planted promptly after preparation.

B. Spread planting soil to minimum depth of 2 inches or as required meeting lines, grades, and elevations shown, after light rolling and natural settlement.

C. Add specified fertilizer and mix thoroughly into upper 4 inches of topsoil.

D. Place approximately 1/2 of total amount of topsoil required.
   1. Work into top of loosened subgrade to create a transition layer and then place remainder of planting soil.
   2. Add specified soil amendments and mix thoroughly into upper 4 inches.

E. Where sod is to be planted in areas that have not been altered or disturbed by excavating, grading, or stripping operations, prepare soil for lawn planting as follows:
   1. Till to a depth of not less than 6 inches.
   2. Apply fertilizers as specified. Remove high areas and fill in depressions.
   3. Till soil to a homogenous mixture of fine texture, free of lumps, clods, stones, roots and other extraneous matter.

F. Prior to preparation of unchanged areas, remove existing grass, vegetation and turf. Dispose of such material outside of Owner's property.
   1. Do not turn existing vegetation over into soil being prepared for lawns.

G. Allow for sod thickness in areas to be sodded.

H. Apply specified commercial fertilizer at rates specified and thoroughly mix into upper 2 inches of topsoil.
   1. Delay application of fertilizer if lawn planting will not follow within a few days.

I. Fine grade sod areas to smooth, even surface with loose, uniformly fine texture.
   1. Roll, rake, and drag lawn areas, remove ridges and fill depressions, as required to meet finish grades.
   2. Limit fine grading to areas, which can be planted immediately after grading.

J. Moisten prepared sod areas before planting if soil is dry.
   1. Water thoroughly and allow surface to dry before planting lawns.
   2. Do not create a muddy soil condition.

K. Restore sod areas to specified condition, if eroded or otherwise disturbed, after fine grading and prior to planting.

## 3.04 SODDING NEW LAWNS

A. Lay sod within 24 hours from time of stripping.

B. Lay sod to form solid mass with tightly fitted joints.
   1. Butt ends and sides of sod strips; do not overlap.
   2. Stagger strips to offset joints in adjacent courses.
   3. Work from boards to avoid damage to subgrade or sod.
   4. Tamp or roll lightly to ensure contact with subgrade.
   5. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

C. Anchor sod on slopes with wood pegs to prevent slippage.

D. Water sod thoroughly with a fine spray immediately after planting.

## 3.05 MAINTENANCE

A. Begin maintenance immediately after planting.

B. Maintain lawns for not less than 30 days after substantial completion, and longer as required to establish an acceptable lawn.

C. Maintain sod by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, regrading and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

D. Mowing:
   1. Whenever grass reaches a height of 3 inches it shall be cut back to 2 inches with all clippings removed.
   2. After 2 mowings, Contractor shall top-dress the sod with an application of fertilizer at the rate of 1 pound of actual nitrogen per 1,000 square feet.

## 3.06 CLEANUP AND PROTECTION

A. During sodding work, keep pavements clean and work area in an orderly condition.

B. Protect sodding work and materials from damage due to landscape operations, operations by other Contractors and trades, and trespassers.
   1. Maintain protection during installation and maintenance periods.
   2. Treat, repair, or replace damaged sod work as directed.

## 3.07 INSPECTION AND ACCEPTANCE

A. Sod areas will be accepted when in compliance with all the following conditions:
   1. The roots are thoroughly attached to the soil.
   2. Absence of visible joints.
   3. All areas show a uniform stand of specified grass in healthy condition.
   4. At least 60 days have elapsed since the completion of the work in this Section.

B. When inspected sod work does not comply with requirements, replace rejected work and continue specified maintenance until reinspected by Engineer and found to be acceptable.
   1. Remove rejected plants and materials promptly from project site.

END OF SECTION

## SECTION 02981

## DECORATIVE STONE LANDSCAPING

### PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Decomposed granite rock groundcover.

### 1.02 SUBMITTALS

A. Product Data: Submit for chemical agents. Include:
   1. Material safety data sheets.
   2. Environmental Protection Agency registration number.
   3. Manufacturer's instructions for handling, storing, mixing, and application.

B. Shop Drawings: Submit gradation analysis from lot.

C. Samples: Provide representative sample (Minimum 2-pound sample in sealed plastic bag) of each type of decorative stone used on the project showing representative color, size, gradation, and texture for approval prior to ordering.

### 1.03 DELIVERY, STORAGE, AND HANDLING

A. Acceptance at site: Provide load tickets indicating weight and conformance with submittals.

B. Storage and protection:
   1. Protect delivered material from contamination by, or mixing with, other materials.

C. Handling:
   1. Handle, mix, and apply chemicals in accordance with applicable regulations and manufacturer's instructions. When required, use licensed applicator.
   2. Store chemicals in accordance with hazardous material regulations.

### 1.04 PROJECT CONDITIONS

A. Existing conditions:
   1. Verify proper finish grades before beginning work.

### PART 2 PRODUCTS

### 2.01 MATERIALS

A. Work includes providing and installing decorative stone/rock groundcover over all landscape, non-building, and non-paved site areas in accordance with Specifications and as indicated on the Drawings.

B. Decomposed granite:
   1. Provide granite that is free from lumps or balls of clay and that does not contain calcareous coatings, caliche, organic matter, or deleterious substances.
   2. Color, size, and source of decomposed granite shall match rock ground cover existing on site. Samples may be obtained from the site near Bioreactors 1-4. Provide samples of proposed matching materials to be approved by the Engineer.
   3. Provide materials that present uniform appearance and are from single production source. Reject material containing clumps, which will not disintegrate with shovel blow.

C. Chemical control agent/post-emergence control:
   1. Manufacturers: One of the following or equal:
      a. United Industries Corp., Spectracide.
      b. Monsanto Co., Roundup.

D. Pre-emergence control agent/pre-emergent herbicide:
   1. Manufacturers: The following or equal:
      a. Elanco Mfg. Co., Surflan 75W.

E. Water: Potable and exhibiting no deleterious effects upon decomposed granite.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Surface preparation:
   1. Prior to placing decomposed granite or other rock ground cover, perform following operations to areas designated to receive granite:
      a. Apply chemical control agent in manner to ensure areas are totally free of weeds.
      b. Grade to true and even condition.
      c. Apply pre-emergence control agent in accordance with manufacturer's instructions.

### 3.02 INSTALLATION

A. Installation of decomposed granite:
   1. Apply evenly distributed granite at designated areas to minimum depth of 2 inches (after settlement) and to 1-1/2 inches minimum below adjacent finish pavement or curb elevation.
   2. After placing and grading decomposed granite, lightly water granite to remove fine material from surface, then water settle or roll to a smooth even surface.
   3. Then apply a second application of pre-emergent control agent according to manufacturer's recommendations.
   4. Maintain all landscape areas in a smooth, weed free condition using post emergence control as required.
   5. A third application of pre-emergent shall be made prior to the end of the 90-day maintenance period for all rock ground cover areas.

B. Tolerances:
   1. Thickness (after settlement) shall not be less than specified. Compact decomposed granite surfacing to within 0.05 foot above and 0.02 foot below specified thickness.
   2. Surface smoothness: Measured parallel with and at right angles to the surfacing centerlines using a 10-foot straightedge, tolerance within 0.02 foot.

## 3.03 CLEAN UP AND PROTECTION

A. Promptly remove any decomposed granite or other rock material dropped onto paved surfaces by hauling or placing operations or otherwise, and keep these areas clean at all times. Remove any excess offsite and dispose of in a legal manner.

B. Protect from damage by elements, settlement, erosion, vehicles, foot traffic, and mixing with other contaminating substances (including soil).

END OF SECTION

## SECTION 03200

## CONCRETE REINFORCING

# PART 1 GENERAL

## 1.01 SUMMARY

A. Section includes:
   1. Reinforcing bars.
      a. Carbon steel.
   2. Thread bars.
   3. Bar supports.
   4. Tie wires.
   5. Welded wire fabric.

## 1.02 REFERENCES

A. American Concrete Institute (ACI):
   1. 318 - Building Code Requirements for Structural Concrete and Commentary.
   2. SP-66 - ACI Detailing Manual.

B. American Iron and Steel Institute (AISI).

C. American Welding Society (AWS):
   1. D1.4 - Structural Welding Code - Reinforcing Steel.

D. ASTM International (ASTM):
   1. A493 - Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging.
   2. A615 - Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
   3. A1064 - Standard Specification of Carbon-Steel wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

E. Concrete Reinforcing Steel Institute (CRSI):
   1. Manual of Standard Practice.

## 1.03 DEFINITIONS

A. Architectural concrete: Concrete surfaces that will be exposed to view in the finished work.
   1. Additionally, for purposes of this Section,includes:
      a. Concrete surfaces that are designated to receive paints or coatings.
      b. Exposed concrete in open basins, channels, and similar liquid containing structures:Surfaces shall be considered exposed to view if located above a line 2 feet below the normal operating water surface elevation in that structure.

B. Bars: Reinforcement or reinforcing bars as specified in this Section.

C. Evaluation Report: Report prepared by ICC-ES , or by other testing agency acceptable to the Engineer and to the Building Official, that documents testing and review of a product to confirm that it complies with the requirements of designated ICC-ES Acceptance Criteria, and its acceptance for use under the Building Code specified in Section 01410 - Regulatory Requirements.

D. Give away bars: Reinforcing bars that are not required by the Contract Documents, but are installed by the Contractor to provide support for the required reinforcing bars.

E. Wire supports: Metal reinforcing supports constructed of steel wire as specified. Includes individual high chairs, continuous high chairs, bolsters and other similar configurations and shapes.

## 1.04 SUBMITTALS

A. General:
   1. Submit in accordance with Section 01330 - Submittal Procedures.
   2. Changes to reinforcement in Contract Documents:
      a. Indicate in a separate letter submitted with shop drawings any changes to reinforcement indicated on the Drawings or specified.
      b. Such changes will not be acceptable unless Engineer has accepted them in writing.

B. Product data:
   1. Bar supports:
      a. Wire bar supports:
         1) Schedule of support materials to be provided and locations of use.
      b. Precast concrete bar supports ("dobies"):
         1) Manufacturer's data indicating compression strength of concrete and confirming dimensions and thickness(es).height(s) to be provided for each location where used.

C. Shop drawings:
   1. Reinforcement shop drawings:
      a. Submit drawings showing bending and placement of reinforcement required by the Contract Documents.
      b. Clearly indicate structures or portions of structures covered by each submittal.
      c. Shop drawings shall conform to the recommendations of the CRSI Manual of Standard Practice and ACI SP-66.
      d. Use the same bar identification marks on bending detail drawings, placement drawings, and shipping tags.
      e. Submittals consisting solely of reinforcing bar schedules, without accompanying placement drawings, will not be accepted unless accepted under prior written agreement with Engineer.
   2. Reinforcement placement drawings:
      a. Clearly show placement of each bar listed in the bill of materials, including additional reinforcement at corners and openings, and other reinforcement required by details in the Contract Documents.
      b. Clearly identify locations of reinforcement with coatings (e.g., galvanized or epoxy) and with yield strength other than ASTM A615, Grade 60.

c. Show anchor bolt locations based on anchor bolt templates for approved equipment.
d. Show splice locations.

3. Reinforcement fabrication drawings:
   a. If bend types or nomenclature differs from that recommended in the CRSI Manual of Standard Practice, provide details showing bend types and dimensional designations.
      Clearly identify reinforcement with coatings and with yield strength other than ASTM A615, Grade 60.

D. Samples (when requested by Engineer):
   1. Bar supports/wire reinforcement supports: Samples of each type of chair and bolster proposed for use. Submit with letter stating where each type will be used.
   2. Precast concrete bar supports: Samples of each type of precast support proposed for use. Submit with letter stating where each will be used.

E. Test reports:
   1. Certified copy of mill test for each steel used. Show physical properties and chemical analysis.
      a. Mill test reports may be submitted as record documents at the time the reinforcement from that heat of steel is shipped to the site.
      b. In such cases, submit certificates under the shop drawing submittal number with the letter "R" (for record date) appended to the end (e.g., of the reinforcement was submitted as 03200-002-1, deliver the associated mill certificate as submittal 03200-002-1R).

F. Special procedures:
   1. Welding procedures conforming to AWS D1.4 for reinforcement to be field welded.
      a. Procedures qualification record.

G. Qualifications statements:
   1. Welder qualifications.

H. Closeout documents:
   1. Field quality control and inspection reports.
   2. Field quality assurance special inspection and testing reports.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Packing and shipping:
   1. Deliver bars bundled and tagged with identifying tags.

B. Acceptance at site:
   1. Reinforcing bars: Deliver reinforcing bars lacking grade identification marks with letter containing manufacturer's guarantee of grade.

## 1.06 SEQUENCING AND SCHEDULING

A. Bar supports:
   1. Do not place concrete until samples and product data for bar supports have been accepted by Engineer.

## PART 2 PRODUCTS

### 2.01 DESIGN AND PERFORMANCE CRITERIA

A. The drawings contain notes describing the size and spacing of reinforcement and its placement, details of reinforcement at wall corners and intersections, and details of extra reinforcement around openings in concrete, and other related information.

### 2.02 MATERIALS

A. Reinforcing bars:
   1. Provide reinforcement of the grades and quality specified, fabricated from new stock, free from excessive rust or scale, and free from unintended bends or other defects affecting its usefulness.
   2. Reinforcing bars:
      a. ASTM A615 Grade 60 deformed bars, including the following requirements,
         1) Actual yield strength based on mil tests of reinforcement provided shall not exceed the minimum yield strength specified in this Section by more than 18,000 pounds per square inch.
         2) Ratio of actual ultimate tensile strength to actual tensile yield strength shall not be less than 1.25.
   3. Reinforcing bars designated or required to be welded:
      a. Low-alloy, ASTM A706 Grade 60, deformed bars.

B. Bar supports:
   1. Wire supports:
      a. All stainless steel bar supports:
         1) Conforming to CRSI Manual of Standard Practice recommendations for types and details, but custom fabricated entirely from stainless steel wire conforming to ASTM A493, AISI Type 316.
      b. Stainless steel protected bar supports:
         1) Conforming to CRSI Manual of Standard Practice Class 2, Type B, and consisting of bright basic wire support fabricated from cold--drawn carbon steel wire with stainless steel ends attached at the bottom of each leg.
         2) Stainless steel wire ends shall conform to ASTM A493, AISI Type 316 and shall extend at least 3/4 inch inward from the formed surface of the concrete.
      c. Bright basic wire bar supports.
         1) Conforming to CRSI Manual if Standard Practice, Class 3.
   2. Plastic supports:
      a. Manufacturers: The following or equal:
         1) Aztec Concrete Accessories.
   3. Deformed steel reinforcing bar supports:
      a. Fabricated of materials and to CRSI details recommended for typical reinforcement embedded in concrete and bent to dimensions required to provide specified clearances and concrete cover.
   4. Precast concrete bar supports ("dobies"):
      a. Pre-manufactured, precast concrete blocks with cast-in annealed steel wires, 16-gauge or heavier.

b. Compression strength of concrete: Equal to or exceeding the compression strength of the surrounding concrete.
c. Block dimensions:
1) Height to provide specified concrete cover.
2) Footprint not less than 3 inches by 3 inches, and adequate to support the weight of the reinforcement and maintain specified concrete cover without settling into the underlying surface.

C. Tie wires:
1. General use: Black annealed steel wire, 16-gauge or heavier.

D. Welded wire fabric reinforcement:
1. Material:
a. Carbon steel conforming to ASTM A1064.
2. Provide welded wire reinforcement in flat sheet form. Rolled wire fabric is not permitted.
3. Fabric may be used in place of reinforcing bars if accepted by Engineer:
a. Provide welded wire fabric having cross-sectional area per linear foot not less than the cross-sectional area per linear foot of reinforcing bars indicated on the Drawings.

## 2.03 FABRICATION

A. Shop fabrication and assembly:
1. Cut and bend bars in accordance with provisions of ACI 318 and the CRSI Manual of Standard Practice.
2. Bend bars cold. Use bending collars to develop the recommended bend radius.
3. Provide bars free from defects and kinks and from bends not indicated on the Drawings.
4. Circumferential and radiused reinforcement: Roll to the radius required for its location in the structure before installation.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verification of conditions:
1. Reinforcing bars and welded wire reinforcement:
a. Verify that reinforcement is new stock, free from rust scale, loose mill scale, excessive rust, dirt, oil, and other coatings that will adversely affect bonding capacity when placed in the Work.
2. Welded wire fabric:
a. Verify that sheets are not curled or kinked before or after installation.

## 3.02 PREPARATION

A. Surface preparation:
1. Reinforcing bars - uncoated:
a. Clean reinforcement of concrete, dirt, oil and other coatings that will adversely affect bond before embedding bars in subsequent concrete placements.

b. Thin coating of red rust resulting from short exposure will not be considered objectionable. Thoroughly clean bars having rust scale, loose mill scale, or thick rust coat.
c. Partially embedded reinforcement: Remove concrete or other deleterious coatings from dowels and other projecting bars by wire brushing or sandblasting before bars are embedded in subsequent concrete placements.

## 3.03 INSTALLATION

A. Reinforcing bars: General:
1. Field-cutting of reinforcing bars is not permitted.
2. Field-bending of reinforcing bars, including straightening and rebending, is not permitted.

B. Placing reinforcing bars:
1. Accurately place bars to meet position and cover requirements indicated on the Drawings and specified. Secure bars in position.
2. Tolerances for placement and minimum concrete cover: As listed in Table 1.

**Table 1 - Reinforcement Placing Tolerances**

| Member | Tolerance on Reinforcement Location (1) | Tolerance on Minimum Concrete Cover (1,2) |
|---|---|---|
| Slabs, beams, walls and columns except as noted below: | | |
| 10 inches thick and less | ± 3/8 inch | - 3/8 inch |
| More than 10 inches thick | ± 1/2 inch | - 1/2 inch |
| Formed soffits: | As noted above | - 1/4 inch |
| Longitudinal location of bends and ends of reinforcement: | | |
| Conditions not listed below: | ± 2 inches | - 1/2 inch |
| At discontinuous ends of brackets and corbels | ± 1/2 inch | - 1/4 inch |
| At discontinuous ends of other members: | ± 1 inch | - 1/2 inch |

Notes:
(1) ± indicates "plus or minus;" - indicates "minus;" + indicates "plus."
(2) Tolerance on cover is limited as noted, but decrease in cover shall not exceed one third of the minimum cover indicated on the Drawings.

3. Spacing between bars:
a. Minimum clear spacing between bars in a layer:
1) As indicated on the Drawings, but not less than the larger of 1.5 times the bar diameter or 1-1/2 inches.
b. Minimum clear spacing between bars in 2 or more parallel layers:
1) Place bars in upper layers directly above bars in lower layers.

2) Minimum spacing between layers: As indicated on the Drawings, but not less than the larger of 1.5 times the bar diameter or 1-1/2 inches.

c. Limits on minimum clear spacing between bars also applies to the clear spacing between a lap splice and the adjacent bars and/or lap splices.

4. Lap splices for bars:
   a. Lap splice locations and lap splice lengths: as indicated on the Drawings. Where lap lengths are not indicated, provide in accordance with ACI 318.
   b. Unless otherwise specifically indicated on the Drawings (and noted as "non-contact lap splice"), install bars at lap splices in contact with each other and fasten together with tie wire.
   c. Where bars are to be lap spliced at concrete joints, ensure that bars project from the first concrete placement a length equal to or greater than minimum lap splice length indicated on the Drawings.
   d. Stagger lap splices where indicated on the Drawings.
   e. Where lap splice lengths are not indicated on the Drawings, provide lap splice lengths in accordance with ACI 318.

C. Reinforcing supports:
   1. Provide supports of sufficient numbers, sizes, and locations to maintain concrete cover, to prevent sagging and shifting, and to support loads during construction without displacement and without gouging or indentation into forming surfaces.
      a. Quantities and locations of supports shall not be less than those indicated in ACI SP-66 and the CRSI Manual of Standard Practice.
   2. Do not use brick, concrete masonry units, concrete spalls, rocks, wood, or similar materials for supporting reinforcement.
   3. Do not use "give away bars" that have less cover than that required by the Contract Documents. Do not adjust the location of reinforcement required by the Contract Documents to provide cover for give away bars.
   4. Provide bar supports of height required to maintain the clear concrete cover indicated on the Drawings.
   5. Provide bar supports at formed vertical faces to maintain the clear concrete cover indicated on the Drawings.
   6. Schedule of reinforcement support materials: Provide bar supports as indicated in Table 2.

**Table 2 - Reinforcement Support Materials**

| Case | Location | Material |
|---|---|---|
| a. | Concrete placed over earth and concrete seal slabs ("mud mats"): | Precast concrete bar supports. |
| b. | Concrete placed against forms and exposed to water or wastewater process liquids (whether or not such concrete received additional linings or coatings): | All stainless steel bar supports. |
| c. | Concrete placed against forms and exposed to earth, weather, frequent washdown, or groundwater in the finished work | Stainless steel protected bar supports. |
| d. | Concrete placed against forms and exposed to interior equipment/piping areas in the finished work | Stainless steel protected bars supports. |

| Table 2 - Reinforcement Support Materials | | |
|---|---|---|
| **Case** | **Location** | **Material** |
| e. | Between mats of reinforcement, and fully embedded within a concrete member | Bright basic wire bars supports, or deformed steel reinforcing bars. |

D. Tying of reinforcing:
   1. Fasten reinforcement securely in place with wire ties.
   2. Tie reinforcement at spacings sufficient to prevent shifting.
      a. Provide at least 3 ties in each bar length. (Does not apply to dowel lap splices or to bars shorter than 4 feet, unless necessary for rigidity).
   3. Tie slab bars at every intersection around perimeter of slab.
   4. Tie wall bars and slab bar intersections other than around perimeter at not less than every fourth intersection, but at not more than the spacing indicated in Table 3:

| Table 3 - Maximum Spacing of Tie Wires for Reinforcement | | |
|---|---|---|
| **Bar Size** | **Slab Bar Spacing (inches)** | **Wall Bar Spacing (inches)** |
| Bars Number 5 and Smaller | 60 | 48 |
| Bars Number 6 through Number 9 | 96 | 60 |
| Bars Number 10 and Number 11 | 120 | 96 |

   5. After tying:
      a. Bend ends of wires inward towards the center of the concrete section. Minimum concrete cover for tie wires shall be the same as cover requirements for reinforcement.
      b. Remove tie wire clippings from inside forms before placing concrete.

E. Welded wire fabric reinforcement:
   1. Install only where indicated on the Drawings or accepted in advance by Engineer.
   2. Install necessary tie wires, spacing chairs, and supports to keep welded wire fabric at its designated position in the concrete section while concrete is being placed.
   3. Straighten welded wire fabric to make sheets flat in the Work.
   4. Do not allow wire fabric to drape between supports unless such a configuration is specifically indicated on the Drawings.
      a. If fabric is displaced during placement of concrete, make provisions to restore it to the designated location using methods acceptable to Engineer.
   5. Bend welded wire fabric as indicated on the Drawings or required to fit Work.
   6. Lap splice welded wire fabric as indicated on the Drawings.
      a. If lap splice length is not indicated, splice in accordance with ACI 318, but not less than 1 1/2 courses of fabric or 8 inches minimum. Tie laps at ends and at not more than 12 inches on center.

F. Welding reinforcing bars:
   1. Weld reinforcing bars only where indicated on the Drawings or where acceptance is received from Engineer prior to welding.
   2. Perform welding in accordance with AWS D1.4 and welding procedures accepted by Engineer.
      a. Conform to requirements for minimum preheat and interpass temperatures.
   3. Submit:
      a. Welding procedures specification.
      b. Procedures qualification record.
      c. Welder qualification test record.
   4. Do not tack weld reinforcing bars except where specifically indicated on the Drawings.

## 3.04 FIELD QUALITY CONTROL

A. Provide quality control for the Work of this Section as specified in Section 01450 - Quality Control.

B. Field inspections and testing:
   1. Submit records of inspections and testing to Engineer in electronic format within 24 hours after completion.

## 3.05 FIELD QUALITY ASSURANCE

A. Provide quality assurance as specified in Section 01450 - Quality Control.

B. Special inspections and tests:
   1. Provide as specified in Section 01455 - Regulatory Quality Assurance.
   2. Frequency of inspections:
      a. Unless otherwise indicated on the Drawings or in this Section, provide periodic special inspection as required by the Building Code specified in Section 01410 - Regulatory Requirements.
   3. Preparation:
      a. Review Drawings and Specification for the Work to be observed.
      b. Review approved submittal sand shop drawings.
   4. Inspections: Special inspection shall include, but is not limited to, the following items.
      a. Reinforcement: General:
         1) Type (material) and location of reinforcement supports.
         2) Bar material/steel grade and bar size.
         3) Location, placement, and spacing of bars.
         4) Clear concrete cover over reinforcement.
         5) Lap splice: Location and lap length. Bars within tolerances for contact (unless non-contact splice is indicated on the Drawings.)
         6) Bar hooks and development lengths embedded within concrete sections as indicated on the Drawings.
         7) Reinforcement tired in position and tie wire legs turned inward toward the center of the concrete section.
      b. Reinforcement: Welding:
         1) Inspector qualification and inspections shall be in accordance with the requirements of AWS D1.4.

2) Provide periodic inspection for:
   a) Weldability of reinforcement other than ASTM A706.
   b) Single pass fillet welds with thickness less than or equal to 5/16 inch.
3) Provide continuous inspection for:
   a) Other welds.
   b) Welds at mechanical reinforcing bar couplers and end anchors.
4) In addition to visual inspection, Owner may inspect reinforcing bar welds by other methods, including radiographic inspection.

5. Records of inspections:
   a. Provide a written record of each inspection using forms acceptable to the Engineer and to the Building Official.
   b. Submit electronic copies of inspection reports to Engineer within 24 hours after completion of inspections.

## 3.06 NON-CONFORMING WORK

A. Before placing concrete, adjust or remove and re-install reinforcement to conform to the requirements of the Contract Documents.

END OF SECTION

**SECTION 03300**

**CAST-IN-PLACE-CONCRETE**

**TABLE OF CONTENTS**

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes: Cast-in-place concrete:

B. The requirements of this Section will require advance planning for preparation and testing of trial batches. Review the mix design and testing requirements carefully, and schedule preparations and testing with sufficient time to complete tests, to obtain Engineer's review of mixes and testing results, and to complete revisions and re-testing if required.

### 1.02 REFERENCES

A. American Concrete Institute (ACI):
1. 212.3R - Report on Chemical Admixtures for Concrete.
2. 302.1R - Guide to Concrete Floor and Slab Construction.
3. 305R - Guide to Hot Weather Concreting.
4. 306R - Guide to Cold Weather Concreting.
5. 318 - Building Code Requirements for Structural Concrete and Commentary.
6. 350 - Code Requirements for Environmental Engineering Concrete Structures and Commentary.
7. Manual of Concrete Practice.

B. ASTM International (ASTM):
1. C29 - Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate.
2. C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
3. C33 - Standard Specification for Concrete Aggregates.
4. C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
5. C40 - Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.
6. C42 - Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
7. C88 - Standard Test Method of Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
8. C94 - Standard Specification for Ready-Mixed Concrete.
9. C114 - Standard Test Methods for Chemical Analysis of Hydraulic Cement.
10. C117 - Standard Test Method for Materials Finer that 75-m (No. 200) Sieve in Mineral Aggregates by Washing.
11. C123 - Standard Test Method for Lightweight Particles in Aggregate.
12. C131 - Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
13. C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
14. C138 - Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
15. C142 - Standard Test Method for Clay Lumps and Friable Particles in Aggregate.

16. C143 - Standard Test Method for Slump of Hydraulic-Cement Concrete.
17. C150 - Standard Specification for Portland Cement.
18. C156 - Standard Test Method for Water Loss from a Mortar Specimen Through Liquid Membrane-Forming Curing Compounds for Concrete.
19. C157 - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete.
20. C171 - Standard Specifications for Sheet Materials for Curing Concrete.
21. C172 - Standard Practice for Sampling Freshly Mixed Concrete.
22. C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
23. C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
24. C293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam With Center-Point Loading).
25. C295 - Standard Guide to Petrographic Examination of Aggregates for Concrete.
26. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
27. C311 - Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete.
28. C494 - Standard Specification for Chemical Admixtures for Concrete.
29. 
30. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
31. C702 - Standard Practice for Reducing Samples of Aggregate to Testing Size.
32. C856 - Standard Practice for Petrographic Examination of Hardened Concrete.
33. C1064 - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
34. C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
35. C1260 - Standard Test Method of Potential Alkali Reactivity of Aggregates (Mortar Bar Method).
36. C1293 - Standard Test Method for Determination of Length Change of Concrete due to Alkali-Silica Reaction.
37. C1602 - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
38. C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete.
39. D29 - Standard Practice for Determining Volatile and Nonvolatile Content of Cellulosics, Emulsions, Resin Solutions, Shellac, and Varnishes.
40. D75 - Standard Practice for Sampling Aggregates.
41. D2103 - Standard Specification for Polyethylene Film and Sheeting.
42. D3665 - Standard Practice for Random Sampling of Construction Materials.
43. D4791 - Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

C. National Ready-Mixed Concrete Association (NRMCA).

## 1.03 DEFINITIONS

A. Alkali: The sum of sodium oxide and potassium oxide calculated as sodium oxide.

B. Alkali load: Amount of alkalies contributed by the portland cement in a concrete mixture, expressed in pounds per cubic yard ($lb/yd^3$) and calculated by multiplying the portland cement content of the concrete in $lb/yd^3$ by the alkali content of the portland cement, or the portland cement portion of a blended cement, divided by 100.

C. Architectural concrete: Concrete surfaces that will be exposed to view in the finished work.
   1. For purposes of this Section, includes only those surfaces that receive paint or coatings.
   2. Exposed concrete surfaces in open basins, channels, and similar liquid containing structures: Surfaces will be considered exposed to view if located above the water line as defined in Section 03366 - Tool Concrete Finishing.
   3. Exterior concrete surfaces with portions above and below grade: Surface will be considered exposed to view of located above the grade line as defined in Section 03366 - Tool Concrete Finishing.

D. Average daily temperature: Calculated by summing hourly measurements of air temperature in the shade at the face of the concrete and dividing that sum by 24. In calculating the sum of the temperatures recorded, any measurement less than 50 degrees Fahrenheit shall be recorded as 0 degrees Fahrenheit and included in the sum.

E. Cementitious materials: Portland cement and supplementary cementitious materials.

F. Class of concrete: Refers to a mix with characteristics, proportions, and constituents (including a specific combination of admixtures) as specified in this Section.
   1. Any change in the source or characteristics of constituent materials, in the proportions of materials, or in the admixtures included in a mix shall be considered as creating a new and separate class of concrete.
   2. Any mix to be placed by pumping shall be considered as creating a new and separate class of concrete.

G. Cold weather: Includes one or more of the following conditions:
   1. Current air temperature is 45 degrees Fahrenheit and falling.
   2. Air temperature during the first 24 hours after placement is expected to fall into the range of 45 degrees Fahrenheit to 40 degrees Fahrenheit.
   3. A period when, for more than 3 consecutive days, the following conditions exist:
      a. The average daily air temperature drops below 40 degrees Fahrenheit.
      b. The air temperature is not greater than 50 degrees Fahrenheit for more than one-half of any consecutive 24-hour period.

H. Cold weather concreting: Operations for placing, finishing, curing, and protecting concrete during cold weather.

I. Green concrete: Concrete that has not yet achieved 100 percent of the minimum specified compressive strength, f'c, for that mix.

J. Hairline crack: Crack with a crack width of less than 4 thousandths of an inch (0.004 inches).

K. Hot weather: Any combination of ambient temperature, concrete temperature, relative humidity, wind speed, and solar radiation intensity that creates conditions that will evaporate water from a free concrete surface at a rate equal to or greater than 0.2 pounds per square foot per hour as determined by the Menzel Formula and nomograph published in ACI 305R and in this Section, Attachment A - Menzel Formula and Nomograph.

L. Hot weather concreting: Operations for placing, finishing, curing, and protecting concrete during hot weather.

M. Mass concrete: Concrete with a thickness of more than 36 inches.

N. Paste content: The total concrete volume minus the volume of aggregate, expressed as a percentage of total volume. Paste volume includes volume of cementitious materials, water, air, admixtures materials, and any fibers.

O. Supplemental cementitious material: inorganic material such as fly ash, natural pozzolans, silica fume, or slag cement that reacts pozzolanically or hydraulically.

## 1.04 DELEGATED DESIGN

A. Provide Delegated Design for the following Work, based on the requirements of this Section.
   1. Concrete mix designs.

## 1.05 SUBMITTALS

A. General:
   1. Data for concrete mixes and mix constituents supplied to the Work shall be coordinated through a single supplier.
   2. A maximum of 2 mix designs will be reviewed by the Engineer for each class of concrete required.
      a. Review of additional mix designs shall be at the expense of the Contractor.

B. Product data:
   1. Submit data completely describing products and demonstrating compliance with the requirements of this Section.
   2. Data for all products in the mix for each class of concrete shall be submitted concurrently with that mix design.
   3. Where products conforming to NSF-61 are required, submit evidence of testing and listing under NSF-61 for use in direct contact with potable water. Testing and listing shall be by a nationally recognized agency acceptable to the Engineer.

4. Admixtures:
    a. For each admixture included in concrete mixes, submit manufacturer's product data demonstrating compliance with standards specified.
    b. If air entraining admixture requires test method other than ASTM C173 to accurately determine air content, make special note of requirements in submittal.
5. Curing compound: Submit complete data on proposed compound.

C. Design data:
1. Concrete mix designs:
    a. Submit full details, including mix design calculations and plots, for concrete mixes proposed for use for each class of concrete.
    b. Include mix design calculations of proportions by both weight and volume.
    c. Determine and include the alkali load of the proposed mix.
    d. Include information on correction of batching for varying moisture contents of fine aggregate.
    e. Submit source quality test records with mix design submittal.
    f. Provide calculations demonstrating that the mixes proposed provide the required average compression strength of concrete (f'cr) based on source quality test records.
    g. For each Class A mix design submitted, plot the mix design Attachment B - Coarseness Factor Chart and submit.
    h. For each Class A mix design submitted, plot the combined aggregate gradation on the chart Attachment C - Combined Aggregate Gradation Chart and submit.

D. Concrete mixes - Trial batches:
1. Drying shrinkage test results.
    a. Submit results of testing.
2. Compression strength test results.
    a. Submit results of testing. Provide data for each cylinder tested.
    b. Submit data indicating trial batch mix designator, slump, and specimen number for each test cylinder.
        1) Using indelible marker, clearly label each cylinder with concrete class, trail batch number, and specimen number.
3. If there is any change in suppliers or in quality of concrete mix constituents, submit new test data.

E. Test reports:
1. Dated not more than 24 months prior to the date of submittal.
2. Aggregate:
    a. Submit certified copies of commercial laboratory tests proposed for use in concrete.
    b. Sieve analyses:
        1) During construction, submit sieve analyses of coarse, fine, and combined aggregates used any time there is a change in supplier, or a significant change in the character and/or grading of materials, and when requested by the Engineer.
    c. Aggregates - coarse:
        1) Physical properties:
            a) Sieve analysis.

b) Percentage of particles having flat and/or elongated characteristics.
c) Abrasion loss.
d) Soundness.

2) Deleterious substances:
a) Clay lumps and friable particles content.
b) Materials finer than 200 sieve (percentage).
c) Shale and chert content.
d) Coal and lignite content.

3) Alkali reactivity.

d. Aggregates - Intermediate:
1) Physical properties:
a) Sieve analysis.
b) Percentage of particles having flat and/or elongated characteristics.
c) Abrasion loss.
d) Soundness.

2) Deleterious substances:
a) Clay lumps and friable particles content.
b) Chert and shale content.
c) Coal and lignite content.
d) Materials finer than No. 200 sieve.

3) Alkali reactivity.

e. Aggregates - Fine:
1) Physical properties:
a) Sieve analysis and fineness modulus.
b) Soundness.

2) Deleterious substances:
a) Clay lumps and friable particles (percentage).
b) Materials finer than No. 200 sieve (percentage).
c) Coal and lignite (percentage).
d) Shale and chert.
e) Organic impurities ("Color" as determined by ASTM C40).

3) Alkali reactivity.

f. Aggregates - Combined:
1) Test combined gradation for the following sieve sizes: 1.5 inches, 1 inch, 3/4 inch, 1/2 inch, 3/8 inch, Number 4, Number 8, Number 16, Number 30, Number 100, Number 200.
2) Bulk density in accordance with ASTM C29.
3) Void content in accordance with ASTM C29.
4) Submit at:
a) Initial mixture design submittal,
b) Intervals of not more than 4 weeks,
c) Any time there is a change in character or grading of constituent materials,
d) When requested by the Engineer.

3. Cement:
a. Mill tests, including alkali content measured as equivalent alkalis, for each shipment of cement included in the Work.
1) During construction, submit mill certificates for cement being used at intervals of not more than 90 days, any time there is a

change in supplier or a significant change in the character of the materials, and when requested by the Engineer.

4. Supplemental cementitious material:
   a. Fly ash: Identify source and provide testing results to demonstrate compliance with requirements of ASTM C618 and this Section.
      1) Include supplier's report certifying the total alkali content of the material, expressed as equivalent percentage of sodium oxide ($Na_2Oe$).

F. Certificates:
   1. Current NRMCA certification for all plants and trucks that will be used to supply concrete.

G. Source quality control submittals:
   1. Truck batch tickets for each load of concrete delivered to the site, whether accepted or rejected.
   2. Concrete supplier's quality control plan. Include the following elements, at a minimum:
      a. Names and qualifications of key quality control personnel:
         1) Quality control manager.
         2) Testing and inspection personnel.
      b. Names and qualifications of testing laboratories:
         1) Each laboratory shall hold current accreditation from the AASHTO Accreditation Program, or other accreditation program acceptable to the Engineer, for each test performed.
      c. Example forms for: inspection reports, certificates of compliance, and test results.
      d. Quality control procedures: Method and frequency of performing each procedure, including inspections and materials testing. At a minimum, the plan shall include:
         1) Daily testing of aggregate gradation.
         2) Monthly testing of cement quality.
         3) Monthly testing of fly ash quality.
      e. Procedures to control quality characteristics, including standard procedures to address properties outside the specified operating limits, and example reports to document non-conformances and corrective actions taken. Include procedure for notifying Contractor and Engineer of non-conformances.
      f. Procedures for verifying that:
         1) Materials are properly stored during concrete batching operations.
         2) Batch plants have the ability to maintain concrete consistency during periods of extreme heat and of low temperatures.
         3) Admixtures are dispensed in the correct dosages within the accuracy requirements specified.
         4) Delivery trucks have a valid NRMCA certification card.
      g. Procedures for verifying that weighmaster certificate for each load of concrete shows:
         1) Cement and supplementary materials are from sources designated in the approved submittals.
         2) Concrete as-batched complies with the constituent weights designated in the approved submittals.

3) Corrections for aggregate moisture are being correctly applied.
4) Any mix water withheld from the batch.

h. Procedures for visually inspecting concrete during discharge.

H. Field quality control submittals:
1. Contractor's notifications of readiness for concrete placement.
2. Contractor's reports of field quality control testing.
a. Include with each report the concrete batch ticket number and identification numbers for associated cylinders used for compressive strength testing.
b. Testing results for slump, temperature, unit weight, and air entrainment.
c. Testing results for compressive strength at 7 and 28 days, and for any compressive strength tests after 28 days.
d. Note on batch ticket the amount of water that was withheld and the maximum amount that can be added on site as "Max add water." Record on the batch ticket the volume of water actually added at site.
e. Note on the batch ticket the concrete mix classification as defined in Table 3 of this Section.

I. Special procedure submittals:
1. Sequence of concrete placing:
a. Submit proposed sequence of placing concrete showing proposed beginning and ending of individual placements. Submittal shall include plans sections and details to address all pours.
2. Cold weather concreting plan.
3. Hot weather concreting plan.
4. Repair of defective concrete: Submit mix design for repair materials to be used.

## 1.06 QUALITY ASSURANCE

A. Pre-installation meetings:
1. Schedule and conduct pre-installation meeting at least 10 days prior to batching and placing of concrete.
a. Provide additional meetings if necessary, to discuss specific concrete submittals, mixes, or placing and curing conditions.
b. Notify Engineer of location and time of each conference.
2. Required attendees:
a. Contractor including Contractor's superintendent and key personnel.
b. Concrete supplier.
c. Technical representative(s) of supplier(s) of concrete admixtures.
d. Subcontractor(s) providing pumping, placing, finishing, and curing.
e. Subcontractor(s) providing embedded items (structural embedded plates, electrical conduit).
f. Sampling and testing personnel.
g. Engineer.
h. On-site inspectors representing Engineer.
i. Other persons deemed by the Engineer and the Contractor to be critical to the quality and efficiency of the Work.
3. Agenda:
a. Review of requirements of Drawings and Specifications.

b. Project and product safety requirements.
c. Discussion of points of interface and coordination between various trades or products to be used in the Work.
d. Contractor's schedule for cast-in-place concrete work.
e. Mix designs, mix tests, and submittals.
f. Admixture types, dosing, performance, requirements for monitoring, and limits on dosing or re-dosing at the site.
g. Placement and consolidation methods, techniques, and equipment and the effects of those methods on form pressures.
h. Slump and limits on placing time or conditions to maintain placeability.
    1) Field adjustment of slump and air content.
i. Procedures for finishing, curing, and retention of moisture during these operations.
j. Procedures and protection for hot and cold weather conditions.
k. Requirements and coordination for inspections.
    1) Responsibility for test specimen curing and storage.
    2) Distribution of test reports.
l. Other Specification requirements requiring coordination between parties to the work.

4. Prepare and submit minutes of the pre-installation meeting as specified in Section 01312 - Project Meetings.

## 1.07 DELIVERY, STORAGE, AND HANDLING

A. Packing and shipping:
1. Deliver, store, and handle concrete materials in manner that prevents damage and inclusion of foreign substances.
2. Deliver and store packaged materials in original containers until ready for use.
3. Deliver aggregate to mixing site and handle in such manner that variations in moisture content will not interfere with steady production of concrete of specified degree of uniformity and slump.

B. Acceptance at site:
1. Reject material containers or materials showing evidence of water or other damage.
2. Concrete mixes: Do not accept or incorporate into the Work concrete mixes that do not comply with the specified requirements for water content, slump, temperature, and air content.

## 1.08 PROJECT CONDITIONS

A. Cold weather concreting: During periods of cold weather as defined in this Section, implement cold weather concreting procedures in this Section.

B. Hot weather concreting: During periods of hot weather as defined in this Section, implement hot weather concreting procedures in this Section.

## 1.09 SEQUENCING AND SCHEDULING

A. Schedule placing of concrete in a manner that completes all placing operations from one construction, contraction, or expansion joint to another construction, contraction, or expansion joint.

B. Joints at each end of the placement shall be as indicated on the Drawings, or as identified and accepted in advance by the Engineer.

## PART 2 PRODUCTS

### 2.01 DESIGN AND PERFORMANCE CRITERIA

A. It is the intent of this Section to secure, for every part of the Work, concrete with a homogeneous mixture, that, when hardened, will have required strength, watertightness, and durability.

B. It is the intent of this Section to procure a workable, low-shrinkage concrete mix that maximizes aggregate content and minimizes paste content.

C. Performance requirements:
   1. General:
      a. Except as otherwise specified, provide concrete composed of portland cement, supplemental cementitious materials, aggregate, admixtures and water, proportioned and mixed to produce a plastic, workable mixture in accordance with requirements of this Section, and suitable to specific conditions of placement.
      b. Proportion aggregates to produce an optimized gradation of aggregate that combines fine, intermediate**,** and coarse aggregate in well-graded proportions that maximizes the aggregate content and minimizes the paste content of the mix. The gradation should maximize long-term durability and strength of the concrete mixture.
      c. Durability requirements will be deemed to be satisfied when:
         1) The mixture is proportioned with a well-graded combined aggregate.
         2) The specified water-cement ratio is satisfied.
         3) The concrete contains the specified range of air content.
         4) The maximum specified paste content is satisfied.
      d. Proportion materials in a manner that will secure the lowest cement content, water-cementious materials ratio, and paste volume that is consistent with good workability, that provides a plastic and cohesive mixture, and that provides a slump that is within the specified range.
      e. Construction and expansion joints have been positioned in structures as indicated in the specifications, and curing methods have been specified, for purpose of to reduce the number and size of cracks, resulting from normal expansion and contraction expected from the concrete mixes specified.
      f. Remove and replace, or repair as specified in Part III, non-conforming work and surfaces with cracks, voids and honeycombs, or surface wetness.
   2. Workmanship and methods: Provide concrete work, including detailing of reinforcing, conforming with best standard practices and as set forth in ACI 318, ACI 350, and the ACI Manual of Concrete Practice.

## 2.02 MATERIALS - GENERAL

A. Water and ice:
   1. Water for concrete mixes, for washing aggregate, and for curing concrete: Clean and free from oil and deleterious amounts of alkali, acid, organic matter, or other substances.
   2. Do not exceed the optional chemical limits in accordance with ASTM C1602.
   3. Do not use water recycled from previously returned fresh concrete.

## 2.03 MATERIALS - CONCRETE MIX CONSTITUENTS

A. Water and ice:
   1. As specified in the preceding paragraphs.

B. Cementitious materials:
   1. Portland cement:
      a. In accordance with ASTM C150.
         1) Type II
      b. Single source: To provide uniformity of appearance, for each structure use only one source, type, and brand of portland cement for walls and slabs that will be exposed in the finished work.
         1) Confirm adequate supply of cement over duration of project before making trial batches or beginning concrete placements.
      c. Cement for finishing: Provide cement from same source and of same type as concrete to be finished or repaired.

C. Supplementary cementitious materials:
   1. Fly ash:
      a. Class C or Class F fly ash in accordance with the requirements of ASTM C618, except as modified in this Section.
         1) Class C, may be used in concrete made with Type II portland cement.
         2) Class F required if used in concrete mixes containing aggregates classified as potentially reactive based on ASTM C1293 or ASTM C1260.
            a) CaO content: Less than 18 percent.
      b. Loss on ignition: Not exceeding 3 percent.
      c. Replace portland cement at ratio of 1.0 pound fly ash for each pound of cement, up to minimum and maximum replacement as specified in "Requirements for Mix Proportioning."

D. Admixtures:
   1. General:
      a. Do not include admixtures, other than those specified, unless written acceptance has been obtained from the Engineer during submittal of mix designs.
      b. Admixtures shall be compatible with concrete constituents and with other admixtures.
         1) All admixtures in a given mix shall be products of the same manufacturer to ensure compatibility.
         2) Admixture manufacturers: One of the following, or equal.

a) Master Builders Solutions.
b) Euclid Chemical.
c) GCP Applied Technologies (formerly W.R. Grace).
d) Sika Corp.

c. Do not use admixtures containing chlorides, calculated as chloride ion, in excess of 0.5 percent by weight of cement.
d. Use in accordance with manufacturer's recommendations. Add each admixture to concrete mix separately.
e. Admixtures used shall be the same products used in concrete trial batches, or the same products used in concrete represented by submitted field test records.

2. Air entraining admixture (AEA):
   a. In accordance with ASTM C260, and dosed to provide entrained air percentages specified in this Section.
   b. Provides entrained air as bubbles, evenly dispersed at the time of placement and during curing.
3. Water reducing admixture (WRA):
   a. May be used at the Contractor's option.
   b. Conforming to ASTM C494, Type A (water-reducing).
      1) ASTM C494, Type D (water-reducing and retarding) may be used during periods of hot weather with prior acceptance by the Engineer.
   c. Not containing air-entraining agents.
   d. Liquid form before adding to the concrete mix.
4. Shrinkage reducing admixture (SRA):
   a. May be used at Contractor's option.
      1) Provide shrinkage reducing admixture in sufficient dosage so as to produce shrinkage within the limits specified.
   b. Not containing expansive agents.
   c. In accordance with ASTM C494, Type S (specific performance).
   d. One of the following, or equal:
      1) Master Builders Solutions: SRA Series.
      2) Euclid Chemical: Eucon SRA Series.
      3) GCP Applied Technologies: Eclipse Series.
5. Set-controlling admixtures:
   a. Shall not be used without prior acceptance from Engineer.

E. Coloring admixtures:
   1. Conduit encasement coloring agent:
      a. Red color concrete used for encasement of electrical ducts, conduits, and similar type items.
      b. Manufacturers: One of the following or equal:
         1) Davis Co., #100 Utility Red.
         2) I. Reiss Co., Inc., equivalent product.
         3) Euclid Chemical Co., Increte Division, “Colorcrete Brick Red.”
      c. Conduit encasement concrete: Mix into each cubic yard of concrete 10 pounds of coloring agent.

F. Aggregate:
   1. General:
      a. Provide concrete aggregates that are sound, graded as specified, and free of deleterious material in excess of allowable amounts specified.

b. Provide aggregates to produce in place concrete with unit weight as follows:
   1) Normal weight concrete: Not less than 140 pounds per cubic foot.
c. Do not use aggregate made from recycled materials such as crushed and screened hydraulic-cement concrete, brick, and other construction materials.
d. Do not use aggregate recycled from fresh concrete returned to the batching facility.

2. Alkali-silica reactivity:
   a. Provide aggregate classified as aggregate-reactivity class of R0 in accordance with ASTM C1778 with expansion not greater than 0.10 percent at 14 days when tested in accordance with ASTM C1260, and not greater than 0.04 percent at one year when tested in accordance with ASTM C1293.
3. Fine aggregate:
   a. Material graded such that 95 to 100 percent of material passes the No. 4 (4.75 mm) sieve, when sampled in accordance with ASTM D75 and D3665, and tested in accordance with ASTM C136.
   b. Provide fine aggregate consisting of clean, natural sand, or sand prepared from crushed stone or crushed gravel.
   c. In accordance with ASTM C33 requirements for grading, deleterious substances, soundness, and alkali reactivity, except as modified in the following paragraphs.
      1) Grading: For sieve sizes listed in ASTM C33 for fine aggregate, not more than 45 percent passing any sieve and retained on the next consecutive sieve.
      2) Deleterious substances: not in excess of the percentages by weight specified in Table 1 of this Section.

**Table 1: Fine Aggregate, Limits on Deleterious Substances**

| Item | Test Method | Percent (maximum) |
|---|---|---|
| Materials finer than No. 200 sieve(2) | ASTM C117 | 3.00(2) |
| Clay lumps and friable particles | ASTM C142 | 1.00 |
| Lightweight particles (SG < 2.40) | ASTM C123 | 1.00 |
| • Chert or shale(1) | ASTM C295 | 1.00(1) |
| Coal and lignite | ASTM C123 | 0.50 |

Notes:
(1) ASTM C123 tests for particles in the sample having a specific gravity less than 2.40. ASTM C295 is used to identify which of those lightweight particles are chert, shale, or coal and lignite. If testing under ASTM C123 indicates a combined percentage of lightweight particles (sum of shale, chert, coal and lignite) not greater than 1.00, testing under ASTM C295 will not be required.
(2) For manufactured sand, if material finer than the No. 200 sieve consists of crusher dust and the aggregate is essentially free of clay or shale, maximum percentage may be increased to 5.0 percent.

      3) Organic impurities: Free of injurious amounts of organic matter and producing a supernatant liquid with color not darker than “standard color” when tested in accordance with ASTM C40.

4) Soundness: In accordance with requirements of ASTM C33 when tested in accordance with ASTM C88 using sodium sulfite solution.

4. Coarse aggregate:
   a. Materials graded such that not more than 10 percent of material passes the 3/8-inch sieve, when sampled in accordance with ASTM D75 and D3665, and tested in accordance with ASTM C136.
   b. Consisting of gravel, crushed gravel, crushed stone, or a combination of these materials having clean, hard, durable particles free from calcareous coatings, organic matter, or other deleterious substances.
   c. Conforming to the requirements of ASTM C33, Class 4S for physical properties, deleterious substances, and alkali reactivity, except as modified in the following paragraphs.
      1) Grading:
         a) Size number as specified in ASTM C33, and as indicated in Table 3 of this Section, except as otherwise specified or accepted by the Engineer.
         b) Weights of flat or elongated particles (particles having a length greater than 3 times average width or thickness) not exceeding 15 percent when tested in accordance with ASTM D4791.
      2) Deleterious substances: Not in excess of the percentages by weight specified in Table 2 of this Section and having total of all deleterious substances exceeding 2 percent.

**Table 2: Coarse Aggregate, Limits on Impurities**

| Item | Test Method | Percent (maximum) |
|---|---|---|
| Clay lumps and friable particles | ASTM C142 | 0.50 |
| Lightweight particles (SG < 2.40) | ASTM C123 | 1.25 |
| • Chert or shale(1) | ASTM C295 | 1.00(1) |
| Materials finer than No. 200 sieve | ASTM C117 | 0.50(2) |
| Coal and lignite | ASTM C123 | 0.25 |

Notes:

(1) ASTM C123 tests for particles in the sample having a specific gravity less than 2.40. ASTM C295 is used to identify which of those lightweight particles are chert, shale, or coal and lignite. If testing under ASTM C123 indicates a combined percentage (sum of shale, chert, coal and lignite) not greater than 1.25, testing under ASTM C295 will not be required.

(2) When material finer than No. 200 sieve consists of crusher dust, maximum percentage may be increased to 1.00 percent. When mix design complies with provisions of ASTM C33, Table 4, footnote C, the maximum percentage may be increased in accordance with the equation in footnote C, up to a maximum of 1.5 percent.

3) Abrasion loss: Loss not greater than 45 percent after 500 revolutions when tested in accordance with ASTM C131.
4) Soundness: Loss not greater than 10 percent when tested in accordance with ASTM C88 using sodium sulfate solution.

## 2.04 MATERIALS FOR PLACING, CURING AND FINISHING

A. General:
   1. Materials shall be compatible with concrete and with other materials.

B. Cement grout:
   1. Use: For spreading over surface of construction and cold joints in concrete before placing additional concrete above those joints.
   2. As specified in Section 03600 - Grouting.

C. Concrete sealer:
   1. As specified in Section 03366 - Tooled Concrete Finishing.
   2. Not for use in water-containment structures.

D. Evaporation retardant:
   1. Use: For mitigating surface moisture evaporation from freshly placed concrete during rapid drying conditions. Placed after screeding.
   2. Waterborne, monomolecular, spray-applied compound, with fugitive dye to indicate coverage.
   3. Manufacturers: One of the following or equal:
      a. Master Builders Solutions, MasterKure ER 50.
      b. Euclid Chemical Co., Eucobar.

E. Nonslip abrasive:
   1. Aluminum oxide abrasive size 8/16, having structure of hard aggregate that is, homogenous, nonglazing, rustproof, and unaffected by freezing, moisture, or cleaning compounds.
   2. Manufacturers: One of the following or equal:
      a. Exolon Co.
      b. Abrasive Materials, Inc.
      c. “Non-Slip Aggregate”, Euclid Chemical Co.

F. Plastic membrane for curing:
   1. Polyethylene film: In accordance with ASTM C171.
   2. Properties:
      a. Color: White.
      b. Thickness: Nominal thickness of polyethylene film shall not be less than 0.0040 inches when measured in accordance with ASTM D2103. Thickness of polyethylene film at any point shall not be less than 0.0030 inches.
      c. Loss of moisture: Not exceed 0.055 grams per square centimeter of surface when tested in accordance with ASTM C156.

G. Sprayed membrane curing compound:
   1. Combination curing and sealing products ("cure and seal") will not be permitted.
   2. Properties:
      a. Clear type with fugitive dye conforming with ASTM C309, Type 1D and containing no wax, paraffin, or oils.
      b. For concrete placed or cured during hot weather, curing compound shall be as specified, except that:
         1) It shall include a white, reflective fugitive dye.

2) Moisture loss during a 72-hour period shall not exceed 9 pounds per cubic yard when tested in accordance with ASTM C156.

H. Surface-applied sealing system:
1. Manufacturers: One of the following or equal:
a. Euclid Chemical Co., Vandex Super.
b. Kryton International, Inc., Krystol T1.
c. Xypex Chemical Corp., Xypex Concentrate.
2. Where surface-applied sealing system is placed over concrete containing permeability reducing admixture for concrete exposed to hydrostatic conditions (PRAH), provide products of same manufacturer providing the admixture.

## 2.05 EQUIPMENT

A. General:
1. Provide adequate equipment and facilities for accurate measurement and control of materials and for readily changing proportions of material into mixers.

B. Batching equipment, or batch plant.
1. Capable of controlling delivery of all material to mixer within 1 percent by weight of individual material.

C. Mixing equipment:
1. Mixers may be of stationary plant, paver, or truck mixer type, as appropriate to the Work.
2. Capable of combining aggregates, water, and cementitious materials, and admixtures within specified time into a thoroughly mixed and uniform mass, and of discharging the mixture without segregation.
a. Maintain concrete mixing equipment in good working order, and operate at loads, speeds, and timing recommended by manufacturer or as specified.
b. Proportion cementitious materials and aggregate by weight.
3. If bulk cementitious materials are used, weigh them on separate visible scale which will accurately register scale load at any stage of weighing operation from zero to full capacity.
4. Prevent cementitious materials from coming into contact with aggregate or with water until materials are in mixer ready for complete mixing with all mixing water.
5. Procedure of mixing cementitious materials with sand or with sand and coarse aggregate for delivery to project site, for final mixing and addition of mixing water will not be permitted.
6. Retempering of concrete will not be permitted.
7. Discharge entire batch before recharging.
8. Volume of mixed material per batch: Not exceed manufacturer's rated capacity of mixer.
9. Equip each mixer with device for accurately measuring and indicating quantity of water entering concrete, and operating mechanism such that leakage will not occur when valves are closed.
10. Equip each mixer with device for automatically measuring, indicating, and controlling time required for mixing:

a. Interlock device to prevent discharge of concrete from mixer before expiration of mixing period.

11. Transit-mixed concrete:
    a. Mix and deliver in accordance with ASTM C94.
    b. Total elapsed time between addition of water at batch plant and discharging completed mix:
    c. Not to exceed 90 minutes.
    d. Elapsed time at project site shall not exceed 30 minutes.
    e. Under conditions contributing to quick setting, total elapsed time permitted may be reduced by the Engineer.
    f. Equip each truck mixer with device interlocked to prevent discharge of concrete from drum before required number of turns and furnish device that is capable of counting number of revolutions of drum.
12. Continuously revolve drum after it is once started until it has completely discharged its batch:
    a. Do not add water until drum has started revolving.
    b. Right is reserved to increase required minimum number of revolutions or to decrease designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing. The Contractor will not be entitled to additional compensation because of such increase or decrease.

D. Other types of mixers: For other types of mixers, mixing shall be as follows:
    1. Mix concrete until there is uniform distribution of materials, and discharge mixer completely before recharging.
    2. Neither speed nor volume loading of mixer shall exceed manufacturer's recommendations.
    3. Continue mixing for minimum of 1-1/2 minutes after all materials are in drum, and for batches larger than 1 cubic yard increase minimum mixing time 15 seconds for each additional cubic yard or fraction thereof.

## 2.06 CONCRETE MIXES

A. General:
    1. Develop and provide mix design for each Concrete Class listed in Table 3 of this Section.
    2. Select and proportion mixes and document properties using one of the two methods that follow. Procedures and requirements for use of each alternative are specified in subsequent paragraphs of this Section.
        a. Field experience method.
        b. Trial batch method.
    3. Organize and submit mix designs with data on all constituent materials and products for that mix, for Engineer's review.
    4. Do not place concrete until the mix design for that Concrete Class has been accepted by Engineer.
    5. After acceptance, do not modify accepted mixes or provide new mixes without Engineer's prior review and acceptance of the proposed alternative.
        a. Exception: At all times, adjust batching of water to compensate for free moisture content of the fine aggregate used.

b. For any change to approved mixes, Engineer may require new trial batching and testing program as specified in this Section before acceptance and use.
c. For any change to approved mixes, make modifications within limits set forth in this Section.
d. If there is change in source or quality of any constituent of the concrete class or mix, the revised mix will be considered a new class of concrete and shall require full re-submittal of all data describing mix constituents, design, and testing.

6. Material sampling, mix designs, trial batch preparation and testing, modifications to mix designs, and any re-testing required to satisfy the requirements of this Section or to obtain satisfactory performance shall be at Contractor's expense and shall not be considered cause for delay.

B. Measurements of materials:
1. Measure materials by weighing, except as otherwise specified or where other methods are specifically authorized in writing by the Engineer.
2. Furnish apparatus for weighing aggregates and cementitious materials that is suitably designed and constructed for this purpose.
3. Accuracy of weighing devices: Furnish devices that have capability of providing successive quantities of individual material that can be measured to within 1 percent of desired amount of that material.
4. Measuring or weighing devices: Subject to review by the Engineer. Shall bear valid seal of the Sealer of Weights and Measures having jurisdiction.
5. Weighing cementitious materials:
a. Weigh cementitious materials separately.
b. Cement in unbroken standard packages (sacks): Need not be weighed.
c. Weigh bulk cementitious materials and fractional packages.
6. Measure mixing water by volume or by weight.

C. Requirements for mix proportioning:
1. Develop and provide mixes that:
a. Can be readily worked into corners and angles of forms and around reinforcement, without excessive vibration, and without permitting materials to segregate or free water to collect on surface.
b. Prevent unnecessary or haphazard changes in the consistency of the concrete supplied.
2. Constituent materials:
a. Provide concrete mixes composed of portland cement, blended aggregates, admixtures and water.
1) Admixtures required for each concrete class are indicated in Table 3 of this Section. Admixtures not specifically required by that table for a specific Concrete Class are optional and may be included at the discretion of the Contractor based on Contractor's planned means and methods of construction.
b. In no case shall returned fresh concrete or its constituents be incorporated into concrete batched for the Work.
3. Minimum specified compressive strength:
a. Minimum specified compressive strength is designated at 28 days, unless otherwise indicated in Table 3 of this Section.

b. For locations where the placed concrete is adequately protected and is not subjected to loads for an extended period during construction, the Contractor may request that the period for achieving the minimum specified compressive strength be extended to 56 days. If accepted by the Engineer, provide mixes that achieve at least 75 percent of their minimum specified compressive strength after 28 days.

4. Proportions and consistency:
   a. Ratio of water to cementitious materials, and cementitious materials content:
      1) Conform to maximum and minimum cementitous material content requirements specified in Table 3 of this Section.
      2) Cementitious materials content: Consisting of portland cement as indicated in Table 3 of this Section, plus supplemental cementitious materials if aggregate testing indicates potentially reactive aggregates:
         a) Fly ash content:
            (1) Minimum: 15 percent of the total weight of cementitious materials.
            (2) Maximum: 25 percent of the total weight of cementitious materials.
   b. Aggregate size and content:
      1) Blend aggregates to produce an optimized gradation that combines well-graded coarse, intermediate, and fine aggregates in proportions that maximize the aggregate content of the mix, and that minimize the cement paste content of the mix.
         a) Percentage of individual fractions of the combined aggregate gradation retained on individual sieve sizes: Within the range shown in Attachment C - Combined Aggregate Gradation Chart ("Tarantula Curve").
         b) Sum of the percentages of individual fractions retained on the No. 8, No. 16, and No. 30 sieves: Greater than 20 percent.
         c) Sum of the percentages of individual fractions retained on the No. 30, No. 50, No. 100, and No. 200 sieves: Within the range of 25 percent to 40 percent.
   c. Determine bulk density and void content of the combined gradation of aggregates in accordance with ASTM C29. Results for combined aggregates shall not be the summation of results of testing of the individual gradations.
      1) Sample the combined aggregate from a flowing aggregate stream or conveyor in accordance with ASTM D75. Take care to ensure that the sample is representative of the proportions of the combined aggregate of the proposed mix.
      2) Reduce sample of combined aggregate to test sample size in accordance with ASTM C702, Method A - mechanical splitter or Method B - quartering.
      3) Perform bulk density test of combined aggregate in accordance with ASTM C29, Procedure A - rodding.
      4) Determine void content of the combined aggregate in accordance with ASTM C29, Procedure A - rodding. Specific gravity of the combined aggregate shall be determined in accordance with ASTM C136.

d. Paste content: Limited to the following:
    1) Class A mixes without air entrainment: Maximum 28 percent measured by volume.
    2) Class A mixes with air entrainment: Maximum 28 percent measured by volume plus the target air content.
    3) Paste content shall be limited to 175 percent of the void content of the combined aggregate gradation determined by ASTM C29.
e. Total water content:
    1) Not exceeding the water to cementitious material ratio specified in Table 3 of this Section.
f. Coarseness/workability (Shilstone Method):
    1) Proportion mixes to fall into the "Optimal" zone (Zone II) when plotted on the Coarseness Factor Chart ("Coarseness Factor" versus "Workability Factor") included as Attachment B - Coarseness Factor Chart to this Section. Provide plot for each Class A mix to be used in the Work.
    2) Coarseness factor (CF) for each mix shall be calculated as the percent of the combined aggregate gradation retained on the 3/8 inch sieve, divided by the percent of the combined aggregate gradation retained on the Number 8 sieve, multiplied by 100: or:

$$CF = \frac{(\%\text{ retained on 3/8” sieve})}{(\%\text{ retained on No. 8 sieve})} \times 100$$

    3) Workability factor (WF) for each mix shall be the percent of the combined aggregate gradation retained on the Number 8 sieve, adjusted for cement content in the mix.
        a) Determine volume of total cementitious material in the mix.
        b) For each 94 pounds of portland cement content above 564 pounds per cubic yard, increase workability factor by 2.5 units.
        c) For each 94 pounds of portland cement below 564 pounds per cubic yard, decrease workability factor by 2.5 units.
        d) Proportion adjustment factor by linear interpolation for each fraction of 94 pounds above or below the 564 pound basis.
        e) Example:
        650 pounds per cubic yard = 564 pounds + 86 pounds.
        Adjustment = (86 lb / 94 lb) x 2.5 = + 2.28.

D. Concrete Classes for use in the Work:
    1. Provide concrete classes listed in Table 3 of this Section.
    2. Provide normal weight concrete, having minimum weight of 140 pounds per cubic foot, unless otherwise noted.
    3. Pumped concrete:
        a. Provide pumped concrete that complies with all requirements of this Section.
        b. Mixes placed by pumping shall be considered a sub-class of each concrete class listed in Table 3 of this Section. Prepare and submit a separate mix design for each mix to be placed by pumping.
    4. Class PM concrete: In addition to the requirements of Table 3 of this Section, conform to the following:
        a. Minimum 28 day flexural strength: 650 psi when tested in accordance with ASTM C293.

b. Cementitious materials content: 75 percent portland cement plus 25 percent Class F fly ash (by weight).
c. Aggregate:
    1) Minimum 55 percent coarse aggregate conforming to ASTM C33 size number 357 or size number 467.
    2) Substitute ASTM C33 size number 57 or size number 67 if mechanical paving equipment is not used.

**Table 3: Concrete Classes**

| Concrete Class[1] | Minimum Specified Compressive Strength at 28 days, f'c [2] (pounds per square inch) | Ratio of water to cementitious materials[3] (minimum - maximum). | Cementitious Materials Content (pounds per cubic yard of concrete by weight)[4] | Cement Type | Maximum Chloride Content (percent by weight of cement) | Maximum Size of Coarse Aggregate (ASTM C33 ) | Air Entrainment (percent), (n/a : not applicable) | Admixtures required[4,5,6] | Slump Range (inches) |
|---|---|---|---|---|---|---|---|---|---|
| A | 4,500 | 0.40 to 0.42 | 535 to 575 | II | 0.30 | #57 | 6±1.5 | AEA WRA | 2 to 4 |
| C | 2,500 | 0.62 max. | min. 423 | II | No limit | #57 | 6±1.5 | AEA WRA | 3 to 6 |
| CE | 3,000 | 0.62 max. | min 423 | II | No limit | #8 | 5±1.5 | AEA WRA | 3 to 6 |

Notes:

(1) Sub classes within major concrete classes are designated as follows:

(2) At locations where concrete will not be subjected to load from other elements of the structure or from Contractor's placing and/or backfilling operations, maximum time period for achievement of specified compressive strength may be extended to 56 days when accepted by the Engineer.

**Table 3: Concrete Classes**

| Concrete Class[1] | Minimum Specified Compressive Strength at 28 days, f'c [2] (pounds per square inch) | Ratio of water to cementitious materials[3] (minimum - maximum). | Cementitious Materials Content (pounds per cubic yard of concrete by weight)[4] | Cement Type | Maximum Chloride Content (percent by weight of cement) | Maximum Size of Coarse Aggregate (ASTM C33 ) | Air Entrainment (percent), (n/a : not applicable) | Admixtures required[4,5,6] | Slump Range (inches) |
|---|---|---|---|---|---|---|---|---|---|

(3) W/C Ratio = Ratio of water to cementitious materials (portland cement plus supplemental cementitious material) by weight. Include weight of admixtures in the water content of the mix when the quantity of the admixtures exceeds 10 ounces per 100 pounds of cement.

(4) Cementitious material includes portland cement plus supplemental cementitious materials. If trial batch testing demonstrates that the required strength cannot be met at 28 or 56 days with the specified combined aggregate gradation and the paste content limits, cementitious material content may be increased with Engineer's approval if a shrinkage-reducing admixture (SRA) is included in the mix design.

(5)Admixtures are designated as follows:

AEA: Air entraining admixture

HRWR: High-range water-reducing admixture SRA: Shrinkage-reducing admixture.

SFR: Synthetic fiber reinforcement.

WRA: Water-reducing admixture

PRAH: Permeability-reducing admixture for concrete exposed to hydrostatic conditions.

E. Install Concrete Classes in accordance with the following requirements unless otherwise indicated on the Drawings.
   1. Class A concrete: Structural concrete.
      a. Use Class A concrete at all locations unless other Classes are specified or indicated on the Drawings.
   2. Class C concrete: Miscellaneous concrete fill and encasement.
      a. Class C concrete may be used for fill for unauthorized excavation, for thrust blocks and ground anchors for piping, for bedding of pipe, and where indicated on the Drawings.
   3. Class CE concrete: Use Class CE for electrical conduit encasements.

F. Concrete mix design documented by field experience:
   1. Mix design:
      a. Prepare preliminary mix design for each Concrete Class. Submit mix design with product and testing data for materials to be used in the mix for Engineer's review.
   2. Historical records for similar mix.
      a. Determinations of similarity of materials and proportions between historical and proposed mixes shall be by the Engineer, and that shall be final.
      b. Historical record - Materials:
         1) Submit with each mix design the following data for a previously-supplied concrete mix similar to that proposed for this Work.
         2) Records demonstrating that the previously supplied mix included similar materials and proportions as those of the proposed mix.
            a) Documentation that the same concrete supplier will provide both mixes.
            b) Documentation that the materials used was from the same suppliers and had essentially the same properties, demonstrated by test data, as those proposed.
            c) Documentation that proportions of materials in the record mix are essentially the same as those proposed and that the specified compressive strength of the record mix is within 1,000 pounds per square inch of that required by this Section.
            d) Concrete supplier's statement describing any changes made to production of the record mix during the time period reported.
            e) Concrete supplier's statement that preparation and quality control procedures for the record mix were essentially the same as those to be employed for this Work.
      c. Historical record - Testing:
         1) Submit with each record mix, corresponding test data for slump, compressive strength (with relationships for rate of strength gain between testing ages), and drying shrinkage.
         2) Only records satisfying the following requirements will be accepted.
            a) All tests were conducted within a period of 1-year preceding the date of the submittal.
            b) All tests were conducted over a period including not less than 45 days.
            c) The record of compressive strength testing includes at least 30 tests for slump and 28-day compressive strength.

d) The record of compressive strength tests is consecutive. In other words, it includes all tests conducted on the subject mix within the 1-year time period described above (not just selected tests during that period).
e) Submit concrete supplier's sworn statement confirming that all tests for the record mix have been reported.
f) Tests for drying shrinkage are described in subsequent paragraphs of this Section for "concrete mix design documented by trial batch preparation and testing,"
g) Provide supplementary testing if requested by Engineer.

d. For mixes determined to be similar and to have an acceptable test history, acceptance criteria shall be as follows:
e. Acceptance criteria:
1) Slump: All tests within limits specified for record mix.
2) Compressive strength: Average compression strength for tests, as determined by ACI 318 and ACI 350 not less than minimum required average strength.
3) Drying shrinkage: Within limits stated in subsequent paragraphs of this Section for "concrete mix design documented by trial batch preparation and testing."

G. Concrete mix design documented by trial batch preparation and testing:
1. Mix design and trial batches:
a. Prepare preliminary mix design for each Concrete Class. Submit mix design with product and testing data for each combination of materials and proportions to be used for Engineer's review.
1) Determine water content of the mix based on curves showing the relation between water-cementitious materials ratio and the 7 and 28 day compressive strength of the concrete.
2) Determine each curve using 4 or more points, each representing the average compressive strength value of at least 3 specimens tested at each age.
b. After materials and proposed mix designs have been accepted by Engineer, have trial batches for each concrete mix design prepared by Contractor's testing laboratory.
1) Prepare trial batches using the cementitious materials, aggregates, and admixtures proposed to be used for the Work.
2) Provide batches of sufficient quantity to determine slump, workability, consistency, and finishing characteristics, and to provide sufficient specimens for testing.
c. For each trial batch, make and test specimens to determine and report slump, compressive strength (with relationships for rate of strength gain between testing ages), and drying shrinkage.
1) If trial batches do not produce concrete conforming to the specified requirements for slump, strength, workability, consistency, drying shrinkage, restrained shrinkage, and finishing, change mix proportions and, if necessary, sources of materials.
2) Make additional trial batches and perform additional tests until a batch that conforms to requirements of this Section is produced.
2. Testing - Slump:
a. Determine slump in accordance with ASTM C143.
b. Acceptance criterion: Slump within range specified.

3. Testing - Compressive strength:
    a. Prepare 4 inch diameter by 8 inch long cylinders in accordance with ASTM C31 for tests specified in this Section.
    b. Determine average compressive strength:
        1) Test at least 12 cylinders from each trial batch for compressive strength in accordance with ASTM C39.
        2) Test 4 cylinders at 7 days, another 4 at 28 days, and another 3 at 56 days**.**
        3) Calculate average compression strength for 7 day tests, for 28 day tests, and for 56 day tests.
        4) Calculate ratios for:
            a) Average 7 day strength to average 28 day strength.
            b) Average 28 day strength to average 56 day strength.
    c. Determine the required average compressive strength for each mix, f'cr, as described in the following paragraphs:
        1) Calculate required average compressive strength (f'cr) based on the minimum specified 28-day compressive strength, f'c, plus a standard deviation determined from the test history available for that mix.
        2) Determine f'cr as specified in ACI 318 and ACI 350, except as modified in the following paragraphs.
            a) Where 15 or more 28-day compressive strength tests are available, calculate standard deviation as described in the preceding paragraphs for "concrete mix design documented by field experience." Add this standard deviation to the specified minimum compressive strength to determine the required average compressive strength (f'cr) for the mix.
            b) Where fewer than 15 compressive strength tests at 28-days are available, determine minimum required compressive strength, (f'cr) from Table 4 of this Section.

**Table 4: Required Average Compressive Strength, Fewer than 15 Tests Available**

| Minimum Specified Compressive Strength, f'c (pounds per square inch) | Required Average Compressive Strength, f'cr (pounds per square inch) |
|---|---|
| Less than 3,000 | f'c + 1,000 |
| 3,000 to 5,000 | f'c + 1,200 |
| Over 5,000 | f'c + 1,400 |

    d. Acceptance criterion: Average compressive strength of the 4 cylinders tested at 28 days, or of the 4 cylinders tested at 56 days when permitted by the Engineer, shall equal or exceed the required average compression strength, f'cr for that concrete mix design.
4. Testing – Chloride content:
    a. Submit test results showing that the concrete mix contains water-soluble chloride ion content contributed from the constituents including water, aggregates, cementitious materials, and admixtures is less than the limit specified in Table 3 of this Section. Test shall be performed in accordance with ASTM C1218 at age between 28 and 42 days.

5. Testing - Drying shrinkage - Prism specimens:
    a. Class A (including A, A-NA, A-SP, and A-NA-SP) and Class PM: From trial batch for each mix, prepare 10 drying shrinkage specimens in accordance with ASTM C157 Divide specimens into 2 groups of 5 specimens each: One group including shrinkage-reducing admixture, and one group without shrinkage-reducing admixture.
    b. Prepare, cure, and test both groups in accordance with ASTM C157, except as modified in the following paragraphs.
        1) Remove drying shrinkage specimens from molds at age of 23 hours plus or minus 1 hour after trial batching.
            a) Immediately place them in lime-saturated water maintained at 73 degrees Fahrenheit plus or minus 3 degrees for at least 30 minutes.
            b) Remove specimens from the water, and wipe with a damp cloth.
            c) Measure to nearest 0.0001 inch to determine original length.
            d) Record measurements and re-submerge specimens in lime-saturated water at 73 degrees Fahrenheit plus or minus 3 degrees for moist curing.
        2) Maintain submerged curing conditions at 73 degrees Fahrenheit plus or minus 3 degrees for 7 days. 7 days after batching, remove specimens from water and repeat measuring procedures.
        3) Immediately store specimens in a humidity controlled room maintained at 73 degrees Fahrenheit plus or minus 3 degrees, and at 50 percent relative humidity plus or minus 4 percent for remainder of the test.
        4) At periods of 14, 21, 28 and 56 days after batching, remove specimens from curing room and repeat measurements.
    c. Drying shrinkage test report:
        1) Report measurements of all specimens at 1, 7, 14, 21, 28, and 56 days after batching.
        2) Using measured length at 7 days as base length for drying shrinkage, calculate the following for each measuring period:
            a) Drying shrinkage of each specimen. Determine as difference between the 7-day base length and measured length for each period.
            b) Average of these differences. If drying shrinkage of any specimen departs from the average of the measurements for each period by more than 0.0004 inch, disregard results obtained from that specimen.
            c) Percentage of drying shrinkage from batching to date of measurement.
    d. Drying shrinkage acceptance criteria:
        1) Average shrinkage of trial batch concrete specimen group at 28 days after batching, when measured and cured as indicated, shall not exceed 0.035 percent.
    e. Mixes accepted by Engineer:
        1) Retain drying shrinkage test specimens. Bag in re-sealable plastic bags and submit to Engineer.
        2) Indicate trial batch identifier, specimen number, and date of final measurements on each specimen bag.

## 2.07 SOURCE QUALITY CONTROL

A. Sample and test materials in accordance with the following requirements:
   1. Sampling, testing, and reporting frequency:
      a. In preparation for mix design submittals and trial batch tests.
      b. Whenever there is a change in source of the material, or a significant change in the characteristics or quality of materials from the same source.
      c. For each 10,000 cubic yards of concrete mix produced.
      d. At intervals not exceeding 90 calendar days, unless otherwise specified in the following paragraphs.
   2. Supplemental cementitious materials.
      a. Sample and test fly ash in accordance with ASTM C311.
   3. Aggregate:
      a. Sample combined aggregate in accordance with ASTM D75 and D3665, and test for gradation in accordance with ASTM C136.
      b. At least once every 30 days, and when requested by the Engineer.
      c. Submit test results.
   4. Portland cement:
      a. Sample and test portland cement and provide mill certificates demonstrating compliance with ASTM C150, and additional requirements of this Section.
         1) Determine alkali content by method set forth in ASTM C114.
      b. At least once every 90 days, and when requested by the Engineer.
      c. Submit test results.

B. Batch materials in accordance with the following requirements:
   1. Concrete batch weights: Control and adjust so as to secure maximum yield, and at all times maintain proportions of concrete mix within specified limits.
   2. Aggregates:
      a. Obtain aggregate from a source capable of providing uniform quality, moisture content, and grading during any single day's operation.
      b. Furnish satisfactory means at batching plant for checking moisture content of fine aggregate for each batch.
   3. Admixtures:
      a. Batch solutions using mechanical batcher capable of accurate measurement.
      b. Air entraining admixture: Add to batch in portion of the mixing water, unless otherwise recommended by the admixture manufacturer.

# PART 3 EXECUTION

## 3.01 PREPARATION

A. Prepare and submit mix designs for each Concrete Class indicated in Table 3 of this Section.

B. Submit proposed sequence of concrete placements. After acceptance, adhere to proposed sequence of placing concrete, except when specific changes are requested by the Contractor and accepted by the Engineer.
   1. Use construction methods and sequence work to allow concrete placement to reach adequate strength and to be constructed with required support to prevent overstress of the concrete structure during construction.

C. Make provisions for monitoring weather conditions:
    1. Install an outdoor weather station capable of measuring and recording ambient temperature, wind speed, and humidity. Furnish instruments accurate to within 2 degrees Fahrenheit, 5 percent relative humidity, and 1 mile per hour wind speed.
    2. Monitor the weather forecast beginning at least 48 hours prior to any concrete placement and make provisions for cold weather concreting or hot weather concreting if those conditions exist or are forecast to exist during the period of placement, finishing, and curing.
        a. Record temperature, relative humidity, and wind speeds for each placement beginning at least 24 hours before scheduled delivery of concrete.

D. Place no concrete without Engineer's prior acceptance of conditions.

E. Notify the Engineer in writing that all preparations are complete and ready for placement of concrete. Such notification shall indicate readiness - not just intention - to place concrete for the designated portion of the Work.
    1. Submit notification to Engineer on forms provided by or acceptable to the Engineer and bearing the signature of Contractor's superintendent.
        a. Sample form is included at the end of this Section, see Attachment B - Coarseness Factor Chart.
    2. Submittal of notification will be Contractor's certification that preparations are complete and in accordance with the Contract Drawings and Specifications.
    3. Provide notification for Engineer to make final observations at the locations of concrete placements not less than 24 hours before commencing placement of concrete.

## 3.02 CONCRETE JOINTS

A. Locations of joints are indicated on the Drawings.
    1. In order to preserve strength and watertightness of structures, make no other joints, except as authorized by the Engineer.
    2. Construct joints where indicated, and as indicated on the Drawings.
    3. Where joint locations are not indicated on the Drawings, submit Contractor's proposed locations for Engineer's review and acceptance. Provide construction joints in slabs and walls at intervals not greater than 35 feet.

B. Time between placements of adjacent concrete separated by joints.
    1. Provide not less than 3 days (72 hours) between placement of adjacent sections for the following:
        a. Slabs.
        b. Walls.
    2. Provide not less than 7 days (168 hours) between placement of the lower and upper pours for the following:
        a. Walls over slabs.
        b. Slabs over walls.
        c. Slabs keyed into the sides of walls.

C. Edges of joints:
    1. Provide joints have edges detailed as indicated on the Drawings.

2. Protect wall and slab surfaces at edges from concrete splatter. Thoroughly clean adjacent surfaces after completion of each placement.

D. Joint construction:
   1. Preparation of forms:
      a. Provide cleanout holes at base of each wall and column for inspection and cleaning.
      b. Wash forms and adjacent joint surfaces of sawdust, chips, and other debris after forms are built, and immediately before concrete or grout placement.
      c. Should formwork confine sawdust, chips, or other loose matter in such manner that it is impossible to remove them by flushing with water, use a vacuum cleaner for their removal, and then flush cleaned surfaces with water.
   2. Before placing concrete against previously placed concrete, thoroughly clean the prior placement of laitance, grease, oil, mud, dirt, curing compounds, mortar droppings, or other objectionable matter by means of pressure washing.
   3. Provide and install waterstops, expansion joint material, and other similar materials as indicated on the Drawings and as specified.
      a. Take special care to ensure that waterstops are secured in proper position.
      b. Take special care to ensure that concrete is well consolidated around and against waterstops during placement.
   4. Horizontal joints:
      a. As initial placement over cold joints, thoroughly spread bed of cement grout as specified in Section 03600 - Grouting.
         1) Thickness: not less than 1/2 inch nor more than 1 inch.
      b. For wall placements above planned cold joints, placement of cement grout will not be required for locations where the wall mix includes high-range water-reducing admixture (“superplasticizers”), and the Contractor can demonstrate dense concrete joints without voids or honeycomb after the forms are removed.

## 3.03 MEASURING AND BATCHING MATERIALS

A. Measurements of materials:
   1. Proportion and measure cementitious materials and aggregates by weight.
      a. Weigh cementitious materials separately.
      b. If bulk cementitious materials are used, weigh them on separate visible scale that will accurately register scale load at any stage of weighing operation from zero to full capacity.
      c. Cement in unbroken standard packages (sacks) need not be weighed.
   2. Mixing water: Measure by volume or by weight.
   3. Other mix constituents: Measure by weight, except as otherwise specified or accepted by the Engineer.
   4. Weighing and measuring devices:
      a. Use equipment designed and constructed specifically for that purpose.
      b. Furnish devices capable of weighing successive quantities of individual material measured to within 1 percent of desired weight of that material.
      c. Bearing valid seal of the department of weights and measures for the authority having jurisdiction over the Work.

5. Measurements and measuring devices:
    a. Subject to review by the Engineer.

B. Batching:
1. Admixtures shall be added at the concrete batch plant.
2. Addition of admixtures in the field is permitted only with prior acceptance by the Engineer, and only when the following conditions are satisfied:
    a. The dosage and mixing is personally overseen by concrete supplier's trained technologist.
    b. Adequate mixing is provided after addition.
    c. The maximum time to placement of concrete remains 90 minutes after water added to mix - not 90 minutes after any field additions/adjustments.
    d. Slump at discharge after additions/modifications conforms to the requirements of Table 3 of this Section.

## 3.04 MIXING AND TRANSPORTING

A. Machine mixing:
1. Prevent cementitious materials from coming into contact with aggregate or with water until materials are in mixer and ready for complete mixing with all mixing water.
2. Procedure of mixing cementitious materials with sand, or with sand and coarse aggregate, for delivery to project site for final mixing and addition of mixing water is not permitted.
3. Remixing of concrete that has started to take its initial set (“retempering”)is not permitted.
4. Discharge entire batch before recharging.
5. Volume of mixed material per batch: Not exceeding manufacturer's rated capacity of mixer.

B. Transit-mixed concrete:
1. Mix and deliver in accordance with ASTM C94, except as modified in this Section.
2. Total elapsed time between addition of water at batch plant and discharging completed mix:
    a. Not to exceed 90 minutes nor 300 revolutions of the mixing drum.
    b. Under conditions contributing to rapid setting, total elapsed time permitted may be reduced by the Engineer.
3. Temperature - minimum and maximum allowable during mixing and transporting:
    a. Minimum: 50 degrees Fahrenheit.
    b. Maximum: 90 degrees Fahrenheit.
4. Continuously revolve drum after it is started until it has completely discharged its batch.
    a. Do not add water until drum has started revolving.
    b. Engineer reserves the right to increase required minimum number of revolutions or to decrease designated maximum number of revolutions allowed, if necessary, to obtain satisfactory mixing. Contractor will not be entitled to additional compensation because of such increase or decrease.

C. Concrete delivery:
   1. Furnish to the Engineer a delivery ticket for each batch of ready mixed concrete within 24 hours after delivery. Include the following information on each ticket:
      a. Time of day concrete was batched, and time of day that discharge from the truck is complete.
      b. Printed record of the individual weight of each of the following constituents in the batch: fine aggregate, coarse aggregate, cement, pozzolan, and water.
      c. Concrete Class as defined in Table 3 of this Section.
      d. Type, brand, and quantity of each admixture in the batch.
      e. Total volume of water allowed in the mix, volume of mixing water added at the batch plant, volume of mixing water withheld from the mix during batching, and total volume of any water added to the mix after leaving the batch plant.
         1) In no case shall volume of mixing water withheld result in a water/cementitious materials ratio less than the minimum values specified in Table 3 of this Section.
      f. Number of revolutions of transit truck at arrival on site, and total number of revolutions when discharge is complete.
      g. Volume of concrete delivered in the batch.
      h. Numerical sequence of the batch delivered for that placement.
   2. Additional water may be only be added to the mix when the following conditions are fully satisfied:
      a. Batch ticket showing total volume of water already added and maximum volume of water that may be added is available for Engineer’s observation before any additional water is added.
      b. Total volume of water in the mix after the addition will be less than the maximum allowable volume of water indicated on the ticket.
      c. The full concrete load is still within the truck's mixing drum, and truck has not begun to discharge the load. Under no conditions shall water be added in the field to a partial truckload of concrete.
      d. Volume of water added, and time of addition are clearly marked for record on the batch ticket delivered to the Engineer.
   3. Addition of admixtures in the field is permitted only with prior approval by the Engineer, and when the following conditions are satisfied:
      a. Dosage and mixing is personally overseen by concrete supplier's trained technologist and admixtures supplier's representative.
      b. Adequate mixing time is provided after addition of admixtures.
      c. The maximum time to placement of concrete remains 90 minutes after water is added to the mix – not 90 minutes after any field additions/adjustments.
      d. Slump at discharge after additions/modifications conforms to the requirements of Table 3 of this Section.

D. Conveying concrete:
   1. Convey concrete from mixer to location of final deposit by methods that prevent separation or loss of materials.
   2. Use equipment for chutes, pumps, and conveying of concrete of such size and design as to ensure practically continuous flow of concrete, from delivery to the point of placement, without separation of materials.

3. Design and use chutes and devices for conveying and depositing concrete that direct concrete vertically downward when discharged from chute or conveying device.
4. Keep equipment for conveying concrete thoroughly clean by washing and scraping upon completion of any day's placement.

## 3.05 PLACING AND CONSOLIDATING

A. Preparation:
   1. Obtain Engineer's acceptance of completed preparations before placing concrete.
      a. Notify Engineer in writing that all preparations are complete and ready for placement of concrete. Such indication shall indicate readiness, not just intention, to place concrete for the designated portion of the work.
      b. Submit completed Attachment D - Contractor's Concrete Placement Checklist Form.
   2. Confirm completeness of the following before notification of readiness is given to Engineer:
      a. Place forms, reinforcement, screeds, anchors, ties, and inserts in final position.
      b. Reinforcement is secure and properly fastened in its correct position.
      c. Loose form ties at construction joints have been retightened.
      d. Dowels, bucks, sleeves, hangers, pipes, conduits, anchor bolts, and any other fixtures required to be embedded in concrete have been placed and adequately anchored.
      e. Forms have been cleaned of debris and form release agents are applied as specified.
   3. Preparation for placement of footings and slabs on grade:
      a. Do not place concrete on ground or compacted fill until subgrade is in moist condition acceptable to the Engineer.
      b. If necessary, sprinkle subgrade with water not less than 6 or more than 20 hours in advance of placing concrete.
      c. If subgrade surface becomes dry prior to actual placing of concrete, sprinkle again, without forming pools of water.
      d. Do not place concrete if subgrade is muddy or soft.
   4. Keep sufficient protective coverings on hand at all times for protection of concrete during and after placement.
      a. Protect concrete placed before rain to prevent water from coming in contact with such concrete
      b. Protect concrete placed before winds to prevent excessive drying or embedment of debris in the finished surfaces.

B. Concrete placement:
   1. Do not place concrete:
      a. With slump outside the limits specified in Table 3 of this Section.
      b. In which initial set has occurred, or that has been retempered.
      c. During rainstorms or high velocity winds.
   2. Deposit concrete at or near its final position to avoid segregation caused by rehandling or flowing.
      a. Do not deposit concrete in large quantities in one place, and then work material along forms with vibrator or by other methods.

3. Do not drop concrete freely into place from height greater than 5 feet. Use tremies for placing concrete where drop is over 5 feet.
4. Place concrete on slopes starting from bottom of slope and working upward.
5. Place concrete in horizontal lifts not exceeding 24 inches in depth and bring up evenly in all parts of forms.
6. After concrete placement begins, continue in a continuous operation without significant interruption until the end of the placement. Plan and implement precautions to prevent any delay, between layers or adjacent volumes, from exceeding 20 minutes.
7. If concrete is to be placed over previously placed concrete and more than 20 minutes has elapsed, spread layer of cement grout over surface before placing additional concrete. Provide grout layer thickness of not less than 1/2 inch, nor more than 1 inch.
8. Placement of concrete for slabs, beams, or walkways:
    a. If cast monolithically over walls or columns, do not commence until concrete in walls or columns has been allowed to set and shrink.
    b. Allow set time of not less than 1 hour for shrinkage.
        1) During waiting time, keep top surface of concrete moist, but not wet.
        2) Do not permit water to pond or stand on the surface.
        3) Do not coat surface with evaporation retarders or curing agents.
    c. Start placement above wall or column with layer of cement grout as described in the preceding paragraph.

C. Consolidating concrete:
1. Consolidate concrete with aid of acceptable mechanical vibrators.
2. Thoroughly consolidate concrete around reinforcement, pipes, or other shapes built into the work.
3. Provide sufficiently intense vibration to cause concrete to flow and settle readily into place and to visibly affect concrete over radius of at least 18 inches.
4. Vibrators:
    a. Keep sufficient vibrators on hand at all times to vibrate concrete as placed.
    b. In addition to vibrators in actual use while concrete is being placed, have on hand a minimum of 1 spare vibrator in operable condition.
    c. Do not place concrete until it has been confirmed that all vibrating equipment, including spares, are in operable condition.
5. Place concrete solidly against forms and concrete surfaces, leaving no voids or honeycomb.
6. Make concrete solid, compact, and smooth. If for any reason surfaces or interiors have voids or are in any way defective, repair such concrete in manner acceptable to the Engineer.
7. Do not over-vibrate so as to produce segregation.

## 3.06 FINISHING CONCRETE

A. Provide concrete finishes in accordance with the details as indicated on the Drawings.

B. Liquid evaporation retardant:
   1. Under conditions that result in rapid evaporation of moisture from the surface of the concrete, coat the surface of the concrete with a liquid evaporation retardant immediately after screeding.
   2. Conditions that result in rapid evaporation of moisture are defined as any combination of ambient temperature, concrete temperature, relative humidity, wind speed, and solar radiation intensity that creates conditions that will evaporate water from a free concrete surface at a rate equal to or greater than 0.1 pounds per square foot per hour as determined by the Menzel Formula and nomograph published in ACI 305R, and included as Attachment A - Menzel Formula and Nomograph to this Section.
   3. Apply evaporation retardant again after each finishing operation as necessary to prevent drying shrinkage cracks.
   4. Do not work evaporation retardant into the surface of the concrete.
   5. Do no use evaporation retardant as finishing aid (to rehydrate surface a creamy state for finishing).

C. Concrete sealer:
   1. Floors and slabs to receive concrete sealer: See Room Finish Schedule on the Drawings, and Section 03366 - Tooled Concrete Finishing.

## 3.07 CURING

A. Cure concrete by methods specified in this Section.

B. Keep concrete continuously moist and at an average daily temperature of at least 50 degrees Fahrenheit for a minimum of 7 days after placement.
   1. Provide at least 350 degree days of curing (350 degrees times 7 days of 24 hours each).
   2. If hourly temperatures at any surface of a concrete placement drop below 50 degrees Fahrenheit during the curing period, count the period below 50 degrees Fahrenheit as zero degrees, and extend the curing time to compensate.

C. Schedule of curing methods:
   1. Cure the following concrete surfaces using water curing, or plastic membrane curing.
      a. Floor surfaces of water containment structures.
      b. Surfaces where additional concrete will be placed over or against the surface, including concrete joints.
      c. Surfaces where grout or other toppings will be placed over the surface.
      d. Slabs scheduled to receive concrete sealer, or other bonded or adhered architectural finishes.
      e. Formed surfaces scheduled to receive coatings, paint, adhered masonry, cementitious materials, or other similar finishes, and where formwork is removed within 7 days after concrete placement.
      f. Horizontal concrete surfaces at tops of walls.
   2. Cure the following concrete surfaces by water curing, plastic membrane curing, or sprayed curing membrane. Selection of methods shall be at the Contractor's option.
      a. Surfaces not listed in the preceding paragraph.

D. Water curing:
   1. Keep surfaces of concrete constantly and visibly wet, day and night, for period of not less than 7 days.
      a. Each day forms remain in place will be counted as 1 day of water curing.
      b. Do not loosen form ties during period when concrete is cured by leaving forms in place. No further curing credit will be allowed for forms remaining in place after contact has been broken between concrete surface and forms.
   2. Begin water curing as soon as concrete attains initial set.
   3. Maintain a wet surface by ponding, continuous sprinkling, covering with saturated burlap, or otherwise saturating the surface by means acceptable to Engineer.
      a. Flood top of walls with water at least 3 times per day and keep surfaces moist at all times during 7 day curing period.
      b. Provide plastic sheet material over surfaces if required to maintain a wet surface during arid or windy conditions. See plastic membrane curing requirements for additional details.
   4. Use water having a temperature within 20 degrees Fahrenheit of the temperature of concrete, and not lower than the minimum temperature allowed for the concrete surface during curing.

E. Plastic membrane curing:
   1. Install plastic membrane as soon as concrete is finished and can support limited pedestrian traffic without damage.
   2. Cover entire surface of finished concrete with membrane.
   3. Anchor membrane to prevent uplift from wind or air trapped below the sheet.
   4. Fully seal joints and edges to provide full seal around perimeter.
   5. Keep concrete under plastic membrane moist, regularly monitoring surfaces and adding supplemental moisture if necessary. Add water as specified for water curing.

F. Sprayed membrane curing compound:
   1. Apply curing compound to concrete surface after repairing and patching, and within 1 hour after forms are removed.
      a. If more than 1 hour elapses after removal of forms, do not use membrane curing compound. Instead, provide water curing for not less than 7 days.
      b. Do not remove sprayed membrane curing compound from concrete in less than 7 days after initial application.
      c. When application of curing compound at concrete joints is accepted by Engineer, take care to apply curing compound to all surfaces along full profile of joints.
   2. Apply curing compound by mechanical, power operated sprayer with mechanical agitator that will uniformly mix all pigment and compound.
      a. Apply curing compound in at least 2 coats.
      b. Apply each coat in direction turned 90 degrees from application direction of the preceding coat.
      c. Apply curing compound in sufficient quantity so that concrete has uniform appearance and its natural color is effectively and completely concealed immediately after spraying.
      d. Continue to coat and recoat surfaces until specified coverage is achieved and until coating film remains on concrete surfaces.

3. Thickness and coverage of curing compound:
    a. Provide curing compound having film thickness that can be scraped from surfaces at any and all points after drying for at least 24 hours.
    b. Contractor is cautioned that method of applying curing compound specified in this Section may require more curing compound than normally suggested by manufacturer of curing compound and is more than is customary in the trade. Apply amounts specified in this Section, regardless of manufacturer's recommendations or customary practice.
4. If Contractor desires to use a curing compound other than specified product, coat sample areas of concrete wall with proposed curing compound, and also coat similar adjacent area with the specified compound in the manner specified, for comparison:
    a. If proposed sample is not equal or better, in opinion of the Engineer, the proposed substitution will not be allowed.
5. Removal of curing compound.
    a. After curing period is complete, remove curing compound placed on surfaces that will receive additional concrete, including all concrete joint surfaces, by heavy sandblasting or by other means acceptable to Engineer. Complete removal and cleanup prior to placing any new concrete against the surface.
    b. Where additional finishes will be applied over concrete surfaces, unless otherwise recommended by the manufacturer of the finish to be applied, remove curing compound by sandblasting. Provide blasting as necessary to fully remove curing compound.
6. Prior to final acceptance of the work, remove, by sandblasting or by other method acceptable to the Engineer, any curing compound on surfaces exposed to process water or exposed to view, so that only natural color of finished concrete is visible and uniform over the entire surface.

## 3.08 PROTECTION

A. General:
    1. Keep forms in place, as specified in the following paragraphs, to provide curing and to protect concrete surfaces and edges from damage.
    2. Immediately after forms are removed, carefully examine concrete surfaces, and repair any irregularities in surfaces and finishes as specified.

B. Form removal:
    1. Do not remove forms from concrete which has been placed when outside ambient air temperature is below 50 degrees Fahrenheit until the following conditions are satisfied:
        a. Concrete has sufficient strength to allow form removal without damage to surfaces.
        b. At least 48 hours have elapsed since the end of concrete placement.
        c. Provisions are in place to maintain moisture for curing concrete, and temperature at or above the required minimum curing temperature specified.
    2. Vertical forms:
        a. Retain in place for a minimum of 24 hours after concrete is placed.
        b. If concrete has sufficient strength and hardness to resist surface or other damage after 24 hours, forms may be removed.

3. Other forms supporting concrete, and shoring: Retain in place as follows:
    a. Formed sides of footings: 24 hours minimum.
    b. Formed vertical sides of beams, girders, and similar members: 48 hours minimum.
    c. Forms below slabs, beams, and girders: Until concrete strength reaches specified strength f'c or until shoring is installed.
        1) Shoring for slabs, beams, and girders: Shore until concrete strength reaches minimum specified 28-day compressive strength.
4. Wall bracing: Brace walls until strength of concrete beams and slabs laterally supporting wall reaches minimum specified 28-day compressive strength.

C. Loading of concrete members:
1. Placement of loads on or against green concrete is not permitted.
2. Do not place soil against walls, or fill over the top of concrete until conditions designated in the following paragraphs are satisfied:
    a. Walls have been cast to their full height in the structure and have achieved their minimum specified 28-day compressive strength.
    b. Connecting slabs and beams that brace the walls are in place, are complete, and (in the case of concrete) have achieved their minimum specified 28-day compressive strength.

## 3.09 COLD WEATHER CONCRETING

A. Implement cold weather concreting procedures during periods of cold weather as defined in this Section.
1. Comply with the recommendations of ACI 306R and this Section.

B. Prepare a cold weather concreting plan. Maintain at least 1 copy of the plan on site. Provide plan for review if requested by the Engineer.
1. Include procedures for batching, delivery, placement, curing, protection, and for monitoring and recording the temperature of the concrete and the surrounding environment.
2. Describe procedure to be implemented in the event of abrupt changes in weather conditions or of equipment failure.
3. Review cold weather concreting plan during pre-construction meeting. Make provisions to address any concerns expressed by Engineer before beginning concrete placements.

C. Preparation:
1. Do not place concrete over frozen subgrade materials. Provide insulating material and supplementary heat if required to maintain a thawed surface.
2. Do not place concrete around metallic elements whose temperature is less than 40 degrees Fahrenheit. If heating is required, use processes that do not alter the metallurgical properties of the elements.
3. Remove snow, ice, and frost from reinforcement, embedments and forms. Schedule such removal immediately before concrete placement so that surfaces do not refreeze.

D. Batching, delivery, placement and finishing:
1. Accelerating admixtures will not be permitted.

2. Based on temperature of the environment and the surfaces where concrete will be placed, select and maintain mix temperature as recommended in ACI 306R.
    a. Make provisions for temperature loss during delivery and placing.
    b. Place concrete at or slightly above the minimum recommended batch temperatures. Do not exceed these minimum values by more than 20 degrees Fahrenheit.
3. Heating: If temperature of water or aggregates is below 35 degrees Fahrenheit, heat the materials.
    a. Mixing water: Do not heat above 140 degrees Fahrenheit.
    b. Aggregates:
        1) Heat uniformly to eliminate ice, snow, and frozen lumps of material.
        2) Avoid overheating.
        3) Do not exceed average temperature of 140 degrees Fahrenheit or spot temperature of 200 degrees Fahrenheit.

E. Protection and curing:
1. Protect concrete to provide continuous warm moist curing immediately after placement and during protection period.
2. Minimum protection period: 7 days.
3. During and immediately after the protection period, maintain temperature in accordance with Table 5 of this Section. Provide record of temperature during placement and curing as specified in the following paragraphs.
    a. Furnish and locate maximum/minimum temperature recording thermometers in sufficient numbers to confirm concrete.

| Table 5: Concrete Temperatures - Normal Weight Concrete | | | |
|---|---|---|---|
| Section Thickness (inches) | <12 | 12 to <36 | 36 to <72 |
| During Protection Period:<br>As maintained (minimum). | 55°F | 50°F | 45°F |
| After Protection Period:<br>Gradual drop during first 24 hours (maximum). | 50°F | 40°F | 35°F |

4. Provide plastic sheeting, polystyrene foam sheets, insulating blankets, and supplemental heating if required to maintain moisture and the specified temperatures during protection.
    a. Protect insulating blankets from moisture in the concrete and from rain or snow using impermeable sheeting.
    b. Supplemental heating units:
        1) Vent units to outside atmosphere. Do not exhaust heater flue gasses into the enclosed and protected area.
        2) Make provisions to heat the flow freely within protected area, and to maintain a uniform temperature throughout the space.
        3) Locate units to avoid local drying or uneven heating of concrete surfaces.
    c. Pay particular attention to maintaining required temperature and moisture at edges and corners.
5. At the end of the protection period, allow concrete to cool gradually to the ambient temperature.
    a. Maximum temperature drop over the first 24-hour period shall be as specified above.

b. Where temperature of concrete exceeds ambient by 20 degrees Fahrenheit or more, loosen forms and leave in place for at least 24 hours before removal.
c. If water curing has been used, maintain concrete temperature as specified in the following paragraphs for at least 24 hours after water curing is terminated. Allow water-cured concrete to air dry for at least 3 days before exposure to freezing temperatures.

F. Temperature records:
1. For each area of concrete placed or cured during cold weather, record the temperature of concrete and the ambient environment.
a. Maintain temperature records on site and make records available for review by the Engineer upon request.
b. Deliver a final copy of each record to Engineer for project files not more than 14 calendar days after the date concrete was placed.
2. Concrete delivered for placement.
a. Measure and record temperature at the point of discharge in accordance with ASTM C1064.
b. Note temperature on the batch ticket.
3. Concrete during the protection period:
a. Furnish and locate self-recording thermometers (maximum/minimum) around each placement. Number and location of thermometers shall be sufficient to represent temperatures around the entire concrete placement.
b. Position thermometers to record the temperature at each edge or corner and at the middle of the placement area.
4. Include in the temperature record of each placement the following information, recorded legibly on a single sheet.
5. In the event that evaluations of the efficacy of concrete protection and curing are required, the lowest temperature recorded in any placement during each 24 hour period will be assumed to be the temperature at which the entire placement was maintained. Protection periods with any temperature records will be assumed to have provided no protection or curing, and the protection period will be extended by 2 days for each day without protection.

## 3.10 HOT WEATHER CONCRETING

A. Implement hot weather concrete procedures during periods of hot weather as defined in this Section.
1. Comply with the recommendations of ACI 305R and this Section.

B. If placements during hot weather are expected, and when requested by the Engineer, prepare a hot weather concreting plan. Maintain at least 1 copy on site. Provide plan for review if requested by the Engineer.
1. Include procedures for batching, delivery, placement, curing, protection, and monitoring and recording the temperature of the concrete and the surrounding environment.
2. Describe procedures to be implemented in the event of abrupt changes in weather conditions, or in the event of equipment failure.
3. Review hot weather concreting plan during pre-construction meeting. Make provisions to address any concerns expressed by Engineer before beginning concrete placements.

C. Preparation:
   1. Do not place concrete against forms, reinforcement, or embedments with a surface temperature greater than 120 degrees Fahrenheit.
      a. If necessary, to maintain maximum concrete temperature during placing, cool forms and reinforcement to temperature below 90 degrees Fahrenheit using water or shades.
      b. Do not allow water to puddle in forms or placement areas.
   2. Moisten forms or subgrade to maintain a saturated surface without standing water or soft spots.
   3. Provide windbreaks, shades, fog spray, sprinkling, wet cover, or other means required to protect concrete from premature loss of moisture and rapid temperature gain.

D. Batching and delivery:
   1. Retarding admixtures will not be permitted.
   2. Temperature of concrete delivered for placement shall not exceed 90 degrees Fahrenheit.
      a. Maintain uniform temperature in the mix below this level during batching, delivery, placing, and consolidation.
      b. Temperature of mix, even if below the maximum allowable temperature specified, shall be maintained at a level to avoid loss of slump, flash setting, or cold joints in placements.
   3. If necessary:
      a. Mix water may be chilled or replaced with ice to maintain mix temperature. Where mix water is replaced with ice, provide replacement at a 1 to 1 ratio by weight.
      b. Shade transit mixed concrete trucks, or cool mixing outside of container with water to control temperature of concrete.

E. Placing and finishing:
   1. Place and finish concrete promptly. Place so that vertical lift lines will not be visible in exposed concrete surfaces.
   2. Provide plastic sheeting, fog nozzles, shades or other means to reduce concrete temperature and protect from moisture loss.

F. Protection and curing:
   1. Furnish and locate maximum/minimum temperature recording thermometers in sufficient numbers to confirm concrete temperatures over full area and edges of concrete.
   2. Flatwork: Protect and cure using water curing methods as specified in this Section.
      a. Water curing:
         1) Keep concrete continuously wet and make provisions for runoff.
         2) For sprinkling or soaker hoses, maintain temperature of water as close as possible to the temperature of the concrete to minimize effects of thermal shock.
   3. Formed surfaces: Protect and cure using forms left in place or membrane curing methods as specified in this Section.
      a. Cover forms and keep continuously moist for at least 24 hours after placement.
      b. Loosen forms as soon as this can be accomplished without damaging the concrete.

c. Maintain continuously moist surfaces by fogging or spraying with water, or by application of curing compound as specified.

## 3.11 FIELD QUALITY CONTROL BY CONTRACTOR

A. Provide quality control over the Work of this Section as required by Section 01450 - Quality Control.

B. Field tests:
   1. During progress of construction, provide testing to determine whether the concrete, as being produced, complies with requirements specified.
   2. Sampling and testing shall be performed by Contractor's testing laboratory. See Section 01455 - Regulatory Quality Assurance - Special Tests and Inspections for requirements.
      a. Cooperate in testing by allowing free access to the Work for testing laboratory to sample and test materials.
      b. Provide full access for Engineer to observe concrete sampling and testing at any time.
      c. Contractor is responsible for providing care of and curing conditions for test specimens in accordance with ASTM C31 until specimens are collected by testing laboratory.
      d. Provide 4 firmly braced, insulated, heated, closed wooden curing boxes, each sized to hold 10 specimens. Include cold weather temperature and hot weather temperature control thermostat for initial curing and storage from time of fabrication through shipment to Owner's testing laboratory.
   3. Testing shall include:
      a. Sampling of concrete in accordance with ASTM C172.
      b. Temperature of concrete at delivery in accordance with the requirements of ASTM C1064 and as specified in this Section.
      c. Slump of concrete using slump cone in accordance with requirements of ASTM C143. Test slump at the following intervals:
         1) At the beginning of each placement.
         2) As often as necessary to keep slump within the specified range, but not less than every 6th truck.
         3) When requested to do so by the Engineer.
         4) Observe concrete during slump test for signs of segregation.
            a) Observe concrete to see if mortar or moisture flows from slumped concrete.
            b) Reject concrete if mortar or moisture flows out of mix.
      d. Unit weight of concrete in accordance with ASTM C138.
      e. Air entrainment in accordance with ASTM C173. Test air content at the following intervals:
         1) At beginning of each placement.
         2) As often as necessary to keep entrained air within specified range, but not less than every 6th truck.
         3) When requested to do so by the Engineer.
         4) Test air entrainment in concrete in accordance with ASTM C173. If air entraining admixtures used for the Work require alternate testing procedures, advise the independent testing laboratory well in advance of the dates of testing, and confirm that appropriate equipment and personnel are provided for the test.

5) Make air test at point of delivery (discharge from mixer). For pumped concrete, make air tests at point of delivery and at point where expelled after pumping for placement.

f. Compressive strength in accordance with ASTM C39. Required number of cylinders is as follows:
   1) Not less than 6 cylinder specimens, 4 inches in diameter by 8 inches long, will be tested for each 150 cubic yards of each class of concrete, with minimum of 6 specimens for each class of concrete placed; not less than 6 specimens for each half day's placement; and not less than 2 sets of 6 specimens for each structure.
   2) 1 cylinder will be broken at 7 days, 1 at 14 days, and 3 at 28 days. The 6th cylinder may be used to evaluate strength after 28 days if requested by the Engineer.
   3) Retain and store "6th cylinders" (tested and untested) at testing laboratory until 56 days. Break “6th cylinder” when directed by the Engineer.

g. Provide full access for Engineer to observe concrete sampling and testing at any time.

C. Test completed liquid containment structures listed in Section 01759 - Water Leakage Test for Concrete Structures for watertightness.

## 3.12 FIELD QUALITY CONTROL BY OWNER

A. Provide on-site inspection and field quality assurance for the Work of this Section as specified in Section 01450 - Quality Control.

B. Special tests and inspections: See Section 01455 - Regulatory Quality Assurance.

C. Field inspections:
   1. Required inspections:
      a. Observe construction for conformance to the Contract Documents and the accepted submittals.
   2. Records of inspections:
      a. Provide record of each inspection.
      b. Submit copies to Contractor upon request.

D. Field tests:
   1. Engineer may request, at any time, additional testing to confirm that materials being delivered and placed conform to the requirements of the Contract Documents.
      a. If such additional testing shows that the material do not conform to the specified requirements, Contractor shall pay the cost of these tests.
      b. If such additional testing shows that the materials do conform to the specified requirements, Owner will pay the cost of these tests.

## 3.13 NON-CONFORMING WORK

A. Remove and replace or repair non-conforming and defective work.
   1. Provide repairs having strength equal to or greater than specified concrete for areas involved.
   2. Provide replacement or repair of non-conforming work by means acceptable to the Engineer and at no additional cost to Owner.

3. Project schedule will not be extended based on work to address non-conforming concrete.

B. Concrete not conforming to the specified requirements for properties of plastic concrete: Remove from the site and replace with conforming materials at no additional cost to Owner.
   1. Temperature: Do not use concrete having a temperature above or below the limits specified in this Section.
   2. Slump: Do not place concrete that does not conform to requirements for slump.
   3. Air entrainment: Do not use concrete that does not conform to requirements for percentage of entrained air.

C. Concrete not conforming to the specified requirements for compressive strength:
   1. Concrete is expected to reach a compressive strength equal to or greater than the minimum specified compressive strength f'c in Table 3 of this Section.
   2. Strength of concrete will be considered acceptable if following conditions are satisfied.
      a. Averages of all sets of 3 consecutive strength test results is greater than or equal to the specified compressive strength f'c.
      b. No individual strength test (average of 3 cylinders) falls below the strength specified in Table 6 of this Section.
      c. Where relationships between 7-day and 28-day compressive strength, or between 28-day and 56-day compressive strength, have been provided as part of the mix design submittals:
         1) 7-day strength may be considered as an indication of 28 day strength provided effects of temperature and humidity between 7 day and 28 day are taken into account.
         2) 28-day strength may be considered as indication of 56 day strength provided effects of temperature and humidity between 28 days and 56 days are taken into account.

**Table 6: Strength Compliance Requirements**

| Minimum Specified Compressive Strength, f'c (pounds per square inch) | Lower Bound of an Individual Compressive Strength Test, (pounds per square inch) |
|---|---|
| Less than 5,000 | f'c – 500 |
| Over 5,000 | f'c – (0.10 x f'c) |

   3. Non-compliant strength tests.
      a. Mark non-compliant strength test reports to highlight the non-complying results, and immediately forward copies to all parties on the test report distribution list.
      b. Initial treatment may consist of additional curing of affected portion(s) followed by not less than 3 cores at each affected area, taken in accordance with ASTM C42 and ACI 318. Obtain Engineer's acceptance of proposed coring locations before proceeding with that work.
      c. Submit report of compressive strength testing for Engineer's review.
      d. If requested by the Engineer, provide additional cores, and obtain petrographic testing in accordance with ASTM C856. Submit results for Engineer's review.

e. If additional curing does not bring the average strength of 3 cores taken in affected area to at least specified compressive strength f'c, designate such concrete in affected area will be considered defective.
f. Engineer may require the Contractor to strengthen defective concrete by means of additional concrete, additional reinforcing steel, or replacement of defective concrete, all of the Contractor's expense.

D. Concrete sections or surfaces with honeycombing and voids:
1. Provide repairs having surface appearance and finish consistent with that of the surrounding work and acceptable to the Engineer.
2. Do not patch, repair, or cover defective Work without prior inspection by the Engineer.
3. Preparation of concrete for repair:
a. Make no repair until Engineer has accepted methods for preparing surfaces and for making and curing repairs.
b. Chip out and key-in imperfections in the Work to make them ready for repair.
c. Coat bonding surfaces and edges of repair area with one of the following bonding agents as accepted by the Engineer.
1) Epoxy bonding agent as specified in Section 03071 - Epoxies; or
2) Epoxy resin/portland cement bonding agent as specified in Section 03072 - Epoxy Resin/Portland Cement Bonding Agent.
4. Methods of repair:
a. Dry pack mortar method:
1) Use for holes having depth nearly equal to or greater than least surface dimension of hole, for cone-bolt holes, and for narrow slots cut for repair.
2) Smooth Holes: Clean and roughen by heavy sandblasting before repair.
3) Install dry-pack mortar as specified in Section 03600 - Grouting.
b. Cement mortar method:
1) Use for holes too wide to dry pack and too shallow for concrete replacement; and for comparatively shallow depressions, large or small, that extend no deeper than nearest surface reinforcement.
2) Install cement mortar as specified in Section 03600 - Grouting.
c. Concrete replacement:
1) Use when holes extend entirely through the concrete section or when holes are more than 1 square foot in area and extend halfway or more through the section.
2) Form, place, consolidate, and cure concrete of same mix as the surrounding work.

E. Leaking construction joints and cracks in concrete walls and slabs:
1. Repair cracks that develop in walls or slabs, and repair cracks that show any signs of leakage until all leakage is stopped.
2. Pressure inject visible cracks in the following areas, other than hairline cracks and crazing, with repair products and methods acceptable to the Engineer.
a. Floors and walls of water bearing structures.
b. Walls and overhead slabs of passageways and occupied spaces where the opposite face of the member is exposed to weather or may be washed down and where the opposite face does not receive a separate waterproofing membrane.

c. Other items not specified to receive separate waterproofing membrane including slabs over water channels, wet wells, reservoirs, and other similar surfaces.

3. Continue pressure injection of cracks as specified until structure is watertight and remains watertight for not less than 1 year after date of Substantial Completion or date of final repair, whichever occurs later in time.

F. Leaking expansion joints in concrete walls or slabs that include waterstops:
   1. Repair any signs of leakage until all leakage is stopped.
   2. Pressure inject visible leaks with hydrophilic polyurethane foam resin as specified in Section 03933 - Hydrophilic and Hydrophobic Foam Polyurethane Resin Injection System.
   3. Continue pressure injection along joints lines as specified until structure is watertight and remains watertight for not less than 1 year after date of Substantial Completion or date of final repair, whichever occurs later in time.

G. Walls and slabs at overhead channels that leak or sweat because of porosity or cracks too small for successful pressure injection with epoxy.
   1. Seal on water or weather side by coating using surface-applied sealing system as specified in this Section.
   2. Apply as recommended by manufacturer published instructions. Where concrete continues to sweat or leak, apply additional coats of surface-applied sealing system until the sweating or leaks stop.
   3. Continue application of surface-applied sealing system until structure is watertight and remains watertight for not less than 1 year after date of Substantial Completion, or date of final repair, whichever occurs later in time.

END OF SECTION

## ATTACHMENT A - MENZEL FORMULA AND NOMOGRAPH

## MENZEL FORMULA AND NOMOGRAPH

Source: ACI 350R

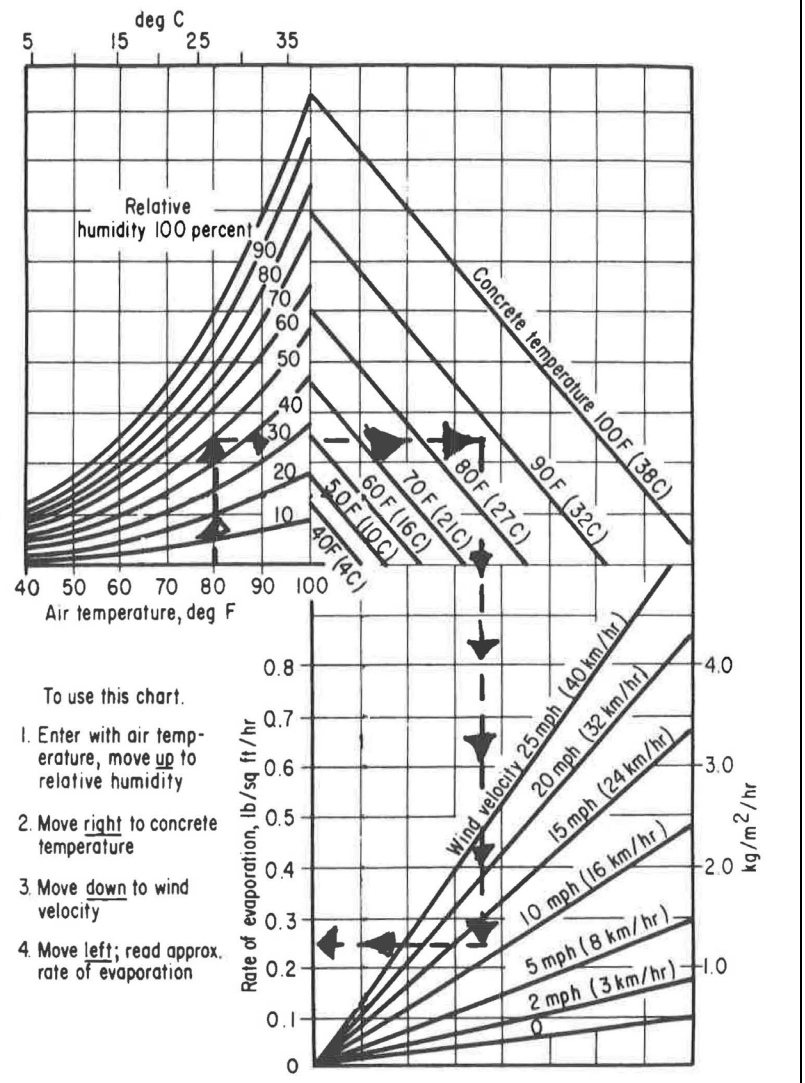



*Fig. 2.1.5—Effect of concrete and air temperatures, relative humidity, and wind speed on the rate of evaporation of surface moisture from concrete. This chart provides a graphic method of estimating the loss of surface moisture for various weather conditions. To use this chart, follow the four steps outlined above. If the rate of evaporation approaches 0.2 lb/ft²/h (1 kg/m²/h), precautions against plastic-shrinkage cracking are necessary (Lerch 1957). Wind speed is the average horizontal air or wind speed in mph (km/h) and should be measured at a level approximately 20 in. (510 mm) higher than the evaporating surface. Air temperature and relative humidity should be measured at a level approximately 4 to 6 ft (1.2 to 1.8 m) higher than the evaporating surface on its windward side shielded from the sun's rays (*PCA Journal *1957).*

## ATTACHMENT B - COARSENESS FACTOR CHART

**COARSENESS FACTOR CHART**

Source: ACI 302.1R-15, Figure 8.9.2.2.

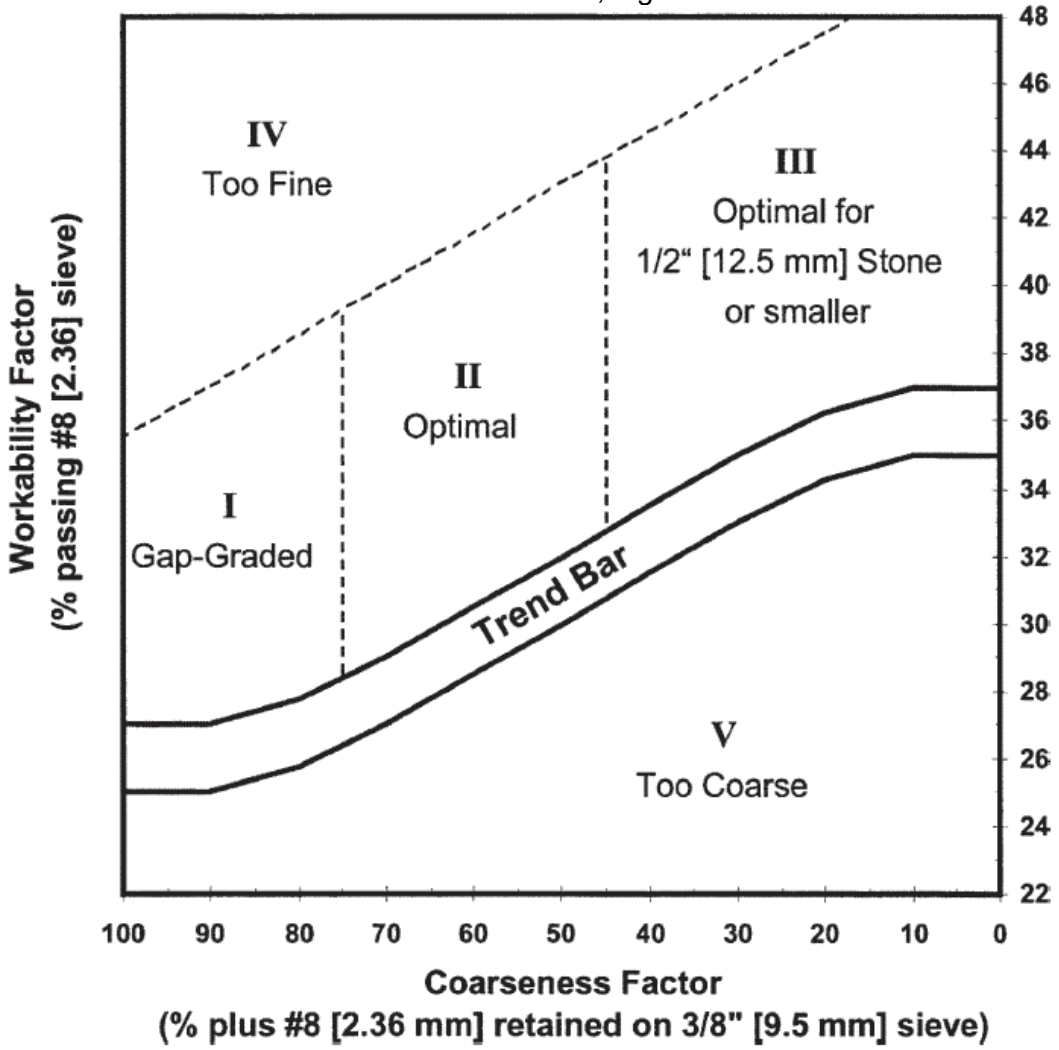
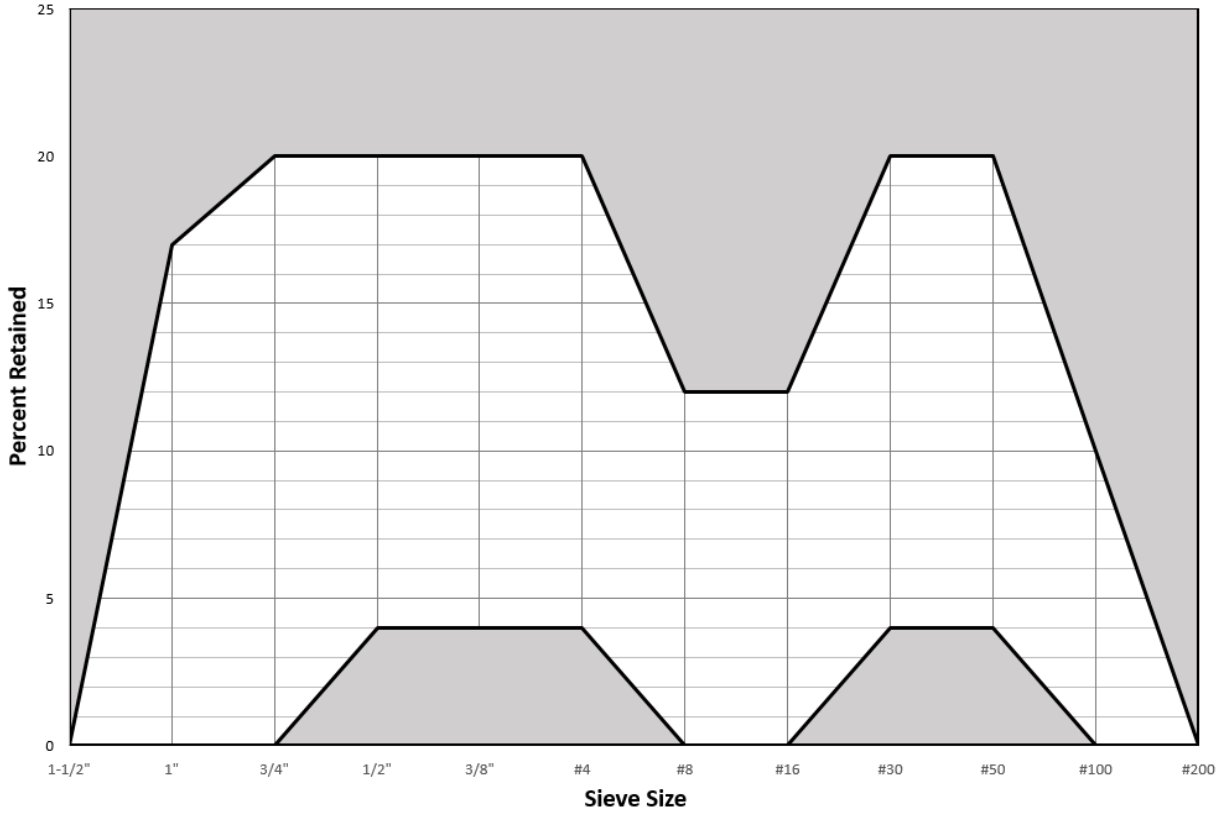



*Fig. 8.9.2.2—Coarseness factor chart for evaluating potential performance of mixture.*

## ATTACHMENT C - COMBINED AGGREGATE GRADATION CHART

## COMBINED AGGREGATE GRADATION CHART



## ATTACHMENT D - CONCRETE PLACEMENT CHECKLIST

## CONCRETE PLACEMENT CHECKLIST

Project: _____ Class of Concrete _____
Project No.: _____Test Cylinders Taken? Yes _____ No _____
Location of Placement _____
The Contractor certifies the above-proposed concrete placement is prepared as indicated and

| Preparation Slab | Contractor | N/A |
|---|---|---|
| Compaction Subgrade | | |
| Filter Fabric/Drain Rock-ABC/Separator Fabric | | |
| Drain Rock, Pea Gravel & Void Form | | |
| Starter Wall Forms | | |
| Reinforcing Steel | | |
| Screeds | | |

| Embedded Items | Contractor | N/A |
|---|---|---|
| A. Anchor Bolts | | |
| B. Water Stop | | |
| C. Rebar | | |
| D. Electrical | | |
| E. Plumbing Rough-in | | |
| F. Mechanical | | |
| G. HVAC | | |

| Concrete Placement Equip. | Contractor | N/A |
|---|---|---|
| A. Crane | | |
| B. Buckets | | |
| C. Hoppers | | |
| D. Vibrators | | |
| E. Elephant trunks | | |
| F. Floodlights | | |
| G. Pump Truck | | |

| Building Department Notification | |
|---|---|
| Date: | Time: |

| Prep Wall Concrete | Contractor | N/A |
|---|---|---|
| Access To Work | | |
| Ladders Secured | | |
| Clean up and Washed Out | | |
| Reinforcing Steel | | |
| | | |

| Forms | Contractor | N/A |
|---|---|---|
| A. Alignment & Grade | | |
| B. Scaffolding | | |
| C. Sleeves & Wall Castings | | |
| D. Embedded Items | | |
| E. Electrical | | |
| F. Plumbing Rough-in | | |
| G. Piping | | |

| Record of Curing Conditions During Placement | | |
|---|---|---|
| | Start | Finish |
| Date | | |
| Time | | |
| Weather | | |
| Temperature | | |
| Comments | | |

is in accord with the Contract Drawings and Specifications. The Contractor requests permission to begin placement of concrete on the date of _____ at _____. The estimated number of yards is: _____. The estimated duration of the placement is _____.

By: _____
Contractor

Released for placement by: _____
Engineer