STANDARD LOW BID PROJECT

Project Budget Over $100,000

September 3, 2019

HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE

UNIVERSITY PROJECT NUMBER 22210

Prepared by

FFKR ARCHITECTS
730 Pacific Avenue
Salt Lake City, UT 84112

For

The University of Utah
U FACILITIES
V. Randall Turpin University Services Building
1795 E. South Campus Drive, Room 201
Salt Lake City, Utah 84112-9403
Phone (801) 581-4707
FAX (801) 581-6081
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Title</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title Sheet</td>
<td>1</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>2</td>
</tr>
<tr>
<td>Notice to Contractors</td>
<td>3</td>
</tr>
<tr>
<td>Description of Work</td>
<td>4</td>
</tr>
<tr>
<td>Project Schedule</td>
<td>5</td>
</tr>
<tr>
<td>Bid Form</td>
<td>6</td>
</tr>
<tr>
<td>Instructions to Bidders</td>
<td>9</td>
</tr>
<tr>
<td>Instructions and Subcontractors List Form</td>
<td>16</td>
</tr>
<tr>
<td>Contractor’s Agreement</td>
<td>19</td>
</tr>
<tr>
<td>Typical Project Inspections</td>
<td>23</td>
</tr>
<tr>
<td>Certificate of Substantial Completion</td>
<td>25</td>
</tr>
<tr>
<td>Past Performance Rating Form</td>
<td>26</td>
</tr>
<tr>
<td>Technical Specifications</td>
<td>27</td>
</tr>
<tr>
<td>Drawings</td>
<td>(provided as a separate file)</td>
</tr>
</tbody>
</table>

The University of Utah General Conditions and Supplemental General Conditions for University of Utah Projects are hereby made part of these Contract Documents by reference. These documents are available at https://pdc.utah.edu/homepage/construction/.

Note that the DFCM Supplemental General Conditions are hereby made part of these bidding documents and subsequent Contract Documents by reference, and are available at http://dfcm.utah.gov/dfcm-standard-documents.html. Applied to this project, the terms “DFCM” or “Division” as used in the DFCM Supplemental General Conditions shall mean “The University of Utah,” and the term “Director” shall mean the “University of Utah Chief Design & Construction Officer.”
NOTICE TO CONTRACTORS

Bids will be received by the University of Utah Department of U FACILITIES for:

HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE
University Project Number 22210
Construction Budget: $681,780.00

Bids will be in accordance with the Contract Documents prepared by University of Utah U FACILITIES and FFKR ARCHITECTS, hereinafter referred to as “A/E” as defined in the General Conditions.

Effective September 10, 2018, the University has retired the previous state mandated Surety Bond Forms and is now requiring the use of the AIA Bid Bond Form A310-2010 and Performance and Payment Bond Form A312-2010.

All Questions must be directed to:

Jackson Ferguson, FFKR Architects. Email: jferguson@ffkr.com Phone: 801-520-5265

The Bid Form provided herein should only be used for paper bid submittals. Should a bid be received on the Bid Form and electronically through BidSync, the electronic bid shall govern.

All bidding documents and addenda will be distributed at http://www.bidsync.com/.

The UNIVERSITY IS NOT RESPONSIBLE FOR DIFFICULTIES, TECHNICAL OR OTHERWISE, ASSOCIATED WITH THE ELECTRONIC BIDDING PROCESS.

BIDDERS WHO CHOOSE TO USE THE ELECTRONIC BIDDING PROCESS DO SO AT THEIR OWN RISK.

Persons or companies bidding on this project shall hold a current Utah Contractor's License covering the type of work to be done and shall be bondable to the amount of the Contract.

There will be an Optional pre-bid meeting on Tuesday, September 10, 2019 at 2:00 p.m. MT at the University of Utah, University Service Building Address: 1795 East South Campus Drive, Salt Lake City, UT 84112. Meet in Conference Room # 241. Further directions may be found by searching building # 350 (VRTUSB) at www.map.utah.edu

Bids will be received until Tuesday, September 24, 2019 by 1:00 p.m. MT, through BidSync, or alternately by sealed envelope per the directions provided in the Instructions to Bidders. Bids will be opened and read aloud in the U FACILITIES Conference Room 201 adjacent to the U FACILITIES reception desk. Note: Bids must be received at U Facilities by the specified time. Do not deliver bids to University Purchasing. See the Instructions to Bidders for more information.

A bid bond in the amount of five percent (5%) of the bid amount, made payable to The University of Utah, must be procured and submitted to the University of Utah within 24 hours after the bid due time. The bid bond may be scanned and submitted with the online bid via www.bidsync.com at the time of the bid.

Construction Constraint: All Bidders must provide proof of relevant experience constructing laboratory spaces within the last (3) years and complete the Experience Summary Form.

The University of Utah reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of the University.

THE UNIVERSITY OF UTAH, U FACILITIES, PAULINE ALLES, CONTRACT ADMINISTRATOR
DESCRIPTION OF WORK

The University of Utah High-Temperature Water Plant (0303), which was constructed in 1963, houses high-temperature water (HTW) generators, pumps, piping and related equipment that circulate hot water needed for heating on main campus. The building is now over fifty years old and does not meet current codes for structural seismic reinforcement. This document describes the scope of construction for a project intended to upgrade the facility to meet modern seismic codes. The project will take place in 4-6 phases, one phase annually, which the University will award at its discretion. The scope of each phase includes, but is not limited to, the following tasks:

1. Phase 1 (calendar year 2019):
   a. New: Site preparation and utility relocation

2. Phase 2 (calendar year 2020):
   a. Demolish: Roof screen, roof assembly, roof exhaust fans, oil cooler, condensate tank, and roof stairs
   b. New: Install oil cooler, roof assembly (curb, roof drains, parapet, roof bracing, and roof diaphragm), fan-floor diaphragm, piping-floor diaphragm, condensate tank, rooftop exhaust fans, roof stairs, and water tank for a research project.

3. Phase 3 (calendar year 2021):
   a. Demolish: Asphalt
   b. New: Four buttresses with foundations, micro-piles, underpinning, concrete caps, internal links, and buttress links.

4. Phase 4 (calendar year 2022):
   a. Demolish: Partial control room, office, west brick wall.
   b. New: Office wing, west envelope and exterior steel, southwest buttress envelope, and fire sprinkler system

5. Phase 5 (calendar year 2023):
   a. Demolish: East and south brick walls
   b. New: East and south envelopes and exterior steel, and northeast, southeast, and northwest buttress envelopes and structural links.

6. Phase 6 (calendar year 2024):
   a. Demolish: North brick wall and interior stairs adjacent to generator 4.
   b. New: North envelope and exterior steel, equipment and pipe bracing, asphalt repair and replacement, make-up air rooftop unit, penthouse walls and roof, stairs from fan level to roof, and dumpster enclosure.

The University intends to award the first phase of the project to the contractor chosen through the initial selection process and may, at University discretion, award change orders for additional phases to the same contractor.

Optional Pre-submittal meeting:

**Date:** Tuesday, September 10, 2019

**Time:** 2:00p.m. MT

**Location:** University of Utah, Turpin University Services Building, Conference Room # 241
1795 East South Campus Drive, Salt Lake City, UT 8411

**Contact:** FFKR Architect: Jackson Ferguson
Phone: 801-520-5265 Email: jferguson@ffkr.com
### PROJECT SCHEDULE

<table>
<thead>
<tr>
<th>Event</th>
<th>Day</th>
<th>Date</th>
<th>Time</th>
<th>Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bidding Documents Available</td>
<td>Tuesday</td>
<td>September 3, 2019</td>
<td></td>
<td>BidSync <a href="http://www.bidsync.com">http://www.bidsync.com</a></td>
</tr>
<tr>
<td><strong>Optional</strong> Walkthru Pre-bid Site Meeting</td>
<td>Tuesday</td>
<td>September 10, 2019</td>
<td>2:00 P.m. MT</td>
<td>At the University of Utah, University Service Building Address: 1795 East South Campus Drive, Salt Lake City, UT 84112. Meet in Conference Room # 241. Further directions may be found by searching building # 350 (VRTUSB) at <a href="http://www.map.utah.edu">www.map.utah.edu</a></td>
</tr>
<tr>
<td>Last Day to Submit Questions</td>
<td>Tuesday</td>
<td>September 17, 2019</td>
<td>4:00 p.m. MT</td>
<td>Jackson Ferguson, FFKR Email: <a href="mailto:jferguson@ffkr.com">jferguson@ffkr.com</a> Phone: 801-520-5265</td>
</tr>
<tr>
<td>Addendum Deadline (exception for delays)</td>
<td>Thursday</td>
<td>September 19, 2019</td>
<td></td>
<td>All addenda will be posted on the BidSync Web Site.</td>
</tr>
<tr>
<td>Prime Contractors Turn In Bid and Bid Bond</td>
<td>Tuesday</td>
<td>September 24, 2019</td>
<td>1:00 p.m. MT</td>
<td>BidSync <a href="http://www.bidsync.com">http://www.bidsync.com</a></td>
</tr>
</tbody>
</table>
| Sub-contractor List and Bid Bond Due | Wednesday | September 25, 2019 | 1:00 p.m. MT | **Pauline Alles**  
University of Utah  
U FACILITIES  
VRT USB (Univ. Services Bldg)  
1795 E. South Campus Dr.  
Room 201  
SLC, UT 84112-9403  
pauline.alles@utah.edu |
| Substantial Completion Date         |       | **February 28, 2020** |             |                                                                      |
The University of Utah  
U FACILITIES  
BID FORM  

Notes to Bidder:

2. This form should only be used for paper bids. Electronic bids must be submitted through BidSync. If both an electronic bid and paper bid are received the electronic bid shall govern.
3. The University will not consider exceptions, clarifications, or terms and conditions added by the Bidder when not specifically requested on the Bid Form. Although BidSync provides space for these considerations elsewhere, any exceptions, clarifications, or terms and conditions inserted by the Bidder may result in rejection of the Bid.

NAME OF BIDDER ____________________________ DATE __________

To: The University of Utah, U FACILITIES  
1795 E. South Campus Drive, Room 201 (V. Randall Turpin University Services Building)  
Salt Lake City, Utah 84112-9403  
Attention: Pauline Alles

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with the invitation for bids for the HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE, University Project Number 22210, and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: ____________________.

The amount(s) shown below do not include Utah State Sales and Use Tax on materials incorporated into the finished product. I/We acknowledge responsibility for complying with all Utah State Sales and Use Tax exemption requirements.

For all work shown on the Drawings and described in the Specifications and Contract Documents, I/we agree to perform for the sum of:

______________________________ DOLLARS ($ ____________)

(In case of discrepancy, written amount shall govern)

By placing a bid I/we certify that I/we do not have an outstanding tax lien.

BIDDERS MUST PROVIDE PROOF OF RELEVANT EXPERIENCE

Note that the following alternates are ranked in order. The determination of the low bidder will be based on the base bid inserted above plus any Additive Alternates awarded in the order in which they are ranked. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.
Additive Alternate #1: Install PVC Storm Drain Line

DOLLARS ($ __________)  
(In case of discrepancy, written amount shall govern)

Additive Alternate #2: Install C900 PVC Water Line

DOLLARS ($ __________)  
(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete no later than **February 28, 2020**, after date of issue of the Notice to Proceed (issued after the Contractor's Agreement is signed by both parties), should I/we be the successful bidder, and agree to pay liquidated damages in the amount of $250.00 per calendar day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor’s Agreement.

This bid shall be valid for 45 days after bid opening.

Enclosed (for hard copy bids, or submitted within 24 hours per the Instructions to Bidders) is a 5% bid bond, as required, in the sum of $ ________________.

The Bid Bond in the amount not less than five percent (5%) of the above bid sum, shall become the property of the University of Utah as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable 100% Performance and Payment Bonds are not delivered within the time set forth.

Upon issuance of the Notice of Intent to the selected bidder (a letter to the Contractor issued by U FACILITIES) and the official Contract (Contractor's Agreement), the undersigned agrees to return the original signed Contract, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the Contract, and deliver an acceptable Certificate of Insurance, all within ten (10) calendar days of the date on the Notice of Intent, unless a shorter time is specified in the Contract Documents.

Respectfully submitted by:

Type/Print Company Name  Signature

Type of Organization (Corporation, Partnership, Individual, etc.)  Type/Print Name and Title

Address:

Telephone Number  FAX Number  Email (for transmission of official notices)

Utah Contractor License Number  Federal Tax ID Number
Experience Summary Form

The University will accept bids only from contractors who can demonstrate that they possess recent, relevant experience constructing **Complex Seismic Upgrades**. Demonstration of experience is contingent on completion of the attached “Experience Summary Form” and acceptance by the University of the Contractor’s experience listed.

**Demonstration of Experience:**

To qualify for this project, bidders must demonstrate that they have successfully completed a remodel in the last three years that has included the following features or requirements:

1. Construction in an operating space.
2. Construction of complex foundation and structural components.

<table>
<thead>
<tr>
<th>Bidding Contractor:</th>
<th>Name of Company bidding this project (not the sub-contractor)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of contractor/sub-contractor who completed this project</td>
<td>Name of contractor/sub-contractor who completed this referenced project</td>
</tr>
<tr>
<td>User Name:</td>
<td>Name of the Company / Institution that purchased the construction work.</td>
</tr>
<tr>
<td>Project Name:</td>
<td>Name of the project.</td>
</tr>
<tr>
<td>Date Completed:</td>
<td>Date of when the work was completed.</td>
</tr>
<tr>
<td>Point of Contact:</td>
<td>Person who can verify project. (other than bidder/sub-contractor)</td>
</tr>
<tr>
<td>Phone Number:</td>
<td>Phone number of the contact who can verify project. (other than bidder)</td>
</tr>
</tbody>
</table>

**Scope of work:**

This form is required to be submitted within 24 hours of the bid due date/time.
INSTRUCTIONS TO BIDDERS

1. **Drawings and Specifications, Other Contract Documents**

Drawings and Specifications, as well as other available Contract Documents, may be obtained as stated in the Notice to Contractors.

2. **Bids**

Before submitting a bid each contractor must register for the bid at [http://www.bidsync.com](http://www.bidsync.com), and shall carefully examine the Contract Documents; shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and, shall include in the bid the cost of all items required by the Contract Documents. If the Bidder observes that portions of the Contract Documents are at variance with applicable laws, building codes, rules, regulations, or contain obvious erroneous or uncoordinated information, the Bidder shall promptly notify the A/E and/or the University Project Manager and the necessary changes shall be accomplished by Addendum.

Do not include Utah State Sales and Use Tax on materials incorporated into the finished product, and do not include this tax on such materials for changes. The University of Utah is exempt from Federal Excise Taxes and Utah Sales and Use Taxes. **The University’s tax certificate is provided in the Supplemental General Conditions for University of Utah Projects** available at [https://pdc.utah.edu/homepage/construction/](https://pdc.utah.edu/homepage/construction/). The Contractor is responsible for complying with all Utah State Sales and Use Tax exemption requirements. The Contractor is responsible for payment of all Utah State Sales and Use Tax obligations that arise from the Contractor’s failure to comply with exemption requirements.

Except as allowed below, bids shall be submitted via the [www.bidsync.com](http://www.bidsync.com) web site.

Allow sufficient time before the 1:00 p.m. deadline to enter all information required by the BidSync system. The bid automatically closes promptly at 1:00 p.m. Any bid not completed by closing time will not be processed. The University is not responsible for technical difficulties arising from the use of the electronic bidding process. If the hard copy bid procedure is used (described below), hard copy bids must be delivered and time stamped prior to 1:00 p.m. at the U FACILITIES reception desk. Bids received after that deadline will not be considered.

A bid bond properly signed by a qualified surety security in the amount of five percent (5%) of the bid, is required. The bid bond may be scanned and attached to the online electronic bid via [www.bidsync.com](http://www.bidsync.com) at the time of the bid, or may be delivered or emailed to U FACILITIES within 24 hours after the bid due time.

IN ALL CASES THE BID BOND MUST BE ON AIA BOND FORM A310-2010 unless only one bid is received, or the failure to comply with the bid bond requirements is determined by U FACILITIES administration to be non-substantial based on the following:

(a) The bid bond is submitted on a form other than that required, and the submitted bid bond meets all other requirements including being issued by a surety firm authorized to do business in the State of Utah, listed in the U.S. Department of the Treasury Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies, for an amount not less than the amount of the bond to be issued. A co-surety may be utilized to satisfy this requirement; and,
(b) The Contractor provides a replacement bid bond properly signed by a qualified surety and on the required Bid Bond form by the close of business of the next succeeding business day after the University notifies the bidder of the defective bid bond.

If circumstances prevent the Contractor from bidding via www.bidsync.com, the University of Utah will accept hard copy bids according to the following procedures:

Hard Copy Bid Procedure. The Bid Form, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided herein, and delivered in a sealed envelope to the U FACILITIES receptionist for time stamp prior to the deadline for submission of bids. The U FACILITIES Receptionist Desk is located at the top of the stairs at the building’s main (south) entrance adjacent to the parking lot.

DO NOT DELIVER BID TO PURCHASING

The following information is required on the outside of the envelope (a sample label is provided at the end of these ‘Instructions to Bidders’):

From: Contractor’s Business Name
       Contractor’s Business Address
To:   The University of Utah U FACILITIES - Attention: Pauline Alles
       1795 E. South Campus Drive, Room 201
       Salt Lake City, Utah 84112-9403
Bid:  HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE
       University Project Number 22210
Due:  Tuesday, September 24, 2019 by 1:00 p.m. MT (or as modified by addendum)

3. Contract and Bond

The Contractor's Agreement will be in the form found in this procurement document. The Contract Time will be as indicated on the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the Contract Sum and secured from a company that meets the requirements specified in the requisite forms.

4. Listing of Subcontractors

Listing of Subcontractors shall be as summarized in the “Instructions and Subcontractor’s List Form”, which is included as part of these Contract Documents. The Subcontractors List shall be delivered to the receptionist at U FACILITIES, or faxed to 801-581-6081, or emailed to pauline.alles@utah.edu within 24 hours of the bid opening.

The University retains the right to audit or take other steps necessary to confirm compliance with requirements for the listing and changing of subcontractors. Any contractor who is found to not be in compliance with these requirements is subject to a debarment hearing and may be debarred from consideration for award of contracts for a period of up to three years.
5. **Interpretation of Drawings and Specifications**

If any person or entity contemplating submitting a bid is in doubt as to the meaning of any part of the drawings, specifications or other Contract Documents, such person shall submit to the A/E, Jackson Ferguson, at FFKR ARCHITECTS, a request for an interpretation thereof. The person or entity submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addenda posted on the BidSync web site. Neither the University nor the A/E will be responsible for any other explanations or interpretations of the proposed documents. The “A/E” shall be deemed to refer to the architect or engineer hired by the University as the A/E or Consultant for the Project.

6. **Addenda**

All addenda will be issued via [www.bidsync.com](http://www.bidsync.com). All bidders are required to register at [www.bidsync.com](http://www.bidsync.com) and view all addenda prior to submission of the bid, regardless of the means used to submit the bid. Contractors are responsible for obtaining information contained in each addendum from the web site. Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the Bid Form. Failure to acknowledge addenda may result in disqualification from bidding.

7. **Award of Contract**

The Contract will be awarded as soon as possible to the lowest, responsive and responsible bidder, based on the lowest combination of base bid and acceptable prioritized alternates, provided the bid is reasonable, is in the interests of the State of Utah to accept and after applying the Utah Preference Laws in U.C.A. Title 63, Chapter 56. The University reserves the right to waive any technicalities or formalities in any bid or in the bidding. Alternates will be accepted on a prioritized basis with Alternate 1 being highest priority, Alternate 2 having second priority, etc.

8. **Licensure**

The Contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

9. **Permits**

In concurrence with the requirements for permitting in the General Conditions, it is the responsibility of the Contractor to obtain the fugitive dust plan requirements from the Utah Division of Air Quality and the SWPPP requirements from the Utah Department of Environmental Quality, and submit the completed forms and pay any permit fee that may be required for this specific project. Failure to obtain the required permit may result in work stoppage and/or fines from the regulating authority that will be the sole responsibility of the Contractor. Any delay to the project as a result of any such failure to obtain the permit or noncompliance with the permit shall not be eligible for any extension in the Contract Time.
10. **Right to Reject Bids**

The University reserves the right to reject any or all Bids.

11. **Time is of the Essence**

Time is of the essence in regard to all the requirements of the Contract Documents.

12. **Withdrawal of Bids**

Bids may be withdrawn on written request to Pauline Alles, U FACILITIES (801-581-5675), provided the request is received from the Bidder prior to the time fixed for opening. Negligence on the part of the Bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

13. **Product Approvals**

Where reference is made to one or more proprietary products in the Contract Documents, but restrictive descriptive materials of one or more manufacturer(s) is referred to in the Contract Documents, the products of other manufacturers will be accepted, provided they equal or exceed the standards set forth in the drawings and specifications and are compatible with the intent and purpose of the design, subject to the written approval of the A/E. Such written approval must occur prior to the deadline established for the last scheduled addenda to be issued. The A/E’s written approval will be in an issued addendum. If the descriptive material is not restrictive, the products of other manufacturers specified will be accepted without prior approval provided they are compatible with the intent and purpose of the design as determined by the A/E.

14. **Financial Responsibility of Contractors, Subcontractors and Sub-subcontractors**

Contractors shall respond promptly to any inquiry in writing by the University to any concern of financial responsibility of the Contractor, subcontractor or sub-subcontractor.

15. **Debarment**

By submitting a bid, the Contractor certifies that neither it nor its principals, including project and site managers, have been, or are under consideration for, debarment or suspension, or any action that would exclude such from participation in a construction contract by any governmental department or agency. If the Contractor cannot certify this statement, attach to the bid a detailed written explanation which must be reviewed and approved by the University as part of the requirements for award of the Project.
16. **Pay Application form and Submit Schedule of Values**

With the first Application for Payment, which form may be found at [https://pdc.utah.edu/homepage/construction/](https://pdc.utah.edu/homepage/construction/), the Contractor shall submit to the A/E and the University Project Manager a schedule of values allocated to all the various portions of the Work. The Schedule of Values shall be submitted on the form approved and provided below. When approved, including any approved modifications by the Project Manager, it shall be the basis for future Contractor applications for payments. The Contractor shall not be entitled to payment until receipt and acceptance of the Schedule of Values.

<table>
<thead>
<tr>
<th>CSI SPEC HEADING</th>
<th>DESCRIPTION</th>
<th>BREAKDOWN PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CON-00-000000</td>
<td>General Construction</td>
<td>$</td>
</tr>
<tr>
<td>CON-00-001000</td>
<td>General Remodeling</td>
<td>$</td>
</tr>
<tr>
<td>CON-00-002000</td>
<td>Other Small Construction</td>
<td>$</td>
</tr>
<tr>
<td>CON-01-010000</td>
<td>Procurement &amp; General Requirements</td>
<td>$</td>
</tr>
<tr>
<td>CON-01-011000</td>
<td>Bonds</td>
<td>$</td>
</tr>
<tr>
<td>CON-01-012000</td>
<td>Insurance</td>
<td>$</td>
</tr>
<tr>
<td>CON-01-013000</td>
<td>General Conditions</td>
<td>$</td>
</tr>
<tr>
<td>CON-01-014000</td>
<td>Municipal Fees</td>
<td>$</td>
</tr>
<tr>
<td>CON-01-015000</td>
<td>Construction Manager’s Fee</td>
<td>$</td>
</tr>
<tr>
<td>CON-02-020000</td>
<td>Existing Conditions</td>
<td>$</td>
</tr>
<tr>
<td>CON-02-022000</td>
<td>Assessment</td>
<td>$</td>
</tr>
<tr>
<td>CON-02-024000</td>
<td>Demolition &amp; Structure Moving</td>
<td>$</td>
</tr>
<tr>
<td>CON-03-030000</td>
<td>Concrete</td>
<td>$</td>
</tr>
<tr>
<td>CON-03-033000</td>
<td>Cast-In-Place Concrete</td>
<td>$</td>
</tr>
<tr>
<td>CON-03-038000</td>
<td>Concrete Cutting &amp; Boring</td>
<td>$</td>
</tr>
<tr>
<td>CON-04-040000</td>
<td>Masonry</td>
<td>$</td>
</tr>
<tr>
<td>CON-05-050000</td>
<td>Metals</td>
<td>$</td>
</tr>
<tr>
<td>CON-05-051000</td>
<td>Structural Metal Framing</td>
<td>$</td>
</tr>
<tr>
<td>CON-05-054000</td>
<td>Cold-Formed Metal Framing</td>
<td>$</td>
</tr>
<tr>
<td>CON-06-060000</td>
<td>Wood, Plastics, &amp; Composites</td>
<td>$</td>
</tr>
<tr>
<td>CON-06-061000</td>
<td>Rough Carpentry</td>
<td>$</td>
</tr>
<tr>
<td>CON-06-062000</td>
<td>Finish Carpentry</td>
<td>$</td>
</tr>
<tr>
<td>CON-06-064000</td>
<td>Architectural Woodwork</td>
<td>$</td>
</tr>
<tr>
<td>CON-07-070000</td>
<td>Thermal &amp; Moisture Protection</td>
<td>$</td>
</tr>
<tr>
<td>CON-07-071000</td>
<td>Damp-proofing &amp; Waterproofing</td>
<td>$</td>
</tr>
<tr>
<td>CON-07-073000</td>
<td>Steep Slope Roofing</td>
<td>$</td>
</tr>
<tr>
<td>CON-07-075000</td>
<td>Membrane Roofing</td>
<td>$</td>
</tr>
<tr>
<td>CON-07-076000</td>
<td>Flashing &amp; Sheet Metal</td>
<td>$</td>
</tr>
<tr>
<td>CON-08-080000</td>
<td>Openings</td>
<td>$</td>
</tr>
<tr>
<td>CON-08-081000</td>
<td>Doors &amp; Frames</td>
<td>$</td>
</tr>
<tr>
<td>CON-08-084000</td>
<td>Entrances, Storefronts, &amp; Curtain Walls</td>
<td>$</td>
</tr>
<tr>
<td>CON-08-085000</td>
<td>Windows</td>
<td>$</td>
</tr>
<tr>
<td>CON-08-087000</td>
<td>Hardware</td>
<td>$</td>
</tr>
<tr>
<td>CON-09-090000</td>
<td>Finishes</td>
<td>$</td>
</tr>
<tr>
<td>CON-09-092000</td>
<td>Plaster &amp; Gypsum Board</td>
<td>$</td>
</tr>
<tr>
<td>CON-09-095000</td>
<td>Ceilings</td>
<td>$</td>
</tr>
<tr>
<td>Contract Code</td>
<td>Work Description</td>
<td>Amount</td>
</tr>
<tr>
<td>---------------</td>
<td>-------------------------------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>CON-09-096000</td>
<td>Flooring</td>
<td>$</td>
</tr>
<tr>
<td>CON-09-097000</td>
<td>Wall Finishes</td>
<td>$</td>
</tr>
<tr>
<td>CON-09-099000</td>
<td>Painting &amp; Coating</td>
<td>$</td>
</tr>
<tr>
<td>CON-10-100000</td>
<td>Specialties</td>
<td>$</td>
</tr>
<tr>
<td>CON-11-110000</td>
<td>Equipment</td>
<td>$</td>
</tr>
<tr>
<td>CON-12-120000</td>
<td>Furnishings</td>
<td>$</td>
</tr>
<tr>
<td>CON-12-123000</td>
<td>Casework</td>
<td>$</td>
</tr>
<tr>
<td>CON-13-130000</td>
<td>Special Construction</td>
<td>$</td>
</tr>
<tr>
<td>CON-14-140000</td>
<td>Conveying Equipment</td>
<td>$</td>
</tr>
<tr>
<td>CON-21-210000</td>
<td>Fire Suppression</td>
<td>$</td>
</tr>
<tr>
<td>CON-21-211000</td>
<td>Water Based Fire Suppression Systems</td>
<td>$</td>
</tr>
<tr>
<td>CON-22-220000</td>
<td>Plumbing</td>
<td>$</td>
</tr>
<tr>
<td>CON-22-221000</td>
<td>Plumbing Piping &amp; Pumps</td>
<td>$</td>
</tr>
<tr>
<td>CON-22-224000</td>
<td>Plumbing Fixtures</td>
<td>$</td>
</tr>
<tr>
<td>CON-22-226000</td>
<td>Gas &amp; Vacuum Systems For Lab &amp; Healthcare Facilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-23-230000</td>
<td>Heating, Ventilating, &amp; Air-Conditioning (HVAC)</td>
<td>$</td>
</tr>
<tr>
<td>CON-23-232000</td>
<td>HVAC Piping &amp; Pumps</td>
<td>$</td>
</tr>
<tr>
<td>CON-23-233000</td>
<td>HVAC Air Distribution</td>
<td>$</td>
</tr>
<tr>
<td>CON-23-237000</td>
<td>Central HVAC Equipment</td>
<td>$</td>
</tr>
<tr>
<td>CON-25-250000</td>
<td>Integrated Automation</td>
<td>$</td>
</tr>
<tr>
<td>CON-25-255000</td>
<td>Integrated Automation Facility Controls</td>
<td>$</td>
</tr>
<tr>
<td>CON-26-260000</td>
<td>Electrical</td>
<td>$</td>
</tr>
<tr>
<td>CON-26-261000</td>
<td>Medium Voltage Electrical Distribution</td>
<td>$</td>
</tr>
<tr>
<td>CON-26-265000</td>
<td>Lighting</td>
<td>$</td>
</tr>
<tr>
<td>CON-27-270000</td>
<td>Communications</td>
<td>$</td>
</tr>
<tr>
<td>CON-27-272000</td>
<td>Data Communications</td>
<td>$</td>
</tr>
<tr>
<td>CON-27-273000</td>
<td>Voice Communications</td>
<td>$</td>
</tr>
<tr>
<td>CON-27-274000</td>
<td>Audio-Video Communications</td>
<td>$</td>
</tr>
<tr>
<td>CON-28-280000</td>
<td>Electronic Safety &amp; Security</td>
<td>$</td>
</tr>
<tr>
<td>CON-28-281000</td>
<td>Electronic Access Control &amp; Intrusion Detection</td>
<td>$</td>
</tr>
<tr>
<td>CON-31-310000</td>
<td>Earthwork</td>
<td>$</td>
</tr>
<tr>
<td>CON-31-311000</td>
<td>Site Clearing</td>
<td>$</td>
</tr>
<tr>
<td>CON-31-312000</td>
<td>Earth Moving</td>
<td>$</td>
</tr>
<tr>
<td>CON-32-320000</td>
<td>Exterior Improvements</td>
<td>$</td>
</tr>
<tr>
<td>CON-32-321000</td>
<td>Bases, Ballasts &amp; Paving</td>
<td>$</td>
</tr>
<tr>
<td>CON-32-323000</td>
<td>Site Improvements</td>
<td>$</td>
</tr>
<tr>
<td>CON-32-328000</td>
<td>Irrigation</td>
<td>$</td>
</tr>
<tr>
<td>CON-32-329000</td>
<td>Planting</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-330000</td>
<td>Utilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-331000</td>
<td>Water Utilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-333000</td>
<td>Sanitary Sewer Utilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-334000</td>
<td>Storm Drain Utilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-336000</td>
<td>Hydronic &amp; Steam Energy Utilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-337000</td>
<td>Electrical Utilities</td>
<td>$</td>
</tr>
<tr>
<td>CON-33-338000</td>
<td>Communications Utilities</td>
<td>$</td>
</tr>
<tr>
<td><strong>TOTAL AMOUNT</strong></td>
<td><strong>(equaling the total contract price)</strong></td>
<td><strong>$</strong></td>
</tr>
</tbody>
</table>
Note: The total of all breakout prices entered in the above form must equal the total contract sum.

17. **Small Business Utilization (MBE/WBE)**

The University is committed to providing equal access for bidding opportunities to minority/woman-owned business enterprises (“MBE/WBE”). Contractors must give equal opportunity for MBE/WBE firms to respond to requests for becoming a Sub-Contractor or Supplier for this project. Contractors must indicate which firms are MBE or WBE on the Subcontractors List when it is submitted (to satisfy Federal reporting requirements).

**HARD COPY BID – RESPONSE LABEL FOR ENVELOPE**

*Note that the University of Utah encourages electronic bid submission via [www.bidsync.com](http://www.bidsync.com).*

---

**CONTRACTOR BID**

**DO NOT DELIVER TO PURCHASING**

**CONTRACTOR BUSINESS NAME:**

**CONTRACTOR’S BUSINESS ADDRESS:**

**To:** University of Utah, U Facilities

1795 East South Campus Drive, Room 201 (V. Randall Turpin University Services Building)

Salt Lake City, Utah 84112-9403

**ATTENTION:** Pauline Alles

**Bid:** **HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE**

University Project Number 22210

**Due:** Tuesday, September 24, 2019 by 1:00 p.m. MT (or as modified by addendum)
The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor’s name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, based on the following:

### DOLLAR AMOUNTS FOR LISTING

<table>
<thead>
<tr>
<th>PROJECTS UNDER $500,000:</th>
<th>ALL FIRST-TIER SUBS $20,000 OR OVER MUST BE LISTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROJECTS $500,000 OR MORE:</td>
<td>ALL FIRST-TIER SUBS $35,000 OR OVER MUST BE LISTED</td>
</tr>
</tbody>
</table>

- Any additional subcontractors identified in the bid documents shall also be listed.
- The University may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- If there are no subcontractors for the job that are required to be reported by State law (either because there are no subcontractors that will be used on the project or because there are no first-tier subcontractors over the dollar amounts referred to above), then you do not need to submit a sublist. If you do not submit a sublist, it will be deemed to be a representation by you that there are no subcontractors on the job that are required to be reported under State law. At any time, the University reserves the right to inquire, for security purposes, as to the identification of the subcontractors at any tier that will be on the worksite.

### LICENSURE:

The subcontractor’s name, the type of work, the subcontractor’s bid amount, and the subcontractor's license number as issued by DOPL, if such license is required under Utah Law, shall be listed. Bidder shall certify that all subcontractors, required to be licensed, are licensed as required by State law. A subcontractor includes a trade contractor or specialty contractor and does not include suppliers who provide only materials, equipment, or supplies to a contractor or subcontractor.

### ‘SPECIAL EXCEPTION’:

A bidder may list ‘Special Exception’ in place of a subcontractor when the bidder intends to obtain a subcontractor to perform the work at a later date because the bidder was unable to obtain a qualified or reasonable bid under the provisions of U.C.A. Section 63A-5-208(4). The bidder shall insert the term ‘Special Exception’ for that category of work, and shall provide documentation with the subcontractor list describing the bidder’s efforts to obtain a bid of a qualified subcontractor at a reasonable cost and why the bidder was unable to obtain a qualified subcontractor bid. The University must find that the bidder complied in good faith with State law requirements for any ‘Special Exception’ designation, in order for the bid to be considered. If awarded the contract, the University shall supervise the bidder’s efforts to obtain a qualified subcontractor bid. The amount of the awarded contract may not be adjusted to reflect the actual amount of the subcontractor’s bid. Any listing of ‘Special Exception’ on the sublist form shall also include amount allocated for that work.

### GROUNDS FOR DISQUALIFICATION:

The University may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. The University may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the University to be unqualified to do the Work or for such other reason in the best interest of the University.
Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the University, the University may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the University. If such correction is submitted timely, then the sublist requirements shall be considered met.

**CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:**

Subsequent to twenty-four hours after the bid opening, the contractor may change its listed subcontractors only after receiving written permission from the University based on complying with all of the following criteria.

1. The contractor has established in writing that the change is in the best interest of the University and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.

2. The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.

3. Any requirement set forth by the University to ensure that the process used to select a new subcontractor does not give rise to bid shopping.

4. Any increase in the cost of the subject subcontractor work is borne by the contractor.

5. Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.

6. The University will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

**EXAMPLE:**

Example of a list where there are only four subcontractors:

<table>
<thead>
<tr>
<th>TYPE OF WORK</th>
<th>SUBCONTRACTOR, “SELF” OR “SPECIAL EXCEPTION”</th>
<th>SUBCONTRACTOR BID AMOUNT</th>
<th>CONTRACTOR LICENSE #</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTRICAL</td>
<td>ABCD Electric Inc.</td>
<td>$350,000.00</td>
<td>123456789000</td>
</tr>
<tr>
<td>LANDSCAPING</td>
<td>“Self” *</td>
<td>$300,000.00</td>
<td>123456789000</td>
</tr>
<tr>
<td>CONCRETE (ALTERNATE #1)</td>
<td>XYZ Concrete Inc</td>
<td>$298,000.00</td>
<td>987654321000</td>
</tr>
<tr>
<td>MECHANICAL</td>
<td>“Special Exception” (attach documentation)</td>
<td>Fixed at: $350,000.00</td>
<td>(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)</td>
</tr>
</tbody>
</table>

* Bidders may list “self”, but it is not required.

**PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.**
The University of Utah  
U FACILITIES  

SUBCONTRACTORS LIST  
Fax to (801) 581-6081 Attention Pauline Alles or  
Email to pauline.alles@utah.edu  

HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE  
UNIVERSITY PROJECT NUMBER 22210  

Caution: You must read and comply fully with instructions.  

<table>
<thead>
<tr>
<th>TYPE OF WORK</th>
<th>SUBCONTRACTOR, “SELF” OR “SPECIAL EXCEPTION”</th>
<th>SUBCONTRACTOR BID AMOUNT</th>
<th>CONT. LICENSE #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

We certify that:  
1. This list includes all subcontractors as required by the instructions, including those related to the base bid as well as any alternates.  
2. We have listed “Self” or “Special Exception” in accordance with the instructions.  
3. All subcontractors are appropriately licensed as required by State law.  

FIRM:  

DATE: ____________________ SIGNED BY: ____________________  

NOTICE: FAILURE TO SUBMIT THIS FORM, PROPERLY COMPLETED AND SIGNED, AS REQUIRED IN THESE CONTRACT DOCUMENTS, SHALL BE GROUNDS FOR THE UNIVERSITY’S REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY THE UNIVERSITY. ATTACH A SECOND PAGE IF NECESSARY.
CONTRACT NUMBER

Project Number 22210

CONTRACTOR’S AGREEMENT

FOR: HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE

THIS CONTRACTOR’S AGREEMENT, made and entered into this ______ day of _____________, 20__, by and between THE UNIVERSITY OF UTAH U FACILITIES, hereinafter referred to as "University", and CONTRACTOR NAME, incorporated in the State of Utah and authorized to do business in the State of Utah, hereinafter referred to as "CONTRACTOR", whose address is: STREET, CITY, STATE, ZIP.

WITNESSETH: WHEREAS, the University intends to have Work performed at The University of Utah.

WHEREAS, Contractor agrees to perform the Work for the sum stated herein.

NOW, THEREFORE, the University and Contractor for the consideration provided in this Contractor's Agreement, agree as follows:

ARTICLE 1. SCOPE OF WORK. The Work to be performed shall be in accordance with the Contract Documents prepared by FFKR ARCHITECTS entitled HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE. The University of Utah General Conditions and Supplemental General Conditions for University of Utah Projects (both available at https://pdc.utah.edu/homepage/construction/), and the DFCM Supplemental General Conditions available on the DFCM website (all aforementioned documents referred to as “General Conditions”), are hereby incorporated by reference as part of this Agreement and included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

The Contractor Agrees to furnish labor, materials, and equipment to complete the Work as required in the Contract Documents which are hereby incorporated by reference. It is understood and agreed by the parties hereto that all Work shall be performed as required in the Contract Documents and shall be subject to inspection and approval of the University or its authorized representative. The relationship of the Contractor to the University hereunder is that of an independent Contractor.

ARTICLE 2. CONTRACT SUM. The University agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of CONTRACT AMOUNT DOLLARS AND NO CENTS ($ 0.00 ), which is the Base Bid and Additive Alternate(s) _________, and which sum also includes the cost of a 100% Performance Bond and a 100% Payment Bond as well as all insurance requirements of the Contractor. Said Bonds have already been posted by the Contractor pursuant to State law. The required proof-of-insurance certificates have been delivered to the University in accordance with the General Conditions before the execution of this Contractor's Agreement.

U FACILITIES PM: STEVE LARAWAY
ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete no later than February 28, 2020. Contractor agrees to pay liquidated damages in the amount of $250.00 per calendar day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: a) to compensate the University for delay only; b) is provided for herein because actual damages cannot be readily ascertained at the time of execution of this Contractor's Agreement; c) is not a penalty; and d) shall not prevent the University from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

No action shall be maintained by the Contractor, including its Subcontractors or suppliers at any tier, against the University or the State of Utah for damages or other claims due to losses attributable to hindrances or delays from any cause whatsoever, including acts and omissions of the University or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive an extension of time, signed by the University, in which to complete the Work under this Contractor’s Agreement in accordance with the General Conditions.

ARTICLE 4. CONTRACT DOCUMENTS. The Contract Documents consist of this Contractor’s Agreement, the Conditions of the Contract (the University’s General Conditions, University and DFCM Supplementary and other Conditions), the Drawings, Specifications, Addenda, and Modifications. The Contract Documents shall also include the bidding documents, including the Notice to Contractors, Instructions to Bidders, and the Bid, to the extent not in conflict therewith, and other documents and oral presentations that are documented as an attachment to the contract.

All such documents are hereby incorporated by reference herein. Any reference in this Contractor’s Agreement to certain provisions of the Contract Documents shall in no way be construed as to lessen the importance or applicability of any other provisions of the Contract Documents.

ARTICLE 5. PAYMENT. The University agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the University invoices for materials purchased and on the site but not installed, for which the Contractor requests payment and agrees to safeguard and protect such equipment or materials and is responsible for the safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the University may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without the University's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The University shall not be responsible for enforcing the Contractor’s obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.
ARTICLE 6. INDEBTEDNESS. Before final payment is made, the Contractor must submit evidence satisfactory to the University that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the University as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by the University as to any concern of financial responsibility, and University reserves the right to request any waivers or releases or bonds from Contractor in regard to any rights of Subcontractors (including suppliers) at any tier or any third parties prior to any payment by University to Contractor.

ARTICLE 7. ADDITIONAL WORK. It is understood and agreed by the parties hereto that no money will be paid to the Contractor for additional labor or materials furnished unless a new contract in writing or a Modification hereof in accordance with the General Conditions and the Contract Documents for such additional labor or materials has been executed. The University specifically reserves the right to modify or amend this Contractor’s Agreement and the total sum due hereunder either by enlarging or restricting the scope of the Work.

ARTICLE 8. INSPECTIONS. The Work shall be inspected for acceptance in accordance with the General Conditions.

ARTICLE 9. DISPUTES. Any dispute, PRE or Claim between the parties shall be subject to the provisions of Article 7 of the General Conditions. The University reserves all rights to pursue its rights and remedies as provided in the General Conditions.

ARTICLE 10. TERMINATION, SUSPENSION OR ABANDONMENT. This Contractor’s Agreement may be terminated, suspended or abandoned in accordance with the General Conditions.

ARTICLE 11. UNIVERSITY’S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF. The University may withhold from payment to the Contractor such amount as, in University’s judgment, may be necessary to pay just claims against the Contractor or Subcontractor at any tier for labor and services rendered and materials furnished in and about the Work. The University may apply such withheld amounts for the payment of such claims in University’s discretion. In so doing, the University shall be deemed the agent of Contractor and payment so made by the University shall be considered as payment made under this Contractor’s Agreement by the University to the Contractor. University shall not be liable to the Contractor for any such payment made in good faith. Such withholdings and payments may be made without prior approval of the Contractor and may be also be prior to any determination as a result of any dispute, PRE, Claim or litigation.

ARTICLE 12. INDEMNIFICATION. The Contractor shall comply with the indemnification provisions of the General Conditions.

ARTICLE 13. SUCCESSORS AND ASSIGNMENT OF CONTRACT. The University and Contractor, respectively bind themselves, their partners, successors, assigns and legal representatives to the other party to this Agreement, and to partners, successors, assigns and legal representatives of such other party with respect to all covenants, provisions, rights and responsibilities of this Contractor’s
Agreement. The Contractor shall not assign this Contractor’s Agreement without the prior written consent of the University, nor shall the Contractor assign any moneys due or to become due as well as any rights under this Contractor’s Agreement, without prior written consent of the University.

ARTICLE 14. RELATIONSHIP OF THE PARTIES. The Contractor accepts the relationship of trust and confidence established by this Contractor’s Agreement and covenants with the University to cooperate with the University and A/E, and use the Contractor’s best skill, efforts and judgment in furthering the interest of the University to furnish efficient business administration and supervision, to make best efforts to furnish at all times an adequate supply of workers and materials, and to perform the Work in the best and most expeditious and economic manner consistent with the interests of the University.

ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT. Contractor and University each represent that the execution of this Contractor’s Agreement and the performance thereunder is within their respective duly authorized powers.

ARTICLE 16. ATTORNEY FEES AND COSTS. Except as otherwise provided in the dispute resolution provisions of the General Conditions, the prevailing party shall be entitled to reasonable attorney fees and costs incurred in any action in the District Court and/or appellate body to enforce this Contractor’s Agreement or recover damages or any other action as a result of a breach thereof.

ARTICLE 17. EXECUTION. This Agreement, and any amendment thereto, may be executed in two or more counterparts through the exchange of electronic (e.g., pdf) or facsimile signatures, each of which will be an original and, together, will constitute one and the same agreement. A signed copy of such documents delivered by email, facsimile, or other means of electronic transmission shall be deemed to have the same legal effect as delivery of an original signed copy of such document.

IN WITNESS WHEREOF, the parties hereto have executed this Contractor’s Agreement on the day and year stated hereinabove.

CONTRACTOR:

________________________________________
Signature Date

Title:____________________________________

________________________________________
Please type/write name clearly Federal Identification Number

UNIVERSITY OF UTAH:

________________________________________
Signatures Date
TYPICAL PROJECT INSPECTIONS
Office of Building Official / Environmental Health & Safety

Notes:
1. Minimum of 24 hour notice is required for inspections.
2. Shaded boxes indicate jurisdiction.
3. The listed items refer to typical code required tests/inspections only, and do not eliminate the need to complete other tests/inspections required by specifications or Codes.

<table>
<thead>
<tr>
<th>TYPICAL INSPECTION</th>
<th>OBO</th>
<th>EH&amp;S</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENERAL PROVISIONS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>GENERAL FIRE SAFETY - CHAPTER 3 IFC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMERGENCY PREPAREDNESS - CHAPTER 4 IFC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIRE SERVICE FEATURES - CHAPTER 5 IFC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HOT WORK - CHAPTER 26</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FOOTINGS AND FOUNDATIONS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FORMS, REINFORCEMENT, &amp; SETBACK PLACEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FOUNDATION WALL WEATHERPROOFING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FIRE SUPPRESSION SUPPLY, UNDERGROUND FLUSH HYDRANT THRUST BLOCKING, HYDROSTATIC TEST</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUBFLOOR:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLUMBING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECHANICAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROUGH INSPECTIONS:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELECTRICAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PLUMBING</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECHANICAL INCLUDING FIRE AND SMOKE DAMPERS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Status</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>Framing Structural, Fire Rated Walls and Fireproofing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Sprinkler, Hangers, Hydrostatic Test &amp; Seismic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exit System Components</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seismic Ceiling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Final Inspections:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plumbing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye Wash / Shower</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fume Hoods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Alarm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Sprinkler</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fire Rated Walls and Assemblies</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The University of Utah
U FACILITIES
CERTIFICATE OF SUBSTANTIAL COMPLETION
HIGH TEMPERATURE WATER PLANT - SEISMIC UPGRADE
UNIVERSITY PROJECT NUMBER 22210

AREA ACCEPTED: ____________________________________________

The Work performed under the subject Contract has been reviewed on this date and found to be Substantially Completed as defined in the GENERAL CONDITIONS; including that the construction is sufficiently completed in accordance with the Contract Documents, as modified by any change orders agreed to by the parties, so that the University can occupy the Project or specified area of the Project for the use for which it is intended.

The University accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at _________(time) on ____________________________ (date).

The University accepts the Project for occupancy and agrees to assume full responsibility for maintenance and operation, including utilities and insurance, of the Project subject to the itemized responsibilities and/or exceptions noted below:

_____________________________________________________________

The University acknowledges receipt of the following closeout and transition materials:

☐ AS-BUILT DRAWINGS  ☐ O & M MANUALS  ☐ WARRANTY DOCUMENTS  ☐ COMPLETION OF TRAINING REQUIREMENTS

A list of items to be completed or corrected (Punch List) is attached hereto. The failure to include an item on it does not alter the responsibility of the Contractor to complete all the Work in accordance with the Contract Documents, including authorized changes thereof. The amount of $_____________ (twice the value of the punch list work) shall be retained to assure the completion of the punch list work.

The Contractor shall complete or correct the Work on the list of (Punch List) items appended hereto within __________ calendar days from the above date of issuance of this Certificate. If the list of items is not completed within the time allotted, the University has the right to be compensated for the delays and/or complete the work with the help of independent contractor at the expense of the retained project funds. If the retained project funds are insufficient to cover the delay/completion damages, the University shall be promptly reimbursed for the balance of the funds needed to compensate the University.

_____________________________________________________________

by: _________________________________________________________

CONTRACTOR (include name of firm) (Signature) DATE

_____________________________________________________________

by: _________________________________________________________

A/E (include name of firm) (Signature) DATE

_____________________________________________________________

by: _________________________________________________________

UNIVERSITY (Departmental Representative) (Signature) DATE

_____________________________________________________________

by: _________________________________________________________

UNIVERSITY (Facility Operations) (Signature) DATE

_____________________________________________________________

by: _________________________________________________________

UNIVERSITY (Project Manager) (Signature) DATE
SAMPLE PAST PERFORMANCE RATING EVALUATION

Date ____________________ Evaluator ____________________

Enter Today’s Date (mm dd, yyyy) Project Manager / Planner / F&E Coordinator)

Reference checked for ____________________

Name of A/E Firm or Contractor’s Company ____________________

Firm / Company Phone ____________________ Fax ____________________ Name of Contact Person for this Project ____________________

Enter Unifier Project Number ____________________ Name of this Project ____________________

Project Completion (mm / yyyy) $ ____________________ Final Agreement / Contract Amount ____________________ Evaluator’s Title ____________________

Rating Guideline

<table>
<thead>
<tr>
<th>QUALITY OF PRODUCT OR SERVICES</th>
<th>COST CONTROL</th>
<th>TIMELINESS OF PERFORMANCE</th>
<th>BUSINESS RELATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 - Exceptional</td>
<td>A/E / Contractor has demonstrated an exceptional performance level in any of the above four categories that justifies adding a point to the score. A/E’s / Contractor’s performance clearly exceeds the performance levels described as “Very Good”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 - Very Good</td>
<td>A/E / Contractor is in compliance with contract requirements and/or delivers quality service or product.</td>
<td>A/E / Contractor is effective in managing costs and submits current, accurate, and complete billings.</td>
<td>A/E / Contractor is effective in meeting milestones and delivery schedule.</td>
</tr>
<tr>
<td>3 - Satisfactory</td>
<td>Minor inefficiencies/errors have been identified.</td>
<td>A/E / Contractor is usually effective in managing cost.</td>
<td>A/E / Contractor is usually effective in meeting milestones and delivery schedules.</td>
</tr>
<tr>
<td>2 - Marginal</td>
<td>Major problems have been encountered.</td>
<td>A/E / Contractor is having major difficulty managing cost effectively.</td>
<td>A/E / Contractor is having major difficulty meeting milestones and delivery schedule.</td>
</tr>
<tr>
<td>1 - Unsatisfactory</td>
<td>A/E / Contractor is not in compliance and is jeopardizing achievement of contract objectives.</td>
<td>A/E / Contractor is unable to manage costs effectively.</td>
<td>A/E / Contractor delays are jeopardizing performance of contract objectives.</td>
</tr>
</tbody>
</table>

Rate the Following:

<table>
<thead>
<tr>
<th>Rating Guideline</th>
<th>Quality of Service or Product</th>
<th>Cost Control</th>
<th>Timeliness of Performance</th>
<th>Business Relations</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating 1 - 5 (5 = Highest)</td>
<td>Enter 1 - 5</td>
<td>Enter Comment(s) Justifying Rating of Quality of the End Product as Compared to Contract Requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter Comment(s) Justifying Rating of Effectiveness of Cost Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter Comment(s) Justifying Rating of Compliance to Contractual Milestones and Delivery Schedule</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enter Comment(s) Justifying Rating of Effectiveness of Response(s) to Technical / Service / Administrative Inquiries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERALL RATING</td>
<td>Enter 1 - 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HIGH TEMPERATURE WATER PLANT -
SEISMIC UPGRADE

UNIVERSITY PROJECT NUMBER 22210

SPECIFICATIONS

September 3, 2019

Prepared by

FFKR ARCHITECTS
730 Pacific Avenue
Salt Lake City, UT 84112

For

The University of Utah
U FACILITIES
V. Randall Turpin University Services Building
1795 E. South Campus Drive, Room 201
Salt Lake City, Utah 84112-9403
Phone (801) 581-4707
FAX (801) 581-6081
University of Utah
Building 303 Seismic Upgrade
Phase 1
U o U Project # 22210
Salt Lake City, Utah 84123

Specifications
BID SET

August 19, 2019
FFKR ARCHITECTS
# Table of Contents

## Division 00 – Procurement and Contracting Requirements

<table>
<thead>
<tr>
<th>Document</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 00 72</td>
<td>The University of Utah Facilities Management General Conditions</td>
</tr>
<tr>
<td>00 00 73</td>
<td>The University of Utah Facilities Management Supplemental Conditions for University of Utah Projects</td>
</tr>
<tr>
<td>00 00 73 19</td>
<td>Supplemental General Conditions for Health Insurance</td>
</tr>
<tr>
<td>00 00 73 84</td>
<td>Supplemental General Conditions Regarding Illegal Immigration</td>
</tr>
<tr>
<td>00 00 73 85</td>
<td>Supplemental General Conditions for Construction Agreements</td>
</tr>
<tr>
<td>00 00 73 87</td>
<td>Supplemental General Conditions for Drug and Alcohol Testing Design and/or Construction Contracts</td>
</tr>
</tbody>
</table>

## Division 01 - General Requirements

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 23</td>
<td>Alternates</td>
</tr>
<tr>
<td>01 45</td>
<td>Quality Control</td>
</tr>
<tr>
<td>01 56 39</td>
<td>Temporary Tree and Plant Protection</td>
</tr>
<tr>
<td>01 57</td>
<td>Temporary Controls</td>
</tr>
<tr>
<td>01 66</td>
<td>Product Storage and Production</td>
</tr>
<tr>
<td>00 00 71</td>
<td>Mobilization and Demobilization</td>
</tr>
<tr>
<td>01 71</td>
<td>Construction Layout</td>
</tr>
<tr>
<td>01 71 34</td>
<td>Survey Referencing</td>
</tr>
<tr>
<td>01 73</td>
<td>Cutting and Patching</td>
</tr>
<tr>
<td>01 74</td>
<td>Progress Cleaning</td>
</tr>
<tr>
<td>01 75</td>
<td>Startup Procedures</td>
</tr>
<tr>
<td>01 78 39</td>
<td>Project Record Documents</td>
</tr>
<tr>
<td>01 78 50</td>
<td>Closeout Procedures</td>
</tr>
</tbody>
</table>

## Division 02 – Existing Conditions

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02 22</td>
<td>Excavating and Compacting for Electrical Systems</td>
</tr>
<tr>
<td>02 41 13</td>
<td>Selective Site Demolition</td>
</tr>
<tr>
<td>02 41 14</td>
<td>Pavement Removal</td>
</tr>
<tr>
<td>02 41 15</td>
<td>Curb and Trip Hazard Removal</td>
</tr>
<tr>
<td>02 58 20</td>
<td>Underground Duct Bank</td>
</tr>
</tbody>
</table>

## Division 03 – Concrete

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03 11</td>
<td>Concrete Forming</td>
</tr>
<tr>
<td>03 20</td>
<td>Concrete Reinforcing</td>
</tr>
<tr>
<td>03 30 04</td>
<td>Concrete</td>
</tr>
<tr>
<td>03 30 05</td>
<td>Concrete Testing</td>
</tr>
<tr>
<td>03 30 10</td>
<td>Concrete Placement</td>
</tr>
<tr>
<td>03 31 00</td>
<td>Cast in Place Concrete for Electrical</td>
</tr>
<tr>
<td>03 35</td>
<td>Concrete Finishing</td>
</tr>
<tr>
<td>03 39</td>
<td>Concrete Curing</td>
</tr>
<tr>
<td>03 40</td>
<td>Precast Concrete</td>
</tr>
<tr>
<td>03 61 00</td>
<td>Cementitious Grouting</td>
</tr>
</tbody>
</table>
DIVISION 22 – PLUMBING
Section 22 10 00 Plumbing Piping

DIVISION 26 – ELECTRICAL
Section 26 00 10 Common Work Results for Electrical

DIVISION 31 – EARTHWORK
Section 31 05 10 Boundary Markers and Survey Monuments
Section 31 05 13 Common Fill
Section 31 11 00 Site Clearing
Section 31 23 16 Excavation
Section 31 23 23 Backfilling for Structures
Section 31 23 26 Compaction
Section 31 41 00 Shoring

DIVISION 32 – EXTERIOR IMPROVEMENTS
Section 32 01 91 Tree Root Cutting
Section 32 05 10 Backfilling Roadways
Section 32 11 23 Aggregate Base Courses
Section 32 12 03 Asphalt Binders
Section 32 16 13 Driveway, Sidewalk, Curb, Gutter
Section 32 91 15 Soil Preparation (Performance Specification)
Section 32 91 19 Landscape Grading
Section 32 93 00 Plants

DIVISION 33 – UTILITIES
Section 33 05 07 Polyvinyl Chloride Pipe
Section 33 05 14 Utility Grade Adjustment
Section 33 05 20 Backfilling Trenches
Section 33 12 16 Water Valves
Section 33 12 33 Water Meter
Section 33 13 00 Disinfection
Section 33 41 00 Drainage Systems
# GENERAL CONDITIONS

August 27, 2010

## Table of Contents

### ARTICLE 1. GENERAL PROVISIONS.

1.1 Basic Definitions.

### ARTICLE 2. THE UNIVERSITY.

2.1 Information and Services Required of the University.
   2.1.1 University's Representative.
   2.1.2 Specialists and Inspectors.
   2.1.3 Surveys and Legal Description.
   2.1.4 Prompt Information and Services.
   2.1.5 Copies of Drawings and Project Manuals (For Construction).

2.1.6 Other Duties.

2.2 Construction By the University or By Separate Contractors
   2.2.1 University's Right To Perform Construction and to Award Separate Contracts.
       (1) In General.
       (2) Coordination and Revisions.

2.2.2 Mutual Responsibility.
   (1) Contractor Coordination.
   (2) Reporting Problems to the University.
   (3) Costs.
   (4) Contractor Remedial Work.

### ARTICLE 3. A/E

3.1 A/E's Administration of the Contract.
   3.1.1 In General.
   3.1.2 Site Visits.
   3.1.3 Communications Facilitating Contract Administration.
   3.1.4 A/E May Reject Work, Order Inspection, Tests.
   3.1.5 A/E Review Contractor's Submittals.

### ARTICLE 4. CONTRACTOR

3.2 Ownership and Use of A/E's Drawings, Specifications and Other Documents.

4.1 Review of Contract Documents and Field Conditions By Contractor.
   4.1.1 Reviewing Contract Documents, Information, Reporting Errors, Inconsistencies or Omissions.

4.1.2 Field Conditions.

4.1.3 Perform in Accordance with Contract Documents and Submittals.

4.1.4 Performance to Produce the Complete System and Intended Results.

4.1.5 Intent and Hierarchy.

4.1.6 Dividing Work and Contractor Representation.

4.1.7 Planning and Priority.

4.2 Supervision and Construction Procedures.
   4.2.1 Supervision and Control.
   4.2.2 Responsibility.
   4.2.3 Not Relieved of Obligations.
   4.2.4 Inspections and Approvals.

4.3 Labor and Materials.
   4.3.1 Payment by Contractor.
   4.3.2 Discipline and Competence.

4.4 Taxes and Other Payments to Government.

4.5 Permits, Fees, Notices, Labor and Materials.
   4.5.1 Permits and Fees.
   4.5.2 Compliance With Public Authorities, Notices.
   4.5.3 Correlation of Contract Documents and Enactments.
   4.5.4 Failure to Give Notice.

4.6 Superintendent.
4.7 Time and Contractor's Construction Schedules.
4.7.1 Progress and Completion.
   (1) Time Is of the Essence; Complete Within Contract Time.
   (2) Notice to Proceed and Insurance.

4.7.2 Schedule Preparation.
4.7.3 Initial Contract Time.
4.7.4 Interim Completion Dates and Milestones.
4.7.5 Schedule Content Requirements.
4.7.6 University's Right to Take Exceptions.

4.7.7 Float Time.
4.7.8 Initial Schedule Submission.
4.7.9 Updates.
4.7.10 Schedule of Submittals.
4.7.11 Schedule Recovery.
4.7.12 Schedule Changes and Modifications
   (1) Contract Time Change Requires Modification.
   (2) Contractor Reordering, Re-sequeencing and Changing Activity Durations.
   (3) Changes In Contract Time.

4.7.13 Excusable Delay.
   (1) In General.
   (2) Weather-Related Excusable Delays.

4.7.14 Compensable Delay, Suspension or Interruption.
   (1) Basic Conditions.
   (2) Compensable Delay Formula.
   (3) Period of Compensable Delay, Suspension or Interruption
   (4) Concurrent Delay.

4.7.15 Time Extension Requests.
4.7.16 Liquidated Damages.
   (1) In General.
   (2) No Waiver of University's Rights.

4.8 Documents and Samples at the Site, Certifying "As-Built".

4.9 Shop Drawings, Product Data and Samples.
4.9.1 Not Contract Documents.
4.9.2 Promptness.
4.9.3 Not Perform Until A/E Approves.
4.9.4 Representations by Contractor.
4.9.5 Contractor's Liability.

4.9.6 Direct Specific Attention to Revisions.
4.9.7 Informational Submittals.
4.9.8 Reliance on Professional Certification.

4.10 Use of Site.
4.10.1 In General.
4.10.2 Access to Neighboring Properties.

4.11 Access to Work.
4.12 Royalties and Patents.
4.13 Indemnification.
4.13.1 In General.

ARTICLE 5. SUBCONTRACTORS.

5.1 Award of Subcontracts and Other Contracts For Portions of the Work.
   5.1.1 Approval Required.
   5.1.2 Business and Licensing Requirements.
   5.1.3 Subsequent Changes.
   5.1.4 Bonding of Subcontractors.

5.2 Subcontractual Relations.
   5.2.1 Comply With Contract Documents.
   5.2.2 Rights.
   5.2.3 Sub-Subcontractors.
   5.2.4 Document Copies.

5.3 Contingent Assignment of Subcontracts.
   5.3.1 Conditions for Assignment to the University.

ARTICLE 6. PROTECTION OF PERSONS AND PROPERTY.

6.1 Safety of Persons and Property.
   6.1.1 Contractor Responsibility.
   6.1.2 Safety Program, Precautions.
   6.1.3 Compliance With Laws.
   6.1.4 Erect and Maintain Safeguards.
   6.1.5 Utmost Care.
   6.1.6 Prompt Remedy.
   6.1.7 Safety Designee.
   6.1.8 Load Safety.
   6.1.9 Off-Site Responsibility.
   6.1.10 Emergencies.

6.3 Historical and Archeological Considerations.
6.4 Contractor Liability.

ARTICLE 7. MODIFICATIONS, REQUESTS FOR INFORMATION, PROPOSED CHANGE ORDER, PRELIMINARY RESOLUTION EFFORTS AND CLAIMS PROCESS.

7.1 Modifications: In General.
   7.1.1 Types of Modifications and Limitations.
   7.1.2 By Whom Issued.
7.1.3 Contractor to Proceed Unless Otherwise Stated.
7.1.4 Adjusting Unit Prices.
7.1.5 Special Notices Required In Order To Be Eligible For Any Contract Modification.
   (1) Concealed or Unknown Conditions.
   (2) Increase in Contract Time.
7.2 Contractor Initiated Requests.
7.2.1 The Request for Information, RFI, Process and Time to File.
7.2.2 Proposed Change Order (“PCO”).
7.3 Proposal Request Initiated by the University.
7.3.1 If Agreement, Change Order Issued.
7.3.2 If Disagreement.
7.4 Evaluation of Proposal For Issuing Change Orders.
7.4.1 Adjusting Sum Based Upon Agreement.
7.4.2 University Resolution of Sum and Standards in the Absence of an Agreement Under Paragraph 7.4.1.
7.4.3 Credits.
7.5 Construction Change Directives.
7.5.1 When Used and Contractor’s Right to Challenge.
7.5.2 Proceed With Work and Notify the University About Adjustment Method.
7.5.3 Interim Payments by the University.
7.6 A/E’s Supplemental Instruction
7.7 Procedure For Preliminary Resolution Efforts.
7.7.1 Request For Preliminary Resolution Effort (Pre).
7.7.2 Time For Filing.
7.7.3 Content Requirement.
7.7.4 Supplementation.
7.7.5 Subcontractors.
7.7.6 Pre Resolution Procedure.
7.7.7 Contractor Required to Continue Performance.
7.7.8 Decision.
7.7.9 Decision Final Unless Claim Submitted.
7.7.10 Extension Requires Mutual Agreement.
7.7.11 If Decision Not Issued.
7.7.12 Payment for Performance.
7.8 Resolution of Claim.
7.8.1 Claim.
7.8.2 Subcontractors.
7.8.3 Time for Filing.
7.8.4 Content Requirement.
7.8.5 Extension of Time to Submit Documentation.
7.8.6 Contractor Required to Continue Performance.
7.8.7 Agreement of Claimant on Method and Person(s) Evaluating the Claim.
7.8.8 The Evaluation Process, Timeframes of Evaluator(s), Director’s Determination, Administrative Appeal to the Executive Director and Judicial Review.
7.8.9 Appeal Process Prerequisite for Further Consideration or Judicial Review.
7.9 Payment of Claim.
7.10 Allocation of Costs of Claim Resolution Process.
7.11 Alternative Procedures.
7.12 Impact on Future Selections.
7.13 Report to Building Board.
7.14 University’s Right to Have Issues, Disputes or Claims Considered

ARTICLE 8. PAYMENTS AND COMPLETION:
8.1 Schedule of Values.
8.2 Applications for Payment.
8.2.1 In General.
8.2.2 Payment for Material and Equipment.
8.2.3 Warranty of Title.
8.2.4 Holdback by the University.
8.3 Certificates for Payment.
8.3.1 Issued by A/E.
8.3.2 A/E’s Representations.
8.4 Decisions to Withhold Certification.
8.4.1 When Withheld.
8.4.2 Certification Issued When Reasons For Withholding Removed.
8.4.3 Continue Work Even if Contractor Disputes A/E’s Determination.
8.4.4 University Not in Breach.
8.5 Progress Payments.
8.5.1 In General, Interest on Late Payments.
8.5.2 Contractor and Subcontractor Responsibility.
8.5.3 Information Furnished by A/E or University to Subcontractor.
8.5.4 University and A/E Not Liable.
8.5.5 Certificate, Payment or Use Not Acceptance of Improper Work.
8.6 Payment Upon Substantial Completion.
8.7 Partial Occupancy or Use.
8.7.1 In General.
8.7.2 Inspection.
8.7.3 Not Constitute Acceptance.
8.8 Final Payment.
8.8.1 Certificate for Payment.
8.8.2 Conditions for Final Payment.
8.8.3 Waiver of Claims: Final Payment.
8.8.4 Delays Not Contractor's Fault.
8.8.5 Waiver by Accepting Final Payment.

ARTICLE 9. TESTS AND INSPECTIONS, SUBSTANTIAL AND FINAL COMPLETION, UNCOVERING, CORRECTION OF WORK AND GUARANTY PERIOD.
9.1 Tests and Inspections.
9.1.1 In General.
9.1.2 Inspectors to Leave Property.
9.1.3 Nonconforming Work.
9.1.4 Certificates.
9.1.5 A/E Observing.
9.1.6 Promptness.
9.2 Inspections: Substantial and Final.
9.2.1 Substantial Completion Inspection.
9.2.2 Final Completion Inspection.
9.3 Uncovering of Work.
9.3.1 Uncover Un-inspected Work.
9.3.2 Observation Prior to Covering.
9.3.3 When an Inspector Fails to Appear or A/E or the University Did Not Make Prior Request.
9.4 Correction of Work and Guaranty Period.
9.4.1 Contractor Correct the Work.
9.4.2 Guaranty and Correction After Substantial Completion.
9.4.3 Removal of Work.
9.4.4 Not Limit Other Obligations.
9.5 Additional Warranties.
9.5.1 In General.
9.5.2 Exclusion.
9.5.3 Furnish Evidence on Request.
9.6 Acceptance of Nonconforming Work.

ARTICLE 10. INSURANCE AND BONDS.
10.1 Liability Insurance.
10.1.1 In General.
10.1.2 Configurations.
10.1.3 Contractor Liability.
10.1.4 Certificate, Notice Requirements, Additional Insured.
10.1.5 Deductible Liability.
10.1.6 Additional Requirements.
10.2 "Builder's Risk" Property Insurance.
10.2.1 In General.
10.2.2 Inspections, Recommendations.
10.2.3 Deductible.
10.2.4 Adjusted With and Payable to Risk Manager as Trustee.
10.2.5 Waiver.
10.2.6 Special Hazards.

ARTICLE 11. MISCELLANEOUS PROVISIONS.
11.1 A/E's Responsibilities.
11.2 Successors and Assigns.
11.3 Written Notice.
11.3.1 Personal Delivery and Registered or Certified Mail.
11.3.2 Fax.
11.4 Rights and Remedies.
11.4.1 Not Limit.
11.4.2 Not Waiver.
11.5 Commencement of Statutory Limitation Period.
11.5.1 Before Substantial Completion.
11.5.2 Between Substantial Completion and Final Certification for Payment.
11.5.3 After Final Certification for Payment.
11.5.4 Exception.
11.6 Not Discriminate, No Sexual Harassment.
11.7 Applicable Laws.
11.8 Interpretation.
11.9 Venue.
11.10 Severability.
11.11 Construction of Words.
11.12 No Third Party Rights.

ARTICLE 12. TERMINATION OR SUSPENSION OF THE CONTRACT.
12.1 Termination by Contractor.
12.1.1 In General.
12.1.2 Notice.
12.2 Termination by the University for Cause.
12.2.1 In General.
12.2.2 University's Right to Carry Out the Work.
12.2.3 Items Required to Be Transferred or Delivered.
12.2.4 Payment.
12.2.5 University Protection if Liable.
12.2.6 Credits and Deficits.
12.2.7 If Contractor Found Not in Default or Excusable.
12.2.8 Rights and Remedies Not Exclusive.
12.3 Suspension, Delay or Interruption of Work By the University for Convenience.
12.3.1 By University in Writing.
12.3.2 Time Period for Claims.
12.3.3 Adjustments.
12.4 Termination for Convenience of the University.
   12.4.1 In General.
   12.4.2 Contractor Obligations.
   12.4.3 Termination Claim.
   12.4.4 Agreed Upon Payment.
   12.4.5 Payment Not Agreed Upon.

12.5 University’s Right to Stop the Work.

12.6 Deductions.
12.7 Partial Termination.
12.8 Partial Payments.
12.9 Preserve and Make Available Records.
ARTICLE 1. GENERAL PROVISIONS.

1.1 BASIC DEFINITIONS.

A/E. (including all design professionals). "A/E" means the person lawfully licensed to practice architecture or engineering or an entity lawfully practicing architecture or engineering identified as such in the A/E's Agreement and is referred to throughout the Contract Documents as if singular in number. The term "A/E" also means the A/E's representative and its subconsultants. When these General Conditions are part of a Contract in which the design professional is an interior designer, landscape subconsultant or other design professional, the term "A/E" as used in these General Conditions shall be deemed to refer to such design professional. A license is not required when the type of design professional is one which is not subject to a professional license, but such professional must meet the prevailing standards in the State of Utah for such practice. For projects where there is no A/E hired by the University, the references in the General Conditions to A/E shall be deemed to refer to the University or University of Utah Facilities Management as may be practicably applied.

ADDENDA. "Addenda" means the written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the bidding documents or the Contract Documents.

ASI. "ASI" shall mean a Supplemental Instruction issued by the A/E to the Contractor which may result in clarifications or minor changes in the Work and does not affect the contract time or the contract amount.

ASSOCIATE VICE PRESIDENT / FACILITIES MANAGEMENT or AVP-FM. "Associate Vice President / Facilities Management" (hereinafter referred to as "AVP-FM") means the University of Utah administrative officer with oversight responsibility for the planning, design, construction, maintenance and operation of campus facilities. AVP-FM may include a designee selected by the AVP-FM for the particular function referred to in the General Conditions.

BID. "Bid" means the offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

BONDS. "Bonds" mean the bid bond, performance and payment bonds and other instruments of security.

CHANGE ORDER. "Change Order" means a written instrument signed by the University and Contractor, stating their agreement for changes of the Contract as specified on the required University change order form.

CLAIM. "Claim" means a dispute, demand, assertion or other matter submitted by the Contractor, including a Subcontractor at any tier subject to the provisions of these General Conditions. The claimant may seek, as a matter of right, modification, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. A request for Preliminary Resolution Effort (PRE) shall not be considered a "Claim." A requested amendment, requested change order, or a
Construction Change Directive (CCD) is not a PRE or Claim unless agreement cannot be reached and the procedures of these General Conditions are followed.

CONSTRUCTION CHANGE DIRECTIVE. A "Construction Change Directive" means a written order signed by the University, directing a change in the Work and stating a proposed basis for adjustment, if any, in the Contract Sum or Contract Time, or both. The University may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions; even if it may impact the Contract Sum and Contract Time.

CONTRACT. The Contract Documents form the Contract for Construction. The term "Contract" represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the A/E and Contractor, (2) between the University and a Subcontractor or (3) between any persons or entities other than the University and Contractor.

CONTRACT DOCUMENTS. The term "Contract Documents" means the Contractor's Agreement between the University and Contractor (hereinafter referred to as "Contractor's Agreement"), the Conditions of the Contract (General, Supplementary and other Conditions), the Drawings, Specifications, Addenda, other documents listed in the Contractor's Agreement and Modifications issued after execution of the Contractor's Agreement. The Contract Documents shall also include the bidding/proposal documents, including the Instructions to Bidders/Proposers, Notice to Contractors and the Bid/Proposal Form, to the extent not in conflict with the other above-stated Contract Documents and other documents and oral presentations as part of the Selection which are documented as an attachment to the Contract.

CONTRACT SUM. The term "Contract Sum" means the Contract Sum as stated in the Contractor's Agreement and, including authorized and signed adjustments to this agreement (modifications), is the total amount payable by the University to the Contractor for performance of the Work under the Contract Documents.

CONTRACT TIME. "Contract Time", unless otherwise provided in the Contract Documents, means the period of time, including authorized and signed adjustments (modifications), stated in the Contract Documents for Substantial Completion of the Work.

CONTRACTOR. The Contractor is the person or entity identified as such in the Contractor's Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative. When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case, shall mean the Contractor who executes each separate Contractor Agreement.

CONTRACTOR'S AGREEMENT. "Contractor's Agreement" means, unless the context requires otherwise, the agreement executed by the Contractor and the University for the Project.

DAY. The term "day" or "days" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

DEFECTIVE. "Defective" is an adjective which when modifying the word "Work" refers to Work that does not conform to the Contract Documents, or does not meet the requirements of any inspection, referenced standard, code, test or approval referred to in the Contract Documents, or has been damaged.

DIRECTOR. "Director" means the University of Utah Facilities Management Director of Campus Design & Construction unless the context requires otherwise. Director may
include a designee selected by the Director for the particular function referred to in the General Conditions.

DFCM. "DFCM" means the Division of Facilities Construction and Management established pursuant to Utah Code Annotated Section 63A-5-201 et seq.

DRAWINGS. The "Drawings" are the graphic and pictorial portions of the Contract Documents, wherever located and whenever issued, showing the design, location and dimensions of the Work, and generally include the drawings, elevations, sections, details, schedules and diagrams.

INSPECTION. The word "inspection" or its derivatives shall mean a review of the Project, including but not limited to a visual review of the Work completed to date to ascertain if the Work is in accordance with the Contract Documents, including all applicable building codes and construction standards.

MODIFICATION. A "Modification" is (1) a Change Order (2) Construction Change Directive or (3) ASI. The Contract may be amended or modified only by (1) a written amendment executed by both the University and Contractor, or (2) by a Modification.

NOTICE TO PROCEED. A "Notice to Proceed" is a document prepared by the University and by its terms authorizes the Contractor to commence Work on the Project. It is deemed issued upon being sent by the University to the Contractor's specified address within the bid or proposal.

PARTIAL USE. "Partial Use" means placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion for all the Work. This partial use does not constitute "substantial completion".

PRELIMINARY RESOLUTION EFFORT. "Preliminary Resolution Effort" or "PRE" means the processing of a request for preliminary resolution or any similar notice about a problem that could potentially lead to a Claim and is prior to reaching the status of a Claim.

PRODUCT DATA. "Product Data" means illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

PROJECT. The "Project" means the total construction of the Work performed under the Contract Documents.

PROJECT MANUAL (FOR CONSTRUCTION). The "Project Manual" is the volume assembled for the Work and may include the bidding/proposal requirements, sample forms, General or Supplementary Conditions of the Contract and Specifications.

PROPOSAL REQUEST OR "PR." A "Proposal Request" or "PR" is a proposal request filed with the Contractor for the purposes of seeking a proposal in order to resolve an issue as part of the Change Order or Contract Modification process.

PROPOSED CHANGE ORDER. A "Proposed Change Order" ("PCO"), is an informal request by the Contractor filed with the University Representative, in an effort to commence the Contract Modification Process. It shall not be considered a "PRE" or a "Claim." The PCO may be related to any potential, or actual delay, disruption, unforeseen condition or materials or any other matter in which the Contractor intends to seek additional monies or time.

REQUEST FOR INFORMATION or RFI. A "Request for Information" or "RFI" is a request filed by the Contractor with the A/E regarding any request for information, direction or clarification related to the Contract Documents, plans or specifications.

RESOLUTION OF THE CLAIM. "Resolution of the Claim" means the final resolution of the Claim by the Director, but does
not include any administrative appeal, judicial review or judicial appeal thereafter.

RULE. “Rule,” unless the context requires otherwise, shall mean a Rule of the Utah Administrative Code.

SALES TAX and/or USE TAX. Sales Tax and/or Use Tax, unless the context requires otherwise, shall mean the sales tax and/or use tax collected or to be collected by the Utah State Tax Commission and shall include any sales and/or use tax that the Utah State Tax Commission collects on behalf of any special district, local government or political subdivision.

SAMPLES. “Samples” mean physical examples, which illustrate materials, equipment or workmanship and establishes standards by which the Work will be judged.

SHOP DRAWINGS. "Shop Drawings" means drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

SPECIFICATIONS. The "Specifications" are that portion of the Contract Documents consisting of the written requirements for materials, equipment, construction systems, standards, installation and workmanship for the Work, and performance of related systems and services.

SUBCONTRACTOR. “Subcontractor” means the person or entity that has a direct contract with the Contractor, including any trade contractor or specialty contractor, or with another Subcontractor at any tier to provide labor or materials for the work but does not include suppliers who provide only materials, equipment or supplies to a contractor or subcontractor. Notwithstanding the foregoing, the text in which the term is used may provide for the exclusion of Subcontractors of other Subcontractors or the exclusion of suppliers. The term “Subcontractor” is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or authorized representative of the Subcontractor. The Term “Subcontractor” does not include a separate contractor or subcontractors of a separate contractor.

SUBSTANTIAL COMPLETION. "Substantial Completion" is the date certified in accordance with Article 9.2 and means the date the Work or designated portion thereof is sufficiently complete, and any lack of completion or performance does not reasonably interfere with the University’s intended use of the Project, in accordance with the Contract Documents so that the University can occupy and use the Work for its intended use. University’s “intended use” or “occupy” as used in this definition, shall include any intended use or occupation by any agency or entity for which the University has intended to so occupy the Project.

SUPPLEMENTAL CONDITIONS OR SUPPLEMENTAL GENERAL CONDITIONS. “Supplementary Conditions,” “Supplemental Conditions” or "Supplemental General Conditions" means the part of the Contract Documents which amends or supplements these General Conditions.

UNIVERSITY OF UTAH or UNIVERSITY. “University of Utah” (hereinafter referred to as “the University”) means an institution of higher education located in Salt Lake City, Utah, a body politic and corporate of the State of Utah. Unless the context requires otherwise, “the University,” as represented by the University of Utah Facilities Management is the “Owner” as that term is commonly referred to in the construction industry.

UNIVERSITY REPRESENTATIVE or PROJECT MANAGER. “University Representative” means the University of Utah Facilities Management person directly assigned to work with the Contractor on a regular basis. Unless the context requires otherwise, the “University Representative” is the “University Project Manager.”
WORK. The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment and services provided, or to be provided, by the Contractor to fulfill the Contractor's obligations.

ARTICLE 2. THE UNIVERSITY.

2.1 INFORMATION AND SERVICES REQUIRED OF THE UNIVERSITY.

2.1.1 UNIVERSITY'S REPRESENTATIVE. The University shall designate a University Representative authorized to act in the University's behalf with respect to the Project. The University or such authorized representative shall render decisions within a reasonable time pertaining to documents submitted by the A/E and/or Contractor in order to avoid a compensable delay in the orderly and sequential progress of the Project.

2.1.2 SPECIALISTS AND INSPECTORS. The University will provide certified building inspection services in accordance with the adopted Building Codes. This includes 'routine' and 'special' inspections unless otherwise noted in the A/E Agreement. The University may assign an inspector or specialist to note deviations from, or necessary adjustments to, the Contract Documents or to report deficiencies or defects in the Work. The inspector or specialist's activities in no way relieves the Contractor of the responsibilities set forth in the Contract Documents.

2.1.3 SURVEYS AND LEGAL DESCRIPTION. The University shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall review this information, including the surveys and any provided soils tests, and compare such information with observable physical conditions and the Contract Documents.

2.1.4 PROMPT INFORMATION AND SERVICES. Upon receipt of a written request from the Contractor, the University shall furnish information or services under the University's control with reasonable promptness to avoid delay in the orderly progress of the Work.

2.1.5 COPIES OF DRAWINGS AND PROJECT MANUALS (FOR CONSTRUCTION). Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals (for construction) as are reasonably necessary for execution of the Work.

2.1.6 OTHER DUTIES.
The foregoing is in addition to other duties and responsibilities of the University enumerated herein and especially those in respect to Article 2.2 (Construction by the University or by Separate Contractors), Article 8 (Payments and Completion) and Article 10 (Insurance and Bonds).

2.2 CONSTRUCTION BY THE UNIVERSITY OR BY SEPARATE CONTRACTORS.

2.2.1 UNIVERSITY'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS.

(1) IN GENERAL. The University reserves the right to perform construction or operations related to the Project with the University's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation.

(2) COORDINATION AND REVISIONS. The University shall provide for coordination of the activities of the University's own forces and of each separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with
other separate contractors and the University in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule and Contract Sum deemed necessary after a joint review and agreement by the University. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the University until subsequently revised.

2.2.2 MUTUAL RESPONSIBILITY.

(1) CONTRACTOR COORDINATION. The Contractor shall afford the University and separate contractor(s) a reasonable opportunity for delivery and storage of their materials and equipment and performance of their activities and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

(2) REPORTING PROBLEMS TO THE UNIVERSITY. If part of the Contractor's Work depends on work by the University or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report in writing to the University apparent defects in workmanship that would render it unsuitable for proper execution. Failure of the Contractor to make said report shall constitute an acknowledgment that the University's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects in workmanship not then reasonably discoverable.

(3) COSTS. Costs caused by delays or by improperly timed activities or defective construction shall be borne by the responsible party in accordance with the procedures and provisions of the Contract Documents.

(4) CONTRACTOR REMEDIAL WORK. The Contractor shall promptly remedy damage caused by the Contractor to completed or partially completed Work or to property of the University or separate contractors and subcontractors as provided in Article 6.

ARTICLE 3. A/E.

3.1 A/E'S ADMINISTRATION OF THE CONTRACT.

3.1.1 IN GENERAL. The A/E assists the University with the administration of the Contract as described in the Contract Documents. The A/E shall have the authority to act on behalf of the University only to the extent provided in the Contract Documents or A/E's Agreement.

3.1.2 SITE VISITS.

(1) Site visits or inspections by the A/E, the University or any University representative shall in no way limit or affect the Contractor's responsibility to comply with all the requirements and the overall design concept of the Contract Documents as well as all applicable laws, statutes, ordinances, resolutions, codes, rules, regulations, orders and decrees.

(2) WRITTEN REPORT. The A/E shall promptly submit to the University a written report subsequent to each site visit.

3.1.3 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION. Except as authorized by the University Representative or as otherwise provided in the Contract Documents, including these General Conditions, the A/E and Contractor shall communicate through the University Representative on issues regarding the timing of the Work, cost of the Work or scope of the Work. Contractor shall comply with communication policies agreed upon at any pre-construction meeting with the University. Communications by and with the A/E subconsultants shall be through the A/E. Communications by and with Subcontractors shall be through the Contractor. Communications by and with separate contractors shall be through the University.
3.1.4 A/E MAY REJECT WORK, ORDER INSPECTION, TESTS. The A/E shall have the responsibility and authority to reject Work which, based upon the A/E’s knowledge or what may be reasonably inferred from the A/E’s site observations and review of data, does not conform to the Contract Documents. Whenever the A/E considers it necessary or advisable for implementation of the intent of the Contract Documents, the A/E shall have the responsibility and authority to require additional inspections or testing of the Work in accordance with the provisions of the Contract Documents, whether or not such Work is fabricated, installed or completed, provided, however, the A/E must obtain the University’s prior written approval of any such additional inspections or testing. However, neither this authority of the A/E nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the A/E to the Contractor, Subcontractors, their agents or employees or other persons performing portions of the Work, including separate contractors. If the Contractor disputes the rejection of any Work and the correction thereof shall involve additional cost or time, it shall be the University’s option to accept such Work whether it be conforming or nonconforming.

3.1.5 A/E REVIEW CONTRACTOR’S SUBMITTALS.

(1) Contractor shall submit shop drawings, product data, and samples and other submittals required by the Contract Documents to the A/E as required by the approved submittal schedule.

(2) The A/E shall review and approve or take other appropriate action upon Contractor’s submittals such as Shop Drawings, Product Data and Samples, but only for the purpose of checking for conformance with the information and design concepts expressed in the Contract Documents. A/E action taken on a submittal shall not constitute a Modification of this Agreement.

(3) The A/E’s action shall be taken no later than 15 days following A/E’s receipt of the submittal, unless agreed to otherwise by Contractor and the University, in order to avoid a delay in the Work of the Contractor or of separate contractors while allowing sufficient time in the A/E’s professional judgment to permit adequate review.

(4) Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents.

(5) The A/E’s review of the Contractor’s submittals shall not relieve the Contractor of the obligations under the Contract Documents.

(6) The A/E’s review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the A/E, of any construction means, methods, techniques, sequences or procedures.

(7) The A/E’s approval of a specific item shall not indicate approval of an assembly of which the item is a component.

(8) When professional certification of performance characteristics of materials, systems or equipment is required by the Contract Documents, the A/E shall be entitled to rely upon such certifications to establish that the materials systems or equipment will meet the performance criteria required by the Contract Documents.

3.2 OWNERSHIP AND USE OF A/E’S DRAWINGS, SPECIFICATIONS AND OTHER DOCUMENTS.

All Drawings, Specifications and other documents prepared by the A/E are and shall remain the property of the University, and the University shall retain all common law, statutory
and other reserved rights with respect thereto. Said documents were prepared and are intended for use as an integrated set for the Project which is the subject of this Contractor's Agreement. The Contractor shall not modify or use Contract Documents on any other project without the prior written consent of the University and A/E. Any such non-permissive use or modification, by Contractor, the Contractor's Subcontractors at any tier or anyone for whose acts the Contractor is liable, shall be at Contractor's sole risk. Contractor shall hold harmless and indemnify the University from and against any and all claims, actions, suits, costs, damages, loss, expenses and attorney fees arising out of such non-permissive use or modification by the Contractor. The Contractor and Subcontractors are granted a limited license to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the A/E appropriate to and for use in the execution of their Work under the Contract Documents. All copies under this license shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the A/E. Submittals or distributions necessary to meet official regulatory requirements or for other purposes relating to completion of the Project are not to be construed as a publication in derogation of the University's copyright or other reserved rights.

ARTICLE 4. CONTRACTOR.

4.1 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR.

4.1.1 REVIEWING CONTRACT DOCUMENTS, INFORMATION, REPORTING ERRORS, INCONSISTENCIES OR OMISSIONS.
The Contractor shall carefully study and compare the Contract Documents with each other and with information furnished by the University pursuant to Article 2.1 hereinafter and shall at once report to the University and A/E errors, inconsistencies or omissions discovered. The Contractor shall not be liable to the University or A/E for damage resulting from errors, inconsistencies or omission in the Contract Documents, unless the Contractor recognized such error, inconsistency or omission or a Contractor of ordinary skill and expertise for the type of Work involved would have readily so recognized such error, inconsistency or omission, and the Contractor failed to report such to the University and A/E. If the Contractor performs any construction activity without such notice to the University and A/E and prior to the resolution of the errors, inconsistency or omission, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

4.1.2 FIELD CONDITIONS.
The Contractor shall take field measurements and verify field conditions and shall carefully compare such field measurements and conditions and other information known to the Contractor, or information which a Contractor of ordinary skill and expertise for the type of Work involved would have known, before commencing activities. Errors, inconsistencies or omissions discovered shall be reported to the University and A/E at once. If the Contractor performs any construction activity without such notice to the University and A/E and prior to the resolution of the error, inconsistency or omission, the Contractor shall assume appropriate responsibility for such performance and shall bear an appropriate amount of the attributable costs for correction.

4.1.3 PERFORM IN ACCORDANCE WITH CONTRACT DOCUMENTS AND SUBMITTALS.
The Contractor shall perform the Work in accordance with the Contract Documents and submittals approved in accordance with the Contract Documents.

4.1.4 PERFORMANCE TO PRODUCE THE COMPLETE SYSTEM AND INTENDED RESULTS. Performance by the Contractor shall be required to the extent consistent with the Contract Documents and reasonably inferable from the Contract.
4.1.5 INTENT AND HIERARCHY.
The Contract Documents should be read as a whole and wherever possible, the provisions should be construed in order that all provisions are operable. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complimentary, and what is required by one Document or provisions thereof shall be as binding as if required by all the Documents or provisions thereof. In case of an irreconcilable conflict between provisions within a Contract Document or between Contract Documents, the following priorities shall govern as listed below:

(1) A particular Modification shall govern over all Contract Document provisions or Modifications issued prior to said particular Modification.

(2) Attachments to the Contractor’s Agreement resulting from the Selection process including any management plan or documented interview information shall govern over addenda, the General Conditions, plans and specifications.

(3) A particular Addendum shall govern over all other Contract Document provisions issued prior to said particular Addendum. Subsequent Addenda shall govern over all prior Addenda.

(4) The Supplementary General Conditions shall govern over the General Conditions.

(5) These General Conditions shall govern over all other Contract Documents except for the Supplementary General Conditions, Addenda, Modifications and Attachments resulting from the selection process.

(6) The drawings and specifications shall not govern over any of the documents listed above.

(7) In case of a conflict or ambiguity within the same level of hierarchy of described documents, the University reserves the right to select the most stringent requirement unless the preponderance of the contract indicates the less stringent requirement.

4.1.6 DIVIDING WORK AND CONTRACTOR REPRESENTATION.
Organization of the specifications into divisions, sections and articles, and arrangement of Drawings, shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade. Contractor represents that the Subcontractors, Sub-subcontractors, manufacturers and suppliers engaged or to be engaged by it are and will be familiar with the requirements for performance by them of their obligations.

4.1.7 PLANNING AND PRIORITY.
The Contractor shall plan and schedule its work to facilitate the Project and shall maintain a work schedule to place proper priority to sequence work to complete the project timely.

4.2 SUPERVISION AND CONSTRUCTION PROCEDURES.

4.2.1 SUPERVISION AND CONTROL. The Contractor shall supervise and direct the Work, using the Contractor’s best skill and attention. The Contractor shall be solely responsible for and have control over the construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, except to the extent that the Contract Documents expressly and specifically state otherwise.

4.2.2 RESPONSIBILITY. The Contractor shall be responsible to the State of Utah and the University for acts and omissions of the Contractor's employees, Subcontractors, and their agents and employees, and other persons performing portions of the
Work under a contract with the Contractor or on behalf of the Contractor.

4.2.3 NOT RELIEVED OF OBLIGATIONS. The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the University or its agents in the University’s administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor or for those that the Contractor is liable.

4.2.4 INSPECTIONS AND APPROVALS.

(1) The Contractor is responsible for requesting inspections for various stages and portions of the Work required under the Contract Documents in a timely manner.

(2) If any of the Work is required to be inspected or approved by the terms of the Contract Documents by any public authority, the Contractor shall timely request such inspection or approval to be performed in accordance with Article 9. Except as provided in Article 9, work shall not proceed without any required inspection and the associated authorization to proceed. Contractor shall promptly notify the University if the inspector fails to appear at the site.

4.3 LABOR AND MATERIALS.

4.3.1 PAYMENT BY CONTRACTOR. Except to the extent it is otherwise stated in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipments, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities, supplies, consumables and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

4.3.2 DISCIPLINE AND COMPETENCE. The Contractor shall enforce strict discipline and good order among the Contractor’s employees, its Subcontractors, agents, representatives and other persons performing under the Contract Documents. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

4.4 TAXES AND OTHER PAYMENTS TO GOVERNMENT. The Contractor shall pay sales, consumer, use, employment-related and similar taxes related to the Work or portions thereof provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. The Contractor shall comply with the laws and regulations regarding the payment of Sales and/or Use Tax and any exemptions. The procurement documents may have a provision regarding specific items which are exempt from State of Utah Sales Tax and/or Use Tax. Any such exemption shall be used only for the items and the project specified in the procurement documents. Any such exemption does not apply to taxes levied by the federal government or any taxing entity outside of the State of Utah. If a Contractor properly relies upon a provision(s) of the bidding or proposal documents, and if State of Utah Sales and/or Use Tax subsequently becomes due, then the Contractor shall be paid such tax amount not included in the bid/proposal amount due to the reliance upon such provision.

4.5 PERMITS, FEES, NOTICES, LABOR AND MATERIALS.

4.5.1 PERMITS AND FEES. Unless required in the Supplementary General Conditions or an Addendum, it will not be necessary for the Contractor to obtain or pay for local building permits, plan check fees, electrical permits, plumbing permits, connection fees, or impact fees, nor will it be necessary to pay fees for inspections pertaining thereto.

4.5.2 COMPLIANCE WITH PUBLIC AUTHORITIES, NOTICES. The Contractor shall comply with and give notices required by laws, ordinances, resolutions, rules, regulations
and lawful orders of public authorities bearing on the performance of the Work.

4.5.3 CORRELATION OF CONTRACT DOCUMENTS AND ENACTMENTS. It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, resolutions, building codes, and rules and regulations. Notwithstanding this, if the Contractor observes, or if such is readily observable to a Contractor of ordinary skill and expertise for the type of Work involved, that a portion of the Contract Documents is at variance therewith, the Contractor shall promptly notify the A/E and the University in writing, and necessary changes shall be accomplished by appropriate Modification.

4.5.4 FAILURE TO GIVE NOTICE. If the Contractor, or any Subcontractor thereof performs Work without complying with the requirements of this Article 4.5 hereinabove, the Contractor shall assume appropriate responsibility for such Work and shall bear the appropriate amount of the attributable costs.

4.6 SUPERINTENDENT. The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

4.7 TIME AND CONTRACTOR'S CONSTRUCTION SCHEDULES.

4.7.1 PROGRESS AND COMPLETION.

(1) TIME IS OF THE ESSENCE; COMPLETE WITHIN CONTRACT TIME. Time is of the essence. By executing the Contractor's Agreement, the Contractor confirms that the Contract Time is adequate to perform the Work. The Contractor shall proceed expeditiously with adequate forces to achieve Substantial Completion within the Contract Time.

(2) NOTICE TO PROCEED AND INSURANCE. The Contractor shall not prematurely commence operations on the site or elsewhere prior to the issuance of a Notice to Proceed by the University or prior to the effective date of insurance required by Article 10 to be furnished by the Contractor, whichever is the latter.

4.7.2 SCHEDULE PREPARATION. The Contractor, promptly after being awarded the Contract, shall prepare and submit for the University’s and A/E’s review, a reasonably detailed CPM schedule for the Work. The schedule shall indicate the order, sequence, and interdependence of all items known to be necessary to complete the Work including construction, procurement, fabrication, and delivery of materials and equipment, submittals and approvals of samples, shop drawings, procedures, or other documents. Work items of the University, other Contractors, utilities and other third parties that may affect or be affected by the Contractor shall be included. If the University is required, by the Contract Documents, to furnish any materials, equipment, or the like, to be incorporated into the Work by the Contractor, Contractor shall submit, with the first schedule submittal, a letter clearly indicating the dates that such items are required at the Project Site. The critical path should be identified, including the critical paths for interim completion dates and milestones. The CPM schedule shall be developed using Primavera, MS Project, or Suretrack unless otherwise authorized by the University Representative. The Contractor's schedule shall be updated at least once a month and submitted with each pay request.

4.7.3 INITIAL CONTRACT TIME. Unless otherwise specified in the bidding documents, the initial Contract Time is the time identified in the Contractor's Agreement.
4.7.4 INTERIM COMPLETION
DATES AND MILESTONES. The schedule
must include contractually specified interim
completion dates and milestones. The milestone
completion dates indicated are considered
essential to the satisfactory performance of this
Contract and to the coordination of all Work on
the Project. The milestone dates listed are not
intended to be a complete listing of all Work
under this Contract or of interfaces with other
Project Contractors.

4.7.5 SCHEDULE CONTENT
REQUIREMENTS. The schedule shall
indicate an early completion date for the Project
that is no later than the Project's required
completion date. The schedule, including all
activity duration's shall be given in calendar
days. The Schedule shall also indicate all of the
following:

1. Interfaces with the work of
outside contractors (e.g., utilities, power and
with any separate Contractor);

2. Description of activity
including activity number/numbers;

3. Estimated duration time for
each activity;

4. Early start, late start, early
finish, late finish date, and
predecessor/successors including stop-start
relationships with lead and lag time for each
activity;

5. Float available to each path
of activities;

6. Actual start date for each
activity begun;

7. Actual finish date for each
activity completed;

8. The percentage complete of
each activity in progress or completed;

9. Identification of all critical
path activities;

10. The critical path for the
Project, with said path of activities being clearly
and easily recognizable on the time-scaled
network diagram. The path(s) with the least
amount of float must be identified. Unless
otherwise authorized by the University
Representative, no more than 40% of all
activities may be identified as critical path items.
The relationship between non-critical activities
and activities on the critical path shall be clearly
shown on the network diagram;

11. Unless otherwise authorized
by the University Representative, all activities
on the schedule representing construction on the
site may not have a duration longer than 14
days. Construction items that require more than
14 days to complete must be broken into
identifiable activities on the schedule with
durations less than 14 days. The sum of these
activities represents the total length required to
complete that construction item; and

12. Additional requirements as
specified in the Supplemental General
Conditions.

4.7.6 UNIVERSITY'S RIGHT TO
TAKE EXCEPTIONS. The University
reserves the right to take reasonable exception to
activity duration, activity placement,
construction logic or time frame for any element
of the Work to be scheduled.

4.7.7 FLOAT TIME. Float or slack
time is defined as the amount of time between
the earliest start date and the latest start date or
between the earliest finish date and the latest
finish date of a chain of activities on the
Schedule. By a proposal request or modification
delivered to the Contractor, the University has
the right to use the float time for non-critical
path activities until the Contractor has
reallocated such time on a newly submitted
schedule.

4.7.8 INITIAL SCHEDULE
SUBMISSION. No progress payments will be
approved until the Contractor has submitted a
Project detailed CPM schedule covering the first
90 days of the Work with a general CPM
schedule for the entire project. The detailed schedule for the entire project is to be completed prior to the second pay request unless otherwise authorized in writing by the University Representative.

4.7.9 UPDATES. Prior to any approval of a pay request, the University, A/E and Contractor shall review the Contractor's schedule compared to the Work completed. The University approves the amount of Work completed as supported by the schedule of values and as verified by the determination of Work completed. If necessary, the Contractor shall then update and submit to the University the schedule with the pay request; all of which in accordance with the University’s approval. All updates shall be provided in electronic and hard copy formats. At each scheduled meeting with the University Representative, the Contractor shall provide a "three week look ahead" with long lead items identified.

4.7.10 SCHEDULE OF SUBMITTALS. The Contractor shall prepare and keep current, for the A/E’s and University’s review, a schedule of submittals required under the Contract Documents which is coordinated with the Contractor's construction schedule and allows the A/E a reasonable time to review the submittals. This submittal schedule is to be included as part of the construction schedule. Submittals requiring expedited review must be clearly identified as such in the schedule of submittals.

4.7.11 SCHEDULE RECOVERY. If the Work represented by the critical path falls behind more than 7 days, the project schedule shall be redone within 14 days showing how the Contractor shall recover the time. A narrative that addresses the changes in the schedule from the previously submitted schedule shall be submitted along with the schedule in both hard copy (appropriate report formats to be determined by the University Representative) and electronic copy. The Contractor shall comply with the most recent schedules.

4.7.12 SCHEDULE CHANGES AND MODIFICATIONS.

(1) CONTRACT TIME CHANGE REQUIRES MODIFICATION. The Contract Time may only be shortened or extended by a written modification fully executed by the University.

(2) CONTRACT REORDERING, RE-SEQUENCING AND CHANGING ACTIVITY DURATIONS. Should the Contractor, after approval of the complete detailed construction schedule, desire to change his plan of construction, he shall submit his requested revisions to the University and the A/E along with a written statement of the revisions including a description of the sequence and duration changes for rescheduling the work, methods of maintaining adherence to intermediate milestones and the contract completion date and the reasons for the revisions. If the requested changes are acceptable to the University, which acceptance shall not be unreasonably withheld, they will be incorporated into the Schedule in the next reporting period. If after submitting a request for change in the Contract Schedule, the University does not agree with the request, the University will schedule a meeting with the Contractor to discuss the differences.

(3) CHANGES IN CONTRACT TIME. The critical path schedule as the term is used in the provisions herein shall be based on the current version of the Contractor's schedule for the Project and accepted by the University just prior to the commencement of the modification, asserted delay, suspension or interruption. If the Contractor believes it is entitled to an extension of Contract Time under the Contract Documents, the Contractor shall submit a PCO in accordance with Article 7.2 to the A/E and the University Representative accompanied by an analysis ("Requested Time Adjustment Schedule") in accordance with the Contract Documents for time extensions. The "Requested Time Adjustment Schedule" shall include "fragments" that represent the added or changed work to the Schedule. The impact on unchanged activities
caused by the changes and/or delays being analyzed shall be included in these fragnets.

A "fragnet" as used in these General Conditions and when used in the context of project scheduling is a subset of project activities that are inter-related by predecessor and successor relationships that are tied into the main schedule with identified start and completion points. Each fragnet may or may not be on the critical path. An entire schedule consists of a series of inter-related fragnets.

4.7.13 EXCUSABLE DELAY.

(1) IN GENERAL. If the Contractor is delayed at any time in the progress of the Work on the critical path schedule by an act or neglect of the University or other causes beyond the Contractor's control or by other causes which the University determines may justify delay, then the Contract Time shall be extended by Change Order. The Contractor shall immediately take all steps reasonably possible to lessen the adverse impact of such delay. Notwithstanding the above, to the extent any of the causes for delay were caused by the Contractor, reasonably foreseeable by the Contractor or avoidable by the Contractor, then to such extent the delay shall not be cause for extension of the Contract Time. For purposes of this paragraph, Contractors shall include all subcontractors and others under the responsibility of the Contractor.

The determination of the total number of days extension will be based upon the current construction schedule in effect at the inception of the change and/or delay and upon all data relevant to the extension as it exists in the project record. Once approved, such data shall be incorporated in the next monthly update of the schedule.

Contractor acknowledges and agrees that delays in work items which, according to the schedule analysis, do not affect any milestone dates or the Contract completion dates shown on the CPM at the time of the delay, will not be the basis for a contract extension.

(2) WEATHER-RELATED EXCUSABLE DELAYS.

Completion time will not be extended for normal bad weather or any weather that is reasonably foreseeable at the time of entering into the contract. The time for completion as stated in the contract documents includes due allowance for calendar days on which Work cannot be performed out of doors. The Contractor acknowledges that it may lose days due to weather conditions. Contract time may be extended at no cost to the University if all of the following are met which must be established by the Contractor:

(a) That the weather prevented Work from occurring that is on the critical path for the project based upon a critical path schedule previously submitted to the University and to the extent accepted by the University;

(b) There are no concurrent delays attributed to the Contractor;

(c) The Contractor took all reasonable steps to alleviate the impact of the weather and took reasonable attempts to prevent the delay and despite such reasonable actions of Contractor, the weather impacted the critical path as described above; and

(d) One of the following occurred:

1. The weather was catastrophic, such as a tornado, hurricane, severe wind storm, severe hail storm; or

2. Based on the full history of information published from the closest station as indicated from the Western Regional Climate Center (Desert Research Institute 2215 Raggio Parkway Reno, Nevada 89512, and as may be described on the website at http://www.wrcc.dri.edu/summary/), one or more of the following occurred:

   a. For any day between November 1 and March 31, the minimum temperature fell below the average minimum temperature plus the extreme low temperature recorded for the month divided by 2.
b. For any day between November 1 and March 31, the maximum temperature fell below the monthly average for the minimum temperature.

c. The daily precipitation exceeded 75% of the historical one day maximum for the month.

d. The snowfall for the month exceeded 175% of the historical average snowfall for the month.

4.7.14 COMPENSABLE DELAY, SUSPENSION OR INTERRUPTION.

(1) BASIC CONDITIONS.
In addition to the other requirements of the Contract Documents, a compensable delay, suspension or interruption of the work occurs only when the following are met:

(a) Is wholly unanticipated by the parties at the time of execution of the Contractor's Agreement or is caused by the breach of a fundamental obligation of the Contract Documents attributable to the University; and

(b) The Contractor delivers a written notice to A/E and University within seven (7) days that the Contractor knows or should have known of the condition giving rise to the purported compensable delay, disruption, suspension or interruption, and said continuation affects the Contract Time as indicated by the last submitted and reasonable critical path schedule.

(2) COMPENSABLE DELAY FORMULA. To the extent of the compensable delay, the Contractor's total entitlement for all compensable delay damages is the computed result of the following formula: Contract Sum divided by Contract Time (in calendar days); the result of which is then multiplied by 0.05; and the result of which is multiplied by the number of calendar days of compensable days allowed under these General Conditions that are beyond the Contract Time. Notwithstanding any other provision of these General Conditions or the Contract Documents, to the extent the Contractor is entitled to receive the 10% or 15% markup under Article 7.4, this provision shall be inapplicable and the markup shall be deemed to include all the compensable delay damages provided by this paragraph.

(3) PERIOD OF COMPENSABLE DELAY, SUSPENSION OR INTERRUPTION. The length and extent of compensable delay, shall be determined, with the use of the Project's critical path schedule, by ascertaining the number of additional days to the Contract Time that are needed in order to perform the Work in accordance with the Contract Documents as a result of the continuation of the aforesaid delay, disruption, suspension or interruption after receipt of the written notice received by the A/E and University under Section 4.7.14(1)(b) above.

(4) CONCURRENT DELAY. Notwithstanding any other provision of these General Conditions, to the extent a non-compensable delay occurs at the same time as a compensable delay, the University shall not be responsible for any compensation for the period of the non-compensable delay.

4.7.15 TIME EXTENSION REQUESTS. Any time extension shall be requested within 21 days after the Contractor knew or should have known about the delay and shall be supported by the critical path schedule analysis.

4.7.16 LIQUIDATED DAMAGES.

(1) IN GENERAL. Should the Contractor fail to complete the Work within the Contract Time, there shall be deducted from any amount due or that may become due the Contractor, the sum as stated in the Contractor's Agreement. Such sum is fixed and agreed upon by the University and Contractor as liquidated damages due the University by reason of the inconvenience and added costs of administration, engineering, supervision and other costs resulting from the Contractor's default, and not as a penalty. Actual damages related to delay can not be ascertained at the time of execution of the Contract. To the extent
that the liquidated damages exceed any amounts that would otherwise be due the Contractor, the Contractor shall be liable for such excess to the University. The University may seek enforcement of such obligation by legal action, and if such is necessary, shall recover the related costs and attorney fees. Notwithstanding any other provision of these General Conditions, the availability of liquidated damages to the University shall not limit the University's rights to seek damages or other remedies available under law or equity to the extent such damages or remedies are not based upon delay.

(2) NO WAIVER OF UNIVERSITY'S RIGHTS. Permitting the Contractor to continue any part of the Work after the time fixed for completion or beyond any authorized extension thereof, shall in no way operate as a waiver or estoppel on the part of the University of any of its rights under the Contract Documents, including the right to liquidated damages or any other remedies or compensation.

4.8 DOCUMENTS AND SAMPLES AT THE SITE, CERTIFYING "AS-BUILTS." The Contractor shall maintain at the site for the University, one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked weekly to record changes and selections made during construction, as well as approved Shop Drawings, Product Data, Samples and similar submittals. These aforesaid items shall be available to the A/E and shall be delivered to the A/E for submittal to the University upon completion of the Work, signed by the Contractor, certifying that they show complete and exact "as-built" conditions, stating sizes, kind of materials, vital piping, conduit locations and similar matters. All notes of encountered or changed conditions shall be included.

4.9 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.

4.9.1 NOT CONTRACT DOCUMENTS. Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The submittal shall demonstrate, for those portions of the Work for which the submittal is required, the way the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents.

4.9.2 PROMPTNESS. The Contractor shall review, approve and submit to the A/E, Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work, or the activities of the University or separate contractors.

4.9.3 NOT PERFORM UNTIL A/E APPROVES. The Contractor shall perform no portion of the Work requiring submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved in writing by the A/E. Such Work shall be in accordance with the approved submittals.

4.9.4 REPRESENTATIONS BY CONTRACTOR. By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

4.9.5 CONTRACTOR'S LIABILITY. The Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the A/E's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the A/E in writing of such deviation at the time of the submittal and the A/E has given written approval to the specific deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the A/E's review and comment.
4.9.6 DIRECT SPECIFIC ATTENTION TO REVISIONS.
The Contractor shall direct specific attention in writing to all revisions on resubmitted Shop Drawings, Product Data, Samples or similar submittals, except those requested by the A/E and indicated on previous submittals.

4.9.7 INFORMATIONAL SUBMITTALS. Informational submittals upon which the A/E is not expected to take responsive action may be so identified in the Contract Documents.

4.9.7 RELIANCE ON PROFESSIONAL CERTIFICATION. When professional certification of performance criteria of materials, systems or equipment is required by the Contract Documents, the University and A/E shall be entitled to rely upon the accuracy and completeness of such calculations and certifications. If a professional stamp is required, the professional shall be licensed in the State of Utah unless otherwise approved by the University in writing. Likewise, the Contractor is entitled to rely upon the accuracy and completeness of the calculations made by the A/E in developing the Contract Documents, unless a Contractor of ordinary skill and expertise for the type of Work involved would know that such is inaccurate or incomplete and therefore must immediately notify the University in writing.

4.10 USE OF SITE.

4.10.1 IN GENERAL.
The Contractor shall confine operations at the site to areas permitted by the Contract Documents, law, ordinances, resolutions, rules and regulations, and permits and shall not unreasonably encumber the site with materials or equipment. Contractor shall take all reasonable means to secure the site, protect the site and protect the Work from any damage. The site shall be left free and clear of refuse, equipment, materials, etc. and the site shall not be subject to spilled liquids and chemicals, toxic or otherwise. Should such an incident occur while the Contractor has control of the site, the Contractor shall be responsible to clean the site and pay all associated costs, fines and penalties. Notwithstanding this, Contractor is not responsible for any damage to the site or the Work to the extent caused by the University or the University’s agents.

4.10.2 ACCESS TO NEIGHBORING PROPERTIES. The Contractor shall not, except as provided in the Contract Documents or with the University’s advance written consent when necessary to perform the Work, interfere with access to properties neighboring the Project site by the owners of such properties and their respective tenants, agents, invitees and guests.

4.11 ACCESS TO WORK.
The Contractor shall provide the University and A/E access to the Work in preparation and progress, wherever located.

4.12 ROYALTIES AND PATENTS.
The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of patent rights and shall hold the University and A/E harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the University in writing.

4.13 INDEMNIFICATION.

4.13.1 IN GENERAL.

(1) To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the University of Utah, the State of Utah, the State of Utah’s institutions, agencies, departments, divisions, authorities, and instrumentalties, boards, commissions, elected or appointed officers, employees, agents, authorized volunteers (hereinafter the above listing of entities and persons is referred to as “indemnities”) from and against every kind and character of claims, damages, losses and
expenses, including but not limited to attorneys' fees, and including those events covered under the blanket Contractual Liability Coverage required under the Contract Documents, arising out of or resulting from any act or omission in the performance of the Work including the work of all the Subcontractors and their employees, provided that any such claim, damage, loss or expense is caused in whole or in part by the negligent or wrongful act or omission of the Contractor, any Subcontractor, and their employees, provided that any such claim, damage loss or expense is caused in whole or in part by the negligent or intentional act or omission of the Contractor, any Subcontractor, or anyone directly or indirectly employed or the agent of any of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder. The Contractor shall defend all actions brought upon such matters to be indemnified hereunder and pay all costs and expenses incidental thereto, but the University of Utah shall have the right, at its option, to participate in the defense of any such action without relieving the Contractor of any obligation hereunder. Notwithstanding any of the above, to the extent the Contractor is complying with a written directive from the University, that is not based on the Contractor's recommendation, the Contractor shall not be held liable under the indemnification provision of this Agreement if the Contractor has promptly disagreed with the written directive by delivering such objection to the University in writing.

(2) Such obligation shall not be construed to negate, abridge, or otherwise reduce any other right or obligation of indemnity which would otherwise exist as to any party or person under Contract Documents.

(3) In claims against any person or entity indemnified under this Article 4.13 by an employee of the Contractor, Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under this Article 3.13 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or Subcontractor under workers' or workmen's compensation acts, disability benefits acts or other employee benefit acts.

ARTICLE 5. SUBCONTRACTORS.

5.1 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK.

5.1.1 APPROVAL REQUIRED.

(1) Listing of Subcontractors shall be as required by U.C.A. 63A-5-208 as amended and/or as stated in the Contract Documents, including but not limited to the "Subcontractors List Form".

(2) The Contractor shall not contract with a proposed person or entity to whom the University has made a reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

5.1.2 BUSINESS AND LICENSING REQUIREMENTS. All Subcontractors used by the Contractor shall comply with all applicable business and licensing requirements.

5.1.3 SUBSEQUENT CHANGES.
After the lapse of twenty-four (24) hours from the bid opening, the Contractor may change its listed Subcontractors only in accordance with Rule R 23-1 and the Contract Documents and with written approval of the Director.

(1) The University will pay the additional costs for a University requested change in subcontractor if all of the following are met:

(a) If the University in writing requests the change of a subcontractor;

(b) The original subcontractor is a responsible subcontractor that meets the requirements of the Contract Documents; and
(c) The original subcontractor did not withdraw as a subcontractor on the project.

(2) In all other circumstances, the Contractor shall pay the additional cost for a change in a subcontractor.

5.1.4 BONDING OF SUBCONTRACTORS. Subcontractors as identified by the University in the procurement documents, may be required to submit performance and payment bonds to cover the full extent of their portion of the Work. This provision does not in any way limit the right of the Contractor to have subcontractors at any tier be required to have a performance and/or payment bond.

5.2 SUBCONTRACTUAL RELATIONS.

5.2.1 COMPLY WITH CONTRACT DOCUMENTS. By appropriate enforceable agreement, and to the extent it can be practically applied, the Contractor shall require each Subcontractor to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Documents, assumes towards the University and A/E.

5.2.2 RIGHTS. Each Subcontractor agreement shall preserve and protect the rights of the University and A/E under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Subcontractor agreement, the benefit of all rights and remedies against the Contractor that the Contractor, by the Contract Documents, has against the University.

5.2.3 SUB-SUBCONTRACTORS. The Contractor shall require each Subcontractor to enter into similar agreements with its Subcontractors which complies with the requirements of Paragraphs 5.2.1 and 5.2.2 hereinabove.

5.2.4 DOCUMENT COPIES. The Contractor shall make available to each proposed Subcontractor, prior to execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound. Subcontractors shall similarly make copies of applicable portions of the Contract Documents available to their respective proposed Subcontractors.

5.3 CONTINGENT ASSIGNMENT OF SUBCONTRACTS.

5.3.1 CONDITIONS FOR ASSIGNMENT TO THE UNIVERSITY. Each subcontract agreement for a subcontractor at any tier for a portion of the Work is assigned by the Contractor to the University provided that the assignment is effective only after termination of the Contract by the University for cause pursuant to Article 12.2 or stoppage of the Work by the University pursuant to Article 12.5, and only for those subcontract agreements which the University accepts by notifying the Subcontractor in writing. The subcontract shall be equitably adjusted to meet the new conditions of the work.

ARTICLE 6. PROTECTION OF PERSONS AND PROPERTY.

6.1 SAFETY OF PERSONS AND PROPERTY.

6.1.1 CONTRACTOR RESPONSIBILITY. The Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract. The Contractor shall take all reasonable precautions for the safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

(1) Employees on the Work and other persons who may be affected thereby;

(2) The Work and materials and equipment to be incorporated therein, whether in
storage on or off the site, under care, custody or
control of the Contractor or a Subcontractor; and

(3) Other property at the site or
adjacent thereto, such as trees, shrubs, lawns,
walks, pavements, roadways, structures and
utilities not designated for removal, relocation or
replacement in the course of construction.

6.1.2 SAFETY PROGRAM,
PRECAUTIONS. The Contractor shall
institute a safety program at the start of
construction to minimize accidents. Said
program shall continue to the final completion of
the Project and conform to applicable laws and
regulations including the Utah Occupational
Safety and Health Rules and Regulations as
published by the Utah Industrial Commission -
UOSH Division. The Contractor shall post
signs, erect barriers, and provide those items
necessary to implement the safety program. As
soon as the Contractor proceeds with the Work,
the Contractor shall have all workers and all
visitors on the site wear safety hard hats, as well
as all other appropriate safety apparel such as
safety glasses and shoes, and obey all safety
rules and regulations and statutes. The
Contractor shall post a sign in a conspicuous
location indicating the necessity of wearing hard
hats and the Contractor shall loan such hats to
visitors.

6.1.3 COMPLIANCE WITH LAWS.
The Contractor shall give notices and comply
with applicable laws, ordinances, rules,
regulations and lawful orders of public
authorities bearing on safety of persons or
property or their protection from damage, injury
or loss. In particular, the Contractor shall
comply with all applicable provisions of Federal,
State and municipal safety laws, rules and
regulations as well as building codes to prevent
accidents or injury to persons on, about, or
adjacent to the premises where the Work is
being performed.

6.1.4 ERECT AND MAINTAIN
SAFEGUARDS. The Contractor shall erect and
maintain, as required by existing conditions and
performance of the Contract, reasonable
saferguards for safety and protection, including
effective fences, posting danger signs and other
warnings against hazards, promulgating safety
regulations and notifying owners and users of
adjacent sites and utilities.

6.1.5 UTMOST CARE. When use or
storage of explosives or other hazardous
materials or equipment or unusual methods are
necessary for execution of the Work, the
Contractor shall exercise utmost care and carry
on such activities under supervision of properly
qualified personnel.

6.1.6 PROMPT REMEDY.
The Contractor shall promptly remedy damage
and loss (other than damage or loss insured
under property insurance required by the
Contract Documents) to property referred to in
Paragraph 6.1.1 of these General Conditions
caused in whole or in part by the Contractor, a
Subcontractor, or anyone directly or indirectly
employed by any of them, or by anyone for
whose acts they may be liable and for which the
Contractor is responsible under said Paragraph
6.1.1, except to the extent such damage or loss is
directly due to errors in the Contract Documents
or caused by agents or employees of the A/E or
the University. The foregoing obligations of the
Contractor are in addition to the Contractor's
obligations under the Contract Documents.

6.1.7 SAFETY DESIGNEE.
The Contractor shall designate a responsible
member of the Contractor's organization at the
site whose duty shall be the prevention of
accidents, damage, injury or loss. This person
shall be the Contractor's superintendent unless
otherwise designated by the Contractor in
writing to the University and A/E.

6.1.8 LOAD SAFETY. The Contractor
shall not load or permit any part of the
construction or site to be loaded so as to
endanger its safety.

6.1.9 OFF-SITE RESPONSIBILITY.
In addition to its other obligations under this
Article 6, the Contractor shall, at its sole cost
and expense, promptly repair any damage or
disturbance to walls, utilities, streets, ways,
sidewalks, curbs and the property of the
University and third parties (including municipalities and other governmental agencies) resulting from the performance of the Work, whether by it or by its Subcontractors at any tier. The Contractor shall not cause materials, including soil and debris, to be placed or left on streets or ways.

6.1.10 EMERGENCIES.
In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor’s discretion, to prevent threatened damage, injury or loss. Contractor shall promptly notify the University Representative of the action taken.

6.2 HAZARDOUS MATERIALS.
In the event the Contractor encounters on the site material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) or any other hazardous waste or substance which may endanger the health of those persons performing the Work or being on the site, the Contractor shall immediately stop Work in the area affected and immediately report the condition to the University Representative and A/E by phone with a follow-up document in writing. The Work in the affected area shall be resumed when written direction is provided by the University Representative. Except to the extent provided otherwise in the Contract Documents or if the presence of hazardous materials is due to the fault of the Contractor, the Contractor shall not be required to perform without the Contractor’s consent, any Work relating to asbestos, polychlorinated biphenyl (PCB) or any other hazardous waste or substance. The University shall procure a licensed abatement contractor qualified to remove the hazardous material. The abatement contractor shall submit notification of demolition to the Utah Division of Air Quality. Abatement contractor shall pay the notification fee. A copy of the hazardous material survey report shall be available to all persons who have access to the construction site.

6.3 HISTORICAL AND ARCHEOLOGICAL CONSIDERATIONS.
In the event the Contractor knows or should have known of any cultural, historical or archeological material that is either recognized as an item to be protected under Federal, State, or local law or regulation, or is an item of obvious value to the University of Utah, the Contractor shall cease any work that would interfere with such discovery and immediately report the condition to the University Representative and A/E by phone with a follow-up document in writing. Work shall resume based upon the direction of the University Representative. Contractor cooperation with any University recognized archaeologist or other cultural/historical expert is required.

6.4 CONTRACTOR LIABILITY.
If the Contractor fails in any of its obligations in Articles 6.1 through 6.3 above, the Contractor shall be liable to any damages to the University of Utah, the State of Utah or any third party resulting from such noncompliance. The Contractor shall also be liable for any mitigation or restoration effort resulting from such noncompliance. To the extent all the following is met, the Contractor may treat the discovery of such material similarly to an unforeseen condition:

6.4.1 The discovery of such material is reasonably unforeseeable given the site conditions that the Contractor should have been aware;

6.4.2 The presence of such material was not identified in any part of the Contract Documents;

6.4.3 The Contractor has undertaken all proper action to mitigate any impact of such discovery on the critical path or monies related to the Project;

6.4.4 The discovery affects the critical path or contract price from that which was contemplated by the Contract Documents; and

6.4.5 The requirements of 7.1.5 and the Contract documents are met.
ARTICLE 7. MODIFICATIONS, REQUEST FOR INFORMATION, PROPOSED CHANGE ORDER, PRELIMINARY RESOLUTION EFFORTS AND CLAIMS PROCESS.

7.1 MODIFICATIONS: IN GENERAL.

7.1.1 TYPES OF MODIFICATIONS AND LIMITATIONS. Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or ASI, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents. The Contractor must have a written Modification executed by the University under this Article 7 prior to proceeding with any Work sought to be an extra.

7.1.2 BY WHOM ISSUED. A Change Order or Construction Change Directive shall be issued by the University Representative. An ASI is issued by the A/E or by the University Representative.

The A/E shall prepare Change Orders and Construction Change Directives with specific documentation and data for the University’s approval and execution in accordance with the Contract Documents, and may issue ASIs not involving an adjustment in the contract sum or an extension of the Contract Time which are not inconsistent with the intent of the Contract Documents.

7.1.3 CONTRACTOR TO PROCEED UNLESS OTHERWISE STATED. Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or ASI.

7.1.4 ADJUSTING UNIT PRICES. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are so changed in a proposed Change Order or Construction Change Directive that application of such unit prices to quantities of Work proposed will cause a substantial inequity to the University or Contractor, the applicable unit prices may be equitably adjusted.

7.1.5 SPECIAL NOTICES REQUIRED IN ORDER TO BE ELIGIBLE FOR ANY CONTRACT MODIFICATION. In order to be eligible for any Modification under this Article 7, the Contractor must have met the following special notice requirements:

1) CONCEALED OR UNKNOWN CONDITIONS. The Contractor must file a written notice with the University Representative within seven (7) calendar days of that the Contractor knew or should have known of a site condition described below or the Contractor shall be deemed to waive any right to file any PCO, PRE or Claim for additional monies or time related to such condition:

(a) If the Contractor encounters unknown and reasonably unforeseeable subsurface or otherwise concealed physical conditions, including hazardous or historical/cultural materials under Article 6, which differ materially from those indicated by the Contract Documents or a site inspection; or

(b) If the Contractor encounters unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents.

1) INCREASE IN CONTRACT TIME. If the Contractor encounters a situation in which the Contractor knows or should have known that such situation would cause a delay, disruption, interruption, suspension or the like to the Project, the Contractor must file a notice with the University Representative within seven (7) working days of when the Contractor knew or should have known of such circumstance or the Contractor shall be deemed to waive any right to file any PCO, PRE or Claim for additional monies or time related to such circumstance. To the extent
the University and/or the State of Utah is damaged by the failure of the Contractor to provide such notice after the Contractor knows or should have known of such circumstance, the Contractor shall be liable for liquidated damages attributable thereto, as well as any damages to the State of Utah and/or University that are allowable in addition to liquidated damages.

7.2 CONTRACTOR INITIATED REQUESTS.

7.2.1 THE REQUEST FOR INFORMATION, RFI, PROCESS AND TIME TO FILE. The Contractor may file an RFI with the A/E regarding any concern which will assist the Contractor in the proper completion of the Work including, but not limited to issues related to the Contract Documents, plans and specifications. The RFI shall be filed with the A/E in a timely manner so as not to prejudice the University as to the quality, time or money related to the Work.

7.2.2 PROPOSED CHANGE ORDER ("PCO"). Within twenty-one (21) days after the Contractor knows or should have known of a situation or concern where the Contractor is going to request additional monies or time, the Contractor must file a Proposed Change Order ("PCO") with the University Representative, or the Contractor shall be deemed to waive any right to claim additional monies or time related to such situation or concern. The PCO shall include all available documentation supporting the PCO available to the Contractor at the time of filing and the Contractor shall thereafter diligently pursue the supplementation(s) of such documentation and promptly deliver such supplementation(s) to the University Representative.

(1) UNIVERSITY REPRESENTATIVE RESPONSE. One of the following may occur after a PCO is filed with the University Representative:

(a) The University Representative, after considering any input by the A/E, may reach an agreement with the Contractor and issue a Change Order.

(b) The University, after considering any input by the A/E, may issue a Construction Change Directive.

(c) If the University Representative, after considering any input by the A/E, disagrees with the Contractor’s PCO, the University Representative may seek additional information or verification from the Contractor, the A/E or other sources, may negotiate with the Contractor, may issue a Change Order upon such later agreement, may retract the PR, or may issue a Construction Change Directive.

(d) If a Construction Change Directive is issued which identifies the University Representative’s position in regard to the subject contract sum and/or time adjustment or if the PCO is denied by the University Representative, the Contractor must file a PRE under Article 7.7 below no later than twenty-one (21) days after the Contractor’s receipt of the Construction Change Directive or such denial of the PCO. Failure to file a PRE in these instances shall be deemed to waive any right to additional time or money related to the PCO, Construction Change Directive or denial of the PCO. Such waiver shall entitle the University to convert the Construction Change Directive into a Change Order, whether or not executed by the Contractor.

If the Construction Change Directive leaves open the determination of additional time or money related to the directed change, then the time period for commencement of filing the PRE shall not accrue until such time as the University has conveyed to the Contractor a position as to the time and money owing as a result of the directed change.

The A/E must continually work with the University in providing data, documentation and efforts to resolve the issues related to the PR.

7.3 PROPOSAL REQUEST INITIATED BY THE UNIVERSITY.

The University may file a Proposal Request with the Contractor seeking information, data and/or
pricing relating to a change in the contract time and or monies owing for particular scope changes or other modifications to the Contract Documents. The PR shall provide a time limit for the Contractor to file a response with the A/E and the University Representative. If a proposal is not timely provided by the Contractor, the University may calculate the Change Order under Article 7.4.2 below. Upon such timely receipt of the proposal, one of the following shall occur:

7.3.1 **IF AGREEMENT, CHANGE ORDER ISSUED.** The University Representative, after considering any input by the A/E, may reach an agreement with the Contractor and issue a Change Order.

7.3.2 **IF DISAGREEMENT.** If the University Representative disagrees with the Contractor's proposal, after considering any input from the A/E, the University Representative may seek additional information or verification from the Contractor or other sources, may negotiate with the Contractor, may issue a Change Order upon such later agreement, may retract the PR, or may issue a Construction Change Directive. If a Construction Change Directive is issued which identifies the University Representative's position in regard to the subject contract sum and/or time adjustment, the Contractor must file a PRE within twenty-one (21) days of the Contractor's receipt of the Construction Change Directive, or the Contractor shall be deemed to waive any such request for additional time or money as a result of the issuance of the Construction Change Directive. Such waiver shall entitle the University to convert the Construction Change Directive into a Change Order, whether or not executed by the Contractor. If the Construction Change Directive leaves open the determination of additional time or money related to the directed change, then the time period for commencement of filing the PRE shall not accrue until such time as the University has conveyed to the Contractor a position as to the time and money owing as a result of the directed change.

7.4 **EVALUATION OF PROPOSAL FOR ISSUING CHANGE ORDERS.**

7.4.1 **ADJUSTING SUM BASED UPON AGREEMENT.** If the Change Order provides for an adjustment to the Contract Sum, the adjustment shall be based on the mutual agreement of the Contractor and the University, including any terms mandated by unit price agreements or other terms of the Contract Documents.

7.4.2 **UNIVERSITY RESOLUTION OF SUM AND STANDARDS IN THE ABSENCE OF AN AGREEMENT UNDER PARAGRAPH 7.4.1.** In the absence of an agreement under Paragraph 7.4.1 above, the adjustment shall be based on an itemized accounting of costs and savings supported by appropriate data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Paragraph shall be limited to the following:

1. All direct and indirect costs of labor; including workers compensation insurance, social security and other federal and state payroll based taxes, and payroll based fringe benefits paid by Contractor so long as they are reasonable and no higher than that charged to other clients;

2. Costs of materials, on-site temporary facilities, supplies and equipment (except hand tools) required for or incorporated into the work;

3. Rental costs of machinery, equipment, tools (except hand tools), and on-site temporary facilities, whether rented from the Contractor or others;

4. Costs of permits and other fees, sales, use or similar taxes related to the Work;

5. Additional costs of field supervision and field office personnel directly attributable to the change; and
(6) Overhead and profit by the following liquidated formula which is not a penalty but a reasonable calculation agreed upon at the time of execution of the Contractor's Agreement, and provided by formula herein due to the fact that the actual amount due for said overhead and profit cannot easily be ascertained at the time of such execution. The markups in 7.4.2(6)(a) and (b) below are to cover the Contractor's additional payment and performance bond premiums, insurance premiums not specified under Paragraph 7.4.2(1), home office and on-site overhead and profit. Overhead and profit includes, but is not limited to the Contractor's Project Manager and Cost Estimator. Each request for pricing shall stand on its own and not be combined with other requests for pricing in determining the allowed markup described below. A particular request for pricing shall include all items reasonably related together and determinable at the time of the request. If several unrelated requests for pricing are grouped together in a single Change Order, each request for pricing will be considered separately for purposes of calculating the markup under the following formula:

(a) A markup of 15% shall be applied to the cost of each individual charge up to $20,000 in cost, but in no case shall the markup be less than $150;

(b) A markup of 10% shall be applied to the portion of the cost of each individual charge in excess of $20,000;

(c) Subcontractors at any tier shall be entitled to markup their costs related to a Change Order with the same percentages as specified in Paragraphs 7.4.2(6)(a) and (b) above, except that the minimum markup shall be $50 for any individual change.

7.4.3 CREDITS. The amount of credit to be allowed by the Contractor to the University for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed to the University based upon corroboration by an appropriate source.

7.5 CONSTRUCTION CHANGE DIRECTIVES.

7.5.1 WHEN USED AND CONTRACTOR'S RIGHT TO CHALLENGE. A Construction Change Directive may be issued by the University Representative in the case of a need for the Work to commence. If the Construction Change Directive leaves open the determination of additional time or money related to the directed change, then the Construction Change Directive shall indicate the timeframe(s) in which further information is to be provided to resolve the matter. At any time that the University and the Contractor agree upon the time and money related to a Construction Change Directive, a Change Order shall be executed by the parties. Additionally, the Construction Change Directive may be converted to a Change Order under Paragraph 7.2.2 or Article 7.3 above.

7.5.2 PROCEED WITH WORK AND NOTIFY THE UNIVERSITY ABOUT ADJUSTMENT METHOD. Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved.

7.5.3 INTERIM PAYMENTS BY THE UNIVERSITY. Pending the final determination of the total cost of the Construction Change Directive, the University shall pay any undisputed amount to the Contractor.

7.6 A/E'S SUPPLEMENTAL INSTRUCTION (Commonly referred to as an “ASI”).

The A/E may at any time that is consistent with maintaining the quality, safety, time, budget and function of the Work, issue to the Contractor a supplemental instruction (“ASI”) after approval from the University Representative is obtained. The Contractor must file with the University Representative a PCO under Paragraph 7.2.2 above, within 21 calendar days of the Contractor's receipt of the ASI, or the Contractor shall be deemed to have waived any right to additional time or monies as a result of such ASI.
7.7 **PROCEDURE FOR PRELIMINARY RESOLUTION EFFORTS.**

7.7.1 **REQUEST FOR PRELIMINARY RESOLUTION EFFORT (PRE).** A Contractor raising an issue related to a breach of contract or an issue concerning time or money shall file a PRE as a prerequisite for any consideration of the issue by the University. The labeling of the notice or request shall not preclude the consideration of the issue by the University.

7.7.2 **TIME FOR FILING.** The PRE must be filed in writing with the University Representative within twenty-one (21) days of any of the following:

1. Issuance of a Construction Change Directive that defines the time and sum due the Contractor but the Contractor disagrees with such assessment;

2. Issuance of the University’s position in regard to a Construction Change Directive that originally left open the time and/or sum due to the Contractor;

3. Issuance of a denial of a PCO by the University;

4. In the case of a Subcontractor, after the expiration of the time period for the Contractor/Subcontractor PRE process under Paragraph 7.7.5 below; or

5. When the Contractor knows or should have known about any other issue where the Contractor seeks additional monies, time or other relief from the State of Utah or the University.

7.7.3 **CONTENT REQUIREMENT.**

The PRE shall be required to include in writing to the extent information is reasonably available at the time of such filing:

1. A description of the issue;

2. The potential impact on cost and time or other breach of contract; and

3. An indication of the relief sought.

7.7.4 **SUPPLEMENTATION.**

Additional detail of the content requirement under Paragraph 7.7.3 above shall be provided later if the detail is not yet available at the initial filing as follows:

1. While the issue is continuing or the impact is being determined, the Contractor shall provide a written updated status report every 30 days or as otherwise reasonably requested by the University Representative; and

2. After the scope of work or other factors addressing the issue are completed, the complete information, including any impacts on time, cost or other relief requested, must be provided to the University Representative within twenty-one (21) days of such completion.

7.7.5 **SUBCONTRACTORS.**

1. Under no circumstances shall any provision of these Contract Documents be intended or construed to create any contractual relationship between the University and any Subcontractor.

2. The Contractor must include the provisions of this Paragraph 7.7.5 in its contract with the first tier Subcontractor, and each Subcontractor must do likewise. At the Contractor’s discretion, the Contractor may allow a Subcontractor at the 2nd tier and beyond to submit the PRE directly with the Contractor.

3. In order for a Subcontractor at any tier to be involved with the PRE of the University, the following conditions and process shall apply:

   a. The Subcontractor must have attempted to resolve the issue with the Contractor including the submission of a PRE with the Contractor.

   b. The Subcontractor must file a copy of the PRE with the University Representative;
(c) The PRE to the Contractor must meet the time, content and supplementation requirements of Paragraphs 7.7.2, 7.7.3 and 7.7.4. The triggering event for a Subcontractor to file a PRE shall be the time at which the issue cannot be resolved through the normal business practices associated with the contract, excluding arbitration and litigation;

(d) The PRE submitted to the Contractor shall only be eligible for consideration in the University’s PRE process to the extent the issue is reasonably related to the performance of the University or an entity for which the University is liable;

(e) The Contractor shall resolve the PRE to the satisfaction of the Subcontractor within sixty (60) days of its submittal to the Contractor or such other time period as subsequently agreed to by the Subcontractor in writing. If the Contractor fails to resolve the PRE with the Subcontractor within such required time period, the Subcontractor may submit in writing the PRE with the Contractor and the University. In order to be eligible for University consideration of the PRE, the Subcontractor must submit the PRE within twenty-one (21) days of the expiration of the time period for the Contractor/Subcontractor PRE process. The University shall consider the PRE as being submitted by the Contractor on behalf of the Subcontractor;

(f) Upon such PRE being submitted, the Contractor shall cooperate with the University Representative in reviewing the issue;

(g) The University shall not be obligated to consider any submission which is not in accordance with any provision of this Article 7.7;

(h) The Subcontractor may accompany the Contractor in participating with the University regarding the PRE raised by the Subcontractor. The University is not precluded from meeting with the Contractor separately and it shall be the responsibility of the Contractor to keep the Subcontractor informed of any such meetings; and

(i) Notwithstanding any provision of this Paragraph 7.7.5, a Subcontractor shall be entitled to pursue a payment bond claim.

7.7.6 PRE RESOLUTION PROCEDURE. The University Representative may request additional information and may meet with the parties involved with the issue.

7.7.7 CONTRACTOR REQUIRED TO CONTINUE PERFORMANCE. Pending the final resolution of the issue, unless otherwise agreed upon in writing by the University Representative, the Contractor shall proceed diligently with performance of the Contract and the University shall continue to make payments in accordance with the Contract Documents.

7.7.8 DECISION. The University shall issue to the Contractor, and any other party brought into the process by the University Representative as being liable to the University, a written decision providing the basis for the decision on the issues presented by all of the parties within thirty (30) days of receipt of all the information required under Paragraphs 7.7.3 and 7.7.4.

7.7.9 DECISION FINAL UNLESS CLAIM SUBMITTED. The decision by the University shall be final, and not subject to any further administrative or judicial review (not including judicial enforcement) unless a Claim is submitted in accordance with these General Conditions.

7.7.10 EXTENSION REQUIRES MUTUAL AGREEMENT. Any time period specified in this Article 7.7 may be extended by mutual agreement of the Contractor and the University.

7.7.11 IF DECISION NOT ISSUED. If the decision is not issued within the thirty (30) day period, including any agreed to extensions, the issue may be pursued as a Claim.
7.7.12 PAYMENT FOR PERFORMANCE.

(1) Except as otherwise provided in the Contract Documents, any final decision where the University is to pay additional monies to the Contractor, shall not be delayed by any PRE, Claim or appeal by another party.

(2) Payment to the Contractor of any final decision shall be made by the University in accordance with the contract for the completed work.

(3) Notwithstanding any other provision of the Contract Documents, payment to the Contractor shall be subject to any set-off, claims or counterclaims of the University.

(4) Payment to the Contractor for a Subcontractor issue submitted by the Contractor shall be paid by the Contractor to the Subcontractor in accordance with the contract between the Contractor and the Subcontractor.

(5) Any payment or performance determined owing by the Contractor to the University shall be made in accordance with the Contract Documents.

7.8. RESOLUTION OF CLAIM.

7.8.1 CLAIM. If the decision on the PRE is not issued within the required timeframe or if the Contractor is not satisfied with the decision, the Contractor or other party brought into the process by the University, may submit a Claim in accordance with this Article 7.8 as a prerequisite for any further consideration by the University or the right to any judicial review of the issue giving rise to the claim.

7.8.2 SUBCONTRACTORS. In order for a Subcontractor to have its issue considered in the Claim process by the University, the Subcontractor that had its issue considered under Paragraph 7.7.5 may submit the issue as a Claim by filing it with the Contractor and the University within the same timeframe and with the same content requirements as required of a Claim submitted by the Contractor under this rule. The University shall consider the Claim as being submitted by the Contractor on behalf of the Subcontractor. Under no circumstances shall any provision of these General Conditions or the Contract Documents be intended or construed so as to create any contractual relationship between the University and any Subcontractor.

(1) Upon such Claim being submitted, the Contractor shall fully cooperate with the Director, the person(s) evaluating the claim and any subsequent reviewing authority.

(2) The Director shall not be obligated to consider any submission which is not in accordance with this Paragraph 7.8.2.

(3) The Subcontractor may accompany the Contractor in participating with the Director, the person(s) evaluating the Claim and any subsequent reviewing authority regarding the Claim. The Director, the person(s) evaluating the Claim and any subsequent reviewing authority is not precluded from meeting with the Contractor separately, and it shall be the responsibility of the Contractor to keep the Subcontractor informed of any such meetings and matters discussed.

(4) Notwithstanding any provision of this Article 7.8, a Subcontractor shall be entitled to pursue a payment bond claim.

7.8.3 TIME FOR FILING. The Claim must be filed in writing promptly with the Director, but in no case more than twenty-one (21) days after the decision is issued on the PRE under Paragraph 7.7.8 or no more than twenty-one (21) days after the thirty (30) day period under Paragraph 7.7.11 has expired with a decision not issued, whichever is later.

7.8.4 CONTENT REQUIREMENT. The written Claim shall include:

(1) A description of the issues in dispute;

(2) The basis for the Claim, including documentation and analysis required by the contract and applicable law and rules that allow for the proper determination of the Claim;
(3) A detailed cost estimate for any amount sought, including copies of any related invoices; and

(4) A specific identification of the relief sought.

7.8.5 EXTENSION OF TIME TO SUBMIT DOCUMENTATION. The time period for submitting documentation and any analysis to support a Claim may be extended by the Director upon written request of the claimant showing just cause for such extension, which request must be included in the initial Claim submittal.

7.8.6 CONTRACTOR REQUIRED TO CONTINUE PERFORMANCE. Pending the final determination of the Claim, including any judicial review or appeal process, and unless otherwise agreed upon in writing by the Director, the Contractor shall proceed diligently with performance of the Contract and the University shall continue to make payments in accordance with the Contract Documents.

7.8.7 AGREEMENT OF CLAIMANT ON METHOD AND PERSON(S) EVALUATING THE CLAIM. The Director shall first attempt to reach agreement with the claimant on the method and person(s) to evaluate the Claim. If such agreement cannot be made within fourteen (14) days of filing of the Claim, the Director shall select the method and person(s), considering the purposes described in Rule R23-26-1. Unless agreed to by the Director and the claimant, any selected person shall not have a conflict of interest or appearance of impropriety. Any party and the person(s) evaluating the Claim has a duty to promptly raise any circumstances regarding a conflict of interest or appearance of impropriety. If such a reasonable objection is raised, and unless otherwise agreed to by the Director and the claimant, the Director shall take appropriate action to eliminate the conflict of interest or appearance of impropriety. The dispute resolution methods and person(s) may include any of the following:

(1) A single expert and/or hearing officer qualified in the field that is the subject of the Claim;

(2) An expert panel, consisting of members that are qualified in a field that is the subject of the Claim;

(3) An arbitration process which may be binding if agreed to by the parties to the Claim;

(4) A mediator; or

(5) Any other method that best accomplishes the purposes set forth in Rule R23-26-1.

7.8.8 THE EVALUATION PROCESS, TIMEFRAMES OF EVALUATOR(S), DIRECTOR’S DETERMINATION, ADMINISTRATIVE APPEAL TO THE AVP-FM AND JUDICIAL REVIEW. The Claim shall be evaluated, the timeframe for specific events related to the person(s) evaluating the Claim, the Director’s determination, any appeal to the AVP-FM and any judicial review shall be subject to the provisions of Rule R23-26-5(8), R23-26-5(9), R23-26-6 and R23-26-8. A copy of these Administrative Rules are available at http://www.rules.utah.gov/.

7.8.9 APPEAL PROCESS PREREQUISITE FOR FURTHER CONSIDERATION OR JUDICIAL REVIEW. The administrative appeal to the AVP-FM is a prerequisite for any further consideration by the State of Utah, or to judicial review of the issue giving rise to the Claim. It shall be considered that the Contractor, or another party brought into the process by the University, has not exhausted its administrative remedies if such an administrative appeal is not undertaken.

7.9 PAYMENT OF CLAIM.

7.9.1 When a stand alone component of a Claim has received a final determination, and is no longer subject to review or appeal, that amount shall be paid in accordance with the
payment provisions of the Contract Documents or judicial order.

7.9.2 When the entire Claim has received a final determination, and is no longer subject to review or appeal, the full amount shall be paid within fourteen (14) days of the date of the final determination unless the work or services has not been completed, in which case the amount shall be paid in accordance with the payment provisions of the Contract Documents to the point that the work or services is completed.

7.9.3 The final determination date is the earlier of the date upon which the claimant accepted the settlement in writing with an executed customary release document and waived its rights of appeal, or the expiration of the appeal period, with no appeal filed, or the determination made resulting from the final appeal.

7.9.4 Any final determination where the University is to pay additional monies to the Contractor shall not be delayed by any appeal or request for judicial review by another party brought into the process by the University as being liable to the University.

7.9.5 Notwithstanding any other provision of the Contract Documents, payment of all or part of a Claim is subject to any set-off, claims or counterclaims of the University.

7.9.6 Payment to the Contractor for a Subcontractor issue (Claim) deemed filed by the Contractor, shall be paid by the Contractor to the Subcontractor in accordance with the contract between the Contractor and the Subcontractor.

7.9.7 The execution of a customary release document related to any payment may be required as a condition of making the payment.

7.10 ALLOCATION OF COSTS OF CLAIM RESOLUTION PROCESS.

7.10.1 In order to file a Claim, a claimant must pay a $1500 filing fee to the University. When the Claim is a pass-through from a Subcontractor in accordance with Paragraph 7.7.5, the payment of the fee shall be made by the Subcontractor.

7.10.2 Unless otherwise agreed to by the parties to the Claim, the costs of resolving the Claim shall be allocated among the parties on the same proportionate basis as the determination of financial responsibility for the Claim.

7.10.3 The costs of resolving the Claim that are subject to allocation include the claimant’s filing fee, the costs of any person(s) evaluating the Claim, the costs of making any required record of the process, and any additional testing or inspection procured to investigate and/or evaluate the Claim.

7.10.4 Each party is responsible for its own attorney fees.

7.11 ALTERNATIVE PROCEDURES.
To the extent otherwise permitted by law, if all parties to a Claim agree in writing, a protocol for resolving a Claim may be used that differs from the process described in this Article 7.

7.12 IMPACT ON FUTURE SELECTIONS.

7.12.1 The presentation of a good faith and non-frivolous issue or Claim shall not be considered by the University’s selection process for a future award of contract; and

7.12.2 The submission of a bad faith and frivolous issue or Claim, or the failure by a Contractor to facilitate resolution of a Claim, may be considered in the University’s evaluation of performance.

7.13 REPORT TO BUILDING BOARD.
The University may report on the claim to DFCM and the Utah State Building Board.

7.14 UNIVERSITY’S RIGHT TO HAVE ISSUES, DISPUTES OR CLAIMS CONSIDERED.
As stated in Rule R23-26-1(6), Articles 7.7 through 7.13 above do not limit the right of the University to have any of its issues, disputes or
claims considered. The University reserves all rights to pursue its issues, disputes or claims in law or equity including, but not limited to, any or all of the following: damages, delay damages and impacts, losses, liability, patent or latent defects, or failure to perform under the Contract Documents. If the Director appoints an expert or a panel to consider any such issue(s), dispute(s) or claim(s) of the University, the Contractor shall cooperate with such expert or panel process.

ARTICLE 8. PAYMENTS AND COMPLETION.

8.1 SCHEDULE OF VALUES.
With the first Application for Payment, the Contractor shall submit to the A/E and the University Representative a schedule of values allocated to all the various portions of the Work. The Schedule of Values shall be submitted on the form approved and provided by the University. The A/E shall make recommendations to the University Representative regarding the Schedule of Values including any suggested modifications. When approved, including any approved modifications, by the University Representative, it shall be the basis for future Contractor Applications for Payments. The Contractor shall not be entitled to payment until receipt and acceptance of the Schedule of Values.

8.2 APPLICATIONS FOR PAYMENT.

8.2.1 IN GENERAL. The following general requirements shall be met:

1. The Contractor shall submit to the A/E an itemized Application for Payment for Work completed in accordance with the schedule of values and that reflects retainage as provided for in the Contractor's Agreement. The Application for Payment shall be on a special form approved and provided by University.

2. Such application shall be supported by such data substantiating the Contractor's right to payment as the University or A/E may require. Said data may include, but is not limited to, copies of requisitions from Subcontractors.

3. Such applications may include requests for payment pursuant to approved Change Orders or Construction Change Directives.

4. Such applications may not include requests for payment for portions of the Work performed by a subcontractor when the Contractor does not intend to pay to a Subcontractor because of a dispute or other reason.

5. In executing the Application for Payment, the Contractor shall attest that subcontractors involved with prior applications for payment have been paid, unless the Contractor provides a detailed explanation why such payment may not have occurred. The University reserves the right to require the Contractor to submit a payment waiver from one or more subcontractors.

8.2.2 PAYMENT FOR MATERIAL AND EQUIPMENT. Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the University and A/E, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the University to establish the University's title to such materials and equipment or otherwise protect the University's interest, and shall include applicable insurance, storage and transportation to the site for such materials and equipment stored off the site. The University may require copies of invoices or other suitable documentation.

8.2.3 WARRANTY OF TITLE.
The Contractor warrants that title to all Work covered by an Application for Payment will pass to the University no later than the time for payment. The Contractor further warrants that
upon submittal of an Application for Payment, all Work for which Certificates for Payment have been previously issued and payments received from the University shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, or other persons or entities making a claim by reason of having provided labor, materials and/or equipment relating to the Work.

8.2.4 HOLDBACK BY THE UNIVERSITY. Notwithstanding anything to the contrary contained in the Contract Documents, the University may, as a result of the claims resolution process, withhold any payment to the Contractor hereunder if and for so long as the Contractor fails to perform any of its obligations hereunder or otherwise is in default under any of the Contract Documents.

8.3 CERTIFICATES FOR PAYMENT.

8.3.1 ISSUED BY A/E. The A/E shall within ten (10) days after receipt of the Contractor's Application for Payment, either issue to the University a Certificate for Payment, with a copy to the Contractor, for such amount as the A/E determines due, or notify the Contractor and University in writing of the A/E's reasons for withholding certification in whole or in part as provided in Paragraph 8.4.1. If the A/E fails to act within said ten (10) day period, the Contractor may file the Application for Payment directly with the University Representative and the University will thereafter have twenty (20) days from the date of the University's receipt to resolve the amount to be paid and to pay the undisputed amount. The accuracy of the Contractor's Applications for Payment shall be Contractor's responsibility, not A/E's.

8.3.2 A/E'S REPRESENTATIONS. The A/E's issuance of a Certificate for Payment shall constitute a representation to the University that to the best of the A/E's knowledge, information and belief, based upon the A/E's observations at the site, the data comprising the Application for Payment, and what is reasonably inferable from the observations and data, that the Work has progressed to the point indicated in the Application and that the quality of the work is in accordance with the Contract Documents. The foregoing representations are subject to minor deviations from the Contract Documents correctable prior to completion and to specific qualifications expressed by the A/E. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment shall not be a representation that the A/E has (a) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (b) reviewed construction means, methods, techniques, sequences or procedures, (c) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the University to substantiate the Contractor's right to payment, (d) ascertained how or for what purpose the Contractor used money previously paid on account of Contract Sum, or (e) any duty to make such inquiries.

8.4 DECISIONS TO WITHHOLD CERTIFICATION.

8.4.1 WHEN WITHHELD. The A/E may decide not to certify payment and may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the University, if in the A/E's judgment the representations to the University required in Paragraph 8.3.2 above can not be made. If the A/E is unable to certify payment in the amount of the Application, the A/E shall notify the Contractor and University as provided in Paragraph 8.3.1 above. If the Contractor and A/E can not agree on a revised amount, the A/E shall promptly issue a Certificate for Payment for the amount to which the A/E makes such representations to the University. The A/E may also decide not to certify payment or, because of subsequently discovered evidence or observations, may nullify the whole or part of a Certificate for Payment previously issued, to such extent as may be necessary in the A/E's opinion to protect the University from loss because of:
(1) Defective Work not remedied;

(2) Third party claims filed or reasonable evidence indicating probable filing of such claims;

(3) Failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;

(4) Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

(5) Damage to the University or another contractor;

(6) Reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

(7) Failure to carry out the Work in accordance with the Contract Documents.

8.4.2 CERTIFICATION ISSUED WHEN REASONS FOR WITHHOLDING REMOVED. When the reasons stated in Paragraph 8.4.1 for withholding certification are removed, certification will be made for such related amounts.

8.4.3 CONTINUE WORK EVEN IF CONTRACTOR DISPUTES A/E'S DETERMINATION. If the Contractor disputes any determination by the A/E or the result of the claims resolution process with regard to any Certification of Payment, the Contractor nevertheless shall expeditiously continue to prosecute the Work.

8.4.4 UNIVERSITY NOT IN BREACH. The University shall not be deemed to be in breach of this Contract by reason of the withholding of any payment pursuant to any provision of the Contract Documents provided the University's action or such withholding is consistent with the results of the dispute resolution process.

8.5 PROGRESS PAYMENTS.

8.5.1 IN GENERAL, INTEREST OR LATE PAYMENTS.

(1) Except as provided in Paragraph 8.3.1, the University shall pay any undisputed amount within thirty (30) days of the date that the application for payment was submitted to the A/E. In no event shall University be required to pay any disputed amount.

(2) Except as otherwise provided by law, if any payment is late based upon the provisions of the Contract Documents, the Contractor shall be paid interest in an amount equal to the published Wall Street Journal prime rate plus 2%. The published Wall Street Journal Prime Rate shall be determined using such rate that is published closest to the 1st of the month for each month of the late period. The amount of payment of interest shall be apportioned using such rate(s) for the late period.

8.5.2 CONTRACTOR AND SUBCONTRACTOR RESPONSIBILITY. The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the University, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payment to its Subcontractors in a similar manner.

8.5.3 INFORMATION FURNISHED BY A/E OR UNIVERSITY TO SUBCONTRACTOR. The A/E or the University shall, on request, furnish to the Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the A/E and University on account of portions of the Work done by such Subcontractor.
8.5.4 UNIVERSITY AND A/E NOT LIABLE. Neither the University or A/E shall have an obligation to pay, monitor or enforce the payment of money to a Subcontractor, except to the extent as may otherwise be required by law.

8.5.5 CERTIFICATE, PAYMENT OR USE NOT ACCEPTANCE OF IMPROPER WORK. A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the University shall not constitute acceptance of Work that is not in accordance with the Contract Documents.

8.6 PAYMENT UPON SUBSTANTIAL COMPLETION. Upon Substantial Completion of the Work or designated portion thereof and upon application by the Contractor and certification by the A/E, the University shall make payment, reflecting adjustment in retainage, if any, for such Work or portion thereof as provided in the Contract Documents. To the extent allowed by law, the University may retain up to 200% of the fair market value of the work that has not been completed in accordance with the Contract Documents.

8.7 PARTIAL OCCUPANCY OR USE.

8.7.1 IN GENERAL. The University may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is Substantially Complete, provided the University and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of the warranties required by the Contract Documents. When the Contractor considers a portion to be substantially complete, the Contractor shall prepare and submit a list to the A/E as previously provided for herein. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. Contractor shall have continuing responsibility to protect the site and the Work during such partial occupancy and shall be responsible for damage except to the extent caused solely by the University during such partial occupancy or use.

The stage of progress of the Work shall be determined by written agreement between the University and Contractor.

8.7.2 INSPECTION. Immediately prior to such partial occupancy or use, the University, Contractor and A/E shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

8.7.3 NOT CONSTITUTE ACCEPTANCE. Except to the extent it is agreed upon in writing by the University, partial occupancy or use of a portion or portion of the Work shall not constitute acceptance of Work not complying with the requirement of the Contract Documents.

8.8 FINAL PAYMENT.

8.8.1 CERTIFICATE FOR PAYMENT. The A/E’s final Certificate for Payment shall constitute a further representation that the conditions listed in Paragraph 8.8.2 as precedent to the Contractor’s being entitled to final payment have been fulfilled.

8.8.2 CONDITIONS FOR FINAL PAYMENT. Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the A/E the following to the extent required by the University Representative:

(1) An affidavit that payrolls, bills for material and equipment, and other indebtedness connected with the Work for which the University’s or the State of Utah’s property might be responsible or encumbered (less amounts withheld by the University) have been paid or otherwise satisfied;
(2) A current or additional certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days prior written notice, by certified mail, return receipt requested, has been given to the University;

(3) A written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents;

(4) If requested by surety in a timely manner or by the University, consent of surety, to final payment;

(5) Receipt of Record Drawings, Specifications, Addenda, Change Orders and other Modifications maintained at the site; the warranties, instructions, operation and maintenance manuals, and training videos required to be furnished by the Contract Documents;

(6) Other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the University. If a Subcontractor refuses to furnish a release or waiver required by the University, the University may require consent of Surety to the final payment. If such liens, claims, security interests or encumbrances remain unsatisfied after payments are made, the Contractor shall refund to the University all money that the University may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees; and

(7) A written statement demonstrating how the Contractor will distribute interest earned on retention to Subcontractors as required by Section 13.8.5, U.C.A.

8.8.3 WAIVER OF CLAIMS: FINAL PAYMENT. The making of final payment shall constitute a waiver of Claims by the University except those arising from:

(1) Liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

(2) Failure of the Work to comply with the requirements of the Contract Documents;

(3) Terms of warranties required by the Contract Documents; or

(4) The one-year guaranty period and any corrected Work.

8.8.4 DELAYS NOT CONTRACTOR'S FAULT. If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, the University shall, upon application by the Contractor and certification by the A/E, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims. Unless otherwise stated by the University in writing, the making of final payment shall constitute a waiver of claims by the University as provided in Paragraph 8.8.3 for that portion of that Work fully completed and accepted by the University.

8.8.5 WAIVER BY ACCEPTING FINAL PAYMENT. Acceptance of final payment by the Contractor or a Subcontractor shall constitute a waiver of Claims by that payee except those Claims previously made in writing and identified by that payee as unsettled at the time of final Application for Payment. Such waivers shall be in addition to the waiver described in Paragraph 8.8.3.
ARTICLE 9. TESTS AND INSPECTIONS, SUBSTANTIAL AND FINAL COMPLETION, UNCOVERING, CORRECTION OF WORK AND GUARANTY PERIOD.

9.1 TESTS AND INSPECTIONS.

9.1.1 IN GENERAL. Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations, resolutions or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise specifically set forth in the Contract Documents or agreed to by the University in writing, the University shall contract for such tests, inspections and approvals with an independent entity, or with the appropriate public authority, and the University shall bear all related costs of tests, inspections and approvals except as provided below. If any of the Work is required to be inspected or approved by the terms of the Contract Documents or by any public authority, the Contractor shall, at least two working days prior to the time of the desired inspection, and following the procedures established by the University, request such inspection or approval to be performed. The Contractor shall give the A/E timely notice of when and where tests and inspections are to be made so that the A/E may observe such procedures.

9.1.2 FAILURE OF AN INSPECTOR TO APPEAR. Work shall not proceed without any required inspection and the associated authorization by University to proceed unless the following procedures and requirements have been met:

(1) The inspection or approval was requested in a timely manner as provided in Paragraph 9.1.1;

(2) The Contractor received written confirmation from the inspection entity that the inspection was scheduled;

(3) The Contractor has contacted or attempted to contact the inspector to confirm

that the inspector is unable to perform the inspection as scheduled;

(4) If the inspector has confirmed that it is unable to perform the inspection as scheduled or if the Contractor is unable to contact the inspector, the contractor shall attempt to contact the University Building Official or University Representative for instruction; and

(5) The Contractor has documented the condition of the work prior to being covered through photos or other means.

9.1.3 NONCONFORMING WORK. If such procedures for testing, inspection or approval under Paragraph 9.1.1 reveal failure of portions of the Work to comply with the requirements established by the Contract Documents, the Contractor shall bear all costs made necessary by such failure including those of repeated procedures and compensation for the University's expenses, including the cost of retesting for verification of compliance if necessary, until the University accepts the Work in question as complying with the requirements of the Contract Documents.

9.1.4 CERTIFICATES. Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the A/E.

9.1.5 A/E OBSERVING. If the A/E is to observe tests, inspections or approvals required by the Contract Documents, the A/E shall do so with reasonable promptness and, where practicable, at the normal place of testing.

9.1.6 PROMPTNESS. Tests, inspections and arrangements for approvals conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.
9.2 INSPECTIONS: SUBSTANTIAL AND FINAL.

9.2.1 SUBSTANTIAL COMPLETION INSPECTION. Prior to requesting a substantial completion inspection, the Contractor shall prepare a comprehensive initial punch-list, including unresolved items from prior inspections, for review by the University and A/E to determine if the Project is ready for a substantial completion inspection. If the University determines that the initial punch-list indicates that the Project is not substantially complete, the initial punch-list will be returned to the Contractor with written comments. If the University determines that the initial punch-list indicates that the Project may be substantially complete, the A/E shall promptly organize and perform a Substantial Completion inspection in the presence of the University and all appropriate authorities.

(1) If the A/E reasonably determines that the initial punch-list prepared by the Contractor substantially understates the amount of the Work remaining to be completed and the Project is not substantially complete, the A/E shall report this promptly to the University, and upon concurrence of the University, the Contractor will be assessed the costs of the inspection and punch-list preparation incurred by the A/E and the University.

(2) When the Work or designated portion thereof is Substantially Complete, the A/E shall prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion; shall establish responsibilities of the University and Contractor for security, maintenance, heat, utilities, damage to the work and insurance; and shall fix the time within which the Contractor shall finish all items on the punch-list accompanying the Certificate. The Certificate of Substantial Completion shall require approval by the University Representative. If there is a punch-list, the Contractor shall proceed promptly to complete and correct items on the list. Failure to include an item on the punch-list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

(3) Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof except to the extent as provided otherwise in the Contract Documents or if such warranty is related to an item where the work is not complete. Such warranty documents shall state the length of the warranty, which must comply with the Contract Documents.

(4) The Certificate of Substantial Completion shall be submitted by the A/E to the University and Contractor for their written acceptance of responsibilities assigned to them in such Certificate.

(5) Except to the extent the University Representative otherwise approves in advance and in writing, the Contractor shall submit the following documents in order to achieve Substantial Completion: written warranties, guarantees, operation and maintenance manuals, and all complete as-built drawings. The Contractor must also provide or obtain any required approvals for occupancy. The Contractor is responsible for the guaranties of all Work, whether performed by it or by its Subcontractors at any tier.

9.2.2 FINAL COMPLETION INSPECTION. Prior to requesting a final inspection, the Contractor shall verify all punch-list items are corrected/completed. Once all punch-list items are corrected/completed the Contractor shall notify the University and request a final inspection. The University shall notify the A/E and perform a final inspection. Two final inspections may be allowed due to required weather changes required to complete some items. When all punch-list items are completed a final pay request will be provided by the Contractor, authorized by the A/E and processed by the University.
9.3 UNCOVERING OF WORK.

9.3.1 UNCOVER UN-INSPECTED WORK. Except as provided in Paragraph 9.3.3, if a portion of the Work is covered prior to an Inspector's approval to proceed, it must, be uncovered for the Inspector's inspection and be replaced at the Contractor's expense without change in the Contract Time.

9.3.2 OBSERVATION PRIOR TO COVERING. Except as provided in Paragraph 9.3.3, if the University or the A/E has requested in writing to observe conditions prior to any Work being covered or if such observation is specified in the Contract Documents, and the Work is covered without such observation, the Contractor shall be required to uncover and appropriately replace the Work at the Contractor's expense without change in the Contract Time. If the Contractor requests an inspection and the University or A/E, including any inspector of each, does not appear, the Contractor shall immediately notify the University of such lack of appearance, but shall not cover the Work without such inspection.

9.3.3 WHEN AN INSPECTOR FAILS TO APPEAR OR A/E OR THE UNIVERSITY DID NOT MAKE PRIOR REQUEST. If Work is performed by the Contractor without an inspection as provided in Paragraph 9.1.2 or if a portion of the Work has been covered which the A/E or University has not specifically requested to observe prior to its being covered or such observation is not specified by the Contract Documents, the A/E or University may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement, shall, by appropriate Change Order, be charged to the University. If such Work is not in accordance with the Contract Documents, the Contractor shall pay such costs unless the condition was caused by the University or a separate contractor in which event the University shall be responsible for payment of such costs.

9.4 CORRECTION OF WORK AND GUARANTY PERIOD.

9.4.1 CONTRACTOR CORRECT THE WORK. The Contractor shall correct Work rejected by the A/E, Inspector or University, or failing to conform to the requirements of the Contract Documents, whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear the costs of correcting such rejected Work, including additional testing and inspections and compensation for the A/E's and Inspector's services and expenses made necessary thereby.

9.4.2 GUARANTY AND CORRECTION AFTER SUBSTANTIAL COMPLETION. If within one year after the date of Substantial Completion of the Work or designated portion thereof, or after the date for commencement of warranties established under Paragraph 9.2.1 or by terms of an applicable special warranty or guaranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, including failure to perform for its intended purpose, the Contractor shall correct it promptly after receipt of written notice from the University to do so unless the University has previously given the Contractor a written acceptance of such condition. The period of one year shall be extended with respect to portions of the Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This obligation of the Contractor under this Paragraph 9.4.2 shall be operative notwithstanding the acceptance of the Work under the Contract, the final certificate of payment, partial or total occupancy and/or termination of the Contract. The University shall give notice of observed defects with reasonable promptness, however, failure to give such notice shall not relieve the Contractor of its obligation to correct the Work at the cost that the Contractor would have incurred if the University did so report with reasonable promptness. All corrected Work shall be subject to a one-year guaranty period the same in all respects as the original Work, except that such guaranty period
shall commence from the time of Substantial Completion of the corrected Work. This guaranty period does not affect the University’s right to pursue any available remedies against Contractor.

9.4.3 REMOVAL OF WORK.

(1) The Contractor shall promptly remove from the premises all Work that the University and/or the A/E determines as being in nonconformance with the Contract Documents, whether incorporated or not.

(2) The Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to the University.

(3) The Contractor shall bear the expense of correcting destroyed or damaged construction, whether completed or partially completed, of the University or of other contractors destroyed or damaged by such removal or replacement.

(4) If the Contractor does not remove such rejected Work within a reasonable time, fixed by written notice, the University may have the materials removed and stored at the expense of the Contractor.

(5) If the Contractor does not correct the nonconforming Work within a reasonable time, fixed by written notice, the University may correct it in accordance with Paragraph 12.2.2 of these General Conditions.

9.4.4 NOT LIMIT OTHER OBLIGATIONS. Nothing contained in this Article 9.4 shall be construed to establish a period of limitation with respect to other obligations which the Contractor may have under the Contract Documents. Establishment of the time period of one year as described in Paragraph 9.4.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor’s liability with respect to the Contractor’s obligations other than specifically to correct the Work.

9.5 ADDITIONAL WARRANTIES.

9.5.1 IN GENERAL. In addition to any other provisions of this Article 9, the following warranties shall apply:

(1) The Contractor warrants to the University that materials and equipment furnished under the Contract will be of good quality and new, except to the extent otherwise required or expressly permitted by the Contract Documents.

(2) The Contractor also warrants to the University that the Work will be free from defects not inherent in the quality required or permitted and that the Work will conform with the requirements of the Contract Documents. Work not conforming to said requirements, including substitutions not properly approved and authorized, may be considered defective at the University’s option.

9.5.2 EXCLUSION. Unless due to the negligent or intentional act or omission of the Contractor or those under the Contractor’s control, or as otherwise stated in the Contract Documents, the Contractor’s guaranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage.

9.5.3 FURNISH EVIDENCE ON REQUEST. If requested by the A/E or University, the Contractor shall furnish satisfactory evidence as to the type and quality of materials and equipment.

9.6 ACCEPTANCE OF NONCONFORMING WORK.
If the University prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the University may do so in writing instead of requiring its removal and correction, in which case the Contract Sum shall
be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 10. INSURANCE AND BONDS.

10.1 LIABILITY INSURANCE.

10.1.1 IN GENERAL. To protect against liability, loss and/or expense arising from damage to property or injury or death of any person or persons incurred in any way out of, in connection with or resulting from the Work provided hereunder, Contractor shall obtain and maintain in force during the entire period of this Contract without interruption, at its own expense, the following insurance from insurance companies authorized to do business in the State of Utah in a form and content satisfactory to the University and rated “A-” or better with a financial size category of (a) Class X or larger where the Contract Sum is $1,000,000 or greater or (b) Class VII or larger where the Contract Sum is under $1,000,000. Said rating and financial size category shall be as published by A.M. Best Company at the time the Contract is executed.

1. Workers’ Compensation Insurance and Employers’ Liability Insurance. Worker’s Compensation Insurance shall cover full liability under the Worker’s Compensation Laws of the jurisdiction in which the Project is located at the statutory limits required by said jurisdiction’s laws. Employer’s Liability Insurance shall provide the following limits of liability: $100,000 for each accident; $500,000 for Disease-Policy Limit; and $100,000 for Disease-Each Employee. The Contractor shall require all Subcontractors to take and maintain similar policies of Worker’s Compensation Insurance.

2. Commercial General Liability Insurance.

(a) Commercial General Liability Insurance, on an “occurrence basis,” including insurance for operations, independent contractors, subcontractors at any tier, products/completed operations and contractual liability specifically designating the Indemnity provisions of these General Conditions as an insured contract on the Certificate of Insurance. Such Commercial General Liability Insurance must be endorsed with a Broad Form Property Damage Endorsement (including Completed Operations) and afford coverage for explosion, collapse and underground hazards. Such Commercial General Liability Insurance shall be in limits not less than the following:

$2,000,000 General Aggregate, plus:

1. If the Construction Value is $25,000,000 or more, an additional $5,000,000 umbrella policy (which covers aggregate and per occurrence) is required; or

2. If the Construction Value is $10,000,000 or more but less than $25,000,000, an additional $2,000,000 umbrella policy (which covers aggregate and per occurrence) is required.

$1,000,000 Products-Completed Operations Aggregate
$1,000,000 Personal and Advertising Injury
$1,000,000 Each Occurrence

(b) For purposes of this subparagraph 2(a), Construction Value means:

1. the Contract Sum if the work is being performed under a Standard Construction Contractor’s Agreement;

2. the Fixed Limit of Construction Costs if the work is being performed under a Construction Manager/General Contractor Agreement; or

3. the Guaranteed Fixed contract Amount if the work is to be performed under a Design/Build Agreement.

3. Automobile liability insurance for claims arising from the ownership, maintenance, or use of a motor vehicle. The insurance shall cover all owned, non-owned, and hired automobiles used in connection with the Work, with the following minimum limits of liability:
Combined Single Limit Bodily Injury and Property Damage Per Occurrence

(4) Aircraft Use. Contractor using its own aircraft, or employing aircraft in connection with the Work performed under this Agreement shall maintain Aircraft Liability Insurance with a combined single limit of not less than $1,000,000 per occurrence. Said certificate shall state that the policy required by this paragraph has been endorsed to name the University of Utah as Additional Insureds.

(5) Unless otherwise provided by the procurement documents, the insurance requirements in 10.1.1(1) through (4) above do not apply to subcontractors or suppliers at any tier under the Contractor and any insurance requirements of subcontractors and suppliers at any tier is a matter between the General Contractor and such subcontractor or supplier.

10.1.2 CONFIGURATIONS. Any policy required by this Article may be arranged under a single policy for the full limit required, or by a combination of underlying policies with the balance provided by an Excess or Umbrella Liability Policy.

10.1.3 CONTRACTOR LIABILITY. Irrespective of the requirements as to insurance to be carried by Contractor as provided herein; insolvency, bankruptcy or failure of any insurance company to pay all claims accruing, shall not be held to relieve Contractor of any obligations hereunder.

10.1.4 CERTIFICATE, NOTICE REQUIREMENTS, ADDITIONAL INSURED. Before the Contract Agreement is executed, certificates evidencing coverages as specified above are in effect, shall be furnished to the University. Such insurance certificates shall contain provisions that no cancellation, material change therein or non-renewal shall become effective except upon thirty (30) days prior written notice to the University as evidenced by return receipt, certified mail sent to the University. The Contractor shall notify the University within thirty (30) days of any claims(s) against the Contractor, and if such claim(s) exceed 20% of the applicable required insured limits, the University may require the Contractor to re-instate the policy to provide full protection at the original limits. For any risk not covered by the Worker’s Compensation Policy, the University of Utah shall be named as additional insured parties. All insurance policies provided shall be primary and non-contributing with, and not in excess of, any other insurance or self-insurance available to the University of Utah.

10.1.5 DEDUCTIBLE LIABILITY. Any and all deductibles in the above described policies shall be assumed by, for the account of, and at sole risk of Contractor. The allowable deductible for any of the policies required by these General Conditions shall be no more than $1,000 or 0.1 percent of the Contract Amount, whichever is greater. When there is an FLCC, the FLCC shall be the Contract Amount for purposes of calculating the allowable deductible.

10.1.6 ADDITIONAL REQUIREMENTS:

(1) Any type of insurance or any increase of limits of liability not described in this Agreement which the Contractor requires for its own protection or on account of any statute, rule or regulation, shall be its own responsibility and at its own expense.

(2) The carrying of any insurance required by this Agreement shall in no way be interpreted as relieving the Contractor or Subcontractors of any other responsibility or liability under this Agreement or any applicable law, statute, rule, regulation or order.

(3) Contractor shall not violate or knowingly permit to be violated any of the provisions of the policies on insurance required under these General Conditions.

10.2 "BUILDER’S RISK" PROPERTY INSURANCE.

10.2.1 IN GENERAL. The University shall provide "Builder’s Risk" property insurance to protect the University, as well as all
Contractors and Subcontractors, and include them as insureds, with respect to Work performed hereunder at the University's own cost and expense, according to the policies and forms currently in force with insurance carriers selected by the University's Risk Manager. The University of Utah's Risk Manager shall furnish, upon request, all parties in interest with copies of said policies.

10.2.2 INSPECTIONS, RECOMMENDATIONS. The University, the state Division of Risk Management and the Builder's Risk insurers shall have the right to inspect the Work. The Contractor shall comply with reasonable risk control recommendations made by insurers or the state Division of Risk Management. Such inspections or recommendations do not relieve the Contractor of any of its responsibilities under the Contract Documents.

10.2.3 DEDUCTIBLE. The above described "Builders Risk" policies shall be subject to a total deductible of $5,000 per loss occurrence, which shall be assumed by all Contractors or Subcontractors, in proportion to their share of the total amount of an insured loss occurrence.

10.2.4 ADJUSTED WITH AND PAYABLE TO RISK MANAGER AS TRUSTEE. Any insured property loss is to be adjusted with the State of Utah Risk Manager, and made payable to the State of Utah Risk Manager as trustee for the Contractor and Subcontractors, as their interests may appear, subject to the requirements of any applicable loss payable clause.

10.2.5 WAIVER. Contractor, including all Subcontractors, and University hereby waive all rights against each other for damages caused by perils insured against under the "Builder's Risk" insurance provided by the University, except such rights as Contractor may have to the proceeds of such insurance held by the State of Utah's Risk Manager as trustee. The University and the Contractor each shall require similar waivers from their contractors, subcontractors, subconsultants and agents, at any tier.

10.2.6 SPECIAL HAZARDS. The University shall bear the risk of loss, delay and/or damage due to earthquake and/or flood and may either insure or self-insure that risk. If the Contractor requests in writing that insurance for other special hazards be included in the "Builder's Risk" policy, the State of Utah's Risk Manager shall, if possible, include such insurance in the policy and the cost thereof shall be charged to the Contractor by Change Order.

10.3 PERFORMANCE BOND AND PAYMENT BOND. The Contractor shall submit and maintain in full force and effect as required by law and the Contract Documents, at its own expense, on forms provided by the University, and include as part of the quoted total all costs involved in securing and furnishing, the bonds listed below, based on the completed cost of the Contract and effective upon execution of the Contract. Said bonds shall be from surety companies which are authorized to do business in the State of Utah, listed in the U. S. Department of Treasury Circular 570, Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies, and acting within the limitation listed therein.

10.3.1 A full 100 percent performance bond covering the faithful execution of the Contract in accordance with the Contract Documents; and

10.3.2 A full 100 percent payment bond covering payment of all obligations arising under the Contract Documents, for the protection of each person supplying labor, service, equipment, or material for the performance of the Work.

10.3.3 Any required insurance required under the U.S. Terrorism Risk Insurance Act of 2002, any similar applicable law, or as such Act may be amended.
ARTICLE 11. MISCELLANEOUS PROVISIONS.

11.1 A/E'S RESPONSIBILITIES.
The General Conditions are not intended to provide an exhaustive or complete list of the A/E's responsibilities. A separate agreement between the University and A/E incorporates these General Conditions by reference and includes additional Design responsibilities.

11.2 SUCCESSORS AND ASSIGNS.
The University and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. The Contractor shall not assign the Contract without the prior written consent of the University, nor shall the Contractor assign any amount due or to become due as well as any rights under the Contract, without prior written consent of the University.

11.3 WRITTEN NOTICE.

11.3.1 PERSONAL DELIVERY AND REGISTERED OR CERTIFIED MAIL.
Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail, return receipt requested, to the last business address known to the party giving notice, confirming the FAX delivery.

11.4 RIGHTS AND REMEDIES.

11.4.1 NOT LIMIT. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

11.4.2 NOT WAIVER. Except as expressly provided elsewhere in the Contract Documents, no action or failure to act by the University, A/E or Contractor shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval or acquiescence in a breach thereunder, except as any of the above may be specifically agreed to in writing. In no case shall the Contractor or any Subcontractors be entitled to rely upon any waiver of any of these General Conditions unless agreed to in writing by the University.

11.5 COMMENCEMENT OF STATUTORY LIMITATION PERIOD.

11.5.1 BEFORE SUBSTANTIAL COMPLETION. Except as provided in 11.5.4 below, as to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion.

11.5.2 BETWEEN SUBSTANTIAL COMPLETION AND FINAL CERTIFICATION FOR PAYMENT.
Except as provided in Paragraph 11.5.4 below, as to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certification for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the
date of issuance of the final Certification for Payment.

11.5.3 AFTER FINAL CERTIFICATION FOR PAYMENT.
Except as provided in Paragraph 11.5.4 below, as to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any guaranty provided under Article 9 the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 9.4.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or the University, whichever occurs last.

11.5.4 EXCEPTION. Notwithstanding any other provision of this Article 11.5 to the contrary, no applicable statute of limitations shall be deemed to have commenced with respect to any portion of the Work which is not in accordance with the requirements of the Contract Documents, which would not be visible or apparent upon conducting a reasonable investigation, and which is not discovered by the University until after the date which, but for this Paragraph 11.5.4, would be the date of commencement of the applicable statute of limitations; the applicable statute of limitations instead shall be deemed to have commenced on the date of such discovery by the University.

11.6 NOT DISCRIMINATE, NO SEXUAL HARASSMENT.
Pursuant to the laws of the State of Utah, the Contractor, Subcontractors, or anyone for whose act any of them may be liable, will take affirmative action to not discriminate against any employee or applicant for employment because of race, creed, color, sex, religion, ancestry or national origin. To the extent applicable, said persons will comply with all provisions of Executive Order No. 11246 dated September 24, 1965 and rules, regulations, orders, instructions, designations and other directives promulgated pursuant thereto.

Contractor, Subcontractors, or anyone for whose act any of them may be liable, shall not act in any manner as would violate the laws, regulations and policies of the United States or the State of Utah prohibiting sexual harassment.

11.7 APPLICABLE LAWS.
The applicable laws and regulations of the State of Utah, as well as any applicable local laws and regulations not superseded or exempted by State law, shall govern the execution of the Work embodied in the Contract Documents as well as the interpretation of the Contract Documents.

11.8 INTERPRETATION.
In the interest of brevity, the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an", but the fact that a modification or an article is absent from the statement and appears in another is not intended to affect the interpretation of either statement.

11.9 VENUE.
In case of any dispute, which may arise under the Contract Documents, the place of venue shall be in the County of Salt Lake, Utah, unless otherwise agreed to by all the parties in writing.

11.10 SEVERABILITY.
The invalidity of any part, paragraph, subparagraph, phase, provision or aspect of the Contract documents shall not impair or affect in any manner the validity, enforceability or effect of the remainder of the Contract Documents.

11.11 CONSTRUCTION OF WORDS.
Unless otherwise stated in the Contract Documents, words, which have well-known technical or construction industry meanings, shall be construed as having such recognized meanings. Unless the context requires otherwise, all other technical words shall be construed in accordance with the meaning normally established by the particular, applicable profession or industry. All other words, unless the context requires otherwise, shall be construed with an ordinary, plain meaning.
11.12 NO THIRD PARTY RIGHTS.
These General Conditions create rights and duties only as between the University and Contractor, and the University and A/E. Nothing contained herein shall be deemed as creating third party beneficiary contract rights or other actionable rights or duties as between Contractor and A/E, or as between the University, Contractor, or A/E on the one hand, and any other person or entity.

ARTICLE 12. TERMINATION OR SUSPENSION OF THE CONTRACT.

12.1 TERMINATION BY CONTRACTOR.

12.1.1 IN GENERAL. If the Work is stopped for a period of sixty (60) days through no act or fault of the Contractor or a Subcontractor, or their agents or employees or any other persons performing portions of the Work under contract with any of the above, the Contractor, may terminate the Contract in accordance with 12.1.2 hereinbelow for any of the following reasons:

(1) Because the University has persistently failed to fulfill fundamental University obligations under the Contract Documents with respect to matters important to the progress of the Work;

(2) Issuance of an order of a court or other public authority having jurisdiction which necessitates such termination, except that where the Contractor has standing, the Contractor must cooperate in efforts to stay and/or appeal such order;

(3) An act of government, such as a declaration of national emergency, making material unavailable; or

(4) Unavoidable casualties or other similar causes as listed in Paragraph 12.2.2(2) hereinbelow.

12.1.2 NOTICE. If one of the reasons for termination in Paragraph 12.1.1 hereinabove exist, the Contractor may, upon ten (10) additional days' written notice to the University and A/E, and such condition giving cause for termination still not cured, terminate the Contract and recover from the University payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages associated only with work completed prior to the notice of termination.

12.2 TERMINATION BY THE UNIVERSITY FOR CAUSE.

12.2.1 IN GENERAL. The Director or Designee may terminate the Contract if the Contractor fails to cure any of the following within a period of ten (10) days (or longer if the University so approves in writing) after receipt of notice from the University specifying the cause for termination:

(1) The Contractor persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;

(2) The Contractor fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;

(3) The Contractor persistently disregards laws, ordinances, or rules, regulations, resolutions or orders of a public authority having jurisdiction; or

(4) The Contractor fails to perform the Work within the time specified in the Contract Documents or any authorized extension thereof or the Contractor fails to make progress with the Work as to endanger such compliance;

(5) The Contractor fails to perform the Work or is otherwise in breach of a material provision of the Contract Documents;

(6) The Contractor fails to respond promptly to the financial responsibility inquiry under the Contractor's Agreement;
(7) As permissible by law for a reason to terminate, the Contractor is adjudged bankrupt;

(8) As permissible by law for a reason to terminate, the Contractor should make a general assignment for the benefit to creditors;

(9) As permissible by law for a reason to terminate, the Contractor should have a receiver appointed on account of the Contractor's insolvency; or

(10) The Contractor fails to follow the material safety requirements and precautions either as expressly provided in the Contract Documents or as consistent with the customary practices in the industry.

12.2.2 UNIVERSITY'S RIGHT TO CARRY OUT THE WORK.

(1) If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten (10) day period (or longer if approved by the University in writing) after receipt of written notice from the University to cure such default or neglect, the University may without prejudice to other remedies the University may have, correct such deficiencies, including taking over the Work and prosecuting the same to completion, by contract or otherwise, and may take possession of, and utilize in completing the Work, such materials, appliances, and facilities as may be on the site of the Work as well as the site as necessary for its proper completion. In such case, the University shall offset from payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the A/E, the University's staff and legal counsel's additional services and expenses made necessary by such default, neglect or failure. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the University. The Contractor shall continue performance of the Contract to the extent not terminated.

(2) Except with respect to defaults of Subcontractors, the Contractor shall not be liable for any excess costs if the failure to perform the Contract arises out of causes beyond the control and without the fault or negligence of the Contractor or anyone for whom the Contractor may be liable. Such causes may include, but are not limited to, acts of God or of the public enemy, acts of the University of Utah, State of Utah or federal government in either their sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather; but in every case the failure to perform must be beyond the control and without the fault or negligence of the Contractor or anyone for whom the Contractor may be liable. If the failure to perform is caused by the default of a Subcontractor, and if such default arises out of causes beyond the control of both the Contractor and the Subcontractor, and without the fault or negligence of either of them or anyone for whom either may be liable, the Contractor shall not be liable for any excess costs for failure to perform unless the supplies or services to be furnished by the Subcontractor were obtainable from other sources in sufficient time to permit the Contractor to meet the required delivery or completion schedule.

12.2.3 ITEMS REQUIRED TO BE TRANSFERRED OR DELIVERED.

The University may require the Contractor to transfer title and deliver to the University, in the manner and to the extent directed by the University:

(1) Any completed portion of the Work; and

(2) Any partially completed portion of the Work and any parts, tools, dies, jigs, fixtures, drawings, information, and contract rights (hereinafter called "construction materials") as the Contractor has specifically produced or specifically acquired for the performance of such part of this Contract as has been terminated; and the Contractor shall, upon direction of the University, protect and preserve property in the possession of the Contractor in which the University has an interest.
12.2.4 PAYMENT. When the University terminates the Contract for one or more of the reasons stated in Paragraph 12.2.1, the University may withhold payment and/or pursue all available remedies.

12.2.5 UNIVERSITY PROTECTION IF LIENABLE. When the subject property is lienable, the University may withhold from amounts otherwise due the Contractor for such completed Work or construction materials such sum as the University determines to be necessary to protect the University and the State against loss because of outstanding liens or claims for former lien holders.

12.2.6 CREDITS AND DEFICITS. If the unpaid balance of the Contract Sum exceeds the full cost of finishing the Work, including compensation for the A/E's services and expenses made necessary thereby, such excess shall be paid to the Contractor. If such cost exceeds the unpaid balance, the Contractor shall pay the difference to the University this obligation for payment shall survive the termination of the Contract.

12.2.7 IF CONTRACTOR FOUND NOT IN DEFAULT OR EXCUSABLE. If, after notice of termination of the Contract under the provisions of this Article, it is determined for any reason that the Contractor was not in default under the provisions of this Article, or that the default was excusable under the provisions of this Article, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the termination for convenience provisions.

12.2.8 RIGHTS AND REMEDIES NOT EXCLUSIVE. The rights and remedies of the University provided in this Article 12.2 shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

12.3 SUSPENSION, DELAY OR INTERRUPTION OF WORK BY THE UNIVERSITY FOR CONVENIENCE.

12.3.1 BY THE UNIVERSITY IN WRITING. The University may in writing and without cause, order the Contractor to suspend, delay or interrupt the Work in whole or in part for such period of time as the University may determine to be appropriate for the convenience of the University.

12.3.2 TIME PERIOD FOR CLAIMS. Any PRE by the Contractor for adjustment under this Article 12.3 must be asserted by the Contractor, in writing, within twenty-one (21) days from the date of termination of such suspension, delay or interruption; provided that the University may, in its sole discretion, receive and act upon any such PRE asserted at any time prior to final payment under this Contract.

12.3.3 ADJUSTMENTS. Any adjustment in Contract Sum and Time shall be in accordance with Articles 3, 4, and 7.

12.4 TERMINATION FOR CONVENIENCE OF THE UNIVERSITY.

12.4.1 IN GENERAL. The performance of Work under this Contract may be terminated by the University in accordance with this Article 12.4 in whole, or from time to time, in part, whenever the University shall determine that such termination is in the best interest of the University or any person for whom the University is acting under this Contract. Any such termination shall be effected by delivery to the Contractor of a notice of termination specifying the extent to which performance of Work under the Contract is terminated, and the date upon which such termination becomes effective.

12.4.2 CONTRACTOR OBLIGATIONS. After receipt of a notice of termination, and except as otherwise directed by the University in writing, the Contractor shall:
(1) Stop work under the Contract on the date and to the extent specified in the notice of termination;

(2) Place no further orders or subcontracts for materials, services or facilities, except as may be necessary for completion of such portion of the Work under the Contract as is not terminated;

(3) Terminate all orders and subcontracts to the extent that they relate to performance of Work terminated by the notice of termination;

(4) Assign to the University in the manner, at the times, and to the extent directed by the University, all of the right, title and interest of the Contractor under the orders and subcontracts so terminated, in which case the University shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

(5) Settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, with the approval or ratification of the University, which approval or ratification shall be final for all the purposes of this Article 12.4;

(6) Transfer title and deliver to the University in the manner, at the times, and to the extent, if any, directed by the University:

(a) The fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced as a part of, or acquired in connection with the performance of the Work terminated by the notice of termination; and

(b) The completed or partially completed drawings, information, and other property which, if the Contract had been completed, would have been required to be furnished to the University;

(7) Use best efforts to sell, in the manner, at the times, to the extent, and at the price or prices directed or authorized by the University, any property of the types referred to in Paragraph 12.4.2(6) above; provided, however, that the Contractor:

(a) Shall not be required to extend credit to any purchaser; and

(b) May acquire any such property under the conditions prescribed by and at a price or prices approved by the University; and provided further that the proceeds of any such transfer of or disposition shall be applied in reduction of any payments to be made by the University to the Contractor under this Contract or shall otherwise be credited to the price or cost of the Work covered by this Contract or paid in such other manner as the University may direct;

(8) Complete performance of such part of the Work as shall not have been terminated by the notice of termination; and

(9) Take such action as may be necessary, or as the University may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Contractor in which the University or State has or may acquire an interest.

12.4.3 TERMINATION CLAIM.
After receipt of a notice of termination, the Contractor may submit to the University a PRE, in the form and with certification prescribed by the University. Such PRE shall be submitted promptly but in no event not later than sixty (60) days from the effective date of termination.

12.4.4 AGREED UPON PAYMENT.
Subject to the provisions of Paragraph 12.4.3 above, the Contractor and the University may agree upon the amount to be paid to the Contractor by reason of the total or partial termination of Work pursuant to this Article 12.4.

12.4.5 PAYMENT NOT AGREED UPON. In the event of the failure of the Contractor and the University to agree, as provided in Paragraph 12.4.4, upon the whole
amount to be paid to the Contractor by reason of the termination of Work pursuant to this Article 12.4, the University shall pay to the Contractor the amounts determined by the University as follows, but without duplication of any amounts agreed upon in accordance with Paragraph 12.4.4:

(1) With respect to all Contract Work performed prior to effective date of the notice of termination, the total (without duplication of any items) of:

(a) The cost of such Work including undisputed Claim amounts;

(b) The cost of terminating, settling and paying claims arising out of the termination of Work under subcontracts or orders as provided in Paragraph 12.4.2(5) above, exclusive of the amounts paid or payable on account of supplies or materials delivered or services furnished by Subcontractors prior to the effective date of the notice of termination under this Contract, which amounts shall be included in the cost on account of which payment is made under Paragraph 12.4.5(1)(a) above;

(c) A sum, as overhead and profit on Paragraph 12.4.5(1)(a) above, determined by the University to be fair and reasonable;

(d) The reasonable cost of the preservation and protection of property incurred pursuant to Paragraph 12.4.2(9); and any other reasonable cost incidental to termination of Work under this Contract, including expenses incidental to the determination of the amount due to the Contractor as the result of the termination of Work under this Contract.

(2) The total sum to be paid to the Contractor under Paragraph 12.4.5(1) above shall not exceed the total Contract Sum as reduced by the amount of payments otherwise made and as further reduced by the Contract price of work not terminated. Except for normal spoilage, and except to the extent that the University shall have otherwise expressly assumed the risk of loss in writing, there shall be excluded from the amounts payable to the Contractor under Paragraph 12.4.5(1) above, the fair value of property which is destroyed, lost, stolen, or damaged so as to become undeliverable to the University, or to a buyer pursuant to Paragraph 12.4.2(7).

12.4.6 DEDUCTIONS. In arriving at the amount due the Contractor under this Article 12.4, there shall be deducted:

(1) All unliquidated advance or other payments on account theretofore made to the Contractor, applicable to the terminated portion of this Contract;

(2) Any Claim which the University may have against the Contractor in connection with this Contract; and

(3) The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the Contractor or sold, pursuant to the provisions of this Article 13.4, and not otherwise recovered by or credited to the University.

12.4.7 PARTIAL TERMINATION.
If the termination is partial, the Contractor may file with the University a PRE for the amounts specified in the Contract relating to the continued portion of the Contract and such equitable adjustment as may be agreed upon shall be made in such amounts. Any PRE under this Paragraph 12.4.7 must be filed within twenty-one (21) days from the effective date of the notice of termination.

12.4.8 PARTIAL PAYMENTS.
The University may, from time to time, under such terms and conditions as it may prescribe, make partial payments and payments on account against costs incurred by the Contractor in connection with the terminated portion of this Contract whenever, in the opinion of the University the aggregate of such payments shall be within the amount to which the Contractor will be entitled hereunder. If the total of such payments is in excess of the amount finally agreed or determined to be due under this Article 12.4, such excess shall be payable by the
Contractor to the University upon demand, together with interest at a rate equal to the average rate at the time being received from the investment of state funds, as determined by the State Treasurer, for the period until the date such excess is repaid to the University; provided, however, that no interest shall be charged with respect to any such excess payment attributable to a reduction in the Contractor's claim by reason of retention or other disposition of termination inventory until ten (10) days after the date of such retention or disposition, or such later date as determined by the University by reason of the circumstances.

12.4.9 PRESERVE AND MAKE AVAILABLE RECORDS. Unless otherwise provided for in this Contract, or by applicable law, the Contractor shall, from the effective date of termination until the expiration of three years after final settlement under this Contract, preserve and make available to the University at all reasonable times at the office of the Contractor, but without direct charge to the University, all books, records, documents and other evidence bearing on the costs and expenses of the Contractor under this Contract and relating to the Work terminated hereunder, or, to the extent approved by the University Representative, photographs, micrographs, or other authentic reproductions thereof.

12.5 UNIVERSITY'S RIGHT TO STOP THE WORK.
If the Contractor fails to correct Work or fails to carry out Work, as required by the Contract Documents or fails to comply with all required and customary safety precautions; the University, by written order signed personally or by an agent specifically so empowered by the University in writing, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the University to stop the Work shall not give rise to a duty on the part of the University to exercise this right for the benefit of the Contractor or any other person or entity.
The University of Utah  
FACILITIES MANAGEMENT

SUPPLEMENTAL  
GENERAL CONDITIONS  
FOR UNIVERSITY OF UTAH PROJECTS

September 30, 2011

TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>ARTICLES</th>
<th>Page Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Basic Definitions</td>
<td>2</td>
</tr>
<tr>
<td>2. Affirmative Action</td>
<td>2</td>
</tr>
<tr>
<td>3. Access to Communications Manholes</td>
<td>2</td>
</tr>
<tr>
<td>4. Digging Permits</td>
<td>2</td>
</tr>
<tr>
<td>5. Request for Utility Shutdown</td>
<td>3</td>
</tr>
<tr>
<td>6. Drug Free Workplace</td>
<td>4</td>
</tr>
<tr>
<td>7. Hazardous Chemicals</td>
<td>4</td>
</tr>
<tr>
<td>8. Interim Life Safety Measures</td>
<td>4</td>
</tr>
<tr>
<td>9. Keys</td>
<td>4</td>
</tr>
<tr>
<td>10. No Smoking Area</td>
<td>5</td>
</tr>
<tr>
<td>11. Operating &amp; Maintenance Manuals / Warranties &amp; Guarantees</td>
<td>5</td>
</tr>
<tr>
<td>12. Parking Permits</td>
<td>7</td>
</tr>
<tr>
<td>13. Parking on University Sidewalks</td>
<td>7</td>
</tr>
<tr>
<td>14. Sexual Harassment</td>
<td>7</td>
</tr>
<tr>
<td>15. Site Lighting</td>
<td>7</td>
</tr>
<tr>
<td>16. Tax Exemption</td>
<td>7</td>
</tr>
<tr>
<td>Tax Exemption Certificate</td>
<td>8</td>
</tr>
<tr>
<td>17. Water Use on Campus</td>
<td>9</td>
</tr>
<tr>
<td>18. Storm Water Pollution Prevention (SWPPP)</td>
<td>9</td>
</tr>
<tr>
<td>19. Vehicle Idling Policy</td>
<td>10</td>
</tr>
<tr>
<td>20. Environmentally Preferable Products</td>
<td>10</td>
</tr>
<tr>
<td>21. Integrity of Fire Rated Partitions</td>
<td>10</td>
</tr>
<tr>
<td>22. Roof Access</td>
<td>11</td>
</tr>
<tr>
<td>23. Utility Connections</td>
<td>11</td>
</tr>
<tr>
<td>24. Additional OSHA Requirements</td>
<td>18</td>
</tr>
</tbody>
</table>

Revision Note: This document replaces the Supplemental General Conditions for University of Utah Projects dated May 2, 2011. The only change is a new paragraph 5.1 added to Article 5 “Request for Utility Shutdown.”
Article 1  Basic Definitions
Except as otherwise described herein, definitions provided in the General Conditions apply to this document. The following definition is added to the General Conditions:

UNIVERSITY PROJECT MANAGER. “University Project Manager” means the University of Utah Facilities Management person directly assigned to coordinate the University’s interests and involvement in the Work. If the contractor’s agreement is issued by the University of Utah, the “University Project Manager” is the “University’s Representative” as defined in the General Conditions.

Article 2  Affirmative Action
The Contractor is encouraged to utilize the services of Small Business Enterprises, Disabled Veteran-Owned Business Enterprises, Minority-Owned Business Enterprises, Woman-Owned Business Enterprises, and Small Disadvantage Business Enterprises as subcontractors and/or suppliers for University projects. The Contractor may be required to survey and provide information on contracts and utilization of these services.

Article 3  Access to Communication Manholes
The University of Utah requires communications manholes on campus to be fitted with a secure access system. Authorization will be required before the Contractor may enter any communication manhole, whether secured or not. Authorization will be requested through the University Project Manager and permission will be given by University Information Technology - Network and Communication Services.

3.1 The Contractor must not proceed with any work in the manhole without first fully understanding the systems and equipment currently in place. Assistance in identifying communications systems and their functions in the manhole may be obtained from University Information Technology - Network and Communication Services at 801-581-8999.

3.2 Note that campus communication systems provide support to several critical functions at the University, including, but not limited to major research activities. An unintended shutdown may adversely affect several critical functions, including highly expensive research. Unintended shutdown of any communication service caused by the Contractor which results in any damage(s) will be assessed to and paid by the Contractor.

Article 4  Digging Permits
A Digging Permit shall be required for all underground digging on campus. The University and other non-University entities support an extensive network of underground utilities.

4.1 Contractors shall request digging permits through the University Project Manager.

4.2 Requests for a Digging Permit are available on-line or from the University Project Manager. Requests must be submitted at least five full University working days prior to the commencement of digging. The request should include a description of the intended work, and drawing(s) showing the intended work area and the contract limit lines.
4.3 This permit process does not automatically request Blue Stakes assistance. The Contractor must also contact Blue Stakes and other utility companies as applicable for assistance in locating non-University underground utilities.

4.4 The issued Digging Permit will identify University utilities known to exist within the affected area. After issuance of the permit, Facilities Management ("FM") will mark the location of existing University utilities at the site. Note that there is a risk that some underground utilities may not be documented in University records. All excavation should proceed with caution.

4.5 During excavation, the equipment operator shall have copies of the Digging Permit and Blue Stakes documentation in his/her immediate possession to guide the operator in utility avoidance and to document the University’s approval of the work.

4.6 Additional assistance in locating existing University utilities is available from the University Surveyor at 801-585-5070.

4.7 Contractor shall provide the University Project Manager notice of not less than two working days prior to backfilling over utilities or other underground improvements. While the intent of this requirement is to allow the University to collect survey data, this does not relieve the Contractor of its obligation to maintain As-Built documentation required by Article 4.8 of the General Conditions.

**Article 5  Request for Utility Shutdown**

A Request for Utility Shutdown shall be submitted to the University Project Manager for each anticipated interruption of any existing utility service on campus. This includes, but is not limited to, any interruption to electric systems, communications; control systems, security, gas (natural, laboratory gasses, etc.), water (potable, non-potable, purified, etc.), steam systems, high-temperature water systems; sanitary sewer, storm sewer, etc. The Contractor is to discuss anticipated shut-down requirements with University Project Manager well in advance of the proposed shut-down.

5.1 Prior to beginning any work on a Utility Shutdown, the Contractor must meet with the University Project Manager and Plant Operations staff to define a hazard control plan that can include Lock Out Tag Out, Confined Space Entry, and NFPA 70 compliance. Refer to Article 24 in these Supplemental General Conditions for additional information. The Contractor must verify that all sources of hazardous energy for the affected system have been identified, properly controlled and/or isolated, and locked out prior to beginning any work. The Contractor and its subcontractors shall place their own locks on the shut down system as an added measure of protection for their employees.

5.2 Utility Shutdown Request forms are available on-line or they can be obtained from the University Project Manager.

5.3 Submit the request to the University Project Manager at least three (3) full University working days prior to the day of shut-down.
5.4 A longer lead time is required for interruptions affecting several campus departments, scientific experiment disruption, and similar complications. Shutdowns of this nature must be identified early and reviewed with the University Project Manager in order to determine notice requirements.

5.5 Each utility shut-down request is subject to approval by Campus Design & Construction, Plant Operations, and University departments which will be affected by the proposed loss of service.

5.6 If immediate shutdown is required to prevent damage to personnel or property, contact Plant Operations Dispatch at 801-581-7221.

Article 6 Drug Free Workplace
It is the policy of the University of Utah that "...the unlawful manufacture, distribution, dispensation, possession, or use of a controlled substance on University property is prohibited." All contractors, subcontractors, and their employees, while under contract with the University must abide by the terms of the above policy. Violation may result in termination of the contract. The University will prosecute violators of this policy to the fullest extent possible.

Article 7 Hazardous Chemicals
The University of Utah shall inform contractors of hazardous chemicals their employees may be exposed to while working on University projects. Conversely, the Contractor shall inform the University of Utah of all hazardous chemicals the Contractor will bring on campus that University of Utah employees may be exposed to. This exchange of information shall occur through the University Project Manager.

Article 8 Interim Life Safety Measures
The Contractor must observe the following interim life safety measures during construction of the project. The University must approve any variance or exception in writing.

8.1 All exits will provide free and unobstructed egress.

8.2 Free and unobstructed access to emergency departments and for emergency forces will be maintained.

8.3 Fire alarm, detection, and suppression systems will not be impaired. In the event of disruption, alternative systems shall be provided which are satisfactory to the authority having jurisdiction.

8.4 Temporary construction partitions will be smoke tight and built of non-combustible or limited combustible materials that will not contribute to the development or spread of a fire.

8.5 The Contractor will provide appropriate additional fire fighting equipment (such as charged, current fire extinguishers) on the construction site.

8.6 Smoking is prohibited in or adjacent to construction areas.
8.7 The Contractor will develop and enforce storage, housekeeping, and egress removal practices that reduce the flammable and combustible fire load of the building to the lowest level necessary for daily operation.

8.8 When structural or compartmentation features of fire safety are compromised, the Contractor will notify the A/E and University Project Manager so that the University can develop alternate fire safety procedures.

**Article 9  Keys**

Should the Contractor require key(s), (as determined by the University Project Manager) for access to the Project Site, the University Project Manager shall arrange to obtain such key(s) for the Contractor.

9.1 At the completion of the Project and before final payment is approved, the Contractor shall return University key(s) to the University Project Manager. Should he/she be unable to do so because of loss, theft, or for any reason, the cost of replacement key(s) and/or re-keying of any locks deemed necessary shall be deducted from the Contractor's final payment. Loss or theft of keys is to be reported to the University Project Manager immediately.

**Article 10  No Smoking Area**

In order to comply with the Utah State Clean Air Act which prohibits smoking in public buildings, a strict no smoking policy shall be enforced at any job site located within the confines of any University of Utah building or within 25 feet of any building opening or entrance. This policy will apply to all contractors, their employees and subcontractors.

**Article 11  Operating and Maintenance Manuals / Warranties and Guarantees**

11.1 All information is to be organized by discipline (architectural, mechanical, electrical, etc.).

11.2 Security Systems O&M Manuals and Warranties/Guarantees


   b. These documents must be delivered directly to the UCard main office by the installing Security Contractor. No other entity will receive a copy of security system documentation.

11.3 Warranties and Guarantees

   a. Submit two sets of paper originals bound in a binder for the University (plus sets required by DFCM for their projects)

   b. Submit two CDs of the same information prepared electronically in a self executable searchable PDF format for the University (plus sets required by DFCM for their projects).
c. Hard copies and electronic submittals are to be clearly identified on the front cover and label with the title “Warranties and Guarantees”, University building number, the project name, University project number, and the Contractor’s business name.

11.4 Operating and Maintenance Manuals

a. Submit O&M manuals as a separate bound document in the same formats described above for warranties and guarantees (2 paper sets and 2 electronic copies of a self executable searchable PDF).

b. The following information shall appear on the front cover (both CD and hard copy):

```
"Operation and Maintenance Manual"

Building Number:
Project Name:
Volume Number:
University Project Number:

A/E Firm:
A/E Subconsultant(s):
Commissioning Agent:

Contractor:
Major Subcontractor(s):
```

c. Special equipment must include a material list, and special architectural items must include paint color identification (source and catalog number).

d. Include complete set(s) of building control diagrams, drawn as installed at the site with all sequences of operations included for all equipment. Equipment, devices and wiring shall be clearly identified with model, size, etc. These drawings are to be included in O&Ms as well as being framed behind glass and hung in the mechanical room along with a valve matrix showing valve type, service and location.

e. For each item of equipment, include approved submittals and provide data and instruction sheets marked to indicate the equipment/device serial number, the plan symbol found on the construction drawings, the model number, and all options ordered.

f. Additionally, the following information is to be included:

1. A table of contents.

2. A complete parts list(s) and source of supply for each piece of equipment, including contact information (addresses and phone numbers).
(3) The balance report, where applicable.

(4) Performance curves and capacity data.

(5) Wiring diagrams.

Article 12 Parking Permits
Every vehicle will require a permit to park on the University of Utah campus. The Contractor is responsible for all costs of required parking permits. Contractor permits are available at 1901 E. South Campus Drive, Room #101 (the north-west corner of the Annex Building just east of the Jon M. Huntsman Center). The sale of parking permits to Contractors is subject to any limitations or other constraints identified in the bidding documents and by University of Utah Commuter Services.

Article 13 Parking on University Sidewalks
Parking or driving on campus sidewalks is not allowed unless prior authorization is received and a hang-tag permit is clearly visible in the vehicle. Authorization must be obtained through the University Project Manager. The hang-tag shall be placed on the vehicle's dashboard or interior mirror, fully visible through the windshield at all times. Not all sidewalks are vehicle accessible. For more information see http://www.facilities.utah.edu/sidewalkpermis/.

Article 14 Sexual Harassment
Sexual harassment of any kind is taken very seriously at the University. Contractors will be held responsible for the actions of their employees and subcontractors while working on University projects. Any contractor, subcontractor, or employee thereof participating in verbal or other sexual intimidation of any kind toward any other individual or group (e.g., making "catcalls") shall be held in violation of Federal Law, Title VII, Section 703 (sexual harassment) and will be prosecuted to the fullest extent possible. University sanctions of convicted violators may include, but not be limited to, termination of Contract.

Article 15 Site Lighting
New and existing site lighting along walkways and around the perimeter of the construction site shall be operational for all hours of darkness during extent of construction. Upon notification of lighting failure, the Contractor shall respond and initiate repair of the failed system within four hours of notification. If the response time is exceeds four hours, the University reserves the right to repair the system and the Contractor will then be responsible for the repair costs.

Article 16 Tax Exemption
Do not include Utah State Sales and Use Tax on materials purchased for the Work, and do not include this tax on materials for proposed charges or invoices. The University of Utah is exempt from Federal Excise Taxes and Utah Sales and Use Taxes. The Contractor is responsible for complying with all Utah State Sales and Use Tax exemption requirements. The Contractor is responsible for payment of all Utah State Sales and Use Tax obligations that arise from the Contractor's failure to comply with exemption requirements.

The Utah State Tax Commission Exemption Certificate (Number N21318) is provided on the following page.
TAX EXEMPTION CERTIFICATE

Utah State Tax Commission
Exemption Certificate
(Sales, Use, Tourism and Motor Vehicle Rental Tax)

<table>
<thead>
<tr>
<th>Name of business or institution claiming exemption (purchaser)</th>
<th>Telephone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Utah</td>
<td>801-581-7241</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Street Address</th>
<th>City</th>
<th>State</th>
<th>Zip Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901 E South Campus Dr #151</td>
<td>Salt Lake City</td>
<td>UT</td>
<td>84112</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authorized Signature</th>
<th>Name (please print)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>James T. Parker</td>
<td>Director of Procurement &amp; Supply Mgmt</td>
</tr>
</tbody>
</table>

Name of Seller of Supplier:

The person signing this certificate MUST check the applicable box showing the basis for which the exemption is being claimed.
Questions should be directed (preferably in writing) to Taxpayer Services, Utah State Tax Commission, 210 N 1950 W, Salt Lake City, UT 84134. Telephone (801) 297-2205, or toll free 1-800-662-4235.

DO NOT SEND THIS CERTIFICATE TO THE TAX COMMISSION
Keep it with your records in case of an audit.

CONSTRUCTION MATERIALS PURCHASED FOR RELIGIOUS AND CHARITABLE ORGANIZATIONS

I certify the construction materials purchased are on behalf of a religious or charitable organization. I further certify the purchased construction materials will be installed or converted into real property owned by the religious or charitable organization.

Name of religious or charitable organization: UNIVERSITY OF UTAH

Sales Tax Exemption No. N21318
Name of project: 

To be valid this certificate must be filled in completely, including a check mark in the proper box.
A sales tax license number is required only where indicated.
Please sign, date and, if applicable, include your license or exemption number.

NOTE TO SELLER: Keep this certificate on file since it must be available for audit review.

NOTE TO PURCHASER: Keep a copy of this certificate for your records. You must notify the seller of cancellation, modification, or limitation of the exemption you have claimed.
If you need an accommodation under the Americans with Disabilities Act, contact the Tax Commission at (801) 297-3811 or TDD (801) 297-2020. Please allow three working days for a response.

DO NOT SEND THIS CERTIFICATE TO THE TAX COMMISSION
Keep it with your records in case of an audit.
Article 17 Water Use on Campus
Fire hydrants on campus may only be used with permission. If water trucks or tanks must be filled outside the construction area, the water station between Buildings 306 and 309 may be used.

Article 18 Storm Water Pollution Prevention (SWPPP)
In addition to complying with the SWPPP requirements provided for in the Instruction to Bidders, the Contractor shall comply with the following. The University must approve any variance or exception in writing.

18.1 The Contractor must employ the following storm water pollution prevention measures during construction of the project.

a. Perimeter control, a system of sediments control best management practices (BMPs) that act as barriers to retain sediment on the construction site.

b. Construction entrance/exit stabilization for all entrances/exits used by the project, no matter how short the duration. Sediment tracking onto University roads, parking lots, sidewalks, and other paved surfaces is prohibited. If tracking occurs, the Contractor must clean the affected area before the end of the workday.

c. Temporary earth stabilization until final stabilization has been achieved.

d. Protect all storm drain inlets/catch basins that could receive storm water from the project until final stabilization of the site has been achieved.

e. If concrete work is part of the project, a concrete washout area must be provided. The area must be lined or a sealed container may be used.

18.2 The Contractor’s SWPPP must be reviewed and approved by the University’s Department of Environmental Health and Safety (EHS) prior to submitting the application (NOI) online, and the Contractor must have the permit before beginning construction. The University Project Manager will assist in submitting the Contractor’s SWPPP to EHS.

18.3 The Contractor shall assume full responsibility for any SWPPP drafted by others and adopted by the Contractor for use at the construction site. The Contractor shall finalize and file the SWPPP grading, sediment and erosion control plan and pay permit fees. The Contractor shall make any needed modifications to the SWPPP to fit the existing site conditions prior to beginning construction.

18.4 In addition to other requirements, the Contractor shall;

a. Inspect the construction site to verify the SWPPP plan every two weeks and after significant rainfall, and keep a record of each inspection at the construction site,

b. Remedy deficient management practices, controls and control structures; and,
c. Modify the SWPPP as site conditions change (i.e., as demolition and construction phases progress).

Article 19  Vehicle Idling Policy
In an effort to reduce vehicle emissions and fuel use at the University of Utah, the Contractor shall adhere to this idling policy for all vehicles and equipment operating on campus.

19.1 For the purposes of this policy, idling means an engine is running while the vehicle it serves is stationary, or the equipment it operates is not performing work.

19.2 Contractor vehicles and equipment are prohibited from idling for periods longer than 60 seconds except under the following conditions:

a. Where idling is necessary to power auxiliary equipment such as lifts, hoists, computers or safety lighting (auxiliary equipment does not include the vehicle’s air conditioner, heater or defrost for wintertime vehicle warm up),

b. Where idling is necessary for testing, maintenance, repair or diagnostic purposes,

c. Where idling is necessary to maintain factory installed emissions equipment on diesel equipment,

d. Where a vehicle is stopped at a traffic control signal; in heavy traffic at a TRAX line or railroad crossing; traveling through a construction zone; and / or,

e. Where turning off the motor could jeopardize the health and safety of the driver or passenger.

Article 20  Environmentally Preferable Products
Subject to limitations and the review and approval requirements stated in the General Conditions and other Contract Documents regarding substitutions, substitution requests and the use of specified materials or products, the Contractor, where allowed, is encouraged to offer Energy Star certified products, EPEAT (Electronic Product Environmental Assessment Tool) recommended products, or products that meet FEMP (Federal Energy Management Program) standards for energy consumption. The University of Utah also encourages contractors to offer products or services, when allowed by Contract Documents, that have a lesser or reduced effect on human health and the environment when compared with competing products or services. Items considered may include raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, disposal, etc.

Article 21  Integrity of Fire Rated Partitions
For all construction work performed in patient care facilities, unless specifically shown on the drawings, neither the Contractor nor any Subcontractor shall allow holes, cuts, or any other type of penetration in any floor slab, partition above the ceiling, or any otherwise concealed partition, without first notifying the University or the University’s representative of every such occurrence. The purpose of this notification is to enable the University to verify that each such penetration is properly sealed according to the requirements of current UBC and NFPA codes (as part of the Work of the Contractor) if required by the
University. Prior to covering concealed locations, and prior to Substantial Completion, the Contractor shall be responsible to arrange an inspection with the University or University’s representative where personal inspection will verify that each such penetration is properly sealed.

**Article 22  Roof Access**

Access to University roofs is limited to authorized personnel only. Roof safety is the responsibility of the Contractor and includes any individual working for or contracting with the Contractor. Safety issues include potential falling hazards and roof integrity protection. Any individual intending to access a University roof must first obtain permission follow the procedures described at the Plant Operations website under “Roof Access.”

**Article 23  Utility Connections**

Connections to certain campus utilities require specific tasks. The following utilities have specific connection task requirements:

23.1  **Trace Wire.** For all underground piping, a #10 THW copper wire must be installed alongside of the pipe to serve as a trace wire. The trace wire must be brought to the interior of valve boxes and manholes when applicable. At building penetrations, trace wire must be brought to the surface outside of the building and secured inside a single valve irrigation box with cover. Any terminations of trace wire not described above shall be secured inside a single valve irrigation box with cover. Terminations of the trace wire shall be noted on As-Built drawings.

23.2  **Electrical Power-Up.** The following requirements must be met prior to activating electrical power at new or remodeled buildings on campus. The Contractor’s Work will be subject to inspection by the University’s Electric Shop and power-up will not be allowed until the following requirements are met.

a.  **Manholes**

   (1)  Switchgear in manholes shall be labeled to identify the building being served.

   (2)  Each new and existing high voltage cable shall be fire-taped and racked on manhole walls.

   (3)  Each new and existing high voltage cable shall be marked to indicate feeder number and feeder voltage.

   (4)  Each conduit leaving the manhole shall be marked to show the next manhole or building.

   (5)  Each manhole shall be labeled with a manhole number.

   (6)  All ground wires in the manhole and all terminations shall be properly grounded.

   (7)  Prior to power-up, each manhole shall be cleaned of all trash.
b. Above Ground High Voltage Switches and Transformers

(1) Switches and transformers shall be labeled to identify the voltage and building served.

(2) Properly ground all gear and terminations.

(3) Color code each feeder leaving the transformer per the voltage feeding the building. Colored tape shall be applied at all terminations, junction boxes and pull boxes. Conductors in sizes #6 and below shall be color coded with colored insulation. Power conductors shall be color coded as follows:

<table>
<thead>
<tr>
<th>Conductor</th>
<th>208v</th>
<th>480v</th>
</tr>
</thead>
<tbody>
<tr>
<td>phase A</td>
<td>black</td>
<td>brown</td>
</tr>
<tr>
<td>phase B</td>
<td>red</td>
<td>orange</td>
</tr>
<tr>
<td>phase C</td>
<td>blue</td>
<td>yellow</td>
</tr>
<tr>
<td>neutral</td>
<td>white</td>
<td>grey</td>
</tr>
<tr>
<td>ground</td>
<td>green</td>
<td>green</td>
</tr>
</tbody>
</table>

c. Main Distribution Panels

(1) Each distribution panel shall be grounded.

(2) Each feeder entering the panel from a transformer shall be color coded (as described in paragraph “b” above) to identify the voltage.

(3) Each distribution panel shall be labeled to identify the voltage.

d. Equipment Labeling

(1) Compliance with NFPA 70E 2009 130.3 C Equipment Labeling (including current updates) is required. All labels must be in place prior to connection to the University Electrical System.

23.3 High Temperature Water Connections. The following requirements must be met prior to activating high temperature water piping at new or remodeled buildings on campus. The Contractor will assist the University during system start-up.

a. Prior to requesting start-up assistance, the Contractor shall check all parts of the system for leaks, and repack valve stem glands that indicate a need for additional packing.
b. No valve between existing and new HTW piping shall be opened until after all tests are approved, and internal cleaning operations are complete; then, system valves may be opened only with authorization and on-site-assistance from Campus Utility Services, the High Temperature Water Plant, and the University Project Manager.

c. The HTW Plant personnel will provide on site management of the start-up process and direct the Contractor in valve positioning. The Contractor shall not activate any valve during start-up until directed to do so by the University.

d. Additional requirements include:

1. Shut-down and start-up will be accomplished by University personnel only. The Contractor shall follow “Request for Utility Shutdown” procedures, but allow additional lead time to allow adequate preparation time for University services.

2. The Contractor shall boil out each HTW pipe system before connecting to a live HTW system. Water quality for start up must be 0 PPH and shall be verified by a University authorized water treatment specialist.

3. Pressure test each pipeline at 800 lbs for 24 hours. If hydrostatic testing is not feasible, provide certification of a leak proof system through x-ray analysis.

4. Before opening or cutting into any HTW pipe, the Contractor must verify 0 PSI in the line and receive approval from the HTW plant.

5. All connections shall be welded and tested before start up. Threaded pipe connections will not be allowed.

6. All pressure gauges, thermometers, valves, etc. shall be furnished and installed in the piping system prior to start-up.

7. Pipe insulation will be installed in confined areas such as manhole vaults and any location where space limitations pose a risk of burn injury.

8. Ladders shall be installed inside manhole vaults.

23.4 Natural Gas Main Connections. Natural gas piping shall be installed in accordance with State adopted code, DOT standards, Questar standards, and University of Utah standards.

a. Exterior buried gas lines shall follow Questar approved specifications for plastic pipe and shall be bedded in sand the entire length of the line. Exterior above ground gas lines 2-1/2” and larger shall be schedule 40 forged black steel butt welded fittings; or, for 2” and smaller shall be 150 lb malleable iron with screwed fittings. Steel pipe must have an approved protective coating.
(1) For buried plastic pipe, yellow warning tape shall be installed 2 feet above the gas line, in addition to an 18 gage copper wire along the entire length of the pipe.

(2) When a gas pipe is run through a wall, the pipe shall be run through protective sleeve and sealed to prevent water from entering the building.

(3) All outside above ground gas piping shall be painted with a protective gray paint.

b. All gas piping shall be tested at 3 PSI for 10 minutes with no drop. A half-pound increment gauge shall be used. Where the supply is over 2 pounds, the test shall be at 1 1/2 times the maximum working pressure. All tests shall be witnessed by the University of Utah Plumbing Shop or its' designee.

23.5 Sanitary Sewer Connections. Sewer mains shall be installed in accordance with State adopted code, using procedures to keep dirt out of the sewer main. All installed piping shall be inspected by the University Plumbing Shop prior to backfill.

a. Buried sewer mains shall be bedded in sand and supported throughout its entire length. Under no circumstances will a pipe be supported with rocks.

b. Warning tape will be installed at 2 feet above the pipe when PVC pipe is installed.

c. Each new sewer main shall be air tested between manholes by a certified testing company. If the air test fails, a camera shall be sent down the sewer main to inspect the line, and the damaged part of the main will be dug up and repaired.

d. All building laterals shall be tied in with a manhole, not a WYE.

23.6 Steam System Connections. An extension to any campus steam piping system will not be allowed until a stamped professionally engineered plan, including drawings and specifications, is approved by the University. Isolation shut-off valves and steam trap design is required.

a. Welded or threaded pipe connections are allowed on steam / condensate systems using only black steel pipe and fittings.

b. Verify the steam demand for each building system before adding any steam appliance.

c. Do not pipe condensate directly to sanitary sewer.

d. Verify proper steam connection points and condensate return connection points before completing the installation and connecting to the existing system.
23.7 **Piping Tie-In to Existing Building Systems.** All piping shall be insulated and labeled. Specific requirements for connections to existing building systems are:

a. **Pressure Testing**

   (1) The Contractor shall apply a hydrostatic test to each piping system. Each system shall hold a minimum of 100 PSI of water or 1 ½ times the operating pressure, whichever is greater, for 30 minutes without any pressure drop on the gage.

b. **Pipe Cleaning**

   (1) Piping (black iron, PVC, copper) shall be cleaned with West B802 Alkaline Clean, 25 gallons in every 1000 gallons of water. Circulate the mix 24 to 48 hours, flush with potable city water, then final fill the system with chemicals described hereinafter. The Contractor shall provide documentation and certify that the required procedure was followed.

c. **Chemical Fill**

   (1) Each piping system to be connected to existing shall be filled with appropriate chemicals or antifreeze equal to the existing system before isolation valves are opened to the building system.

   (2) Close loop systems shall have West C-404, 50 to 100 PPM, MO+6.

   (3) Glycol systems shall have 30% minimum of either Jeffcool P150 or Dowfrost.

   (4) Open loop systems shall have West C-313-U at 200 PPM; and shall include sodium hypochlorite at 0.5 to 1.5 PPM.

d. **Black iron piping shall be American made schedule 40 seamless (only).**

e. **Copper Piping**

   (1) Copper piping shall be type L with dielectric unions and sweat fittings.

   (2) Gas welded piping shall be nitrogen purged while welding. All fittings will be wiped clean.

23.8 **Storm Drainage Connections.** Storm drainage piping shall be installed in accordance with State adopted code, and in a manner as to keep dirt out of the piping. All installed piping shall be inspected by the University Plumbing Shop and the University’s inspector (Office of the Building Official) prior to backfill or concealment.
a. Exterior Piping

(1) Storm water from roofs, paved areas, yards, courtyards, etc. shall drain into a dedicated storm drainage system. Under no circumstance shall storm water be tied to a sanitary sewer line.

(2) Storm drainage piping shall be installed with a bedding material in the bottom of the trench. If PVC is used, 1 foot of sand on the bottom of the pipe, and 2 feet of sand over the top of the pipe will be required. Under no circumstance shall the pipe be resting on rocks.

(a) All storm drain laterals shall tie into a manhole or a collection box.

(b) A storm drain shall not reduce in size in the direction of flow.

(c) Buried storm drain piping 12 inches and smaller shall be tested by a certified testing company between manholes. If the test fails, a camera shall be sent down the line to determine the location of the bad section, it shall be dug up and repaired.

(d) Buried storm drain piping larger than 12 inches shall be inspected using a camera sent down the line to check joints for tightness. If a joint is not secure, it shall be dug up and repaired.

b. Interior piping:

(1) Storm drain piping inside buildings shall be tested using either water or air.

(a) If water is used, all openings shall be tightly sealed, except at the highest point, and then filled with water to the point of overflow. No part of the system shall be tested with less than 10 feet of head of water. The static pressure shall be held for 15 minutes.

(b) If air is used, 5 PSI shall be maintained for a minimum of 15 minutes will no loss on the gage.

23.9 Water Main Connections. Installation and disinfection of water mains shall be in accordance with State adopted code. Before connecting new water mains to an existing water main, the following must be done:

a. All water mains shall be kept clean during construction.

b. All fittings shall be installed with restraining glands and thrust blocks.

c. All water mains shall be swabbed and cleaned with a 1% hypochlorite disinfecting solution if dirt or trench water enters the pipe per State adopted code.
d. All water lines shall be capped at the end of the work day to protect piping from animal entry and dirt inside the pipe.

e. When C900 is used, it shall be bedded with sand one foot below the pipe and 2 feet above the pipe. Caution tape shall be installed at 2 feet above and all along the pipe.

f. All building supply lines shall be installed with shut off valves on all three sides of the tee.

g. To fill the water main with water, the Contractor must use an approved cross-connection control device. A hydrostatic pressure test will be required (200 PSI for 2 hours).

h. All new water lines shall be chlorinated with a 50 PPM or higher and remain in the pipe for a 24 hour period. After the retention period, the heavily chlorinated water shall be flushed into a sanitary sewer only. Salt Lake City Sewer Department must be contacted to let them know that high chlorinated water is coming to them. Upon refilling the system with clean potable water, two bacteriological samples 24 hours apart shall be taken. After the second sample comes back satisfactory, the system can be connected to the University’s water system. All work shall be inspected by the University of Utah’s Plumbing Shop before being buried or concealed and prior to start-up.

23.10 Water Line Connections Inside Buildings. Water lines entering each building shall have parallel pressure reducing valves and parallel backflow prevention devices with appropriate isolation valves on each parallel path.

a. Backflow prevention devices shall be installed to separate potable water from industrial and/or non-potable water.

b. Installation shall be in accordance with State adopted code and will be inspected by the University Plumbing Shop and Building Inspector.

c. Each floor of the building shall have an isolation valve(s), accessible at the floor it serves.

d. Each laboratory room shall have an isolation valve(s), accessible in the lab it serves, in addition to shut-off valves at each fixture in the lab.

e. The Contractor shall test water piping at 2 times the operating pressure for 30 minutes. The test shall be in accordance with State adopted code.

f. The Contractor shall clean the water piping system by first flushing with clean potable water until dirty water is no longer observed at outlet points. The system shall be filled with clean water including 50 PPM chlorine and held in the system for 24 hours (or 200 PPM for 3 hours). The system shall then be flushed with clean potable water until chlorine is no longer present. The heavily chlorinated
water shall be flushed into a sanitary sewer only. Salt Lake City Sewer Department must be contacted to let them know that high chlorinated water is coming to them.

Article 24 Additional OSHA Requirements
In addition to any safety regulations or practices which may otherwise be required or prudent, the Contractor shall establish and implement safety programs that comply with the following OSHA General Industry regulations when working inside University buildings or on or around University utility systems:

24.1 CFR 1910.146, Permit Required Confined Space
24.2 CFR 1910.147; Control of Hazardous Energy (Lock Out Tag Out)
24.3 CFR 1910.335; Electrical Safeguards for Personal Protection

End of Supplemental General Conditions
SUPPLEMENTAL GENERAL CONDITIONS FOR HEALTH INSURANCE
Effective March 17, 2016

Article 1. Intent and Purpose.
Current law: House Bill 282, 2016 Utah Legislative Session. Legislative History: The 2009 Utah Legislature passed House Bill 331 entitled “Health Reform – Health Insurance Coverage in State Contracts” which law became effective July 1, 2009. This bill has been amended by HB20 of the 2010 Utah Legislative Session, HB 128 of the 2011 Utah Legislative Session as well as HB 282 of the 2016 Utah.

These laws require certain state entities, including DFCM, to require a contractor who contracts with the state entity to offer the contractor’s employees qualified health insurance coverage as defined in Utah Code Annotated (UCA) 26-40-115, and in accordance with the commercially equivalent benchmark provided by the Department of Health, the CHIP commercial benchmark for FY 2016 and posted on the following URL: http://www.health.utah.gov/chip/PDF/2016Benchmark.pdf, in accordance with UCA 26-40-115(2), during the duration of the contract if the contract is over a certain amount, and if the contract is a construction and/or design contract. The intent of the Articles of these Supplemental General Conditions is to provide the necessary provisions to the General Conditions as a result of such Bills. The purpose of this Supplemental General Conditions for Health Insurance is to comply with UCA 63A-5-205 as well as Utah Code Administrative Rule R23-23 which are both hereby incorporated by reference herein. In case of conflict between UCA 63A-5-205 and Rule R23-23, UCA 63A-5-205 shall control.

Article 2. Applicability of these Supplemental General Conditions.
This Supplemental General Conditions for Health Insurance only applies to those contracts as required by UCA 63A-5-205.

As stated in UCA 63A- 5-205:

(1) Except as provided in UCA 63A-5-205(4) below, UCA 63A-5-205(3) applies to all design or construction contracts entered into by the Division or the Board on or after July 1, 2009, and
(a) applies to a prime contractor if the prime contract is in the amount of $2,000,000 or greater at the original execution of the contract; and
(b) applies to a subcontractor if the subcontract is in the amount of $1,000,000 or greater at the original execution of the contract.
(2) UCA 63A-5-205(3) does not apply if:
(a) the application of UCA 63A-5-205(3) jeopardizes the receipt of federal funds;
(b) the contract is a sole source contract;
(c) the contract is an emergency procurement;
(d) to a change order as defined in Section 63G-6a-103, or a modification to a contract, when the contract does not meet the threshold required by UCA 63A-5-205(3).
A person who intentionally uses change order or contract modifications to circumvent the requirements of UCA 63A-5-205(3) is guilty of an infraction.

**Article 3. Definitions.**

The following definitions apply to this Supplemental General Conditions for Health Insurance:

3.1 “Contractor” means the person/entity under direct contract with the Division herein. If the direct contract includes a Design Professional, then the Design Professional is a “Contractor” for purposes of this Supplemental General Conditions for Health Insurance.

3.2 “Design Professional” means the Architect or Engineer, its Subconsultants or Subcontractors at any tier, or any of their agents, employees, including those employed directly or indirectly, or other persons or entities for whose acts the Design Professional or its Subconsultants/Subcontractors at any tier may be liable.

3.3 “Employee(s)” means an “employee,” “worker” or “operative” as defined in UCA 34A-2-104 who:

   (i) works at least 30 hours per calendar week; and

   (ii) meets employer eligibility waiting requirements for health care insurance which may not exceed the first day of the calendar month following 60 days from the date of hire.

3.4 "Health benefit plan" means the same as that term is defined in UCA 31A-1-301.

3.5 "Qualified health insurance coverage" means the same as that term is defined in UCA 26-40-115.

3.6 "Subcontractor" means the same as that term is defined in Section 63A-5-208.

3.7 "State" means the State of Utah.

3.8 “Director” includes an authorized designee of the Director.

**Article 4. Health Insurance Certification.**

4.1 A Contractor (including Design Professional) shall demonstrate compliance with UCA 63A-5-205 (6)(a) or (b) at the time of execution of each initial contract described in UCA 63A-5-205(3). The compliance is subject to an audit by DAS, DFCM or the Office of the Legislative Auditor General. A Contractor (including Design Professional) subject to UCA Section 63A-5-205(3) shall demonstrate to the director that the Contractor has and will maintain an offer of qualified health insurance coverage for the Contractor’s employees and employees’ dependents. Such Certification shall be on the form provided by DFCM.

4.2 If a subcontractor of the contractor is subject to Subsection (3) of UCA 63A-5-205, the contractor shall:

   (a) place a requirement in the subcontract that the subcontractor shall obtain and maintain an offer of qualified health insurance coverage for the subcontractor's employees and the employees' dependents during the duration of the subcontract; and

   (b) certify to the director that the subcontractor has and will maintain an offer of qualified health insurance coverage for the subcontractor's employees and the employees' dependents during the duration of the prime contract.

4.3 The actuarially equivalent determination required for the qualified health insurance coverage is met by the Contractor if the Contractor provides the department or division with a written statement of actuarial equivalency, which is no more than one year old, regarding the contractor's offer of qualified health coverage from an actuary selected by the contractor or the contractor's insurer, or an underwriter who is responsible for developing the employer group's premium rates;
SUPPLEMENTAL
GENERAL CONDITIONS
REGARDING ILLEGAL IMMIGRATION

May 10, 2011

Article 1. Intent and Purpose. Senate Bill 81 modified by Senate Bill 39 – 2009. The 2009 Utah Legislature passed Senate Bills 81 and 39 regarding “Illegal Immigration” which laws became effective July 1, 2009 (hereinafter “SB81/39”). The 2011 Utah Legislature made further amendments that relate to this document in HB 116. These bills deal with provisions related to the immigration status of individuals within the state. The intent of Articles 1 through 3 of these Supplemental General Conditions is to provide the necessary provisions to the General Conditions as a result of such bills.

Article 2. Applicability. These “Supplemental General Conditions for Illegal Immigration” under SB 39 of the 2009 Utah General Legislative Session and HB 116 of the 2011 Utah General Legislative Session, only applies to Request for Proposals and includes sole sources that are part of Requests for Proposals. However, all entities under contract with DFCM as well as all others that are subject to applicable immigration laws, including their subcontractors/subconsultants, at any tier, shall comply with all applicable immigration laws. This document does not apply to procurements that are done by the Competitive Sealed Bidding process (often referred to as “low-bid”), the Multi-Step Process, direct awards, sole sources awards that are not part of Requests for Proposals, and emergency procurements. This document also does not apply to good faith contract modifications to contracts that existed prior to July 1, 2009.

There is a Program Start Date defined in said HB 116 of the 2011 Utah General Legislative Session. At such time that knowledge is obtained about when that Program Start Date is, DFCM will post an amendment to this “Supplemental General Conditions Regarding Illegal Immigration.”

Article 3. E-Verify Clause. Certify registration and use of employment “Status Verification System”.

3.1 Each offeror and each person signing on behalf of any offeror certifies as to its own entity, under penalty of perjury, that the named Contractor has registered and is participating in the Status Verification System to verify the work eligibility status of the Contractor’s new employees that are employed in the State of Utah in accordance with 63G-12-302 as described in HB 116 of the 2011 Utah General Legislative Session. (A copy of 63G-12-302 is provided at the end of this document for your convenience.)

3.2 The Contractor shall require that the following provision be placed in each subcontract at every tier: “The subcontractor shall certify to the main (prime or general) contractor by affidavit that the subcontractor has verified through the Status Verification System the employment status of each
new employee of the respective subcontractor, all in accordance with Section 63G-11-103 and to comply with all applicable employee status verification laws. Such affidavit must be provided prior to the notice to proceed for the subcontractor to perform the work.”

3.3 The State of Utah or DFCM will not consider a proposal for award, nor will it make any award where there has not been compliance with this Article.

3.4 Manually or electronically signing the Proposal is deemed the Contractor’s certification of compliance with all provisions of this employment status verification certification required by all applicable status verification laws including UCA Section 63G-12-302 as described in HB 116 of the 2011 Utah General Legislative Session. (A copy of 63G-12-302 is provided at the end of this document for your convenience.)

Article 4. Indemnity

4.1 Contractor (includes, but is not limited to any Contractor, Design Professional, Designer or Consultant) shall protect, indemnify and hold harmless, the State of Utah, the DFCM and its officers, employees, agents, representatives and anyone that the State of Utah or the DFCM may be liable for, against any claim, damages or liability arising out of or resulting from violations of these Supplemental General Conditions Regarding Illegal Immigration whether violated by employees, agents, or contractors of the following:

4.1.1 Contractor;
4.1.2 Subcontractor at any tier; and/or
4.1.3 any entity or person for whom the Contractor or Subcontractor may be liable.

4.2 Notwithstanding 4.1 above, Design Professionals or Designers under direct contract with the DFCM shall only be required to indemnify the State of Utah or the DFCM for a liability claim that arises out of the design professional's services, unless the liability claim arises from the Design Professional's negligent act, wrongful act, error or omission, or other liability imposed by law except that the Design Professional shall be required to indemnify the State of Utah or the DFCM in regard to subcontractors or subconsultants at any tier that are under the direct or indirect control or responsibility of the Design Professional, and includes all independent contractors, agents, employees or anyone else for whom the Design Professional may be liable at any tier.
* The following is provided for your convenience: Note: The definitions of “Public Employer,” “Status Verification System,” “Unauthorized Alien,” and “Program Start Date” as well as other relevant definitions are located in Section 63G-12-102. Other provisions of Utah Code Title 63G, Chapter 12, should be read as well as all applicable immigration laws.)

63G-12-302. Status verification system -- Registration and use -- Performance of services -- Unlawful practice.

(1) As used in this section:

(a) "Contract" means an agreement for the procurement of goods or services that is awarded through a request for proposals process with a public employer and includes a sole source contract.

(b) "Contractor" means a subcontractor, contract employee, staffing agency, or any contractor regardless of its tier.

(2) (a) Subject to Subsection (5), a public employer shall register with and use a Status Verification System to verify the federal employment authorization status of a new employee.

(b) This section shall be enforced without regard to race, religion, gender, ethnicity, or national origin.

(3) (a) Subject to Subsection (5), beginning July 1, 2009:

(i) a public employer may not enter into a contract for the physical performance of services within the state with a contractor unless the contractor registers and participates in the Status Verification System to verify the work eligibility status of the contractor's new employees that are employed in the state; and

(ii) a contractor shall register and participate in the Status Verification System in order to enter into a contract with a public employer.

(b) (i) For purposes of compliance with Subsection (3)(a), a contractor is individually responsible for verifying the employment status of only new employees who work under the contractor's supervision or direction and not those who work for another contractor or subcontractor, except as otherwise provided in Subsection (3)(b)(ii).

(ii) Each contractor or subcontractor who works under or for another contractor shall certify to the main contractor by affidavit that the contractor or subcontractor has verified through the Status Verification System the employment status of each new employee of the respective contractor or subcontractor.

(c) Subsection (3)(a) does not apply to a contract:

(i) entered into by the entities referred to in Subsection (3)(a) prior to July 1, 2009, even though the contract may involve the physical performance of services within the state on or after July 1, 2009; or

(ii) that involves underwriting, remarketing, broker-dealer activities, securities placement, investment advisory, financial advisory, or other financial or investment banking services.

(4) (a) It is unlawful for an employing entity in the state to discharge an employee working in Utah who is a United States citizen or permanent resident alien and replace the employee with, or have the employee's duties assumed by, an employee who:

(i) the employing entity knows, or reasonably should have known, is an unauthorized alien hired on or after July 1, 2009; and

(ii) is working in the state in a job category:

(A) that requires equal skill, effort, and responsibility; and
(B) which is performed under similar working conditions, as defined in 29 U.S.C., Sec. 206 (d)(1), as the job category held by the discharged employee.

(b) An employing entity, which on the date of a discharge in question referred to in Subsection (4)(a) is enrolled in and using the Status Verification System to verify the employment eligibility of its employees in Utah who are hired on or after July 1, 2009, is exempt from liability, investigation, or lawsuit arising from an action under this section.

(c) A cause of action for a violation of this Subsection (4) arises exclusively from the provisions of this Subsection (4).

(5) On and after the program start date:
(a) a public employer, after hiring an employee, shall verify the employment eligibility of the new employee:
   (i) through the status verification system if the individual does not hold a permit; and
   (ii) through the u-verify program if the individual holds a permit; and
(b) a contractor is considered to be in compliance with this section if, after hiring an employee, the contractor verifies the employment eligibility of the new employee:
   (i) through the status verification system if the individual does not hold a permit; and
   (ii) through the u-verify program if the individual holds a permit.

Renumbered and Amended by Chapter 18, 2011 General Session
SUPPLEMENTAL
GENERAL CONDITIONS
FOR CONSTRUCTION AGREEMENTS

July 15, 2008

The 2008 Utah Legislature passed Senate Bill 220 entitled “Cause of Action for Defective Construction” which law became effective May 5, 2008 (hereinafter “SB220”). The intent purpose of Article 1 through 3 of these Supplement General Conditions is to provide the necessary provisions to the General Conditions as a result of such Bill.

Article 2. “Entities under the Contractor” shall mean any and all agents, independent contractors, subcontractors, suppliers, manufacturers and providers at every tier under the General Contractor.

3.1 Conditions. The General Conditions impose duties and performance obligations on the parties. This includes, but is not limited to, the provisions of Article 5.2.1 (regarding subcontractor’s compliance with Contract Documents), Article 4.13 (indemnification which discusses acts, omissions, and negligence responsibility) and other provisions of the General Conditions which list many performance obligations of the General Contractor and those under the General Contractor.

3.2 Third Party Beneficiary. The State of Utah and DFCM shall be an intended third party beneficiary to all contracts entered into with Entities under the Contractor. Upon written request by DFCM, DFCM shall be entitled to obtain copies of all such contracts. The General Contractor shall be responsible for assuring that all such third party beneficiary agreements are in place and shall bear the responsibility for any lack of required language in any contracts with an Entity under the Contractor which does not contain this required provision.

3.3 “Economic Loss Rule.” The “Economic Loss Rule” as it has been referred to in Utah law shall be deemed to be interpreted in accordance with prevailing Utah law.
3.4 Toxic Torts. “Defective Construction” for purposes of any limitation of any cause of action or right as contemplated by SB220 does not, under these Supplemental General Conditions and for purposes of any Entities under the Contractor, include the use or installing of a defective or inherently dangerous, hazardous or toxic product, substance, or material. The State has third party beneficiary rights and other rights allowed by law to pursue a direct cause of action against the manufacturer and/or distributor of such defective or inherently dangerous, hazardous or toxic product, substance or material, except that the General Contractor and other subcontractors, exclusive of manufacturers and distributors, under the General Contractor shall not be responsible to the State of Utah for said “product, substance or material” unless the General Contractor or such subcontractor knew or should reasonably have known that the product, substance or material was defective or inherently dangerous, hazardous or toxic at the time it was provided or installed on the Project.

3.5 Subsection 3 of SB 220. For purposes of Subsection (3) of SB 220, the phrase “property damage” shall be deemed to refer to damage to “other property” meaning property that is other than the exact specific construction defect itself.

3.6 “Failure of the Construction to Function as Designed.” The language “failure to function as designed” as used in SB 220 shall not be deemed to refer to the failure of the construction to be constructed in accordance with the Contract Documents.

3.7 Independent Duty. The State of Utah and DFCM maintain the right to pursue a cause of action against the General Contractor and directly against any Entities under the Contractor, for violation of any independent duty owed to the State of Utah or DFCM.

3.8 Not create Contract Right by Entity under the Contractor with State of Utah or DFCM. These Supplemental General Conditions shall not be construed in any manner which would create a contract between the State of Utah/DFCM and any Entity under the Contractor, except for the Third Party Beneficiary rights of the State of Utah/DFCM provided herein. Any pursuit of a claim by an Entity under the Contractor, including payment claims, shall be maintained either against the payment bond or the upper tier Contractor in accordance with Utah law.

Article 4. Warranties and Obligations
Every Entity under the Contractor has an obligation to comply with the requirements of this Contract, including the indemnification of the Owner for negligent or intentional construction defects and to provide materials and construction that meets all express or implied warranties under the Uniform Commercial Code, including fitness for a particular purpose, merchantability, workmanlike construction (work completed in a skillful manner and is non-defective) and habitability, and is performed with the reasonable care to protect persons and property. In regard to toxic, hazardous materials and other matters of construction where applicable statutory and case law allows, strict liability shall apply.
SUPPLEMENTAL GENERAL CONDITIONS FOR DESIGN AGREEMENTS

July 15, 2008

The 2008 Utah Legislature passed Senate Bill 220 entitled “Cause of Action for Defective Construction” which law became effective May 5, 2008 (hereinafter “SB220”). The intent purpose of these Supplement General Conditions is to provide the necessary provisions to the General Conditions as a result of such Bill.

Article 2. “Entities under the Designer” shall mean any and all agents, independent contractors, consultants, subconsultants, subcontractors, suppliers, manufacturers and providers at every tier under the Designer.


3.1 Design Agreement. The Design Agreement for the subject Project imposes duties and performance obligations on the parties. This includes, but is not limited to, the standard of care provisions provided in said Design Agreement.

3.2 Third Party Beneficiary. The State of Utah and DFCM shall be a third party beneficiary to all contracts entered into with Entities under the Designer. Upon written request by DFCM, DFCM shall be entitled to obtain copies of all such contracts. The Designer shall be responsible for assuring that all such third party beneficiary agreements are in place and shall bear the responsibility for any lack of required language in any contracts with an Entity under the Designer which does not contain this required provision.

3.3. “Economic Loss Rule.” The “Economic Loss Rule” as it has been referred to in Utah law shall be deemed to be interpreted in accordance with prevailing Utah law.

3.4 Toxic Torts. “Defective Construction” for purposes of any limitation of any cause of action or right as contemplated by SB220 does not, under these Supplemental General Conditions and for purposes of any Entities under the Designer, include the use or installing of a defective or inherently dangerous,
hazardous or toxic product, substance, or material. The State has third party beneficiary rights and other rights allowed by law to pursue a direct cause of action against the manufacturer and/or distributor of such defective or inherently dangerous, hazardous or toxic product, substance or material, except that the Designer and other consultants/subconsultants under the Designer, exclusive of manufacturers and distributors, shall not be responsible to the State of Utah for said “product, substance or material” unless the Designer or such consultants/subconsultants knew or should reasonably have known that the product, substance or material was defective or inherently dangerous, hazardous or toxic at the time it was made a part of the Contract Documents by the Designer.

3.5 **Subsection 3 of SB 220.** For purposes of Subsection (3) of SB 220, the phrase “property damage” shall be deemed to refer to damage to “other property” meaning property that is other than the exact specific construction defect itself.

3.6 **“Failure of the Construction to Function as Designed.”** The language “failure to function as designed” as used in SB 220 shall not be deemed to refer to the failure of the construction to be constructed in accordance with the Contract Documents.

3.7 **Independent Duty.** The State of Utah and DFCM maintain the right to pursue a cause of action against the Designer and directly against any Entities under the Designer, for violation of any independent duty owed to the State of Utah or DFCM.

3.8 **Not create Contract Right by Entity under the Designer with State of Utah or DFCM.** These Supplemental General Conditions shall not be construed in any manner which would create a contract between the State of Utah/DFCM and any Entity under the Designer, except for the Third Party Beneficiary rights of the State of Utah/DFCM provided herein. Any pursuit of a claim by an Entity under the Designer, including payment claims, shall be maintained against the upper tier entity in accordance with Utah law.
SUPPLEMENTAL GENERAL CONDITIONS
FOR DRUG AND ALCOHOL TESTING
DESIGN AND/OR CONSTRUCTION CONTRACTS

July 1, 2010

1. These Supplemental General Conditions shall only apply to design or construction contracts in compliance with UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7. (Note: the Administrative Rule is anticipated to have an effective date in early July, 2010 and will upon its being effective apply to those design and construction contracts issued on or after July 1, 2010, and the Statute itself is effective on July 1, 2010.) All applicable provisions of UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7 are incorporated herein by reference as if fully set forth herein. The provisions below provide some, but not all of the provisions of said statute and administrative rule. The absence of the recitation of a provision of UCA Section 63G-6-604 or Utah Administrative Code Rule R23-7 below, shall not lesson its importance. Contractors and Designers are encouraged to read the complete UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7 in order to assure compliance with all the applicable provisions.

2. Definitions. For the purpose of these Supplemental General Conditions, the definitions in UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7 shall apply. For convenience, the following definitions are provided below:

a. "Contractor" for purposes of these Supplemental General Conditions includes the Prime Contractor, a Designer (Architect/Engineer), and any of their subcontractors, consultants or subconsultants at any tier involved in design and/or construction. “Contractor” for purposes of these Supplemental General Conditions does not include a supplier who provide only materials, equipment or supplies to a Contractor, Designer or any of their subcontractors, consultants or subconsultants at any tier.

b. "Covered Individual" means an individual who: (i) on behalf of the Contractor provides services directly related to design or construction under the contract; and (ii) is in a safety sensitive position, including a design position that has responsibilities that directly affect the safety of an improvement to real property that is the subject of a state construction contract.

3. Contractor shall have a drug and alcohol testing policy in accordance with UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7 during the period of the contract that applies to the “Covered Individuals” hired by the Contractor. Contractor shall post in one or more conspicuous places notice
to “Covered Individuals” hired by the Contractor that the Contractor has the drug and alcohol testing policy described in UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7-4(1)(a)(i). Said “Covered Individuals” shall be subject to random drug and alcohol testing under said policy if at any time during the period of the contract there are ten (10) or more “Covered Individuals” hired by the Contractor.

4. Contractor hereby certifies the following:

a. By executing this Contract, that the Contractor, including all entities included in the definition of Contractor in paragraph 2.a. above, shall comply with all provisions of Utah Administrative Code Rule R23-7 as well as UCA 63G-6-604, including having and maintaining a drug and alcohol testing policy, the posting and random testing requirements during the period of the contract that applies to Covered Individuals hired by the Contractor, including all entities included in the definition of Contractor in paragraph 2.a. above;

b. That the Contractor, including all entities included in the definition of Contractor in paragraph 2.a. above, shall have these requirements placed in all subcontracts for design or construction at any tier, in order that all such subcontractors, consultants and subconsultants at any tier have notice of these requirements and understand the need for compliance with these requirements;

c. That the subcontractors, consultants and subconsultants at any tier referred to in paragraph 4.b. above shall comply with the same requirements as the Contractor for having and maintaining a drug and alcohol testing policy, the posting and random testing requirements during the period of their contract;

d. That the Contractor, or any entity included in the definition of Contractor in paragraph 2.a. above may be suspended or debarred in accordance with the Utah Procurement Code for failure to comply as provided in UCA Section 63G-6-604(3)(a) and Utah Administrative Code Rule R23-7-4(3)(b); and

e. That the prime contractor or prime designer shall on a semi-annual basis throughout the term of this Contract, report to the Division in writing, information that indicates compliance with the provisions of UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7.

5. Reasonable notice and an opportunity to cure any violation of UCA 63G-6-604 shall be provided to the Contractor before any suspension or debarment may be undertaken by the Division against the Contractor in light of the circumstances of the contract or the violation. The greater the risk to person(s) or property as a result of noncompliance, the shorter this notice and opportunity to cure shall be, including the possibility that the notice may provide for immediate compliance if necessary to protect person(s) or property.

6. If a Contractor meets the requirements of UCA Section 63G-6-604 and Utah Administrative Code Rule R23-7, said statute and rule may not be construed to restrict the Contractor’s ability to impose or implement an otherwise lawful provision as part of a drug and alcohol testing policy.
SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

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

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

1.4 PROCEDURES

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

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

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Provide indicated PVC storm drain line.
   1. Base Bid: Make only minor modifications to existing waterline near northwest corner of building, as indicated.
   2. Alternate: Install 6-inch diameter PVC storm drain line per APWA standard plans No. 381 and 382. See Drawing sheet C302 Utility Plan South-West Phase 1.

B. Alternate No. 2: Provide indicated C900 PVC water line.
   1. Base Bid: Do not provide indicated water line in Phase 1 of the Work.
   2. Alternate: Install 6-inch diameter C900 PVC water line per AWPA standard plans No. 381 and 382. See Drawing sheet C302 Utility Plan South-West Phase 1.

END OF SECTION 01 23 00
SECTION 01 45 00
QUALITY CONTROL

PART 1  GENERAL

1.1 SECTION INCLUDES
A. CONTRACTOR responsibilities for quality control.

1.2 QUALITY ASSURANCE
A. Employ an agency or staff to assure installed product and materials comply with Contract Documents, and to assure inspections, tests, and other services comply with industry standards.
B. Use an AMRL (AASHTO Materials Reference Library) certified laboratory that has personnel certified by WAQTC (Western Alliance for Quality Transportation Construction).
C. When requested by ENGINEER, provide a professional opinion from a testing agency concerning test results and quality of work covered by testing performed.
D. Do more testing, if, in ENGINEER’s opinion, work is not being adequately controlled.

1.3 TESTING AGENCY
A. Provide sufficient personnel and cooperate with ENGINEER and CONTRACTOR in performing testing service.
B. Obtain and secure samples using procedures specified in the applicable testing code.
C. Perform product testing in accordance with applicable requirements of the Contract Documents.
D. Correlate tests with ENGINEER’s acceptance tests.
E. When an out-of-tolerance condition exists, perform additional control testing until tolerance is attained.
F. Report any non-compliance of materials and mixes to CONTRACTOR and ENGINEER immediately.

1.4 SUBMITTALS – CONTRACTOR
A. Before Construction: Identify:
   1. Name, address and telephone number of testing agency.
   2. Person whom agency has charged with engineering managerial responsibility.
   3. Licensed professional for testing agency who is to review services.
   4. Names and levels of certification and years of experience of testing agency’s laboratory and field technicians.

B. During Construction: Submit quality control test data requested by ENGINEER to demonstrate work performed complies with Contract Documents.

1.5 SUBMITTALS – TESTING AGENCY
A. During Construction: Submit field test results immediately to ENGINEER and CONTRACTOR or not later than day of test. Submit laboratory test results within 48 hours of determination.
B. After Construction: Submit a final summary report in tabular form. Show each failed test and its corresponding passing test.
C. Reports: Include on all reports:
   1. Project title, number and date.
   2. Date, time and location of test.
   3. Name and address of material Supplier.
   4. Identification of product being tested and type of test.
   5. Testing results and interpretation of results.
   6. Name of technician(s) who sampled and who performed test.
1.6 LIMITS ON TESTING AGENCY
   A. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   B. Agency may not suspend work.
   C. Agency has no authority to determine acceptance for ENGINEER.
   D. Samples must be collected and secured only by the testing agency.

PART 2 PRODUCTS

2.1 MATERIALS
   A. Material furnished from sources that have been found satisfactory under OWNER’s or ENGINEER’s normal testing and sampling procedures may be used in the Work.
   B. Materials that are supported with a Supplier’s certificate of compliance may be used in the Work. Certificate must be in possession of CONTRACTOR for review by ENGINEER before use.

PART 3 EXECUTION

Not Used

END OF SECTION
SECTION 01 56 39 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for temporary site fencing.
2. Section 31 10 00 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at a height 6 inches above the ground for trees up to and including 4-inch size at this height and as measured at a height of 12 inches above the ground for trees larger than 4-inch size.

B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches above the ground line.

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

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

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
b. Arborist’s responsibilities.
c. Quality-control program.
d. Coordination of Work and equipment movement with the locations of protection zones.
e. Trenching by hand or with air spade within protection zones.
f. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
   2. Detail fabrication and assembly of protection-zone fencing and signage.
   3. Indicate extent of trenching by hand or with air spade within protection zones.

C. Samples: For each type of the following:
   2. Protection-Zone Fencing: Assembled Samples of manufacturer’s standard size made from full-size components.
   3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

D. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
   1. Species and size of tree.
   2. Location on site plan. Include unique identifier for each.
   3. Reason for pruning.
   4. Description of pruning to be performed.
   5. Description of maintenance following pruning.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For arborist and tree service firm.

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

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

   1. Use sufficiently detailed photographs or video recordings.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality-control program.

1.7 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:

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

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

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.
PART 2 - PRODUCTS

2.1 MATERIALS

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

1. Mixture: Well-blended mix of two parts stockpiled soil to one part planting soil.
2. Planting Soil: Planting soil as specified in Section 32 91 15 "Soil Preparation (Performance Specification)."

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

1. Type: Shredded hardwood.
2. Size Range: 3 inches maximum, 1/2 inch minimum.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements: Previously used materials may be used when approved by Architect.

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

   a. Height: 72 inches.

2. Gates: Single-swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 36 inches.

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

1. Text: As per Owner’s Representative.
2. Lettering: 3-inch-high minimum, white characters on red background.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

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

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

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.

2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.

3. Access Gates: Install; adjust to operate smoothly, easily, and quietly; free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 20 feet on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

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

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.

2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.
3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 31 20 00 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

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

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

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

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

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1).
   a. Type of Pruning: Cleaning, reducing and thinning where indicated.

B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.

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

D. Do not paint or apply sealants to wounds.

E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

F. Chip removed branches and dispose of off-site.

3.7 REGRADING

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

B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.

1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

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

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

3.8 FIELD QUALITY CONTROL

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

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

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

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches or smaller in caliper size.
2. Large Trees: Provide two new tree(s) of at least 2-inch caliper size for each tree being replaced that measures more than 4 inches in caliper size.
   a. Species: As indicated on drawings.
3. Plant and maintain new trees as specified in Section 329300 "Plants."

C. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch uniform thickness to remain.

D. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet beyond drip line and no closer than 36 inches to tree trunk. Drill 2-inch-diameter holes a minimum of 12 inches deep at 24 inches o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

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

END OF SECTION 01 56 39
SECTION 01 57 00
TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Requirements for controlling surface and subsurface environmental conditions at a construction site, and related areas under the CONTRACTOR's responsibility.
B. Requirements for removal of physical evidence of temporary controls upon completion of the Work.

PART 2 PRODUCTS

2.1 MATERIALS
A. Temporary Materials: CONTRACTOR's choice.

PART 3 EXECUTION

3.1 NOISE CONTROL
A. Use equipment that is equipped with noise attenuation devices. Comply with local Laws and Regulations.
B. Control construction noise in residential areas from 9:00 pm to 7:00 am.

3.2 DUST AND MUD CONTROL
A. Comply with Utah State air quality regulations.
B. Provide suitable equipment to control dust or air pollution caused by construction operations.
C. Provide suitable mud and dirt containment, so Work site, access roadways and properties adjacent to the Work site are kept clean.

3.3 SURFACE WATER CONTROL
A. Control all on-site surface water. Provide proper drainage so flooding of the site or adjacent property does not occur.
B. Provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering the site.
C. Immediately before suspension of construction operations for any reason, provide proper and necessary drainage of Work site area.
D. Provide berms or channels as necessary to prevent flooding or saturation of Subgrade. Promptly remove all water collecting in depressions.
E. Dispose of water in a manner that will not cause damage to adjacent areas or facilities.

3.4 GROUND WATER CONTROL
A. Provide a dewatering system sufficient to maintain excavations and foundations dry and free of water on a 24 hour basis.
B. Notify ENGINEER, in writing, if groundwater conditions differ from conditions shown in the
Bid Documents, or in any soil test data that has been supplied.
C. Remove all dewatering facilities when no longer required.
D. Dispose of water in a manner that will not cause damage to adjacent or downstream areas or facilities.

3.5 POLLUTION CONTROL
A. Soil: Prevent contamination of soil from discharge of noxious substances (including engine oils, fuels, lubricants, etc.). Excavate and legally dispose of any such contaminated soil off-site, and replace with acceptable compacted fill and topsoil.
B. Water: Prevent disposal of wastes, effluent, chemicals, or other such substances adjacent to or into streams, waterways, sanitary sewers, storm drains, or public waterways. Perform any emergency measures required to contain any spillage.
C. Air: Control atmospheric pollutants.

3.6 EROSION CONTROL
A. Use measures such as berms, dikes, dams, sediment basins, fiber mat netting, gravel, mulches, slopes, drains and other erosion control devices or methods to prevent erosion and sedimentation.
B. Provide construction and earthwork methods which control surface drainage from cut, fill, borrow, and waste disposal areas, to prevent erosion and sedimentation.
C. Inspect earthwork during execution to detect any evidence of the start of erosion. Apply corrective measures as required.

END OF SECTION
SECTION 01 66 00
PRODUCT STORAGE AND PROTECTION

PART 1  GENERAL

1.1 SECTION INCLUDES
A. Storage, handling, and protection of products to be incorporated in the Work.

1.2 SUBMITTALS
A. Submit a copy of written permission if property other than OWNER's is used to store materials or equipment.

1.3 STORAGE
A. Store products immediately on delivery, per manufacturer's instructions, with seals and labels intact and legible.
B. Store products subject to damage by elements in weather-tight enclosures:
   1. Maintain temperatures within ranges required by manufacturer's instructions.
   2. Provide humidity control for sensitive products, as required by manufacturer's instructions.
   3. Store unpacked products on shelves, in bins or in neat piles, accessible for Inspection.
C. Provide substantial platforms, blocking or skids to support fabricated products above ground, to prevent soiling or staining. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
D. Store loose granular materials on solid surfaces to prevent mixing with foreign matter. Provide surface drainage to prevent flooding or ponding of rainwater. Prevent mixing with refuse or injurious materials. Do not store construction materials and equipment in municipal rights-of-way for more than five (5) days.
E. Arrange storage in manner to provide easy access for inspection.

1.4 STORAGE ON SIDEWALK, CURB AND GUTTER
A. Do not remove, block, or otherwise render sidewalks unusable by either storage of construction equipment and materials, or construction procedures used, unless a safe, usable, alternate walkway at least four (4) feet wide is provided.
B. Maintain curb and gutter clean and clear of debris, dirt, or excavated materials at all times.

1.5 MAINTENANCE OF STORAGE
A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
   1. State of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained.
   3. Surfaces of products exposed to elements are not adversely affected.
B. Any weathering of products, coatings and finishes is not acceptable.

1.6 STORAGE AREA RESTORATION
A. Remove all plant, equipment and stockpiles from the work site.
B. Restore all storage areas and service roads to prior condition without any additional cost to OWNER.

1.7 PROTECTION
A. Installed Product: Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, before completion and acceptance of Work.
B. Finished Surfaces: Provide coverings to protect finished surfaces from damage:
   1. Cover projections, wall corners, jambs, sills and soffits of openings, in areas used for traffic and for passage of products in subsequent work.
2. Protect finished floors and stairs from dirt and damage:
   a. In areas subject to foot traffic, secure heavy paper, sheet goods, or other materials in place.
   b. For movement of heavy products, lay planking or similar materials in place.
   c. For storage of products, lay tight wood sheathing in place.
   d. Cover walls and floor of elevator cars, and unprotected surfaces of car doors when used by construction personnel.

C. Waterproofed and roofed surfaces:
   1. Prohibit use of surfaces for traffic of any kind, and for storage of any products.
   2. When some activity must take place in order to complete work, obtain recommendations of Supplier and installer for protection of surface.
      a. Install recommended protection and remove on completion of that activity.
      b. Restrict use of adjacent unprotected areas.

D. Security: Provide security for materials, equipment and tools. OWNER will not protect Work from vandalism.

1.8 PROTECTION OF LAWNS AND LANDSCAPING
   A. Protect planted lawn and landscaped areas from pedestrian and vehicular traffic.

<table>
<thead>
<tr>
<th>PART 2</th>
<th>PRODUCTS</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART 3</td>
<td>EXECUTION</td>
<td>Not Used</td>
</tr>
</tbody>
</table>

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Mobilization and demobilization requirements.

1.2 REFERENCES
   A. APWA (Utah) Standards: Plan 412 Invert Cover.

1.3 DEFINITIONS
   A. Mobilization includes bringing all necessary equipment to the site to do the Work. It includes all labor, materials, and equipment to set up temporary offices, buildings, facilities, signs, and utilities.
   B. Demobilization includes removing all construction equipment and debris so site is left clean.

1.4 TEMPORARY FACILITIES
   A. Field Office: CONTRACTOR's choice.
   B. Utilities: Provide power, telephone, water, storm and sanitary facilities, and all other temporary utilities required.
   C. Security and Protection: Construct and maintain temporary fencing for the protection of materials, tools, and equipment. Obtain prior approval for all fence locations.
   D. Construction and Support: Set up and maintain in a neat and orderly manner temporary roads and paving, dewatering facilities, enclosures, identification signs and bulletin boards, waste disposal and temporary heat. Provide and maintain temporary all weather pedestrian walk ways and road detours.
   E. Invert Cover: Install covers as shown in APWA Plan 412 or Drawings. Installation must be tight so no debris can by-pass the cover and enter the piping below.

PART 2 PRODUCTS

2.1 MATERIALS
   A. Temporary Materials: CONTRACTOR's choice.

DEMOBILIZATION

PART 3 EXECUTION

3.1 INSTALLATIONS
   A. Relocate and modify temporary facilities as required.
   B. Install temporary utility service or connect to existing service.
C. Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities for easy access. Use of gasoline-burning, open flame, or salamander type heating units is prohibited.

D. Use local standards and codes for erection of adequate fences and barricades. Maintain all signing, barricades, fencing, drainage, and other items as required to protect public and private property from damage caused by construction operations.

E. Coordinate location of storage areas to avoid interference with drainage, traffic, or private property.

F. Provide and maintain all temporary signage required by the Work.

3.2 REMOVALS

A. Completely remove temporary materials and equipment:
   1. When construction needs can be met because of permanent installation, and
   2. At completion of the Work.

B. Clean or repair damage caused by installation or use of temporary facilities.

C. Restore areas to original or to specified conditions at completion of the Work.

END OF SECTION
PART 1  GENERAL

1.1 SECTION INCLUDES
   A. Construction surveying requirements.

1.2 SUBMITTALS
   A. Before contract closeout submit:
      1. Documentation to verify accuracy of survey work.
      2. When required by Laws and Regulations, submit a certificate signed by a licensed professional certifying that elevations and locations of improvements conform with the Contract Documents.
      3. All survey data, survey information showing dimensions, location angles and elevations of construction on contract Record Documents.

1.3 SURVEY REFERENCE POINTS
   A. Known basic horizontal and vertical control points for the Project are indicated.
   B. Locate and protect survey control points before starting site work, and preserve all permanent reference points during construction.
   C. Notify ENGINEER in writing within 24 hours of any survey work changes or clarifications required for Project. Secure written authorization before making any changes or relocations.
   D. Report in writing when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
   E. Replace construction stakes damaged or destroyed by CONTRACTOR at no additional cost to OWNER.

PART 2  PRODUCTS
       Not used

PART 3  EXECUTION

3.1 PROJECT SURVEY REQUIREMENTS
   A. Any work done without line and grade established by CONTRACTOR is at CONTRACTOR's own risk.
   B. Locate and layout by instrumentation and similar appropriate means to include but not limited to:
      1. Pavement subgrade and finish grade.
      2. Site improvements:
         a. Stakes for grading, fill and topsoil placement.
         b. Slope elevations.
         c. Utility locations and invert elevations.
4. Retaining wall locations and elevations.
5. Curb and gutter alignment and grade.
6. Building foundations, column locations and floor levels.
7. Controlling lines and levels required for civil, mechanical, and electrical trades.

END OF SECTION
SECTION 01 71 34
SURVEY REFERENCING

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Installation of reference marks.
   B. Making permanent records of marks set.

1.2 SUBMITTALS
   A. Field notes in 8 1/2 inches x 11 inches format or in standard field book form. Before construction begins and after construction ends show the following:
      1. All corners, points, or monuments which may be disturbed, damaged, moved, removed, covered, or destroyed by construction activity. Describe their kind, size, location, and any other data relating thereto.
      2. All corners, points, or monuments which are replaced, established, or reestablished, lines of survey, bearings, basis of bearings, scale of drawing, structures containing reference marks, and picture drawings of each mark installed.
      3. Found corners, points, or monuments, describing in detail the size, type, location and ownership.
      4. A north arrow, length of lines, scale of drawing, weather, temperature, errors of closure, and method of adjustment.
      5. Land surveyor's signature and seal on each tie-sheets record.
   B. If any survey point, monument, or line is disturbed or destroyed before referencing (tie-out), reestablish that point, monument, or line at no additional cost to OWNER, and submit a record of survey plat to the governing agency to show how its location was reestablished.
   C. “Corner File Report” that complies with applicable Laws and Regulations.

1.3 QUALITY ASSURANCE
   A. Comply with all pertinent surveying codes, Laws and Regulations including but not limited to Utah State Code Title 17 Chapter 23 – County Surveyor.

PART 2 PRODUCTS

2.1 BRASS TAG
   A. Imprinted with land surveyor's license number or business name fastened with a 1 inch long brad to:
      1. a 3/8 inch diameter and 1-1/4 inch deep lead plug pounded into a hole drilled in a concrete structure, or
      2. a cement water paste poured into the top of a two (2) inches diameter 24 inches long cast iron pipe driven into the ground.
   B. Depress tag and brad a minimum of 1/8 inch below surface plane of concrete structure or end of pipe.

2.2 REBAR AND CAP
   A. No. 5 deformed rebar at least 24 inches long.
   B. Installed free from movement.
   C. Cap bears the license number, business name, or government agency name.

2.3 RECORD OF SURVEY
A. Mylar sheet complying with applicable Laws and Regulations for providing plat survey control.

2.4 OTHER MATERIALS
A. Select all other materials, not specifically described but required for proper completion of work of this Section.

PART 3 EXECUTION

3.1 REFERENCE MARKS
A. Furnish and install reference marks set in concrete or mortar in sufficient number and durability to assure the perpetuation of facile replacement of any survey point, monument, or line.
B. Install reference marks where location of section corner or survey monuments are likely to be disturbed or destroyed, or where difficult terrain is encountered.
C. When specified or for new subdivision work, install reference marks for lot lines in concrete curbs or sidewalks. If not available, install witness monuments in approved locations.

3.2 REFERENCE SURVEY MONUMENTS BEFORE DISTURBANCE
A. Obtain local jurisdiction’s monument permit not less than 72 hours before disturbing, damaging, moving, removing, covering, or destroying any existing survey monument.
B. Pay all costs and submit all pertinent data when replacing monuments not referenced.

3.3 REFERENCING SURVEY POINTS AND LINES
A. Reference all survey points and lines which may be disturbed or destroyed by construction operations using reference marks.
B. Locate reference marks on lines or extensions of lines that the survey points designate.

END OF SECTION
SECTION 01 73 29
CUTTING AND PATCHING

PART 1  GENERAL

1.1  SECTION INCLUDES
   A. Cutting and patching to:
      1. Fit several parts together, to integrate with other work.
      2. Uncover work to install work done out of sequence.
      3. Remove and replace defective and non-conforming work.
      4. Remove Samples of installed work for testing.
      5. Provide openings in non-structural elements for penetrations of mechanical and electrical work.

1.2  SUBMITTALS
   A. Submit written request in advance of cutting and patching that affects:
      1. Structural integrity of any element of Project.
      2. Integrity of weather-exposed or moisture-resistant element.
      3. Efficiency, maintenance, or safety of any operational element.
      5. Work of OWNER or separate contractor.
   B. Include in request:
      1. Identification of Project.
      2. Location and description of affected work.
      3. Necessity for cutting and patching.
      4. Description of proposed work, and products to be used.
      5. Alternatives to cutting and patching.
      6. Effect on work of OWNER or separate contractor.
      7. Written permission of affected separate contractor.
      8. Date and time work will be executed.

PART 2  PRODUCTS

2.1  MATERIALS
   A. Those required for original installation.
   B. For any change in materials, submit request for substitution, Section 01 25 00 requirements.
PART 3 EXECUTION

3.1 INSPECTION
A. Inspect existing conditions, including elements subject to damage or movement during modifications to completed work.
B. After uncovering, inspect conditions affecting performance of work.
C. Beginning of Modification work constitutes acceptance of existing conditions.

3.2 PREPARATION
A. Provide supports to assure structural integrity of surroundings, devices and methods to protect other portions of work from damage.
B. Provide protection from elements for areas which may be exposed by work.

3.3 PERFORMANCE
A. Execute work by methods to avoid damage to existing structures and other work, and which will provide proper surfaces to receive patching and finishing.
B. Employ original installer if possible to be responsible for modification work on weather-exposed and moisture-resistant elements, and exposed to view surfaces.
C. Restore Work with new products per requirements of Contract Documents.
D. Fit Work, to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
E. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for an assembly, refinish entire unit.

END OF SECTION
SECTION 01 74 13
PROGRESS CLEANING

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Cleaning and disposal of waste materials, debris, and rubbish.
   B. Cleaning of Work before Final Inspection.

1.2 SUBMITTALS
   A. Before Project Closeout: Certificate of disposal of Hazardous Waste if applicable.

1.3 JOB CONDITIONS
   A. On Site Burning: Not permitted.

PART 2 PRODUCTS

2.1 CLEANING MATERIALS
   A. Use only materials which will not create hazards to health or property, and which will not damage surfaces.
   B. Use only cleaning materials recommended by manufacturer of item being cleaned.

PART 3 EXECUTION

3.1 CLEANING DURING CONSTRUCTION
   A. Initiate and maintain a specific cleaning program to prevent accumulation of debris. Maintain areas under CONTRACTOR's control free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
   B. Provide covered containers for deposit of debris and rubbish.
   C. Periodically clean interior areas to provide suitable conditions for finish work.
   D. Remove debris and rubbish from closed or remote spaces before closing the space.
   E. Broom clean interior areas before start of surface finishing, and continue cleaning on an as-needed basis.
   F. Control cleaning operations so dust and other particulate will not adhere to wet or newly-coated surfaces.
3.2 **DISPOSAL DURING CONSTRUCTION**
   A. Regularly remove and legally dispose of waste materials, debris, and rubbish from site.
   B. Provide additional collections and disposal of debris whenever the periodic schedule is inadequate to prevent accumulation.

3.3 **CLEANING BEFORE FINAL INSPECTION**
   A. Site:
      Clean exposed-to-view surfaces.
      Remove waste, debris, and surplus materials from site. Clean grounds; paved areas and sweep clean.
      Rake clean other surfaces.
   B. Building:
      Clean interior and exterior exposed-to-view surfaces.
      Remove temporary protection and labels not required to remain.
      Clean finishes free of dust, stains, films and other foreign substances.
      Clean transparent and glossy materials to a polished condition. Polish reflective surfaces to a clear shine.
      Vacuum clean carpeted and similar soft surfaces. Clean resilient and hard-surface floors.
      Clean surfaces of equipment; remove excess lubrication. Clean plumbing fixtures to sanitary condition.
      Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
      Clean lighting fixtures and lamps. Continue cleaning until acceptance.
      Remove waste and debris from roofs, gutters, area ways, and drainage systems.

**END OF SECTION**
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Procedural requirements for start-up, testing, adjusting and balancing systems.

1.2 COORDINATION
   A. Coordinate services with work of various trades to ensure rapid completion of services.
   B. Report any deficiencies noted during performance of services to allow immediate corrective action.

1.3 JOB CONDITIONS
   A. Before start of testing, adjusting and balancing, verify required job conditions:
      1. Systems installation is complete and in full operation.
      2. Conditions are within a reasonable range relative to design conditions.
      3. Special equipment such as electronic equipment are in full operation.
   B. Verify that special product or equipment requirements for preparation, testing and balancing have been met for elements of each of the systems that require testing.

PART 2 PRODUCTS

2.1 MATERIALS
   A. Provide material required to perform start-up of each respective item of equipment and system before beginning of test, adjust and balance procedures.

2.2 VERIFICATION OF PERFORMANCE
   A. Provide an independent certifying association to provide information and assistance required to adjust and balance system.
PART 3 EXECUTION

3.1 START-UP

A. Start up completed facility with appropriate personnel present.
B. Perform specified services and if necessary employ and pay for a manufacturer approved organization to perform specified services.
C. Provide appropriate utilities and instrumentation required for starting, testing, adjusting and balancing operations:
   1. Make instruments available to ENGINEER to facilitate spot checks during testing.
   2. Retain possession of instruments, remove from site at completion of services.
D. Comply fully with procedural standards of certifying association under whose standards service will be performed.
   1. Execute each step of the prescribed procedure without omission.
   2. Accurately record the required data.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
   A. Requirements for collecting, maintaining, updating, and submitting Record Documents.

1.2  DEFINITIONS
   A. Record Documents: Those documents maintained and annotated by CONTRACTOR during construction for recording "as built" condition of the Work.

1.3  CONSTRUCTION PHOTOGRAPHS
   A. Provide electronic photographs when specified in the Contract Documents starting with a series of photographs before the start of any physical construction, and continuing for as long as the Work progresses:
      1. Provide not less than 12 different subjects or angles of view each time from different locations in the Project area at intervals not exceeding one (1) month.
      2. On each photograph indicate the date, job title, photograph identification, and direction the camera was facing.
      3. With each request for payment.
      4. Upon completion of the Work, submit all electronic pictures on disc. ENGINEER may request hard copies of the pictures.
   B. Secure ENGINEER's approval if a video tape is to be substituted for the photograph prints.

1.4  DOCUMENTS ON SITE
   A. Keep at job site 1 copy of each of the following, if issued for the Work:
      3. Addenda.
      4. Reviewed Shop Drawings, product data and Samples.
      5. Modifications to the Contract Documents.
      6. Field test records.
      7. Inspection certificates.
      8. Manufacturer's certificates.
      10. Storm water pollution prevention plan (SWPPP).
      11. All related permits.
B. Do not use record documents for construction purposes.
C. Store Record Documents in a location, apart from documents used for construction.
D. Maintain Record Documents in a clean, dry, legible condition.
E. Provide adequate files and racks for storage of Record Documents that will allow ready access for review and updating.
F. Make Record Documents available at all times for review and Inspection by ENGINEER.

1.5 MARKING DEVICES
A. Red colored waterproof for all marking unless requested otherwise.

1.6 RECORDING
A. Clearly and legibly label each document "PROJECT RECORD".
B. Number Record Documents in a manner which will allow ready retrieval of documents and allow indexing of documents for submittal to ENGINEER.
C. Update Record Documents as work occurs to show the current status of the Work.
D. Do not permanently cover or conceal any work until all required information has been recorded on the Record Documents.
E. Contract Drawings: Legibly mark contract Drawings to record following actual construction information:
   1. Measured depths of various elements of foundation or finish grading in relation to finish floor datum or other permanent benchmark.
   2. Measured horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
   3. Measured location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of construction.
   4. Field changes of dimension and detail.
   5. Changes made by contract Modifications.
   6. Details not contained in original contract Drawings.
F. Project Manual and Addenda: Legibly update each to record:
   1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
   2. Changes made by contract Modifications.
   3. Other technical matters and details included in the Work, but not originally specified.
G. Shop Drawings: Maintain reviewed Shop Drawings as Record Documents; legibly annotate drawings to record changes made to Shop Drawings.
H. Product Data and Samples: Maintain reviewed product data and Samples as Record Documents; update and document any variations
from the reviewed product data and Samples after acceptance.

1.7 SUBMITTAL OF DOCUMENTS
A. At the completion of the Work, submit all Record Documents.
B. Accompany the submittal with a transmittal letter, in duplicate, containing:
   1. Submittal date.
   2. Project title and number.
   3. CONTRACTOR’s name and address.
   4. Title and number of each Record Document.
   5. Certification that each document as submitted is complete and accurate.
   6. Signature of CONTRACTOR, or CONTRACTOR’s authorized representative.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION
SECTION 01 78 50
CLOSEOUT PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Administrative provisions for Substantial Completion, acceptance of work, and Final Inspection.

1.2 REFERENCES
   A. APWA (Utah) Standards:
      Plan 110  Arrow diagram for project close-out.

1.3 SUBSTANTIAL COMPLETION
   A. When Work, or designated portion thereof, is substantially complete, submit written notice with list of any outstanding items to be completed or corrected.
   B. After receipt of CONTRACTOR's certification of Work Completion, ENGINEER will make final inspection to determine status of completion.
   C. Should Work not be substantially complete, remedy deficiencies and re-submit a written notice.

1.4 ACCEPTANCE OF WORK
   A. Protect Work until it is accepted.
   B. Neither ENGINEER's determination that Work is complete, nor acceptance thereof by the OWNER, shall operate as a bar to claim against the CONTRACTOR under the provisions of the contract documents.

1.5 CLOSEOUT SUBMITTALS
   A. Record Documents: Section 01 78 39.
   B. Operation and Maintenance Data; Section 01 78 23.
   C. Evidence of payment to Subcontractors and Suppliers: Document 00 72 00, Final Application for Payment.
   D. Final Summary Report of CONTRACTOR’s Testing Agency: Section 01 45 00 requirements.

1.6 CLOSEOUT SCHEDULE
   A. See APWA Plan 110 requirements.

PART 2 PRODUCTS  Not Used

PART 3 EXECUTION  Not Used

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Related Requirements: Review the General Contract Conditions, General Requirements, which contain information and requirements that apply to this Section.

B. Work Included: Execute finish grades complete, as shown, and as specified.

1.2 QUALITY ASSURANCE

A. Applicable Standards: Apply the current or latest editions of the standards described below:
   1. ASTM - American Society for Testing and Materials
   2. AASHTO - American Association of State Highway Officials
   3. IBC – International Building Code

1.3 PROJECT CONDITIONS

A. Protection and Maintenance of Existing Improvements:
   1. Furnish, place, and maintain all supports, shoring and bracing or sheet piling as per the Occupational Safety and Health Administration, Publication 29 CFR Part 1926 that may be required for the sides of the excavation or for protection of adjacent existing improvements. The adequacy of such systems shall be the complete responsibility of the Contractor.
   2. Provide protection necessary to prevent damage to existing improvements indicated to remain in place. Provide necessary fencing or barricades. Protect all improvements on adjoining properties and on University property. Restore damage improvements to their original condition, as acceptable to the University Project Manager.
   3. Assessment of damages shall be by the University and all replacement and repair to be to the University’s satisfaction. Cost of replacement of all damaged improvements to be borne by the Contractor.
   4. Maintain all benchmarks, monuments and other reference points. If disturbed or destroyed, replace as directed. Cost of replacement to be borne by the Contractor.

B. Construction Traffic: Conduct construction operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities to include adjacent project areas or temporary access. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from the University Project Manager.

C. Areas to be excavated as part of this project are not suspected to contain hazardous materials such as asbestos, petroleum, lead, etc. If such materials are encountered during excavation, the Contractor shall immediately cease excavation and notify the University Project Manager for direction.

1.4 SITE MAINTENANCE

A. Standing Water:
   1. Keep site free of standing water at all times. Provide and maintain grading or pumping as necessary to prevent erosion, softening of compacted surfaces and formation of mud in trenches and excavation.
2. Run all surface or subsurface seepage encountered to temporary sumps located where required or directed. From the sumps, pump water out and legally dispose of in a manner that will keep the entire site in workable condition at all times.

B. Dust:
   1. Assume full responsibility for all alleviation or prevention of dust nuisance on or about the site.

PART 2 - PRODUCTS

2.1 FILLS

A. General:
   1. All fill materials shall be approved by Soils Engineer.
   2. Excavated materials from the site may be used if approved by Soils Engineer.

B. Imported Fill:
   1. Non-expansive, predominantly granular soil, free from organic matter, deleterious substances, and not containing materials over 2 inches in greatest dimension.
   2. Do not use material having a dimension greater than 3/4 inches in the upper 6 inches of fill.

C. Stockpiling: Material accepted for filling and backfilling may be stockpiled on site at locations acceptable to the University.

2.2 SHORING AND BRACING

A. The Contractor shall be responsible for the proper design, installation, use, maintenance and removal of all materials and equipment necessary to properly brace trenches per the Occupational Safety and Health Administration, Publication 29 CFR Part 1926. The Contractor shall provide additional shoring or bracing measures in addition to the referenced publication requirements as may be necessary to ensure the safety of the work area.

PART 3 - EXECUTION

3.1 EXCAVATION

A. General:
   1. Excavate for pads, ductbanks, manholes, structures and conduits to elevations and dimensions shown. Extend excavation a sufficient distance from structure foundations to permit placing and removal of formwork, installation of materials, services, and inspection. Hand trim foundation excavations to final grade just before concrete is placed. Remove loose, soft materials, and all organic matter. Foundations shall bear on approved undisturbed bearing soil or compacted fill material. The University will not pay for excavations carried below indicated grades without written authorization necessary.
   2. Excavate for ductbanks to elevations and grades indicated. Allow for necessary base material. Do not over-excavate except where trench bottom is unsuitable for ductbank installation.
3. Earth excavation shall include the satisfactory removal and disposal of all materials encountered, regardless of the nature of the materials, the condition of the materials at the time they are excavated, or the manner in which they were excavated.

4. Contractor shall remove or bore under existing paving, walks, curbs and vegetation necessary for the execution of these plans to the satisfaction of the Project Inspector.

5. All materials to be excavated shall be unclassified and shall include earth fills, gravels, and other materials encountered.

6. Contractor shall remove all existing site structures, footing and vegetation necessary for the execution of these plans to the satisfaction of the Project Inspector and dispose of properly off site.

7. If backfilling and compacting is suspended, disturbed areas shall be brought to required grade and immediately seeded and mulched or sodded.

8. Where construction is adjacent to trees to remain cut roots cleanly at a right angle. Roots of trees that are to remain, exposed during excavation, shall be wrapped with burlap and kept wet until backfilling is complete.

B. Earth Forms: Concrete may be poured against vertical excavated surfaces provided the material will stand without caving, and provided that minimum reinforcing steel clearances indicated on Drawings are maintained, and suitable provisions are taken to prevent raveling of top edges.

C. Wood Forms: Pour excavated width of concrete section as shown on Drawings. Excavation for formed concrete shall be of sufficient width to allow for convenient construction and removal of forms.

3.2 EXCESS EXCAVATED MATERIAL

A. Unsuitable Material: Legally dispose of off site, all materials determined unsuitable for use as bedding fills or topsoil.

B. Unauthorized Excavation: Where unauthorized excavations are made below indicated elevations, restore to proper elevations as specified for compacted backfilling.

C. No additional payments shall be made for unauthorized excavation nor for all labor and materials to correct such work.

3.3 PLACEMENT OF FILLS

A. Supervision: Place all structural fill under the supervision of the Soils Engineer.

B. Surface Preparation:
   1. If required scarify to a depth of 6 inches. The subgrade of all areas to be paved. Adjust moisture conditions as required to maintain fill material within 2 percent above or below optimum moisture content for compaction.
   2. All areas to receive pavement replacement shall be proof rolled.

C. Spreading:
   1. Spread fill material in uniform lifts of not more than eight (8) in. in uncompacted thickness.
2. Fill material shall be moisture conditioned to within 2% above or below the optimum moisture content to permit proper compaction.
3. Place and compact each layer to fill to density required before placing additional fill material. Repeat filling until required grade is attained.
4. Suspend fill operations when satisfactory results cannot be obtained because of environmental or other unsatisfactory site conditions. Do not use muddy or frozen subgrade surface. Do not place fill material on muddy or frozen subgrade surface.
5. Topsoil or other organic materials are not permitted as fill or backfill material.

D. Precaution: Do not drop fill on any structure. Do not place backfill around, against, or upon any concrete structure until structure has attained sufficient strength to withstand the loads imposed.

E. Backfilling, Prior to Approval: Do not allow or use any of the work performed or installed to be covered up or enclosed by work of this Section prior to all required inspections, tests, and approvals. Should any of the work be so enclosed or covered up before it has been approved, uncover all such work at no additional cost to the University. After the work has been completely tested, inspected, and approved, make all repairs and replacements necessary to restore the work to the condition in which it was found at the time of the uncovering, all at no additional cost to the University.

F. Maintain surface conditions, which permit adequate drainage of rain water and prevent ponding of surface water in pockets. When fill placement is interrupted by rain, remove wet surface materials or permit to dry before placing additional fill material.

3.4 EXISTING UTILITIES

A. Notification: Where unmarked utility lines or other underground obstructions or piping may be uncovered within the work area, notify the University Project Manager, the agencies or service utility companies having jurisdiction thereof, and take necessary measures to prevent interruption of service.

B. Damage or Interruption: Should such lines or services be damaged, broken, or interrupted through the Contractor's own negligence, immediately repair and restore at no additional expense to the University.

3.5 COMPACTION

A. Extent: Compact all areas to receive fills and all areas to be paved. Extend compaction to not less than 5 ft. beyond pavement edges.

B. Density: 95% maximum density - Per ASTM D-1557 of ASTM D-698 as appropriate.

C. Equipment: Use compacting rollers, pneumatic or vibratory compactors, or other equipment and methods approved by the Project Inspector.

3.6 TESTING

A. Supervision: All excavation, backfilling, and compaction shall be randomly tested by the Testing and Inspection Agency. The Project Inspector reserves the right to increase the testing requirements.
B. Density:
1. Standards: Per ASTM or AASHTO test methods where fill, backfill, or in-place materials are required to be compacted to a specified density. The results of these tests shall be the basis upon which satisfactory completion of work will be judged.
2. Intervals: One test for every two (2) feet of fill height per 100 feet of trench. Compaction tests made by Soils Engineer. Additional testing may be required to comply with utility provider standards.
3. Unacceptable Installations: Any area or portion thereof that does not meet minimum density requirements shall be reworked and recompacted until it meets the project density requirements. Retest reworked areas as specified herein.
4. Fees for Additional Testing: Fees for all additional testing made necessary by inadequate compaction, replacement of unacceptable material, or other work not complying with the Drawings and Specifications, will be borne by the Contractor at no additional cost to the University.

3.7 STREET REPAIR

A. When construction requires trenching in existing asphalt paved streets, the asphalt paving repair shall consist of a minimum six inch Grade SX asphalt surface course over compacted subgrade or will match the thickness of the existing pavement, which ever is greater in thickness.

3.8 CLEAN-UP

A. Keep all areas of work clean, neat and orderly at all times.

B. Upon completion of work, remove off the site all surplus materials, tools, equipment, rubbish and debris resulting from the work.

END OF SECTION 02 22 00
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Remove site structural and site utility items and dispose of them off site.
   B. Salvage.

1.2 PAYMENT PROCEDURES
   A. Payment for structures or obstructions that are not designated for removal and disposal in the Bid documents, that cannot be removed with equipment reasonably expected to be used in the work without cutting, drilling, or blasting, will be paid for by Change Order.
   B. Backfilling depressions left because of demolition work will not be measured or paid for separately except as provided in the preceding paragraph.

PART 2 PRODUCTS
   Not Used

PART 3 EXECUTION

3.1 PREPARATION
   A. Review all work procedures with ENGINEER and with representatives of any utility in the work zone.
   B. Locate and preserve all active utilities which are to remain in service.
   C. Implement traffic control plan requirements, Section 01 55 26.

3.2 PROTECTION
   A. Protect irrigation systems.
   B. Protect structures to be removed and their contents from vandalism and theft.
   C. Protect trees:
      1. Avoid or minimize damage to trees and tree roots.
      2. Provide certified arborist observation of root cuts larger than four (4) inches diameter. Roots provide anchorage, storage of energy, and absorption and conduction of water and mineral elements. Loss of root connection affects health and stability of tree and safety of people and property. Notify ENGINEER of such root cut.
   D. Repair or replace damage at no additional cost to OWNER.

3.2 STRUCTURE DEMOLITION
   A. Remove structures and incidentals such as foundations, fences, outbuildings, etc.
   B. Remove foundation walls at least two (2) feet below finished grade or two (2) feet below natural ground surface. Remove floor slab or break it into pieces no larger than three (3) feet square.
   C. Backfilling and compaction of excavations for structures, Section 31 23 23.
D. Building components, Section 02 41 19.

3.3 PIPELINE DEMOLITION

A. General:
   1. Abandoned pipelines not to be salvaged are considered as incidental excavation work, Section 31 23 16.
   2. Do not damage pipe or structures that remain in service or are to be salvaged for OWNER.

B. Gravity Pipe Demolition:
   1. Plug abandoned pipe with a permanent, water-tight concrete plug extending into the abandoned pipe at least two (2) feet.
   2. Seal openings in walls of remaining manholes, catch basins, or structures with water-tight plugs.

C. Pressure Pipe Demolition:
   1. Coordinate demolition with ENGINEER and agency owning the utility pipe.
   2. Plug abandoned pipe with a permanent water-tight plug.
   3. Cap and restrain the active pipe with a blind flange or equivalent type of plug.
   4. For service line demolition or abandonment, disconnect the line from the mainline and shut off the corporation stop.

3.4 BRIDGE AND ABUTMENT DEMOLITION

A. Remove existing bridges and abutments indicated.

B. Remove structures so that no remaining portion is closer than three (3) feet to any water course or closer than two (2) feet to the Subgrade and Embankment surface, or within two (2) feet of the natural ground surface.

C. Remove structures so compacted backfill can be provided as required in backfilling operation, Section 31 23 23.

3.5 BURIED FUEL TANK DEMOLITION

A. Remove buried fuel storage tanks and dispose of tank contents in accordance with Laws and Regulations.

B. Do not spill fuel on Subgrade.

C. Comply with the local authority having jurisdiction over fuel tank removals.

3.6 MISCELLANEOUS DEMOLITION

A. Remove miscellaneous structures and obstructions or cover them with backfill if the result meets the following requirements:
   1. Backfill is stable.
   2. Burial does not interfere with construction.
   3. Permission to do so is obtained from ENGINEER.
   4. No remaining portion is within two (2) feet of the final ground surface contours.

3.7 SALVAGE

A. Salvage designated equipment and materials for OWNER.

B. All other material becomes the property of CONTRACTOR unless such materials are not owned by OWNER.

END OF SECTION
SECTION 02 41 14
PAVEMENT REMOVAL

PART 1 GENERAL

1.1. SECTION INCLUDES
   A. Remove roadway Pavement.
   B. Remove curb, gutter, sidewalk, Driveway Approach, waterway and similar flat work.

1.2 MEASUREMENT PROCEDURES
   A. Double saw cutting required for pavement removal or T-patches will not be measured or paid for separately.

1.3 REFERENCES
   A. APWA (Utah) Standards:
      Plan 256  Concrete pavement patch

1.4 SUBMITTALS
   A. Traffic control plan, Section 01 55 26.

PART 2 PRODUCTS  Not Used

PART 3 EXECUTION

3.1 PREPARATION
   A. Implement traffic control plan requirements, Section 01 55 26.
   B. Coordinate utility locations, Section 01 31 13.
   C. Preserve all active utilities.
   D. Notify neighborhood at least 48 hours before day and time of operation.
   E. Mark existing utilities on redline drawings.

3.2 PROTECTION
   A. Install Invert Covers, Section 01 71 13.
   B. Trees:
      1. Avoid or minimize damage to trees and tree roots.
      2. Provide certified arborist observation of root cuts larger than four (4) inches diameter. Roots provide anchorage, storage of energy, and absorption and conduction of water and mineral elements. Loss of root connection affects health and stability of tree and safety of people and property. Notify ENGINEER of such root cut.
C. Existing Surfaces:
   1. Protect adjacent surfaces including concrete walls, planters, carriage walks, driveway approaches, rock walls, rock gardens, concrete steps, sidewalks, and curb cut assemblies. Replace damaged facilities at no additional cost to OWNER.
   2. Use rubber cleats or Pavement pads when operating backhoes, outriggers, track equipment, or any other equipment on or crossing paved surfaces.
   3. Restore paved surfaces that are damaged by removal operations at no additional cost to the OWNER. Match the existing Pavement surface plus 1 inch.

D. Environment:
   1. Control dust, Section 01 57 00.
   2. Protect plant and animal habitat. Follow federal, state or local protection requirements.

E. Repair or replace any damage at no additional cost to OWNER.

3.3 REMOVE PORTLAND CEMENT CONCRETE PAVEMENT
A. See APWA Plan 256 requirements.
B. Cutting:
   1. DO NOT use machine mounted impact hammers.
   2. Make concrete cuts straight, vertical, true, full-depth.
   3. Cut along perimeter of panel to be removed. Where edge of existing surface is cracked, broken, or deteriorated, make the cut so the defective surface can be removed.
   4. Cut along any edge that is damaged during construction, including cavities underneath caused by construction or concrete removal.
C. Removal:
   1. Remove concrete to the nearest expansion joint or vertical saw cut.
   2. Remove panels without damaging remaining panels.
   3. Remove all bonding inhibitors.

3.4 REMOVE BITUMINOUS CONCRETE PAVEMENT
A. Cutting:
   1. Use any method that produces a true, vertical, full-depth cut.
   2. When bituminous pavement overlays Portland cement concrete Pavement, DO NOT use machine mounted impact hammers.
   3. If an edge of an existing surface is cracked, broken, or deteriorated, make the cut so the defective surface can be removed.
   4. Re-cut along any edge that is damaged during construction, and where cavities underneath pavement are caused by construction.
B. Remove Pavement: Remove pavement without damaging remaining.
3.5 **REMOVE CONCRETE FLAT WORK**

A. Saw cut flat work at weakened plane joints. Saw cut full depth.

B. Where edge of existing surface is cracked, broken, or deteriorated, make the cut so the defective surface can be removed.

C. Saw along any edge that is damaged during construction, including cavities underneath caused by construction.

D. If flat work that is not scheduled for removal is damaged, remove and replace the flat work at no additional cost to OWNER.

3.6 **CLEANING**

A. Remove all debris and dust. Clean surrounding rails, sidewalks, Driveways, Driveway approaches, landscaping, concrete flat work, and other objects in vicinity of work.

END OF SECTION
SECTION 02 41 15
CURB AND TRIP HAZARD REMOVAL

PART 1  GENERAL

1.1 SECTION INCLUDES
   A. Saw cut and remove a curb.
   B. Remove a trip hazard by saw cutting, grinding, or jacking.

1.2 REFERENCES
   A. APWA (Utah) Standards:

1.3 SUBMITTALS
   A. Traffic control plan, Section 01 55 26.

1.4 SITE CONDITIONS
   A. Control dust, Section 01 57 00.

PART 2  PRODUCTS
Not Used

PART 3  EXECUTION

3.1 PROTECTION
   A. Implement traffic control plan requirements, Section 01 55.26.
   B. Do not damage abutting surfaces that are not scheduled for cutting or removal.
   C. Protect plant and animal habitat. Follow federal, state or local protection requirements.

3.2 CURB REMOVAL FOR NEW DRIVEWAY APPROACH
   A. Remove curb as shown in APWA Plan 222.
   B. At the Apron: Saw off curb so surface of curb cut matches slope of apron. Do not provide a lip at flow-line unless indicated elsewhere.
   C. At the Curb Flare: Saw off curb perpendicular to the back of curb:
      1. If the flare is in a pedestrian walking area, limit the curb cut slope (parallel to the flow-line) to 10 percent (1:10) maximum.
      2. If the flare is NOT in a pedestrian walking area, make the length of the curb cut slope (parallel to the flow-line) three (3) feet minimum.
   D. Remove blade marks on sawed surfaces by grinding.

3.3 CURB REMOVAL FOR NEW CURB CUT ASSEMBLY
   A. For assembly types see APWA Plans 235, 236, and 237.
   B. Curb Ramp or Blended Transition: Saw off curb to match the surface slope of the Curb Ramp or Blended Transition.
   C. Curb Flare: Saw off the curb perpendicular to the back of curb:
      1. If the flare is in a pedestrian walking area, limit the curb cut slope (parallel to the flow-line) to 10 percent (1:10) maximum.
      2. If the flare is NOT in a pedestrian walking area, typical horizontal length of the curb cut slope
is two (2) feet.

D. Remove blade marks on sawed surfaces by grinding.

3.4 TRIP HAZARD REMOVAL

A. **DO NOT cut or grind concrete structures** such as bridge decks, catch basins, manholes, concrete borders, culverts, etc. ENGINEER must determine other means of trip hazard removal.

B. Remove trip hazards greater than 1/4 inch high but less than 1 1/2 inches high. ENGINEER must determine acceptable means for removing trip hazards higher than 1 1/2 inches.

C. Make saw cut slopes, grinding slopes, and milled slopes not steeper than 10 percent (1:10) measured in direction of pedestrian travel. Grind sawed or milled surfaces to remove blade marks or to make smooth.

D. If flat work is jacked (Section 32 01 29), jack until displacement differential is less than 1/4 inch. Repair adjacent flat work elevations if adversely moved out of place because of the jacking process. Repair damaged form strip irrigation system or vegetation if growth is adversely affected.

3.5 CLEANING AND REPAIR

A. Remove debris and dust from work site.

B. Clean surrounding rails, concrete flat work, Driveways aprons, landscaping and other objects in vicinity of work.

C. Repair damage at no additional cost to OWNER.

END OF SECTION
PART 1 – GENERAL

1.1 DESCRIPTION

A. The work in this section shall include furnishing and installing the electrical duct bank including excavation conduit, spacers, pull wires, encasement, and backfill for the project.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. The following related documents are listed for the convenience of the contractor only. The contractor is responsible for meeting the requirements of all specification sections.
   1. Excavating, Backfilling and Compacting for Electrical Systems, Section 02 22 00
   2. Cast in Place Concrete for Electrical, Section 03 31 00

1.3 CODES AND STANDARDS

A. Equipment and installation shall meet the requirements of the applicable sections of the latest codes and standards of the following organizations:
   1. American National Standards Institute (ANSI)
   3. Rigid Steel Conduit, Zinc-Coated (ANSI C80.1)
   4. National Electrical Manufacturers Association (NEMA)
   5. Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80) (TC 2)
   6. PVC Fittings for Use with Rigid PVC Conduit and Tubing (TC 3)
   7. PVC and ABS Plastic Utilities Duct for Underground Installation (TC 6)
   8. Fittings for ABS and PVC Plastic Utilities Duct for Underground (TC9)
   9. National Fire Protection Association (NFPA)
  10. National Electrical Code (NEC)

1.4 SUBMITTALS

A. Submit catalog data on the following items:
   1. Chairs and spacers
   2. Long radius sweeps

1.5 QUALIFICATIONS

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

PART 2 – PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. General: Electrical components and materials shall be in accordance with the National Electrical Code (NFPA 70). When applicable, all electrical materials and equipment shall be listed by Underwriters Laboratories and shall bear the UL label.
B. Conduit:
1. Above Ground Conduit: Rigid metal conduit, UL 6 hot dip galvanized, threaded type.

C. Fittings:
1. Metal Fittings: NEMA FB1
2. Plastic Fittings: NEMA TC3

D. Pull Wire: Pull wire shall be NO. 14 hot-dip galvanized steel or nylon rope having a minimum tensile strength of 200 lbs.

E. Warning Tape: Provide magnetic warning tape: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried high voltage electrical circuits, or buried communication circuits.

F. Duct Bank Reinforcing Steel: ASTM A615, Grade 40 for #2 or #3 bar and ties; grade 60 for all other bar; billet steel deformed bars, uncoated finish.

G. Tie Wire: ASTM A82, Minimum 16 gauge annealed type.

H. Conduit Spacers: PVC spacers sized and shaped for strength and support of conduits during installation and placement of concrete encasement. Wood, brick, galvanized steel or other unacceptable material is not permitted.

I. A horizontal and vertical spacing of 3 inches shall be maintained between ducts by installing high impact polystyrene spacers. Spacers shall be interlocked horizontally only. Along the length of duct run, spacers shall be placed at an interval of 4 spacers per 20 feet.

J. Concrete: Ready mixed, 2000 psi 28 day strength per specification Section 03301, Cast in Place Concrete with red dye coloring applied to the top layer of concrete.

PART 3 – EXECUTION

3.1 PREPARATION

A. Soil Data: The contractor is to examine the site and then determine the character of materials to be encountered.

B. Excavation: Excavate duct bank trench per specification Section 02220, Excavating, Backfilling and Compaction for Utility Systems.

3.2 INSTALLATION

A. Duct Bank:
1. Install duct in accordance with drawings. All duct shall be schedule 40 PVC unless indicated otherwise.
2. Install duct bank at depths as indicated on drawings.
3. Install duct with minimum slope of 4 inches per 100 feet. Slope towards manholes.
4. Cut duct square using saw or pipe cutter; de-burr cut ends.
5. Insert duct to shoulder of fittings.
6. Join nonmetallic duct using adhesive as recommended by manufacturer.
7. Wipe nonmetallic duct dry and clean before joining. Apply full even coat of adhesive to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
8. For electrical ducts, install no more than the equivalent of three 90-degree bends between pull points.
9. Terminate duct at manhole entries using termaduct with end bell.
10. Band ducts including rebar together before placing concrete.
11. Where ductbanks pass under roadways, driveways or parking areas, provide a minimum of two number 4 rebars per vertical row of conduits, longitudinally along the duct bank, one at the top and one at the bottom of the duct bank. Provide transverse rebar hoops at 3 foot intervals.
13. Duct banks shall be encased in concrete per the drawings. Surfaces not exposed to view will have an as-cast form finish. Surfaces exposed to view will have a smooth form finish. Use red mineral pigment sprinkled on top of the wet concrete after installation or mix red pigment with concrete to color concrete. Trowel red pigment into the top layer of concrete.
14. The minimum separation maintained between the outside surfaces of conduits in duct banks shall be per drawings.
15. The encasement surrounding the structure of conduits shall have a minimum thickness of three inches on the top, bottom and sides.
16. Provide pull wire in each empty duct. In one duct in each ductbank (electrical or telecommunication) provide a pre-lubricated conduit measuring tape.
17. Swab duct. Use suitable caps to protect installed duct against entrance of dirt and moisture.
18. Backfill trenches.
19. Except on conduit risers, accomplish changes in direction of runs exceeding a total of 10 degrees, either vertical or horizontal, by long sweep bends having a minimum radius of curvature of 25 feet unless indicated otherwise on drawings. Sweep bends may be made up of one or more curved or straight sections or combinations thereof. Manufactured bends shall have a minimum radius of 36 inches for use with conduits of less than 3 inches in diameter and a minimum radius of 60 inches for ducts of 3 inches in diameter and larger.
20. Conduit separators shall be of high impact polystyrene. Stagger the joints of the conduits by rows and layers so as to provide a duct line having maximum strength. During construction, protect partially completed ductlines from the entrance of debris such as mud, sand, and dirt by means of suitable conduit plugs. As each section of a duct line is completed from manhole to manhole, draw a brush through having the diameter of the duct, and having stiff bristles until the conduit is clear of all particles of earth, sand, and gravel; then immediately install conduit plugs.

B. Identification: Identify duct bank conduits by labeling both ends of the pull wire in each conduit.

3.3 FIELD QUALITY CONTROL

A. Verify that duct bank installation is in accordance with this specification and the drawings.

B. Verify duct bank conduits are identified.

C. Verify pull wires have been installed in empty ducts.
D. Verify warning tape has been installed.

END OF SECTION 02 58 20
SECTION 03 11 00
CONCRETE FORMING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Formwork for cast-in-place concrete.
B. Openings in formwork for other affected work.
C. Form accessories such as snap ties, bracing, etc.
D. Stripping formwork.

1.2 REFERENCES
A. ACI Standards.

1.3 DEFINITIONS
A. Shoring: The activity to support formwork.
B. Reshoring: The activity to reduce the amount of formwork supporting concrete elements. As concrete sets and strength increases, less need for formwork occurs gradually until concrete becomes free standing.

1.4 SUBMITTALS
A. Shop Drawings: Fabrication and erection drawings of forms for specific finished concrete surfaces, as indicated. Show general construction of forms, jointing, special joints or reveals, location and pattern of form tie placement, and other items affecting exposed concrete visibility.
B. Form Release Agent: Where concrete surfaces are scheduled to receive special finishes or applied coverings which may be affected by agent submit manufacturer’s instructions for use of agent.

1.5 QUALITY ASSURANCE
A. Designer's Qualifications: Structural design professional who complies with Utah licensing law, has experience in concrete formwork, and is acceptable to the authority having jurisdiction.
B. Design Forms:
   1. With sufficient strength to maintain finished tolerances indicated in Section 03 35 00, to support loads, pressures, and allowable stresses as outlined in ACI 347 and for design considerations such as wind loads, allowable stresses, and other applicable requirements of local Laws and Regulations.
   2. To permit easy removal.
   3. For required finishes.
C. Design, engineering, and construction of formwork is CONTRACTOR's responsibility.

1.6 JOB CONDITIONS
   A. For reference purposes, establish and maintain sufficient control points and bench marks to check tolerances. Maintain in an undisturbed condition and until final completion and acceptance of Work.
   B. Regardless of tolerances specified, allow no portion of Work to extend beyond legal boundaries.

1.7 FIELD SAMPLES
   A. Prepare field Samples and submit per Section 01 33 00.
   B. Construct and erect sample formwork panel for architectural concrete surfaces receiving special treatment or finish as a result of formwork. Formwork to include vertical and horizontal form joints and typical rustication joints when required.
   C. Size panel to indicate special treatment or finish required, including form release agent.
   D. Remove formwork after casting concrete.

1.8 ACCEPTANCE
   A. Secure ENGINEER's inspection of form layout for concrete flat work.

PART 2 PRODUCTS

2.1 FORM MATERIALS
   A. Faced with material which will produce smooth and uniform texture on concrete, unless indicated otherwise.
   B. Arrange facing material orderly and symmetrical, keeping number of seams to a minimum.
   C. Do not use material with raised grain, patches, or other defects which will impair texture of concrete surface.

2.2 FORMWORK ACCESSORIES
   A. Form Ties:
      1. Use ties constructed so end fasteners can be removed without spalling concrete faces.
      2. After end fasteners of ties have been removed, embedded portion of ties are to terminate not less than two (2) times the diameter or thickness of the fasteners from formed faces of concrete, but in no case greater than 3/4 inch.
      3. When formed face on concrete is not exposed, form ties may be cut off flush with formed surfaces. Use ties with 3/4 inch diameter cones on both ends or an approved equal for water retaining structures.
   B. Premolded Expansion Joint Filler: F1 sheet, Section 32 13 73 unless...
indicated elsewhere.

C. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, impair natural bonding or color characteristics of concrete. To prevent contamination, agents used on potable water structures are subject to review by ENGINEER before use.

D. Fillets for Chamfered Corners: Wood strips 1 inch x 1 inch size, maximum length possible.

PART 3  EXECUTION

3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 FORM CONSTRUCTION

A. Make forms sufficiently tight to prevent loss of concrete.

B. Unless indicated otherwise, place chamfer strips in corners of forms to produce beveled edges on permanently exposed exterior corners.

C. To maintain specified finish tolerances, camber formwork to compensate for anticipated deflections.

D. Provide positive means of adjustment using wedges, jacks, Shores, and struts to take up all settlement during concrete placing operation.

E. Provide temporary ports in formwork to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

F. At construction joints, overlap forms over hardened concrete at least six (6) inches. Hold forms against hardened concrete to prevent offsets or loss of mortar at construction joint and to maintain true surface.

G. Construct wood forms for wall openings to facilitate loosening, or counteract swelling.

H. Fasten wedges used for final adjustment of forms before concrete placement in position after final check.

I. Anchor formwork to Shores, supporting surfaces or members to prevent upward or lateral movement and deflection of any part of formwork system during concrete placement.

J. Provide runways for moving equipment with struts or legs, supported directly on formwork or structural member without resting on reinforcing.

K. Position expansion joint material and other embedded items accurately and support to prevent displacement.

L. To prevent entry of concrete, fill voids in sleeves, inserts, and anchor slots temporarily with readily removable material.

M. For architectural concrete, limit deflection of facing materials between studs as well as deflection of studs and waler to 0.0025 times span.
N. For underground concrete work, do not use soil walls for forming unless authorized by ENGINEER.

3.3 INSERTS, EMBEDDED PARTS, AND OPENINGS
   A. Provide formed openings for elements embedded in or passing through concrete.
   B. Coordinate work of other sections for the forming and setting of openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.
   C. Install accessories per manufacturer’s instructions. Ensure items are not disturbed during concrete placement.

3.4 FORM FINISHES
   A. Use forms with smooth rubbed, scrubbed, sand floated finishes that meet ACI 347 unless indicated otherwise.
   B. For As-cast Finishes:
      1. Install form panels in orderly arrangement with joints planned in approved relation to building elements.
      2. Where panel joints are recessed or otherwise emphasized, locate form ties within joints, not within panel areas.
      3. Where an as-cast finish is required, no grouting will be permitted in the finishing operation.
   C. Textured Finishes: As indicated.

3.5 APPLICATION OF FORM RELEASE AGENT
   A. Apply form release agent on formwork per manufacturer’s instructions. Apply before placing reinforcing steel, anchoring devices, and embedded items.

3.6 FORM REMOVAL
   A. Do not pry against face of concrete. Use only wooden wedges.
   B. When repair of surface defects or finishing is required at an early age, remove forms as soon as concrete has hardened sufficiently to resist damage from removal operations.
   C. Remove top forms on sloping surfaces of concrete as soon as concrete has attained sufficient stiffness to prevent sagging. Perform needed repairs or treatment required on such sloping surfaces at once, followed by specified curing.
   D. Loosen wood forms for wall openings as soon as it can be accomplished without damage to concrete.
   E. Formwork for columns, walls, sides of beams, and other members not supporting weight of concrete may be removed as soon as concrete has hardened sufficiently to resist damage from removal.
   F. Where no Reshoring is planned, leave forms and Shoring used to support weight of concrete in beams, slabs, and other concrete members in place until concrete has attained its specified strength.
   G. Where Reshoring is planned, supporting formwork may be removed.
when concrete has reached 70 percent of specified strength, provided Reshoring is installed immediately.

H. When Shores and other vertical supports are so arranged that non-load carrying, form-facing material may be removed without loosening or disturbing Shores and supports, facing material may be removed at an earlier age.

3.7 RESHORING
A. When Reshoring is permitted or required, plan operations in advance and obtain approval.
B. During Reshoring do not subject concrete in beam, slab, column, or any other structural member to combined dead and construction loads and live loads in excess of loads permitted for developed concrete strength that time of Reshoring.
C. Place Reshores as soon as practical after stripping operations are complete, but in no case later than end of working day on which stripping occurs.
D. Tighten Reshores to carry required loads without over-stressing.
E. Leave Reshores in place until the concrete being supported has reached its specified strength.
F. For floors supporting Shores under newly placed concrete, level original supporting Shore or Reshore:
   1. Reshoring system shall have a capacity to resist anticipated loads in all cases equal to at least 1/2 the capacity of the Shoring system.
   2. Unless otherwise specified locate Reshores directly under a Shore.
   3. In multistory buildings, extend Reshoring through a sufficient number of stories to distribute the weight of newly placed concrete, forms, and construction live loads in such a manner that design loads of floors and supporting Shores are not exceeded.
G. Design, engineering, and construction of Shoring and Reshoring is the responsibility of the CONTRACTOR.

3.8 REMOVAL STRENGTH
A. When removal of formwork or Reshoring is based on concrete reaching a specified strength, it shall be assumed that concrete has reached this strength when either of the following conditions has been met:
   1. When test cylinders, field cured along with the concrete they represent, have reached the specified strength.
   2. When concrete has been cured per Section 03 39 00 for the same length of time as the site-cured cylinders that reached specified strength. Determine the length of time the concrete has been cured in the structure by cumulative number of days or fractions thereof, not necessarily consecutive, during which the air temperature is above 50 deg F and concrete has been damp or sealed from evaporation and loss of moisture.
3.9 **REUSE OF FORMS**
   A. Do not reuse forms if there is any evidence of surface wear or defect which would impair quality of concrete surface.
   B. Thoroughly clean and properly coat forms before reuse.

3.10 **FIELD QUALITY CONTROL**
   A. Before commencing a pour, verify connections, form alignment, ties, inserts and Shoring are placed and secure.
   B. Observe formwork continuously while concrete is being placed to verify that the forms are plumb and there are no deviations from desired elevation, alignment, or camber.
   C. If during construction any weakness develops and false-work shows undue settlement or discoloration, stop work, remove affected construction if permanently damaged, and strengthen false-work.

END OF SECTION
SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Reinforcing steel bars, wire fabric or rod mats for cast-in-place concrete.
   B. Support chairs, bolsters, bar supports, and spacers for supporting reinforcement.

1.2 REFERENCES
   A. **AASHTO Standards:**
      M254 Corrosion Resistant Coated Dowel Bars.
   B. **ACI Standards:**
      301 Structural Concrete for Buildings.
      315 Concrete Reinforcement.
   C. **ASTM Standards:**
      A82 Steel Wire, Plain, for Concrete Reinforcement. A185 Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.
      A615 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
      A706 Low-Alloy Steel Deformed Bars for Concrete Reinforcement.
      C1116 Fiber-Reinforced Concrete and Shotcrete. D3963 Epoxy-Coated Reinforcing Steel.
   D. **AWS Standards:**
      D1.1 Structural Welding Code Steel.
      D1.4 Structural Welding Code Reinforcing Steel.
   E. **CRSI Standards:**

1.3 SUBMITTALS
   A. **Manufacturer's Certificate:** Submit mill test certificates of supplied concrete reinforcement, indicating physical and chemical analysis.
   B. **Welder's certification.**
C. **Shop Drawings:**
   1. Indicate sizes, spacings, locations, and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting, and spacing devices.
   2. When required, prepare Shop Drawings by an engineer who complies with Utah licensing law and is acceptable to agency having jurisdiction.

1.4 **QUALITY ASSURANCE**
   B. Comply with ACI 301.
   C. Welders: Certified to comply with AWS D1.1 or AWS D1.4 as applicable.

1.5 **ACCEPTANCE**
   A. Unless specified otherwise, chairs for supporting reinforcement in flat slabs are spaced as follows:
      1. Three (3) feet maximum for No. 5 and smaller bars.
      2. Five (5) feet maximum for bars larger than No. 5.
   B. Dowels are placed on dowel baskets and properly aligned.
   C. Epoxy and galvanized coatings are not chipped or cut. Ends of cut bars are epoxy coated or galvanize painted before placement.
   D. Minimum covering over reinforcement is as specified.

---

**PART 2 PRODUCTS**

2.1 **MATERIALS**
   A. Fiber Reinforcement: Glass, ASTM C1116.
   B. Reinforcement:
      1. Grade 60 ksi deformed steel bars, ASTM A615 and supplementary requirements S1 or ASTM A706 for welding.
      2. Welded wire fabric. Plain steel type, ASTM A185 in flat sheets or coiled rolls. Dimensions of the mesh 4”x 4” or as indicated.
   C. Stirrups: Steel, ASTM A82.
   D. Dowel Bars for Expansion Joints: Grade 60 ksi smooth steel bar, ASTM A615.
      1. Galvanized or epoxy coated in roadway Pavements.
      2. Provide plastic cap to permit longitudinal movement of dowel bar within concrete section equal to joint width plus 1/4 inch.
      3. For load transfer joints, paint bars with 1 coat of paint conforming to AASHTO M254 and coat 1/2 with grease.
E. Coatings for Corrosion Protection:
   1. Epoxy coat, ASTM D3963.
   2. Galvanized, Section 05 05 10.

2.2 ACCESSORY MATERIALS
   A. Tie Wire: Minimum 16 gage annealed type or an acceptable patented system.
   B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.3 FABRICATION
   A. Fabricate reinforcement, ACI 315 providing for concrete cover.
   B. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on Shop Drawings.
   C. Weld reinforcing bars; with AWS D1.4.

PART 3 EXECUTION

3.1 PLACING
   A. All reinforcement to be free of loose mill scale, loose or thick rust, dirt, paint, oil or grease.
   B. Place all reinforcement in the exact position indicated. With tie wire, tie bars together at all intersections except where spacing is less than 12 inches in each direction, in which case tie alternate intersections.
   C. Maintain the distance from vertical forms and between layers of reinforcement by means of prefabricated chairs, ties, hangers, or other approved devices. Placing and fastening of reinforcement in each section of the Work must be approved before concrete is placed.
   D. Overlap sheets of metal mesh one square plus six (6) inches to maintain a uniform strength. Securely fasten at the ends, edges, and supports to maintain clearances.
   E. Flat Slab Work:
      1. Support reinforcing steel of formed flat slabs with plastic chairs, precast concrete blocks or other non-oxidizing slab bolsters.
      2. Size chairs or bolsters to position the steel in the exact location indicated.
      3. Space chairs and bolsters not more than five (5) feet on centers in each direction.
      4. Coat metal supports in contact with forms to prevent rust.
      5. Tie down deck steel to beams or forms at regular intervals of not more than five (5) feet on centers along the beams or forms to prevent movement of steel during concrete placement.
3.2 **SPLICING**

A. Furnish all reinforcement in the full lengths indicated unless otherwise permitted. Splicing of bars, except where indicated is not permitted without ENGINEER’s knowledge. Stagger splices where possible.

B. Unless indicated otherwise, overlap reinforcing bars a minimum of 30 diameters to make the splice. In lapped splices, place the bars and wire to maintain the minimum distance for clear spacing to the surface of the concrete.

C. Do not use lap splices on bars greater than No. 11 diameter unless approved.

D. Weld reinforcing steel only if indicated or if authorized in writing. Weld in conformance to AWS D1.4.

E. Do not bend reinforcement after embedding in hardened concrete.

F. Do not permit reinforcement or other embedded metal items bonded to the concrete, to extend continuously through any expansion joint, except dowels in floors bonded on only one side of joints.

3.3 **PLACING EMBEDDED ITEMS**

A. Place all sleeves, inserts, anchors and embedded items before concrete placement. Temporarily fill voids in embedded items to prevent entry of concrete.

B. Give all trades whose work is related to the concrete section (Section 03 30 04) ample notice and opportunity to introduce or furnish embedded items before concrete placement.

END OF SECTION
SECTION 03 30 04
CONCRETE

PART 1  GENERAL

1.1 SECTION INCLUDES
   A. Material requirements.

1.2 REFERENCES
   A. ACI Standards:
      211.1 Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
      211.2 Selecting Proportions for Structural Lightweight Concrete.
      211.3 Standard Practice for Selecting Proportions for No-Slump Concrete.
      214 Evaluation of Strength Test Results of Concrete.
      301 Specifications for Structural Concrete for Buildings.
      305 Hot Weather Concreting.
      306 Cold Weather Concreting.
      318 Building Code Requirements for Reinforced Concrete.
   B. ASTM Standards:
      C33 Concrete Aggregates.
      C39 Compressive Strength of Cylindrical Concrete Specimens. C88 Soundness of
         Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
      C94 Ready-Mixed Concrete.
      C117 Material Finer than 75µ (No. 200) Sieve in Mineral Aggregates by
         Washing.
      C123 Lightweight Particles in Aggregate.
      C138 Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
      C142 Clay lumps and Friable Particles in Aggregates. C143 Slump of
         Hydraulic-Cement Concrete.
      C150 Portland Cement.
      C172 Sampling Freshly Mixed Concrete.
      C227 Potential Reactivity of Cement-Aggregate Combinations (Mortar Bar Method).
      C231 Air Content of Freshly Mixed Concrete by the Pressure Method.
      C260 Air-Entraining Admixtures for Concrete.
      C289 Potential Reactivity of Aggregates (Chemical Method). C295
         Petrographic Examination of Aggregates for Concrete.
      C441 Effectiveness of Mineral Admixtures or Ground Blast- Furnace Slag in
         Preventing Excessive Expansion of Concrete Due to The Alkali-Silica
         Reaction.
      C494 Chemical Admixtures for Concrete.
      C535 Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and
         Impact in the Los Angeles Machine.
C595 Blended Hydraulic Cements.
C618 Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
C1116 Fiber-Reinforced Concrete and Shot Crete. C1157 Blended Hydraulic Cement.
C1240 Use of Silica Fume as a Mineral Admixture in Hydraulic Cement Concrete, Mortar, and Grout.
C1260 Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
C1293 Concrete Aggregates by Determination of Length Change of Concrete Due to Alkali-Silica Reaction.
C1567 Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method).
C1602 Mixing Water Used in The Production of Hydraulic Cement Concrete.
STP 15-C Manual on Quality Control of Materials.

1.3 SUBMITTALS
A. Quality Assurance:
   1. Independent Laboratory: Submit names, certification levels, and years of experience of testing agency’s field technicians that are assigned to the Work. Verify laboratory complies with ASTM and ACI standards.
B. Mix Design: Allow ENGINEER 10 days to evaluate the submittal. Provide the following information.
   1. Date of mix design. If older than 365 days from date of submission recertify mix design.
   2. Physical properties of the aggregate (this section article 2.3). Test results shall not be older 455 days from the date of submission. The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed.
   3. Identify whether mix is for hot, cold, or normal weather placement.
   4. Cement source, type and chemical composition.
   5. Aggregate soundness and potential reactivity.
   6. Average Strength (f_{cr}), per quality control chart.
   7. Allowable range of slump and air content.
   8. Water cement ratio.
   10. Unit weight.
   11. Analysis of water if water is not potable.
   12. Mortar bar or prism test results if a pozzolan is included in the mix.
   13. Technical data sheets for additives to be used at the plant and at the job site. Certify additives are compatible with each other.
C. Pre-approved Mix Design: Submit name and address of Supplier and Suppliers mix design number if available.
D. Before Changing Mix Design: Submit a new design and allow ENGINEER 10 days to evaluate the changes.

1.4 QUALITY ASSURANCE
A. General:
1. Use a laboratory that follows and complies with ASTM C1077.
2. Reject concrete that does not meet requirements of this section.
3. If requested, submit a quality control and testing report describing source and field quality assurance activities performed by CONTRACTOR and Suppliers.

B. **At Source:**
   1. Do not change material sources, type of cement, air-entraining agent, water reducing agent, other admixtures except as allowed by mix design.
   2. Store bagged and bulk cement in weatherproof enclosures. Exclude moisture and contaminants.
   3. Prevent segregation and contamination of aggregate stockpiles.
   4. Avoid contamination, evaporation, or damage to admixtures. Protect liquid admixtures from freezing.

C. **At Site:** Use of admixtures will not relax hot or cold weather placement requirements.

### 1.5 ACCEPTANCE

A. **Materials:**
   1. Aggregate Source:
      a. Verify suitability of aggregate source.
      b. Verify aggregate gradation.
      c. Verify percent of combined aggregate passing No. 200 sieve.
   2. At the Site:
      a. Verify mix identification, batch time, slump, air content, and temperature.
      b. Verify drum rotation is less than 300 revolutions.
   3. At the Laboratory: Verify strength in 28 days.

B. **Defective Material:** Popouts, scaling, etc.
   1. Price adjustment, Section 01 29 00 and Section 03 30 10.
   2. Dispute resolution, Section 01 35 10.

---

**PART 2 PRODUCTS**

### 2.1 CEMENT

A. **General:**
   1. Do not use air entraining cement except for hand mixed applications.
   2. Do not use cement containing lumps or is partially set.
   3. Do not mix cement originating from different sources.

B. **Standard Set Cement:**
   1. Type II cement per tables 1 and 3 in ASTM C150, or Type V when necessary, or
   2. Low-alkali cement per Table 2 in ASTM C150.

C. **Blended Hydraulic Cement:** The following are cement equivalencies when substituting blended cement for a Portland cement.

<table>
<thead>
<tr>
<th>Portland Cement ASTM C150</th>
<th>Blended Cement ASTM C595</th>
<th>Blended Cement ASTM C1157</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type I</td>
<td>IP</td>
<td>GU</td>
</tr>
<tr>
<td>Type II</td>
<td>IP (MS)</td>
<td>MS</td>
</tr>
</tbody>
</table>

---

**BUILDING 303 SEISMIC UPGRADE PHASE 1**

**CONCRETE**

**03 30 04**

**19 AUGUST 2019 - U of U 22210**

**SECTION 03 3004 - PAGE 3**
### Rapid Set Cement
As above and as follows:
1. Initial set time: 15 minutes minimum.
2. Color: Acceptable to the ENGINEER.

#### WATER
A. Clean, non-staining, non-detrimental per ASTM C1602.
B. Screen out extraneous material.
C. Do not use alkali soil water.

#### AGGREGATES
A. Gravel, crushed gravel, crushed stone, crushed concrete, slag, sand or combination with the following physical properties.

#### Table 2 – Physical Properties

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coarse Aggregate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wear (hardness or toughness), percent</td>
<td>(a)</td>
<td>(a)</td>
<td>--</td>
</tr>
<tr>
<td>Soundness (5 cycles), percent</td>
<td>Na&lt;sub&gt;2&lt;/sub&gt;SO&lt;sub&gt;4&lt;/sub&gt;</td>
<td>C88</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>MgSO&lt;sub&gt;4&lt;/sub&gt;</td>
<td>C88</td>
<td>--</td>
</tr>
<tr>
<td>Coal and lignite (SG = 2.4 min.), percent</td>
<td>C123</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Clay lumps, friable particles, chert, percent</td>
<td>C142</td>
<td>--</td>
<td>7</td>
</tr>
<tr>
<td>Material finer than 200 sieve, percent</td>
<td>C117</td>
<td>--</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>Fine Aggregate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soundness (5 cycles), percent</td>
<td>Na&lt;sub&gt;2&lt;/sub&gt;SO&lt;sub&gt;4&lt;/sub&gt;</td>
<td>C88</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>MgSO&lt;sub&gt;4&lt;/sub&gt;</td>
<td>C88</td>
<td>--</td>
</tr>
<tr>
<td>Fineness modulus</td>
<td>C33</td>
<td>2.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Coal and lignite (SG = 2.4 min.), percent</td>
<td>C123</td>
<td>0.5</td>
<td>1.0</td>
</tr>
<tr>
<td>Clay lumps, friable particles, chert, percent</td>
<td>C142</td>
<td>--</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Aggregate blend (meets one of the following)**
1. Average prism length change in 12 months, percent | C1293 | -- | 0.04 |
2. Average mortar bar length change in 16 days, percent | C1260 | -- | 0.10 |
3. Petrography limits, percent
   - Quartz……………………………………….d | C295  | -- | 5.0 |
   - Chert or chalcedony ……………………...| --    | -- | 3.0 |
   - Tridymite or cristobalite………………| --    | -- | 1.0 |
   - Opal……………………………………...| --    | -- | 0.5 |
   - Natural glass in volcanic rock……….| --    | -- | 3.0 |
4. Historical data acceptable to ENGINEER

**NOTES**
(a) Wear retained on No. 8 sieve. For aggregate less than 1 1/2” use ASTM C131. For larger aggregates use ASTM C535.
(b) Organic impurities producing a dark color concrete may cause rejection.
(c) Prism length change and mortar bar length change based upon unmodified ASTM tests.
(d) Quartz must NOT be optically strained, micro-fractured, or microcrystalline in nature.
2.4 ADDITIVES
   A. Calcium Chloride: Not allowed in reinforced concrete.
   B. Air Entrainment: ASTM C260. For extrusion enhancement use non-vinsal resin.
      1. Type A: Water reducing.
      2. Type B: Set retarding.
      3. Type C: Set accelerating.
      4. Type D: Water reducing and set retarding.
      5. Type E: Water reducing and set accelerating.
      6. Type F: High range water reducing (super plasticizer). *
      7. Type G: High range water reducing and set retarding. *
         * Keep the relative durability factor of water reducing additives not less than 90 and the chlorides content (as Cl⁻) not exceeding 1 percent by weight of the admixtures.
   D. Pozzolan:
      1. Natural or fly ash per ASTM C618.
      2. Silica fume per ASTM C1240.
   E. Special Admixtures: Allowed if mix design submittal is accepted:
      1. Lithium nitrate based solution for control of reactive aggregates.
      2. Calcium nitrite based solution for corrosion protection of reinforced structures subject to chloride-induced corrosion.
      4. Viscosity modifier for enhancement of self consolidating concrete or for workability.

2.5 MIX DESIGN
   A. Class: Unless specified elsewhere, as follows.
      1. Above Ground: 5000 minimum.
      2. At Ground Level: 4000 minimum.
   B. Selection of Cement: ASTM C150 or C1157.
      1. For sulfate resistance, use Type V Portland cement, or Type II with Class F fly ash. Class F fly ash may be used as an addition to Type V Portland cement.
      2. Do not use fly ash with Type IP(MS) or Type III Portland cement.
   C. Selection of Aggregates:
      1. Maximum Particle Size:
         a. 1/5 of narrowest dimension between forms.
         b. 1/3 of depth of slab.
         c. 3/4 of minimum clear spacing between reinforcing bars.
         a. Coarse Aggregate: Choose from the following grades. Gradations are based upon percent of material passing sieve by weight.

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>357 (2”)</td>
</tr>
<tr>
<td>2-1/2”</td>
<td>100</td>
</tr>
<tr>
<td>2 Inch</td>
<td>95 - 100</td>
</tr>
</tbody>
</table>
b. Fine Aggregate:

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8”</td>
<td>100</td>
</tr>
<tr>
<td>No. 4</td>
<td>95 to 100</td>
</tr>
<tr>
<td>No. 16</td>
<td>45 to 80</td>
</tr>
<tr>
<td>No. 50</td>
<td>10 to 30</td>
</tr>
<tr>
<td>No. 100</td>
<td>2 to 10</td>
</tr>
</tbody>
</table>

Table 4 – Fine Aggregate Gradation

C. Silts and Clays: The amount of material smaller than the No. 200 sieve in any combined gradation sample is limited to the following percentages by weight of the combined sample:
1) 1.75 percent maximum for concrete subject to abrasion.
2) 3.0 percent maximum for all other concrete.

D. Selection of Pozzolan:
1. General: If a blended aggregate passes an unmodified ASTM C1293 test, use of a Pozzolan is CONTRACTOR’s choice. If aggregate does not pass ASTM C1293, select a Pozzolan (or blended cement, or both) and determine the effective dosage to meet one of the following tests:
   a. ASTM C1567. The expansion of a cement-pozzolan-aggregate job-mix mortar bar is less than or equal to 0.10 percent at 16 days. Do not use this test if a lithium admixture is used in the job-mix.
   b. ASTM C441. The expansion of a test mixture at 56 days is less than or equal to a control mixture prepared with cement with equivalent alkalis between 0.5 and 0.6 percent.
2. Fly Ash (Class F): Allowed as a cement replacement under the following conditions:
   a. Before replacement is made, use the minimum cement content in the design formula to establish the water/cement ratio.
   b. Replace up to 20 percent of the cement by weight on a one (1) part fly ash to one (1) part cement basis.
   c. Submit to ENGINEER a quality history of the fly ash identifying a minimum of 20 of the most current ASTM C618 analysis.
3. Natural Pozzolan (Class N): Allowed as a cement replacement if the 14 day expansion test (ASTM C1567) with job aggregates, job cement and natural pozzolan does not exceed the 14 day expansion test of job aggregates, job cement and Class F fly ash.
4. Silica Fume: Allowed as a cement replacement if replacement of hydraulic cement on a 1 part silica fume to 1 part cement does not exceed 10 percent, and water/cement ratio is established before cement is replaced with silica fume.

E. Selection of Mix Properties: Select and proportion the mix to produce appropriate strength, durability and workability. Use ACI 211.1, 211.2, or 211.3, and meet the following properties and limitations:

<table>
<thead>
<tr>
<th>Properties</th>
<th>Standard</th>
<th>Class 2000</th>
<th>Class 3000</th>
<th>Class 4000</th>
<th>Class 5000</th>
</tr>
</thead>
</table>

Table 5 – Mix Properties and Limitations
## Compressive Strength (f'c) at 28 days, psi, minimum

<table>
<thead>
<tr>
<th></th>
<th>C39</th>
<th>2000</th>
<th>3000</th>
<th>4000</th>
<th>5000</th>
</tr>
</thead>
</table>

## Compressive Strength at 7 days, psi, (for reference only)

<table>
<thead>
<tr>
<th></th>
<th>C39</th>
<th>1340</th>
<th>2010</th>
<th>2680</th>
<th>3350</th>
</tr>
</thead>
</table>

## Average Strength, psi (f_c)

<table>
<thead>
<tr>
<th></th>
<th>214</th>
<th>(a)</th>
<th>(a)</th>
<th>(a)</th>
<th>(a)</th>
</tr>
</thead>
</table>

## Cement content, bags, minimum

<table>
<thead>
<tr>
<th></th>
<th>--</th>
<th>4.5</th>
<th>5.5</th>
<th>6.5</th>
<th>7.5</th>
</tr>
</thead>
</table>

## Water-cement ratio (by weight), maximum

<table>
<thead>
<tr>
<th></th>
<th>318</th>
<th>(d)</th>
<th>(d)</th>
<th>0.44</th>
</tr>
</thead>
</table>

## Entrained air, percent (based upon aggregate size)

<table>
<thead>
<tr>
<th></th>
<th>2&quot;</th>
<th>1-1/2&quot;</th>
<th>1&quot;</th>
<th>3/4&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>3.0 to 6.0</td>
<td>4.5 to 7.5</td>
<td>4.0 to 7.0</td>
<td>3.0 to 6.0</td>
</tr>
<tr>
<td>Maximum</td>
<td>4.0 to 7.0</td>
<td>4.5 to 7.5</td>
<td>5.0 to 7.5</td>
<td>4.0 to 7.0</td>
</tr>
</tbody>
</table>

## Slump

<table>
<thead>
<tr>
<th></th>
<th>C143</th>
<th>(d)</th>
<th>(d)</th>
<th>(d)</th>
<th>(d)</th>
</tr>
</thead>
</table>

### NOTES

(a) The amount by which average strength (f_{cr}) exceeds compressive strength (f'c) is based upon statistical assurance that no more than 1 test in 100 tests will fall below compressive strength (f'c).

(b) Unless allowed otherwise by ENGINEER.

(c) Before pozzolan substitution.

(d) Specific to exposure conditions and finishing need.

(e) Comply with ACI 211.1 if air content is changed.

(f) 1 bag of cement = 94 pounds.
1. Cold Weather: ACI 306. Unless allowed otherwise by ENGINEER, increase cement content in the mix design by 1 class between October 1 and March 1, i.e. Class 3000 becomes Class 4000, Class 4000 becomes Class 5000, etc.

2. Hot Weather: ACI 305. Reduce temperature of mix ingredients or use an admixture appropriate to job conditions when air temperature is over 75 deg F.

3. Concrete Deposited Under Water: Increase cement content one (1) class for concrete placed above water or use viscosity modifying admixture.

F. **Selection of Fiber Reinforcement**: The basis for determining material proportions of fiber-reinforced concrete is the Supplier’s responsibility per ASTM C1116 subject to mix property requirements of this Section. Unless specified otherwise provide synthetic fibers.

2.6 **SOURCE QUALITY CONTROL**

A. **General**: Collect Samples randomly. Do not change source quality control sampling point.

B. **Aggregate**:
   3. Petrographically examine fine and coarse aggregate sources once every three (3) years, ASTM C295.

C. **Concrete Mix**: Obtain samples per ASTM C172 and run the following tests:
   2. Unit weight, ASTM C138.
   5. Temperature, ASTM C1064.

D. **Concrete Quality Charts**: Comply with ACI 214 and ACI 301. Plot new results and identify trends on quality control charts that comply in form to ASTM STP 15-C. Show the Specified Strength ($f'_c$), the required Average Strength ($f_{cr}$), and the compressive strength versus date of Sample.

E. **Equipment**: Certify at least every two (2) years through the services of a design professional licensed in the State of Utah, that plant equipment complies with requirements of the National Ready Mixed Concrete Association and ASTM C94.
   1. Transit Trucks: Equip transit trucks with plates indicating total volume, agitating volume and mix volume.
   2. Weights and Measures: Comply with regulatory requirements of State of Utah.

---

### PART 3  EXECUTION

3.1 **INSTALLATION**

A. Placement, Section 03 30 10.

3.2 **FIELD QUALITY CONTROL**

A. Truck Mixed Concrete (Dry Batch): ASTM C94.
   1. Truck Mixer: Fill drum no more than 63 percent of the gross drum volume and no less than two (2) cubic yards. Use drum manufacturer’s recommended mixing speed (between 12 – 18 rpm).
   2. Truck Agitator: Do not fill drum greater than 80 percent of the gross drum volume. Use drum manufacturer’s recommended agitating speed (between 2 – 6 rpm).

B. Mixing Plant: ASTM C94.
   1. Use option C and requirements in this Section for preparing ready-mixed concrete.
2. Use scales certified by the State of Utah. Do not use volume measurement except for water and liquid admixtures.
3. Mixing time must exceed 80 seconds after adding air entrainment admixture.

C. Hand Mixing:
1. Do not hand mix batches larger than 0.5 cubic yard.
2. Hand mix only on a watertight platform.
3. Ensure all stones are thoroughly covered with mortar and mixture is of uniform color and consistency before adding water.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Concrete sampling and testing requirements.

1.2 REFERENCES
A. ACI Standards:
   318 Building Code Requirements for Reinforced Concrete.
B. ASTM Standards:
   C31 Making and Curing Concrete Test Specimens in the Field. C39 Compressive Strength of Cylindrical Concrete Specimens. C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
   C78 Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
   C138 Unit Weight, Yield, and Air Content (Gravimetric) of Concrete.
   C143 Slump of Portland Cement Concrete. C172 Sampling Freshly Mixed Concrete.
   C173 Air Content of Freshly Mixed Concrete by Volumetric Method.
   C231 Air Content of Freshly Mixed Concrete by the Pressure Method.
   C567 Unit Weight of Structural Lightweight Concrete.

1.3 SUBMITTALS
A. Concrete Supplier: If requested, submit reports and material certificates verifying concrete quality control.
B. Laboratory: Promptly submit test data results for seven (7) and 28 day breaks to Supplier, CONTRACTOR and ENGINEER.

1.4 QUALITY ASSURANCE
A. Provide an ASTM C1077 compliant and ACI certified laboratory.
B. Provide level I ACI certified field sampling technicians.

1.5 SITE CONDITIONS
A. Assist ENGINEER: Furnish labor to assist ENGINEER in obtaining and handling acceptance Samples at site or sources.
B. Store and Cure Test Specimens: Safely store and cure concrete test specimens and acceptance test specimens for first 24 hours:
   1. Follow ASTM C31 in making and curing cylinders or beams at site. Do not move the cylinders or beams for the initial 16 hour cure period. Provide initial cure temperature as follows:
      a. 60 to 80 deg F for Class 4,000 or less.
      b. 68 to 78 deg F for Class 5,000 or greater.
2. Equip storage device with an automatic 24 hour temperature recorder with an accuracy of plus or minus two (2) deg F
3. Use water containing hydrated lime if water is to be in contact with cylinders or beams.
4. Ensure the device(s) can accommodate the required number of test cylinders or beams. Lack of capacity will cause the placement of concrete to cease.
5. Have the storage devices available at the point of placement at least 24 hours before placement.
6. A 24 hour test run may be required.

1.6 ACCEPTANCE

A. At the Laboratory:
2. Flexure strength, ASTM C78.

B. At the Site:
1. Acceptance: Reject non-complying batches until two (2) consecutive batches are compliant then proceed in random batch testing for acceptance.
2. Sampling Protocol: ASTM C172. Unless indicated otherwise follow Table 1 sampling frequency requirements. Collect sample at discharge chute before placement, or at pumper hose after priming grout has been wasted.
Table 1 – Sampling Frequency

<table>
<thead>
<tr>
<th>Rate of Placement (Cubic Yard / Day)</th>
<th>Temperature</th>
<th>Air</th>
<th>Slump</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 8</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0 - 50</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Each additional 50 cu. yd. or fraction thereof</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

3. Testing Protocol:
   a. Temperature, ASTM C1064.
   b. Air content, ASTM C231 or ASTM C173 if lightweight aggregate is used.
   c. Slump, ASTM C143.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PRECAST PRODUCTS
   A. Obtain composite Samples from different portions of the batch.
   B. Make and cure concrete test specimens for acceptance, ASTM C31.
   C. Cure all precast products with water vapor or water.
   D. Do not damage precast products by stripping forms or handling before the concrete reaches its specified strength.

3.2 CAST-IN-PLACE PRODUCTS
   A. Obtaining Samples:
      1. Batch samples, ASTM C172.
      2. Core samples, ASTM C42.
   B. Identify location of tests on test reports.
   C. Compressive strength, ASTM C39:
      1. Mold four (4) test specimens, ASTM C31.
      2. For strength test perform slump, air, unit weight, and temperature test.
      3. Break 1 cylinder at seven (7) days and three (3) cylinders at 28 days. The average strength of three (3) cylinder breaks shall be considered the test result.
      4. If any one cylinder in a 28 days test shows definite evidence of improper sampling, molding, handling, curing, or testing, discard the cylinder. The average strength of the remaining cylinders shall be considered the test result.
   D. Tensile (flexural) strength, ASTM C78:
      1. Mold four (4) test specimens, ASTM C31.
      2. For strength test perform slump, air, unit weight, and temperature test.
      3. Break 1 beam at seven (7) days and three (3) beams at 28 days. The average strength of the three (3) beam breaks shall be considered the test result.
4. If any one beam in a 28 days test shows definite evidence of improper sampling, molding, handling, curing, or testing, discard the beam. The average strength of the remaining beams shall be considered the test result.

E. Aggregate, ASTM C136 for fine and coarse aggregate.

F. Slump test, ASTM C143.

G. Air Test:
   2. Light weight concrete, ASTM C173.

H. Unit Weight:
   2. Light weight concrete, ASTM C567.

I. When requested, test in-place concrete by impact hammer, sonoscope, or other non-destructive device:
   1. To determine relative strengths in various locations in Work.
   2. To aid in evaluating concrete strength.
   3. To select areas to be cored.
   4. To verify quality control in the absence of control testing.

3.3 RETESTING DEFECTIVE CONCRETE STRENGTH

A. If CONTRACTOR desires to do a retest, a request to ENGINEER for retesting must be made within 35 days from time of concrete placement. No coring or retesting shall be done after 40 days have elapsed from the time of placement:
   1. Choose three (3) random test locations and verify choice with ENGINEER. Obtain retest samples per ASTM C42 and test compressive strength per ASTM C39 or flexure strength per ASTM C78.
   2. Establish a chain of custody for all test samples.
   3. If concrete placed in the Work will be dry under service condition, air dry cores for seven (7) days before tests. Unless otherwise specified, use air temperature 60 to 80 deg F and relative humidity less than 60 percent.
   4. If concrete placed in the Work will be more than superficially wet under service conditions, test cores after moisture conditioning (liquid or vapor water cure).
   5. If more than 1 core shows evidence of having been damaged before testing provide replacement cores, otherwise evaluation will be done on two (2) or more core samples.
   6. Evaluate cores in accordance with ACI 318 requirements.
   7. If core tests are inconclusive, or impractical to obtain, or if structural analysis does not confirm the safety of the Work, load test may be used and evaluated in accordance with ACI 318 requirements.

B. Coat sides of core hole with concrete epoxy resin adhesive. Fill core holes with non-shrink concrete mortar. Match color and texture of surrounding concrete.

C. Within 40 days from time of placement publish the chain of custody record and the results of retesting.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Concrete placement for slabs on grade, slabs on fill, structural building frame, and other concrete components.

1.2 REFERENCES
   A. **ACI Standards:**
      301 Structural Concrete for Buildings.
      305 Hot Weather Concreting.
      306 Cold Weather Concreting.
      309 Consolidation of Concrete.
   B. **ASTM Standards:**
      C881 Epoxy-Resin-Base Bonding Systems for Concrete. C1059 Latex Agents for Bonding Fresh to Hardened Concrete.

1.3 SUBMITTALS
   A. **Batch Delivery Ticket:** For each batch delivered to site, identify:
      1. Date and Project description.
      2. Producer and plant.
      3. Name of contractor.
      4. Serial number of ticket.
      5. Mix identification number or code.
      6. Truck number and time dispatched.
      8. Type and amount of cement.
      10. Water added for receiver of concrete and receiver's initials.
      11. Admixture types.
      12. Separate weights of fine and coarse aggregate.
      13. Statement of whether batch is pre-mixed at plant or mixed in transit.
   B. **Record of Placed Concrete:** Identify date of record, location of pour, quantity, air temperature, and CONTRACTOR’s quality control test Samples taken.
   C. **Bonding Compound:** Identify product name, type, and chemical analysis.

1.4 QUALITY ASSURANCE
   A. Provide ACI certified finishers.
   B. Remove and replace any placed concrete suffering hot or cold weather damage.
   C. For control testing follow Section 03 30 05 requirements.

1.5 ACCEPTANCE
   A. General:
1. Price adjustment, Section 01 29 00. CONTRACTOR may request ENGINEER determine appropriate Modifications or payment adjustments to pay for Defective work.

2. Retesting by CONTRACTOR, Section 01 35 10 and Section 03 30 05.

B. Concrete work that fails to meet any of the following requirements will be considered defective. Replace Defective Work at no additional cost to OWNER:

1. Placement:
   a. Reinforcing steel size, quantity, strength, position, damage, or arrangement is not as specified or does not comply with code.
   b. Formwork differs from required dimensions or location in such a manner as to reduce concrete’s strength or load carrying capacity or physical esthetics.
   c. Workmanship likely to result in deficient strength.

2. Finishing:
   a. Concrete exposed to view has defects that adversely affect appearance.
   b. Slab tolerances of Section 03 35 00 are not met.

3. Protection:
   a. Method of curing is not as specified.
   b. Inadequate protection of concrete during early stages of hardening and strength development from:
      1) temperature extremes.
      2) rapid moisture loss.
   c. Mechanical injury, construction fires, accidents, or premature removal of formwork likely to result in deficient strength development.

---

PART 2 PRODUCTS
2.1 MATERIALS
A. Concrete: Section 03 30 04. Class as indicated:
   1. For roadway cuts, Section 33 05 25.
B. Bonding Compound: ASTM C1059. Either polyvinyl acetate base or acrylic base latex:
   1. Use type I in areas not subject to high humidity or immersion in water with minimum bond strength of 400 psi.
   2. Use type II in areas subject to high humidity or immersion in water with minimum bond strength of 1250 psi.
C. Vapor Retarder: 10 mil thick clear polyethylene sheet. Type recommended for below grade application.
D. Forms: Section 03 11 00.
E. Reinforcement: Section 03 20 00.
F. Coverings and Curing Compound: Section 03 39 00.
G. Shrinkage Compensating Grouts: Section 03 61 00.
H. Epoxy Adhesive: Section 03 61 00.

PART 3 EXECUTION

3.1 EXAMINATION
A. Verify items to be cast into concrete are accurately placed and held securely.
B. Verify slump, air content range, mix identity, and batch time on delivery ticket matches mix design.
C. Verify slab steel mats are supported by steel chairs, precast concrete blocks, or other slab bolsters. Do not pour if absent.

3.2 PREPARATION
A. Implement traffic control plan requirements, Section 01 55 26.
B. Notify ENGINEER no later than 24 hours before commencement of concrete placement.
C. Do not allow construction loads to exceed structural capacity.
D. Clean previously placed concrete. Apply bonding compound per manufacturer's instructions.
E. At locations where new concrete is dowelled to existing work, drill, remove dust, insert and pack steel dowels with shrink compensating grout, and expansion caps where required.

3.3 DELIVERY
A. Concrete Temperature: Keep mixed concrete temperature before placement between 60 deg F. and 90 deg F.
B. Slump and Air Content: Keep within allowable ranges.
C. Transport Time:

<table>
<thead>
<tr>
<th>Air Temperature</th>
<th>Time After Initial Batching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 90 deg F</td>
<td>1–1/2 hours</td>
</tr>
<tr>
<td>Greater than 90 deg F</td>
<td>1–hour (without retarder)</td>
</tr>
<tr>
<td></td>
<td>Greater than 90 deg F</td>
</tr>
<tr>
<td></td>
<td>1–1/2 hours (with retarder)</td>
</tr>
</tbody>
</table>

To increase time past 1-1/2 hours, a hydration stabilizer that is acceptable to Supplier may be used.
D. Tempering:
   1. Water may be added if all following conditions are met:
a. The mix design water/cement ratio is not exceeded.
b. The delivery ticket allows for addition of water based upon water/cement ratio.
c. The amount of water added is accurately measured to within 1 gallon of the design addition.
d. Water addition is followed by three (3) minutes of mixing at mixing speed before discharge.
e. Supplier and CONTRACTOR mutually agree on who is authorized to add water.

2. Do not add water after 1 cubic yard of concrete has discharged from the delivery vehicle.

E. Super-plasticizer: Comply with manufacturer’s requirements. If none, then as follows:
   1. If added at site, add agent using injection equipment capable of rapidly and uniformly distributing admixture to concrete. Before discharge, mix for a minimum of five (5) minutes at a drum rate not less than 12 rpm or more than 15 rpm.
   2. If added at plant, do not deliver to site unless batch delivery ticket displays water/cement ratio before super-plasticizer addition.

3.4 CONCRETE PLACEMENT

A. In General: ACI 301.
   1. Do not disturb reinforcement, inserts, embedded parts, and formed joints.
   2. Do not break or interrupt successive pours such that cold joints occur.
   3. Honeycomb or embedded debris in concrete is not acceptable.

B. Hot Weather Placement: ACI 305. If the rate of evaporation approaches 0.2 lb./ft²/hr., precautions against plastic shrinkage cracking are necessary. (i.e. dampening Subgrade and forms; placing concrete at the lowest possible temperature; erecting windbreaks and sunshades; fog sprays; use of evaporation retardants; or rescheduling time of placement).

C. Cold Weather Placement: ACI 306. Accelerating admixture may be used in concrete work placed at ambient temperatures below 50 deg F. Use of admixtures will not relax cold weather placement, curing, or protection requirements. If air temperature is forecasted to fall below 32 deg F within 14 days of placement, proceed as follows:
   1. Provide cold weather protection (cover, insulation, heat, etc.).
   2. Do not use chemical “anti-freeze” additives in the concrete. (NOTE: this does not apply to normal accelerators.)
   3. Do not proceed with the placement of concrete until the temperature of all contact surfaces is 35 degrees F and ambient temperature is ascending.
   4. Protect the concrete from freezing until a compressive strength of at least 90 percent of design strength has been achieved, determined by either:
      a. Maturity meter. Refer to AASHTO T 325, or.
      b. Field cured cylinders.
   5. Adequately vent combustion-type heaters that produce carbon monoxide.
   6. When applying external heat, maintain moist conditions to avoid excessive moisture loss from concrete.
   7. When removing heat, limit drop in temperature of concrete surfaces to 20 degrees F during any 12 hour period until the surface temperature of the concrete reaches that of the atmosphere.

D. Concrete Temperature: Keep mixed concrete temperature at time of placement between 60 deg F and 90 deg F

E. Do not disturb reinforcement, inserts, embedded parts, and formed joints.

F. Do not break or interrupt successive pours such that cold joints occur.
G. Honeycomb or embedded debris in concrete is not acceptable.

3.5 JOINTS AND JOINT SEALING
   A. Steel edging and jointing tools are acceptable. Preferred are magnesium, aluminum or wood tools
   B. Pavement joint sealing, Section 32 13 73.

3.6 CONSOLIDATION
   A. Keep spare vibrator available during concrete placement operations.
   B. Follow ACI 309 requirements.

3.7 CURING
   A. Section 03 39 00. Use a membrane forming compound unless specified otherwise.

3.8 FINISHING
   A. Section 03 35 00 and as follows.

| Table 1 - Finishes                                                                 |
|--------------------------------|---------------------------------|
| Type of work                   | Finish                          |
| Sidewalks, garage floors, ramps, exterior concrete Pavement | Broom or belt                   |
| Exterior platforms, steps, and landings, exterior and interior pedestrian ramps, not covered by other finish materials | Non-slip                          |
| Surfaces intended to receive bonded applied cementitious applications | Scratched                        |
| Surfaces intended to receive roofing, except future floors, waterproofing membranes, and roof surfaces that are future floors or sand bed terrazzo | Floated                          |
| Floors and roof surfaces that are floors intended as walking surfaces or to receive floor coverings | Troweled                         |
| Unpainted concrete surfaces not exposed to public view | Rough as-cast form finish       |
| Unpainted concrete surfaces exposed to public view | Smooth as-cast form finish      |
| Concrete surfaces to receive paint or plaster | Grout cleaned finish             |

3.9 PROTECTION AND REPAIR
   A. Protection, Section 01 66 00:
      1. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, graffiti, and mechanical injury.
      2. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
   B. Repair:
      1. Modify or replace concrete not conforming to required levels, lines, details, and elevations.
      2. Structural analysis and additional testing may be required at no additional cost to OWNER when the strength of a structure is considered potentially deficient.
      3. To patch imperfections refer to Section 03 35 00 requirements.
      4. Remove graffiti and mechanical injury.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. The work of this section consists of furnishing and placing formwork, shoring, bracing and anchorage, concrete reinforcement, accessories, and placing concrete in connection with cast-in-place concrete installation including installation of joints, concrete curing and concrete finishing.

B. Related Requirements:
   1. Other Division 03 Sections for Concrete Paving, Curbs and Walks.

1.2 REFERENCES

A. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

B. ACI 305 and 306 - Hot and Cold Weather Protection for Concrete.

C. ACI 309 - Recommended Practice for Consolidation of Concrete.

D. ACI 315 - Details and Detailing of Concrete Reinforcement.

E. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.

F. ASTM C33 - Concrete Aggregates.

G. ASTM C94 - Ready-Mixed Concrete.

H. ASTM C150 - Portland Cement.

I. ASTM C260 - Air Entraining Admixtures for Concrete.

J. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.


L. ASTM C618 - Fly Ash Mineral Admixture for Concrete.

M. ASTM C672 - Scaling Resistance of Concrete Surfaces Exposed to Deicing Chemicals.


1.3 SUBMITTALS

A. Submit mix design(s) for all concrete mixes furnished under this contract.

1.4 QUALITY CONTROL

A. Requirements of Regulatory Agencies: Comply with all applicable provisions of the state and local building and safety codes.
B. Reference Standards: Comply with the referenced standards except where more stringent requirements are shown or specified.

C. Design Criteria:
   1. Formwork Design: The Contractor shall assume all responsibility for the safety of the formwork and shall provide all necessary design, construction, materials, and maintenance to produce the required concrete work safely.

D. The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.
   1. Inspection or testing does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.
   2. Workmanship: The Contractor is responsible for and shall bear the cost of correcting concrete work that does not conform to the specified requirements including, but not limited to, strength, tolerances, joint types and patterns, and finishes. Correct deficient concrete by means acceptable to the Engineer. The cost of extra work incurred to approve corrective work shall be borne by the Contractor.

1.5 QUALITY ASSURANCE

A. Testing Agency: A Testing Agency employed by the Contractor shall provide testing services. The Contractor is responsible for the costs of any retests. Refer to Section 01400.

B. Source Quality Control: The Project Inspector and Testing Laboratory shall be offered uninterrupted access to the ready-mix batching plant at all times that the work is in progress.

1.6 DELIVERY, STORAGE AND HANDLING

A. General: Materials handling and batching shall conform to applicable provisions of ASTM C94.

B. Reinforcing: Unload and store reinforcing bars so they will be kept free of mud and damage.

C. Concrete:
   1. Hauling Time: Discharge all concrete transmitted in a truck mixer, agitator, or other transportation device not later than 1-1/2 hours, or 300 revolutions of the drum after the mixing water has been added, whichever is earliest.

D. Extra Water:
   1. Deliver concrete to site in exact quantities required by design mix.
   2. Should extra water be required for workability before depositing concrete and water/cement ratio of accepted mix design has not been exceeded, General Contractor's superintendent shall have sole authority to authorize addition of water. Any additional water added to mix after leaving batch plant shall be indicated on truck ticket and signed by person responsible.
   3. Where extra water is added to concrete it shall be mixed thoroughly for 50 revolutions of drum before depositing.
   4. Water may be added to the concrete only once for each batch.
1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Cold Weather Placement:
      a) Comply with the requirements of ACI Specification 306R.
      b) Subject to acceptance of Engineer an accelerating admixture may be used. Admixtures shall meet applicable requirements of CDOT Specification 711. Calcium Chloride and other chloride-type accelerating admixtures will not be allowed.
   2. Hot Weather Placement:
      a) Comply with the requirements of ACI 305.
      b) Retarding admixture may be used subject to acceptance of Engineer. Admixtures shall meet applicable requirements of CDOT Specification 711.
      c) Protect to prevent rapid drying. Start finishing and curing as soon as possible.

B. Protection: Protect newly finished slabs from rain and hail damage and vandalism.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Forms: Either steel or wood, of size and strength to resist movement during concrete placement and retain horizontal and vertical alignment until removal.
   1. Use forms that are straight and free of distortion and defects. Do not use bent, twisted, split or defective form materials.
   2. Use flexible spring steel forms or laminated boards to form radius bends as required.
   3. Coat forms with non-staining, clear, paraffin base oil that will not discolor or otherwise deface the surface of the concrete.

B. Fillets for Chamfered Corners: Wood strips or rigid plastic type; size as detailed; maximum possible lengths.

C. Form Ties: Snap-off metal, or required length, one-inch diameter cone ends at exposed concrete.

2.2 REINFORCING STEEL

A. Reinforcing Steel: ASTM A615, grade 40 for #2 or #3 bar, ties and stirrups; grade 60 for all other bar; billet-steel deformed bars, uncoated finish.

B. Welded Steel Wire Fabric: ANSI/ASTM A185 plain type; in flat sheets or coiled rolls; uncoated finish.

C. Tie Wire: ASTM A82, minimum 16 gage annealed type.

D. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete. Wood, brick or other unacceptable material is not permitted.
2.3 CONCRETE MATERIALS

A. Provide Class A concrete materials in accordance CDOT Specification Section 601 - Structural Concrete. A minimum 28-day compressive strength of 3500 psi shall be required unless shall be required unless otherwise noted in the plans and specifications.

B. Calcium Chloride: Use is prohibited.

C. Use of admixtures will not relax cold weather placement requirements.

D. Fiber Mesh Reinforcement: 100% virgin polypropylene, fibrillated fibers containing no reprocessed olefin materials and specifically manufactured to an optimum gradation utilizing 25 individual fiber designs for use as concrete secondary reinforcement. Volume per cubic yard shall equal a minimum of 0.1% (1.5 pounds). Fiber manufacturer must document evidence of 5 year satisfactory performance history, compliance with applicable building codes and ASTM C1116 Type III 4.1.3 and ASTM C1116 Performance Level I. Fibrous concrete reinforcement shall be manufactured by Fibermesh Company, 4019 Industry Drive, Chattanooga, Tennessee, USA, 37416 or approved equal.

2.4 ACCESSORIES

A. Form Release Agent: Colorless material that will not stain concrete, absorb moisture, contain oils or waxes, or impair natural bonding or color characteristics of coating intended for use on concrete.
   1. Pro-Cote manufactured by Protex
   2. Cast Off manufactured by Sonneborn or
   3. Debond manufactured by L&M Construction Chemicals

B. Anti-Spalling Compound: ASTM C309; 50 percent (by volume) boiled linseed oil and 50 percent (by volume) mineral spirits; Promulsion 60 manufactured by Protex or ASTM C672; 35 percent solids epoxy polyester sealer; Super Seal #35 manufactured by L&M Construction Chemicals.

C. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 10,000 psi in 28 days; Masterflow 713 manufactured by Master Builders, Five Star Grout manufactured by U.S. Grout Corp., Propak manufactured by Protex or Crystex manufactured by L&M.

D. Flowable Fill: Use of an approved controlled low slump material (flowfill, shrinkcrete, or equivalent) for backfill of trenches is permissible. All controlled low slump material (CLSM) must have a maximum 28-day strength of 60 psi.

2.5 CURING MATERIALS

A. Water: Clean and not detrimental to concrete.

B. Curing and Sealing Compound - Compounds complying with ASTM C 309. Apply per manufacturer's recommendations.

2.6 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94 and ACI 301 Chapter 3.
B. Cement Content: Type I or II cement, minimum of 564 pounds per cubic yard.

C. Deliver concrete and discharge entire load within 1-1/2 hours, or before drum has turned 300 revolutions, whichever occurs first, after introduction of mixing water.

D. During cold weather (below 45 degrees F.), use heated water and aggregates if necessary to maintain concrete temperature between 60 degrees F. and 90 degrees F.

PART 3 - EXECUTION

3.1 FORMWORK ERECTION

A. Verify lines, levels, and measurement before proceeding with formwork.

B. Minimize form joints. Symmetrically align form joints and make watertight to prevent leakage of mortar.

C. Provide chamfer strips on external corners where detailed.

D. Do not apply form release agent other than specified materials where concrete surfaces receive special finishes or applied coatings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

E. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, dowels, anchors, and other inserts and embedded materials.

F. Do not remove forms, shoring and bracing until concrete has sufficient strength to support its own weight, and construction and design loads which may be imposed upon it.

G. During cold weather, remove ice and snow from forms. Do not use deicing salts. Do not use water to clean out completed forms unless formwork and construction proceed within heated enclosure. Use compressed air to remove foreign matter.

3.2 REINFORCEMENT

A. Place, support, and secure reinforcement against displacement.

B. Locate reinforcing splices per ACI 318.

C. Reinforcing with any of the following defects will not be permitted in the work.
   1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
   2. Bends or kinks not indicated on drawings or final shop drawings.
   3. Bars with reduced cross-sections due to excessive rusting or other cause.
3.3 PLACING CONCRETE

A. Contractor's Review: Contractor Quality Control shall inspect forms and reinforcing prior to concrete placement to assure accurate placement of embedded items. Inspection must be signed off by the Project Inspector.

B. Place concrete in accordance with ACI 301 and 304.

C. Hot Weather Placement: ACI 301 and ACI 305.

D. Cold Weather Placement: ACI 301 and ACI 306.

E. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

F. Maintain concrete cover around reinforcing as specified on the Drawing.

G. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.

H. Place concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.

I. If a section cannot be placed continuously, provide construction joint. Place concrete at such a rate that concrete that is being integrated with fresh concrete is still plastic. Avoid placement methods that produce segregation of the mix.

J. Discard concrete that becomes non-plastic and unworkable, does not meet required quality control limits, or becomes contaminated with foreign materials.

K. Consolidate concrete placed in forms by mechanical vibrating equipment supplemented by hand spading, rodding and tamping in accordance with ACI 309. Vibration of forms and reinforcing is not permitted.

L. Roughen surfaces of set concrete at all joints, except where bonding agents are used. Clean surfaces of laitance, coatings, loose particles and foreign matter. Roughen surfaces in manner to expose bonded aggregate.

M. Use bonding agent at joints between fresh concrete and existing or fully cured, hardened concrete. Apply bonding agent in accordance with manufacturer's instructions.

N. Uniformly spread, screed, and float concrete. Do not use grate tampers or mesh rollers. Do not spread concrete by vibration.

O. Control joints: Provide hand tooled control joints in patterns shown on the Drawings. Provide continuous control joints. In no case shall distance between joints, construction or control, exceed 15'-0". Provide depth of control joint equal to 1/4 slab depth. Refer to drawings for details.
P. Separate slabs, curbs, manholes, and inlets from vertical surfaces with expansion joint material. Extend full depth of joint, not less than $\frac{1}{2}$ inch, or more than 1 inch below finished surface where sealants are indicated.

Q. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify the Project Inspector upon discovery.

R. Prior to placing, remove foreign materials. Broom and vacuum clean.

S. Place dividers, edge strips, reinforcing and other items to be cast in.

3.4 CONCRETE FINISHING

A. After striking off and consolidating concrete, smooth the exposed surface by screening and floating. Adjust floating to compact the surface and produce a uniform texture.

B. After completion of floating and when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
   1. Broom finish, by drawing a wet hair bottom across the concrete surface, in the direction of drainage. Provide an abrasive, textured or otherwise slip-proof surface to all concrete slabs. Broom finish ramps perpendicular to slope.
   2. Broom finish and score pedestrian ramps as required on detail Drawings.

3.5 CONCRETE CURING, PROTECTION AND SURFACE TREATMENTS

A. General:
   1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.
   2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be seven days for all concrete.
   3. Avoid rapid drying at the end of the curing period. During hot and cold weather, cure concrete in accordance with ACI 305 and ACI 306R.

B. Curing Methods: Perform curing of concrete by moisture curing, by moisture-retaining cover curing, by curing compound, and by combinations thereof. Coordinate with and choose a curing method that is compatible with the requirements for use of the concrete surface. Comply with the requirements of CDOT Specification Section 601.13 and applicable portions of ACI Specifications 305 and 306R, as appropriate.

C. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces, by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above for specified curing time.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs and other flat surfaces by application of appropriate curing method.
3.6 FORM REMOVAL

A. Removal of Forms: Supplement and Modify ACI 301 as follows:
   1. ACI 301 4.5.4: Formwork not supporting weight of concrete such as sides of curbs, sidewalks and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F. for 24 hours after placing the concrete provided:
      a) The concrete is sufficiently cured to be undamaged by form removal.
      b) Required shores and supports are so arranged that they will not be loosened or disturbed during form removal.
      c) Supplemental curing and protection is provided for exposed concrete surfaces.

3.7 REPAIR OF SURFACE DEFECTS

A. Formed Surfaces:
   1. Inspect concrete surfaces immediately upon removal of forms.
   2. Modify or replace concrete not conforming to required lines, details and elevations.
   3. Repair or replace concrete not properly placed resulting in honeycombing and other defects.

3.8 TOLERANCES

A. Formed Surfaces:
   1. Top of form units: Not more than 1/8” in 10’.
   2. Vertical face: Longitudinal axis, not more than 1/4” in 10’.

B. Slab Finishing Tolerances:
   1. Slope to Drain: 1/8 inch per foot minimum.

3.9 QUALITY CONTROL TESTING DURING CONSTRUCTION

A. Testing Laboratory: Sampling and testing for quality control during placement of concrete shall include the following.
   1. Slump: ASTM C143; at least one test at the beginning of concrete placement for each batch plant and each set of cylinders made. Additional tests at the Project Inspector's discretion when concrete consistency seems to have changed. Test when taking samples for compression tests.
   2. Air Content: ASTM C173, volumetric method for normal weight concrete; ASTM C231 pressure method for normal weight concrete; at least one for each day's pour of each type of air-entrained concrete. Test when taking samples for compression tests.
   3. Concrete Temperature: Test hourly when air temperature is 40o F (4 degrees C) and below, and when 80o F (27 degrees C) and above; and each time a set of compression test specimens is made.
   4. Compression Test Specimen: ASTM C31; one set of 3 standard cylinders for each compression strength test unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimen are required. If additional cylinders are required by the Contractor for any reason, they shall be done at the Contractor's expense.

B. Compressive Strength Tests: ASTM C39; one set for each day's pour exceeding 5 cubic yards. A minimum of one set for each 150 cubic yards or fraction thereof. No more than one site of cylinders
at a time shall be made from any single truck. One specimen tested at 7 days, one specimen tested at 28 days, and one specimen retained in reserve for later testing if required.

1. When frequency of testing will provide less than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches of from each batch if fewer than five are used.

2. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength by more than 500 psi.

C. Test results shall be submitted in writing to the Project Inspector 24 hours after tests. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day tests and 28-day tests.

D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

E. Additional Tests: The Testing Agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure. Testing Agency shall conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 and as required by Section 01400.

END OF SECTION 03 31 00
SECTION 03 35 00
CONCRETE FINISHING

PART 1  GENERAL

1.1 SECTION INCLUDES
   A. Finishing interior and exterior concrete surfaces.

1.2 REFERENCES
   A. ACI Standards:
      303 Guide to Cast-in-Place Architectural Concrete Practice.

1.3 SUBMITTALS
   A. Name, type, chemical analysis and manufacturer’s recommended rate of application for liquid chemical hardener.

1.4 PROJECT CONDITIONS
   A. Protect adjacent materials and finishes from dust, dirt and other surface or physical damage during finishing operations. Provide protection as required and remove from site at completion of Work.

PART 2  PRODUCTS

2.1 MATERIALS
   A. Masonry Mortar and Grout: Section 04 05 16.
   B. Dry Shake: Blend of metallic or mineral aggregate with Portland cement concrete in proportions recommended by manufacture.
   C. Proprietary Materials: If permitted or required, proprietary compounds may be used in lieu of or in addition to foregoing blended materials. Use such compounds per manufacturer’s recommendations.
   D. Liquid-Chemical Hardener: Colorless, aqueous solution containing a blend of magnesium fluosilicate, zinc fluosilicate and a wetting agent. Mixture contains not less than two (2) pounds fluosilicate per gallon and does not interfere with adhesives and bonding.

PART 3  EXECUTION

3.1 PREPARATION
   A. Examine areas and conditions under which work of this section will be performed.
   B. Correct conditions detrimental to timely and proper finishing.
C. Do not proceed until unsatisfactory conditions are corrected.

3.2 FINISHING HORIZONTAL SLABS

A. Do not apply water (i.e. sprinkle) to any surface of concrete when finishing slabs.

B. Edges and Joints: Tools may be made out of steel. Preferred is wood, aluminum or magnesium.

C. Tolerances:
   1. Class A: 1 in 1000.
   2. Class B: 1 in 500.
   3. Class C: 1 in 250.

D. Float Finish: After concrete has been placed, consolidated, struck-off, and leveled, do not work further until ready for floating:
   1. Begin floating when water sheen has disappeared and surface has sufficient stiffness.
   2. During or after first floating, check planeness of entire surface with a 10 feet long straightedge applied at two (2) or more different angles.
   3. Cut down high spots and fill low spots to the required tolerance.
   4. Reprove slab immediately to a uniform sandy texture.

E. Trowel Finish:
   1. Do not use steel trowel or a power trowel on exterior concrete or on concrete that contains more than three (3) percent air.
   2. First troweling shall produce smooth surface relatively free of defects but which may still show some trowel marks.
   3. Second troweling after surface has stiffened shall make finished surface essentially free of trowel marks, uniform in texture and appearance.
   4. On surfaces intended to support floor coverings, grind off defects that would show through floor covering.

F. Broom or Belt Finish: Sweep surface with brushes, rakes, tines or burlap belt before final set.

G. "Dry Shake" Finish: Give the surface a floated finish. Evenly apply approximately 2/3 of a blended unsegregated material:
   1. Begin floating immediately after application of first "dry shake".
   2. After material has been embedded by floating, apply remainder of blended material to surface at right angles to previous application.
   3. Make second application heavier in any areas not sufficiently covered by first application.
   4. Immediately follow with second floating.
   5. After selected material has been embedded by second floating, complete operation with a broomed, floated, or troweled finish, as indicated.
H. Non-slip Finish: Give surface a "dry shake" application, using crushed ceramically bonded aluminum oxide particles. Apply at 25 pounds per 100 square feet.

I. Exposed Aggregate Finish: Immediately after surface of concrete has been leveled to tolerance and surface water has dissipated, spread aggregate uniformly over surface to provide complete coverage to the depth of a single stone:
   1. Embed aggregate into surface by light tamping.
   2. Float surface until embedded aggregate is fully coated with mortar and surface has been brought to tolerance.
   3. Start exposure of aggregate after matrix has hardened sufficiently to prevent dislodgment.
   4. Flow ample quantities of water, without force, over surface of concrete while matrix encasing aggregate is removed by brushing with a fine bristle brush.
   5. Continue until aggregate is uniformly exposed.
   6. An approved chemical retarder sprayed onto freshly floated surface may be used to extend working time.

J. Chemical-Hardener Finish: Apply liquid chemical-hardener finish to interior concrete floors where indicated. Do not apply liquid chemical hardener on floor areas scheduled to receive synthetic matrices terrazzo, setting beds for tile, terrazzo, vinyl flooring, or like items. Apply hardener after complete curing and drying of concrete surface per manufacturer's recommendations. Evenly apply each coat, and allow 24 hours for drying between coats. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

3.3 FINISHING FORMED SURFACES

A. General:
   1. Allow concrete to cure not more than 72 hours before commencing surface finish operations, unless approved otherwise.
   2. Revise the finishes as needed to secure approval.

B. As-Cast Form Finish:
   1. Rough: Patch defects, chip or rub off fins exceeding 1/4 inch height.
   2. Smooth: Patch tie holes and defects and remove fins completely:
      a. When surface texture is impaired and form joints misaligned, grind, bush-hammer, or correct affected concrete.
      b. Slurry grout areas evidencing minor mortar Leakage to match adjacent concrete.
      c. Repair major mortar Leakage as a defective area.
      d. When workmanship is less than acceptable standard, provide one of rubbed finishes at no additional cost to OWNER.
C. Rubbed Finishes:
   1. Smooth: Remove forms and perform necessary patching as soon after placement as possible:
      a. Finish newly hardened concrete no later than 24 hours following form removal.
      b. Wet surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced.
   2. Grout Cleaned: Undertake no cleaning operations until all contiguous surfaces are completed and accessible:
      a. Wet surface of concrete sufficiently to prevent absorption of water from grout.
      b. Apply grout uniformly.
      c. Immediately after grouting, scrub surface with cork float or stone to coat surface and fill voids.
      d. While grout is still plastic, remove excess grout by working surface with rubber float or sack.
      e. After surface whitens from drying, rub vigorously with clean burlap.
      f. Keep damp for at least 36 hours after final rubbing.
   3. Cork Floated: Remove forms within two (2) to three (3) days of placement where possible:
      a. Remove ties.
      b. Remove all burrs and fins.
      c. Dampen wall surface.
      d. Apply mortar with firm rubber float or with trowel, filling all surface voids.
      e. Compress mortar into voids.
      f. If mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with fog sprayer.
      g. Produce final texture with cork float using a swirling motion.

D. Unformed Finish:
   1. After concrete is placed, strike smooth, tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces.
   2. Float to texture that is reasonably consistent with formed surfaces.
   3. Continue final treatment on formed surfaces uniformly across uniformed surfaces.

E. Blasted Finish:
   1. Perform abrasive blasting within 24 to 72 hours after casting.
   2. Coordinate with form work construction, concrete placement schedule, and formwork removal to ensure that surfaces are blasted at the same age for uniform results.
3. Reapply curing protection after blast finishing

F. Architectural Finish, ACI 303:
   1. Tooled Finish:
      a. Dress thoroughly cured concrete surface with electric, air, or hand tools to uniform texture, and give a bush hammered surface texture.
      b. Remove sufficient mortar to exposed coarse aggregate in relief and to fracture coarse aggregate for tooled finish.

G. Patched Finish:
   1. Repair defective areas:
      a. Remove honeycomb and defective concrete to sound concrete.
      b. Make edges perpendicular to surface or slightly undercut.
      c. Feather edges are not permitted.
      d. Dampen area to be patched and at least six (6) inches surrounding it to prevent absorption of patching mortar water.
      e. Prepare bonding grout.
      f. Mix to consistency of thick cream.
      g. Brush into surface.
   2. Tie Holes: Unless indicated otherwise, after being cleaned and thoroughly dampened, fill tie hole solid with patching mortar.
   3. Make patches in concrete closely match color and texture of surrounding surfaces. Determine mix formula for patching mortar by trial and obtain a good color match with concrete when both patch and concrete are cured and dry:
      a. Mix white and gray Portland cement as required to match surrounding concrete to produce grout having consistency of thick paint.
      b. Use a minimum amount of mixing water.
      c. Mix patching mortar in advance and allow to stand without frequent manipulation, without addition of water, until it has reached stiffest placeable consistency.
      d. After initial set, dress surfaces of patches manually to obtain same texture as surrounding surfaces.
   4. After surface water has evaporated from patch area, brush bond coat into surface:
      a. When bond coat begins to lose water sheen, apply patching mortar.
      b. Thoroughly consolidate mortar into place and strike-off to leave patch slightly higher than surrounding surface.
c. Leave undisturbed for at least one (1) hour before final finish.
d. Keep patched area damp for 72 hours or apply curing compound.
e. Do not use metal tools in finishing an exposed patch.

5. Where as-cast finishes are indicated, total patched area may not exceed 1 in 500 of as-cast surface. This is in addition to form tie patches, if ties are permitted to fall within as-cast areas.

6. In any finishing process which is intended to expose aggregate on surface, patched areas must show aggregate:
   a. Outer 1 inch of patch shall contain same aggregate as surrounding concrete.
   b. For aggregate transfer finish, patching mixture shall contain same selected colored aggregates.
   c. After curing, expose aggregates together with aggregates of adjoining surfaces by same process.

END OF SECTION
1.1. **SECTION INCLUDES**
   A. Concrete curing requirements.

1.2 **REFERENCES**
   A. **ACI Standards:**
      301 Structural Concrete for Buildings.
      305 Hot Weather Concreting.
      306 Cold Weather Concreting.
   B. **ASTM Standards:**
      C171 Sheet Materials for Curing Concrete.
      C1315 Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

1.3 **SUBMITTALS**
   A. Curing agent data sheet.
   B. Curing plan. Describe estimated cure quantity and procedure.
   C. Manufacturer certificates, Section 01 33 00 that shows product meets performance criteria.
   D. Manufacturer's recommended installation procedures which, when accepted by ENGINEER, will become the basis for accepting or rejecting installed product.

1.4 **QUALITY ASSURANCE**
   A. Use workers knowledgeable of ACI 301, 305, 306.

1.5 **PRODUCT HANDLING**
   A. Protect materials of this Section before, during, and after installation.
   B. Protect the work and materials of other trades.
   C. In the event of damage, immediately make replacements and repair at no additional cost to OWNER.

1.6 **WEATHER LIMITATIONS**
   A. Above 75 deg F, ACI 305
   B. Below 55 deg F, ACI 306.

---

**PART 2 PRODUCTS**

2.1 **COVERS**
   A. Water or Fog-spray: Clean, non-staining and non-detrimental to concrete.
   B. Sheet Coverings: White waterproof paper, polyethylene film, or polyethylene coated burlap sheet complying with ASTM C171.
   C. Mat Coverings: Clean roll goods of cotton or burlap fabric.
D. Insulating Coverings: Non-staining curing blankets.

2.2 MEMBRANE FORMING COMPOUND
A. Material:
   1. Styrene-acrylic.
   2. Styrene-butadiene.
   3. Alpha-methylstyrene.
B. Reference: ASTM C1315:
   1. Type II Class A or B (white pigmented).
   2. Type ID Class A (clear with fugitive dye).
C. Volatile Organic Compounds (VOC): Comply with local, state and federal requirements.

PART 3 EXECUTION

3.1 PREPARATION
A. **DO NOT DILUTE CURING COMPOUNDS.**
B. Do not use membrane forming curing compound on surfaces that are to receive hardeners.
C. Commence curing operation within 20 minutes after finishing.

3.2 APPLICATION – COVERS
A. Water: Apply water-fog spray or ponding.
B. Absorptive Mat: Place absorptive mat to provide coverage of concrete surfaces and edges. Lap over adjacent absorptive covers. Thoroughly saturate with water and keep continuously wet.
C. Moisture-Retaining Sheet: Place cover in widest practicable width with sides and ends lapped and sealed to prevent moisture loss. Repair any holes or tears during curing period.
D. Formed Surface Curing: Cure formed concrete surfaces, including underside of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period. If forms are removed before curing completion, applying cure film or penetrant or use methods indicated above, as applicable.

3.3 APPLICATION – MEMBRANE FORMING COMPOUND
A. Apply coating continuously and uniformly. Follow manufacturer’s recommendations.
B. Protect continuity of film coatings and repair damage during cure period.
C. If forms are removed before expiration of cure period, apply coating to unprotected areas.

3.4 CONCRETE CURE TEMPERATURE
A. During cure period, eliminate thermal shock of concrete by keeping cure temperature even throughout extent and depth of concrete.

3.5 SCHEDULE
A. Concrete Exposed to Potable Water (as in Water Storage reservoirs):
   1. Moisture cover curing, or
   2. Acrylic cure, or
   3. Styrene acrylic silane co-polymer cure.

END OF SECTION
PART 1  GENERAL

1.1  SECTION INCLUDES
   A. Pre-cast concrete, complete with required connecting and supporting devices.

1.2  REFERENCES
   A. ACI Standards:
      318  Building Code Requirements for Reinforced Concrete. This reference standard includes
           ASTM material standards.
   B. ASTM Standards:
      A36:  Structural Steel.
      C478  Precast Reinforced Concrete Manhole Sections.
      C857  Minimum Structural Design Loading for Underground Precast Concrete Utility
           Structures.
      C858  Underground Precast Concrete Utility Structures. C891  Installation of
           Underground Precast Concrete Utility
           Structures.
   C. AWS Standards:
      D1.1  Structural Welding Code Steel.
      D1.4  Structural Welding Code Reinforcing Steel.
   D. PCI Standards:
      Design Handbook.
      MNL-116  Quality Control and Assurance for Plant Production of Prestressed Concrete.
      MNL-117  Quality Control and Assurance for Plant Production of Architectural Precast Concrete.

1.3  DESIGN CRITERIA
   A. Design structural precast concrete units, ACI 318 and PCI design handbook.
   B. Design utility precast units, ASTM C857 and C858.
   C. Under direct supervision of a design professional who is fully experienced in design of units.
   D. Design units to support required stripping and handling loads, and live, dead and construction loads.
   E. Design component connections to provide adjustment to accommodate misalignment of structure
      during installation.
1.4 **SHOP DRAWINGS**
   A. Prepare Shop Drawings under seal of a licensed design professional.
   B. Submit Shop Drawings, Section 01 33 00.
   C. Indicate unit locations, unit identification marks, fabrication details, reinforcement, connection details, pertinent dimensions, and erection support points. Unit identification marks to appear on all manufactured units.
   D. Do not proceed with fabrication until Shop Drawings have been accepted.

1.5 **QUALITY ASSURANCE**
   A. Manufacturer:
      1. Prestressed: PCI certified.
      2. Precast Concrete Units: PCI or NPCA certified
   B. Transporter: Acceptable to manufacturer.
   C. Erector:
      1. Prestressed: PCI certified.
      2. Precast: Has five (5) years minimum experience in erecting precast units.
   D. Welders: Certified, AWS D1.1 and AWS D1.4.

1.6 **DELIVERY, STORAGE AND HANDLING**
   A. Handle precast units in positions consistent with their shape and design. Lift and support only from support points indicated on Shop Drawings.
   B. Embedded Lifting or Handling Devices: Capable of supporting units in positions anticipated during manufacture, storage, transportation, and erection.
   C. Block and laterally brace units while stored at manufacturers. Provide lateral bracing that is sufficient to prevent bowing and warping that is clean, nonstaining, and will not inhibit uniform curing of exposed surfaces.
   D. Provide edges of units with adequate protection to prevent staining, chipping, or spalling of concrete.
   E. Unless otherwise approved in writing, do not deliver units to job site until required for installation.

---

**PART 2  PRODUCTS**

2.1 **CONCRETE**
   A. Above Ground: 5000 psi minimum, Section 03 30 04 and ACI 318.
   B. Underground: Class 4000 minimum, Section 03 30 04 and ASTM C478 or ASTM C858.
2.2 ACCESSORIES
   A. Connecting and Supporting Devices: Steel, ASTM A36.
   B. Bolts, Nuts, and Washers: High-strength steel. Section 05 05 23.
   C. Reinforcement: Grade 60 billet steel bars, Section 03 20 00 plain finish

2.3 FABRICATION
   A. Maintain plant records and quality control program during production of structural precast concrete. Make records available to ENGINEER.
   B. Use molds which are rigid and constructed of material that will result in uniform finished products.
   C. If self-consolidating concrete is NOT used, vibrate concrete to ensure proper consolidation, elimination of unintentional cold joints, and minimize entrapped air on surface.
   D. Fabricate required connecting devices, plates, angles, items fit to steel framing members, bolts and accessories.
   E. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are sufficiently embedded, anchored and properly located.
   F. Ensure finished surfaces of precast structural units are uniform.
   G. Cure units under identical conditions to develop specified concrete quality, and minimize appearance blemishes such as non-uniformity, staining or surface cracking.

2.4 DESIGN DEVIATIONS
   A. Deviation: Provide installation equivalent to basic intent without additional cost to OWNER. Deviations from exact required cross-section will be permitted only with approval.
   B. Manufacturer's Proposed Design: Supported by complete design calculations and drawings. When requested, submit design calculations for review bearing seal and signature of a licensed design professional.

2.5 OPENINGS
   A. Provide required openings, six (6) inches or larger. If approved, smaller sizes may be field constructed by coring or sawing.

2.6 FINISHES
   A. General: Required finish will be described in one of the following paragraphs. If no finish is indicated or selected by ENGINEER, provide Standard Finish.
   B. Standard Finish: Produced in forms such as plastic or metal lined that impart a smooth finish to the concrete. Small surface holes, normal form joint marks, minor chips and spall are acceptable if approved. Major or unsightly imperfections, honeycomb or structural defects are not acceptable.
   C. Commercial Finish: Produced in forms such as plywood or lumber that impart texture to concrete. Remove fins and large projections. Fill holes over 3/8 inch. Make faces true and well defined. Correct exposed ragged edges by rubbing or grinding.
D. Architectural Grade A Finish: Produced in forms such as plastic or metal lined that impart smooth finish to concrete. Fill holes over 1/4 inch in diameter with sand-cement paste. Grind smooth form offsets or fins over 1/8 inch. Coat with neat cement paste using float. After paste coat has dried, rub with burlap to remove loose particles.

E. Architectural Grade B Finish: Produced in forms such as plastic or metal lined that impart smooth finish to concrete. Fill holes over 1/4 inch in diameter with sand-cement paste. Grind smooth form offsets or fins over 1/8 inch.

F. Special Finishes: Sandblasting, acid washing, retarders or form liners as approved by ENGINEER. Special finishes require submittal of two 12 x 12 inch Samples showing a representative color and texture to be used.

G. Painted Finishes: On concrete to be painted, use a form release agent acceptable to the paint manufacturer.

2.7 REPAIR

A. Repair of damaged units is acceptable if structural integrity or appearance is not impaired.

2.8 ALLOWABLE TOLERANCES

A. Length: Plus or minus 3/4 inch, or plus or minus 1/8 inch per 10 feet of length, whichever is greater, or as indicated.

B. End Squareness: 1/2 inch maximum.

C. Blockouts: 1 inch of centerline location indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Do not install precast units until concrete has attained its design compressive strength.

B. Install members plumb, level, and in alignment within PCI MNL-116 or PCI MNL-117 and indicated limits of erection tolerances.

C. Clean weld marks or other marks, debris, or dirt from exposed surfaces of units.

D. Install underground utility precast units per ASTM C891.

3.2 PERFORMANCE REQUIREMENTS

A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.
B. Rejection: Units may be rejected for any one of the following:
   1. Exceeding specified installation tolerances.
   2. Damaged during construction operations.
   3. Exposed-to-view surfaces which develops surface deficiencies.
   4. Other defects as listed in PCI MNL-116 or PCI MNL-117.

END OF SECTION
SECTION 03 61 00
CEMENTITIOUS GROUTING

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Pre-mixed non-metallic shrinkage resistant grout, pre-mixed waterstop hydraulic cement grout, epoxy grout, and Portland cement grout:
   1. Grout for leveling beds of structural steel plates.
   2. Sealing of joints and gaps between piping and structures.

1.2 REFERENCES
A. ASTM Standards:
   C109  Compressive Strength of Hydraulic Cement Mortars (Using 2 in. or 50 mm Cube Specimens).
   C144  Aggregate for Masonry Mortar. C150  Portland Cement.
   C472  Physical Testing of Gypsum Plasters and Gypsum Concrete.
   C595  Blended Hydraulic Cements.
   C881  Epoxy - Resin - Base Bonding Systems for Concrete.
   C1090 Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout.
   D695  Compressive Properties of Rigid Plastics.

1.3 SUBMITTALS
A. Grout mix components. Indicate proportions used, environmental conditions, and admixture limitations. Indicate material "Type", "Grade", and "Class" which suits Project requirements.
B. Manufacturer's data for latex bonding agent.

PART 2 PRODUCTS

2.1 MATERIALS - GENERAL
A. Cement:
   1. Portland: Natural color Type II (normal) or Type IIA (air entrained), ASTM C150.
   2. Blended: ASTM C595 or C1157.
B. Lime: Type S, hydrated, ASTM C207.
C. Water: Clean, non-staining, non-detrimental.
D. Aggregate: Standard masonry type, ASTM C144.

2.2 PORTLAND CEMENT GROUT
A. Proportions by Volume: One part Portland cement, and sand equal to 2-1/2 to three times sum of volumes of cement and lime.
B. Mix thoroughly with water to form a stiff workable plastic putty.
C. Compressive Strength: 2800 psi in 28 days, ASTM C109.

2.3 GYPSUM PLASTER GROUT
A. Premixed, prepackaged, wood fiber gypsum plaster with an ASTM C472 minimum average dry compressive strength of 2000 psi in 28 days.
B. Mix with water per manufacturer's instructions for intended use to form a stiff plastic mix required for workability.

2.4 CEMENT BASED SHRINKAGE RESISTANT GROUT
   A. Grade B or Grade C; ASTM C1107. Premixed, non-metallic, non-gaseous product at a fluid consistency (flow cone) of 20 to 30 seconds. Thirty-minute-old grout shall flow through flow cone after slight agitation, in temperatures of 40 deg F to 90 deg F
   B. Bleeding: None.
   C. Compressive Strength: 6500 to 9000 psi in 28 days, ASTM C109.
   D. Non-shrink percentage: 0.5 percent, ASTM C1090.

2.5 EPOXY ADHESIVE GROUT
   A. Two component material, ASTM C881. Suitable for use on dry or damp surfaces, 100 percent solids, high modulus, moisture insensitive:
      1. Tensile Strength: 5000 psi minimum in 14 days, ASTM D638.
      2. Tensile Elongation: Two (2) percent minimum, ASTM D638.
      3. Compressive Strength: 6500 psi minimum in 24 hours and 70 deg F, 12,500 psi in 28 days and 70 deg F, ASTM D695.
      5. Bond Strength:
         a. Direct Shear: 400 psi.
         b. Direct Tension: 250 psi.
         c. Beam Break: 800 psi.
      6. Pot Life: Five minutes maximum at 70 deg F

2.6 BONDING GROUT
   A. Of approximately one part cement to one part fine sand passing a No. 30 sieve with approved latex bonding agent when allowed.

2.7 PNEUMATICALLY PLACED PLASTER ("GUNITE" OR "SHOTCRETE")
   A. Materials: Portland cement, lime, water and sand.
   B. Compressive Strength: 2800 psi in 28 days, ASTM C109.
   C. Proportioning: One part cement to not more than five parts sand.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Fill joints, voids, and pockets, completely.
   B. Comply with manufacturer's instructions and UBC Chapter 47.
   C. Finish surfaces exposed to view smooth.
   D. Pneumatically Placed Plaster: Screened and reused rebound material in an amount not greater than 25 percent of the total sand in any batch.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Install new plumbing systems and/or modify the existing plumbing system as indicated on the drawings and as specified herein consisting of the following but not limited thereto:
   1. Revised water, sanitary sewer, and roof drain service

B. Related Sections: Drawings, specifications, and general provisions of the contract, including General and Supplementary Conditions apply to this section.

1.2 SUBMITTALS

A. Refer to Division 1 for general requirements.

B. Product Data: Provide submittals on all items furnished under this section including pipe and fittings.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Refer to Division 1 for code, standard and regulatory requirements.

PART 2 - PRODUCTS

2.1 DOMESTIC WATER PIPING

A. Below Grade and Entry:
   1. Flanged or Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
   2. Flanges: ASME 16.1, Class 250, cast iron.
   3. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
   4. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
   5. Valves: AWWA, Ductile-Iron Nonrising-Stem, Resilient-Seated Gate Valves: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
      c. End Connections: Flanged.
      d. Interior Coating: Complying with AWWA C550.

B. Indoor Above Grade:
   1. Pipe: ASTM B88, Type L drawn temper seamless copper tube.
5. Solder Filler: ASTM b 32, Alloy Sn95, Sn94 or E; lead free.
6. Brazing Filler Metal: AWS A5.8 BcuP, copper phosphorus or BAg, silver classification.

2.2 SANITARY SEWER PIPING

A. Above Grade Soil and Waste Piping:
   1. 10 inches and smaller – Hubless cast-iron pipe and fittings. All hubless cast-iron pipe and fittings shall meet the requirements of ASTM A-888 or CISPI 301 as applicable. Couplings, both at horizontal and vertical joints, shall be clamped and restrained where required and in accordance with CISPI 310-97. Or, Service weight hub and spigot cast-iron pipe and fittings. All hub and spigot cast-iron pipe and fittings shall meet the requirements of ASTM A-74.

B. Below Grade Soil and Waste Piping:
   1. Sizes 10 inches and smaller - Hubless cast-iron soil pipe and fittings with stainless steel clamps and elastomeric gaskets. All hubless cast-iron pipe and fittings shall meet the requirements of ASTM A-888 or CISPI 301 as applicable. Or, Service weight hub and spigot cast-iron pipe and fittings. All hub and spigot cast-iron pipe and fittings shall meet the requirements of ASTM A-74.

C. Vent Piping: All applications – Use hubless cast-iron soil pipe and fittings with stainless steel clamps and elastomeric gaskets. All hubless cast-iron pipe and fittings shall meet the requirements of ASTM A-888 or CISPI 301 as applicable.

D. Joining Methods:
   1. Hubless cast-iron pipe joint coupling clamps and shields shall be heavy duty and fabricated from Type 304 stainless steel. Clamps shall be Tyler "Husky", Mission Heavyweight, or Clamp-All "125." Sealing sleeves shall conform to ASTM C564 requirements.
   2. Hub and spigot gaskets shall meet ASTM C 564.

2.3 STORM DRAINAGE PIPING

A. Above Grade Storm Piping:
   1. 10 inches and smaller – Hubless cast-iron pipe and fittings. All hubless cast-iron pipe and fittings shall meet the requirements of ASTM A-888 or CISPI 301 as applicable. Couplings, both at horizontal and vertical joints, shall be clamped and restrained where required and in accordance with CISPI 310-97.

B. Below Grade Soil and Waste Piping:
   1. Sizes 10 inches and smaller - Hubless cast-iron soil pipe and fittings with stainless steel clamps and elastomeric gaskets. All hubless cast-iron pipe and fittings shall meet the requirements of ASTM A-888 or CISPI 301 as applicable.
   2. For exterior (beyond building foundation) sanitary piping, Polyvinyl Chloride (PVC) plastic sewer pipe may be used. All pipe and fittings shall be made from PVC Compounds meeting the requirements of ASTM-D-1784. Pipe and fittings shall be made to and meet the
requirements of ASTM-D-3034-PSM Plastic Sewer Mains, and shall have a wall thickness of SDR 35 as shown in ASTM-D-3034

C. Joining Methods:
1. Hubless cast-iron pipe joint coupling clamps and shields shall be heavy duty and fabricated from Type 304 stainless steel. Clamps shall be Tyler "Husky", Mission Heavyweight, or Clamp-All "125." Sealing sleeves shall conform to ASTM C564 requirements.
2. All PVC pipe and fitting gasket joints shall meet or exceed the requirements of ASTM-3212.
3. Pipe couplings when used in storm drainage application shall be clamped and restrained, both at horizontal and vertical joints, where required and in accordance with CISPI 310-97

2.4 REDUCED-PRESSURE BACKFLOW PREVENTER

A. Approved manufacturers are Febco 825Y or Watts 909.

B. Reduced-Pressure-Principal Backflow Preventer: ASSE 1013, consisting of NRS gate valves, or ball valves for 2 inches and smaller, on the inlet and outlet and strainer on the inlet. Include test cocks and pressure differential relief valve having ASE A112.12 air-gap fitting located between two positive-seating check valve for continuous pressure application.

C. Provide reduced-pressure backflow preventer of size shown on the drawings.

D. Backflow preventer shall be listed on the State of Utah Cross-Connection Regulation Approval list.

2.5 CLEANOUTS AND CLEANOUT ACCESS COVERS

A. Approved manufacturers are Josam, Smith, Zurn, and Wade.

B. Locations:
1. Rough-In Piping: Josam 58900, coated cast iron, ferrule and taper ABS plug with outlet type to match piping system.
2. Tile or Asphalt Floors: Josam 55000 coated cast iron, recessed top, floor cleanout, internal gasketed taper thread ABS plug, and adjustable housing.
3. Carpet Areas: Josam 55000, coated cast iron, adjustable collar with rolled thread and ABS countersunk plug, and scoriated secure round nikaloy cover.
4. Concrete Floors Without Finish in Mechanical Rooms and Garages: Josam 57000 less top with Josam, coated cast iron, internal gasketed, taper thread ABS plug, and adjustable housing with heavy-duty scoriated loose-set round cast iron tractor cover.
5. Exterior: Josam 55000-VP-22, coated cast iron, internal gasketed, taper ABS plug, and adjustable housing with heavy-duty scoriated loose-set round cast iron tractor cover. Spigot or NO-HUB connection.
6. Wall: Josam 58910, round stainless steel smooth wall access cover, center screw, coated cast iron cleanout ferrule with spigot connection, and recessed thread ABS plug.

2.6 CORROSION-PROTECTION PIPING ENCASEMENT

A. Encasement for Underground Metal Piping:
1. Standards: ASTM A674 or AWWA C105.
2. Form: Sheet or tube.
3. Material: LLDPE film of 0.008-inch minimum thickness, or high-density, crosslaminated PE film of 0.004-inch minimum thickness.
4. Color: Natural

PART 3 - EXECUTION

3.1 PREPARATION

A. General:
1. Verify existing grades, inverts, utilities, obstacles, and topographical conditions prior to installation.
2. Examine walls, floors, roofs, and plumbing chases for suitable conditions where piping and specialties are to be installed.
3. Do not proceed until unsatisfactory conditions have been corrected.

B. Domestic Water Service:
1. Make arrangements with the local water authorities, including the agency that has jurisdictional control over the area within which the construction site is located, for connecting into the water distribution system and installing the water service as indicated on the drawings.

C. Sanitary Sewer:
1. Make arrangements with the local wastewater authorities, including the agency that has jurisdictional control over the area within which the construction site is located, for connecting into the sanitary sewage collection system and installing the building sewer as indicated on the drawings.

D. Storm Sewer:
1. Make arrangements with the local wastewater authorities, including the agency that has jurisdictional control over the area within which the construction site is located, for connecting into the storm water collection system and installing the building storm sewer as indicated on the drawings.

3.2 PIPE INSTALLATION

A. General:
1. Provide bedding, anchors, thrust restraints/anchors, and restraints as appropriate and in accordance with manufacturer’s recommendations based on type of pipe, fittings, joints, and bury depth using final finished grading as the basis.
2. Examine rough-in requirements for plumbing fixtures and other equipment having to verify actual locations of piping connections prior to installation.
3. Examine walls, floors, roofs, and plumbing chases for suitable conditions where piping and specialties are to be installed.
4. Piping shall be run true, plumb, and straight, with all restraints adjusted to carry their proportional load and locked to prevent pipe "wag," misalignment, movement, shear, or sagging.

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

6. Install exposed piping at right angles or parallel to building walls. Diagonal runs are not permitted unless expressly indicated.

7. Install piping free of sags or bends and with ample space between piping to permit proper insulation applications.

8. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors unless indicated to be exposed to view.

9. Install piping tight to slabs, beams, joists, columns, walls, and other permanent elements of the building. Allow sufficient space above removable ceiling panels to allow for panel removal.

10. Exterior Wall Penetrations: Seal pipe penetrations through exterior walls using sleeves and mechanical sleeve seals.

11. Fire Barrier Penetrations: Where pipes pass through fire-rated walls partitions, ceilings, and floors, maintain the fire-rated integrity. Use fire-stop caulking materials at all fire-rated wall penetrations.

12. The use of solder containing lead is prohibited.

13. Refer and conform to the “Copper Development Association” instructions for proper preparation and actual installation practice for all soldered and brazed joints.

14. Provide 10 mil PVC tape, (Scotchwrap No. 50 or equal), for all piping and fittings that are to be enclosed in concrete or masonry walls.

15. For domestic water piping; braze copper joints 2” and larger and solder joints 1-1/2” and smaller.

B. Domestic Water Service: Water service shall be laid at least 1'-0" below frost line.

C. Sanitary Waste and Vent Piping and Storm Drainage Piping: Install building drain and storm sewer with not less than 3'-0” of earth cover below the finished grade 1'-0” below frost level.

D. Reduced-Pressure Backflow Preventer:

1. Locate valve where it will be visible and accessible for maintenance, minimum and maximum height above finished floor or service platform as required by code, and at such location that dripping or discharge of water from relief vent will not create a nuisance nor damage to finished surfaces.

2. Provide funnel assembly with backflow preventer. Hang and anchor funnel and drain piping rigid to the drain receptor.

3. Install a shutoff valve and strainer upstream and a shutoff valve downstream of the backflow preventer.

4. Provide suitable anchoring device for backflow preventer.

E. Water Pressure Regulator:

1. Provide a water pressure regulator where shown on the drawings.

2. Provide a bronze body wye strainer upstream and full port ball valves and unions upstream and downstream of each regulating valve.

3. Provide a pressure gauge with a gauge cock downstream of each regulating valve. Gauge range at building regulating valves shall be 0 to 200 psi.
F. Water Meter: Install water meter as required by the local authorities. Provide concrete base support under meter.

G. Provide conduit and wire to install remote readout at location directed by the University.

H. Cleanouts:
1. Provide cleanouts in locations required by Code and at locations shown on the drawings.
2. For exterior cleanouts, extend cast-iron inspection pipe up to exterior cleanout poured in place in 24” x 24” x 8” concrete block set flush with finished grade.

I. Flashing:
1. Flashing Flanges: Install flashing flange and clamping device with each stack and cleanout passing through waterproof membranes.
2. Vent Flashing Sleeves: Install on stacks passing through roof, secure over stack flashing in accordance with manufacturer’s instructions.

3.3 FIELD QUALITY CONTROL

A. General Testing Procedures:
1. All piping systems shall be tested and proven tight prior to concealment. The test shall be witnessed by the Architect/Engineer, plumbing inspector, or the Owner's representative.
2. Insure that the test pressure that might damage fixtures or equipment does not reach such units by valving them off or otherwise isolating them during the test.
3. When job site conditions do not permit the use of water, air testing may be used in lieu of water.

B. Domestic Water Pipe Testing:
1. Open and close all system valves at least once while system is pressurized to test valve packing. Tighten as required.
2. Test procedures shall be as follows:
   a. Domestic Hot and Cold Water: 150 psig hydrostatic test. (200 psig on water service when serving a fire line.)
   b. All hydrostatic tests shall be held for a minimum of eight hours without loss of pressure. All air tests shall be held for a minimum of 1 hour without loss of pressure.

C. Sanitary Waste and Vent Pipe and Storm Drainage Testing Procedure: Drainage systems (including sanitary sewers, sanitary vents and storm sewers): Test piping systems in accordance with the Code test procedures.

3.4 CLEANING

A. Sterilization:
1. Prior to placing the potable water system in operation, but after all testing has been completed, sterilize the entire or sectionalized piping system with not less than 50 ppm of available chlorine solution and allowed to stand six hours before flushing. During this period of time, a pressure of not less than 40 psi shall be maintained on the section being opened and closed several times.
2. At the end of the six-hour period, the system shall be flushed with clean potable water until the chlorine residual is reduced to less than 1 ppm. During the flushing, each faucet and valve shall be opened and closed a minimum of four times.

3. Water samples shall be taken and tested by an independent laboratory. The system must be free of all bacteriological contamination. If the system shows any contamination, it shall be re-chlorinated until it is free of bacteriological contamination.

3.5 EQUIPMENT INSTALLATION

A. Plumbing Fixtures:
   1. Set fixtures level with solid backing behind lavatory supports.
   2. Provide chrome-plated anchor bolts and washers for all lavatories and china bolt caps for all floor-mounted water closets.
   3. Remove all labels, clean fixtures, and leave installation ready for use.
   4. Provide rigid bracing for each flush valve stub-out.
   5. Connections to individual fixtures shall not be less than sizes scheduled on the drawings unless otherwise specifically noted.
   6. Seal all cracks between fixture and wall, and/or counter top, and/or floor with matching color sealant equal to General Electric silicone.
   7. Provide chrome-plated escutcheon plates at all exposed water and waste pipe penetrations through walls.

END OF SECTION 22 10 00
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 SUMMARY

A. This section includes requirements for basic electrical materials and methods for the following items.
   1. Raceways
   2. Conductors and cables
   3. Supporting devices for electrical components
   4. Electrical identification
   5. Electrical demolition
   6. Cutting and patching for electrical construction
   7. Touch-up painting

1.3 REFERENCES

A. The latest edition of the following standards and codes, standard publications of professional organizations, and local authorities having jurisdiction are the minimum requirements for this work.
   1. American National Standards Institute (ANSI)
   3. Association of Edison Illuminating Companies (AEIC)
   5. Insulated Cable Engineer’s Association (ICEA)
   6. Institute of Electrical and Electronic Engineers (IEEE)
   7. National Electrical Manufacturer’s Association (NEMA)
   8. National Fire Protection Association (NFPA)
   9. NFPA 70, National Electrical Code (NEC)
  10. Underwriters’ Laboratories, Inc. (UL)
  11. State, City, and Local Authorities

1.4 DEFINITIONS

A. Instructions such as "Provide" shall mean the same as the words "This Contractor shall" preceded each such instruction. "Provide" shall mean "Furnish and Install." Where the words "Accepted" or "Acceptable" are used, such "Accepted" or "Acceptable" action by the Engineer or Architect denotes that the work or equipment item is in conformance with the design concept of the project and, in general, complies with pertinent information given in the Contract Documents.

B. EMT: Electrical metallic tubing

C. ENT: Electrical nonmetallic tubing

D. FMC: Flexible metal conduit
E. IMC: Intermediate metal conduit
F. LFMC: Liquidtight flexible metal conduit
G. LFNC: Liquidtight flexible nonmetallic conduit
H. RMC: Rigid metallic conduit
I. RNC: Rigid nonmetallic conduit

1.5 SUBMITTALS

A. Product Data:
   1. Hangers and supports
   2. Electrical identification materials

B. Shop Drawings: Dimensioned plans and sections or elevation layouts of electricity-metering equipment, including CT cabinets, conduit and conductor sizes, terminations, and other utility requirements.

C. Coordination Drawings: Plans, sections, and elevations drawn to scale and coordinating installation of equipment, where required by the contract drawings or where site physical conditions limit installation capabilities.

D. Operation and Maintenance Data: For electricity-metering equipment to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70, the National Electrical Code.

C. All equipment and materials shall be new and unused and shall be in conformance with the current applicable industry standards. Workmanship and neat appearance shall be as important as electrical and mechanical operation. Defective or damaged materials shall be replaced or repaired prior to final acceptance in a manner meeting approval of Architect and/or Engineer and at no additional cost to the Owner.

1.7 SEQUENCING

A. Coordinate chases, slots, inserts, sleeves, and openings with general construction work and arrange in building structure during progress of construction to facilitate the electrical installation.

B. Set inserts and sleeves in poured-in-place concrete, masonry work, and other structural components as they are constructed.
C. Sequence, coordinate, and integrate the installation of electrical materials and equipment for efficient flow of the Work. Coordinate the installation of large equipment requiring positioning before closing in the building.

D. Coordinate electrical service connections to components furnished by utility companies.
   1. Coordinate installation and connection of exterior underground and overhead utilities and services, including provision for electricity-metering components, prior to commencement of any work.
   2. Comply with requirements of authorities having jurisdiction and of utility company providing electrical power and other services.

E. Coordinate location of access panels and doors for electrical items that are concealed by finished surfaces.

F. No work shall be concealed until after inspection and approval by proper authorities. If work is concealed without inspection and approval, Contractor shall be responsible for all work required to expose and restore the concealed work in addition to all required modifications.

G. Where electrical identification devices are applied to field-finished surfaces, coordinate installation of identification devices with completion of finished surface.

H. Where electrical identification markings and devices will be concealed by equipment and similar obstructions, coordinate installation of these items before ceiling installation.

PART 2 - PRODUCTS

2.1 RACEWAYS

A. Metallic Conduit Systems:
   1. EMT: ANSI C80.3, zinc-coated steel. EMT shall be galvanized on the outside and coated on the inside with a hard smooth lacquer finish. EMT fittings shall be set-screw type. EMT shall comply with UL 797 and ANSI C80.3.
   2. FMC: Flexible metal conduit shall be galvanized steel with steel fittings and shall comply with UL 1.
   3. IMC: ANSI C80.6, zinc-coated steel, with threaded fittings. Intermediate steel conduit shall be hot-dipped galvanized.
   4. LFMC: Zinc-coated steel with sunlight-resistant and mineral-oil-resistant plastic jacket. Liquidtight Flexible Steel conduit shall comply with UL 514C. Liquid and moisture tight conduit shall be American Brass with Appleton "ST" connectors or approved equal.
   5. RMC: Rigid Steel Conduit shall be galvanized and shall comply with UL 6 and ANSI C80.1. Plastic-coated conduit shall be rigid galvanized steel conduit having a 0.030-inch minimum thick factory-bonded PVC jacket, using pre-jacketed couplings as manufactured by Pittsburgh Robroy, Plastic Applicator, Occidental, or approved equal.

B. Nonmetallic Conduit Systems:
   1. ENT: NEMA TC 13
2. RNC: NEMA TC 2, Schedule 40 or 80 PVC
3. LFNC: UL 1660
4. ENT and RNC fittings: NEMA TC3, match to conduit or conduit/tubing type and material

C. Raceway Fittings: Specifically designed for the raceway type with which used.

2.2 CONDUCTORS AND CABLES

A. UL-listed building wires and cables with conductor material, insulation type, cable construction, and rating as specified in Part 3.

B. Rubber Insulation Material: comply with:
   1. ICEA S-95-658 / NEMA WC70 – Non-shielded 0-2 kV Cables
   2. ICEA S-105-692 - 600 V Single Layer Thermoset Insulated Utility Underground Distribution Cable

C. Thermoplastic Insulation Material: comply with:
   1. ICEA S-95-658 / NEMA WC70 – Non-shielded 0-2 kV Cables
   2. ICEA S-105-692 - 600V Single Layer Thermoset Insulated Utility Underground Distribution Cable

D. Cross-Linked Polyethylene Insulation Material: comply with:
   1. ICEA S-95-658 / NEMA WC70 – Non-shielded 0-2 kV Cables.
   2. ICEA S-105-692 - 600V Single Layer Thermoset Insulated Utility Underground Distribution Cable
   3. ICEA S-81-570 - Direct Burial, 600V, Ruggedized Insulation

E. Ethylene Propylene Rubber Insulation Material: comply with:
   1. ICEA S-95-658 / NEMA WC70 – Non-shielded 0-2 kV Cables
   2. ICEA S-105-692 - 600V Single Layer Thermoset Insulated Utility Underground Distribution Cable

F. Conductor Material: Copper.

G. Conductors and Cables:
   1. All conductors shall be new, unless otherwise noted. All conductors #8 AWG and larger shall be stranded. Conductors #10 and smaller may be solid or stranded depending on their application.
   2. Secondary voltage conductors and cables shall be electrical grade, annealed copper, tinned if rubber insulated, and fabricated in accordance with ASTM and ICEA standards. The use of aluminum is prohibited except where shown on one-line or equipment schedules. Minimum size #12 for branch circuits; #14 for control wiring. Conductor types shall be as follows:
      a. In sizes #1/0 AWG and larger: Cross-linked polyethylene insulation type XHHW (75 to 90°C) or THWN/THHN.
b. In sizes #1 AWG and smaller: All conductors shall have heat/moisture resistant thermoplastic insulation type THW or THWN (75°C), except as follows:
   1) Where conduit temperature will exceed 100°F, use type THHN (90°C). Type XHHW (90°C) permissible in dry locations.
   2) Motor circuit conductors: 75° THWN or XHHW from disconnect to motor.
   3) In 120-volt incandescent fixtures, type AF (150°C).
   4) In wireways of fluorescent lighting fixtures types THWN/THHN/MTW (90°C).
   5) Handling cord drops and cord connections: Type “SO” cord.
   6) Conductors in 120 volt circuits longer than 100 feet or 277 volt circuits longer than 200 feet shall not be less than #10 AWG.

c. All wiring for control circuits to contactors, pushbuttons, and the like, shall be #12 AWG, copper, stranded with THWN insulation.

H. Wire Connectors and Splices: Units of size, ampacity rating, material, type, and class suitable for service indicated.

2.3 SUPPORTING DEVICES FOR ELECTRICAL COMPONENTS

A. Provide hangers and supports to support raceways, fixtures, cabinets, boxes, etc. as manufactured by B-Line, Unistrut, Binkley or Kindorf.

B. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.

C. Metal Items for Use Outdoors or in Damp Locations: Steel, hot-dip galvanized after fabrication.

D. Slotted-Steel Channel Supports: Flange edges turned toward web, and 9/16-inch-diameter (14 mm) slotted holes at a maximum of 2 inches (50 mm) o.c., in webs.
   1. Channel Thickness: Selected to suit structural loading.
   2. Fittings and Accessories: Products of the same manufacturer as channel supports.

E. Nonmetallic Channel and Angle Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with 9/16-inch-diameter (14 mm) holes at a maximum of 8 inches o.c. (203 mm), in at least one surface.
   1. Fittings and Accessories: Products of the same manufacturer as channels and angles.
   2. Fittings and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.

F. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.

G. Pipe Sleeves: ASTM A 53, Type E, Grade A, Schedule 40, galvanized steel, plain ends.

H. Expansion Anchors: Carbon-steel wedge or sleeve type.

I. Toggle Bolts: All-steel springhead type.
2.4 ELECTRICAL IDENTIFICATION

A. Identification Devices: A single type of identification product for each application category. Use colors prescribed by ANSI A13.1, NFPA 70, and these Specifications.
   1. As a minimum, identification means shall be installed on the following:
      a. Raceways and cables
      b. Junction boxes

B. Raceway and Cable Labels: Comply with ANSI A13.1, Table 3, for minimum size of letters for legend and minimum length of color field for each raceway and cable size.
   1. Type: Pre-tensioned, wraparound plastic sleeves. Flexible, preprinted, color-coded, acrylic band sized to suit the diameter of the item it identifies.
   2. Color: Black letters on orange background.
   3. Legend: Indicates voltage.

C. Colored Adhesive Marking Tape for Raceways, Wires, and Cables: Self-adhesive vinyl tape, not less than 1 inch wide x 3 mil thick (25 mm wide x 0.08 mm thick).

D. Underground Warning Tape: Permanent, bright-colored, continuous-printed, vinyl tape with the following features:
   1. Not less than 6 inches wide x 4 mil thick (150 mm wide x 0.102 mm thick).
   2. Compounded for permanent direct-burial service.
   3. Embedded continuous metallic strip or core.
   4. Printed legend that indicates type of underground line.

E. Color-Coding Cable Ties: Type 6/6 nylon, self-locking type. Colors to suit coding scheme.

F. Engraved-Plastic Labels, Signs, and Instruction Plates: Engraving stock, melamine plastic laminate punched or drilled for mechanical fasteners 1/16-inch (1.6-mm) minimum thickness for signs up to 20 sq. in. (129 sq. cm) and 1/8-inch (3.2-mm) minimum thickness for larger sizes. Engraved legend in black letters on white background.

G. Interior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Preprinted, aluminum, baked-enamel-finish signs, punched or drilled for mechanical fasteners, with colors, legend, and size appropriate to the application.

H. Exterior Warning and Caution Signs: Comply with 29 CFR, Chapter XVII, Part 1910.145. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm), galvanized-steel backing, with colors, legend, and size appropriate to the application. 1/4-inch (6-mm) grommets in corners for mounting.

I. Fasteners for Nameplates and Signs: Self-tapping, stainless-steel screws or No. 10/32 stainless-steel machine screws with nuts and flat and lock washers.

2.5 CONCRETE EQUIPMENT BASES

A. Concrete Forms and Reinforcement Materials: As specified in Division 03, Section "Cast-in-Place Concrete for Electrical."
B. Concrete: 3000-psi (20.7-MPa), 28-day compressive strength as specified in Division 03, Section "Cast-in-Place Concrete for Electrical."

2.6 TOUCH-UP PAINT

A. Equipment: Equipment manufacturer’s paint selected to match installed equipment finish.

B. Galvanized Surfaces: Zinc-rich paint recommended by item manufacturer.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide the maximum possible headroom.

B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.

C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Adhere to clearances required by the NEC, NFPA 70. Connect for ease of disconnecting, with minimum interference with other installations.

D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 RACEWAY APPLICATION

A. Use the following raceways for outdoor installations:
   1. Exposed: IMC
   2. Concealed: IMC
   3. Underground, Single Run: RNC
   4. Underground, Grouped: RNC
   5. Connection to Vibrating Equipment: LFMC
   6. Boxes and Enclosures: NEMA 250, Type 3R or Type 4

B. Use the following raceways for indoor installations:
   1. Exposed: EMT
   2. Concealed: EMT
   3. Connection to Vibrating Equipment: FMC; except in wet or damp locations, use LFMC
   4. Damp or Wet Locations: IMC
   5. Embedded in concrete: IMC or RMC
   6. Boxes and Enclosures: NEMA 250, Type 1, unless otherwise indicated
   7. Damp or wet locations: NEMA 250, Type 4, nonmetallic

3.3 RACEWAY AND CABLE INSTALLATION

A. Conceal raceways and cables, unless otherwise indicated, within finished walls, ceilings, and floors.
B. Install raceways and cables at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Locate horizontal raceway runs above water and steam piping.

C. Use temporary raceway caps to prevent foreign matter from entering.

D. Stub-up Connections: Extend conduits through concrete floor for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; FMC may be used 6 inches (150 mm) above the floor. Install screwdriver-operated, threaded flush plugs flush with floor for future equipment connections. Arrange so that curved portion of bends is not visible above the finished slab.

E. Make conduit bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

F. Use raceway and cable fittings compatible with raceways and cables and suitable for use and location.

G. Install pull wires in empty raceways. Use No. 14 AWG zinc-coated steel or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of the pull wire.

H. Install telephone and signal system raceways, 2-inch trade size (DN53) and smaller, in maximum lengths of 150 feet (45 m) and with a maximum of two 90-degree bends or equivalent. Separate lengths with pull or junction boxes where necessary to comply with these requirements, in addition to requirements above.

I. Connect motors and equipment subject to vibration, noise transmission, or movement with a maximum of 72-inch (1830-mm) flexible conduit. Install LFMC in wet or damp locations. Install separate ground conductor across flexible connections.

3.4 WIRING METHODS FOR POWER, LIGHTING, AND CONTROL CIRCUITS

A. Feeders: Type THHN/THWN insulated conductors in raceway.

B. Underground Feeders and Branch Circuits: Type THWN or single-wire, Type UF insulated conductors in raceway.

C. Branch Circuits: Type THW or THHN/THWN insulated conductors in raceway where exposed. Armored or nonmetallic sheathed cable where permitted by authorities having jurisdiction and where concealed in ceilings and gypsum board partitions.

D. Remote-Control Signaling and Power-Limited Circuits: Type THHN/THWN insulated conductors in raceway for Classes 1, 2, and 3, unless otherwise indicated.
3.5  WIRING INSTALLATION

A. Install splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

B. Install wiring at outlets with at least 12 inches (300 mm) of slack conductor at each outlet.

C. Connect outlet and component connections to wiring systems and to ground. Tighten electrical connectors and terminals, according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A.

3.6  ELECTRICAL SUPPORTING DEVICE APPLICATION

A. Damp Locations and Outdoors: Hot-dip galvanized materials or nonmetallic, U-channel system components.

B. Dry Locations: Steel materials

C. Support Clamps for PVC Raceways: Click-type clamp system

D. Selection of Supports: Comply with manufacturer's written instructions.

E. Strength of Supports: Adequate to carry present and future loads, times a safety factor of at least four; minimum of 200-lb. design load.

3.7  SUPPORT INSTALLATION

A. Install support devices to securely and permanently fasten and support electrical components.

B. Install individual and multiple raceway hangers and riser clamps to support raceways. Provide U-bolts, clamps, attachments, seismic restraints, and other hardware necessary for hanger assemblies and for securing hanger rods and conduits.

C. Support parallel runs of horizontal raceways together on trapeze- or bracket-type hangers.

D. Size supports for multiple raceway installations so capacity can be increased by a 25% minimum in the future.

E. Support individual horizontal raceways with separate, malleable-iron pipe hangers or clamps and appropriate seismic restraints.

F. Install 3/8-inch-diameter (9.5 mm-diameter) or larger threaded steel hanger rods, unless otherwise indicated. Trim off threaded rod supports at a maximum length equal to the rod diameter below the bottom nut.

G. Spring-steel fasteners specifically designed for supporting single conduits or tubing may be used instead of malleable-iron hangers for 1-1/2 inch (38 mm) and smaller raceways serving lighting and
receptacle branch circuits above suspended ceilings and for fastening raceways to slotted channel and angle supports.

H. Arrange supports in vertical runs so the weight of raceways and enclosed conductors is carried entirely by raceway supports, with no weight load on raceway terminals.

I. Simultaneously install vertical conductor supports with conductors.

J. Separately support cast boxes that are threaded to raceways and used for fixture support. Support sheet metal boxes directly from the building structure or by bar hangers. If bar hangers are used, attach bar to raceways on opposite sides of the box and support the raceway with an approved fastener not more than 24 inches (610 mm) from the box.

K. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.

L. Install sleeves for cable and raceway penetrations of concrete slabs and walls unless core-drilled holes are used. Install sleeves for cable and raceway penetrations of masonry and fire-rated gypsum walls and of all other fire-rated floor and wall assemblies. Install sleeves during erection of concrete and masonry walls.

M. Securely fasten electrical items and their supports to the building structure, unless otherwise indicated. Perform fastening according to the following unless other fastening methods are indicated:
   1. Wood: Fasten with wood screws or screw-type nails.
   2. Masonry: Toggle bolts on hollow masonry units and expansion bolts on solid masonry units.
   3. New Concrete: Concrete inserts with machine screws and bolts.
   4. Existing Concrete: Expansion bolts.
   5. Threaded studs driven by a powder charge and provided with lock washers in existing concrete are not allowed unless approved by the Architect.
   6. Steel: Welded threaded studs or spring-tension clamps on steel. Field welding shall comply with AWS D1.1.
   7. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
   8. Light Steel: Sheet-metal screws.
   9. Fasteners: Select so the load applied to each fastener does not exceed 25% of its proof-test load.

3.8 IDENTIFICATION MATERIALS AND DEVICES

A. All components of electrical system shall be neatly and accurately labeled to facilitate ready identification and service. Temporary type of markings, which are visible on equipment, will not be permitted. Repaint trims, housing, etc. where such markings cannot be readily removed. Defaced finish must be refinished. Provide labels as follows or as indicated elsewhere:
Common Work Results for Electrical

1. Provide engraved composition nameplates on each branch circuit panelboard, etc. Lettering shall be 1/2-inch minimum height for panelboards. Apply labeling for panelboards on outside of each panelboard door and include voltage and phase.

2. Provide neatly-typed directory cards for all branch circuit panelboard directories.

3. Provide engraved composition nameplates having 3/8-inch minimum height, white letters engraved in a black face for each switch or circuit breaker in switchboards and subdistribution boards. Provide labeling of matching style designating all units as designated on drawings. Secure all lamenoid nameplates with rivets or screws. Adhesives will not be allowed.

4. Use of Dymolabels for panels and circuit number identification on all receptacle covers and disconnect switches in mechanical and equipment rooms is forbidden.

5. Provide engraved composition nameplates on all time clocks, starters, etc. Lettering shall be 3/8 inches minimum height for equipment. Labeling for equipment shall be in accordance with designations given on the associated drawings.

B. Coordinate names, abbreviations, colors, and other designations used for electrical identification with corresponding designations indicated in the Contract Documents or required by codes and standards. Install at locations for most convenient viewing without interference with operation and maintenance of equipment. Use consistent designations throughout Project.

1. Bands: Pretensioned, snap-around, colored plastic sleeves or colored adhesive marking tape. Make each color band 2 inches (51 mm) wide, completely encircling conduit, and place adjacent bands of two-color markings in contact, side by side.

2. Band Locations: At changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (8 m) maximum intervals in congested areas.

3. Colors:
   a. Fire Alarm System: Red
   b. Security System: Blue and yellow
   c. Telecommunication System: Green and yellow

C. Tag and label each feeder conductor (with an operating voltage of 600 volts or less) in pullboxes with an engraved, non-metallic tag, having 3/16-inch minimum height letters. Tag shall be a minimum of one inch diameter or square. State circuit number and phase (A, B, C).

D. Tag and label circuits designated to be extended in the future. Identify source and circuit numbers in each cabinet, pull and junction box, and outlet box. Color-coding may be used for voltage and phase identification.

E. Install continuous underground plastic markers during trench backfilling, for exterior underground power, control, signal, and communication lines located directly above power and communication lines. Locate 6 to 8 inches (150 to 200 mm) below finished grade. If width of multiple lines installed in a common trench or concrete envelope does not exceed 16 inches (400 mm), overall, use a single line marker.

F. Color-code 208/120V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:

1. Phase A: Black
2. Phase B: Red
3. Phase C: Blue
4. Neutral: White
5. Ground: Green

G. Color-code 480/277V system secondary service, feeder, and branch-circuit conductors throughout the secondary electrical system as follows:
   1. Phase A: Brown
   2. Phase B: Orange
   3. Phase C: Yellow
   4. Neutral: White with a colored stripe or gray
   5. Ground: Green

H. Install warning, caution, and instruction signs where required to comply with 29 CFR, Chapter XVII, Part 1910.145, and where needed to ensure safe operation and maintenance of electrical systems and of items to which they connect. Install engraved plastic-laminated instruction signs with approved legend where instructions are needed for system or equipment operation. Install metal-backed butyrate signs for outdoor items.

I. Install engraved-laminated emergency-operating signs with white letters on red background with minimum 3/8-inch-high lettering for emergency instructions on power transfer, load shedding, and other emergency operations.

3.9 FIRESTOPPING

A. Apply firestopping to cable and raceway penetrations of fire-rated floor and wall assemblies to achieve fire-resistance rating of the assembly.

3.10 CONCRETE BASES

A. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger, in both directions, than supported unit. Follow the supported equipment manufacturer's anchorage recommendations and setting templates for anchor-bolt and tie locations, unless otherwise indicated.

3.11 DEMOLITION

A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.

B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.

C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches (50 mm) below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.

D. Remove demolished material from Project site. Coordinate with the Owner for any materials to be salvaged.
E. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.12 CUTTING AND PATCHING

A. Cut, channel, chase, and drill floors, walls, partitions, ceilings, and other surfaces required to permit electrical installations. Perform cutting by skilled mechanics of trades involved.

B. Repair and refinish disturbed finish materials and other surfaces to match adjacent undisturbed surfaces. Install new fireproofing where existing firestopping has been disturbed. Repair and refinish materials and other surfaces by skilled mechanics of trades involved.

3.13 FIELD QUALITY CONTROL

A. Inspect installed components for damage and faulty work, including the following:
   1. Raceways
   2. Conductors and cables
   3. Supporting devices for electrical components
   4. Electrical identification
   5. Concrete equipment bases
   6. Electrical demolition
   7. Cutting and patching for electrical construction
   8. Touch-up painting

3.14 REFINISHING AND TOUCH-UP PAINTING

A. Refinish and touch-up paint as required.
   1. Clean damaged and disturbed areas and apply primer, intermediate, and finish coats to suit the degree of damage at each location.
   2. Follow paint manufacturer's written instructions for surface preparation and for timing and application of successive coats.
   3. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
   4. Repair damage to PVC or paint finishes with matching touch-up coating recommended by manufacturer.

3.15 CLEANING AND PROTECTION

A. On completion of installation, including outlets, fittings, and devices, inspect exposed finish. Remove burrs, dirt, paint spots, and construction debris.

B. Protect equipment and installations and maintain conditions to ensure that coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

END OF SECTION 26 00 10
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Materials and procedures for installing boundary markers and survey monuments.

1.2 PERFORMANCE REQUIREMENTS
   A. Identify the land surveyor who set the marker plates and reference marks.
   B. For vertical control datum use Mean Sea Level datum adjusted by United States Coast and Geodetic Survey for the location of survey.
   C. Vertical Accuracy: 3rd order.
   D. Make all individual tape measurements to the nearest 0.01 of a foot, with tape corrections for temperature, sag, suspension, etc. noted on all field notes requiring such measurements.
   E. Horizontal Accuracy:
      1. 1:10,000 minimum for urban areas.
      2. 1:20,000 minimum for metropolitan areas.

1.3 SUBMITTALS
   A. Survey notes and drawings showing:
      1. All monuments found, set, reset, or replaced, describing their kind, size, and location and giving other data relating thereto.
      2. Lines of survey, concrete structures containing reference marks, types of marks installed, distances and angles from monument referenced.
      3. Witness monuments, basis of bearings, bearings, length of lines to monuments or corners witnessed and scale of drawing.
      4. Errors of closure and method of adjustment.
      5. Memorandum of oaths and certificates.
      7. Any other data necessary for the interpretation of various items and locations for points, lines, and areas shown.
   B. Copies of plats filed with the County Recorder.

1.4 QUALITY ASSURANCE
   A. Use a land surveyor who complies with Utah licensing law and who is acceptable to OWNER to supervise setting or resetting of monuments and boundary markers.
   B. Make surveys in conformance with accepted practice of land surveying and comply with all pertinent Laws and Regulations of land survey regulatory agencies and authority having jurisdiction.

PART 2 PRODUCTS

2.1 MONUMENT
   A. Monument Post: Minimum three (3) feet long, precast or cast-in-place concrete. Make exposed surface of finished monument posts uniform, even texture, and free of holes, cracks, and chipped edges.
B. Marker Plate: Brass or bronze or as indicated.

2.2 FRAME AND COVER
A. Asphalt coated, heavy duty, cast iron, Section 05 56 00.

2.3 LOT LINE WITNESS MARKER
A. Brass surveyor's tag or brass nail set in a lead filled hole in concrete.

2.4 REBAR CORNER MARKER
A. No. 5 rebar, at least 18 inches long with the top fitted with a nonferrous survey cap and stamped with land surveyor's registration number.

2.5 PIPE CORNER MARKERS
A. One (1) inch internal diameter galvanized steel pipe at least 18 inches long, or two (2) inches internal diameter galvanized steel pipe at least 36 inches long.
B. Fit pipe with concrete or mortar plug, tagged with surveyor's license number.
C. Fix tag in concrete or mortar plug with a one (1) inch minimum long bent brass brad.

2.6 FIELD NOTE PAPER
A. Twenty (20) pound bond paper minimum with format of documents acceptable to OWNER.

2.7 CONCRETE
A. Cast-in-place: Class 4000, Section 03 30 04, or
B. Precast: Class 5000, Section 03 40 00.

PART 3 EXECUTION

3.1 PREPARATION
A. Locate and preserve utilities, Section 31 23 16.
B. Excavation, Section 31 23 16.

3.2 HORIZONTAL CONTROL
A. Set base horizontal ground control upon a minimum of two (2) United States Coast and Geodetic Survey triangulation stations or equivalent, and tie to the Lambert Conformal Conic Projection for establishment of the State Plane Coordinate System with local datum adjustment within the Project area.

3.3 BEARING BASE
A. Refer all directional measurements to one "bearing base". Actual measurements may be equated to bearings and linear measurements shown on any record (i.e., plat, official map, description, or approved field notes of lines resurveyed that are shown on such records used in the survey).

3.4 TIE TO EXISTING MONUMENTS
A. Tie into a monument which has State Plane Coordinates if the monument is within 1/2 mile of the proposed survey site or at a selected location.

3.5 CORNER MARKERS
A. Site Boundary: Install pipe corner markers.
B. Lot Boundary: Install rebar corner markers for lot corners. Do not use rebar where pipe corner markers are installed as a boundary marker and a corner marker.

3.6 LOT LINE WITNESS MARKER
A. Witness lot lines by installing 1/2 inch surveyor tags in sidewalk. If sidewalk does not exist, install tags in curb or mass concrete.

3.7 MONUMENTS
A. Locate monument post so reference point falls within 1 inch diameter circle in the center of
marker plate. Install marker plate in survey monument post before the concrete has acquired its initial set.

B. Compact backfill to 95 percent or greater relative to a modified proctor density, Section 31 23 26.

C. Set top of frames and covers 1/4 inch lower than Pavement surface. Recess marker plate a minimum of four (4) inches below cover.

D. Install monument so frame and cover does not contact monument or marker plate.

3.8 DAMAGED MONUMENTS

A. Replace survey control monuments that are disturbed or destroyed by CONTRACTOR.

B. If OWNER allows replacement of lost or destroyed survey control monuments, use a licensed land surveyor to re-establish control monuments based upon original survey control.

3.9 REFERENCE MARKS

A. Section 01 71 34.

END OF SECTION
PART 1  GENERAL

1.1. SECTION INCLUDES
   A. Common fill material.

1.2  REFERENCES
   A. ASTM Standards:
      C136  Sieve Analysis of Fine and Coarse Aggregates.
      D448  Classification for Sizes of Aggregate for Road and Bridge Construction.
      D1883 CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
      D2487  Classification of Soils for Engineering Purposes.
      D2844 Resistance R-Value and Expansion Pressure of Compacted Soils.
      D3282 Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
      D3740 Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
      F1647  Organic Matter Content of Putting Green and Sports Turf Root Zone Mixes.

1.3  SUBMITTALS
   A. General. If a change in source of material is required, submit name of Supplier, source and gradation analysis of material before delivery to site.
   B. Topsoil. Submit certification from topsoil Supplier assuring topsoil product meets requirements in this Section.
   C. Borrow, granular borrow, granular backfill borrow, recycled fill, sand, gravel. Before delivering material to site, identify:
      1. Name of Supplier and source.
      2. Gradation, classification and CBR.
      3. Percent composition of reclaimed bitumious concrete or Portland cement concrete included in the mix.
   D. Slag, pumice, scoria. Identify name of supplier, source, and density.

1.4  QUALITY ASSURANCE
   A. Use a laboratory that complies with ASTM D3740 and Section 01 45 00 requirements.
   B. Reject fill products that do not meet requirements of this section.
   C. Remove product found defective after installation and install acceptable product at no additional cost to OWNER.

1.5  ACCEPTANCE
   A. General:
      1. Acceptance is by Lot. One (1) lot is one (1) day production
      2. Dispute resolution, Section 01 35 10.
   B. Roadway Backfill: Sub-lot size is 5,000 tons.
PART 2 PRODUCTS

2.1 BORROW
   A. Classifications A-1-a through A-4, ASTM D3282.

2.2 GRANULAR BORROW
   B. Material meets design CBR-value (ASTM D1883) or R value (ASTM D2844) for suitability of source, not for project control testing.

2.3 GRANULAR BACKFILL BORROW
   A. Classification A-1, ASTM D3282.
   B. Well graded.
   C. Particle size, two (2) inch maximum.
   D. Material meets design CBR-value (ASTM D1883) or R value (ASTM D2844) for suitability of source, not for project control testing.

2.4 RECYCLED FILL
   A. Material: Pulverized Portland cement concrete, pulverized bituminous concrete pavement or combination, either mixed with or not mixed with a new aggregate.
   B. Gradation: Meet requirements of this section based upon use; e.g. borrow, granular borrow, granular backfill borrow, etc.

2.5 NATIVE
   A. When allowed by ENGINEER, material obtained from Excavations may be used as fill, provided organic material, rubbish, debris, and other objectionable materials are removed and CONTRACTOR has submitted the appropriate proctor density data (see Section 31 23 26).

2.6 CLAY
   A. Classification CL, CL-ML, or ML, ASTM D2487.
   B. Free of organic matter, frozen material, debris, rocks, and deleterious materials.
   C. Homogeneous, relatively uniform.

2.7 SAND
   A. Friable river or bank aggregate, free of loam and organic matter. Graded as follows.

2.8 GRAVEL
<table>
<thead>
<tr>
<th>Sieve</th>
<th>Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/8</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>1 – 10</td>
</tr>
</tbody>
</table>
   A. Material: Rock, stone, or other high quality mineral particle or combination.
   Sewer Rock.
Pea Gravel.

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Size No.</th>
<th>ASTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 to 1.5”</td>
<td>3 to 1.5”</td>
<td>1</td>
</tr>
<tr>
<td>2 to 1”</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1.5 to 3/4”</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1 to 1/2”</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Size No.</th>
<th>ASTM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 to No. 4</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>3/8 to No. 8</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

2.9 TOPSOIL

No. 4 to No. 16 9
No. 4 (screenings) 10

A. Chemical Characteristics:
1. Acidity and alkalinity range: pH 5.5 to 7.7
2. Soluble Salts: Less than 2.0 mmhos/cm.
3. Sodium Absorption Ratio (SAR): less than 3.0
4. Nitrogen (NO₃N): 48 ppm minimum
5. Phosphorus (P): 11 ppm minimum
6. Potash (K): 130 ppm minimum
7. Iron (Fe): 5.0 ppm minimum

B. Physical Characteristics:
1. Fertile, loose, friable.
2. Free of weeds, subsoil, lumps or clods of hard earth, plants or their roots, sticks, toxic minerals, chemicals and stones greater than 1-1/2 inch diameter.
3. Composition, ASTM D2487:

<table>
<thead>
<tr>
<th>Material</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>15 – 60</td>
</tr>
<tr>
<td>Silt</td>
<td>10 – 70</td>
</tr>
<tr>
<td>Clay</td>
<td>5 – 30</td>
</tr>
<tr>
<td>Organic matter</td>
<td>2 - 5</td>
</tr>
</tbody>
</table>
Humus determined by ASTM F1647. Peat may be used as an organic amendment to meet the humus requirements.

2.10 **SLAG, PUMICE, SCORIA**
A. Chemically inert, porous, durable, free draining.

<table>
<thead>
<tr>
<th>Gradation, US Sieve</th>
<th>Slag</th>
<th>Pumice</th>
<th>Scoria</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>80–100</td>
<td>80–100</td>
<td>80–100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>20–100</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>0–20</td>
<td>0–20</td>
<td>40–100</td>
</tr>
<tr>
<td>No. 4</td>
<td>0–10</td>
<td>0–10</td>
<td>10–70</td>
</tr>
<tr>
<td>No. 16</td>
<td>--</td>
<td>0–65</td>
<td>0–40</td>
</tr>
<tr>
<td>No. 50</td>
<td>--</td>
<td>0–40</td>
<td>0–25</td>
</tr>
<tr>
<td>No. 200</td>
<td>0–3</td>
<td>0–3</td>
<td>0–15</td>
</tr>
<tr>
<td>Density, pound per cubic foot</td>
<td>85–100</td>
<td>75–80</td>
<td>60–75</td>
</tr>
</tbody>
</table>

**NOTES:**
(a) Gradations are based upon percent of material passing sieve by weight, ASTM C136.
(b) Density measured as in-place target.

2.11 **SOURCE QUALITY CONTROL**
A. Verify gradation, ASTM C136.
B. Select samples on a random location and time basis.
C. If tests indicate materials do not meet specified requirements, change materials and retest at no additional cost to OWNER.

**PART 3 EXECUTION**
Not Used

**END OF SECTION**
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Removal of trees, stumps, roots, and tree debris.
   B. Clearing site of plant life, root systems and shrubs.
   C. Removal of fences, fence posts, mail box posts, and miscellany.

1.2 REFERENCES
   A. NAA Standards:
      Pruning Standards for Shade Trees.
   B. Utah Shade Tree Pruning Standards.

1.3 QUALITY ASSURANCE
   A. Provide at least one person, who is familiar with NAA pruning standards for the type of tree involved, to be present during tree pruning operations.

1.4 SITE CONDITIONS
   A. Repair or replace damaged trees and shrubs at no additional cost to OWNER.

1.5 PROTECTION
   A. Protect roots and branches of trees to remain.
   B. Construct temporary barricading at tree’s approximated drip line. Place continuous barricades at least three (3) feet high.
   C. When setting posts, avoid damaging tree roots.
   D. Do not permit heavy equipment or stockpiling of materials or debris within the barricaded area, or permit earth surface to be changed.
   E. Provide water and fertilizer to maintain existing trees.

PART 2 PRODUCTS

2.1 STUMP TREATMENT SOLUTION
   A. Formulated to kill existing vegetation.

PART 3 EXECUTION

3.1 EXAMINATION
   A. The drawings do not purport to show all trees and shrubs existing on site.
   B. Verify with ENGINEER which plantings are to be removed or to remain.
   C. Tree root inspection:
      1. Assist ENGINEER by removing and replacing existing surface improvements.
2. Cost of removals and replacements will be paid for using existing payment prices, or if none, then by using contract Modification prices.

3.2 PREPARATION
   A. Locate utilities. Preserve utilities that are to remain in service, Section 31 23 16.
   B. Review work procedures with ENGINEER.
   C. Schedule work carefully with consideration for property owners and general public.
   D. Before starting, arrange for disconnection of all utility services that are to be removed or which interfere with work.

3.3 SITE CLEARING
   A. Remove all vegetation outside of excavation, fill slope lines, and limits of slope rounding.
   B. Remove fences, posts, appurtenances, and miscellaneous objects.

3.4 TREE REMOVAL
   A. Remove branches, limbs, and debris.
   B. Remove stumps and roots to 18 inches below proposed grade.
   C. For stumps larger than six (6) inches caliper remove and treat as follows:
      1. Remove chips and debris from around remaining stump.
      2. Apply stump treatment solution in accordance with manufacturer's recommendations.
      3. Do not allow chemical solution to mist, drip, drift, or splash onto adjacent ground surfaces or desirable vegetation.
      4. Replace any existing vegetation damaged or killed through improper use of chemical at no additional cost to OWNER.

END OF SECTION
EXCAVATION

SECTION 31 23 16
EXCAVATION

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Excavation and disposal of excavated materials.
B. Protection of existing facilities such as utilities, vegetation, structures affected by excavation, etc.

1.2 PAYMENT PROCEDURES
A. No Contract Time extension shall be granted and no additional compensation shall be made if buried utilities or structures that conflict with the Work have not been found by Keyholing.
B. Perform Incidental Excavation at no additional cost to OWNER.

1.3 DEFINITIONS
A. Authorized Over Excavation: Upper limit of excavation is proposed excavation limit. Lower and lateral limits are as authorized by ENGINEER.
B. Classified Excavation: The excavation of specified materials.
C. Incidental Excavation: Excavation done for CONTRACTOR's benefit, excavation error, dewatering of excavation, slough, or over-break.
D. Unclassified Excavation: The excavation of all materials encountered regardless of the nature, size, or manner in which they are removed. Presence of isolated boulders or rock fragments will not be sufficient cause to change classification of surrounding materials.
E. Keyholing: The process of making a small, precisely controlled hole for “day-lighting”, or uncovering and exposing underground utilities, in order to locate or inspect them.

1.4 STORAGE AND HANDLING
A. Stockpile excavated material to cause minimum inconvenience to public and provide for emergency services as necessary.
B. Provide free access to existing fire hydrants, water valves, gas valves, and meters.
C. Provide free flow of storm water in all gutters, conduits, and natural water courses.
D. Utilize traffic control signs, markers, and procedures in product storage and handling activities.
E. Promptly remove other material from site.

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS
A. Common fill, Section 31 05 13.
B. Aggregate base course, Section 32 11 23.
C. Stabilization fill, aggregate base course or common fill with maximum rectilinear particle size of two (2) inches.
D. Stabilization fabric, Section 31 05 19.
PART 3 EXECUTION

3.1 PREPARATION
A. Photograph existing surfaces where work will take place to document conditions before excavation, Section 01 78 39.
B. Use white paint and mark the proposed excavation.
C. Call the one-call center and wait the required amount of time. Colors of one call center marks indicate the following:

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>Proposed excavation</td>
</tr>
<tr>
<td>Red</td>
<td>Electric power lines, cables, conduit and lighting cables</td>
</tr>
<tr>
<td>Yellow</td>
<td>Gas, oil, steam, petroleum or gaseous materials.</td>
</tr>
<tr>
<td>Orange</td>
<td>Communications, alarm, signal, cables or conduits.</td>
</tr>
<tr>
<td>Blue</td>
<td>Potable water.</td>
</tr>
<tr>
<td>Purple</td>
<td>Reclaimed water, irrigation and slurry lines.</td>
</tr>
<tr>
<td>Green</td>
<td>Sewer and storm drain lines.</td>
</tr>
<tr>
<td>Pink</td>
<td>Temporary survey markings.</td>
</tr>
</tbody>
</table>
D. Implement traffic control plan requirements, Section 01 55 26.
E. For temporary controls, refer to Section 01 57 00.

3.2 PROTECTION
A. Identify required lines, grades, contours, and benchmarks, Section 01 71 23.
B. Utilities:
   1. Keyhole, expose or otherwise locate utilities as necessary to give utility agency at least one (1) day notice to protect, preserve, or relocate a utility that may interfere with or may be damaged by excavation work. Perserve utilities that remain in service.
   2. Where utilities or structures conflict with design grades, report conflict to appropriate utility company and ENGINEER 14 days before initiating work within the conflict area.
C. Support and protect from damage any existing facility and structure that exists in, passes through, or passes under the site.
D. Protect existing landscape sprinkler systems. When sprinkler system disturbance is required, interrupt and repair system so operation of system is maintained, Section 02 41 13.
E. Carefully remove soil around tree roots so ENGINEER can assess stability and health of tree.

3.3 GENERAL EXCAVATION REQUIREMENTS
A. Excavate topsoil from areas to be relandscaped or regraded and other marked areas.
B. Excavate site to line and grade indicated. Legally dispose of excavated material.
C. Carefully excavate soils in vicinity of buried utility marks placed by the one-call center.
D. Where soil has been softened or eroded by flooding or hardened by drying, rework all damaged areas or replace with approved material at no additional cost to OWNER.
E. Notify ENGINEER of unexpected subsurface conditions.
F. Underpin adjacent structure, service utilities and pipe chases that may be damaged by excavation work.
G. Protect excavation walls as required. If conditions permit, slope excavation sides to maintain a safe and clean working area. Remove loose materials.
H. Where ENGINEER deems subgrade material to be susceptible to frost heave or otherwise unsatisfactory, excavate additional depth.

3.4 TOPSOIL
A. Excavate topsoil only to depth that will preserve topsoil quality.
B. Do not mix topsoil with subsoil during stockpiling or spreading.

3.5 **SHORING**
A. Slope, shore, sheet, brace or otherwise support excavations over four (4) feet deep, Section 31 41 00.
B. When soil conditions are unstable, excavations shallower than four (4) feet deep must also be sloped, supported or shored.

3.6 **DEWATERING**
A. Keep excavation free from surface and ground water.
B. If ground water is in the intended construction operations, dewater excavations.
C. If there are no olfactory or visual indications of contamination in the water, discharge according to requirements of Federal, State or local agency having jurisdiction.
D. If any evidence of contamination in the water, based on olfactory or visual indications, cease excavation work until potential risks are evaluated. During evaluation, handle water as a contaminated material.
E. Pay for damages and costs resulting from dewatering operations.

3.7 **ROADWAY EXCAVATION**
A. In advance of setting line and grade stakes, clear and grub area of brush, weeds, vegetation, grass, and debris. Drain all depressions or ruts.
B. Roadway excavation is Unclassified Excavation. It includes Portland cement concrete or bituminous concrete pavement removal and removal of any aggregate base or sub-base material to line and grade established by Drawings or ENGINEER.

3.8 **STRUCTURAL AND LANDSCAPE EXCAVATION**
A. Provide shoring, cribs, cofferdams, caissons, pumping, bailing, draining, sheathing, bracing, and related items.
B. For piling work, coordinate special requirements for piling. Protect excavation walls.
C. If conditions permit, slope excavation sides as excavation progress. Maintain a safe and clean working area.
D. Support excavations. Do not interfere with the bearing of adjacent foundations, pipelines, etc.

3.9 **TRENCH EXCAVATION**
A. Grade bottom of trenches to provide uniform bearing surface.
B. If necessary, make bell holes and depressions required for laying and joining pipe or box.
C. Limit width of trench excavations to the dimensions suitable for worker access per pipe manufacturer's recommendation. Provide enough space for compaction equipment. Notify ENGINEER if excavation operations exceed any indicated line and grade limits.
D. In roadways and regardless of trench depth, limit length of open trenches to 200 lineal feet day or night. Provide barricading, Section 01 55 26. Protect trenches over night.

3.10 **STABILIZATION EXCAVATION**
A. Perform stabilization excavation as Incidental Excavation.

3.11 **AUTHORIZED OVER EXCAVATION**
A. Over excavation must be permitted by ENGINEER to be classified as authorized over excavation. Volume will be determined by the method of average-end-areas in the original position.

3.12 **TOLERANCE**
A. Grading: Top surface of Subgrade = plus or minus 1 inch.
PART 1  GENERAL

1.1 SECTION INCLUDES
   A. Structural backfill materials.
   B. Structural backfilling requirements.

1.2 REFERENCES
   A. ASTM Standards:
      D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
      (12,400 ft-lbf/ft^3 (600 kN-m/m^3)).
      D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil using
      Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
      D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow
      Depth).
      D4832 Preparation and Testing of Soil-Cement Slurry Test Cylinders.

1.3 SUBMITTALS
   A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
      1. Subgrade material, and
      2. Each type of fill to be used.

1.4 QUALITY ASSURANCE
   A. Do not change material sources, or aggregate without ENGINEER's knowledge.
   B. Reject backfill material that does not comply with requirements specified in this Section.
   C. If requested, submit a written quality control inspections and testing report describing source
      and field quality control activities performed by CONTRACTOR and Suppliers.

1.5 STORAGE
   A. Safely stockpile backfill materials.
   B. Separate differing materials, prevent mixing, and maintain optimum moisture content of
      backfill materials.

1.6 SITE CONDITIONS
   A. Do not place, spread, or roll any backfill material over material that is damaged by water.
      Remove and replace damaged material at no additional cost to OWNER.
   B. Control erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted
      areas.
   C. Reshape and compact damaged structural section to required density.

1.7 ACCEPTANCE
   A. General: Native material may be wasted if there is no additional cost to substitute material
      acceptable to ENGINEER.
   B. Material: For material acceptance refer to:
      2. Aggregate base course, Section 32 11 23.
      3. Cement treated fill, Section 31 05 15.
C. **Lift thickness**: One test per Lot.

D. **Compaction**: One test per Lot. Verify compaction using nuclear tests, ASTM D2922. Density and lot sizes as follows:

<table>
<thead>
<tr>
<th>Structure Type</th>
<th>Density</th>
<th>Proctor</th>
<th>Lot Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strip Footings</td>
<td>95</td>
<td>Standard</td>
<td>Subgrade: 200 linear feet</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>Modified</td>
<td>Aggregate base course: 200 linear feet per lift.</td>
</tr>
<tr>
<td>Structure Footing excluding strip footings</td>
<td>95</td>
<td>Standard</td>
<td>Subgrade: 225 square feet.</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>Modified</td>
<td>Aggregate base course: Each 225 square feet per lift</td>
</tr>
<tr>
<td>Embankments</td>
<td>95</td>
<td>Standard</td>
<td>Fill: 625 square feet per lift</td>
</tr>
<tr>
<td>Interior Slab on Grade</td>
<td>98</td>
<td>Modified</td>
<td>Aggregate base course: 625 square feet</td>
</tr>
<tr>
<td>Side of Foundation Walls and Retaining Walls</td>
<td>95</td>
<td>Standard</td>
<td>Exterior: 625 square feet</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>Modified</td>
<td>Interior</td>
</tr>
<tr>
<td>Miscellaneous small structures (e.g. Manholes, drainage boxes, etc.)</td>
<td>95</td>
<td>Standard</td>
<td>Subgrade: Each footprint area Fill: Each lift</td>
</tr>
<tr>
<td></td>
<td>98</td>
<td>Modified</td>
<td>Aggregate base course: Each lift</td>
</tr>
</tbody>
</table>

**NOTES**
(a) Standard proctor, ASTM D698.
(b) Modified proctor, ASTM D1557.

E. **Flowable Fill Strength**: Lot size is one day production with sub-lots of 250 cubic yards or part thereof. Verify strength using cylinders, ASTM D4832.

F. **Grade, Cross Slope**: Measured at random locations.

1.8 **WARRANTY**
A. Repair settlement damage at no additional cost to OWNER.

---

**PART 2 PRODUCTS**

2.1 **BACKFILL MATERIALS**
A. Common fill, Section 31 05 13. Granular material, CONTRACTOR’s choice.
B. Aggregate base course, Section 32 11 23. Untreated base course.
C. Cement treated fill, Section 31 05 15. Use a flowable fill so vibration is not required.

2.2 **WATER**
A. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
B. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

---

**PART 3 EXECUTION**

3.1 **PREPARATION**
A. Implement traffic control plan requirements, Section 01 55 26.
B. Verify:
1. Backfill material meets gradation requirements.
2. Foundation walls are braced to support surcharge forces imposed by backfilling operations, areas to be backfilled are free of debris, snow, ice or water.
3. Ground surface is not frozen.
   C If ground water is in the intended backfill zone, dewater.

3.2 PROTECTION
   A. Protect existing trees, shrubs, lawns, structures, fences, roads, sidewalks, pavings, curb and gutter and other features.
   B. Protect above or below grade utilities. Contact utility companies to repair utility damage. Pay all cost of repairs.
   C. Avoid displacement of and damage to existing installations while compacting or operating equipment. Do not fill adjacent to structures until excavation is checked by ENGINEER.
   D. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stressed or moved from alignment.
   E. Do not disturb or damage foundation perimeter drainage, foundation, damp-proofing, foundation waterproofing and protective cover, or utilities in trenches. Movement of construction machinery over work at any stage of construction is solely at CONTRACTOR’s risk.
   F. Restore any damaged structure to its original strength and condition.

3.3 LAYOUT
   A. Identify required line, levels, contours, and datum.
   B. Stake and flag locations of underground utilities.
   C. Upon discovery of unknown utility or concealed conditions, notify ENGINEER.
   D. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.
   E. If discrepancy is found between Contract Documents and site, ENGINEER shall make such minor adjustments in the Work as necessary to accomplish the intent of Contract Documents without increasing the Cost of the Work to CONTRACTOR or OWNER.

3.4 SUBGRADE
   A. Protect Subgrade from desiccation, flooding, and freezing.
   B. Before backfilling over Subgrade, get ENGINEER’s inspection of subgrade surface preparations.
   C. If Subgrade is not readily compactable get ENGINEER’s permission to stabilize the subgrade.

3.5 FOUNDATIONS AND SLABS ON GRADE
   A. Lift thickness before compaction is eight (8) inches.
   B. Do not backfill against walls until concrete has obtained 14 days strength. Backfill against foundation walls simultaneously on each side.
   C. Fill unauthorized excavations with material acceptable to ENGINEER at no additional cost to OWNER.
   D. Do not damage adjacent structures or service lines.
   E. Where flowable fill is used, use fill that flows easily and vibration for compaction is not required.

3.6 MODIFIED BACKFILL LAYER METHOD
   A. Section 33 05 20.

3.7 TOLERANCES
   A. Compaction: Ninety-five (95) percent or ninety eight (98) percent minimum relative to a standard or modified proctor density, Section 31 23 26.
   B. Lift Thickness (before compaction):
1. Eight (8) inches when using riding compaction equipment.
2. Six (6) inches when using hand held compaction equipment.
3. As proven in the modified backfill layer method, Section 330520.
C. Cement Treated Fill: Compressive strength targets are 60 psi in 28 days and 90 psi maximum in 28 days.

3.8 **CLEANING**

A. Remove stockpiles from site. Grade site surface to prevent free standing surface water.
B. Leave borrow areas clean and neat.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Compaction of granular fill materials.

1.2 REFERENCES
A. ASTM Standards:
   D698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft$^3$ (600 kN-m/m$^3$)).
   D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft$^3$ (2,700 kN-m/m$^3$))
   D2216 Laboratory Determination of Water (MoISTure) Content of Soil and Rock.
   D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   D3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
   D3282 Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.
   D3740 Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

1.3 DEFINITIONS
A. A-1 Soil: Defined in ASTM D3282.
B. Modified Proctor Density: The maximum laboratory density, as defined in and determined by ASTM D1557 using procedure A, B or C as applicable.
C. Relative Density (or Relative Compaction): The ratio of field dry density to the maximum laboratory density expressed as a percentage.
D. Standard Proctor Density: The maximum laboratory density, as defined in and determined by ASTM D698 using procedure A, B or C as applicable.

1.4 QUALITY ASSURANCE
A. Use a soil and rock laboratory that complies with ASTM D3740.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION

3.1 COMPACTIOn
A. Moisten or dewater backfill material to obtain optimum moisture for compaction.
B. When no density compactive effort is specified, compact the entire area to 95 percent and eliminate unstable zones.
C. Correct deficient compaction conditions. Replace or repair materials and damaged facilities.
3.2 **FIELD QUALITY CONTROL**

A. **Testing:** Perform control testing of materials. Perform additional testing at no additional cost to OWNER, for
   
1. Changes in source of materials or proportions requested by CONTRACTOR, or
2. Failure of materials to meet specification requirements, or
3. Other testing services needed or required by CONTRACTOR.

B. **Optimum Soil Density:** Use ASTM D2216 and the following industry standards.
   
1. For A-1 Soils: Method C of ASTM D1557 (Modified Proctor)
2. For All Other Soils: Method C of ASTM D698 (Standard Proctor).

C. **Field Density:**
   
1. Use ASTM D3017 and test method C of ASTM D2922 for shallow depth nuclear testing.
2. No density determinations are required on any material containing more than 65 percent material retained on the number 10 sieve or more than 60 percent material retained on the number 4 sieve. In lieu of reporting densities in such cases, report the sieve analysis to document the material type.

3.3 **REPORT**

A. For each material tested, document the following:
   
1. Vertical and horizontal location of the test.
2. Optimum laboratory moisture content.
3. Field moisture content.
4. Maximum laboratory dry density.
5. Field density.
6. Percent compaction results.

END OF SECTION
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Shoring for open Excavations requiring a Protective System.
   B. Underpinning to stabilize adjacent structure.

1.2 PRICE - MEASUREMENT AND PAYMENT
   A. In Trenching Shoring:
      1. A two (2) Protective System is required if each Side of the Trench is to be shored. The use
         of a Trench Box shall be classified as one Protective System.
      2. Payment covers cost of Protective System to a depth of three (3) feet below Excavation elevations indicated. Allowance for extra cost may be made, based upon the actual cost to CONTRACTOR of constructing, extending, or reconstructing any Protective System that may be necessary to carry excavation to required depth that is greater than three (3) feet below Excavation elevations indicated. Extra cost will be paid for by Change Order.
   B. Excavation in Lieu of Protective System: If a Protective Systems is specified but the CONTRACTOR uses open excavation (without a protective system) and ENGINEER has knowledge of the alternate excavation operation, the CONTRACTOR will be paid in full for the Protective System specified, which includes extra excavation, extra backfill, backfill compaction, or other incidental work performed by CONTRACTOR in lieu of constructing the Shoring or underpinning.

1.3 DEFINITIONS
   A. Accepted Engineering Practices: Those requirements or practices that are compatible with standards required by a duly licensed or recognized authority.
   B. Benching: A method of protecting persons and property against cave-ins by excavating the Sides of an Excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
   C. Excavation: Any man-made cut, cavity, or depression in an earth surface, including Trenches, formed by earth removal and producing unsupported earth conditions (Sides). If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a Trench.
   D. Failure: The permanent deformation or breakage of a structural member or connection; or the collapse of all or part of an Excavation.
   E. Protective System: Any recognized method of protecting persons and property against cave-ins, collapse of adjacent structures, or material that may fall or roll from an Excavation Side into an Excavation. Protective systems include Support Systems, Sloping and Benching systems and Shield systems.
   F. Shield: A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect persons and property within the structure without preventing a cave-in. Shields may be permanent structures or may be designed to be portable and moved along as work progresses. Portable Shields used in Trenches are usually referred to as "trench boxes" or "trench shields".
   G. Shoring: A structure that supports the Sides of an Excavation and thereby protects persons and property from cave-ins.
   H. Side: Vertical or inclined earth surface formed at the outer edges of an Excavation.
   I. Sloping: A method of protecting persons and property against cave-ins by excavating to form
Sides that are inclined away from the Excavation, the angle of incline being of such a degree for the conditions of exposure that a cave-in will not occur.

J. **Support System**: A structure that protects persons and property by providing support to an adjacent structure, underground installation, or the Sides of an Excavation.

K. **Trench**: A narrow Excavation made in the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

L. **Trench Box**: See Shield.

M. **Unfractured Rock**: Rock that can be excavated with vertical Sides and remain intact while exposed. Fractured rock is considered equivalent to unfractured rock when the material on the Side or Sides of the Excavation is secured against cave-in or movement by rock bolts, netting, or other means approved by a licensed design professional.

1.4 **DESIGN OF PROTECTIVE SYSTEMS**

A. Design Support Systems, Shield systems, structural components of these systems, and Sloping and Benching systems to resist all loads that are intended to be imposed or transmitted to them.

B. Design a system for any hydrostatic pressure in the Sides of an Excavation.

1.5 **SUBMITTALS**

A. Submit a Protective System plan when requested.

PART 2 PRODUCTS

2.1 **MATERIALS**

A. CONTRACTOR's choice.

PART 3 EXECUTION

3.1 **PREPARATION**

A. Make safe or remove trees, surface encumbrances that are hazardous to Shoring operations.

B. Provide adequate ventilation of Excavations.

C. Control dust and groundwater.

3.2 **STABILITY OF ADJACENT STRUCTURES**

A. Support adjoining buildings, walls, sidewalks, pavements, or other structures endangered by excavation operations.

B. Excavation below level of base of footing of any structural foundation or wall shall not be permitted except as follows:

1. Underpinning or other Support Systems is provided to ensure stability of structure, or

2. Excavation is in Unfractured Rock, or

3. A licensed design professional determines in writing that such work will in no way pose a hazard to persons and property or the integrity of the structure.

3.3 **PROTECTION OF PERSONS AND PROPERTY**

A. Protect from cave-ins. Install a Support System, by Sloping, by Benching, by use of a Shield system, or by use of a combination of these methods.

B. Scale to remove loose material. Use rock bolting, wire mesh, installation of protective barricades, or provide equivalent protection.
C. Stairway, Ladder, Ramp: Comply with OSHA.
D. Protect against cave-ins from vibratory loads adjacent to excavation operations.

3.4 INSPECTIONS
A. Inspect Excavations daily for evidence of possible cave-ins, indications of Failure of Protective Systems, or other hazardous conditions.
B. Upon discovery of hazardous conditions, cease all work in Excavations until additional precautions have been taken to ensure persons and property safety.

3.5 SHIELD SYSTEMS
A. Minimize time when Sides of an Excavation remain unsupported.
B. Do not subject Shield systems to loads other than those considered in their design.
C. Remove persons and property from Excavation when portable Shields are being relocated.

3.6 INSTALLATION AND REMOVAL OF SUPPORT SYSTEMS
A. Do not overload Support Systems.
B. Install additional members to carry loads imposed upon the Support System when temporary removal of individual members is necessary.
C. When removing Support System, release member by member slowly to avoid Failure of the remaining members or cave-ins.
D. Coordinate backfilling to minimize time an unsupported Excavation remains open.

END OF SECTION
SECTION 32 01 91
TREE ROOT CUTTING

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Cutting and removing tree roots.
   B. Protecting surface improvements from future tree root growth.

1.2 PROJECT CONDITIONS
   A. Provide written watering instructions to neighbors in property abutting the tree root cuts to advise them of the tree's watering requirements.

1.3 SUBMITTALS
   A. Upon ENGINEER’s request, submit a copy of arborist's ISA certificate and registration number on file with the State Division of Commercial Code.

1.4 QUALITY ASSURANCE
   A. Provide an ISA certified arborist to observe tree root cutting.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION

3.1 AVOIDING ROOT CUTS
   A. When placing or replacing concrete sidewalk:
      1. Adjust alignment to curve around, over or away from tree trunks. Do not proceed in this work until alignment has been reviewed by ENGINEER.
      2. Adjust thickness and concrete contraction joints.
   B. When replacing concrete curb and gutter:
      1. Adjust thickness and concrete contraction score marks over tree roots.
      2. Do not vary gutter invert from straight grade.

3.2 CUTTING TREE ROOTS
   A. Never cut buttress roots [i.e. roots at the broadened base of the tree trunk] without written authorization of arborist. Avoid injury to trunk.
   B. Keep root cutting at least four (4) feet away from tree trunk. Limit cutting to one side of tree unless authorized otherwise in writing by arborist.
   C. Cut roots clean and straight (no ragged or torn edges). Use an axe, saw, or appropriate equipment that properly cuts roots. Do not make partial root cuts.
D. Do not injure roots to remain.
E. Cut roots back to root laterals.

3.3 BACKFILLING
   A. Backfill all cut and exposed roots the same day of root cutting, or cover with wood chips, mulch and water until backfilling is accomplished.
   B. Place soil below root cut.
   C. To prevent vertical root growth, place an impermeable membrane over root cuts. Bend membrane edges to plane below cut root. Place backfill materials adjacent to and above impermeable membrane.

3.4 PROTECTION
   A. After cutting roots of tree:
      1. Immediately water tree after backfilling.
      2. Apply a minimum of 1 inch of water over the entire area under the tree canopy and well beyond over a period of four (4) hours.
      3. Restrict water runoff.

END OF SECTION
SECTION 32 05 10
BACKFILLING ROADWAYS

PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Roadway backfill materials.
   B. Roadway backfilling requirements.

1.2 REFERENCES
   A. APWA (Utah) Standards:
      Plan 245 Subgrade stabilization.
   B. ASTM Standards:
      D698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
      D1557 Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
      D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
      D4832 Preparation and Testing of Soil-Cement Slurry Test Cylinders.

1.3 DEFINITIONS
   A. Embankment: A raised earthen structure.
   B. Pavement: A surface or covering, as of Portland cement concrete, bituminous concrete, brick, concrete paver, etc., specifically a paved street, sidewalk, curb, gutter, curb cut assembly, ramp, apron, Driveway, etc.
   C. Subgrade: A surface of native earth or Rock leveled off as to receive backfill materials.

1.4 SUBMITTALS
   A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
      1. Subgrade material.
      2. Each type of fill to be used.
   B. Submit aggregate batch delivery tickets showing name of material source, serial number of ticket, date and truck number, name of Supplier, job name and location, volume or weight, and aggregate classification or Supplier’s identification code.
1.5 QUALITY ASSURANCE
   A. Do not change material sources, or aggregate without ENGINEER's knowledge.
   B. Reject backfill material that does not comply with requirements specified in this section.
   C. If requested, submit a quality control Inspection and testing report describing source and field quality control activities performed by CONTRACTOR and Suppliers.

1.6 STORAGE
   A. Safely stockpile backfill materials.
   B. Separate differing materials, prevent mixing, and maintain optimum moisture content of backfill materials.

1.7 SITE CONDITIONS
   A. Do not place, spread, or roll any backfill material over material that is damaged by water. Remove and replace damaged material at no additional cost to OWNER.
   B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and rutted areas.
   C. Reshape and compact damaged structural roadway section to required density.
   D. Soil Cement: Do not spread soil cement mixture when air temperature is less than 40 deg F in the shade.
   E. Drainage: Immediately before suspension of construction operations for any reason, provide proper and necessary drainage of work area.

1.8 ACCEPTANCE
   A. General: Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.
   B. Material: For material acceptance refer to:
      2. Aggregate base course, Section 32 11 23.
      3. Cement treated fill, Section 31 05 15.
   C. Lift Thickness: One test per Lot.
   D. Compaction: One test per Lot. Verify density using nuclear tests, ASTM D2922. Compaction standard and Lot size as follows:
Table 1 – Compaction Standard and Lot Sizes

<table>
<thead>
<tr>
<th>Material</th>
<th>Proctor</th>
<th>Lot Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subgrade</td>
<td>Standard</td>
<td>1000 square yards</td>
</tr>
</tbody>
</table>
| Common Fill                   | Standard | PCC or AC Surface Course: 1,000 square yards per lift  
|                               |          | Driveway Approach: 400 square feet per lift    
|                               |          | Sidewalk: 400 linear feet per lift             |
| Aggregate base course         | Modified | PCC or AC Surface Course: 1,000 square yards per lift  
|                               |          | Driveway Approach: 400 square feet per lift    
|                               |          | Sidewalk: 400 linear feet per lift             
|                               |          | Curb, Gutter, and Waterways: 200 linear feet per lift |
| NOTES                         | (a)      | Standard proctor, ASTM D698.                  |
|                               | (b)      | Modified proctor, ASTM D1557.                  |

E. Flowable Fill Strength: Lot size is one day production with sub-lots of 250 cubic yards or part thereof. Verify strength using cylinders, ASTM D4832.

F. Grade, Cross Slope: Measured at random locations.

1.9 WARRANTY

A. Repair incidental settlement or settlement damage at no additional cost to OWNER.

PART 2  PRODUCTS

2.1 BACKFILL MATERIALS

A. Common fill, Section 31 05 13: Granular material, CONTRACTOR’s choice.
B. Aggregate base course, Section 32 11 23: Untreated base course.
C. Cement treated fill, Section 31 05 15: Use a flowable fill so vibration is not required.

2.2 WATER

A. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
B. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

2.3 GEOTEXTILE

A. Stabilization separation fabric, Section 31 05 19: Woven, high MARV.
PART 3 EXECUTION

3.1 PREPARATION
   A. Implement traffic control plan requirements, Section 01 55 26.
   B. Verify:
      1. Backfill material meets gradation requirements.
      2. Areas to be backfilled are free of debris, snow, ice or water.
      3. Bearing surfaces are not frozen.
   C. If ground water is in the intended backfill zone, dewater.

3.2 PROTECTION
   A. Protect existing trees, shrubs, lawns, structures, fences, roads, sidewalks, paving, curb and gutter and other features.
   B. Protect above or below grade utilities. Contact utility companies to repair utility damage. Pay all cost of repairs.
   C. Avoid displacement of and damage to existing installations while compacting or operating equipment. Do not fill adjacent to structures until excavation is checked by ENGINEER.
   D. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stressed or moved from alignment.
   E. Do not disturb or damage foundation perimeter drainage, foundation, damp-proofing, foundation waterproofing and protective cover, or utilities in trenches. Movement of construction machinery over work at any stage of construction is solely at CONTRACTOR's risk.
   F. Restore any damaged structure to its original strength and condition.

3.3 LAYOUT
   A. Identify required line, levels, contours, and datum.
   B. Stake and flag locations of underground utilities.
   C. Upon discovery of unknown utility or concealed conditions, notify ENGINEER.
   D. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.
   E. If discrepancy is found between Contract Documents and site, ENGINEER shall make such minor adjustments in the Work as necessary to accomplish the intent of Contract Documents without increasing the Cost of the Work to CONTRACTOR or OWNER.
3.4 SUBGRADE
   A. Protect Subgrade from desiccation, flooding, and freezing.
   B. Before backfilling over Subgrade, get ENGINEER's review of Subgrade surface preparations.
   C. If Subgrade is not readily compactable, get ENGINEER’s permission to stabilize the Subgrade:
      1. Excavation for Subgrade stabilization is incidental work. Section 31 23 16.
      2. Place geotextile fabric per APWA Plan 245. Place acceptable fill in lifts over the geotextile, compact and wrap.

3.5 EMBANKMENTS
   A. Place backfill material in lifts not exceeding equipment compaction capability.
   B. Build shoulders to a grade higher than that of adjacent fills. Provide surface runoff at all times.
   C. Commence compaction along edge of area to be compacted and gradually advance toward center.
   D. Operate compaction equipment along lines parallel or concentric with the center-line of the embankment being constructed.
   E. Do not damage subsurface structures or utilities.

3.6 BASE COURSES
   A. Place backfill material in lifts not exceeding eight (8) inches before compaction.
   B. Maintain moisture content in compaction operations.
   C. Avoid segregation when spreading backfill. Keep surfaces free from pockets of coarse and fine aggregate.
   D. Rework fills that do not conform to compaction requirements until requirements are met.
   E. Protect cement treated fill against freezing and traffic for seven (7) days.

3.7 MODIFIED BACKFILL LAYER METHOD
   A. Section 33 05 20.

3.8 TOLERANCES
   A. Compaction: Ninety-five (95) percent or greater relative to a standard or modified proctor density, Section 31 23 26.
   B. Lift Thickness (before compaction):
      1. Eight (8) inches when using riding compaction equipment.
      2. Six (6) inches when using handheld compaction equipment.
      3. As proven in the modified backfill layer method, Section 33 05 20.
   C. Cement Treated Fill: Compressive strength targets are 60 psi in 28 days. Maximum is 90 psi in 28 days.
3.9 FIELD QUALITY CONTROL
   A. Test roadway backfilling until a compaction pattern acceptable to CONTRACTOR and ENGINEER is achieved. Continue random quality control compaction testing.
   B. Proof Rolling Test:
      1. Before placing fill material for roadbed backfills, proof roll subgrade using gross weight of 18,000 pounds/tandem axle, with a tire pressure at least 90 psi.
      2. All proof roll passes will traverse the subgrade parallel to the roadbed centerline. All subsequent passes will be offset 1/2 the vehicle width until the entire subgrade is tested.
      3. ENGINEER will analyze, determine, designate and measure the areas, if any, requiring additional compaction or reconstruction.
      4. Once subgrade passes the proof rolling test, protect the surface from construction operations and traffic damage. Repair all cuts, ruts, and breaks. Keep surface in a satisfactory condition until geotextile fabric or base course has been placed.

3.10 CLEANING
   A. Remove stockpiles from site when work is complete. Grade site to prevent free standing surface water.
   B. Leave borrow areas clean and neat.

END OF SECTION
SECTION 32 11 23
AGGREGATE BASE COURSES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Treated and untreated base course production and placement.

1.2 REFERENCES
A. AASHTO Standards:
   R9   Acceptance Sampling Plans for Highway Construction.
B. ASTM Standards:
   C29   Unit Weight and Voids in Aggregate.
   C131  Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
   C117  Materials Finer Than 0.075mm (No. 200) Sieve in Mineral Aggregates by Washing.
   C136  Sieve Analysis of Fine and Coarse Aggregates. D75 Sampling Aggregates.
   D448  Sizes of Aggregate for Road and Bridge Construction.
   D1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3)).
   D1883 CBR (California Bearing Ratio) of Laboratory-Compacted Soils.
   D2216 Laboratory Determinations of Water (Moisture) Content of Soil and Rock.
   D2419 Sand Equivalent Value of Soils and Fine Aggregate. D2922  Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
   D3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS
A. Master Grading Band: A graphical area defined by gradation limits allowed for various sieve sizes ranging from the maximum sieve size to the No. 200 sieve.
B. Target Grading Curve: A smooth locus of points within the limits of the Master Grading Band.
C. Target Grading Band: Gradation limits defined by the allowable variance from the Target Grading Curve. It is possible that these limits may lie outside of the Master Grading Band.
D. Mean of Deviations: The sum of the absolute values of the variance between each screen target value and each measured value divided by the number of tests in the Lot.
F. Lot: (a) Quantity of aggregate delivered to a site when considering gradation, (b) area of aggregate placed at a site when considering density.
1.4 SUBMITTALS

A. **Mix Design:** Provide the following. Allow ENGINEER 10 days to evaluate the submittal.
   1. Date of mix design. If older than 365 days from date of submission, recertify mix design.
   2. Name of supplier and aggregate source.
   3. Target gradation for each sieve size,
   4. Percent composition of reclaimed asphalt or concrete included in the mix.
   5. Unit weight, CBR, relative density, and relative moisture content.
   6. Aggregate physical properties (this section article 2.1). The information is for suitability of source and not for project control. A new report may be required if aggregate source is changed. Test results shall not be older than 455 days from date of submission.

B. **At Delivery:** Submit batch delivery ticket identifying serial number of ticket, date and truck number, job name, weight of aggregate, mix identification, and description.

1.5 QUALITY ASSURANCE

A. Do not change aggregate source until ENGINEER accepts new source and new mix design.

B. Use a laboratory that follows and complies with ASTM D3740 and Section 01 45 00 requirements.

C. If requested, submit a quality control and testing report describing source and field quality assurance activities performed by CONTRACTOR and Suppliers.

1.6 ACCEPTANCE

A. **General:**
   1. Acceptance is by Lot.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring complying material as part of its installation, Section 01 29 00.
   3. ENGINEER is not obligated to accept changes in gradation target after any material is delivered to site.
   4. Observation of CONTRACTOR’s field quality control testing does not constitute acceptance. Such testing; however, may be used by ENGINEER for acceptance if requirements in Section 01 35 10 are met.
   5. Dispute resolution, Section 01 35 10.

B. **Gradation:** Lot size is one (1) day production. Sub-lot size is 500 tons. Collect samples from grade before compaction. Conduct at least one (1) gradation analysis for each lot. Lot is acceptable if gradation test deviations are within pay factor 1.00 limits. At ENGINEER’s discretion, a lot with a sub-lot deviation greater than pay factor 0.70 limits may stay in place at 50 percent pay.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Pay Factor</th>
<th>Mean of Deviations of Acceptance Tests From the Target Grading Curve Expressed in Percentage Points</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 Sample</td>
<td>2 Samples</td>
</tr>
<tr>
<td></td>
<td>Sample</td>
<td>Sample</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>1/2” and Larger Sieves</td>
<td>1.00</td>
<td>0 – 15</td>
</tr>
<tr>
<td></td>
<td>0.95</td>
<td>16 – 17</td>
</tr>
<tr>
<td></td>
<td>0.90</td>
<td>18 – 19</td>
</tr>
<tr>
<td></td>
<td>0.80</td>
<td>20 – 21</td>
</tr>
<tr>
<td></td>
<td>0.70</td>
<td>22 – 23</td>
</tr>
<tr>
<td>3/8” Sieve</td>
<td>1.00</td>
<td>0 – 15</td>
</tr>
<tr>
<td></td>
<td>0.95</td>
<td>16 – 17</td>
</tr>
<tr>
<td></td>
<td>0.90</td>
<td>18 – 19</td>
</tr>
<tr>
<td></td>
<td>0.80</td>
<td>20 – 21</td>
</tr>
<tr>
<td></td>
<td>0.70</td>
<td>22 – 23</td>
</tr>
<tr>
<td>No. 4 Sieve</td>
<td>1.00</td>
<td>0.95</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>0 – 14</td>
<td>15 – 17</td>
</tr>
<tr>
<td></td>
<td>0.0 – 10.5</td>
<td>10.6 – 12.1</td>
</tr>
<tr>
<td></td>
<td>0.0 – 8.8</td>
<td>8.9 – 10.1</td>
</tr>
<tr>
<td></td>
<td>0.0 – 7.8</td>
<td>7.9 – 9.0</td>
</tr>
<tr>
<td></td>
<td>0.0 – 7.0</td>
<td>7.1 – 8.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No. 16 Sieve</th>
<th>1.00</th>
<th>0.95</th>
<th>0.90</th>
<th>0.80</th>
<th>0.70</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 11</td>
<td>12 – 13</td>
<td>14</td>
<td>15 – 16</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>0.0 – 8.2</td>
<td>8.3 – 9.4</td>
<td>9.5 – 10.3</td>
<td>10.4 – 11.6</td>
<td>11.7 – 12.7</td>
</tr>
<tr>
<td></td>
<td>0.0 – 6.9</td>
<td>7.0 – 7.9</td>
<td>8.0 – 8.6</td>
<td>8.7 – 9.8</td>
<td>9.9 – 10.7</td>
</tr>
<tr>
<td></td>
<td>0.0 – 6.2</td>
<td>6.3 – 7.1</td>
<td>7.2 – 7.8</td>
<td>7.9 – 8.8</td>
<td>8.9 – 9.6</td>
</tr>
<tr>
<td></td>
<td>0.0 – 5.6</td>
<td>5.7 – 6.4</td>
<td>6.5 – 7.0</td>
<td>7.1 – 8.0</td>
<td>8.1 – 8.7</td>
</tr>
</tbody>
</table>
C. **Relative Density**: Lot size 10,000 cubic yards. Conduct at least one laboratory determination to be used as a standard for field density and field moisture content determinations.

D. **Field Density**: Lot size is one (1) day placement. Number of density tests varies according to placement type, location and sub-lot size (Table 2). Conduct at least one (1) field density test in the lot. Select each test location randomly.

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Sub-lot Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Pavement (includes curb, gutter and water way when in conjunction with pavement placement).</td>
<td>1,000 square yards</td>
</tr>
<tr>
<td>II</td>
<td>Curb, gutter, waterway</td>
<td>200 linear feet</td>
</tr>
<tr>
<td></td>
<td>Sidewalk</td>
<td>400 linear feet</td>
</tr>
<tr>
<td></td>
<td>Driveway approach, curb cut assembly, waterway transition structure, flat work</td>
<td>400 square feet</td>
</tr>
<tr>
<td>III</td>
<td>Landscaping and other non-structural, non-load bearing areas</td>
<td>--</td>
</tr>
</tbody>
</table>

**PART 2 PRODUCTS**

### 2.1 UNTREATED BASE COURSE

A. **Material**: Crushed rock, gravel, sand, or other high quality mineral particle, or combination that is free of organic matter, free of chemical or petroleum contamination, and meets the following physical properties.

<table>
<thead>
<tr>
<th>Property</th>
<th>ASTM</th>
<th>Aggregate Class</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coarse aggregate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angularity (2 fractured faces), min., percent</td>
<td>D5821</td>
<td>50</td>
</tr>
<tr>
<td>Wear (toughness or hardness), max., percent</td>
<td>C131</td>
<td>50</td>
</tr>
<tr>
<td><strong>Fine aggregate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquid Limit, max.</td>
<td>D4318</td>
<td>25</td>
</tr>
<tr>
<td>Plastic Index, max.</td>
<td>D4318</td>
<td>0</td>
</tr>
<tr>
<td>Sand Equivalent, min., percent</td>
<td>D2419</td>
<td>35</td>
</tr>
<tr>
<td><strong>Blended aggregate</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry Roiled Unit Weight, min., percent</td>
<td>C29</td>
<td>75</td>
</tr>
<tr>
<td>CBR, min., percent</td>
<td>D1883</td>
<td>70</td>
</tr>
</tbody>
</table>
NOTES
(a) Faces: Retained on No. 4 sieve.
(b) Wear: Retained on No. 12 sieve after 500 revolutions.
(c) Liquid limit and plastic index: Passing No. 40 sieve.
(d) Sand equivalent (clay content or cleanliness): Passing No. 4 sieve.
(e) CBR: Use a surcharge of 10 pounds measured at 0.20 inch penetration at 95 percent relative to a modified proctor density. A reduction in aggregate class may be accepted providing any costs for difference in excavation, backfill, and alternate design for CBR does not increase Concrete Price.

B. Graden: Analyzed according to ASTM C136 on a dry weight and percent passing basis. Target Grading Curve must lie within the selected aggregate grade in table 4. Field gradation shall not vary from target by more than the target tolerance.

<table>
<thead>
<tr>
<th>Sieve</th>
<th>Aggregate Grade</th>
<th>Target Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Grade 1-1/2</td>
<td>Grade 1</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>100</td>
<td>–</td>
</tr>
<tr>
<td>1&quot;</td>
<td>–</td>
<td>100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>70 – 85</td>
<td>–</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>–</td>
<td>79 – 91</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>55 – 75</td>
<td>–</td>
</tr>
<tr>
<td>No. 4</td>
<td>40 – 65</td>
<td>49 – 61</td>
</tr>
<tr>
<td>No. 16</td>
<td>25 – 40</td>
<td>27 – 35</td>
</tr>
<tr>
<td>No. 200</td>
<td>7 – 11</td>
<td>7 – 11</td>
</tr>
</tbody>
</table>

NOTE
(a) It is assumed fine and course aggregate have same bulk specific gravity.
(b) Target tolerance for 3/4 sieve in Grade 3/4, and 1" sieve in Grade 1 is not applicable.
(c) Percentage of fines passing No. 200 sieve determined by washing, ASTM C117.
C. **Changing Source:** A new material properties report is required.

### 2.2 TREATED BASE COURSE

A. Treatment includes addition of lime, cement slurry, asphalt emulsion, RAP, crushed concrete, or any combination, or other material acceptable to ENGINEER.

B. Base course containing RAP:
   1. Meet requirements of this section article 2.1 and the following:
      a. Sand equivalent and fractured face measured after asphalt residue is burned off.
      b. Plasticity and wear requirements apply to virgin aggregate portion only.
      c. Allowable asphalt content is controlled by allowable CBR.
   2. Remove debris from crushed RAP aggregate by screening.
   3. Mechanically blend virgin and RAP aggregates. Do not use windrows for blending.

C. Base course containing crushed concrete.
   1. Meet requirements of this section article 2.1 and the following:
      a. Cement with its chemical components is allowed.
      b. Wear test and fractured face test not required.

### 2.3 SOURCE QUALITY CONTROL

A. Reject crushed aggregate base products that do not meet requirements of this Section.


---

### PART 3 EXECUTION

#### 3.1 SUB-BASE PREPARATION

A. Trenches, Section 33 05 20.

B. Structures, Section 31 23 23.

C. Landscaping, Section 32 91 19.

D. Pavements, Section 32 05 10.

#### 3.2 PLACEMENT

A. General:
   1. Place uniform lifts not exceeding eight (8) inches before compaction.
   2. Maintain optimum moisture content plus or minus two (2) percent.
   3. Use appropriate compaction equipment.
   4. Do not place additional material on any unaccepted layer or on any frozen surface.

B. Provide aggregate suitable for the following locations.

<table>
<thead>
<tr>
<th>Type</th>
<th>Location</th>
<th>Aggregate Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Pavement (includes curb, gutter and waterway when in conjunction with pavement placement)</td>
<td>A</td>
</tr>
<tr>
<td>II</td>
<td>Concrete flat work (includes driveway approach, curb cut assembly, curb, gutter, sidewalk, waterway, etc.)</td>
<td>X</td>
</tr>
</tbody>
</table>
### III Landscape (includes non-structural, non-load bearing areas.)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

**NOTES:**
(a) X indicates where placement is allowed.

**C. Compaction:**
1. Type I and Type II Placement: 95 percent minimum.
2. Type III Placement: Suitable to overlying surface, or installation, or use. Verify compactive effort with ENGINEER.

**D. Finish:** Uniform with surface deviation no more than 3/8 of an inch from line and grade in 10 feet in any direction.

#### 3.3 FIELD QUALITY CONTROL

- **A. Sampling Protocol:** Random location selection, ASTM D3665. Sample collection, ASTM D75.

#### 3.4 REPAIR OR REMOVAL

- **A.** If product is correctable and at no additional cost to OWNER, provide laboratory data showing design CBR has not been reduced and material in-place has been compacted to 97 percent minimum.
- **B.** Remove any product that cannot be corrected and install acceptable product at no additional cost to OWNER.

END OF SECTION
PART 1  GENERAL

1.1 SECTION INCLUDES
A. An asphalt-based cement that is produced from petroleum residue either with or without the addition of non-particulate, non-fibrous organic modifiers.
B. Requirements for accepting non-complying Asphalt Binders.

1.2 REFERENCES
A. ASTM Standards:
   D113   Ductility of Bituminous Materials, D977   Emulsified Asphalt.
   D2026 Cutback Asphalt (Slow-Curing Type). D2027 Cutback Asphalt (Medium-Curing Type).
   D2028 Cutback Asphalt (Rapid-Curing Type).
   D2397 Cationic Emulsified Asphalt.
   D3381 Viscosity-Graded Asphalt Cement for Use in Pavement Construction.
   D6373 Performance Graded Asphalt Binder.

1.3 SUBMITTALS
A. Submit bill of lading for each shipment of Asphalt Binder from vendor. Identify the following:
   1. Source of product (manufacturer);
   2. Type and grade of asphalt, and
   3. Type and amount of additives in the product.

1.4 QUALITY ASSURANCE
A. Reject Asphalt Binders that are not uniform in appearance and consistency or foams at hot mixing temperature.
B. Do not use storage containers contaminated with other types or grades of petroleum products.
C. Do not use petroleum product that does not comply with contract requirements.

1.5 ACCEPTANCE
A. General:
   1. Acceptance is by Lot. One (1) Lot is one (1) day production.
   2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring material as part of its installation. Section 01 29
   3. Dispute resolution, Section 01 35 10.
B. Performance Graded Asphalt Binder (PGAB): Sub-lot size is 20,000 gallons. Collect sub-lot Samples randomly from oil storage unit.
   1. Meet limits published in Section 209 of UDOT’s “Manual of Instruction, Part 8 Materials”. Pay reductions are as follows:
      a. If none of the critical properties are outside rejection limit a composite pay adjustment of 25 percent or less is allowed.
      b. If one or more of the critical properties falls outside the rejection limit or if a composite pay adjustment is more than 25 percent, Asphalt Binder will be rejected.
C. Asphalt Cement (AC) Binder: Sub-lot size is 20,000 gallons. Collect sub-lot Samples randomly from oil storage unit.
   1. Ductility: Meet this section’s requirements, or
   2. Viscosity or Penetration: Meet graphics published in Section 955 of UDOT’s “Manual of Instructions, Part 8 Materials”:
      a. Lot may be accepted using the published graphics. If pay adjustment exceeds 30 percent, reject Asphalt Binder, or
      b. If allowed to remain after placement, pay adjustment will be 50 percent.
D. **Cut-back Binder:** Meet this section’s requirements for ductility.

E. **Trinidad Lake Modified Asphalt:** Supplier’s certificate for ASTM compliance.

F. **Emulsified Asphalt:** Supplier’s certificate for ASTM compliance.

G. **Recycle Asphalt:** Identity of source (asphalt cement or tar products).

H. **Crack Patch:** Meet material requirements in Section 32 01 17.

## PART 2 PRODUCTS

### 2.1 PERFORMANCE GRADE ASPHALT BINDER (PGAB)

A. Petroleum asphalt that complies with ASTM D6373. Blending binder with polymers, crumb rubber, or natural bitumens is CONTRACTOR’s choice.

### 2.2 ASPHALT CEMENT (AC)

A. Petroleum asphalt that complies with Table 2 of ASTM D3381 except as follows:

1. Replace ductility, ASTM D113, at 77 deg F (25 deg. C) with ductility at 39.2 deg F (4 deg. C). Use the following values:
   - AC-5: greater than 25.
   - AC-10: greater than 15.
   - AC-20: greater than 5.

2. Delete the loss on heating requirement on residue from "Thin-Film Oven Test".

B. **AC-5 Latex Additive:** Anionic emulsion of butadiene-styrene low-temperature copolymer consisting of two (2) percent by weight (solids basis), stabilized with fatty-acid soap for storage stability.

### 2.3 TRINIDAD LAKE MODIFIED ASPHALT (TLA)

A. Petroleum asphalt that complies with ASTM D5710 (a blend of natural bitumens).

### 2.4 SLOW CURE CUT-BACK ASPHALT (SC)

A. Petroleum asphalt that complies with ASTM D2026 (fluxed with a light oil) except if penetration of residue is more than 200 and its ductility at 77 deg F (25 deg. C) is less than 100 cm, the material will be acceptable if the ductility at 59 deg F (15 deg. C) is greater than 100.

### 2.5 MEDIUM CURE CUT-BACK ASPHALT (MC)

A. Petroleum asphalt that complies with ASTM D2027 (fluxed or blended with a kerosene type solvent, non-foaming when heated to application temperature) except if penetration of residue is more than 200 and its ductility at 77 deg F (25 deg. C) is less than 100 cm, the material will be acceptable if the ductility at 59 deg F (15 deg. C) is greater than 100.

### 2.6 RAPID CURE CUT-BACK ASPHALT (RC)

A. Petroleum that complies with ASTM D2028 asphalt (fluxed or blended with a naphtha solvent, non-foaming when heated to application temperature).

### 2.7 EMULSIFIED ASPHALT

A. Petroleum asphalt uniformly emulsified with water, homogeneous throughout, and when stored, shows no separation within 30 days after delivery. Frozen emulsions not accepted:

1. Anionic, ASTM D977 (breaks by evaporation).
2. Cationic, ASTM D2397 (breaks chemically).

### 2.8 RECYCLE ASPHALT (RA)

A. Petroleum asphalt that complies with ASTM D4552 (homogeneous, free-flowing at pumping temperature made from maltene fractions of asphalt cement for surface revitalization or from tar products to make Pavements resistant to fuel spillage:

1. RA-1, RA-5, RA-25 or RA-75 for recycling RAP aggregate when less than 30 percent virgin aggregate is added.
2. RA-250 or RA-500 when more than 30 percent virgin aggregate is added to RAP.

### 2.9 WARM-MIX ASPHALT (WMA)

A. Performance grade Asphalt Binder or asphalt cement binder blended with a wax, foam, chemical, or organic additive.

## PART 3 EXECUTION

### 3.1 INSTALLATION
A. Prime coat, Section 32 12 13.19.
B. Tack coat, Section 32 12 13.13.
C. Plant mix paving, Section 32 12 16.13.
D. Road mix paving, Section 32 12 16.19.
E. Slurry seal coating, Section 32 01 13.61.
F. Crack sealing, Section 32 01 17.

END OF SECTION
PART 1  GENERAL

1.1. SECTION INCLUDES
   A. Concrete flat work such as waterways, waterway transition structures, sidewalks, curb, gutters, Driveway Approaches, etc.

1.2 REFERENCES
   A. **APWA (Utah) Standards**: Plan 205 Curb and gutter.
      Plan 206 Curb and gutter dowel tie-in. Plan 209 Curbs.
      Plan 211 Waterway.
      Plan 216 Mountable curb driveway approach. Plan 221 Flare driveway approach.
      Plan 225 Open driveway approach. Plan 229 Pipe driveway approach. Plan 231 Concrete sidewalk.
   B. **ASTM Standards**:
      A36 Structural Steel.
      C39 Compressive Strength of Cylindrical Concrete Specimens. C172 Sampling Freshly Mixed Concrete.

1.3 DEFINITIONS
   A. **Driveway**: A paved or unpaved vehicular thoroughfare outside of, but connected to a public road right-of-way or highway right-of-way.
   B. **Driveway Approach**: A paved or unpaved vehicular thoroughfare connecting a public road or highway to a Driveway.

1.4 SUBMITTALS
   A. Traffic control plan, Section 01 55 26.
   B. Concrete mix design, Section 03 30 04.
   C. Batch ticket, Section 03 30 10.

1.5 QUALITY ASSURANCE
   A. If requested, submit a quality control and testing report describing source and field quality assurance activities performed by CONTRACTOR and Suppliers.

1.6 NOTICE
   A. Follow Laws and Regulations concerning when and to whom notices are to be given at least two (2) days before work starts.
   B. Indicate when concrete work will take place and when driveway approach can be used.
   C. Warn of potential vehicle tow away and other construction issues affecting neighborhood.
   D. Should work not occur on specified day, send a new notice.

1.7 ACCEPTANCE
   A. General:
1. Acceptance is by lot. One lot is one day production.
2. If non-complying material has been installed and no price for the material is specified, apply pay adjustment against cost of work requiring material as part of its installation, Section 01 29 00.
3. Dispute resolution, Section 01 35 10 and Section 03 30 05.

B. Concrete Mix:
1. Testing Frequency: Section 03 30 05. Sample per ASTM C172.
2. Temperature, Slump, Air: Lot size is 1 random batch. Reject non-complying batches until two (2) consecutive batches are compliant then proceed in random batch testing for acceptance.
3. Strength: Lot size is 50 cubic yards. At ENGINEER’s discretion and ASTM C39, a lot with deficient sub-lot strength may be accepted if pay is adjusted using one of the following applicable pay factors, or accepted at 50 percent pay if a sub-lot is in Reject.

<table>
<thead>
<tr>
<th>Pay Factor</th>
<th>PSI Below 28 days Compressive Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.98</td>
<td>1 to 100</td>
</tr>
<tr>
<td>0.94</td>
<td>101 to 200</td>
</tr>
<tr>
<td>0.88</td>
<td>201 to 300</td>
</tr>
<tr>
<td>0.80</td>
<td>301 to 400</td>
</tr>
<tr>
<td></td>
<td>Greater than 400</td>
</tr>
<tr>
<td></td>
<td>Reject</td>
</tr>
</tbody>
</table>

C. Placement, Section 03 30 10:
1. Verify line, grade, cross slope, finish and dimensions.
2. No standing water in curb and gutter.
3. Membrane curing compound applied for total coverage at two (2) times manufacturer’s recommended rate in two (2) directions after finishing and texturing.

PART 2 PRODUCTS

2.1 MATERIALS
A. Concrete Mix:
1. Class 4000 cast-in-place, Section 03 30 04.
2. Slump range per mix design.
B. Reinforcement: Grade 60 ksi galvanized or epoxy coated steel, Section 03 20 00, deformed.
C. Expansion Joint Filler: F1 sheet 1/2 inch thick, Section 32 13 73.
D. Contraction Joint Filler (Backer Rod): Closed cell, Type 1 round, Section 32 13 73.
E. Contraction Joint Sealer: HAS1 or HAS4 hot applied, Section 32 13 73.
F. Curing Compound: Membrane forming compound, Section 03 39 00.
G. Plate Steel: Galvanized Steel, ASTM A36, Section 05 05 10.

PART 3 EXECUTION

3.1 CONSTRUCTION EQUIPMENT
A. Slip Form Machines:
   1. Placement must produce required cross-section, line, grade, finish, and jointing as specified for formed concrete.
   2. If results are not acceptable, remove and replace work with formed concrete.

3.2 PREPARATION
A. Implement notification and traffic control plan requirements, Section 01 55 26.
B. Examine surfaces scheduled to receive concrete formwork for defects.
C. Do not start work until defects are corrected.
D. Check slopes on each side of the work to ensure drainage. Failure to check and verify will result in CONTRACTOR repairing any drainage deficiencies at no additional cost to OWNER.

3.3 CONCRETE PLACEMENT
A. Section 03 30 10.
B. Make sure base course is uniformly damp at time of concrete placement.
C. Obtain ENGINEER’s review of base course and forms before placing concrete.
D. Do not use methods that segregate the mix.
E. Place concrete so time between end of placement and beginning of finishing is less than 15 minutes.
F. Consolidate concrete with vibrator or other acceptable method. Do not use mechanical vibrators. Prevent dislocation of inserts.

3.4 CONTRACTION JOINTS
A. Section 32 13 73.
B. Geometrics:
   1. Tooled Joints (Score Lines):
      a. Depth = T/4. T is the depth of the concrete slab in inches.
      b. Top radius = 1/2 inch.
   2. Saw Cut Joints: Saw joints before uncontrolled shrinkage cracking occurs. Do not tear or ravel concrete during sawing.
   3. Template Joints: 1/8 to 3/16 inch wide 1/4-depth of slab.
C. Sidewalks.
   1. At intervals equal to the width of the sidewalk and transverse to the line of walk.
   2. Radial at curbs and walk returns.
   3. Place longitudinal joints in walks when width of walk in feet is greater than two (2) times the walk thickness in inches. (e.g. maximum width of a four (4) inch thick walk before placement of a longitudinal contraction joint is eight (8) feet). Make longitudinal joints parallel to, or concentric with, the lines of the walk.
   4. In walk returns make at least one (1) radial joint midway between beginning of curb returns (BCR) and end of curb returns (ECR). Match longitudinal and traverse joints with joints in adjacent walks.
D. Curb, Gutter, Waterway:
1. Place joints at intervals not exceeding 12 feet.
2. At curb radius and walk returns make joints radial.
3. Where integral curb and gutter is adjacent to concrete pavement, align joints with pavement joints where practical.

3.5 EXPANSION JOINTS

A. General: Section 32 13 73:
   1. 1/2 inch wide full depth filler that is flush with concrete surface. Do not place seal over top of joint filler.

B. Sidewalks:
   1. Place expansion joints to separate sidewalk from utility poles, hydrants, manhole frames, buildings and abutting sidewalks.
   2. Place expansion joints between sidewalk and back of curb returns and between sidewalk and sidewalk ramps.
   3. Do not place expansion joints in sidewalk ramp surfaces.
   4. Expansion joints are not required when using slip form method to place concrete except where sidewalk changes direction or where it joins foundation walls or structures.

C. Curb, Gutter, Waterway:
   1. Do not place longitudinal joint in drain gutter flow-line.
   2. Where drain gutter transitions extend beyond curb return, place expansion joints at ends of drain gutter transition.
   3. Place expansion joints at beginning of curb radius (BCR) and at end of curb radius (ECR).

D. Curb and Gutter Dowel Tie-in: Follow APWA Plan 206 requirements. Tie-in occurs between new and existing curb and gutter.

E. Slip Form Work: Expansion joints are not required except at BCR or ECR.

F. Driveway Approach: Do not place expansion joints in curb returns.

G. Street Intersection Corner: Place expansion joints at BCR and ECR.

3.6 FINISH

A. Section 03 35 00.

B. Round edges exposed to public view to a 1/2 inch radius.

C. Apply broom finish longitudinal to curb and gutter flow-line.

D. Apply broom finish transverse to sidewalk centerline as follows:
   1. Fine hair finish where grades are less than six (6) percent.
   2. Rough hair finish where grades exceed six (6) percent.

E. Remove form marks or irregularities from finish surfaces.

3.7 TOLERANCES

A. Curb, Gutter, Curb and Gutter: APWA Plan 205, 209, 211, 213.
   1. Line: Less than 1/2 inch variance in 10 feet and not more than 1 inch from true line at any location.
   2. Grade: Not more than 1/4 inch variance in 10 feet. Flood curb and gutter with water after final set has been reached. Remove and replace any area where ponding is found.
   3. Standing Water: None allowed.

B. Sidewalk: APWA Plan 231:
   1. Cross slope one (1) percent minimum, two (2) percent maximum.
   2. Standing Water: None allowed.


3.8 CURING
A. Section 03 39 00.
B. Curing compound: Apply at two (2) times manufacturer’s recommended rate. Apply total coverage in two (2) directions after texturing.
C. Eliminate thermal shock of concrete by keeping cure temperature even throughout extent and depth of concrete slab.

3.9 PROTECTION AND REPAIRS
A. General: All expenses are at no additional cost to OWNER.
B. Protection: Section 03 30 10:
   1. Protect concrete work from deicing chemicals during the 28 days cure period.
   2. Immediately after placement, protect concrete from graffiti or other types of mechanical injury.
C. Repair: Section 03 30 10. Consider also guidelines published by the American Concrete Pavement Association (ACPA). Do not begin corrective work until ENGINEER agrees with repair option:
   1. Correct all humps or depressions.
   2. Standing Water: Remove and replace any area where ponding is found. If necessary, flood construction to determine ponding extent.
   3. Restore surfaces damaged by saw cutting, grinding, or removal operations.

END OF SECTION
SECTION 32 91 15 - SOIL PREPARATION (PERFORMANCE SPECIFICATION)

PART 1 - GENERAL

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

1.2 SUMMARY
   A. Section includes planting soils specified according to performance requirements of the mixes.

1.3 ALLOWANCES
   A. Preconstruction and field quality-control testing are part of testing and inspecting allowance.

1.4 DEFINITIONS
   B. Backfill: The earth used to replace or the act of replacing earth in an excavation. This can be amended, or unamended soil as indicated.
   C. CEC: Cation exchange capacity.
   D. Compost: The product resulting from the controlled biological decomposition of organic material that has been sanitized through the generation of heat and stabilized to the point that it is beneficial to plant growth.
   E. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
   F. Imported Soil: Soil that is transported to Project site for use.
   G. Layered Soil Assembly: A designed series of planting soils, layered on each other, which together produce an environment for plant growth.
   H. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
   I. NAPT: North American Proficiency Testing Program. An SSSA program to assist soil-, plant-, and water-testing laboratories through interlaboratory sample exchanges and statistical evaluation of analytical data.
J. Organic Matter: The total of organic materials in soil exclusive of undecayed plant and animal tissues, their partial decomposition products, and the soil biomass; also called "humus" or "soil organic matter."

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.


M. SSSA: Soil Science Society of America.

N. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

O. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.

P. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.


1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include recommendations for application and use.
   2. Include test data substantiating that products comply with requirements.
   3. Include sieve analyses for aggregate materials.
   4. Material Certificates: For each type of imported soil and soil amendment and fertilizer before delivery to the site, according to the following:
      a. Manufacturer's qualified testing agency's certified analysis of standard products.
      b. Analysis of fertilizers, by a qualified testing agency, made according to AAPFCO methods for testing and labeling and according to AAPFCO's SUIP #25.
      c. Analysis of nonstandard materials, by a qualified testing agency, made according to SSSA methods, where applicable.

B. Samples: For each bulk-supplied material, 1-quart volume of each in sealed containers labeled with content, source, and date obtained. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of composition, color, and texture.
1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For each testing agency.

B. Preconstruction Test Reports: For preconstruction soil analyses specified in "Preconstruction Testing" Article.

C. Field quality-control reports.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

1. Laboratories: Subject to compliance with requirements, provide testing by the following:

   a. Soil Testing Laboratory at Utah State University.

1.9 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction soil analyses on existing, on-site soil.

1. Notify Architect and Landscape Architect seven days in advance of the dates and times when and indicate locations where laboratory samples will be taken.

B. Preconstruction Soil Analyses: For each unamended soil type, perform testing on soil samples and furnish soil analysis and a written report containing soil-amendment and fertilizer recommendations by a qualified testing agency performing the testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

1. Have testing agency identify and label samples and test reports according to sample collection and labeling requirements.

1.10 SOIL-SAMPLING REQUIREMENTS

A. General: Extract soil samples according to requirements in this article.

B. Sample Collection and Labeling: Have samples taken and labeled by state-certified, -licensed, or -registered soil scientist under the direction of the testing agency.

1. Number and Location of Samples: Minimum of eight representative soil samples from varied locations for each soil to be used or amended for landscaping purposes.

2. Procedures and Depth of Samples: According to USDA-NRCS's "Field Book for Describing and Sampling Soils."

3. Division of Samples: Split each sample into two, equal parts. Send half to the testing agency and half to Owner for its records.
4. Labeling: Label each sample with the date, location keyed to a site plan or other location system, visible soil condition, and sampling depth.

1.11 TESTING REQUIREMENTS

A. General: Perform tests on soil samples according to requirements in this article.

B. Physical Testing:

1. Soil Texture: Soil-particle, size-distribution analysis by one of the following methods according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods":
   a. Sieving Method: Report sand-gradation percentages for very coarse, coarse, medium, fine, and very fine sand; and fragment-gradation (gravel) percentages for fine, medium, and coarse fragments; according to USDA sand and fragment sizes.

2. Bulk Density: Analysis according to core method and clod method of SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."

3. Total Porosity: Calculate using particle density and bulk density according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."


5. Saturated Hydraulic Conductivity: According to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods"; at 85% compaction according to ASTM D 698 (Standard Proctor).

C. Chemical Testing:

1. CEC: Analysis by sodium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 3-Chemical Methods."

2. Clay Mineralogy: Analysis and estimated percentage of expandable clay minerals using CEC by ammonium saturation at pH 7 according to SSSA's "Methods of Soil Analysis - Part 1-Physical and Mineralogical Methods."

3. Metals Hazardous to Human Health: Test for presence and quantities of RCRA metals including aluminum, arsenic, barium, copper, cadmium, chromium, cobalt, lead, lithium, and vanadium. If RCRA metals are present, include recommendations for corrective action.

4. Phytotoxicity: Test for plant-available concentrations of phytotoxic minerals including aluminum, arsenic, barium, cadmium, chloride, chromium, cobalt, copper, lead, lithium, mercury, nickel, selenium, silver, sodium, strontium, tin, titanium, vanadium, and zinc. Include oils, herbicides and pesticides.

D. Fertility Testing: Soil fertility analysis according to standard laboratory protocol of SSSA NAPT WERA-103, including the following:

1. Percentage of organic matter.
2. CEC, calcium percent of CEC, and magnesium percent of CEC.
3. Soil reaction (acidity/alkalinity pH value).
4. Buffered acidity or alkalinity.
6. Phosphorous ppm.
7. Potassium ppm.
8. Manganese ppm.
10. Zinc ppm.
11. Zinc availability ppm.
12. Copper ppm.
13. Sodium ppm and sodium absorption ratio.
15. Presence and quantities of problem materials including salts and metals cited in the 
   Standard protocol. If such problem materials are present, provide additional 
   recommendations for corrective action.
16. Other deleterious materials, including their characteristics and content of each.

E. Organic-Matter Content: Analysis using loss-by-ignition method according to SSSA's "Methods 
   of Soil Analysis - Part 3-Chemical Methods."

F. Recommendations: Based on the test results, state recommendations for soil treatments and soil 
   amendments to be incorporated to produce satisfactory planting soil suitable for healthy, viable 
   plants indicated. Include, at a minimum, recommendations for nitrogen, phosphorous, and 
   potassium fertilization, and for micronutrients.

1. Fertilizers and Soil Amendment Rates: State recommendations in weight per 1000 sq. ft. 
   for 6-inch depth of soil.
2. Soil Reaction: State the recommended liming rates for raising pH or sulfur for lowering 
   pH according to the buffered acidity or buffered alkalinity in weight per 1000 sq. ft. for 
   6-inch depth of soil.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing 
   weight, certified analysis, name and address of manufacturer, and compliance with state and 
   Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or 
   on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, 
   discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, 
   water conveyance systems, or walkways.
3. Do not move or handle materials when they are wet or frozen.
4. Accompany each delivery of bulk fertilizers and soil amendments with appropriate 
   certificates.
PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED ACCORDING TO PERFORMANCE REQUIREMENTS

A. Planting-Soil Type: Existing, on-site surface soil, with the duff layer, if any, retained; and stockpiled on-site; modified to produce viable planting soil. Using preconstruction soil analyses and materials specified in other articles of this Section, amend existing, on-site surface soil to become planting soil complying with the following requirements:

2. Soil Reaction: pH of 6.5 to 7.3.
3. CEC of Total Soil: Minimum 10 meq/100 mL at pH of 7.0.
4. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
5. Soluble-Salt Content: 5 to 10 dS/m measured by electrical conductivity.
6. Bulk Density: 1.2 g/cu. cm to 1.4 g/cu. cm at 85% compaction.
7. Total Porosity: Minimum 50 percent at 85% compaction.
8. Macro Porosity: Minimum 5 percent at 85% compaction.
9. RCRA Metals: Below maximum limits established by the EPA.
10. Phytotoxicity: Below phytotoxicity limits established by SSSA.

B. Planting-Soil Type: Imported, naturally formed soil from off-site sources and consisting of silt loam soil according to USDA textures; and modified to produce viable planting soil. Amend imported soil with materials specified in other articles of this Section to become planting soil complying with the following requirements:

1. Sources: Take imported, unamended soil from sources that are naturally well-drained sites where topsoil occurs at least 4 inches deep, not from agricultural land, bogs, or marshes; and that do not contain undesirable organisms; disease-causing plant pathogens; or obnoxious weeds and invasive plants including, but not limited to, quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and bromegrass.
2. Additional Properties of Imported Soil before Amending: Minimum of 6 percent organic-matter content, friable, and with sufficient structure to give good tilth and aeration. Clean soil to be of the following:
   a. Unacceptable Materials: Concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.
   b. Unsuitable Materials: Stones, roots, plants, sod, clay lumps, and pockets of coarse sand that exceed a combined maximum of 8 percent by dry weight of the imported soil.
   c. Large Materials: Stones, clods, roots, clay lumps, and pockets of coarse sand exceeding 2 inches in any dimension.
4. Soil Reaction: pH of 6.5 to 7.3.
5. CEC of Total Soil: Minimum 10 meq/100 mL at pH of 7.0.
6. CEC of Clay Fraction: Maximum 15 meq/100 mL at pH of 7.0.
7. Soluble-Salt Content: 5 to 10 dS/m measured by electrical conductivity.
8. Bulk Density: 1.2 g/cu. cm to 1.4 g/cu. cm at 85% compaction.
9. Total Porosity: Minimum 50 percent at 85% compaction.
10. Macro Porosity: Minimum 5 percent at 85% compaction.
11. RCRA Metals: Below maximum limits established by the EPA.
12. Phytotoxicity: Below phytotoxicity limits established by SSSA.

2.2 INORGANIC SOIL AMENDMENTS (As recommended or required in Testing Reports)

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
   1. Class: T, with a minimum of 99 percent passing through a No. 8 sieve and a minimum of 75 percent passing through a No. 60 sieve.
   2. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
   3. Form: Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.

E. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to ASTM C 33/C 33M.

2.3 ORGANIC SOIL AMENDMENTS (As recommended or required in Testing Reports)

A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
   1. Feedstock: Limited to leaves.
   2. Reaction: pH of 5.5 to 7.5.
   3. Soluble-Salt Concentration: Less than 4 dS/m.
   4. Moisture Content: 35 to 55 percent by weight.
   5. Organic-Matter Content: 30 to 40 percent of dry weight.
   6. Particle Size: Minimum of 98 percent passing through a 2-inch sieve.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of maximum 5 dS/m.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 6 to 7.5, a
soluble-salt content measured by electrical conductivity of maximum 5 dS/m, having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.

D. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.

1. Partially Decomposed Wood Derivatives: In lieu of shredded and composted wood derivatives, mix shredded and partially decomposed wood derivatives with ammonium nitrate at a minimum rate of 0.15 lb/cu. ft. of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of 0.25 lb/cu. ft. of loose sawdust or ground bark.

E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth. Sterilized.

2.4 FERTILIZERS (As recommended or required in Testing Reports)

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

D. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

PART 3 - EXECUTION

3.1 GENERAL

A. Place planting soil and fertilizers according to requirements in other Specification Sections.

B. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in planting soil.
C. Proceed with placement only after unsatisfactory conditions have been corrected.

D. Notify Architect and Landscape Architect 7 days minimum prior to beginning work.

3.2 PREPARATION OF UNAMENDED, ON-SITE SOIL BEFORE AMENDING

A. Excavation: Excavate soil from designated area(s) to a depth of 6 inches and stockpile until amended.

B. Unacceptable Materials: Clean soil of concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials that are harmful to plant growth.

C. Unsuitable Materials: Clean soil to contain a combined maximum of 8 percent by dry weight of stones, roots, plants, sod, clay lumps, and pockets of coarse sand.

D. Screening: Pass unamended soil through a 2-inch sieve to remove large materials.

3.3 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Subgrade Preparation: Till subgrade to a minimum depth of 12 inches for all shrub and groundcover areas. Till subgrade to a minimum depth of 6 inches for all turf and seed areas. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply, add soil amendments, and mix approximately half the thickness of unamended soil over prepared, loosened subgrade according to "Mixing" Paragraph below. Mix thoroughly into top 4 inches of subgrade. Spread remainder of planting soil.

C. Mixing: Spread unamended soil to total depth of 12 inches for all shrub and groundcover areas and 6 inches for all turf and seed areas, but not less than required to meet finish grades after mixing with amendments and natural settlement. Do not spread if soil or subgrade is frozen, muddy, or excessively wet.

1. Amendments: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them with unamended soil to produce planting soil.

   a. Mix lime or sulfur with dry soil before mixing fertilizer.
   
   b. Mix fertilizer with planting soil no more than seven days before planting.

2. Lifts: Apply and mix unamended soil and amendments in lifts not exceeding 8 inches in loose depth for material compacted by compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

D. Compaction: Compact each blended lift of planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.
E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.4 BLENDING PLANTING SOIL IN PLACE

A. General: Mix amendments with in-place, unamended soil to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Preparation: Till unamended, existing soil in planting areas to a minimum depth of 12 inches for all shrub and groundcover areas. Till subgrade to a minimum depth of 6 inches for all turf and seed areas. Remove stones larger than 2 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

C. Mixing: Apply soil amendments and fertilizer, if required, evenly on surface, and thoroughly blend them into full depth of unamended, in-place soil to produce planting soil.

1. Mix lime or sulfur with dry soil before mixing fertilizer.
2. Mix fertilizer with planting soil no more than seven days before planting.

D. Compaction: Compact blended planting soil to 75 to 82 percent of maximum Standard Proctor density according to ASTM D 698.

E. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.5 APPLYING COMPOST TO SURFACE OF PLANTING SOIL

A. Application: Apply 4 inches of the compost component of planting-soil mix to surface of in-place planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.

B. Finish Grading: Grade surface to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform the following tests and inspections:

1. Compaction: Test planting-soil compaction after placing each lift and at completion using a densitometer or soil-compaction meter calibrated to a reference test value based on laboratory testing according to ASTM D 698. Space tests at no less than one for each 2000 sq. ft. of in-place soil or part thereof.

2. Performance Testing: For each amended planting-soil type, demonstrating compliance with specified performance requirements. Perform testing according to "Soil-Sampling Requirements" and "Testing Requirements" articles.

C. Soil will be considered defective if it does not pass tests and inspections.
D. Prepare test and inspection reports.

E. Label each sample and test report with the date, location keyed to a site plan or other location system, visible conditions when and where sample was taken, and sampling depth.

3.7 PROTECTION

A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."

B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Vehicle traffic.
4. Foot traffic.
5. Erection of sheds or structures.
6. Impoundment of water.
7. Excavation or other digging unless otherwise indicated.

C. If planting soil or subgrade is overcompacted, disturbed, or contaminated by foreign or deleterious materials or liquids, remove the planting soil and contamination; restore the subgrade as directed by Architect and Landscape Architect and replace contaminated planting soil with new planting soil.

3.8 CLEANING

A. Protect areas adjacent to planting-soil preparation and placement areas from contamination. Keep adjacent paving and construction clean and work area in an orderly condition.

B. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.

1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 32 91 15
PART 1 GENERAL

1.1 SECTION INCLUDES
   A. Landscape grading requirements.
   B. Backfill materials.

1.2 SUBMITTALS
   A. Submit maximum laboratory dry density and optimum laboratory moisture content for:
      1. Subgrade material, and
      2. Each type of fill to be used.

1.3 QUALITY ASSURANCE
   A. Do not change material sources, or aggregate without ENGINEER's knowledge.
   B. Reject backfill material that does not comply with requirements in this Section.
   C. Landscape grading is aesthetic by nature and subject to continual monitoring and
      modification during the backfilling process. Work closely with ENGINEER particularly
      when grading and construction berms, channels, or other aesthetic considerations.
   D. If requested, submit a quality control and testing report describing source and field quality
      assurance activities performed by CONTRACTOR and Suppliers.

1.4 STORAGE
   A. Safely stockpile backfill materials.
   B. Separate differing materials, prevent mixing, and maintain optimum moisture content of
      backfill materials.
   C. Avoid displacement of and injury to Work while compacting or operating equipment.
   D. Movement of construction machinery over Work at any stage of construction is solely
      at CONTRACTOR's risk.

1.5 SITE CONDITIONS
   A. Do not place, spread, or roll any backfill material over material that is damaged by water.
      Remove and replace damaged material at no additional cost to OWNER.
   B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and
      rutted areas.
   C. Reshape and compact damaged structural section to required density.

1.6 ACCEPTANCE
   A. Native material may be wasted if there is no additional cost to substitute material acceptable to
      ENGINEER.
   B. For material acceptance refer to:
      2. Crushed aggregate base, Section 32 11 23.
      3. Cement treated fill, Section 31 05 15.

1.7 WARRANTY
   A. Any settlement noted in landscaped surfaces will be considered to be caused by improper
      compaction methods and shall be corrected at no additional cost to the OWNER.
   B. Restore incidentals damaged by settlement at no additional cost to OWNER.
PART 2  PRODUCTS

2.1 BACKFILL MATERIALS
   A. Common fill, Section 31 05 13.
   B. Cement treated fill, Section 31 05 15.
   C. Crushed aggregate base, Section 32 11 23.
   D. Structural soil mix, Section 32 91 13.

2.2 WATER
   A. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
   B. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.

PART 3  EXECUTION

3.1 PREPARATION
   A. Implement traffic control plan requirements, Section 01 55 26.
   B. Identify required line, levels, contours, and datum.
   C. Stake and flag locations of underground utilities.
   D. Upon discovery of unknown utility or concealed conditions, notify ENGINEER.
   E. Verify stockpiled fill meets gradation requirements, areas to be backfilled are free of debris, snow, ice or water, and ground surface is not frozen.
   F. If subgrade is not readily compactable secure written authorization for stabilization excavation and backfill. Refer to Section 31 23 16.

3.2 PROTECTION
   A. Protect existing trees, shrubs, lawns, existing structures, fences, roads, sidewalks, paving, curb and gutter and other features.
   B. Protect above or below grade utilities. Contact utility companies to repair utility damage. Pay all cost of repairs.
   C. Protect subgrade from desiccation, flooding and freezing.
   D. Do not fill adjacent to structures until Excavation is checked by ENGINEER.
   E. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become over-stressed or moved from alignment.
   F. Do not disturb or damage foundation perimeter drainage, foundation, damp-proofing, foundation waterproofing and protective cover, or utilities in trenches.
   G. Restore任何 damaged structure to its original strength and condition.

3.3 LAYOUT
   A. Maintain all benchmarks, control monuments and stakes, whether newly established by surveyor or previously existing. Protect from damage and dislocation.
   B. If discrepancy is found between Contract Documents and site, ENGINEER shall make such minor adjustments in the Work as necessary to accomplish the intent of Contract Documents without increasing the Cost of the Work to CONTRACTOR or OWNER.

3.4 BACKFILLING
A. General: Conduct work in an orderly manner. Do not create a nuisance. Do not permit soil accumulation on streets or sidewalks. Do not allow soil to be washed into sewers and storm drains.

B. Grading Intent: Spot elevations and contours indicated are based on the best available data. The intent is to maintain constant slopes between spot elevations. If a spot elevation is determined to be in error, or the difference in elevation between points change, then the minimum percentage of slope as a result of field adjustment of specific spot elevations is as follows:
1. Pavement Areas: 1 percent.
2. Concrete or Brick Areas: 0.30 percent.
3. Lawn or Planted Area: 0.75 percent.

C. Planted Surfaces:
1. Place backfill to a finished grade.
2. Grade slopes to provide adequate drainage after compaction. Do not create water pockets or ridges. Prevent erosion of freshly graded areas during construction until surfaces have been constructed and landscaping areas have taken hold.
3. Remove surface stones greater than 1 inch from finished grading.

D. Hard Surfaces: Place structural soil to depth specified.

3.5 MODIFIED BACKFILL LAYER METHOD
A. Section 33 05 20.

3.6 COMPACTION
A. Ninety-two (92) percent relative to a standard proctor density, Section 31 23 26, unless indicated elsewhere.

3.7 SURFACE FINISHING
A. Restore paved surfaces, Section 33 05 25.
B. Finish landscaped surfaces to match existing with grass, Section 32 92 00 or with other ground cover, Section 32 93 13.
1. Backfill areas to contours and elevations required. Do not use frozen materials.
2. Make smooth changes in grade. Blend slopes into level areas.
3. Remove surplus backfill materials from site.
4. Leave stockpile areas completely free of excess fill materials.
5. Slope grade away from building at a minimum of five (5) percent for ten (10) feet unless indicated otherwise.

3.8 CLEANING
A. Remove stockpiles from the site. Grade site surface to prevent free standing surface water.
B. Leave borrow areas clean and neat.

END OF SECTION
SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Plants.
   2. Tree stabilization.

B. Related Requirements:
   1. Section 01 56 39 "Temporary Tree and Plant Protection" for protecting, trimming, pruning, repairing, and replacing existing trees to remain that interfere with, or are affected by, execution of the Work.

1.3 UNIT PRICES

A. Unit prices apply to authorized work covered by quantity allowances.

B. Unit prices apply to additions to and deletions from the Work as authorized by Change Orders.

1.4 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.
E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown inground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

G. Finish Grade: Elevation of finished surface of planting soil.

H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

J. Planting Area: Areas to be planted.

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 15 "Soil Preparation (Performance Specification)" for drawing designations for planting soils.

L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.5 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.
1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.
   2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than 20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:
   1. Trees and Shrubs: Three Samples of each variety and size delivered to site for review. Maintain approved Samples on-site as a standard for comparison.
   2. Organic Mulch: 1-pint volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.

1.8 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:
   1. Manufacturer's certified analysis of standard products.
   2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

D. Sample Warranty: For special warranty.

1.9 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.
1.10 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the National Association of Landscape Professionals or AmericanHort.
2. Experience: Five years' experience in landscape installation in addition to requirements in Section 01 40 00 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:
   a. Landscape Industry Certified Technician - Exterior.
   b. Landscape Industry Certified Interior.
   c. Landscape Industry Certified Horticultural Technician.
5. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants purchased under allowances is made by Architect, who tags plants at their place of growth before they are prepared for transplanting.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches above the root flare for trees up to 4-inch caliper size, and 12 inches above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
B. Bulk Materials:
   1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
   2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
   3. Accompany each delivery of bulk materials with appropriate certificates.

C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

D. Handle planting stock by root ball.

E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.

F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
   1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

H. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
   1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
   2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
   3. Do not remove container-grown stock from containers before time of planting.
   4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.12 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.13 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:
   a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
   b. Structural failures including plantings falling or blowing over.
   c. Faulty performance of tree stabilization.
   d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods: From date of Substantial Completion.
   a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

3. Include the following remedial actions as a minimum:
   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
   c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
   d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing
trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.

2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label at least one plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 10-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

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

1. Type: Shredded hardwood.
2. Size Range: 3 inches maximum, 1/2 inch minimum.

2.4 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.5 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new hardwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal by length indicated, pointed at one end.
2. Wood Deadmen: Timbers measuring 8 inches in diameter and 48 inches long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles.
5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches long.

2.6 MISCELLANEOUS PRODUCTS

A. Wood Pressure-Preservative Treatment: AWPA U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.

B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

C. Burlap: Non-synthetic, biodegradable.

D. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

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

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect’s acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to Section 329115 "Soil Preparation (Performance Specification)."

B. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at application rate according to manufacturer's written recommendations.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Subsoil and topsoil removed from excavations may be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch-diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Backfill: Planting soil. For trees, use excavated soil for backfill.
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
   a. Quantity: Two per plant.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. Container-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.

1. Backfill: Planting soil. For trees, use excavated soil for backfill.
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch from root tips; do not place tablets in bottom of the hole.
   a. Quantity: Two per plant.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying:
   a. Stake trees of 2- through 5-inch caliper. Stake trees of less than 2-inch caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches below bottom of backfilled excavation and
to extend at least 72 inches above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.

b. Stake trees with two stakes for trees up to 12 feet high and 2-1/2 inches or less in caliper; three stakes for trees less than 14 feet high and up to 4 inches in caliper. Space stakes equally around trees.

2. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

3.8 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings in even rows with triangular spacing.

B. Use planting soil for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.9 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of 12 inches and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees and Treelike Shrubs in Turf Areas: Apply organic mulch ring of 2-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 6 inches of trunks or stems.

2. Organic Mulch in Planting Areas: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.
3.10 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.12 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Remove and replace trees that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced for each tree of 4 inches or smaller in caliper size.
2. Provide one new tree(s) of same caliper size for each tree being replaced that measures more than 4 inches in caliper size.
3. Species of Replacement Trees: Same species being replaced.
3.13 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before Substantial Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.14 MAINTENANCE SERVICE

A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: 12 months from date of Substantial Completion.

B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: 12 months from date of Substantial Completion.

END OF SECTION 32 93 00
PART 1 GENERAL

1.1 SECTION INCLUDES
A. Polyvinyl chloride pipe, couplings, fittings and joint materials.

1.2 REFERENCES
A. ASTM Standards:
   D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
   D2241 Poly (Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR - Series).
   D2321 Underground Installation of Flexible Thermoplastic Sewer Pipe.
   D2412 Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
   D2564 Solvent Cement for Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings.
   D2729 Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   D3034 Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   D3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
   D3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
   F679 Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
   F949 Poly(vinyl Chloride) (PVC) Corrugated sewer Pipe with a Smooth Interior and Fittings.
B. AWWA Standards:
   C110 Ductile-Iron and Gray-Iron Fitting, 3 inches Through 48 inches, for Water and Other Liquids.
   C905 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 14 In. Through 48 In.

1.3 DEFINITIONS
A. Standard Dimension Ratio (SDR): Outside diameter of pipe divided by wall thickness.

1.4 QUALITY ASSURANCE
A. Evaluate pipes that show damage such as dents, cuts, cracks, breaks, fractures, or distortions. Recommend appropriate action. ENGINEER may require CONTRACTOR provide certification by a professional engineer competent in the structural design of the pipe material for action recommended.

PART 2 PRODUCTS

2.1 PRESSURE PIPE SYSTEM
A. Pipe: AWWA C900, C905, or C909 as applicable. Use outside diameters defined by ductile iron pipe sizes. Dimensions, class, SDR, and tolerances per ASTM D2241.
B. Compounds: Type 1, Grade 1, Class 12454A, ASTM D1784.
C. Joints:
   1. Bell and spigot with flexible elastomeric seals, ASTM D3139. Use non-toxic lubricant.
   2. Solvent weld, ASTM D2564.
D. Fittings (4 inch and larger): Ductile iron Class 250, ASTM C110.

2.2 **GRAVITY PIPE SYSTEM**

A. Pipe:
   1. Solid smooth wall:
      a. 4 to 15 inch diameter, ASTM D3034.
      b. 18 to 27 inch diameter, ASTM F679.
   2. Corrugated wall with a smooth interior, 4 to 10 inches diameter, ASTM F949.

B. Fittings: ASTM D1784.

C. Stiffness: 50 psi minimum when measured at five (5) percent deflection, ASTM D2412.

D. Additives and Fillers: Not to exceed 10 parts by weight; 100 parts of resin in the compound.

E. Joints: Bell and spigot with flexible elastomeric seals, ASTM D3212.

F. Flattening: No visual evidence of splitting, cracking, or breaking when flattened to 60 percent deflection, ASTM D2412.

2.3 **PERFORATED PIPE SYSTEM**

A. Pipe: Refer to gravity pipe products above.

B. Perforations: ASTM D2729.

C. Joints: Push-on, solvent weld or other.

2.4 **SOLVENT WELDS**

A. Primer, ASTM F656.

B. Glue, ASTM D2564.

---

**PART 3 EXECUTION**

3.1 **INSTALLATION**

A. Assembly: Abide by manufacturer’s instructions and the following. Use the more stringent provisions if there are any conflicts.
   1. Pressurized Systems:
      a. Water distribution and transmission, Section 33 11 00, AWWA C900, C905, and C909.
      b. Underground irrigation, Section 32 84 23, and ASTM D2855.
   2. Gravity Systems:
      a. Sanitary sewers, Section 33 31 00.
      b. Under drains and storm drains, Section 33 41 00.

B. Burial: Comply with Section 33 05 20 and the following. Use the more stringent provisions if there are any conflicts.
   1. ASTM D2774 for pressure pipe systems.
   2. ASTM D2321 for gravity pipe systems.

END OF SECTION
PART 1   GENERAL

1.1 SECTION INCLUDES
   A. Raise, lower, or change slope of Street Fixtures.
   B. Install Cover Collars.
   C. This specification is NOT APPLICABLE to raising and lowering Street Fixtures that withstand internal pressure.

1.2 REFERENCES
   A. APWA (Utah) Standards.
      Plan 273   Frame and cover for monument
      Plan 360   Grade ring
      Plan 362   Cover collar for storm drains
      Plan 413   Cover collar for sanitary sewer manhole
      Plan 574   Cover collar for water valve box

1.3 DEFINITIONS
   A. Box: A structure such as a valve box, meter box, monument box, fire hydrant box, electrical pull box, cleanout box or other like structure not intended for human entry.
   B. Cover Collar: A concrete filled annular space between the frame of a Street Fixture and the adjacent pavement surface usually one (1) foot wide.
   C. Extension Ring: A concrete or metal ring used to adjust surface elevations and surface cross slopes of Street Fixtures covers. Metal rings are used between metal frames and metal covers or grates. Concrete rings are used below metal frames or in the concrete structure below.
   D. Manhole: A structure designed to permit human entry and working space inside and to confine and control the flow of pipe-conveyed fluids. These structures are collectively referred to as manholes regardless of composition, design, type or depth.
   E. Street Fixture: The top of existing structures such as but not limited to Manholes, catch basin, sumps, inlets, valve boxes, meter boxes, monument boxes, and similar structure in a thoroughfare surface.
   F. Vault: A structure intended for human entry containing electrical or telephone facilities or other like utilities.
PART 2 PRODUCTS

2.1 PAVEMENT
   A. Bituminous Concrete: Unless indicated otherwise in the Bid Documents or by ENGINEER, provide PG64-22, DM-1/2, 50 blow, product per Section 32 12 05.
   B. Concrete: Class 4000 cast-in-place, Section 03 30 04.

2.2 GROUT
   A. Portland cement grout, Section 03 61 00.

2.3 EXTENSION RINGS
   A. Metal: APWA 273.
   B. Concrete or plastic: APWA Plan 360.

PART 3 EXECUTION

3.1 PREPARATION
   A. Determine condition of existing incidental structure. Any item not reported damaged before construction shall be considered unbroken and must be replaced by CONTRACTOR at no additional cost to OWNER.
   B. Provide Invert Cover over pipe in cleanout box to prevent gravel, concrete, or debris from entering pipeline.
   C. Unless required otherwise, arrange for utility companies to adjust their own structures.
   D. Coordinate all adjustments with requirements of affected utility company.

3.2 ADJUST STRUCTURE TO GRADE
   A. Restrict excavation around structure to a minimum.
   B. After structure adjustment, backfill void around structure and compact before paving or landscaping.
   C. Apply mortar to inside and outside of concrete grade rings.
   D. If the cone is cracked during construction, restack the manhole with shorter manhole sections and install a new cone at no additional cost to the OWNER.

3.3 ADJUST COVER IN PAVEMENT SURFACE
   A. Method A - Metal extension rings:
      1. Use rings that lock together.
      2. Set frame at desired elevation and cross-slope.
      3. Seal joints between pavement and ring, Section 32 01 17.
B. Method B – Concrete extension rings:
   1. Place concrete grade rings under frame or in structure riser shaft.
   2. Set frame at desired elevation and cross-slope.
   3. Provide 100 percent concrete support under frame. Do not use wood, bricks, concrete fragments, blocks or particles as support.
   4. Grout seams between concrete rings and between frame and concrete rings.

C. Method C – Place Concrete:
   1. Set frame at desired elevation and cross-slope.
   2. Place concrete and provide 100 percent concrete support under frame.

D. Method D – Concrete Deck:
   1. Remove existing concrete deck.
   2. Reset steel rebar.
   3. Set frame to grade, set forms.
   4. Pour concrete. Provide complete concrete support under Street Fixtures.

3.4 INSTALL COVER COLLAR
A. Follow APWA Plans 362, 413, or 574 requirements as applicable.
B. Open annular space between pavement and Street Fixtures cover. Unless indicated otherwise, make space 12 inches wide.
C. Set concrete collar to 1/4 inch minimum to 1/2 inch maximum below bituminous concrete pavement surface and 1/4 inch below Portland cement concrete pavement surface.
D. Trowel finish, Section 03 35 00.

3.5 SURFACE FINISHING
A. In new streets or overlays, adjust Street Fixture covers after paving is complete.
B. Restore paved surfaces, Section 33 05 25.
C. Landscapes: Restore landscaping as indicated and as follows where applicable.
   1. Section 32 92 00 for turf and grasses.
   2. Section 32 93 13 for other ground cover.
D. Repair public and private facilities damaged by CONTRACTOR.

END OF SECTION
SECTION 33 05 20
BACKFILLING TRENCHES

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Backfill materials in trenches and backfilling requirements.

1.2 REFERENCES
A. APWA (Utah) Standards: Plan 381 Trench backfill
Plan 382 Pipe zone backfill
B. ASTM Standards:
   D698 Laboratory Compaction Characteristics of Soil Using Standard Effort
   (12,400 ft-lbf/ft$^3$ (600 kN·m/m$^3$)).
   D1557 Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-
   lbf/ft$^3$ (2,700 kN·m/m$^3$)).
   D2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow
   Depth).
   D4832 Preparation and Testing of Soil-Cement Slurry Test Cylinders.

1.3 DEFINITIONS
A. Bedding: That surface of the excavation or portion of the Pipe Zone below the pipe.
B. Pipe Zone: That zone in a backfilling operation which supports, and surrounds the pipe
   barrel, and extends to 1 foot above the top of the pipe barrel.

1.4 SUBMITTALS
A. Submit maximum laboratory dry density and optimum laboratory moisture content
   for:
   1. Subgrade material, and
   2. Each type of fill to be used.
B. Submit aggregate batch delivery tickets showing name of material source, serial number of
   ticket, date and truck number, name of Supplier, job name and location, volume or weight.
   And aggregate classification or Supplier’s identification code.

1.5 QUALITY ASSURANCE
A. Do not change material sources, or aggregate without ENGINEER’s knowledge.
B. Reject backfill material that does not comply with requirements in this Section.
C. If requested, submit a quality control inspections and testing report describing source and
   field quality control activities performed by CONTRACTOR and Suppliers.

1.6 STORAGE
A. Safely stockpile backfill materials.
B. Separate differing materials, prevent mixing, and maintain optimum moisture content of
   backfill materials.

1.7 SITE CONDITIONS
A. Do not place, spread, or roll any backfill material over material that is damaged by water.
   Remove and replace damaged material at no additional cost to OWNER.
B. Control traffic and erosion. Keep area free of trash and debris. Repair settled, eroded, and
   rutted areas.
C. Reshape and compact damaged structural section to required density.
D. Restore any damaged structure to its original strength and condition.
E. Replace contaminated backfill at no additional cost to OWNER.

1.8 SEQUENCING
A. Coordinate backfilling operation with pipeline commissioning, Section 33 08 00.

1.9 ACCEPTANCE
A. General: Native material may be wasted if there is no additional cost to substitute material acceptable to ENGINEER.
B. Material: For material acceptance refer to:
   2. Aggregate base course, Section 32 11 23.
   3. Cement treated fill, Section 31 05 15.
C. Lift Thickness: One test per lot.
D. Compaction: One test per lot. Verify density using nuclear tests, ASTM D2922. Compaction standard and Lot sizes as follows:

<table>
<thead>
<tr>
<th>Material</th>
<th>Proctor</th>
<th>Lot Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subgrade</td>
<td>Standard</td>
<td>200 linear feet</td>
</tr>
<tr>
<td>Common Fill</td>
<td>Standard</td>
<td>200 linear feet per lift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 square feet of footing area per lift</td>
</tr>
<tr>
<td>Aggregate base course</td>
<td>Modified</td>
<td>200 linear feet per lift</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25 square feet of footing area per lift</td>
</tr>
</tbody>
</table>

NOTES
(a) Standard proctor, ASTM D698.
(b) Modified proctor, ASTM D1557.
(c) Lift thickness above pipe zone before compaction, 8 inches.

E. Flowable Fill Strength: Lot size is one (1) day production with sub-lots of 50 cubic yards or part thereof. Verify strength using cylinders, ASTM D4832.
F. Grade, Cross Slope: Measured at random locations.

1.10 WARRANTY
A. Correct any settlement of Trench backfill or structures built over Trench backfill at no cost to OWNER.
B. Restore structures damaged by settlement at no additional cost to OWNER.

PART 2 PRODUCTS

2.1 BACKFILL MATERIALS
A. Common fill, Section 31 05 13. Granular material, CONTRACTOR’s choice.
B. Aggregate base course, Section 32 11 23. Untreated base course.
C. Cement treated fill, Section 31 05 15. Use a flowable fill so vibration is not required.
D. Slag or bitumen bearing material NOT ALLOWED in trench.

2.2 WATER
A. Make arrangements for sources of water during construction and make arrangements for delivery of water to site.
B. Comply with local Laws and Regulations at no additional cost to OWNER when securing water from water utility company.
2.3 **GEOTEXTILE FABRIC**
   
   A. Section 31 05 19. Use woven or non-woven stabilization-separation fabric. Select either moderate MARV or high MARV as needed.

2.4 **IDENTIFICATION TAPE**
   
   A. Permanent, bright colored, continuous printed magnetic plastic tape, intended for direct burial service; not less than six (6) inches wide by four (4) mils thick. Tape shall read "CAUTION: BURIED INSTALLATION BELOW". Color as follows.

<table>
<thead>
<tr>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red</td>
<td>Electric power lines, cables, conduit and lighting cables</td>
</tr>
<tr>
<td>Yellow</td>
<td>Gas, oil, steam, petroleum or gaseous materials</td>
</tr>
<tr>
<td>Orange</td>
<td>Communications, alarm, signal, cables or conduits</td>
</tr>
<tr>
<td>Blue</td>
<td>Potable water</td>
</tr>
<tr>
<td>Purple</td>
<td>Reclaimed water, irrigation and slurry lines</td>
</tr>
<tr>
<td>Green</td>
<td>Sewer and storm drain lines</td>
</tr>
</tbody>
</table>

---

**PART 3 EXECUTION**
3.1 PREPARATION
   A. Implement traffic control plan requirements, Section 01 55 26.
   B. Identify required line, levels, contours, and datum.
   C. Stake and flag locations of underground utilities.
   D. Verify:
      1. Backfill material meets gradation requirements.
      2. Foundation walls are braced to support surcharge forces imposed by backfilling operations, areas to be backfilled are free of debris, snow, ice or water.
      3. Trench bottom is not frozen.
   E. If ground water is in the intended backfill zone, dewater.

3.2 SUBGRADE
   A. Protect subgrade from desiccation, flooding, and freezing.
   B. Before backfilling over Subgrade, get ENGINEER’s review of Subgrade surface preparations.
   C. If Subgrade is not readily compactable, get ENGINEER’s permission to stabilize the subgrade:
      1. Excavation for Subgrade stabilization is incidental work, Section 31 23 16.

3.3 PROTECTION
   A. During installation or repair, plug end of pipe or fitting except when installing next section of pipe or fitting.
   B. Movement of construction machinery over Work at any stage of construction is solely at CONTRACTOR’s risk.

3.4 GENERAL BACKFILLING REQUIREMENTS
   A. Avoid injuring and displacement of conduit, pipe and structures while compacting soil or operating equipment next to pipeline.
   B. Place geotextile fabrics; Section 31 05 19.
   C. Do not damage corrosion protection on pipe.
   D. Repair or replace damaged pipe at no additional cost to OWNER.
   E. Withdraw sheathing, shoring, piles, and similar supports as backfilling progresses. Backfill and compact all holes left by removals.
   F. Provide sufficient water quality facilities to protect downstream fish and wildlife, and to meet State water quality requirements.
   G. Water settling of trench backfill is not permitted. "Jetting" of trench backfill is prohibited.

3.5 PIPE ZONE
   A. Follow APWA Plan 382 requirements.
   B. Maintain uniform foundation along barrel of pipe with sufficient relief for joint connections.
   C. Use backfill materials meeting pipe manufacturer's recommendations. Maximum backfill particle size is 3/4 inch for plastic pipe.
   D. Do not permit free fall of backfill material that may damage pipe, pipe finish, or pipe alignment.
   E. Except where piping must remain exposed for tests, fill pipe zone as soon as possible.

3.6 TRENCH ABOVE PIPE ZONE.
   A. Follow APWA Plan 381 requirements.
   B. Maximum lift thickness before compaction is eight (8) inches.
C. Fill unauthorized excavations with material acceptable to ENGINEER at no additional cost to OWNER.
D. Do not damage adjacent structures or service lines.
E. Install continuous identification tape directly over buried lines 18 inches below finished grade.

3.7 MODIFIED BACKFILL LAYER METHOD
A. At discretion of CONTRACTOR, backfill may be placed in thicker layers than indicated above subject to the following provisions:
   1. CONTRACTOR proves the ability of proposed method to achieve specified average compaction density.
   2. ENGINEER, on the basis of test results, approves the system in writing.
B. Should CONTRACTOR find it necessary to change the method or any part of it, including the source of material, or the rate of placing the material, obtain approval of ENGINEER, who may require a further trial area.
C. If testing shows a previously approved system is no longer producing the required degree of compaction, make changes to comply.
D. Where vibration effects are creating environmental problems, make changes to eliminate problems.

3.8 TOLERANCES
A. Compaction: Ninety-five (95) percent or greater relative to a standard or modified proctor density, Section 31 23 26.
B. Lift Thickness (before compaction):
   1. Eight (8) inches when using riding compaction equipment.
   2. Six (6) inches when using hand held compaction equipment.
   3. As proven in the modified backfill layer method.
C. Cement Treated Fill: Compressive strength targets are 60 psi in 28 days and 90 psi maximum in 28 days.

3.9 FIELD QUALITY CONTROL
A. Test trench backfilling until a compaction pattern acceptable to CONTRACTOR and ENGINEER is achieved. Continue random quality control compaction testing.

3.10 SURFACE FINISHING
A. Provide temporary paved surfaces where trenches pass through roadways, driveway approaches or sidewalks.
B. Restore paved surfaces, Section 33 05 25.
C. Landscapes: Restore landscaping as indicated and as follows where applicable.
   1. Section 32 92 00 for turf and grasses.
   2. Section 32 93 13 for other ground cover.
D. Repair public and private facilities damaged by CONTRACTOR.

3.11 CLEANING
A. Remove stockpiles from site when work is complete. Grade site to prevent free standing surface water.
B. Leave borrow areas clean and neat.

END OF SECTION
SECTION 33 12 16
WATER VALVES

PART 1 GENERAL

1.1. SECTION INCLUDES
   A. Gate, butterfly, plug, check, pressure reducing, pressure relief, control valves and their installation.

1.2 REFERENCES
   A. AWWA Standards:
      C504  Rubber-Seated Butterfly Valves.
      C508  Swing-Check Valves for Waterworks Service, 2 In. Through 24 In. NPS.
      C509  Resilient-Seated Gate Valves for Water and Sewerage Systems.

1.3 SUBMITTALS
   A. Provide technical information for evaluating quality of valve. As a minimum include dimensions, weights, materials lists and operation charts.

PART 2 PRODUCTS

2.1 VALVES - GENERAL
   A. Underground:
      1. Less than three (3) inches: Screwed ends.
      2. 3 inches and larger: Flanged or mechanical joint ends. Non-rising stem. Two inches square operating nut. Low alloy steel bolts, AWWA C111.
   B. Submerged or Above Sewage or Water:
      1. Valve body bolts per manufacturer’s recommendations.
      2. For joining valve to piping system use stainless steel nuts and bolts, Section 05 05 23.
   C. Below an Operating Deck: Provide shaft extension from the valve to deck level.
D. Above Ground: Non-rising stems equipped with a hand wheel.
E. Manually Operated Valves Over six (6) feet Above Operating Level: Provide chain operated handles.
F. Clearance: Install so handles clear all obstruction when moved from open to closed.
G. Rated Working Pressure: 150 psi if not indicated.

2.2 GATE VALVES
A. AWWA C509.
B. 3 inches through 48 inches, cast iron body, bronze mounted, non-rising stem with "O" ring seals.
C. Open counterclockwise.

2.3 BUTTERFLY VALVES
A. AWWA C504.
B. 3 inches through 48 inches, cast iron body, bronze mounted.
C. Short body if disc will not interfere with adjacent fittings or long body at CONTRACTOR’s option.
D. Wafer Valves: Subject to ENGINEER’s approval.

2.4 ECCENTRIC PLUG VALVES
A. Material: Cast iron body, bronze mounted, non-lubricated, eccentric, quarter-turn type with resilient face plugs, ductile iron discs with upper and lower shafts integral.
B. Markings: Indicate open and close position.
C. Port Areas: At least 82 percent of full pipe area.
D. Resilient Seat Seals: Buna N, field replaceable.

2.5 CHECK VALVES
A. AWWA C508.
B. Less than three (3) inches: Y-pattern, bronze, regrinding, swing check valve, 200 psi working pressure.
C. 3 inches and larger: Iron body, bronze mounted, swing valves with stainless steel hinge pins and outside weight and lever if not indicated otherwise.

2.6 PRESSURE REDUCING VALVES - SERVICE LINE
A. Operation: Capable of reducing a varying higher upstream pressure to an adjustable constant lower downstream pressure.
B. Spring and nylon reinforced diaphragm type construction.
C. Equip with Y-strainer upstream of valve.

2.7 PRESSURE REDUCING VALVES - MAIN LINE
A. Operation: Capable of maintaining an adjustable constant downstream pressure regardless of upstream pressure.
B. Type: Hydraulically operated using a direct-acting, spring-loaded, normally open, pilot valve controlled diaphragm:
   1. Single removable seat and a resilient disc. No "O" ring type discs permitted. No external packing glands permitted. No pistons operating main valve or pilot controls permitted.
   2. Y-strainers on pilot controls, variable closing and opening speed controls and a valve position indicator.
C. Rating: 250 psi working pressure.
D. Connection: Flanged.
E. Pressure Gage: Upstream and downstream of valve capable of accurately measuring system pressures.

2.8 PRESSURE RELIEF VALVES
A. Operation: Maintain a constant upstream pressure by passing or relieving excess pressure.
B. Closed Valves: Drip-tight.
C. Type: Hydraulically operated, pilot control using a diaphragm with a single removable seat and resilient disc.
D. Pilot Controls: Direct acting, adjustable between 20 and 200 psi, spring-loaded diaphragm valve.
E. Rating: 250 psi working pressure.
F. Connection: Flanged.

2.9 CONTROL VALVE
A. Globe: Diaphragm actuated, single seated, composition disc, hydraulically operated.
B. Pilot Controls: Externally mounted, four-way, solenoid pilot valve with self cleaning strainers and diaphragm type check valves:
   1. Equipped with a limit switch for pump control.
   2. Equipped with a built-in lift check valve to prevent flow reversal.
E. Rating: 250 psi working pressure.
F. Connection: Flanged.
G. Solenoids and Limit Switch: Supplied with operating voltage indicated.

PART 3 EXECUTION

3.1 INSTALLATION
A. Flush all lines before valve installation.
B. In ductile iron water mains, AWWA C600.
C. Install butterfly valve shafts vertical in vault boxes and horizontal otherwise.
SECTION 33 12 33
WATER METER

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Water meters, service connections, materials.

1.2 REFERENCES
A. AWWA Standards:
   C704   Cold-Water Meters - Propeller Type for Main Line Applications.
   C800   Underground Service Line Valves and Fittings.

1.3 SUBMITTALS
A. Manufacturer's test records for range and accuracy of meter being furnished.
B. Equipment material diagram and parts schematic.

PART 2 PRODUCTS

2.1 METERS FOR SYSTEM PIPING
A. Materials and Construction: AWWA C704:
   1. Cast iron bodies, 175 psi working pressure, flanged connections.
   2. Built-in straightening vanes.
   3. Working pressure 150 psi.
   4. Polyethylene plastic propeller.
   5. Stainless steel shaft with stainless steel ball bearings, lubricated by means of a single pressure fitting.
B. Accuracy: Plus or minus two (2) percent of scale for velocities over 1 foot per second.
C. Totalizer: Six digits reading in units required.

2.2 METERS FOR SERVICE PIPING
A. Provided by OWNER unless indicated otherwise.
2.3 SERVICE LINE, VALVES, AND FITTINGS
   A. Service Pipe: Copper, Section 33 05 03 or smooth wall polyethylene, Section 33 05 06. The service
      pipe between main and meter and to a point not less than 1 foot from the public way side of the
      property line cannot exceed the meter size.
   B. Service Valves and Fittings: AWWA C800.
   C. Meter Setters: Brass, with angle fittings, saddle nuts and gaskets.
   D. Corporation Stops and Angle Valves: Invert key design.
   E. Bypasses: Not allowed on any service installation without approval of ENGINEER.

2.4 METER BOXES
   A. Meters to 1” Service: Plastic or asphalt-dipped corrugated metal. Fiber meter boxes not acceptable.
   B. Meters 1-1/2” and Larger: Reinforced concrete with a minimum clearance of 12” from each side
      of meter plumbing.
   C. Cover: Ductile or cast iron with utility inscription

PART 3 EXECUTION

3.1 INSTALLATION
   A. Install meter box, meter setters, valves, etc. at indicated locations. If not indicated, install in street
      right-of-way parking strip or at a location approved by ENGINEER.
   B. Install meter setters level and horizontal. Provide suitable pipe lengths to prevent stress.
   C. DO NOT operate utility agency's main line valves. Contact agency if valves are to be operated. If
      required by water utility agency notify affected water users, Section 01 31 13.
   D. OWNER Supplied Meters: Installed by CONTRACTOR unless indicated otherwise.

END OF SECTION
SECTION 33 13 00

DISINFECTION

PART 1  GENERAL

1.1  SECTION INCLUDES

   A. Disinfection of potable water system.
   B. Test and report results.

1.2  REFERENCES

   A. AWWA A100: AWWA Standard for Water Wells.
   B. AWWA B300: AWWA Standard for Hypochlorites.
   C. AWWA B301: AWWA Standard for Liquid Chlorine.
   D. AWWA C651: AWWA Standard for Disinfecting Water Mains.

1.3  DEFINITIONS

   A. Disinfectant Residual: The quantity of disinfectant in treated water.
   B. ppm: Parts per million.

1.4  SUBMITTALS

   A. CONTRACTOR's evidence of experience in disinfection.
   B. Bacteriological laboratory's evidence of certification if laboratory is not OWNER's laboratory.
   C. Disinfection Report: 3 copies containing:
      1. Date issued.
      2. Project name and location.
      3. Treatment contractor's name, address and phone number.
      4. Type and form of disinfectant used.
      5. Time and date of disinfectant injection started.
      6. Time and date of disinfectant injection completed.
      7. Test locations.
      8. Initial and follow-up disinfectant residuals in ppm for each outlet tested.
9. Time and date of flushing start.
10. Time and date of flushing completion.
11. Disinfectant residual after flushing in ppm for each outlet tested.
12. Flush water disposal location and acceptance by local agency.
D. Bacteriological Report: 3 copies including:
   1. Date issued.
   2. Project name and location.
   3. Laboratory's name, certification number, address, and phone number.
   4. Time and date of water sample collection.
   5. Name of person collecting samples.
   6. Test locations.
   7. Time and date of laboratory test start.
   8. Coliform bacteria test results for each outlet tested.
   9. Certification that water conforms or fails to conform to bacterial standards of State of Utah public drinking water regulations.

1.5 QUALITY ASSURANCE

A. Bacteriological Laboratory: Certified by State of Utah if laboratory is other than OWNER's laboratory.

1.6 PRODUCT HANDLING

A. Store and protect disinfectant in accordance with manufacturer's recommendations to protect against damage or contamination. Do not use unsuitable disinfectant.
B. Follow all instruction labeling for safe handling and storage of disinfectant materials.

1.7 REGULATORY REQUIREMENTS

A. Conform to State of Utah public drinking water regulations.

PART 2 PRODUCTS

2.1 DISINFECTANT

A. Liquid Chlorine: AWWA B301 with chlorine 99.5 percent pure by volume.
B. Sodium Hypochlorite: AWWA B300 with not less than 100 grams per liter available chlorine.
C. Calcium Hypochlorite: AWWA B300 with 65 to 70 percent available chlorine by weight in granular form.
D. Powder, tablet, or gas according to manufacturer's specification.
2.2 **ALKALI**

A. Caustic Soda or Soda Ash.
2.3 **ACID**

A. Hydrochloric (Muriatic) type.

**PART 3 EXECUTION**

3.1 **PREPARATION**

A. Provide necessary signs, barricades, and notices to prevent accidental exposure to disinfecting materials, consuming disinfecting water, or disturbing the system being disinfected.

B. Make sure the potable water system is complete, clean, and that the system to be disinfected is not connected to the existing system.

3.2 **DISINFECTION OF WATER LINES**

A. Use one method defined under AWWA C651 that is acceptable to ENGINEER.

B. After pressure testing per Section 33 08 00, flush system through hydrants or if a hydrant does not exist, install a tap of sufficient size to provide 2.5 feet per second flushing velocity in the line.

C. Starting at outlet closest to water source, bleed water from each outlet until chlorine residual reaches outlet. Repeat process at each outlet throughout system.

D. Collect a bacteriological water sample at end of line to be tested. If sample fails bacteriological test, flush system and retest. Continue flushing and retesting until a good sample is obtained.

E. If flushing does not produce a passing bacteriological test disperse disinfectant throughout system to obtain 10 to 25 ppm of free chlorine residual.

F. Flush the chlorinated water from the main until chlorine measurements show the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

G. After a negative bacteriological sample is obtained, let the system relax for 24 hours. Flush and collect a subsequent bacteriological sample for testing. If the subsequent test is negative then water line is acceptable.

3.3 **DISINFECTION OF CULINARY WELLS**

A. Use one method defined under AWWA A100 that is acceptable to ENGINEER.

B. Do not start disinfection until well is thoroughly cleaned.

C. Use a disinfecting solution containing a minimum of 50 ppm residual chlorine.

D. Flush system after disinfection.
3.4 DISINFECTION OF WATER STORAGE RESERVOIRS

A. Use one method defined under AWWA C652 that is acceptable to the ENGINEER.
B. Do not start disinfection until water storage tank is thoroughly cleaned.
C. Provide and use necessary safety equipment for workers in contact with disinfectant or gasses.
D. Flush system after disinfection.

3.5 FIELD QUALITY CONTROL

A. Bacteriological Test:
   1. Collect Samples for testing no sooner than 16 hours after system flushing.
   2. Analyze water samples per State of Utah requirements.
   3. If bacteriological test proves water quality to be unacceptable, repeat system treatment.
   4. Do not place water systems into service until a negative bacteriological test is made. Provide a copy of the negative bacteriological test to ENGINEER.
B. Disposal of Disinfectant:
   1. Legally dispose of disinfecting water and ensure no chlorine buildup or damage to the environment.

END OF SECTION
SECTION 33 41 00
DRAINAGE SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES
A. Installation of a buried non-pressure pipe system such as a storm drain, a sub-drain, irrigation, etc.
B. Refer to Section 33 11 00 if the installation is a pressurized pipe system.

1.2 REFERENCES
A. APWA (Utah) Standards:
   - Plan 255 Bituminous concrete T-patch
   - Plan 315 Catch basin (single or double grate)
   - Plan 322 Curb face outlet box
   - Plan 331 Cleanout box
   - Plan 341 Precast manhole
   - Plan 381 Trench
   - Plan 382 Pipe zone backfill
B. ASTM Standards:
   - C 478 Precast Reinforced Concrete Manhole Section.
   - C 923 Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

1.3 DEFINITIONS
A. Non-pressure Pipe System: Pipelines with joints that have no leakage after a sustained hydraulic pressure not exceeding 10.8 psi (22 in. Hg) for 10 minutes or a sustained vacuum pressure not exceeding 3 kPa (5 in. Hg) for 10-minutes.

1.4 PERFORMANCE REQUIREMENTS
A. Vertical Cover: Unless indicated otherwise, provide at least two (2) feet of protection cover during construction.
B. Remove any section of pipe already placed that is found to be out of alignment tolerance, defective, or damaged. Relay or replace without additional cost to OWNER.

1.5 SUBMITTALS
A. Product data: Submit manufacturer’s technical product data and installation instructions.
B. Commissioning: Provide Section 33 08 00 submittals.

1.6 SITE CONDITIONS
A. Minimize neighborhood traffic interruptions. Barricade stockpiles.
B. Provide access to adjacent properties for local traffic and pedestrians, Section 01 31 13.

1.7 ACCEPTANCE
A. Each drainage system component must pass applicable commissioning requirements in Section 33 08 00.

PART 2 PRODUCTS

2.1 PIPES AND FITTINGS
A. Provide piping materials and factory fabricated piping products of sizes, types, and classes required.
B. Where not indicated, select product acceptable to ENGINEER and comply with installation requirements.
C. Provide pipe fittings and accessories of same material and weight or class as pipe, with joining method indicated or recommended by manufacturer.

2.2 IN-PLANE WALL DRAINAGE
A. Drainage Core: Manufacturer’s standard three-dimensional non-bio-degradable, plastic designed to effectively conduct water to foundation drainage system.
B. Filter Fabric: Manufacturer’s standard non-woven geotextile fabric of polypropylene or polyester fibers, or combination.

2.3 SUB DRAIN FILL MATERIALS
A. Sewer rock, Section 32 11 23 and geotextile, Section 31 05 19.

2.4 MORTAR, GROUT AND CONCRETE
A. Portland cement mortar, Section 04 05 16.
B. Non-shrink grout, Section 03 61 00.
C. Concrete:
   1. Cast-in-place: Section 03 30 04.
   2. Precast Concrete: Section 03 40 00.

2.5 MANHOLES
A. Basin: Concrete floor with cast in place concrete walls or ASTM C478 precast concrete.
B. Steps: None.
C. Top: Concentric cone. Concentric flat slab concrete deck allowed only with ENGINEER's permission.
D. Frame and Cover: Scoriated, asphalt coated, heavy duty, ductile iron Section 05 56 00, with flat top design meeting load rating H-20 and appropriate utility lettering. Shape, size and lifting device as necessary.
E. Pipe Connectors:
   2. Cast in Place or Connections to Existing Fixture with Plastic Pipe: Use rubber adapter gasket for precast sections. Grout, Section 03 61 00 for cast in place sections.
F. Joints in Sections: Bituminous mastic gasket-type sealant or otherwise acceptable to ENGINEER.

2.6 INLETS, CATCH BASINS, CLEANOUTS
A. Basin: Concrete floor and walls.
C. Frame and Grate:
   1. Asphalt coated, heavy duty, cast iron, Section 05 56 00. Shape and size indicated.
   2. Galvanized, heavy duty, steel: Sections 05 12 00 and 05 05 10. Shape and size as indicated.

2.7 OUTFALLS
A. Cast-in-place or precast concrete with reinforced headwall, apron, and tapered sides. Provide riprap, Section 31 37 00, if indicated.

2.8 DRAIN PIPE JOINT SCREENS
A. Heavy mesh burlap, coal-tar saturated felt, 18 to 14 mesh copper screening or synthetic drainage fabric.
B. Plastic or corrosion resistant metal bands.

PART 3 EXECUTION

3.1 PREPARATION
A. Verify Trench Excavation is ready to receive work, and dimensions, and elevations are correct. Commencing installation means acceptance of existing conditions.
B. Hand trim excavations to required elevations. Backfill over excavations and compact, Section 31 23 26.
C. Remove stones larger than two (2) inches or other hard matter that could damage pipe or impede backfilling or compaction.
D. Examine areas and conditions under which materials and products are to be installed. Do not proceed with system installation until unsatisfactory conditions have been corrected in manner acceptable to system installer.
E. Clearly identify and promptly set aside defective or damaged pipe.
F. Use pipe cutting tool acceptable to pipe manufacturer.

3.2 ABANDONED UTILITIES
A. Use concrete to plug and cap open ends of abandoned underground utilities that are to remain in place.
B. Provide closures to withstand hydrostatic or earth pressure that may result after ends of abandoned utilities have been closed.

3.3 INSTALLATION - PIPE AND FITTINGS
A. Place bell or groove end facing upstream.
B. Install gaskets per manufacturer's recommendations.
C. Plug pipeline branches, stubs or other open ends that are not to be immediately connected.
D. Clean interior of pipe of dirt and debris as work progresses.
E. Insulate dissimilar metals from direct contact with each other using neoprene gaskets or asphalt coatings.
F. Meet line and grade tolerance in Section 33 08 00. Use a laser device or demonstrate an equivalent method of establishing line and grade.

3.4 INSTALLATION - JOINTS
   A. Join pipe per manufacturer's recommendation.
   B. Join pipe of different sizes at manholes or cleanouts only.
   C. Use neoprene couplings with stainless steel bands to make connections between dissimilar pipe, or where standard pipeline joints are impractical.

3.5 INSTALLATION - MANHOLES
   A. Install manholes per APWA Plan 341.
   B. Form bottom of excavation clean and smooth to correct elevation.
   C. Place structures in location indicated.
   D. Provide elevations and pipe inverts for inlets and outlets indicated.
   E. When structures occur in Pavements, mount frame and cover 1/2 inch below finished surface. Provide a concrete Cover Collar between the frame and bituminous concrete pavement. Elsewhere set frame and cover three (3) inches above finished grade.

3.6 INSTALLATION - INLETS, CATCH BASINS, CLEANOUTS
   A. Install facilities per APWA Plans 315, 316, 317, 331.
   B. Form bottom of excavation clean and smooth to correct elevation.
   C. Construct with all connecting piping and appurtenances in their final position.
   D. Cut all piping parallel to interior surface wall. Grout connection to provide smooth transition inlet into pipe.

3.7 INSTALLATION SUB DRAIN SYSTEMS
   A. Install pipe and fittings per manufacturer's requirements.
   B. Open Joint Systems: Loosely butt pipe ends. Place 12 inches wide filter fabric around pipe circumference, centered over joint.
   C. Mechanical Joint Perforated Pipe System: Place pipe with perforations facing down.
   D. Place drainage pipe on bed of sewer rock, Section 31 05 13.

3.8 INSTALLATION - TAP CONNECTIONS
   A. Not allowed in storm drain systems. Provide a cleanout or manhole structure.

3.9 INSTALLATION - OUTFALLS
   A. Install outfalls per APWA Plans 322 and 323.

3.10 INSTALLATION - AREA DRAINS
   A. Install area drains per APWA Plan 372.

3.11 BACKFILLING
   A. Trench Backfill: Place backfill per Section 33 05 20. Provide product and placement indicated in the following Standard Plans.
      1. APWA Plan 382 for pipe zone backfill.
      2. APWA Plan 381 for trench backfill above pipe zone.
   B. Landscapes: Restore landscaping as indicated and as follows where applicable.
      1. Section 32 92 00 for turf and grass cover.
      2. Section 32 93 13 for other ground cover.
   C. Repair public and private facilities damaged by CONTRACTOR.

3.12 SURFACE FINISHING
   A. Roadway Trenches and Patches: Restore pavement patches per Section 33 05 25. Provide product and placement indicated in the following standard plans.
      1. APWA Plan 255 for bituminous pavement T-patch.
      2. APWA Plan 256 for concrete pavement patch.
   B. Landscapes: Restore landscaping as indicated and as follows where applicable.
      1. Section 32 92 00 for turf and grass cover.
      2. Section 32 93 13 for other ground cover.
   C. Repair public and private facilities damaged by CONTRACTOR.
3.13 COMMISSIONING
   A. Before surface finishing, commission pipeline per Section 33 08 00. Provide sizes and types of equipment connections and fittings that match pipe materials when pressure testing system.
   B. If paved surfaces must be kept open prior to commissioning, provide temporary paved surfaces.

3.14 CLEANING
   A. Remove debris, concrete, or other extraneous material that accumulates in existing piping or structures.
   B. Clean all pipelines after testing. Do not flush sand, gravel, concrete, debris or other materials into existing piping systems.

END OF SECTION