



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

**Division of Facilities Construction and Management**

**DFCM**

**STANDARD LOW BID PROJECT  
Project Budgets Over \$100,000**

**March 9, 2009**

**SOUTHWEST UTAH YOUTH CENTER  
PARKING LOT IMPROVEMENTS**

**DEPARTMENT OF HUMAN SERVICES**

**CEDAR CITY, UTAH**

DFCM Project Number 08199430

InSite Engineering, P.C.  
1883 West Royal Hunte Drive, #200  
Cedar City, Utah 84720

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Current copies of the following documents are hereby made part of these contract documents by reference. These documents are available on the DFCM web site at <http://dfcm.utah.gov> or are available upon request from DFCM.

DFCM Supplemental General Conditions dated July 15, 2008  
DFCM General Conditions dated May 25, 2005.  
DFCM Application and Certification for Payment dated May 25, 2005.

Technical Specifications:  
Drawings:

**The Agreement and General Conditions dated May 25, 2005 have been updated from versions that were formally adopted and in use prior to this date. The changes made to the General Conditions are identified in a document entitled Revisions to General Conditions that is available on DFCM's web site at <http://dfcm.utah.gov>**

# NOTICE TO CONTRACTORS

Sealed bids will be received by the Division of Facilities Construction and Management (DFCM) for:

**SOUTHWEST UTAH YOUTH CENTER PARKING LOT IMPROVEMENTS**  
**DEPARTMENT OF HUMAN SERVICES – CEDAR CITY, UTAH**  
**DFCM PROJECT NO: 08199430**

Bids will be in accordance with the Contract Documents that will be available on **Monday, March 9, 2009**, and distributed in electronic format only on CDs from DFCM, 4110 State Office Building, Salt Lake City, Utah and on the DFCM web page at <http://dfcm.utah.gov>. For questions regarding this project, please contact Brent Lloyd, DFCM, at 801-550-5882. No others are to be contacted regarding this bidding process. The construction estimate for this project is \$210,000.00.

A **mandatory** pre-bid meeting will be held at **10:00 AM** on **Thursday, March 12, 2009** at the Southwest Utah Youth Center located at 270 East 1600 North, Cedar City, Utah. All bidders wishing to bid on this project are required to attend this meeting.

Bids will be received until the hour of **3:00 PM** on **Wednesday, March 25, 2009** at DFCM, 4110 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. NOTE: Bids must be received at 4110 State Office Building by the specified time.

A bid bond in the amount of five percent (5%) of the bid amount, made payable to the Division of Facilities Construction and Management on DFCM's bid bond form, shall accompany the bid.

The Division of Facilities Construction and Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of DFCM.

**DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT**

Joanna Reese, Contract Coordinator  
4110 State Office Building, Salt Lake City, Utah 84114

## **PROJECT DESCRIPTION**

Located at the Southwest Utah Youth Center in Cedar City, Utah, the Contractor will be responsible for supply all material and labor to reconstruct the parking lot as detailed in the plans and specifications. The Base Bid portion of this project will consist of reconstruction of approx. 33,000 SF of parking lot with curb, gutter and sidewalk on a portion of the perimeter. Also included, will be installation of storm drain piping and collection boxes, landscape modifications and repairs, relocation of an existing fire hydrant and light pole, a 6' high masonry wall, and installation of a sewer grinding station.

Alternate bids to the project will include approx. 3,700 SF of additional paving, additional landscape improvements, and installation for a 20' X 20' storage shed.

The challenge in this project will be careful coordination and communication skills necessary to work with traffic needs of the facility. The Youth Center will be full operation and open to visitors during the entire project. The Contractor shall provide barricades insuring safety, delineating traffic routes and protecting the work area for the duration of the project.

**PROJECT SCHEDULE**

**PROJECT NAME: SOUTHWEST UTAH YOUTH CENTER PARKING LOT IMPROVEMENTS  
DEPARTMENT OF HUMAN SERVICES - CEDAR CITY, UTAH  
DFCM PROJECT NO. 08199430**

Event	Day	Date	Time	Place
Bidding Documents Available	Monday	March 9, 2009	2:00 PM	DFCM 4110 State Office Bldg SLC, UT and the DFCM web site *
<b>Mandatory</b> Pre-bid Site Meeting	Thursday	March 12, 2009	10:00 AM	Southwest Utah Youth Center, 270 East 1600 North, Cedar City, Utah
Last Day to Submit Questions	Tuesday	March 17, 2009	10:00 AM	Brent Lloyd – DFCM E-mail – brentlloyd@utah.gov Fax 801-538-3267
Addendum Deadline (exception for bid delays)	Thursday	March 19, 2009	2:00 PM	DFCM web site *
Prime Contractors Turn In Bid and Bid Bond	Wednesday	March 25, 2009	3:00 PM	DFCM 4110 State Office Bldg SLC, UT
Sub-contractor List Due	Thursday	March 26, 2009	3:00 PM	DFCM 4110 State Office Bldg SLC, UT Fax 801-538-3677
Substantial Completion Date	Tuesday	June 30, 2009		

\* **NOTE: DFCM's web site address is <http://dfcm.utah.gov>**



# BID FORM

NAME OF BIDDER \_\_\_\_\_ DATE \_\_\_\_\_

To the Division of Facilities Construction and Management  
4110 State Office Building  
Salt Lake City, Utah 84114

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **Southwest Utah Youth Center Parking Lot Improvements – Department of Human Services – Cedar City, Utah - DFCM Project #08199430** 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: \_\_\_\_\_

**BASE BID:** 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)

**ADDITIVE ALTERNATE #1** – Northeast Paving Area: 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)

**ADDITIVE ALTERNATE #2** – Entry Area Landscape: 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)

**ADDITIVE ALTERNATE #3** – 20' X 20' Storage Shed: 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)

I/We guarantee that the Work will be Substantially Complete by June 30, 2009, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$250.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

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

Enclosed is a 5% bid bond, as required, in the sum of \_\_\_\_\_

The undersigned Contractor's License Number for Utah is \_\_\_\_\_.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, 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.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management 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.

Type of Organization:

\_\_\_\_\_  
(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

Respectfully submitted,

\_\_\_\_\_  
Name of Bidder

ADDRESS:

\_\_\_\_\_

\_\_\_\_\_  
Authorized Signature

**State of Utah**  
**Southwest Utah Youth Center Parking Lot Improvements**  
**BASE BID UNIT PRICE PROPOSAL**

This bid form is to be used in conjunction with the construction drawings prepared by InSite Engineering. Contractor to supply all necessary labor and material to complete the project. The items and quantities for the bid are as follows:

<b>Base Bid</b>					
<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	Mobilization	L.S.	1	_____	_____
2.	Remove existing curb and gutter	L.F.	830	_____	_____
3.	Remove top 6" of soil in unpaved areas	L.S.	1	_____	_____
4.	Sawcut existing asphalt	L.F.	248	_____	_____
5.	Pulverize existing asphalt	S.F.	19,151	_____	_____
6.	Remove, stockpile, replace & re-compact ex. asphalt & road base	C.Y.	532	_____	_____
7.	Remove existing sheds and misc. concrete	L.S.	1	_____	_____
8.	Remove existing landscaping	L.S.	1	_____	_____
9.	Remove and replace existing Sidewalk on 1600 N.	L.F.	12	_____	_____
10.	15" CPP storm drain pipe	L.F.	243	_____	_____
11.	Double curb inlet box	Each	1	_____	_____
12.	2'x2' storm drain box	Each	4	_____	_____
13.	Remove and replace ex. storm drain box with 2'x2' storm drain box		Each	1	_____
14.	Core drill existing sump	L.S.	1	_____	_____
15.	Raise/Lower irrigation lid to grade	Each	1	_____	_____
16.	Raise/Lower valve to grade	Each	1	_____	_____
17.	Relocate existing fire hydrant	L.S.	1	_____	_____
18.	30" curb & gutter	L.F.	930	_____	_____



**Base Bid Continued**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
19.	6' sidewalk	L.F.	207	_____	_____
20.	8" curb	L.F.	68	_____	_____
21.	24" Over ex. and re-compact	C.Y.	3,910	_____	_____
22.	8" Road Base	S.F.	13,640	_____	_____
23.	3" Asphalt paving	S.F.	32,775	_____	_____
24.	3' Cross gutter	L.F.	382	_____	_____
25.	Gravel	Ton	138	_____	_____
26.	Grade existing dirt road to match	L.S.	1	_____	_____
27.	Concrete around ex. equipment	S.F.	509	_____	_____
28.	Relocate light pole	L.S.	1	_____	_____
29.	Muffin Monster grinder with accessories	L.S.	1	_____	_____
30.	Muffin Monster vault	L.S.	1	_____	_____
31.	4" drain line from Muffin Monster into ex. sewer lateral	L.S.	1	_____	_____
32.	Sewer cleanout	Each	1	_____	_____
33.	Run power for controls from Muffin Monster to control room	L.S.	1	_____	_____
34.	Parking lot striping	L.S.	1	_____	_____
35.	New sod	S.F.	2,000	_____	_____
36.	Relocate & repair sprinklers	L.S.	1	_____	_____
37.	4" conduits	L.F.	388	_____	_____
38.	Rock/diamond block retaining wall	L.S.	1	_____	_____
39.	6" Pipe bollards	Each	4	_____	_____

**Base Bid Continued**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
40.	Parking lot signs	Each	3	_____	_____
41.	6' Masonry Wall on Concrete Retaining Wall	L.F.	155	_____	_____

TOTAL BASE BID: \_\_\_\_\_

Where installed quantities differ from the estimated quantities, the Unit prices shall be used to determine the payment amount.

**Alternate 1 Northeast Paving Area**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	30" curb & gutter	L.F.	80	_____	_____
2.	24" Over ex. and re-compact	C.Y.	291	_____	_____
3.	8" Road Base	S.F.	3,695	_____	_____
4.	3" Asphalt paving	S.F.	3,695	_____	_____

TOTAL ALTERNATE 1 BID: \_\_\_\_\_

**Alternate 2 Entry Landscaping**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	Entry Landscaping	L.S.	1	_____	_____

TOTAL ALTERNATE 2 BID: \_\_\_\_\_

**Alternate 3 20' x 20' Shed**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	20'x20' shed w/overhead door	L.S.	1	_____	_____

TOTAL ALTERNATE 3 BID: \_\_\_\_\_

# 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 Invitation to Bid.

## 2. Bids

Before submitting a bid, each contractor 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 DFCM Representative and the necessary changes shall be accomplished by Addendum.

The bid, bearing original signatures, must be typed or handwritten in ink on the Bid Form provided in the procurement documents and submitted in a sealed envelope at the location specified by the Invitation to Bid prior to the deadline for submission of bids.

Bid bond security, in the amount of five percent (5%) of the bid, made payable to the Division of Facilities Construction and Management, shall accompany bid. **THE BID BOND MUST BE ON THE BID BOND FORM PROVIDED IN THE PROCUREMENT DOCUMENTS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID.**

If the bid bond security is submitted on a bid bond form other than DFCM's required bid bond form, and the bid security meets all other legal requirements, the bidder will be allowed to provide an acceptable bid bond by the close of business on the next business day following notification by DFCM of submission of a defective bid bond security. **NOTE: A cashier's check cannot be used as a substitute for a bid bond.**

## 3. Contract and Bond

The Contractor's Agreement will be in the form found in the specifications. The Contract Time will be as indicated in 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, upon the forms provided in the procurement documents. 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. Any bonding requirements for subcontractors will be specified in the Supplementary General Conditions.

**4. Listing of Subcontractors**

Listing of Subcontractors shall be as summarized in the “Instructions and Subcontractor’s List Form”, which are included as part of these Contract Documents. The Subcontractors List shall be delivered to DFCM or faxed to DFCM at (801)538-3677 within 24 hours of the bid opening. Requirements for listing additional subcontractors will be listed in the Contract Documents.

DFCM 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 DFCM Project Manager 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 DFCM’s web site at <http://dfcm.utah.gov>. Neither the DFCM nor A/E will be responsible for any other explanations or interpretations of the proposed documents. A/E shall be deemed to refer to the architect or engineer hired by DFCM as the A/E or Consultant for the Project.

**6. Addenda**

Addenda will be posted on DFCM’s web site at <http://dfcm.utah.gov>. 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. DFCM 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. DFCM Contractor Performance Rating**

As a contractor completes each DFCM project, DFCM, the architect/engineer and the using agency will evaluate project performance based on the enclosed “DFCM Contractor Performance Rating” form. The ratings issued on this project will not affect this project but may affect the award on future projects.

**9. 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.

**10. 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.

**11. Right to Reject Bids**

DFCM reserves the right to reject any or all Bids.

**12. Time is of the Essence**

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

**13. Withdrawal of Bids**

Bids may be withdrawn on written request received from 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.

**14. 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.

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

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

**16. 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 DFCM as part of the requirements for award of the Project.

**BID BOND**

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

**KNOW ALL PERSONS BY THESE PRESENTS:**

That \_\_\_\_\_ hereinafter referred to as the "Principal," and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, with its principal office in the City of \_\_\_\_\_ and authorized to transact business in this State and U. S. Department of the Treasury Listed, (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the STATE OF UTAH, hereinafter referred to as the "Obligee," in the amount of \$ \_\_\_\_\_ (5% of the accompanying bid), being the sum of this Bond to which payment the Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

**THE CONDITION OF THIS OBLIGATION IS SUCH** that whereas the Principal has submitted to Obligee the accompanying bid incorporated by reference herein, dated as shown, to enter into a contract in writing for the \_\_\_\_\_ Project.

**NOW, THEREFORE, THE CONDITION OF THE ABOVE OBLIGATION IS SUCH**, that if the said principal does not execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the principal, then the sum of the amount stated above will be forfeited to the State of Utah as liquidated damages and not as a penalty; if the said principal shall execute a contract and give bond to be approved by the Obligee for the faithful performance thereof within ten (10) days after being notified in writing of such contract to the Principal, then this obligation shall be null and void. It is expressly understood and agreed that the liability of the Surety for any and all defaults of the Principal hereunder shall be the full penal sum of this Bond. The Surety, for value received, hereby stipulates and agrees that obligations of the Surety under this Bond shall be for a term of sixty (60) days from actual date of the bid opening.

**PROVIDED, HOWEVER**, that this Bond is executed pursuant to provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to same extent as if it were copied at length herein.

**IN WITNESS WHEREOF**, the above bounden parties have executed this instrument under their several seals on the date indicated below, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

**DATED** this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_\_.

**Principal's name and address (if other than a corporation):**

\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

**Principal's name and address (if a corporation):**

\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_  
(Affix Corporate Seal)

**Surety's name and address:**

\_\_\_\_\_  
\_\_\_\_\_

By: \_\_\_\_\_  
Attorney-in-Fact (Affix Corporate Seal)

STATE OF \_\_\_\_\_ )  
 ) ss.  
COUNTY OF \_\_\_\_\_ )

On this \_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared before me \_\_\_\_\_, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

Subscribed and sworn to before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.  
My Commission Expires: \_\_\_\_\_  
Resides at: \_\_\_\_\_

**Agency:** \_\_\_\_\_  
**Agent:** \_\_\_\_\_  
**Address:** \_\_\_\_\_  
**Phone:** \_\_\_\_\_

\_\_\_\_\_  
NOTARY PUBLIC

Approved As To Form: May 25, 2005  
By Alan S. Bachman, Asst Attorney General



**Division of Facilities Construction and**

**INSTRUCTIONS AND SUBCONTRACTORS LIST FORM**

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM 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**

**PROJECTS UNDER \$500,000: ALL FIRST-TIER SUBS \$20,000 OR OVER MUST BE LISTED**  
**PROJECTS \$500,000 OR MORE: ALL FIRST-TIER SUBS \$35,000 OR OVER MUST BE LISTED**

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director 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, DFCM 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 Director 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 Director 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 Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for

**INSTRUCTIONS AND SUBCONTRACTORS LIST FORM**  
**Page No. 2**

such other reason in the best interest of the State of Utah. Notwithstanding any other provision in these instructions, if there is a good faith error on the sublist form, at the sole discretion of the Director, the Director may provide notice to the contractor and the contractor shall have 24 hours to submit the correction to the Director. 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 Director 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 State 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 Director 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 Director 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:

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONTRACTOR LICENSE #
ELECTRICAL	ABCD Electric Inc.	\$350,000.00	123456789000
LANDSCAPING	"Self" *	\$300,000.00	123456789000
CONCRETE (ALTERNATE #1)	XYZ Concrete Inc	\$298,000.00	987654321000
MECHANICAL	"Special Exception" (attach documentation)	Fixed at: \$350,000.00	(TO BE PROVIDED AFTER OBTAINING SUBCONTRACTOR)

\* 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.**



SUBCONTRACTORS LIST
FAX TO 801-538-3677

PROJECT TITLE: \_\_\_\_\_

Caution: You must read and comply fully with instructions.

Table with 4 columns: TYPE OF WORK, SUBCONTRACTOR, 'SELF' OR 'SPECIAL EXCEPTION', SUBCONTRACTOR BID AMOUNT, CONT. LICENSE #

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 OWNER'S REFUSAL TO ENTER INTO A WRITTEN CONTRACT WITH BIDDER. ACTION MAY BE TAKEN AGAINST BIDDERS BID BOND AS DEEMED APPROPRIATE BY OWNER. ATTACH A SECOND PAGE IF NECESSARY.

**CONTRACTOR'S AGREEMENT**

FOR:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

THIS CONTRACTOR'S AGREEMENT, made and entered into this \_\_\_\_ day of \_\_\_\_\_, 20\_\_, by and between the DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT, hereinafter referred to as "DFCM", and \_\_\_\_\_, incorporated in the State of \_\_\_\_\_ and authorized to do business in the State of Utah, hereinafter referred to as "Contractor", whose address is \_\_\_\_\_.

WITNESSETH: WHEREAS, DFCM intends to have Work performed at \_\_\_\_\_.

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

NOW, THEREFORE, DFCM 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 \_\_\_\_\_ and entitled "\_\_\_\_\_."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 and Supplemental General Conditions dated July 15, 2008 ("also referred to as General Conditions") on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are 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 DFCM or its authorized representative. The relationship of the Contractor to the DFCM hereunder is that of an independent Contractor.

**ARTICLE 2. CONTRACT SUM.** The DFCM agrees to pay and the Contractor agrees to accept in full performance of this Contractor's Agreement, the sum of \_\_\_\_\_ DOLLARS AND NO CENTS (\$\_\_\_\_\_.00), which is the base bid, and which sum also includes the cost of a 100% Performance Bond and a 100%

CONTRACTOR'S AGREEMENT  
PAGE NO. 2

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 DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

**ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY.** The Work shall be Substantially Complete by \_\_\_\_\_. Contractor agrees to pay liquidated damages in the amount of \$\_\_\_\_\_ per 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 DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM 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 or Subcontractor or suppliers at any tier, against the DFCM or 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 DFCM or its officers, employees or agents, except as expressly provided in the General Conditions. The Contractor may receive a written extension of time, signed by the DFCM, 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 (DFCM General Conditions, Supplementary and other Conditions), the Drawings, Specifications, Addenda and Modifications. The Contract Documents shall also include the bidding documents, including the Invitation to Bid, Instructions to Bidders/ Proposers and the Bid/Proposal, 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 DFCM 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 DFCM 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 safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM 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 DFCM'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 DFCM 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 DFCM 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 DFCM as well as compliance with the applicable provisions of the General Conditions.

Contractor shall respond immediately to any inquiry in writing by DFCM as to any concern of financial responsibility and DFCM reserves the right to request any waivers, 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 DFCM 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 DFCM 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. DFCM 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. DFCM'S RIGHT TO WITHHOLD CERTAIN AMOUNT AND MAKE USE THEREOF.** The DFCM may withhold from payment to the Contractor such amount as, in DFCM'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 DFCM may apply such withheld amounts for the payment of such claims in DFCM's discretion. In so doing, the DFCM shall be deemed the agent of Contractor and payment so made by the DFCM shall be considered as payment made under this Contractor's Agreement by the DFCM to the Contractor. DFCM 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 DFCM 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 DFCM, 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 DFCM.

**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 DFCM to cooperate with the DFCM and A/E and use the Contractor's best skill, efforts and judgment in furthering the interest of the DFCM; 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 DFCM.

**ARTICLE 15. AUTHORITY TO EXECUTE AND PERFORM AGREEMENT.** Contractor and DFCM 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.



**PERFORMANCE BOND**

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

That \_\_\_\_\_ hereinafter referred to as the "Principal" and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_, with its principal office in the City of \_\_\_\_\_ and authorized to transact business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah, hereinafter referred to as the "Obligee," in the amount of \_\_\_\_\_ DOLLARS (\$) \_\_\_\_\_ for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the Principal has entered into a certain written Contract with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, to construct \_\_\_\_\_ in the County of \_\_\_\_\_, State of Utah, Project No. \_\_\_\_\_, for the approximate sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), which Contract is hereby incorporated by reference herein.

**NOW, THEREFORE**, the condition of this obligation is such that if the said Principal shall faithfully perform the Contract in accordance with the Contract Documents including, but not limited to, the Plans, Specifications and conditions thereof, the one year performance warranty, and the terms of the Contract as said Contract may be subject to Modifications or changes, then this obligation shall be void; otherwise it shall remain in full force and effect.

No right of action shall accrue on this bond to or for the use of any person or corporation other than the state named herein or the heirs, executors, administrators or successors of the Owner.

The parties agree that the dispute provisions provided in the Contract Documents apply and shall constitute the sole dispute procedures of the parties.

**PROVIDED, HOWEVER**, that this Bond is executed pursuant to the Provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

**WITNESS OR ATTESTATION:**

**PRINCIPAL:**

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

(Seal)

Title: \_\_\_\_\_

**WITNESS OR ATTESTATION:**

**SURETY:**

\_\_\_\_\_

\_\_\_\_\_

By: \_\_\_\_\_

Attorney-in-Fact (Seal)

STATE OF \_\_\_\_\_ )  
 ) ss.  
COUNTY OF \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared before me \_\_\_\_\_, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney in-fact of the above-named Surety Company and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

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

My commission expires: \_\_\_\_\_

Resides at: \_\_\_\_\_

\_\_\_\_\_  
NOTARY PUBLIC

**Agency:** \_\_\_\_\_  
**Agent:** \_\_\_\_\_  
**Address:** \_\_\_\_\_  
**Phone:** \_\_\_\_\_

Approved As To Form: May 25, 2005  
By Alan S. Bachman, Asst Attorney General

**PAYMENT BOND**

(Title 63, Chapter 56, U. C. A. 1953, as Amended)

**KNOW ALL PERSONS BY THESE PRESENTS:**

That \_\_\_\_\_ hereinafter referred to as the "Principal," and \_\_\_\_\_, a corporation organized and existing under the laws of the State of \_\_\_\_\_ authorized to do business in this State and U. S. Department of the Treasury Listed (Circular 570, Companies Holding Certificates of Authority as Acceptable Securities on Federal Bonds and as Acceptable Reinsuring Companies); with its principal office in the City of \_\_\_\_\_, hereinafter referred to as the "Surety," are held and firmly bound unto the State of Utah hereinafter referred to as the "Obligee," in the amount of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_) for the payment whereof, the said Principal and Surety bind themselves and their heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

**WHEREAS**, the Principal has entered into a certain written Contract with the Obligee, dated the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, to construct \_\_\_\_\_ in the County of \_\_\_\_\_, State of Utah, Project No. \_\_\_\_\_ for the approximate sum of \_\_\_\_\_ Dollars (\$ \_\_\_\_\_), which contract is hereby incorporated by reference herein.

**NOW, THEREFORE**, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, 1953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

That said Surety to this Bond, for value received, hereby stipulates and agrees that no changes, extensions of time, alterations or additions to the terms of the Contract or to the Work to be performed thereunder, or the specifications or drawings accompanying same shall in any way affect its obligation on this Bond, and does hereby waive notice of any such changes, extensions of time, alterations or additions to the terms of the Contract or to the Work or to the specifications or drawings and agrees that they shall become part of the Contract Documents.

**PROVIDED, HOWEVER**, that this Bond is executed pursuant to the provisions of Title 63, Chapter 56, Utah Code Annotated, 1953, as amended, and all liabilities on this Bond shall be determined in accordance with said provisions to the same extent as if it were copied at length herein.

**IN WITNESS WHEREOF**, the said Principal and Surety have signed and sealed this instrument this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

**WITNESS OR ATTESTATION:**

\_\_\_\_\_

**PRINCIPAL:**

\_\_\_\_\_

By: \_\_\_\_\_ (Seal)

Title: \_\_\_\_\_

**WITNESS OR ATTESTATION:**

\_\_\_\_\_

**SURETY:**

\_\_\_\_\_

By: \_\_\_\_\_ Attorney-in-Fact (Seal)

STATE OF \_\_\_\_\_ )  
 ) ss.  
COUNTY OF \_\_\_\_\_ )

On this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, personally appeared before me \_\_\_\_\_, whose identity is personally known to me or proved to me on the basis of satisfactory evidence, and who, being by me duly sworn, did say that he/she is the Attorney-in-fact of the above-named Surety Company, and that he/she is duly authorized to execute the same and has complied in all respects with the laws of Utah in reference to becoming sole surety upon bonds, undertakings and obligations, and that he/she acknowledged to me that as Attorney-in-fact executed the same.

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

My commission expires: \_\_\_\_\_  
Resides at: \_\_\_\_\_

NOTARY PUBLIC

**Agency:** \_\_\_\_\_  
**Agent:** \_\_\_\_\_  
**Address:** \_\_\_\_\_  
**Phone:** \_\_\_\_\_

Approved As To Form: May 25, 2005  
By Alan S. Bachman, Asst Attorney General



CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT \_\_\_\_\_ PROJECT NO: \_\_\_\_\_

AGENCY/INSTITUTION \_\_\_\_\_

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 State of Utah can occupy the Project or specified area of the Project for the use for which it is intended.

The DFCM - (Owner) 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 DFCM 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 Owner 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. The amount withheld pending completion of the list of items noted and agreed to shall be: \$\_\_\_\_\_. If the list of items is not completed within the time allotted the Owner 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 Owner shall be promptly reimbursed for the balance of the funds needed to compensate the Owner.

CONTRACTOR (include name of firm) by: \_\_\_\_\_ (Signature) DATE

A/E (include name of firm) by: \_\_\_\_\_ (Signature) DATE

USING INSTITUTION OR AGENCY by: \_\_\_\_\_ (Signature) DATE

DFCM (Owner) by: \_\_\_\_\_ (Signature) DATE

**General Contractor Performance Rating Form**

Project Name:		DFCM Project#	
Contractor:  (ABC Construction, John Doe, 111-111-1111)	A/E:  (ABC Architects, Jane Doe, 222-222-2222)	Original Contract Amount:	Final Contract Amount:
DFCM Project Manager:		Contract Date:	
Completion Date:		Date of Rating:	

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

<b>1. Rate Contractors quality of workmanship, management of sub contractor performance, project cleanliness, organization and safety requirement.</b>	<b>Score</b>
<u>Agency Comments:</u>	
<u>A &amp; E Comments:</u>	
<u>DFCM Project Manager Comments:</u>	

<b>2. Rate Contractor administration of project costs, change orders and financial management of the project budget.</b>	<b>Score</b>
<u>Agency Comments:</u>	
<u>A &amp; E Comments:</u>	
<u>DFCM Project Manager Comments:</u>	

<b>3. Rate Contractor's performance and adherence to Project Schedule, delay procedures and requirements of substantial completion, inspection and punch-list performance.</b>	<b>Score</b>
<u>Agency Comments:</u>	
<u>A &amp; E Comments:</u>	
<u>DFCM Project Manager Comments:</u>	

<b>4. Evaluate performance of contractor management team including project manager, engineer and superintendent also include in the rating team's ability to work well with owner, user agency and consultants.</b>	<b>Score</b>
<u>Agency Comments:</u>	
<u>A &amp; E Comments:</u>	
<u>DFCM Project Manager Comments:</u>	

5. Rate success of Contractor's management plan, completion of the plans mitigation of project risks and performance of value engineering concepts.	Score
<u>Agency Comments:</u>	
<u>A &amp; E Comments:</u>	
<u>DFCM Project Manager Comments:</u>	

<b>Signed by:</b>	<b>Date:</b>	<b>Mean Score</b>
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**Additional Comments:**

**GENERAL SPECIFICATIONS**

**SOUTHWEST UTAH YOUTH CENTER**

**270 East 1600 North  
Cedar City, Utah**

**PARKING LOT IMPROVEMENTS  
DFCM PROJECT NO. 08199430**

February 20, 2009

Prepared by

InSite Engineering  
1883 W. Royal Hunte Dr. Suite 200  
Cedar City, Utah 84720  
(435) 867-4565

## BASE BID UNIT PRICE PROPOSAL

This bid form is to be used in conjunction with the construction drawings prepared by InSite Engineering. Contractor to supply all necessary fittings to complete the project. The items and quantities for the bid are as follows:

<b>Base Bid</b>			Estimated	Unit	
<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Price</u>	<u>Amount</u>
1.	Mobilization	L.S.	1	_____	_____
2.	Remove existing curb and gutter	L.F.	830	_____	_____
3.	Remove top 6" of soil in unpaved areas	L.S.	1	_____	_____
4.	Sawcut existing asphalt	L.F.	248	_____	_____
5.	Pulverize existing asphalt	S.F.	19,151	_____	_____
6.	Remove, stockpile, replace & re-compact ex. asphalt & road base	C.Y.	532	_____	_____
7.	Remove existing sheds and misc. concrete	L.S.	1	_____	_____
8.	Remove existing landscaping	L.S.	1	_____	_____
9.	Remove and replace existing Sidewalk on 1600 N.	L.F.	12	_____	_____
10.	15" CPP storm drain pipe	L.F.	243	_____	_____
11.	Double curb inlet box	Each	1	_____	_____
12.	2'x2' storm drain box	Each	4	_____	_____
13.	Remove and replace ex. storm drain box with 2'x2' storm drain box	Each	1	_____	_____
14.	Core drill existing sump	L.S.	1	_____	_____
15.	Raise/Lower irrigation lid to grade	Each	1	_____	_____
16.	Raise/Lower valve to grade	Each	1	_____	_____
17.	Relocate existing fire hydrant	L.S.	1	_____	_____
18.	30" curb & gutter	L.F.	930	_____	_____

**Base Bid Continued**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
19.	6' sidewalk	L.F.	207	_____	_____
20.	8" curb	L.F.	68	_____	_____
21.	24" Over ex. and re-compact	C.Y.	3,910	_____	_____
22.	8" Road Base	S.F.	13,640	_____	_____
23.	3" Asphalt paving	S.F.	32,775	_____	_____
24.	3' Cross gutter	L.F.	382	_____	_____
25.	Gravel	Ton	138	_____	_____
26.	Grade existing dirt road to match	L.S.	1	_____	_____
27.	Concrete around ex. equipment	S.F.	509	_____	_____
28.	Relocate light pole	L.S.	1	_____	_____
29.	Muffin Monster grinder with accessories	L.S.	1	_____	_____
30.	Muffin Monster vault	L.S.	1	_____	_____
31.	4" drain line from Muffin Monster into ex. sewer lateral	L.S.	1	_____	_____
32.	Sewer cleanout	Each	1	_____	_____
33.	Run power for controls from Muffin Monster to control room	L.S.	1	_____	_____
34.	Parking lot striping	L.S.	1	_____	_____
35.	New sod	S.F.	2,000	_____	_____
36.	Relocate & repair sprinklers	L.S.	1	_____	_____
37.	4" conduits	L.F.	388	_____	_____
38.	Rock/diamond block retaining wall	L.S.	1	_____	_____
39.	6" Pipe bollards	Each	4	_____	_____

**Base Bid Continued**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
40.	Parking lot signs	Each	3	_____	_____
41.	6' Masonry Wall on Concrete Retaining Wall	L.F.	155	_____	_____

TOTAL BASE BID: \_\_\_\_\_

Where installed quantities differ from the estimated quantities, the Unit prices shall be used to determine the payment amount.

**Alternate 1 Northeast Paving Area**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	30" curb & gutter	L.F.	80	_____	_____
2.	24" Over ex. and re-compact	C.Y.	291	_____	_____
3.	8" Road Base	S.F.	3,695	_____	_____
4.	3" Asphalt paving	S.F.	3,695	_____	_____

TOTAL ALTERNATE 1 BID: \_\_\_\_\_

**Alternate 2 Entry Landscaping**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	Entry Landscaping	L.S.	1	_____	_____

TOTAL ALTERNATE 2 BID: \_\_\_\_\_

**Alternate 3 20' x 20' Shed**

<u>Item</u>	<u>Description</u>	<u>Unit</u>	<u>Estimated Quantity</u>	<u>Unit Price</u>	<u>Amount</u>
1.	20'x20' shed w/overhead door	L.S.	1	_____	_____

TOTAL ALTERNATE 3 BID: \_\_\_\_\_

SECTION 00010

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SUMMARY OF WORK

MUFFIN MONSTER IN-LINE SEWER GRINDER SPECIFICATIONS

END OF TABLE OF CONTENTS

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 PROJECT DESCRIPTION

- A. The project consists of a new expanded parking lot and sewer grinder pump upgrade for the Southwest Utah Youth Center, located at 270 East and 1600 North in Cedar City, Utah according to the bid documents as prepared by InSite Engineering, dated February 2009.

- 1. The following description is an outline of the work to be accomplished and not meant to be a definitive scope of work; scope of work is defined by the complete set of contract documents.

- B. The Work consists of removing the existing asphalt paving, some curb and gutter, and landscape area. The new parking lot will be larger and include new curb and gutter, concrete cross gutter, asphalt paving, and sidewalks. A new sewer grinder pump will be installed on the existing sanitary sewer line from the complex. A storm drain line will be installed to carry the drainage water from the site to an existing storm drain box in 1600 North Street. A 6' masonry wall will be constructed along a portion of the property to screen the property. There will be some repair to irrigation sprinkler lines, relocating parking lot lights and fire hydrant relocation.

- 1. The Work includes site preparation, excavation, concrete, masonry walls, asphalt paving, storm drain lines and boxes.
  - 2. There is an alternate of providing some rock landscaping and a storage shed to the project.
  - 3. There will be a Base Bid.

1.3 CONTRACTOR USE OF PREMISES

- A. General: During the construction period the Contractor and subcontractors shall have use of the premises for construction operations. The use of the premises is limited only by the End User's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

- 1. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed without owner's approval.
  - 2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owner's employees at all times. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

1.4 END USER OCCUPANCY

- A. Partial Occupancy: The End User reserves the right to occupy and to place and install equipment in completed areas of the building, prior to Substantial Completion provided that such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the total Work.

#### 1.5 END USER CONSTRUCTED WORK

- A. Coordinate with the Owner and Project Manager/General Contractor where construction in this contract interfaces with work performed by the End User.
- B. Repair any damage to End User constructed items which occurs during the course of construction as a result of construction activity. Replace damaged items when repair is not possible to restore to the original undamaged condition or when required by Owner.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01400

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. SECTION INCLUDES

1. References and standards.
2. Mock-ups.
3. Control of installation.
4. Testing and inspection services.

B. RELATED REQUIREMENTS

1. Document 00700 - General Conditions: Inspections and approvals required by public authorities.
2. Section 01210 - Allowances: Allowance for payment of testing services.
3. Section 01300 - Administrative Requirements: Submittal procedures.
4. Section 01422 - Definitions,

1.2. REFERENCE STANDARDS

- A. ASTM C 1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2007a.

1.3. SUBMITTALS

- A. Testing Agency Qualifications: 1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.
- B. Test Reports: After each test/inspection, promptly submit two copies of report to Engineer.
1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with Contract Documents.
    - k. When requested by Owner or Engineer, provide interpretation of results.
  2. Test report submittals are for the Engineer's knowledge as contract administrator for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents, or for the owner's information.
- C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and or installation/application subcontractor to Engineer in quantities specified for Product Data.
1. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- D. Manufacturer's instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special

attention, and special environmental criteria required for application or installation.

- E. Erection Drawings: Submit drawings for Engineer's benefit as contract administrator or for Owner.
  - 1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.
  - 2. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

#### 1.4. REFERENCES AND STANDARDS

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

#### 1.5 TESTING AND INSPECTION AGENCIES

#### PART 2 PRODUCTS. NOT USED

#### PART 3 EXECUTION

##### 3.1 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have Work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

##### 3.2 MOCK-UPS

- A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by the Engineer and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

### 3.3 TESTING AND INSPECTION

- A. Testing Agency Duties:
  - 1. Test samples of mixes submitted by General Contractor .
  - 2. Provide qualified personnel at site. Cooperate with Engineer and Owner in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Engineer of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests and inspections required by Engineer.
  - 7. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Engineer or Owner.
  - 4. Agency has no authority to stop the Work.
- C. Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by beyond specified requirements.
  - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by beyond specified requirements.
- D. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by the Engineer.
- E. Retesting required because of non-conformance to specified requirements shall be paid for by ? .

### 3.4 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not conforming to specified requirements.
- B. If, in the opinion of the Engineer it is not practical to remove and replace the Work, the Engineer will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01422

DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result, Products may be new, never before used, or re-used materials or equipment.

D. Project Manual: This book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Temporary telecommunications services.
- B. Temporary sanitary facilities.
- C. Temporary Controls: Barriers, enclosures, and fencing.
- D. Security requirements.
- E. Vehicular access and parking.
- F. Waste removal facilities and services.
- G. Project identification sign.

1.02 RELATED REQUIREMENTS

- A.

1.03 TEMPORARY UTILITIES

- A. New permanent facilities may be used.
- B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.04 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services required for this project.

1.05 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.06 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public right-of-way and for public access to existing building,
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.07 VEHICULAR ACCESS AND PARKING

- A. Coordinate access and haul routes with governing authorities and Owner.

- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

**1.08 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

**1.09 PROJECT IDENTIFICATION**

- A. No signs are allowed without Owner's permission except those required by law.

**1.10 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore new permanent facilities used during construction to specified condition.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

SECTION 01510

TEMPORARY UTILITIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heat, ventilation, and water.

1.02 RELATED REQUIREMENTS

A. Section 01500 - Temporary Facilities and Controls:

1.03 TEMPORARY ELECTRICITY

A. Cost: By General Contractor.

B. Provide power outlets for construction operations, with branch wiring and distribution boxes located at each floor. Provide flexible power cords as required.

C. Provide main service disconnect and over-current protection at convenient location and meter.

D. Permanent convenience receptacles may be utilized during construction.

E. Provide adequate distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.

1.04 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

A. Provide and maintain incandescent lighting for construction operations to achieve a minimum lighting level of 2 watt/sq ft.

B. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps as required.

C. Maintain lighting and provide routine repairs.

1.05 TEMPORARY HEATING

A. Cost of Energy: By General Contractor.

B. Provide heating devices and heat as needed to maintain specified conditions for construction operations.

C. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in specifications.

D. Prior to operation of permanent equipment for temporary heating purposes, verify that the installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts. Cleaning or clearing of material in duct work shall be provided as necessary,

1.06 TEMPORARY WATER SERVICE

A. Cost of Water Used: by General Contractor as needed for construction.

**SOUTHWEST UTAH YOUTH CENTER PARKING LOT IMPROVEMENTS**  
DFCM PROJECT NO. 08199430

February 2009

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 02055

SOILS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Subsoil materials.
  - 2. Topsoil materials.
  
- B. Related Sections:
  - 1. Geotechnical Study.
  - 2. Section 02060 - Aggregate.
  - 3. Section 02311 - Rough Grading.
  - 4. Section 02320 - Backfill.
  - 5. Section 02324 - Trenching.
  - 6. Section: Subbase preparation.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
  
- B. ASTM International:
  - 1. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
  - 2. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

1.3 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.
  
- B. Materials Source: Submit name of imported materials source.
  
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Furnish each subsoil material from single source throughout the Work.

PART 2 – PRODUCTS

2.1 SUBSOIL MATERIALS

- A. Subsoil Type S1:
  - 1. Excavated and re-used material.
  - 2. Graded.
  - 3. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
  - 4. Conforming to ASTM D2487 Group Symbol GP.

## 2.2 SOURCE QUALITY CONTROL

- A. Section 01400 - Quality Control Services: Testing and Inspection Services Testing and analysis of soil material.
- B. Testing and Analysis of Subsoil Material: Perform in accordance with ASTM D1557.
- C. Testing and Analysis of Topsoil Material: Perform in accordance with ASTM D1557.
- D. When tests indicate materials do not meet specified requirements, change material and retest.
- E. Furnish materials of each type from same source throughout the Work.

## PART 3 – EXECUTION

### 3.1 EXCAVATION

- A. Excavate subsoil from areas designated. Strip topsoil to full depth of topsoil in designated areas.
- B. Stockpile excavated material meeting requirements for subsoil materials.
- C. Remove excess excavated materials not intended for reuse, from site.
- D. Remove excavated materials not meeting requirements for subsoil materials from site.

### 3.2 STOCKPILING

- A. Stockpile materials on site at locations designated by Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil 8 feet high maximum.
- E. Prevent intermixing of soil types or contamination.
- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- G. Stockpile unsuitable or hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

### 3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02060

AGGREGATE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Coarse aggregate materials.
  - 2. Fine aggregate materials.
  
- B. Related Sections:
  - 1. Geotechnical Study.
  - 2. Section 02055 - Soils: Fill and grading materials.
  - 3. Section 02311 - Rough Grading.
  - 4. Section 02320 - Backfill.
  - 5. Section 02324 - Trenching.
  - 6. Section 02512 - Site Water Distribution.
  - 7. Section 02538 - Sanitary Sewer System.
  - 8. Section 02540 - Septic Tank Systems.
  - 9. Section 02551 - Natural Gas Distribution.
  - 10. Section 02630 - Storm Drainage.
  - 11. Section 02721 - Aggregate Base Course.
  - 12. Section: Subbase preparation.

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
- B. ASTM International:
  - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - 2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3  - 3. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
  - 4. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.</sup>

1.3 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.
  
- B. Materials Source: Submit name of imported materials suppliers.
  
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material 5 from single source throughout the Work.

PART 2 - PRODUCTS

**2.1 COARSE AGGREGATE MATERIALS**

- A. Coarse Aggregate Type A1: Natural stone or crushed rock; free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, ASTM D2487 Group Symbol GM, GC; to the following limits:

1. Minimum Size: 1/2 inch (25 mm)
2. Maximum Size: 1 1/2 inch (50 mm)

Use for free draining gravel material, pipe foundation material as indicated on the Drawings.

- B. Coarse Aggregate Type A2: 1 1/2 inch minus angular, crushed, free of shale, clay, friable material and debris; graded in accordance with ANSI/ASTM C136, Group Symbol GW; within the following limits: (Alternative gradations will be considered)

Sieve Size Percent Passing

- 1 1/2 inch 100
- 1 inch 80 to 95
- 3/4 inch 75 to 85
- 1/2 inch 60 to 80
- 3/8 inch 55 to 75
- No. 4 35 to 60
- No. 10 25 to 45
- No. 50 8 to 25
- No. 200 2 to 8

Use for untreated base course material, structural foundation material and as shown on the Drawings.

- C. Coarse Aggregate Type A3: 3/4 inch minus angular, crushed, free of shale, clay, friable material and debris; graded in accordance with ANSI/ASTM C136; within the following limits: (Alternative gradations will be considered)

Sieve Size Percent Passing

- 3/4 inch 100
- 1/2 inch 75 to 95
- 3/8 inch 65 to 85
- No. 4 40 to 65
- No. 10 25 to 50
- No. 50 10 to 25
- No. 200 2 to 8

Use for pipe bedding material, pipe zone backfill and as shown on the Drawings.

- D. Coarse Aggregate Type A4: Durable material free of shale, clay, organic matter, friable material and debris meeting the following limits: (Alternative gradations will be considered)

Sieve Size Percent Passing

- 6 inches 100
- 4 inches 98 to 100
- 3 inches 95 to 100
- 2 inches 75 to 100
- 1 inch 40 to 80
- No. 4 25 to 60
- No. 200 5 to 12

Use for the granular base course, import trench backfill, structure backfill, site fill material, and where specified elsewhere and shown on the Drawings.

- E. Aggregate Type A5: Native material, free of organic material, friable materials and debris.  
Maximum allowable size is three (3) inches.  
Use for trench backfill and structure backfill.

## 2.2 FINE AGGREGATE MATERIALS

- A. Fine Aggregate Type A6 (Sand): Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter; graded in accordance with ASTM C136 ASTM D2487 Group Symbol SW SP; within the following limits:
  - Sieve Size Percent Passing
  - No.4 100
  - No.14 10 to 100
  - No.50 5 to 90
  - No.100 4 to 30
  - No.200 0

## 2.3 SOURCE QUALITY CONTROL

- A. Section 01400 - Quality Control Services: Testing and inspection services.
- B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557, ASTM D4318, ASTM C136.
- C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM D1557. ASTM D4318. ASTM C136.
- D. When tests indicate materials do not meet specified requirements, change material and retest.

## PART 3 – EXECUTION

### 3.1 EXCAVATION

- A. Stockpile excavated material meeting requirements for coarse aggregate materials and Fine aggregate materials.
- B. Remove excess excavated materials not intended for reuse, from site.
- C. Remove excavated materials not meeting requirements for coarse aggregate materials and fine aggregate materials from site.

### 3.2 STOCKPILING

- A. Stockpile materials on site at locations designated by Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.
- E. Stockpile unsuitable and hazardous materials on impervious material and cover to prevent erosion and leaching, until disposed of.

3.3 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 02220

EXCAVATING, BACKFILLING, AND COMPACTION

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Preparation
- B. Excavation
- C. Backfilling
- D. Compaction
- E. Dewatering
- F. Field Quality Control
- G. Cleaning Up

1.02 QUALITY ASSURANCE

- A. Comply with federal, state, and local codes and regulations.
- B. All working conditions shall be in accordance with the "Utah Occupational Safety and Health Division", Safe Practices for Excavation & Trenching Operations, latest edition, or other Laws or Regulations which apply.

1.03 REFERENCES

- A. Utah Occupational Safety and Health Division (UOSHD).
- B. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. Designation T-99
  - 2. Designation T-180
- C. American Society for Testing and Materials (ASTM)
  - 1. ASTM D-698
  - 2. ASTM D-1557

1.04 QUALITY ASSURANCE

- A. Cedar City requirements shall govern for all work in City right-of-ways:
  - 1. All work shall conform to the applicable standards, regulations, and requirements of Cedar City.
  - 2. Permits shall be obtained and paid for by the Contractor.

3. License and Permit Bond, without cancellation clause, in an amount and form prescribed by Cedar City, shall be provided by the Contractor in connection with his excavations and improvements in the City right of way.

**PART 2 PRODUCTS**

**2.01 FOUNDATION MATERIALS**

- A. All foundation materials shall be free from alkali, salt, and petroleum products, roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that in the opinion of the Soils Engineer may be objectionable or deleterious.

- B. Undisturbed soil foundation material:

1. Shall be natural trench bottom soil unless unable to adequately support pipe or structures.
2. Shall not be lumpy or frozen.

- C. Gravel:

1. Shall be hard, durable, broken stone or slag.
2. Shall be graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
1"	100
3/4"	85-100
1/2"	20-40
#4	10-20

- D. The recommendations of the soils engineer for gradations shall take precedence over typical gradations found herein.

**2.02 BEDDING MATERIALS**

- A. Sand Bedding Material:

1. Shall be free from alkali, salt, and petroleum products, roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that in the opinion of the Soils Engineer may be objectionable or deleterious.
2. Graded within the following limits:

<u>Seive Size</u>	<u>Percent Passing by Weight</u>
3/4"	100
#4	80-100
#10	30-50
#40	10-30
#200	0-15

3. The recommendations of the soil's engineer for gradations shall take precedence over typical gradations found herein.

**2.03 BACKFILL MATERIALS**

A. Granular backfill:

1. Shall be readily compactable and shall be free from alkali, salt, and petroleum products, roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that in the opinion of the Soils Engineer may be objectionable or deleterious.
2. Graded within the following limits:

<u>Seive Size</u>	<u>Percent Passing by Weight</u>
3 inch	100
No. 10	50 max.
No. 40	30 max.
No. 200	15 max.

3. May be select material from excavation if it will meet all requirements of granular backfill, including compaction requirements as specified for type of surface improvement above trench.
4. The recommendations of the soil's engineer for gradations shall take precedence over typical gradations found herein.

C. Excavated Soil Backfill Material:

1. Shall be free from alkali, salt, and petroleum products, roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that in the opinion of the Soils Engineer may be objectionable or deleterious.
2. Shall be select material from excavation, with no particle larger than 4 inches in diameter.
3. Use on-site materials only if specified compaction requirements can be met.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. It shall be the Contractor's sole responsibility to locate all (whether or not shown on the Drawings) existing water, sanitary sewer, storm drain, and gas lines, electrical and telephone conduit and other underground utilities with their existing house service connections, and all other underground structures in order that no damage or loss of service will result from interference with existing lines.
- B. Review all available drawings, notes, and information on the location of these underground lines and structures in determining the location of the existing facilities.
- C. Have an electronic pipe finder on the job at all times and mark all lines on the road ahead of the excavating machine.
- D. Blue Stakes Location Center shall be contacted 48 hours before any excavation is commenced. Phone 1-800-662-4111 for assistance.
- E. Mark with paint any existing cracks on concrete along which work will take place, in order to determine after the construction is completed whether such damage was caused by the operations of the Contractor or had occurred previously. Any concrete showing unmarked cracks upon completion of construction will be evidence of damage by the Contractor's forces, and shall be replaced or repaired to the satisfaction of the Owner of the damaged concrete, at the Contractor's own expense.

- F. All fences removed for excavation shall be returned to their original condition except that damaged portions will be replaced with new fencing at the Contractor's expense.
- G. Obtain all required permits.

### 3.02 EXCAVATION

- A. All gas, sanitary sewer, storm drain, water and other pipelines, flumes and ditches of metal, wood or concrete, underground electrical conduits and telephone cable, and all walks, curbs, and other improvements encountered in excavating trenches carefully shall be supported, maintained and protected from injury or interruption of service until backfill is complete and settlement has taken place.
- B. If any existing facility is damaged or interrupted, promptly after becoming aware thereof and before performing any Work affected thereby, identify the owner of such existing facility, and give written notice thereof to that owner and the Owner and Engineer. Indemnify the Owner from any and all damages resulting from damaged facilities.
- C. Excavation for pipe lines, concrete valve boxes, manholes and appurtenant structures shall include the work of removing all earth, sand, gravel, quicksand, stone, loose rock, solid rock, clay, shale, cement, hardpan, boulders, and all other materials necessary to be moved in excavating the trench for the pipe; maintaining the excavation by shoring, bracing, and sheeting or well pointing to prevent the sides of the trench from caving in while pipe laying is in progress; and removing sheeting from the trench after pipe has been laid.
- D. Trench support system shall be suitable for the soil structure, depth of cut, water content of soil, weather conditions, superimposed loads, vibration. Contractor may select one of the following methods of ensuring the safety of workers in the trench, as approved by the Utah State Industrial Commission or its safety inspectors:
  - 1. Sloping sides of trench to the angle of repose at which the soil will remain safely at rest.
  - 2. Shoring trench sides by placing sheeting, timber shores, trench jacks, bracing, piles, or other materials to resist pressures surrounding the excavation.
  - 3. Using a movable trench box built-up of steel plates and a heavy steel frame of sufficient strength to resist the pressures surrounding the excavation.
- E. All damage, injury or loss resulting from lack of adequate sheeting, bracing, and shoring shall be the responsibility of the Contractor; and the Contractor shall effect all necessary repairs or reconstruction resulting from such damage.
- F. Trenches shall be of the necessary width for proper laying of pipe. Care shall be taken not to over-excavate. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe along the entire length of the barrel of the pipe.
- G. Trenches shall be excavated to the depths shown on the Drawings, including any required allowances for the sewer rock foundation, when required, and for other pipe bedding requirements.

- H. Excess materials shall be hauled away from the construction site or otherwise disposed of by the Contractor as approved by the Engineer.

### 3.03 BACKFILLING

- A. The trenches shall not be backfilled until the utilities systems as installed conform to the requirements of the Drawings and Specifications. Where, in the opinion of the Engineer, damage is likely to result from withdrawing sheeting, the sheeting shall be left in place.
- B. Trenches shall be backfilled to the proper surface with material as shown or specified. Trenches improperly backfilled shall be reopened to the depth required for correction, then refilled and compacted as specified, or the condition shall be otherwise corrected as approved.
- C. Materials for trench backfill shall be as shown on the Drawings or in the soils report
- D. Each lift shall be evenly spread and moistened or dried by disk harrowing or other means so that the required density will be produced.
- E. Backfill around valves with Granular Backfill Material.
- F. Care shall be exercised so that when backfilling is complete and settlement has taken place, all existing pipes, flumes, ditches, conduits, cables, walks, curbs, and other improvements will be on the same alignment and grade as they were before work commenced.

### 3.04 COMPACTION

- A. Compaction shall be the responsibility of the Contractor. He shall select the methods to be used and carefully perform the work of backfilling and compaction so as to prevent damage to new or existing piping. Any new or existing piping damaged during the Contractor's work shall be replaced as directed by the Engineer with new piping.
- B. Backfill Compaction Requirements:
  - 1. Under pavements, or other surface improvements, the average density shall be 96% of laboratory maximum density with no individual test lower than 92% of the laboratory maximum density, as determined by AASHTO Designation T-180, and as specified by the Soils Engineer (ASTM D-1557).
  - 2. In shoulders and other unimproved areas, the average density shall be 90% of laboratory maximum density with no individual test lower than 86% of the laboratory maximum density, as determined by AASHTO Designation T-180 (ASTM D-1557).
- C. Compaction shall be performed in strict accordance with the manufacturer's recommendations for each type of pipe.
- D. Mechanical compaction: Shall be accomplished by the use of sheeps-foot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers of a size and type necessary to achieve the required degree of compaction.

### 3.05 DEWATERING

- A. The Contractor shall do all pumping, shall build all drains and do all the work necessary to keep the trench and pipes free from water during the progress of the work.
- B. In wet trenches, a channel shall be kept open along the side of the pipe for conducting the water to a sump hole, from which it shall be pumped out of the trench. No water shall be allowed to enter the pipe.

### 3.06 FIELD QUALITY CONTROL

- A. The Owner shall employ a testing laboratory to perform field and laboratory density tests, except that the Contractor shall make such additional tests, at his expense, as deemed necessary by him to assure that the work of compaction is performed properly, determine any adjustments in compacting equipment, thickness of layers, moisture content and compactive or other effort necessary to obtain the specified minimum relative density. Provide access to the work and all men and machinery necessary to aid the testing laboratory personnel in performing field density tests or taking samples for laboratory tests. In general, tests and samples shall be made as the work proceeds.
- B. The Owner shall have testing laboratory perform maximum density tests on materials to be compacted from samples submitted by Contractor taken from locations selected by the Soil's Engineer.
- C. The Owner shall have testing laboratory perform field density tests of compacted backfill materials. The approximate location and number of such tests shall be as shown on the drawings, as described in the Bid Form, or as selected by the Soil's Engineer. Field density tests shall be taken as follows:
  - 1. In planted or unimproved areas:
    - (a) 18" above the top of the pipe
    - (b) Finished grade
  - 2. In streets, roads, parking lots or other paved areas:
    - (a) 18" above the top of the pipe
    - (b) 24" to 36" below the gravel road base
    - (c) Gravel road base subgrade
    - (d) Top of gravel road base
    - (e) Top of bituminous surface course
- D. Copies of test results prepared by the testing laboratory shall be transmitted to the Contractor at the same time they are transmitted to the Engineer.
- E. Successful performance of compaction at the location of the field density test shall not relieve the Contractor of his responsibility to meet the specified density requirements for the complete project.

### 3.07 CLEANING UP

- A. The roadway, parking areas, including shoulders, slopes, ditches, and borrow pits shall be smoothly trimmed, and shaped by machinery, or other satisfactory methods, to the lines, grades and cross-sections, as established, and shall be so maintained until accepted. Any surplus material not suitable for spreading on the project shall be disposed of as specified above.

END OF SECTION

SECTION 02225

DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Section 01100 - Summary: Limitations on use of site and premises.
- B. Section 01500 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01700 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- D. Section 01732 - Waste Management: Limitations on disposal of removed materials; requirements for recycling.
- E. Section 02310 - Grading: Topsoil removal.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; ,2004.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fill Material: As specified in Section 02310 - Grading

PART 3 EXECUTION

3.0 SCOPE

- A. Remove paving and curbs as required to accomplish new work.
- B. Remove all improvements and existing items as shown on the plans,
- C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect, and maintain temporary barriers and security devices as required.
4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
5. Do not close or obstruct roadways or sidewalks without approval.
6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

D. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

E. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

### 3.03 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities that remain from future damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

### 3.04 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands,

END OF SECTION

SECTION 02230

SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated paving, curbs, and slabs.
3. Removing designated trees, shrubs, and other plant life.
4. Removing abandoned utilities.

B. Related Sections:

1. Section 02311 - Rough Grading.

1.2 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.

1.3 QUALITY ASSURANCE

- A. Conform to applicable code for environmental requirements and disposal of debris.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01040 – Project Coordination: Verification of existing conditions before starting work.

- B. Verify existing plant life designated to remain is tagged or identified.

3.2 PREPARATION

- A. Call Local Utility Line Information service at 800-662-4111 not less than two working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.

- B. Protect trees, plant growth, and features designated to remain, as final landscaping.

- C. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.4 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Partially remove paving, curbs, and, slabs as indicated on Drawings. Neatly saw cut edges at right angle to surface.
- C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

END OF SECTION

SECTION 02311

ROUGH GRADING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating subsoil.
2. Cutting, grading, filling, rough contouring, compacting, site for site structures, building pads, drainage and pavement.

B. Related Sections:

1. Section 02055 - Soils.
2. Section 02060 - Aggregate.
3. Section 02230 - Site Clearing: Excavating topsoil.
4. Section 02324 - Trenching: Trenching and backfilling for utilities.

1.2 REFERENCES

A. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics Of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
3. ASTM D2434 - Standard Test Method for Permeability of Granular Soils (Constant Head).
4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01300 - Submittals: Requirements for submittals.

B. Materials Source: Submit name of imported materials suppliers.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.4 CLOSEOUT SUBMITTALS

A. Section 01700 – Project Closeout: Requirements for submittals.

B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Subsoil Fill: Type S1 as specified in Section 02055.

B. Structural Fill: Type S1 A2 A4 as specified in Section 02055, 02060.

C. Granular Fill: Type A1 A2 A3 A4 A5 as specified in Section 02060.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify existing conditions before starting work with a site tour including the Engineer and Owner.
- B. Verify site conditions under provisions of Section 02230
- C. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

#### 3.2 PREPARATION

- A. Call Local Utility Line Information service at 800 662-4111 not less than two working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Protect utilities indicated to remain from damage.
- D. Protect bench marks, survey control point, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

#### 3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, re-landscaped, or re-graded.
- B. Do not excavate wet subsoil.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from site.

#### 3.4 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- C. Place material in continuous layers as follows:
  - 1. Subsoil Fill: Maximum 8 inches compacted depth. 95% max density.
  - 2. Structural Fill: Maximum 8 inches compacted depth. 95% max density.
  - 3. Granular Fill: Maximum 8 inches compacted depth. 95% max density.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.

F. Make grade changes gradual. Blend slope into level areas.

G. Repair or replace items indicated to remain damaged by excavation or filling.

### 3.5 TOLERANCES

A. Section 01400 - Quality Control Services: Tolerances.

B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

### 3.6 FIELD QUALITY CONTROL

A. Section 01400 - Quality Control Services: Testing and inspection services.

B. Perform laboratory material tests in accordance with ASTM D1557.

C. Perform in place compaction tests in accordance with the following:

1. Density Tests: or ASTM D2922.
2. Moisture Tests: ASTM D3017.

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Frequency of Tests: Pavement and Slabs - 1 test per lift per 1000 square feet  
Trenches - 1 test mid and top trench per 100 feet of trench.

END OF SECTION

SECTION 02324

TRENCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Geotechnical Study.
2. Section 02055 - Soils.
3. Section 02060 - Aggregate.
4. Section 02311 - Rough Grading: Topsoil and subsoil removal from site surface.
5. Section 02512 - Site Water Distribution: Water piping and bedding from building to booster pump.
6. Section 02538 - Sanitary Sewer System: Sanitary sewer piping and bedding from building to Manhole/septic tank
7. Section 02551 - Natural Gas Distribution: Gas piping and bedding from building to storage tank.
8. Section 02630 - Storm Drainage: Storm sewer piping and bedding from building to drain outlet
9. Section 03300 - Cast-in-Place Concrete: Concrete materials.

1.2 REFERENCES

A. ASTM International:

1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.4 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.

B. Materials Source: Submit name of imported fill materials suppliers.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

### 1.6 COORDINATION

- A. Section 01040 – Project Coordination: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

## PART 2 - PRODUCTS

### 2.1 BEDDING MATERIALS

- A. Type B1 - Pea Gravel: Natural stone; free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136, to the following:
  - 1. Minimum Size: 1/4 inch
  - 2. Maximum Size: 5/8 inch.
- B. Type B2 - Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, or organic matter; uniform in size with no material larger than 3/4".

### 2.2 FILL MATERIALS

- A. Subsoil Fill: Type S1 as specified in Section 02055.
- B. Structural Fill: Type S1 A2 A4 as specified in Section 02055. 02060.
- C. Granular Fill: Type A1 A3 as specified in Section 02060.

## PART 3 - EXECUTION

### 3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
  - 1. Architect/Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

### 3.2 PREPARATION

- A. Call Local Utility Line Information service at 800 662-4111 not less than two working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

### 3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, boulders, and rock up of 1/6 cubic yard, measured by volume.
- C. Perform excavation within 36 inches of existing utility service in accordance with utility's requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.
- E. Cut trenches 12" wider than the outer diameter of the utility. Remove water or materials that interfere with Work.
- F. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and utilities.
- G. Do not interfere with 45 degree bearing splay of foundations.
- H. When Project conditions permit, slope side walls of excavation as OSHA requires. When side walls cannot be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- I. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Architect/Engineer until suitable material is encountered.
- J. Cut out soft areas of subgrade not capable of compaction in place. Backfill with Fill Type A4 and compact to density equal to or greater than requirements for subsequent backfill material.
- K. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- L. Correct areas over excavated areas with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by Architect/Engineer.
- M. Remove excess subsoil not intended for reuse, from site.

### 3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 5 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

### 3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place material in continuous layers as follows:
  - 1. Subsoil Fill: Maximum 8 inches compacted depth.
  - 2. Structural Fill: Maximum 8 inches compacted depth.
  - 3. Granular Fill: Maximum 8 inches compacted depth.
- D. Employ placement method that does not disturb or damage, utilities in trench.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Do not leave more than 50 feet of trench open at end of working day.
- G. Protect open trench to prevent danger to Owner.

### 3.6 TOLERANCES

- A. Section 01400 - Quality Control Services: Tolerances.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

### 3.7 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Control Services: Testing and inspection services.
- B. Perform laboratory material tests in accordance with ASTM D1557.
- C. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: or ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.
- E. Frequency of Tests: 1 Test mid and top of trench every 100 feet.

### 3.8 PROTECTION OF FINISHED WORK

- A. Section 01700 – Project Closeout: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

### 3.9 SCHEDULE

- A. Storm, Sanitary Piping and Utilites:
  - 1. Cover pipe and bedding with Fill Type S1,A4,A5: To subgrade elevation.
  - 2. Compact uniformly to minimum 95 percent of maximum density.

END OF SECTION

SECTION 02510 - WATER DISTRIBUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes water-distribution piping and related components outside the building for combined water service and fire-service mains.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

1.3 DEFINITIONS

- A. EPDM: Ethylene propylene diene terpolymer rubber.
- B. LLDPE: Linear, low-density polyethylene plastic.
- C. PA: Polyamide (nylon) plastic.
- D. PE: Polyethylene plastic.
- E. PP: Polypropylene plastic.
- F. PVC: Polyvinyl chloride plastic.
- G. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
- H. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
  - 1. Wiring Diagrams: Power, signal, and control wiring for alarms.

- C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For water valves and specialties to include in emergency, operation, and maintenance manuals.

#### 1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
  - 1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
  - 2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
  - 3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
- B. Piping materials shall bear label, stamp, or other markings of specified testing agency.
- C. 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.
- D. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
- E. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
- F. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
- G. NSF Compliance:
  - 1. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
  - 2. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.

- B. During Storage: Use precautions for valves, including fire hydrants, according to the following:
  - 1. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
  - 2. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
- D. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- E. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
- F. Protect flanges, fittings, and specialties from moisture and dirt.
- G. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

#### 1.7 PROJECT CONDITIONS

- A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
  - 1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of water-distribution service without Construction Manager's written permission.

#### 1.8 COORDINATION

- A. Coordinate connection to water main with Southern Utah University Facilities Management.

### PART 2 - PRODUCTS

#### 2.1 COPPER TUBE AND FITTINGS

- A. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.
  - 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
  - 2. Copper, Pressure-Seal Fittings:

- a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - 1) Viega; Plumbing & Heating Systems.
  - c. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
  - d. NPS 2-1/2 to NPS 4 :Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
- B. Hard Copper Tube: ASTM B 88, Type K, water tube, drawn temper.
- 1. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
  - 2. Copper, Pressure-Seal Fittings:
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Viega; Plumbing & Heating Systems.
    - c. NPS 2 and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
    - d. NPS 2-1/2 to NPS 4 : Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
- C. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
- D. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

## 2.2 DUCTILE-IRON PIPE AND FITTINGS

- A. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
  - 1. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  - 2. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.

1. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
  2. Gaskets: AWWA C111, rubber.
- C. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
1. Grooved-End, Ductile-Iron Pipe Appurtenances:
    - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - b. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Anvil International, Inc.
      - 2) Victaulic Company of America.
    - c. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
    - d. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
- D. Flanges: ASME 16.1, Class 125, cast iron.

## 2.3 PE PIPE AND FITTINGS

- A. PE, ASTM Pipe: ASTM D 2239, SIDR No. 5.3, 7, or 9; with PE compound number required to give pressure rating not less than 200 psig.
1. Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
  2. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- B. PE, AWWA Pipe: AWWA C906, DR No. 7.3, 9, or 9.3; with PE compound number required to give pressure rating not less than 200 psig.
1. PE, AWWA Fittings: AWWA C906, socket- or butt-fusion type, with DR number matching pipe and PE compound number required to give pressure rating not less than 200 psig.
- C. PE, Fire-Service Pipe: ASTM F 714, AWWA C906, or equivalent for PE water pipe; FMG approved, with minimum thickness equivalent to FMG Class 150.
1. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.

2.4 PVC PIPE AND FITTINGS

- A. PVC, Schedule 40 Pipe: ASTM D 1785.
  - 1. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
- B. PVC, Schedule 80 Pipe: ASTM D 1785.
  - 1. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
  - 2. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.
- C. PVC, AWWA Pipe: AWWA C900, Class 150, with bell end with gasket, and with spigot end.
  - 1. Comply with UL 1285 for fire-service mains if indicated.  
PVC Fabricated Fittings: AWWA C900, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  - 2. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
  - 3. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Gaskets: AWWA C111, rubber.
  - 4. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
    - a. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.5 SPECIAL PIPE FITTINGS

- A. Ductile-Iron Rigid Expansion Joints:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. EBAA Iron, Inc.
    - b. U.S. Pipe and Foundry Company.
  - 3. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
    - a. Pressure Rating: 250 psig minimum.

**B. Ductile-Iron Flexible Expansion Joints:**

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. EBAA Iron, Inc.
  - b. Hays Fluid Controls; a division of ROMAC Industries Inc.
  - c. Star Pipe Products.
3. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
  - a. Pressure Rating: 250 psig minimum.
  - b.

**C. Ductile-Iron Deflection Fittings:**

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. EBAA Iron, Inc.
3. Description: Compound, ductile-iron coupling fitting with sleeve and 1 or 2 flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
  - a. Pressure Rating: 250 psig minimum.

**2.6 JOINING MATERIALS**

- A. Refer to Division 2 Section "Piped Utilities - Basic Materials and Methods" for commonly used joining materials.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series.
- C. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- D. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

2.7 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
  
- B. Tubular-Sleeve Pipe Couplings:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Cascade Waterworks Manufacturing.
    - b. Dresser, Inc.; Dresser Piping Specialties.
    - c. Ford Meter Box Company, Inc. (The); Pipe Products Div.
    - d. Hays Fluid Controls; a division of ROMAC Industries Inc.
    - e. JCM Industries.
    - f. Smith-Blair, Inc.
    - g. Viking Johnson.
  - 3. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
    - a. Standard: AWWA C219.
    - b. Center-Sleeve Material: Manufacturer's standard.
    - c. Gasket Material: Natural or synthetic rubber.
    - d. Pressure Rating: 150 psig minimum.
    - e. Metal Component Finish: Corrosion-resistant coating or material.
  
- C. Split-Sleeve Pipe Couplings:
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Victaulic Depend-O-Lok.
  - 3. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
    - a. Standard: AWWA C219.
    - b. Sleeve Material: Manufacturer's standard.
    - c. Sleeve Dimensions: Of thickness and width required to provide pressure rating.
    - d. Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
    - e. Pressure Rating: 150 psig minimum.
    - f. Metal Component Finish: Corrosion-resistant coating or material.

D. Flexible Connectors:

1. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
2. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.

E. Dielectric Fittings: Combination of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.

1. Dielectric Unions: Factory-fabricated union assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
2. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig minimum working pressure to suit system pressures.
3. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
  - a. Provide separate companion flanges and steel bolts and nuts for 150- or 300-psig (minimum working pressure to suit system pressures).
4. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and 300-psig minimum working pressure at 225 deg F.
5. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types, and 300-psig minimum working pressure at 225 deg F.

2.8 GATE VALVES

A. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. American AVK Co.; Valves & Fittings Div.
  - b. American Cast Iron Pipe Co.; American Flow Control Div.
  - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - d. Crane Co.; Crane Valve Group; Stockham Div.
  - e. East Jordan Iron Works, Inc.
  - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).

- g. McWane, Inc.; Kennedy Valve Div.
  - h. McWane, Inc.; M & H Valve Company Div.
  - i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
  - j. Mueller Co.; Water Products Div.
  - k. NIBCO INC.
  - l. U.S. Pipe and Foundry Company.
4. Nonrising-Stem, Metal-Seated Gate Valves:
- a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
    - 1) Standard: AWWA C500.
    - 2) Minimum Pressure Rating: 200 psig.
    - 3) End Connections: Mechanical joint.
    - 4) Interior Coating: Complying with AWWA C550.
5. Nonrising-Stem, Resilient-Seated Gate Valves:
- a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 200 psig.
    - 3) End Connections: Mechanical joint.
    - 4) Interior Coating: Complying with AWWA C550.
6. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
- a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
    - 1) Standard: AWWA C509.
    - 2) Minimum Pressure Rating: 250 psig.
    - 3) End Connections: Push on or mechanical joint.
    - 4) Interior Coating: Complying with AWWA C550.
7. OS&Y, Rising-Stem, Metal-Seated Gate Valves:
- a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.
    - 1) Standard: AWWA C500.
    - 2) Minimum Pressure Rating: 200 psig.
    - 3) End Connections: Flanged.
8. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
- a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.

- 1) Standard: AWWA C509.
- 2) Minimum Pressure Rating: 200 psig.
- 3) End Connections: Flanged.

B. UL/FMG, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. American Cast Iron Pipe Co.; American Flow Control Div.
  - b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - c. Crane Co.; Crane Valve Group; Stockham Div.
  - d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  - e. McWane, Inc.; Kennedy Valve Div.
  - f. McWane, Inc.; M & H Valve Company Div.
  - g. Mueller Co.; Water Products Div.
  - h. NIBCO INC.
  - i. U.S. Pipe and Foundry Company.
4. UL/FMG, Nonrising-Stem Gate Valves:
  - a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.
    - 1) Standards: UL 262 and FMG approved.
    - 2) Minimum Pressure Rating: 175 psig.
    - 3) End Connections: Flanged.
5. OS&Y, Rising-Stem Gate Valves:
  - a. Description: Iron body and bonnet and bronze seating material.
    - 1) Standards: UL 262 and FMG approved.
    - 2) Minimum Pressure Rating: 175 psig .
    - 3) End Connections: Flanged.

C. Bronze Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Crane Co.; Crane Valve Group; Crane Valves.
  - b. Crane Co.; Crane Valve Group; Jenkins Valves.
  - c. Crane Co.; Crane Valve Group; Stockham Div.
  - d. Hammond Valve.
  - e. Milwaukee Valve Company.
  - f. NIBCO INC.
  - g. Red-White Valve Corporation.
4. OS&Y, Rising-Stem Gate Valves:
- a. Description: Bronze body and bonnet and bronze stem.
    - 1) Standards: UL 262 and FMG approved.
    - 2) Minimum Pressure Rating: 175 psig.
    - 3) End Connections: Threaded.
5. Nonrising-Stem Gate Valves:
- a. Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.
    - 1) Standard: MSS SP-80.

## 2.9 GATE VALVE ACCESSORIES AND SPECIALTIES

### A. Tapping-Sleeve Assemblies:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - b. East Jordan Iron Works, Inc.
  - c. Flowserve.
  - d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  - e. McWane, Inc.; Kennedy Valve Div.
  - f. McWane, Inc.; M & H Valve Company Div.
  - g. Mueller Co.; Water Products Div.
  - h. U.S. Pipe and Foundry Company.
4. Description: Sleeve and valve compatible with drilling machine.
  - a. Standard: MSS SP-60.

- b. Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
  - c. Valve: AWWA, cast-iron, nonrising-stem, resilient-seated gate valve with one raised face flange mating tapping-sleeve flange.
- B. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately 5 inches in diameter.
- 1. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
- C. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.
- 2.10 CHECK VALVES
- A. AWWA Check Valves:
- 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. American AVK Co.; Valves & Fittings Div.
    - b. American Cast Iron Pipe Co.; American Flow Control Div.
    - c. APCO Willamette; Valve and Primer Corporation.
    - d. Crane Co.; Crane Valve Group; Crane Valves.
    - e. Crane Co.; Crane Valve Group; Stockham Div.
    - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
    - g. McWane, Inc.; Kennedy Valve Div.
    - h. McWane, Inc.; M & H Valve Company Div.
    - i. Mueller Co.; Water Products Div.
    - j. NIBCO INC.
    - k. Watts Water Technologies, Inc.
  - 4. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
    - a. Standard: AWWA C508.
    - b. Pressure Rating: 175 psig .
- B. UL/FMG, Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - b. Crane Co.; Crane Valve Group; Stockham Div.
  - c. Globe Fire Sprinkler Corporation.
  - d. Kidde Fire Fighting.
  - e. MATCO-NORCA, Inc.
  - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  - g. McWane, Inc.; Kennedy Valve Div.
  - h. Mueller Co.; Water Products Div.
  - i. NIBCO INC.
  - j. Reliable Automatic Sprinkler Co., Inc.
  - k. Tyco Fire & Building Products.
  - l. United Brass Works, Inc.
  - m. Victaulic Company of America.
  - n. Viking Corporation.
  - o. Watts Water Technologies, Inc.
4. Description: Swing-check type with pressure rating; rubber-face checks, unless otherwise indicated; and ends matching piping.
  - a. Standards: UL 312 and FMG approved.
  - b. Pressure Rating: 175 psig.

## 2.11 DETECTOR CHECK VALVES

### A. Detector Check Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Badger Meter, Inc.
  - c. FEBCO; SPX Valves & Controls.
  - d. Globe Fire Sprinkler Corporation.
  - e. McWane, Inc.; Kennedy Valve Div.
  - f. Mueller Co.; Hersey Meters.
  - g. Victaulic Company of America.

- h. Viking Corporation.
  - i. Watts Water Technologies, Inc.
4. Description: Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
- a. Standards: UL 312 and FMG approved.
  - b. Pressure Rating: 175 psig.
  - c. Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
5. Description: Iron body, corrosion-resistant clapper ring and seat ring material, flanged ends, with connections for bypass and installation of water meter.
- a. Standards: UL 312 and FMG approved.
  - b. Pressure Rating: 175 psig.

## 2.12 BUTTERFLY VALVES

### A. AWWA Butterfly Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. DeZURIK/Copes-Vulcan; a unit of SPX Corporation.
  - b. Milliken Valve Company.
  - c. Mosser Valve; a division of Olson Technologies, Inc.
  - d. Mueller Co.; Water Products Div.
  - e. Pratt, Henry Company.
  - f. Val-Matic Valve & Manufacturing Corp.
4. Description: Rubber seated.
  - a. Standard: AWWA C504.
  - b. Body: Cast or ductile iron.
  - c. Body Type: Flanged.
  - d. Pressure Rating: 150 psig.

### B. UL Butterfly Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. McWane, Inc.; Kennedy Valve Div.
  - b. Milwaukee Valve Company.
  - c. Mueller Co.; Water Products Div.
  - d. NIBCO INC.
  - e. Pratt, Henry Company.
4. Description: Metal on resilient material seating.
  - a. Standards: UL 1091 and FMG approved.
  - b. Body: Cast or ductile iron.
  - c. Body Type: Flanged.
  - d. Pressure Rating: 175 psig.

## 2.13 PLUG VALVES

### A. Plug Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. DeZURIK/Copes-Vulcan; a unit of SPX Corporation.
  - b. Homestead Valve; a division of Olson Technologies, Inc.
  - c. Milliken Valve Company.
  - d. McWane, Inc.; M & H Valve Company Div.
  - e. Pratt, Henry Company.
  - f. Val-Matic Valve & Manufacturing Corp.
4. Description: Resilient-seated eccentric.
  - a. Standard: MSS SP-108.
  - b. Body: Cast iron.
  - c. Pressure Rating: 175-psig minimum CWP.
  - d. Seat Material: Suitable for potable-water service.

2.14 PRESSURE-REDUCING VALVES

A. Water Regulators:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Cash Acme; a division of The Reliance Worldwide Corporation.
  - b. Conbraco Industries, Inc.
  - c. Honeywell Water Controls.
  - d. Watts Water Technologies, Inc.
  - e. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Standard: ASSE 1003.
5. Pressure Rating: Initial pressure of 150 psig.

B. Water Control Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. CLA-VAL Automatic Control Valves.
  - b. Flomatic Corporation.
  - c. OCV Control Valves.
  - d. Watts Regulator Co.; Ames Fluid Control Systems.
  - e. Watts Regulator Co.; Watts ACV Division.
  - f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Description: Pilot-operation, diaphragm-type, single-seated main water control valve with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot control valve, restrictor device, specialty fittings, and sensor piping.
  - a. Pressure Rating: Initial pressure of 150 psig minimum.
  - b. Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.

2.15 RELIEF VALVES

A. Air-Release Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Crispin-Multiplex Manufacturing Co.
  - b. GA Industries, Inc.
  - c. Val-Matic Valve & Manufacturing Corp.
4. Description: Hydromechanical device to automatically release accumulated air.
  - a. Standard: AWWA C512.
  - b. Pressure Rating: 300 psig .
  - c. Body Material: Cast iron.
  - d. Trim Material: Stainless steel

B. Air/Vacuum Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Crispin-Multiplex Manufacturing Co.
  - b. GA Industries, Inc.
  - c. Val-Matic Valve & Manufacturing Corp.
4. Description: Direct-acting, float-operated, hydromechanical device with large orifice to automatically release accumulated air or to admit air during filling of piping.
  - a. Standard: AWWA C512.
  - b. Pressure Rating: 300 psig.
  - c. Body Material: Cast iron.
  - d. Trim Material: Stainless steel.

C. Combination Air Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Crispin-Multiplex Manufacturing Co.
  - b. GA Industries, Inc.
  - c. Val-Matic Valve & Manufacturing Corp.
4. Description: Float-operated, hydromechanical device to automatically release accumulated air or to admit air.
  - a. Standard: AWWA C512.
  - b. Pressure Rating: 300 psig.
  - c. Body Material: Cast iron.
  - d. Trim Material: Stainless steel.

## 2.16 VACUUM BREAKERS

### A. Pressure Vacuum Breaker Assembly:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Conbraco Industries, Inc.
  - c. FEBCO; SPX Valves & Controls.
  - d. Flomatic Corporation.
  - e. Toro Co. (The); Irrigation Division.
  - f. Watts Water Technologies, Inc.
  - g. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Standard: ASSE 1020.
5. Operation: Continuous-pressure applications.
6. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
7. Accessories: Ball valves on inlet and outlet.

## 2.17 BACKFLOW PREVENTERS

### A. Reduced-Pressure-Principle Backflow Preventers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Conbraco Industries, Inc.
  - c. FEBCO; SPX Valves & Controls.
  - d. Flomatic Corporation.
  - e. Watts Water Technologies, Inc.
  - f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Standard: AWWA C511.
5. Operation: Continuous-pressure applications.
6. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.

**B. Double-Check, Backflow-Prevention Assemblies:**

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Conbraco Industries, Inc.
  - c. FEBCO; SPX Valves & Controls.
  - d. Flomatic Corporation.
  - e. Watts Water Technologies, Inc.
  - f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Standard: AWWA C510.
5. Operation: Continuous-pressure applications, unless otherwise indicated.
6. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.

**C. Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies:**

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Ames Fire & Waterworks; a division of Watts Regulator Co.
  - b. Conbraco Industries, Inc.
  - c. FEBCO; SPX Valves & Controls.
  - d. Watts Water Technologies, Inc.
  - e. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Standards: ASSE 1047 and UL listed or FMG approved.
  5. Operation: Continuous-pressure applications.
  6. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
  7. Accessories:
    - a. Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.
    - b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
    - c. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.
- D. Double-Check, Detector-Assembly Backflow Preventers:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
    - a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    - b. Conbraco Industries, Inc.
    - c. FEBCO; SPX Valves & Controls.
    - d. Watts Water Technologies, Inc.
    - e. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
  4. Standards: ASSE 1048 and UL listed or FMG approved.
  5. Operation: Continuous-pressure applications.
  6. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
  7. Accessories:
    - a. Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.
    - b. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.
- E. Backflow Preventer Test Kits:
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. Conbraco Industries, Inc.
  - b. FEBCO; SPX Valves & Controls.
  - c. Flomatic Corporation.
  - d. Watts Water Technologies, Inc.
  - e. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
4. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

## 2.18 FIRE HYDRANTS

### A. Dry-Barrel Fire Hydrants:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
  - a. American AVK Co.; Valves & Fittings Div.
  - b. American Cast Iron Pipe Co.; American Flow Control Div.
  - c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
  - d. American Foundry Group, Inc.
  - e. East Jordan Iron Works, Inc.
  - f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
  - g. McWane, Inc.; Kennedy Valve Div.
  - h. McWane, Inc.; M & H Valve Company Div.
  - i. Mueller Co.; Water Products Div.
  - j. Troy Valve; a division of Penn-Troy Manufacturing, Inc.
  - k. U.S. Pipe and Foundry Company.
4. Description: Freestanding, with one NPS 4-1/2 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
  - a. Standard: AWWA C502.
  - b. Pressure Rating: 150 psig minimum.
5. Description: Freestanding, with one NPS 4-1/2 and two NPS 2-1/2 outlets, 5-1/4-inch main valve, drain valve, and NPS 6 mechanical-joint inlet. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
  - a. Standards: UL 246, FMG approved.

- b. Pressure Rating: 150 psig minimum.
- c. Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
- d. Operating and Cap Nuts: Pentagon, 1-1/2 inches point to flat.
- e. Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
- f. Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Refer to Division 2 Section "Earthwork" for excavating, trenching, and backfilling.

#### 3.2 PIPING APPLICATIONS

- A. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
- B. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
- C. Do not use flanges or unions for underground piping.
- D. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
- E. Underground water-service piping NPS 3/4 to NPS 3 shall be the following:
  - 1. Soft copper tube, ASTM B 88, Type wrought-copper, solder-joint fittings; and brazed joints.
- F. Underground water and fire-service piping NPS 4 to NPS 8 shall be the following:
  - 1. Ductile-iron, push-on-joint pipe; and gasketed mechanical-joint pipe; ductile-iron, mechanical-joint fittings; joints.

#### 3.3 VALVE APPLICATIONS

- A. General Application: Use mechanical-joint-end valves for NPS 3 and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for NPS 2 and smaller installation.
- B. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Underground Valves, NPS 3 and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
2. Underground Valves, NPS 4 and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
3. Use the following for valves in vaults and aboveground:
  - a. Gate Valves, NPS 2 and Smaller: Bronze, nonrising stem.
  - b. Gate Valves, NPS 3 and Larger: AWWA, cast iron,
  - c. Check Valves: AWWA C508, swing type.
4. Pressure-Reducing Valves: Use for water-service piping in vaults and aboveground to control water pressure.
5. Relief Valves: Use for water-service piping in vaults and aboveground.
  - a. Air-Release Valves: To release accumulated air.
  - b. Air/Vacuum Valves: To release or admit large volume of air during filling of piping.
  - c. Combination Air Valves: To release or admit air.
6. Detector Check Valves: Use for water-service piping in vaults and aboveground to detect unauthorized use of water.

### 3.4 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. See Division 2 Section "Piped Utilities - Basic Materials and Methods" for piping-system common requirements.

### 3.5 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with utility company for tap of size and in location indicated in water main.
- B. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
- C. Make connections larger than NPS 2 with tapping machine according to the following:
  1. Install tapping sleeve and tapping valve according to MSS SP-60.
  2. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
  3. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
  4. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
- D. Make connections NPS 2 and smaller with drilling machine according to the following:
  1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.

2. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
  3. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
  4. Install corporation valves into service-saddle assemblies.
  5. Install manifold for multiple taps in water main.
  6. Install curb valve in water-service piping with head pointing up and with service box.
- E. Comply with NFPA 24 for fire-service-main piping materials and installation.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
  2. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
- F. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
1. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
- G. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
- H. Bury piping with depth of cover over top at least 36 inches.
- I. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- J. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
1. Terminate water-service piping at 5' outside of building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
- K. Mechanical sleeve seals are specified in Division 15 Section "Basic Mechanical Materials and Methods."
- L. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
- M. See Division 13 Section "Fire-Suppression Piping" for fire-suppression-water piping inside the building.
- N. See Division 15 Section "Domestic Water Piping" for potable-water piping inside the building.
- 3.6 JOINT CONSTRUCTION
- A. See Division 2 Section "Piped Utilities - Basic Materials and Methods" for basic piping joint construction.
- B. Make pipe joints according to the following:

1. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
5. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
6. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
7. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.
8. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 2 Section "Piped Utilities - Basic Materials and Methods" for joining piping of dissimilar metals.

### 3.7 ANCHORAGE INSTALLATION

- A. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
  1. Concrete thrust blocks.
  2. Locking mechanical joints.
  3. Set-screw mechanical retainer glands.
  4. Bolted flanged joints.
  5. Heat-fused joints.
  6. Pipe clamps and tie rods.
- B. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
  1. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
  2. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
  3. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
  4. Fire-Service-Main Piping: According to NFPA 24.
- C. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

### 3.8 VALVE INSTALLATION

- A. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

- B. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
- C. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
- D. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
- E. MSS Valves: Install as component of connected piping system.
- F. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
- G. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves.
- H. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.

### 3.9 DETECTOR-CHECK VALVE INSTALLATION

- A. Install in vault or aboveground.
- B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- C. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.

### 3.10 VACUUM BREAKER ASSEMBLY INSTALLATION

- A. Install pressure vacuum breaker assemblies of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install pressure vacuum breaker assemblies in vault or other space subject to flooding.

### 3.11 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.
- D. Support NPS 2-1/2 and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.

3.12 FIRE HYDRANT INSTALLATION

- A. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
- B. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
- C. AWWA Fire Hydrants: Comply with AWWA M17.
- D. UL/FMG Fire Hydrants: Comply with NFPA 24.

3.13 CONNECTIONS

- A. Piping installation requirements are specified in other Division 2 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. See Division 2 Section "Piped Utilities - Basic Materials and Methods" for piping connections to valves and equipment.
- C. Connect water-distribution piping to existing water main with tee and gate valve.
- D. Connect water-distribution piping to interior domestic water and fire-suppression piping.
- E. Ground equipment according to Division 16 Section "Grounding and Bonding."
- F. Connect wiring according to Division 16 Section "Conductors and Cables."

3.14 FIELD QUALITY CONTROL

- A. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
- B. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
  - 1. Increase pressure in 50-psig increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to 0 psig. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
- C. Prepare reports of testing activities.

3.15 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 2 Section "Earthwork."

- B. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 2 Section "Piped Utilities - Basic Materials and Methods" for identifying devices.

### 3.16 CLEANING

- A. Clean and disinfect water-distribution piping as follows:
  - 1. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
  - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
    - a. Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
    - b. Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
    - c. After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
    - d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

END OF SECTION 02510

SECTION 02516

DISINFECTION OF WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes disinfection of potable water distribution system; and testing and reporting results.
- B. Related Sections:
  - 1. Section 02512 - Site Water Distribution Product and Execution requirements for installation, testing, of site domestic water distribution piping.
  - 2. Section 15410 - Plumbing Fixtures: Disinfection of building domestic water piping system.

1.2 REFERENCES

- A. American Water Works Association:
  - 1. AWWA B300 - Hypochlorites.
  - 2. AWWA B302 - Ammonium Sulfate.
  - 3. AWWA B303 - Sodium Chlorite.
  - 4. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
  - 5. AWWA C651 - Disinfecting Water Mains.

1.3 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.
- B. Product Data: Submit procedures, proposed chemicals, and treatment levels for review.
- C. Test Reports: Indicate results comparative to specified requirements.
- D. Certificate: Certify cleanliness of water distribution system meets or exceeds specified requirements.

1.4 CLOSEOUT SUBMITTALS

- A. Section 01700 – Project Closeout: Requirements for submittals.
- B. Disinfection Report:
  - 1. Type and form of disinfectant used.
  - 2. Date and time of disinfectant injection start and time of completion.
  - 3. Test locations.
  - 4. Name of person collecting samples.
  - 5. Initial and 24 hour disinfectant residuals in treated water in ppm for each outlet tested.
  - 6. Date and time of flushing start and completion.
  - 7. Disinfectant residual after flushing in ppm for each outlet tested.
- C. Bacteriological Report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.

2. Time and date of water sample collection.
3. Name of person collecting samples.
4. Test locations.
5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
6. Coliform bacteria test results for each outlet tested.
7. Certify water conforms, or fails to conform, to bacterial standards of authority having jurisdiction.

D. Water Quality Certificate: Certify water conforms to quality standards of City of Brigham City, suitable for human consumption.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AWWA C651.

#### 1.6 QUALIFICATIONS

- A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years documented experience.
- B. Testing Firm: Company specializing in testing potable water systems, certified by State of Utah.
- C. Submit bacteriologist's signature and authority associated with testing.

### PART 2 - PRODUCTS

#### 2.1 DISINFECTION CHEMICALS

- A. Chemicals: AWWA B300, Hypochlorite, AWWA B301, Ammonium Sulfate, and AWWA B303, Sodium Chlorite.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Section 01040 – Project Coordination: Verification of existing conditions before starting work.
- B. Verify piping system has been cleaned, inspected, and pressure tested.
- C. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

#### 3.2 INSTALLATION

- A. Provide and attach required equipment to perform the Work of this section.
- B. Perform disinfection of water distribution system and installation of system and pressure testing. Refer to Section 02512.
- C. Introduce treatment into piping system.
- D. Maintain disinfectant in system for 24 hours.

E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.

F. Replace permanent system devices removed for disinfection.

### 3.3 FIELD QUALITY CONTROL

A. Section 01050 – Field Engineering: Field inspecting, testing, adjusting, and balancing.

B. Disinfection, Flushing, and Sampling:

1. Disinfect pipeline installation in accordance with AWWA C651. Use of liquid chlorine is not permitted
2. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.
3. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.
4. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

END OF SECTION

SECTION 02525

CURBS ,GUTTERS, RAMPS, AND WALKS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment, materials, labor, tools, and transportation and other items required to provide and install subgrade preparation, drainage course placement, formwork, and placement and finishing of portland cement concrete curbs, gutters, walks and drive aprons.
- B. Protection of newly constructed curbs, gutters, drive aprons and walks.
- C. Curing provisions.

1.02 RELATED WORK

- A. Section 02230 - Base Course
- B. Section 03200 - Concrete Formwork
- C. Section 03300 - Cast in Place Concrete

1.03 QUALITY ASSURANCE

- A. Use workmen thoroughly trained and experienced in placing and finishing the type of work specified.
- B. Comply with applicable federal, state, and local codes and regulation.
- C. Comply with hot or cold weather requirements.
- D. Concrete work shall be warranted against defects in materials or workmanship for a period of two (2) years, subject to applicable laws and regulations. In no case shall the Work be warranted for less than one (1) year.

1.04 REFERENCES

- A. American Concrete Institute (ACI)
  - 1. Manual of Concrete Practice, 1985, Part 2:
    - a. ACI 305R-77- Hot Weather Concreting
    - b. ACI 306R-78 - Cold Weather Concreting
    - c. ACI 318 - Building Code Requirements
- B. American Society for Testing and Materials (ASTM)
  - 1. D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction
  - 2. C150 - Portland Cement

- 3. C33 - Concrete Aggregates
- 4. C94 - Ready Mixed Concrete

C. American Association of State Highway and Transportation Officials (AASHTO)

D. Federal Standard (FS)

#### 1.05 SUBMITTALS

- A. Submit concrete trip tickets to Owner's representative at the time of delivery to the site.
- B. Submit mix design in accordance with Section 03300.
- C. Submit construction, expansion, and contraction joint layout plan for approval.
- D. Submit manufacturers data for all products proposed.

#### 1.06 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

- A. Furnish and Install Curb and Gutter. Measurement and payment will be based upon the in-place lineal footage of concrete receiving curb and gutter installed with 8" of compacted base course. Such payment shall include the costs of compacted road base material, fiber mesh reinforcement, and all labor, materials, tools and equipment needed to complete this work.
- B. Furnish and Install 4" Thick Concrete Sidewalk. Measurement and payment will be based upon the in-place square footage of concrete slab installed with 8" of compacted base course. Such payment shall include the costs of compacted road base and concrete materials and all labor, materials, tools and equipment needed to complete this work.

#### 1.07 DELIVERY AND HANDLING

- A. Ready mixed concrete shall be delivered to the site only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be not more than ninety (90) minutes when ambient temperatures are below 80° F and not more than sixty (60) minutes when ambient temperatures are above 80° F.
- B. Concrete which has reached initial set prior to placement, or retempered concrete is not acceptable, shall not be used in the Work, and shall be promptly removed from the project site.

#### 1.08 PROJECT CONDITIONS

- A. Concreting operations shall not be performed when air temperature at the project site falls below 40° F.
- B. Concreting operations shall not be performed when air temperature at the project site rises above 105° F.

### PART 2 PRODUCTS

#### 2.01 CONCRETE MATERIALS AND MIXTURE

- A. Shall be in accordance with Section 03300.
- B. Cement shall comply with the requirements of ASTM C150, Type II.
- C. Coarse Aggregate shall comply with the requirements of ASTM C33 and Section 03300 of these specifications.
- D. Fine Aggregate shall comply with the requirements of ASTM C33 and Section 03300 of these specifications.
- E. Admixtures shall not be allowed in portland cement concrete with the following exceptions:
  - 1. Air Entraining Admixture shall comply with the requirements of ASTM C260.
- F. Concrete curing compound shall comply with ASTM C309, Type II, Class A and shall restrict moisture loss to 0.055 gr./sq.cm when applied at a rate of 200 sq.ft./gal.
- G. Mix design shall comply with Section 03300 of these specifications.

## 2.02 JOINT MATERIALS

- A. Filler material shall be pre-formed, non-extruding resilient type conforming to the requirements of ASTM D544 of appropriate thickness to fill joint.
- B. Joint sealant shall be polyurethane based, self leveling, one part elastomeric sealant complying with the requirements of FS-TT-S00230 Class A, Type I unless Type II is recommended for the intended application by the sealant manufacturer.
- C. Select joint materials of sufficient strength, hardness and durability to withstand stiletto heel traffic without damage or deterioration.

## 2.03 REINFORCEMENT

- A. Reinforcement shall comply with the requirements of Section 03100 of these specifications.

## 2.04 FORMWORK

- A. Formwork shall comply with the requirements of Section 03200 of these specifications.

## 2.05 EQUIPMENT

- A. Equipment for placing concrete shall comply with the requirements of Section 03300 of these specifications.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Remove all wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed. Concrete shall not be placed on frozen ground or in standing water.
- B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.

- C. Thoroughly wet the forms (except in freezing weather), or oil them; remove all standing water.
- D. Thoroughly clean all transporting and handling equipment.
- E. Notify the Owner at least 24 hours before placing concrete.
- F. Obtain the Engineer's approval of location of construction, expansion, or control joints prior to the start of concrete placement.
- G. Verify that reinforcement is free of loose mill scale, mud, paint, oil, grease, or other materials which may hinder proper bonding of concrete to reinforcement.

### 3.02 PLACING STEEL REINFORCEMENT

- A. Steel reinforcement shall be placed in accordance with the requirements of Section 03100 of these specifications.

### 3.03 PLACING CONCRETE

- A. Concrete shall be placed in accordance with the requirements of Section 03300 of these specifications.

### 3.04 SIDEWALK, DRIVEWAY, AND CURB AND GUTTER JOINTS

- A. Locate all joints according to the approved joint plan, making all joints perpendicular and straight.
- B. Joints for existing structures or paving removed or damaged as a result of the Work shall be replaced, matching joints in original structure as closely as possible.
- C. Expansion Joints
  1. Expansion joints in sidewalks shall be one half inch (1/2") in thickness and shall be placed where sidewalk joins existing walks, fixed objects, and at curbs at all handicap ramps using premolded expansion joint filler. Expansion joints shall not be spaced greater than 50' on center. Dowel bars are not required at expansion joints unless indicated on the drawings.
  2. Expansion joints in curb and gutter shall be one half inch (1/2") in thickness and shall be placed between curb and gutter and storm drain structures, at changes in direction, or at intervals not exceeding 50' using premolded expansion joint filler.
  3. Joint sealant shall be installed over all expansion joints. Provide and install bond breaker per the manufacturer's recommendations.

#### D. Contraction Joints

1. Sidewalks
  - a. Contraction joints shall be installed at intervals equal to the width of sidewalk using steel plates not less than 1/8" nor more than 1/4" in thickness.
  - b. Remove steel plates once concrete has reached initial set.
  - c. Tooled joints shall be rounded to provide a neat, workmanlike appearance.
  - d. Joints may be provided by cutting into fresh concrete to a minimum depth of 1/4 of the walk thickness. Cut joints shall be straight and perpendicular to walk.

2. Curb and Gutter

- a. Contraction joints shall be installed according to the approved joint plan using steel templates not less than 1/8" nor more than 3/16" in thickness.
- b. Remove steel templates once concrete has reached initial set.
- c. Curb and gutter placed by slipform methods shall have joints installed every 10' by cutting into fresh concrete to a depth not less than 1-1/2". Round such joints to provide a neat workmanlike appearance.

- E. Inspect joints upon removal of forms to verify that concrete or mortar has not sealed across the joint. Cut neatly and remove any such concrete or mortar in the joint.

3.05 HOT WEATHER CONCRETING

- A. Hot weather concreting shall be performed in accordance with Section 03300 of these specifications.

3.06 COLD WEATHER CONCRETING

- A. Cold weather concreting shall be performed in accordance with Section 03300 of these specifications.

3.07 FINISHING

- A. Concrete surfaces shall be finished smooth and true to grade by float. The finishing shall commence immediately after the concrete is placed and shall progress at a rate equal to the paving operation. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the mixing operations until the finishing is resumed.
- B. Hand methods of strike off and consolidation will only be permitted when the width of pavement to be constructed is less than 10 feet or at rounded intersection where the use of machine finishing is impractical.
- C. While the concrete is still plastic the entire slab surface shall be tested by the Contractor for trueness with an accurate 10 foot straightedge. Any depressions found shall be immediately filled with fresh concrete, struck off, reconsolidated, and finished. High spots shall be struck off and refinished.
- D. In advance of curing operations the pavement shall be textured by brooming. Owner shall be notified 24 hours in advance of placing and brooming operations in order to be present to review and recommend modifications to placement and finishing.

E. Finished Surface

1. The finished surface shall be true to grade and cross section, free from ruts, humps, depressions or other irregularities. The surface shall not deviate from line and grade by more than 1/8" in 10'. The determination of compliance with smoothness may be made with a straightedge or string line at the option of the Engineer. Any irregularities found shall be corrected by the Contractor using suitable grinding or grooving tools and equipment.
2. The grinding tool shall consist of a machine equipped with cutting wheels mounted on a horizontal shaft. The grinding action shall be conducted parallel to the centerline. Grinding operations may be

deferred, as directed by the Engineer, whenever tearing of aggregate with the surface occurs and shall not be resumed until the concrete has hardened sufficiently to avoid tearing.

3. The finished surface across contact joints shall not deviate from a straight line by more than 1/8" in 12" when tested with a straightedge. The Contractor shall take the necessary precautions to prevent slumping of the edge of the concrete at contact joints.
4. Line and Grade Control:
  - a. Contractor shall establish references at suitable intervals for line and grade control of the placing operations.
    1. Contractor shall furnish, place and maintain such supports, wire devices and materials that may be required to provide continuous line and grade reference controls to the placing machine, trimmers, or paver.

### 3.07 CURING

A. Protect placed concrete from the effects of hot or cold weather as required under Section 03300 of these specifications.

B. Membrane Curing Compound

1. Surfaces of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.
2. The curing compound shall be delivered to the work in ready mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.
3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100° F, unless otherwise specified by the manufacturer's recommendations.
4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 100 square feet, unless otherwise specified by the manufacturer's recommendations.
5. In the event that the application of curing compound is delayed, the application of water spray, ponding, or soaked tarps shall be started immediately and shall be continued until application of the compound is started or resumed.

### 3.08 PROTECTION

A. Contractor shall protect the concrete against all damage and markings.

B. Erect and maintain suitable barricades and barriers to protect the finished surface. Any sections damaged from traffic or other causes prior to final acceptance shall be removed, replaced, or repaired to the Owner's satisfaction at no additional expense to the Owner.

C. Concrete surface shall be protected against pitting or damage due to rain.

END OF SECTION

SECTION 02538

SANITARY SEWER PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Gravity sanitary sewage pipe.
2. Low pressure sanitary sewage pipe.
3. Underground pipe markers.
4. Bedding and cover materials.

B. Related Sections:

1. Section 02060 - Aggregate: Aggregate for backfill in trenches.
2. Section 02324 - Trenching: Execution requirements for trenching required by this section.

1.2 REFERENCES

A. ASTM International:

1. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft<sup>3</sup> (2,700 kN-m/m<sup>3</sup>)).
2. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications.
3. ASTM D2729 - Standard Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
4. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
5. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
6. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
8. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DRPR) Based on Controlled Outside Diameter.
9. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

1.3 DEFINITIONS

- A. Bedding: Fill placed under, beside and directly over pipe, prior to subsequent backfill operations.

1.4 SUBMITTALS

- A. Section 01300 - Submittals: Requirements for submittals.

- B. Product Data: Submit data on pipe materials, pipe fittings, valves and accessories.

- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01700 – Project Closeout: Requirements for submittals.
- B. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.
- C. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

### 1.6 FIELD MEASUREMENTS

- A. Verify field measurements and elevations are as indicated.

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 – Materials and Equipment: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver and store valves in shipping containers with labeling in place.

### 1.8 COORDINATION

- A. Section 01040 – Project Coordination: Coordination and project conditions.
- B. Coordinate the Work with termination of sanitary sewer connection outside building, connection to municipal sewer utility service, and trenching.

## PART 2 PRODUCTS

### 2.1 GRAVITY SANITARY SEWAGE PIPE

- A. Plastic Pipe: ASTM D3034, Type PSM, Poly (Vinyl Chloride) (PVC) material; inside nominal diameter as indicated on the plans, bell and spigot style rubber ring sealed gasket joint.
  - 1. Fittings: PVC.
  - 2. Joints: ASTM F477, elastomeric gaskets.

### 2.2 UNDERGROUND PIPE MARKERS

- A. Magnetic Locator Tape: Identification tape shall be furnished with white or black printing on a blue color field having the words CAUTION: Name of Utility - BELOW. All pipe shall include a 3-inch magnetic locator tape installed in the pipeline trench approximately 12 inches below ground surface.

### 2.3 CLEANOUTS

- A. Sewer pipe cleanouts are for Gravity Sanitary Sewage Pipe and are to be constructed of the same class and specification of materials as the pipe they serve.
- B. Cleanouts are to be constructed as shown on Detail in Drawings.
- C. Cleanouts for 4" pipe are to be spaced no more than every 100 feet.

### 2.4 BEDDING AND COVER MATERIALS

- A. Bedding: Fill Type A3, B1, B2 as specified in Section 02055, 02060, 02324.
- B. Cover: Fill Type A2, A3, A4, A5, A6, as specified in Section 02060.

- C. Soil Backfill from Above Pipe to sub grade: Soil Type S1, A2, A3, A4, A5 as specified in Section 02055,2060.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Section 01040 – Project Coordination: Verification of existing conditions before starting work.
- B. Verify trench cut excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on Drawings.

#### 3.2 PREPARATION

- A. Correct over excavation with fine aggregate.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

#### 3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 02324 for Work of this Section.
- B. Backfill around sides and to top of pipe in accordance with Section 02324.
- C. Maintain optimum moisture content of fill material to attain required compaction density.
- D. Place fill material in accordance with Section 02324.

#### 3.4 INSTALLATION - GRAVITY SANITARY SEWAGE PIPE

- A. Install Gravity Sanitary Sewage Pipe, fittings, and accessories in accordance with ASTM D2321. Seal joints watertight.
- B. Lay Gravity Sanitary Sewage Pipe to slope gradients noted on Drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches.
- D. Refer to Section 02324 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.
- E. Install a 3-inch magnetic locator tape in the pipeline trench approximately 8 inches below ground surface.
- F. Install site sanitary sewage system piping to 5 feet of building. Connect to building sanitary waste system. Refer to Plumbing Specifications.
- G. Install cleanouts in laterals at a maximum of 100' apart and as shown on drawings.
- H. All sanitary sewer construction to be according to Hurricane City and Ash Creek Improvement District requirements and specifications.

#### 3.5 FIELD QUALITY CONTROL

**SOUTHWEST UTAH YOUTH CENTER PARKING LOT IMPROVEMENTS**

DFCM PROJECT NO. 08199430

February 2009

- A. Section 01400 - Quality Control Services and 01700 – Project Closeout: Field inspecting, testing, adjusting, and balancing.
- B. Compaction Testing for Bedding: In accordance with ASTM D1557. ASTM D2922. ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Compaction Tests: See Section 02324.

**3.6 PROTECTION OF FINISHED WORK**

- A. Section 01700 – Project Closeout: Requirements for protecting finished Work.
- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 02630  
STORM DRAINAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Pipe and fittings.
  - 2. Nonpressure transition couplings.
  - 3. Expansion joints and deflection fittings.
  - 4. Cleanouts.
  - 5. Drains.
  - 6. Encasement for piping.
  - 7. Manholes.
  - 8. Channel drainage systems.
  - 9. Catch basins.
  - 10. Stormwater inlets.
  - 11. Pipe outlets.
  - 12. Stormwater disposal systems.

1.3 DEFINITIONS

- A. PVC: Polyvinyl Chloride pipe and fittings.
- B. HDPE: High Density Polyethylene pipe and fittings.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control reports.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.

- B. Protect pipe, pipe fittings, and seals from dirt and damage.
- C. Handle manholes according to manufacturer's written rigging instructions.
- D. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

## 1.6 PROJECT CONDITIONS

- A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
  - 1. Notify Construction Manager and Owner no fewer than two days in advance of proposed interruption of service.
  - 2. Do not proceed with interruption of service without Construction Manager's written permission.

## PART 2 - PRODUCTS

### 2.1 ABS PIPE AND FITTINGS

- A. ABS Sewer Pipe and Fittings: ASTM D 2751, with bell-and-spigot ends for gasketed joints.
  - 1. NPS 3 to NPS 6: SDR 35.
  - 2. NPS 8 to NPS 12: SDR 42.
- B. Gaskets: ASTM F 477, elastomeric seals.

### 2.2 HDPE PIPE AND FITTINGS

- A. Corrugated HDPE Drainage Pipe and Fittings NPS 3 to NPS 10: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
  - 1. Silttight Couplings: HDPE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
  - 2. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
- B. Corrugated HDPE Pipe and Fittings NPS 12 to NPS 60: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
  - 1. Silttight Couplings: HDPE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
  - 2. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

2.3 PVC PIPE AND FITTINGS

A. PVC Gravity Sewer Piping:

1. Pipe and Fittings: ASTM F 679, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.

2.4 NONPRESSURE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Dallas Specialty & Mfg. Co.
  - b. Fernco Inc.
  - c. Logan Clay Pipe.
  - d. Mission Rubber Company; a division of MCP Industries, Inc.
  - e. NDS Inc.
  - f. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
2. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Shielded, Flexible Couplings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Cascade Waterworks Mfg.
  - b. Dallas Specialty & Mfg. Co.
  - c. Mission Rubber Company; a division of MCP Industries, Inc.
2. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

E. Ring-Type, Flexible Couplings:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Fernco Inc.

- b. Logan Clay Pipe.
  - c. Mission Rubber Company; a division of MCP Industries, Inc.
2. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

## 2.5 CLEANOUTS

### A. Plastic Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Canplas LLC.
  - b. IPS Corporation.
  - c. NDS Inc.
  - d. Plastic Oddities; a division of Diverse Corporate Technologies, Inc.
  - e. Sioux Chief Manufacturing Company, Inc.
  - f. Zurn Light Commercial Products Operation; Zurn Plumbing Products Group.
2. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.6 DRAINS

- ### A. Drains to be cast in place or precast concrete boxes with an open steel removable grate to allow access for maintenance. The grate should be capable of handling 2,000 lb loading. Subject to compliance with requirements, provide product indicated on Drawings or comparable product

## 2.7 MANHOLES

### A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.

9. Steps: Individual FRP steps; ASTM A 615/A 615M, deformed, 1/2-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
10. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.

## 2.8 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, and the following:
  1. Cement: ASTM C 150, Type II.
  2. Fine Aggregate: ASTM C 33, sand.
  3. Coarse Aggregate: ASTM C 33, crushed gravel.
  4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.
  1. Reinforcing Fabric: ASTM A 185 steel, welded wire fabric, plain.
  2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.
- C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
  1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
    - a. Invert Slope: 1 percent through manhole.
  2. Benches: Concrete, sloped to drain into channel.
    - a. Slope: 4 percent.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.
  1. Reinforcing Fabric: ASTM A 185, steel, welded wire fabric, plain.
  2. Reinforcing Bars: ASTM A 615, Grade 60 deformed steel.

## 2.9 CATCH BASINS

- A. Standard Precast Concrete Catch Basins:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
  2. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
  3. Riser Sections: 4-inch minimum thickness, and lengths to provide depth indicated.
  4. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
  5. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
  6. Grade Rings: Top of catch basin to be cast in place concrete to match to gutter or finished ground elevations.
- B. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
1. Size: 24 by 24 inches minimum unless otherwise indicated.
  2. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- C. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading.
1. Grate Free Area: Approximately 50 percent unless otherwise indicated.

### PART 3 - EXECUTION

#### 3.1 EARTHWORK

- A. Excavation, trenching, and backfilling are specified in Division 2 Section "Earthwork."

#### 3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

- E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- F. Install gravity-flow, nonpressure drainage piping according to the following:
  - 1. Install piping pitched down in direction of flow.
  - 2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction.
  - 3. Install piping with 12" minimum cover.
  - 4. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

### 3.3 PIPE JOINT CONSTRUCTION

- A. Join gravity-flow, nonpressure drainage piping according to the following:
  - 1. Join ABS sewer piping according to ASTM D 2321 and ASTM D 2751 for elastomeric-seal joints.
  - 2. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
  - 3. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
  - 4. Join nonreinforced-concrete sewer piping according to ASTM C 14 and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
  - 5. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
  - 6. Join dissimilar pipe materials with nonpressure-type flexible couplings.

### 3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
  - 1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
  - 2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
  - 3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
  - 4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads .
- B. Set with tops 1 inch above surrounding earth grade.
- C. Set cleanout frames and covers in concrete pavement and roads with tops 1/8" below the pavement surface. Set cleanout frames and covers in pavement in cast-in-place-concrete block, 18 by 18 by 12 inches deep.

### 3.5 MANHOLE INSTALLATION

- A. General: Install manholes, complete with appurtenances and accessories indicated.

- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
- D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 6 inches above finished surface elsewhere unless otherwise indicated.

### 3.6 CATCH BASIN INSTALLATION

- A. Construct catch basins to sizes and shapes indicated.
- B. Set frames and grates to elevations indicated.

### 3.7 STORMWATER INLET AND OUTLET INSTALLATION

- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
- B. Install outlet into curb and gutter per detail shown and Cedar City specifications.
- C. Install outlets that spill onto grade, anchored with concrete, where indicated.
- D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
- E. Construct energy dissipaters at outlets, as indicated.

### 3.8 CONCRETE PLACEMENT

- A. Place cast-in-place concrete according to ACI 318.

### 3.9 CLOSING ABANDONED STORM DRAINAGE SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use procedure below:
  - 1. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes and Structures: Excavate around manholes and structures as required and remove manhole or structure and close open ends of remaining piping.
- C. Backfill to grade according to Division 2 Section "Earthwork."

3.10 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installation of green warning tape directly over piping and at outside edge of underground structures.
1. Use warning tape over ferrous piping.
  2. Use warning tape over nonferrous piping and over edges of underground structures.

3.11 FIELD QUALITY CONTROL

- A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.
1. Submit separate reports for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
  2. Test completed piping systems according to requirements of authorities having jurisdiction.
  3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
  4. Submit separate report for each test.
  5. Gravity-Flow Storm Drainage Piping: Test according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
    - a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.
    - b. Option: Test plastic piping according to ASTM F 1417.
    - c. Option: Test concrete piping according to ASTM C 924.
    - d.
- C. Leaks and loss in test pressure constitute defects that must be repaired.

- D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

- E. Clean interior of piping of dirt and superfluous materials. Flush with water.

END OF SECTION 02630

SECTION 02721

AGGREGATE BASE COURSE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Subgrade preparation to lines and grades shown on the plan.
- B. Place, grade and compact base and sub-base course materials.
- C. Dust and surface water control.

1.2 RELATED WORK

- A. Section 02740 – Asphaltic Concrete Paving.
- B. Section 03100 – Concrete Formwork
- C. Section 03300 – Cast in place concrete

1.3 REFERENCES

- A. American Society for Testing Materials (ASTM).
- B. American Association of Safety and Highway Transportation Officials (AASHTO)

PART 2 - PRODUCTS

2.1 BASE COURSE MATERIAL

- A. Granular base for Pavement Preparation:
  - 1. Shall be untreated natural stone.
  - 2. Shall not be lumpy or frozen.
  - 3. Shall be free from noticeable concentrations of alkali, salt, shale, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectionable or deleterious.
  - 4. Shall be graded within the following limits:

Sieve Size	Percent Passing By Weight
1"	100
½"	70 - 100
No. 4	41- 68
No. 16	21- 41
No. 40	10 - 27
No. 200	4 - 13

PART 3 - EXECUTION

3.1 PREPARATION OF SUBGRADE

- A. Prior to placing base course materials, the subgrade shall be scarified to a depth of not less than 6", moistened or dried to optimum moisture content, and

compacted to at least 95% maximum Modified Proctor Density as determined in accordance with ASTM D1557 (AASHTO T-180), and shall be within 2% of optimum moisture content.

- B. The subgrade shall then be proof rolled in the presence of the Engineer by passing loaded rubber-tired construction equipment uniformly over the surface at a constant rate. At least two (2) passes shall be made over all subgrade areas.
- C. If excessively soft, loose, or disturbed soils are encountered, they shall be removed as directed by the Engineer to a maximum depth of two feet (2') and replaced and re-compacted to 95% maximum Modified Proctor Density using approved subgrade stabilizing material.
- D. Ensure subgrade is to required lines and elevations.

### 3.2 PLACEMENT OF BASE COURSE

- A. Protect against "pumping" moisture to surface by limiting travel on exposed subgrade. Where it is determined by the Owner that construction vehicle traffic (other than proof rolling) has caused subgrade instability, remove disturbed soils and replace with sand backfill at no additional cost to the Owner.
- B. Apply water soluble herbicide for nonselective control of annual and perennial weeds in strict accordance with manufacturer's instructions and all laws and regulations.
- C. Place base course material on the prepared and accepted subgrade. The material shall be back-dumped and spread in a uniform lift thickness.
- D. Handle and spread materials in a manner that will prevent segregation of sizes. When vibrating or other acceptable types of compaction equipment are used, the entire course may be placed in one layer, provided the ability of the equipment to achieve specified compaction to the full layer depth is demonstrated. In no case shall compacted lift thickness be greater than 8".
- E. When base course is constructed in more than one layer, the previously placed layer shall be cleaned of loose and foreign matter. Upper layer of base course shall not be less than 1-1/2", nor shall fine materials be added to reach final grade.
- F. Overstressing the subgrade soil and base course shall be avoided by utilizing equipment in spreading and dumping that exerts only moderate pressure on the soil. Avoid excessive travel on lower base course lifts. Severe rutting, cracking or yielding is an indication of overstressing the soil. Any ruts or cracks which develop in the base course during spreading or compacting shall be repaired as directed at no additional cost to Owner.
- G. Base course shall be compacted to no less than 95% maximum Modified Proctor Density, as determined by ASTM D1557 (AASHTO T-180). Moisture content shall be maintained to within 1.5% of optimum throughout placing and compaction operations.
  - 1. Compaction shall always be commenced along the edge of the area to

- be compacted and the roller shall gradually advance toward the center of the area to be compacted.
2. Compaction equipment shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted.
- H. Base course shall be substantially true to line and grade as indicated on the drawings. The surface shall be within 1/2" of required grade. Completed thickness of base course shall be within 1/2" of indicated thickness, with average thickness not less than that indicated.
- I. The top surface of compacted base course shall be finished by blading or rolled with equipment designed for that purpose.
- J. Temporary Graded Surface
1. When allowed by the local jurisdiction having authority, where trenches are excavated in paved traffic lanes, the surface course may be temporarily replaced by a surface consisting of base course material. The base course shall be removed and replaced with pavement as soon as conditions permit, or as required by local jurisdiction having authority.
  2. The surface shall be maintained to provide for a smooth flow of traffic without holes, bumps, etc. until final acceptance of the work.

### 3.3 DUST AND SURFACE WATER CONTROL

- A. Dust control measures shall be implemented by application of water to all work areas, storage areas, haul and access roads, or other areas affected by work.
- B. All work shall be in compliance with the Federal, State and local air pollution standards, and not cause a hazard or nuisance to personnel and the public in the vicinity of the work.
- C. Provide and operate at least one (1) mobile tank sprinkling unit during the contract period.
- D. Other methods of dust control for haul and access roads may include chemical treatment, light bituminous treatment or other method as approved by the Owner.
- E. Surface water shall be controlled to the extent that the areas to receive pavement, walks or slabs are not allowed to become wet from runoff from adjacent areas. Surface water shall be directed away from these areas but not directed toward adjacent property, buildings, or any improvement that may be amaged by water. Surface water shall not be allowed to enter sanitary sewers.

### 3.4 FIELD QUALITY CONTROL

- A. Testing and inspection of placed Base Course will be provided by the Owner. Tests provided by the Owner are as follows:

<u>Item</u>	<u>Type</u>	<u>Frequency</u>
Base Course Aggregate Sampling	ASTM D75	Each day or 1 test/ 500 sq. yd., or as required.
Atterberg Limits	ASTM D2419,	

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	D423, and D424	As required
Sieve Analysis	ASTM C136	As required
Bearing Ratio	ASTM D1883	As required
Maximum Density	ASTM D1557, Method D	As required
In-place Density	ASTM D2167, D2922 and D3017	As required

B. If tests indicate that sub-base and/or base course do not meet specified requirements, remove defective work, replace and retest at no cost to Owner.

END OF SECTION

SECTION 02740

ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Proof roll base course to reveal soft and yielding spots.
- B. Place and compact asphaltic concrete paving.
- C. Protection of newly placed pavement.

1.2 RELATED WORK

- A. Section 02721 – Aggregate Base Course
- B. Section 02763 – Pavement Marking

1.3 QUALITY ASSURANCE

- A. Do not place asphaltic concrete paving when the air temperature in the shade and/or the roadbed temperature are below 50°F, or during rain, when the base course surface is wet, or during other adverse weather conditions.
- B. Do not place tack coat when air temperature in the shade and the roadbase temperature are below 50°F, or during rain, fog, or other adverse weather conditions.
- C. All work shall be performed by experienced and qualified workmen with equipment standard with the industry.
- D. Approval by Engineer of sources of supply of materials shall be obtained prior to delivery of materials.
- E. Comply with federal, state and/or local codes and regulations.

1.4 REFERENCES

- A. American Society for Testing Materials (ASTM):
  - 1. D1557, “Tests for Moisture – Density Relationship of Soils using 10 lb (4.5 kg) Rammer in 18 inch (457 mm) Drop”.
  - 2. D1559, “Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus”.
  - 3. D2041, “Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures”.
  - 4. D2170, “Kinematic Viscosity of Asphalts (Bitumens)”.
- B. THE ASPHALT INSTITUTE (A.I.) Specification Series No. 2 (SS-2).
- C. American Association of State Highway and Transportation Officials (AASHTO):
  - 1. Materials and compaction tests.
    - a. AASHTO T-180

D. Utah Department of Transportation, “2005 Standard Specifications For Road and Bridge Construction”.

1. Section 02741 Hot Mix Asphalt (HMA).

1.5 SUBMITTALS

A. An asphaltic concrete paving mix design prepared by a certified laboratory and materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements shall be submitted for review and approval at least one week prior to commencement of the work.

B. Written certification of compliance for pavement marking paint.

C. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.6 WARRANTY

A. See General Conditions.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Asphaltic cement:

1. Viscosity Graded original, AC-10, conforming to requirements of ASTM D-3381 (AASHTO M-226, Table 2), and Section 02741 – Utah Department of Transportation, “2005 Standard Specifications For Road and Bridge Construction”.

2. Shall not foam when heated to 350°F.

B. Mineral Aggregate:

1. Shall consist of crushed stone, crushed gravel, or crushed slag, or a combination thereof; free of clay, silt, organic matter or other deleterious materials.

2. Gradation shall be in accordance with the following:

a. Asphaltic concrete surface course:

Sieve Size	Percent Passing by Weight
1/2”	100
3/8”	70 - 100
#4	50 - 78
#16	30 - 48
#50	18 - 31
#200	7 - 13

b. Asphaltic concrete base course:

Sieve Size	Percent Passing by Weight
3/4”	100
3/8”	75 - 91
#4	60 - 80
#16	28 - 38
#50	11 - 23
#200	5 - 9

3. Course aggregate, retained on the No. 4 sieve shall consist of clean, hard, rough, durable and sound fragments, with not less than 50 percent of particles by weight with at least one mechanically fractured face or clean angular face.
4. Fine aggregate passing the No. 4 sieve may be either a natural or manufactured product. The aggregate shall be clean, hard grained and moderately sharp, and shall contain not more than 2 percent by weight of vegetable matter or other deleterious substances.
5. That portion of the fine aggregate passing the No. 40 sieve be nonplastic when tested in accordance with ASTM D-424.
6. The weight of minus 200 mesh material retained in the aggregate, as determined by the difference in percent passing a No. 200 sieve by washing and dry sieving without washing, shall not exceed 6 percent of the total sample weight. That portion of the fine aggregate passing the No. 200 sieve shall be determined by washing with water in accordance with ASTM C-117.
7. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 100 pounds per cubic foot when tested in accordance with ASTM C-29.
8. The aggregate shall have a percentage of wear not exceeding forty when tested in accordance with ASTM C-131 and C-535.
9. The aggregate shall have a weighted loss not exceeding 12 percent by weight when subject to five cycles of sodium sulfate and tested in accordance with ASTM C-88, D-1073, D-692.

## 2.2 ASPHALTIC CONCRETE PAVING MIXTURE

- A. Combine mineral constituents and asphalt cement in proportions per mix design at a central plant to produce an asphaltic concrete pavement mix.
- B. Mix design shall be based on the Marshall Method. The combined mineral aggregate plus any approved additives when mixed with the asphaltic cement in accordance with ASTM D-1559 shall conform to the following requirements:

<u>Requirement</u>	<u>Value</u>
Percentage of Wear:	40
Marshall Stability:	1200 lb. Minimum
Flow (0.01 inch):	10 -18
Air Voids:	1.5% to 3.0%
Retained Strength:	60% Minimum
Asphalt Cement Content:	4.0% to 6.0% by weight
- C. The asphaltic cement shall be heated at the mixing plant to a temperature at which it can be applied uniformly to the aggregate.
- D. Coarse and fine aggregate shall be stored separately at the mixing plant in a manner that will prevent intermingling.
- E. When it is necessary to blend aggregates from one or more sources to produce the combined gradation, each source or size of aggregate shall be stockpiled individually. Aggregate from the individual stockpiles shall be fed through separate bins to the cold elevator feeders. They shall not be blended in the stockpile.
- F. Cold aggregates shall be fed carefully to the plant so that surpluses and shortages will not occur and cause breaks in the continuous operation.

- G. The aggregate shall be dried and heated to provide a paving mixture temperature in conformance with placing conditions, but not to exceed 163°C (325°F).
- H. The heated and dried aggregates shall not contain enough moisture to cause the mixture to slump, the asphalt to foam, or the aggregate to segregate during hauling and placing.
- I. The shortest mixing time consistent with satisfactory coating of the aggregate shall be used. The mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 96 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The required mixing time, as determined above, shall be in accordance with ASTM D-2489.
- J. If a dryer drum mixing process is used, the mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 98 percent of the particle retained on the No. 4 sieve are coated with asphaltic cement. The moisture content of the asphaltic cement sampled behind the laydown machine prior to compaction shall not exceed 1 percent by weight.

### 2.3 UDOT ASPHALTIC CONCRETE PAVING MIXTURE

- A. In accordance with UDOT 2005 standard specification 02741.

### 2.4 TACK COAT

- A. Emulsified asphalt CSS-1H or SS-1H.

### 2.5 FABRICS – Not required.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean overlay area in accordance with Section 02230.
- B. Install risers for manholes, valves and cleanouts to match finished grade of asphalt surface course.
- C. Sawcut all asphalt edges to a clean straight line when patching.

### 3.2 TRANSPORTING THE ASPHALTIC CONCRETE PAVEMENT

- A. Transport time from the mixing plant to the job site shall not exceed 1 hour.
- B. Hauling truck shall have no direct frame contact with the paver or bear down on the paver during dumping operations.

### 3.3 TACK COAT

- A. Prior to placing pavement, tack coat shall be applied to the vertical edges of concrete and “cold” pavement (over ½ hour old) which will be in contact with new pavement. Tack coat shall extend 12 inches onto adjacent base course material. The tack coat shall be carefully applied at a rate of 0.15 gal/SY. Tack coat shall be applied uniformly at the same rate to the horizontal top surface of each lift of bituminous pavement prior to placing the next lift of bituminous pavement to promote a bond between the two courses of pavement. None of the material shall penetrate into the pavement and for this reason the application should be limited.

- B. Prior to applying the material, the surface to be treated shall be swept or flushed free of dust or other foreign material.
- C. Protect all surfaces not required to receive tack coat from any inadvertent application.
- D. The temperature range of the tack coat at the time of application shall be such that the viscosity will be between 50 and 100 centistokes as determined in accordance with ASTM Designation D-2170.
- E. Under no circumstances shall traffic be permitted to travel over the tacked surface. If detours cannot be provided, restrict operation to a width that will permit at least one-way traffic over the remaining portion of the roadbed. If one-way traffic is provided, the traffic shall be controlled in accordance with governing authority.
- F. After application of tack coat, sufficient time shall be given to allow for complete separation of asphalt and water before paving operations begin. The tack coat shall be applied on only as many surfaces as will be paved against in the same day.

### 3.4 PLACEMENT OF ASPHALTIC CONCRETE PAVEMENT

- A. Place asphalt pavement to provide a compacted depth as indicated on the plans. Placing the pavement shall be a continuous operation. The machine shall spread mixture and shall strike a finish that is smooth, true to cross section, uniform in density and texture, and free from hollows and other irregularities. If any irregularities occur, they shall be corrected before final compaction of the mixture. The paving machine shall be selfpropelled, equipped with hoppers, distributing screws, adjustable screeds and equalizing devices, capable of spreading hot asphaltic concrete paving mixture without tearing, shoving or gouging, and of producing a finished surface of specified quality. Place inaccessible and small areas by hand.
- B. Ensure asphalt pavement temperature is between 150 and 300 centistokes as determined with ASTM D-2170 when mixing with a pugmill, or between 220°F and 260°F when using the dryer-drum mixing process, immediately after placing and prior to initial rolling.
- C. Ensure joints made during paving operations are straight, clean, vertical and free of broken or loose material. Carefully make joints to insure a continuous bond between old and new pavement, or between successive day's work. A continuous bond between adjoining work is required.
- D. If more than ½ hour elapses between adjacent paving passes, the "cold joint" shall have tack coat applied to the "cold" pavement prior to placing the adjacent pass.

### 3.5 COMPACTION

- A. Roll and compact to specified density before temperature of the mixture drops below 180 F.
- B. Compact asphalt paving course to required density, with a steel wheeled tandem roller steel three-wheeled roller, vibratory roller, or a pneumatic-tired roller, weighing not less than five tons. Start compaction as soon as pavement will bear equipment without checking or undue displacement. Speed of the roller shall be slow enough to avoid displacement of hot mixture, and any displacements occurring as a result of changing the direction of the roller, or from any other cause, shall at once be corrected by the use of

rakes and of fresh mixture where required. Ensure each pass of roller overlaps previous passes by at least ½ of the roller width to ensure smooth surface free of roller marks. Keep roller wheels sufficiently moist so as not to pick up material. Rolling shall continue until roller marks are eliminated and no further compression is possible. The finished compacted pavement shall have a density of 91% minimum, (no test less than 91% of the density determined in accordance with ASTM D-2041), as determined by ASTM D2170.

- C. Leave pavement with a uniform, dense surface.
- D. Perform hand tamping in areas not accessible to rolling equipment. Thorough compaction must be achieved, and joints between curbs, headers, manholes and similar structures must be effectively sealed.
- E. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature.

### 3.6 PLACEMENT OF UDOT ASPHALTIC CONCRETE PAVEMENT

- A. Place pavement in accordance with UDOT Standard Specification 02741.

### 3.7 SCHEDULE

- A. Asphalt type and thickness:
  - 1. Trench Patching – 4 inches minimum, Regular Asphaltic Surface Course
  - 2. Patching on interior of Salt Storage Pond – 4 inches minimum, Zero Voids Surface Course
  - 3. Driveway and parking area – 4 inches, Regular Asphaltic Surface Course

END OF SECTION

SECTION 02763

PAVEMENT MARKING

PART 1 - GENERAL

1.1. SUMMARY

A. Section Includes:

1. Pavement and curb markings.

1.2 QUALITY ASSURANCE

- A. Regulatory Requirements – Paint handicap spaces to conform to ADA Standards and local code requirements.

1.3. PROJECT/ SITE CONDITIONS

A. Environmental Requirements

1. Apply only on dry surfaces and during favorable weather, and when damage by rain, fog, or condensation not anticipated.
2. Latex Paint –
  - a. Atmospheric temperature above 50°F.
  - b. When temperature is not anticipated to drop below 50°F during drying period.
3. Alkyd or Chlorinated Rubber Paint.
  - a. Atmospheric temperature above 40°F.
  - b. When temperature is not anticipated to drop below 40°F during drying period.

PART 2 - PRODUCTS

2.1. MATERIAL

. Paint

1. State of Utah #780.
2. Colors.
  - a. Yellow – Parking stripes, crosswalk stripes, and safety markings.
  - b. Blue & White – Handicapped markings, Staff Parking Areas
  - c. Red – Fire lanes and no parking zones.

PART 3 - EXECUTION

3.1. PREPARATION

- A. Do not apply acrylic latex systems until new paving has cured 7 days minimum. Do not apply alkyd or chlorinated rubber until paving has cured 3 months minimum.
- B. Surfaces shall be dry and free of grease and loose dirt particles. Scrape and wire brush chipped or damaged paint on existing curbs.
- C. Perform layout with chalk or lumber crayon only.

3.2. APPLICATION

- A. Site tolerances

1. General – Make lines parallel, evenly spaced, and with sharply defined edges.
  2. Line Widths -
    - a. Plus or minus  $\frac{1}{4}$  inch variance on straight segments.
    - b. Plus or minus  $\frac{1}{2}$  inch variance on curved alignments.
  - B. Coat with coverage of 103-113 sq ft/gal.
  - C. Thickness – Minimum paint thickness 7 mil dry.
- 3.3. CLEANING
- A. Remove drips, overspray, improper markings, and paint material tracked by traffic by sand blasting, wire brushing, or other method approved by Architect prior to performance.

END OF SECTION

SECTION 02810

IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Provide all irrigation equipment and accessories complete, in place, as shown on the drawings, specified herein, and needed for a complete and proper installation.
- B. It is the intention of these specifications, together with the accompanying drawings to accomplish the work of installing after construction an irrigation system which will operate in an efficient and satisfactory manner according to the workmanlike standards established for the irrigation industry.
- C. It will be the contractor's responsibility to report to the Engineer or Owner any deviations between the drawings, specifications and the site. Failure to do so prior to the installing of equipment, and resulting in replacing, and/or relocating, will be done at the contractor's expense.
- D. It will be the contractor's responsibility to examine the site prior to construction and as construction of the roadway is being completed to document what type of existing irrigation system will be disturbed.

As demolition of the existing roadways and curb and gutters take place It will be the contractor's responsibility to make repairs and cap existing lateral lines to ensure all areas away from the construction remain functional through-out the construction period.

It is the contractor's responsibility to insure all existing irrigation systems are returned to good working order at the end of construction.

1.2 RECORD IRRIGATION DRAWINGS

- A. Prepare record drawings which show deviations from the contract documents made during construction affecting the main line pipe, controller locations, remote control valves, manual drain valves, and all drip distribution and collection line locations. The drawings shall also indicate and show approved substitutions of size, materials and manufacturer's name and catalog number. The Contractor will keep a record of all departures from the contract drawings that occur during construction. These shall be kept on a clean set of prints of the contract drawings. The Architect will review the "record drawings" to verify that changes are being recorded as construction occurs.

1.3 PERMITS AND FEES

- A. Obtain all permits and pay required fees to any governmental agency having jurisdiction over the work. Inspections required by local ordinances during the course of construction shall be arranged as required. On completion of the work, satisfactory evidence shall be furnished to the Owner's representative to show that all work has been installed in accordance with the ordinances and code requirements. See existing utilities paragraph below.

1.4 QUALITY ASSURANCE

- A. This contract work is to be conducted primarily by and coordinated by a licensed Landscape Irrigation Contractor specializing in landscape irrigation work. All work that is irrigation related work shall be conducted by employees who have each had a minimum of one year of experience constructing landscape irrigation systems. The on site supervisor must have a minimum of three years experience constructing landscape irrigation systems and one year experience in a supervisory role.

#### 1.5 COORDINATION

- A. Coordinate and cooperate with other contractors to enable the work to proceed as rapidly and efficiently as possible.

#### 1.6 INSPECTION OF SITE

- A. The contractor shall acquaint him/herself with all site conditions. Should utilities not shown on the plans be found during excavations notify the Engineer. Failure to do so will make the contractor liable for any and all damage thereto arising from his/her operations subsequent to discovery of such utilities not shown on plans.

#### 1.7 EXISTING UTILITIES

- A. Before any trenching, excavation or digging below the surface for any reason is begun, the contractor shall have the area "Blue Staked" in order to determine as close as possible the location of all underground utilities. The contractor will conduct his/her work in such a manner to protect all utilities from damage. It is the responsibility of the contractor to repair or replace any damage incurred by the contractor or the contractor's employees at no expense to the owner.

#### 1.8 PROTECTION OF EXISTING SITE CONDITIONS

- A. The contractor shall take necessary precautions to protect site conditions to remain. Should damage be incurred, the contractor shall repair the damage to its original condition at the contractor's own expense. Contractor shall be responsible for the continued watering of all areas affected by construction. This can be completed by handwatering, the use of temporary irrigation systems or the continued operation of existing systems not disturbed by construction.

#### 1.9 GUARANTEE

- A. All work shall be guaranteed for compliance with the drawings and specifications for a period of one year after the date of substantial completion. The contractor shall make good any deficiencies at the time he/she is notified of any faults, and place in satisfactory condition any damage to the buildings or grounds without cost to the owner. All guarantees shall be in writing and approved by the Engineer before submitting to the Owner.

#### 1.10 SUBMITTALS

- A. Submit three copies of manufacturer's technical data and installation instructions for landscape irrigation system.

### PART 2 - MATERIALS

## 2.1 GENERAL

- A. All materials throughout the system shall be new and in perfect condition. After award of the contract and prior to beginning work, the Contractor shall submit for approval three copies of the complete list of materials which he/she proposes to install. Quantities of materials and equipment need not be included. No deviations from the specifications shall be allowed, except as provided for in these documents.

## 2.2 PIPING

- A. All main line pipe shall be Schedule 40, Type 1120-1220 Polyvinyl Chloride (PVC) pipe and shall conform to CS-256-63. All lateral lines shall be Schedule 40, Type 1120-1220 Polyvinyl Chloride (PVC). All piping shall be free from cracks, holes, foreign material, blisters, inside bubbles, wrinkles and dents. Pipe ratings shall be printed on the pipe and no pipe shall be less than 3/4" diameter.
- B. Pipe Joints: All joints shall be solvent welded as per manufacturer's recommendations, using both the proper primer and glue. All joints must be allowed to set for a minimum of 24 hours prior to pressure testing.

## 2.3 FITTINGS

- A. Fittings for main and lateral lines shall be Schedule 40, Polyvinyl Chloride (PVC). Do NOT use galvanized fittings of any kind.
- B. Fittings on flex swing risers shall be barbed insert ells made of THICK-WALLED POLY PIPE as manufactured by Rainbird.

## 2.4 RISERS

- A. Flexible swing pipe shall be THICK-WALLED POLY PIPE (funny pipe) as manufactured by Rainbird. This pipe is to be used only between heads and lateral lines and shall not exceed a distance of 5 feet.

## 2.5 SOLVENT CEMENT

- A. Compatible with PVC pipe and of proper consistency.

## 2.6 AUTOMATIC CONTROLLERS

- A. All irrigation systems shall be connected to the existing controller.

## 2.7 VALVES

- A. Ball Valves: Ball valves shall be solid bronze meeting Federal Specification WW-V-54, CLASS A, TYPE 1. Size shall be the same size as the electric valve it is installed next to. Valve shall be installed on the up-stream side of the electric remote control valve and in the same valve box.
- B. Manual Drain Valves: All drain valves shall be 3/4" Mueller Oriseal. This valve is to be installed on mainlines only.

1. Drains: Drains shall be installed at all low points on the mainline only. Each drain shall be provided with a gravel sump of 18" x 18" x 18" filled with 1" diameter gravel. Install the mainline such that a minimum number of drains are required.
- C. Automatic Drain Valves: Automatic drains shall be 1/2" King Drains per manufacturers recommendations. Automatic drains are to be installed at low points of lateral lines only.
- D. Electric Remote Control Valve: All electric remote control valves shall be of the size and type as specified on the drawings,
  1. Rainbird GB Series, Automatic Remote Control Valves, or approved equal.

## 2.8 SLEEVES

- A. All sleeves shall be PVC Schedule 40 sized 2 pipe sizes larger than the pipe or pipes being sleeved (4" diameter min.). Install sleeves in locations as shown on the drawings and at the depths specified for lateral and mainlines. Coordinate the installation of the sleeves with installation of all hard surfaces. Mark location of all sleeves with a 3/4" galvanized roofing nail at both sides of sidewalk or curb and gutter or asphalt in such a manner that future location will not require more than hand shovel excavation. Insure that adequate amounts of sleeving are installed for both water lines and electric control wires.

## 2.9 ELECTRIC CONTROL WIRE

- A. Wires shall be UF DIRECT BURIAL type. No wire shall be smaller than #14. Ground or neutral wires shall be WHITE, grass areas shall be RED and shrubbery areas shall be BLUE. Spare wires shall be Green.
- B. No splices in electric control wires. All wires shall be 'homeruns' from the valve to the controller.
- C. Conduit: Standard Electrical Conduit. Size as needed.

## 2.10 HEADS

- A. All heads shall be as specified on the drawings. Nozzle patterns are indicated and shown, however, specific site conditions may require that different nozzle patterns be used. Contractor shall adjust patterns to provide adequate coverage.
  1. Rainbird 1800-PRS Pressure Compensating, with pop-up bodies with Rainbird spray nozzles as needed for small areas between sidewalk and curb.
  2. Rainbird 5000 series Rotor pop-up Sprinklers in the larger areas. Provide sprinklers with optional nozzles for variable radius and overlap.
- B. All heads shown on the drawings shall be installed. Contractor shall consult with the Owner/Engineer prior to the deletion or addition of any heads.

## 2.11 VALVE BOXES

- A. Valve boxes shall be of sufficient size to house the required electric remote control valves and still allow room for maintenance without having to excavate or perform similar operations. Boxes

shall be as manufactured by Carson or Brooks Industries meeting ASTM D368 for tensile strength of 12" deep and furnish with a non-hinged cover. Each valve box is to have a 6" bottom extension minimum. The extension should allow for the installation of the valve cluster at the depth of the lateral line (12"). The contractor shall also allow for 4-6" of clear space between the valve cluster and the gravel below the valve.

- B. Valve boxes shall be set flush with the finished grade. Valves shall be set 12" below the top of the box including ball valves and quick couplers where called for. Do NOT install more than one (1) electric remote control valves in a single standard valve box. All valves must have ample room and access for repair.

## 2.12 QUICK COUPLERS

- A. All quick couplers shall be a 1" single lug valve.

## PART 3 – EXECUTION

### 3.1 WORKMANSHIP

- A. Lay Out work as accurately as possible to the drawings. The drawings, though carefully drawn, are generally diagrammatic to the extent that swing joints, offsets and all fittings are not shown. All irrigation lines shall be installed in common trenches where possible. Where possible, all trenching shall occur on soft spaces.
- B. If for any reason full and complete coverage of all irrigation areas does not cover, irrigation contractor shall be responsible to contact the Owner for verification before continuing with his work.
- C. All existing systems with lateral lines and heads running along existing curbs that are to be removed shall be replaced with new piping and heads.
- D. Any Major Revisions to the irrigation system must be submitted and answered in written form, along with any change in contract price.

### 3.2 EXCAVATION AND TRENCHING

- A. Perform all excavations as required for the installation of the work included under this section, including shoring of earth banks to prevent cave-ins. Restore all surfaces, existing underground installations, etc., damaged or cut as a result of the excavations to their original condition.
- B. Trenches for lateral lines shall be dug a minimum of 12" deep and as wide as necessary to properly install pipes.
- C. Trenches for mainlines shall be dug a minimum of 18" deep. Run all electrical wires in mainline trench as shown in detail on drawings. Where it becomes necessary for wires to leave the mainline trench, the trench for all electrical wires shall be treated as a mainline trench, as herein described.
- D. Trenches shall be made wide enough to allow a minimum of 6 inches between parallel pipe lines.
- E. All trenches are to be 12" away from all curbs, buildings and sidewalks.

### 3.3 PIPE LINE ASSEMBLY

- A. Install automatic control valves where shown and group together where practical. Place no closer than 12 inches to walk edges, building, and walls. Install in valve box, arranged for easy adjustment and removal. Allow sufficient space around entire valve assembly. Each valve shall be connected to the main line through a ball valve.
- B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.
- C. Plastic pipe and fittings shall be solvent welded using solvents and methods as recommended by manufacturer of the pipe, except where screwed connections are required. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture before applying solvent with a non-synthetic bristle brush.
- D. Install pipe in dry weather when temperature is above 40 degrees F. in strict accordance with Manufacturers instructions.
- E. Pipe may be assembled and welded on the surface. Snake pipe from side to side of trench bottom to allow for expansion and contraction.

### 3.4 BACKFILLING OF TRENCHES

- A. Backfill around and over the pipes in accordance other trenching in these specifications. All material that is to come in contact with the pipes shall be less than 1/4 inch in diameter. This material shall be imported for this specific use if necessary. Upon the approval of the Engineer, the existing material on site may be used as backfill material above the pipes.

### 3.5 FLUSHING AND TESTING

- A. After installation of all new pipes, including laterals for a given circuit, the control valve shall be opened fully and a full head of water be used to flush out the system
- B. Testing will be performed after completion of each circuit and after completion of the entire system. At this time any necessary repair work will be done at the contractor's expense and the entire system will be in good working order prior to the issuance of the Certificate of Substantial Completion.

### 3.6 PIPING INSPECTIONS

- A. Before any pipes are covered, the Engineer shall inspect the system for compliance with specifications and drawings. Any required changes will be made at this time at the expense of the contractor.

### 3.7 SYSTEM OPERATION

- A. The entire system will be tested in the presence of the Southern Utah University grounds maintenance staff, in order to insure COMPLETE coverage of all areas to be watered and the automatic operation of the system using the automatic clock. Any changes required will be made at this time at the contractor's expense.

- B. All heads will be adjusted to their proper coverage and set to the proper depth at this time.

### 3.8 AUTOMATIC CLOCK

- A. All clocks shall be as specified on the drawings and installed according to the manufactures recommendations. Ground all clocks with an 8 foot grounding rod, using a #6 or larger solid copper wire.

### 3.9 ELECTRICAL CONTROL WIRES

- A. Electrical control wires shall be installed in the same trench as the main line wherever possible. Wires shall be laid alongside the pipe by "snaking" into the trench to allow as much slack as possible for contraction and expansion of the wire. All wire connections at remote control valves will be left with two feet of wire so that the splice or the valve manifold can be brought to the surface for repairs without disconnecting the wires.
- B. It is important that the joint be absolutely waterproof so that there is no chance for leakage of water and corrosion build-up on the connection. All wiring shall be 'home-run from the valve to the controller.
- C. Conduit : Standard Electrical Conduit from mainline to irrigation controller. Size as needed for required wires.

### 3.10 SLEEVING

- A. All lines to be laid under hard surfaces shall be installed in a 4" minimum PVC Schedule 40 sleeve unless noted otherwise. Depth of sleeves to be determined by the type of line that is to be placed in sleeve. In the case of new construction, all sleeves are to be placed prior to laying of any hard surface. In the case of existing construction, the sleeves must be installed by boring under the existing hard surface.

### 3.11 QUICK COUPLERS

- A. Quick couplers shall be installed on a swing joint.
- B. Install one (1) quick coupler at each remote control valve or valve cluster.

### 3.12 TESTING

- A. Operation Testing: After finish grading, contouring and mulching, test the entire system for operation including electrically actuating the remote control valve. Run the system until water begins to puddle and/or run off to determine the initial controller run time to determine the number of irrigation cycles necessary to meet weekly evapotranspiration rates (E.T.) for the plant material installed.

### 3.13 ADJUSTMENT

- A. After completion of grading, seeding, or sodding, and rolling of grass areas, carefully adjust lawn sprinkler heads so they will be flush with, or not more than 1/2" below finish grade.

3.14 CLEAN-UP

- A. Remove from the site all debris resulting from work of this section.

END OF SECTION

SECTION 02900

LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

- A. The Extent of the landscape development work is shown on the drawings and includes preparation of landscaped areas, restoration of areas disturbed by construction, and placement of all plant materials bark mulch, and sod.

1.2 RECORD DRAWINGS

- A. The Contractor will keep a record of all departures from the contract drawings that occur during construction. These shall be kept on a clean set of prints of the contract drawings. The Architect will review the "record drawings" to verify that changes are being recorded as construction occurs.

1.3 QUALITY ASSURANCE

- A. The landscape work shall be done by a single licensed Landscape Contractor specializing in landscape work. The on site supervisor must have a minimum of three years experience in landscape construction and one year experience in a supervisory role.

1.4 PLANT MATERIAL SOURCE QUALITY CONTROL

- A. General: Ship landscape materials with certificates of inspection as required by governmental authorities. Comply with governing regulations applicable to landscape materials.
- B. The source or supplier for all plant materials shall be furnished to the Engineer prior to the delivery of any plant materials on site or stored elsewhere.

1.5 EXISTING UTILITIES

- A. Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate, as required, to minimize possibility of damage to underground utilities. The Contractor shall have the area "Blue Staked" prior to digging. It is the responsibility of the Contractor to repair or replace any damage incurred by the contractor or the contractor's employees at no expense to the owner.

1.6 GUARANTEE

- A. Guarantee lawns through the specified maintenance period.

PART 2 - MATERIALS:

2.1 GRASS MATERIALS

- A. Sod: All sod shall be two year old Kentucky Blue Grass that has been cut fresh the morning of installation. Only sod that has been grown in a commercial sod farm shall be used, Do not use sod from any other source. All sod that has not been laid with 24 hours shall be deemed unacceptable and shall be removed from the site.

## 2.2 MISCELLANEOUS MATERIALS

- A. Fertilizer for lawns and ground covers shall be 16-16-8 with guaranteed chemical analysis marked on container.

## PART 3 - EXECUTION

### 3.1 COORDINATION

- A. The contractor shall coordinate his work with that of other contractors on site, and shall cooperate to the fullest extent to see that the work is completed in a timely and workmanship like manner.

### 3.2 PREPARATION FOR SOD

- A. The surface on which the sod is to be installed shall be firm and free of footprints, depressions or undulations of any kind. The surface shall be free of all rocks larger than 1/2" in diameter and all sticks, roots, rubbish, and other extraneous materials. NO EXCEPTIONS.
- B. The finish grade of the topsoil adjacent to all sidewalks, etc., prior to sodding shall be 1" below the top surface of the concrete or hard surface.
- C. If a crust has formed on the topsoil, it shall be loosened by raking prior to sodding.

### 3.3 SOD

- A. Prior to laying of sod, the entire surface to receive sod shall be uniformly covered with the specified fertilizer at the rate of 5 pounds per 1000 square feet.
- B. Upon completion of the laying operation, an inspection of the area shall be made. All voids and large cracks between individual pieces of sod shall be filled with topsoil, prior to watering. Upon completion of filling all voids in the newly laid sod areas, the sod is to be completely saturated with water.
- C. Watering of the sod shall be the complete responsibility of the contractor. Provide acceptable visual barriers by means of barricades set at appropriate distances and strings or tapes between the barriers as an indication of new work. Restore any damaged areas caused by others, erosion, or vehicular traffic until such a time as the lawn is accepted by the owner.

### 3.8 MAINTENANCE

- A. Begin maintenance immediately after planting.

- B. Maintain lawns for not less than the period stated below, and longer as required to establish an acceptable lawn.
  - 1. Not less than four (4) growing months (April to September), and a minimum of two (2) mowings, after Substantial Completion.
  - 2. If installed in fall and not given full four months of maintenance, or if not considered acceptable at that time, continue maintenance the following spring until acceptable lawn is established.
  - 3. The contractor shall be responsible for the protection, watering and replacement of any damaged lawn until acceptance by the owner. This guarantee shall include repairing of any eroded places and maintaining the lawn by watering, mowing and controlling of insects as well as advising the owner of any maintenance or watering procedures necessary to care for and promote plant life. All lawn must be in satisfactory condition at the time of the final acceptance.

### 3.9 CLEANUP AND PROTECTION

- A. During landscape work store materials and equipment where directed. Keep pavements clean and work area in an orderly condition.
- B. Protect landscape areas, work and materials from damage due to operations by other contractors, trades and trespassers. Maintain protection during installation and maintenance periods. Treat, repair or replace damaged landscape work as directed.
- C. The contractor shall keep the site free from accumulation of waste material. At the time of completion, all areas must be swept or washed clean and all rubbish removed to the satisfaction of the Architect.

### 3.10 INSPECTION AND ACCEPTANCE

- A. Substantial Completion for landscape work.
  - 1. When the landscape work is completed, including maintenance, the Owners representative will, upon request, make an inspection to determine acceptability.
  - 2. The landscape work may not be inspected for acceptance in parts.
  - 3. Where inspected landscape work does not comply with the requirement, replace rejected work and continue specified maintenance until re-inspected by the Architect and found to be acceptable. Remove rejected plants and materials promptly from the project site.
  - 4. As-built Drawings shall be furnished to the Engineer at the time of the Substantial Completion Inspection before final acceptance.

END OF SECTION

SECTION 03100  
CONCRETE FORMWORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Concrete formwork for on-site cast-in-place concrete waterway, or other improvements removed or damaged during the work.

1.02 RELATED WORK

- A. Section 03300 - Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

- A. Comply with federal, state, and/or local codes and regulations.
- B. All work shall be performed by experienced and qualified workmen.

1.04 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

- A. No measurement will be made.
- B. Payment will be included in the contract amounts for the related items.

PART 2 PRODUCTS

2.01 UTILITY STRUCTURE FORM MATERIALS

- A. Forms shall be of suitable material and of a type, size, shape, quality, and strength to insure construction as designed.
- B. Metal forms for exposed surfaces may be used when all bolt and rivet holes are countersunk so that a plane, smooth surface of the desired contour is obtained.
- C. Rough lumber may be used for forming surfaces that will be covered by earth in the finished structure.
- D. Forms for all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground shall be made of surfaced lumber, or material which will provide a surface at least equal to surfaced lumber or plywood.
- E. All lumber shall be free from knotholes, loose knots, cracks, splits, warps, or other defects affecting the strength or appearance of the finished structure. Any lumber or material which becomes badly checked or warped, prior to placing concrete, shall not be used.

PART 3 EXECUTION

3.01 PREPARATION

- A. All forms shall be free of bulge and warp, and shall be cleaned thoroughly before being used.

3.02 FORM CONSTRUCTION

- A. Forms shall be so constructed that the finished concrete shall be of the form and dimensions shown on the plans and true to line and grade, and sufficiently rigid to resist deflection. Design of formwork and removal of forms and shores are to conform to ACI 318. The responsibility for their adequacy shall rest with the contractor.
- B. All forms shall be mortar tight and so designed and constructed that they may be removed without injuring the concrete.
- C. If, at any stage of the work, during or after placing the concrete, the forms sag or bulge to such an extent as to allow concrete to fall below the elevation shown on the plans, or outside the true line of the form, the concrete affected shall be removed.
- D. No concrete may be deposited against the earth as a side form.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Inspection
- B. Preparation
- C. Placing Concrete
- D. Hot Weather Concreting
- E. Cold Weather Concreting
- F. Expansion, Contraction and Construction Joints
- G. Finishing
- H. Curing
- I. Field Quality Control
- J. Protection

1.02 RELATED WORK

- A. Section 03100 - Concrete Formwork

1.03 QUALITY ASSURANCE

- A. Qualifications of Workmen:
  - 1. Use workmen thoroughly trained and experienced in placing and finishing the types of concrete specified.
- B. Comply with federal, state and local codes and regulations.
- C. Comply with hot or cold weather requirements as applicable.

1.04 REFERENCES

- A. The American Concrete Institute (ACI):
  - 1. 306R, "Cold Weather Concreting"

2. 305R, "Hot Weather Concreting"
3. 318-83, "Building Code Requirements"

B. American Society for Testing and Materials (ASTM):

1. C-150, "Portland Cement"
2. C-33, "Concrete Aggregates"
3. C-94, "Ready-Mixed Concrete"

1.05 SUBMITTALS

- A. A mix design and information based on trial batch test results shall be submitted to Owner at least two weeks prior to commencement of the work.
- B. Results from a reputable independent testing laboratory showing concrete aggregates comply with applicable sections of ASTM C-33. Contractor shall pay for necessary tests as directed by Engineer. A minimum of one test shall be made on the aggregate used for the first 5 cubic yards of concrete and for each 50 cubic yards thereafter. Should the Engineer deem that additional testing of aggregate is necessary, he may select samples from any of the aggregate to be used and have these samples tested by a recognized laboratory of his choice. Such material shall not be used in the work until the test reports are available. Should the material fail to meet the specified requirements, the aggregate will be rejected and the expense of testing shall be borne by the Contractor. Should the tests show the aggregate to be satisfactory, the cost of additional testing will be borne by the Owner.
- D. Submit manufacturer's information (catalog data) for all products.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Ready-mixed concrete: Concrete shall be mixed only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80° F and sixty minutes for temperatures above 80° F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.
- B. Materials shall be delivered, stored, and handled so as to prevent damage by water or inclusion of foreign materials. Packaged materials shall be delivered and stored in original package, marked with brand and maker's name, until ready for use. Packages of materials showing evidence of water or other damage shall be rejected. Bulk cement shall be identified by shipping and delivery statements.
- C. Cement shall not be stored longer than 4 months before usage.

1.07 WARRANTY

- A. Shall be for two (2) years in accordance with applicable laws and regulation. See General Conditions.

1.08 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

- A. No measurement will be made.
- B. Payment will be included in the lump sum contract amount.

**PART 2 PRODUCTS**

**2.01 CONCRETE MATERIALS**

**A. Cement:**

1. Portland cement shall be Type II, low alkali, complying with ASTM C-150, unless otherwise specified.
2. Air-entrainment of cement is required.

**B. Coarse Aggregates:**

1. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, air-cooled blast furnace slag, or crushed hydraulic-cement concrete, or a combination thereof, conforming to the requirements of ASTM C-33.
2. The amount of deleterious substances included in the aggregate shall not exceed the amount specified in ASTM C33.
3. Coarse aggregate size shall be graded within the following limits.

Coarse Aggregate Size (Nominal)	Percent Passing (by weight)					
	1-1/2"	1"	3/4"	1/2"	3/8"	No. 4
3/4"	100	95-100	-	25-60	-	0-10

\* The recommendations of the soil's engineer for gradations shall take precedence over typical gradations found herein.

**C. Fine aggregate:**

1. Fine aggregate shall consist of natural sand, manufactured sand, or a combination thereof, conforming to the requirements of ASTM C-33.
2. Shall not be used in the work until approval by the Engineer of the tests performed by the independent testing laboratory.
3. The amount of deleterious substances included in the aggregate shall not exceed the amount specified in ASTM C33.
4. Fine aggregate shall be uniformly graded from coarse to fine within the following gradation:

	Percent Passing
3/8"	100
No. 4	95-100
No. 16	45-80
No. 50	10-30
No. 100	2-10

**D. Water:**

1. Water used in washing aggregate and mixing concrete shall be of a potable quality clean and free from oil, acid, salt, injurious amounts of alkali, organic matter or other deleterious substances.

**E. Admixtures:**

**SOUTHWEST UTAH YOUTH CENTER PARKING LOT IMPROVEMENTS**

DFCM PROJECT NO. 08199430

February 2009

- 1. The air-entraining admixture shall conform to ASTM Designation C-260 and be added at the mixer, not the job site.
- 2. Flyash shall NOT be used in concrete.
- 3. Use Pro Mesh Fiber Mesh additive in concrete or approved equal. Follow manufacturer's recommendations. Add approximately 1.5 pounds of additive per cubic yard of mix. Mix well and wait for a minimum of 5 minutes before placing.
- 4. No other admixtures will be allowed unless approved by the Engineer.

F. Concrete curing compound:

- 1. Liquid membrane curing compound shall conform to all applicable sections of ASTM C-309.

2.02 CONCRETE MIX

- A. Concrete shall consist of a mixture of Portland Cement, water, fine and coarse aggregates, and an air entraining agent.
- B. The proportions of the concrete materials shall produce a mixture that will work readily into corners and angles of forms and around reinforcing steel. The mixture shall have a water content which does not exceed the maximum specified amount, and which shall have the required compressive strength.
- C. The methods of measuring concrete materials shall permit proportions to be accurately controlled and easily checked. Measurement of materials for ready-mixed concrete shall conform to ASTM C-94. Engineer shall have free access to the mixing plant at all times.
- D. Concrete mix shall be as follows (unless otherwise shown or specified). The proportions given below are intended to give the required strength and shall be carefully followed as to minimum quantity of cement per cubic yard of concrete and as to water/cement ratios and more cement per cubic yare of concrete will be required if tests indicate necessity for such increased quantity to achieve the design strength:

Intended Use	Coarse Aggrega	Min. Cement	Min. 28-Day	Min. 14-Day	Slump (inches)	Air Entrainm	Max. Water/
Concrete Pavement, Storm Drain Inlet Boxes, Curbs & Walks	3/4	6.5	4000	550	2.5-4.0	5-6.5	0.45

2.04 EQUIPMENT

- A. Mixing equipment shall be subject to approval. Mixers may be of the stationary plant, paver, or truck mixer type.
- B. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed.

- C. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials, and for readily changing the proportions of the material. The batch plant shall be capable of controlling the delivery of all material to within 1% by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.
- D. Mixers shall be equipped with a device for automatically measuring and indicating the time required for mixing, which device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period. Neither speed nor volume capacity of the mixers shall exceed manufacturer's recommendations. Excessive over-mixing, requiring additions of water to preserve the required consistency, will not be permitted.

### PART 3 EXECUTION

#### 3.01 INSPECTION

- A. Inspect subgrade surface and verify grade and adequacy of compaction.
- B. Correct grade and compaction deficiencies.
- C. Notify the Engineer in writing of readiness to place concrete in any portion of the work. This notification shall be given as far in advance of the placing of concrete as the Engineer deems necessary for him to make final inspection of the preparations at the location of the proposed concrete placing. All forms, steel, screeds, anchors, ties, and inserts shall be in place before the Contractor's notification of readiness is given to the Engineer.
- D. No concrete shall be placed until forms, reinforcement, etc. has been inspected by the Engineer.

#### 3.02 PREPARATION

- A. Remove all water, wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed.
- B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.
- C. Thoroughly dampen the surfaces which will come into contact with the concrete (except in freezing weather), forms may be oiled instead; remove all standing water. Reinforcement shall be thoroughly cleaned of all ice and other coatings.
- D. Thoroughly clean all transporting and handling equipment.
- E. Erect and maintain suitable barriers to protect the finished surface. Any section damaged from traffic or other causes occurring prior to its official acceptance, shall be repaired or replaced by the Contractor at his own expense in a manner satisfactory to the Owner.
- F. The concrete surface must not be damaged or pitted by rain, hail or snow.
- G. Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position, and until the form ties at construction joints have been retightened, all sleeves,

hangers, pipe, bolts and any other items required to be embedded in the concrete have been placed and anchored and the forms cleaned and coated as specified.

### 3.03 PLACING CONCRETE

- A. Except by specific written authorization, concreting operations shall not be continued when a descending air temperature, in the shade and away from artificial heat, falls below 40 F, nor shall operations be resumed until ascending air temperature, in the shade and away from artificial heat, reaches 35 F.
- B. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
  - 1. The free fall of concrete from the end of the spout or chute, or from a transporting vehicle, shall not exceed 6 feet, except when beginning a wall pour, in which case the free fall shall not exceed 2 feet.
  - 2. When the distance through which concrete must be dropped vertically exceeds the maximums specified above, a tremie or flexible metal spout shall be used. Flexible metal spouts having sufficient strength to hold the weight of the concrete shall be composed of conical sections not more than 3 feet long, with the diameter of the outlet and taper of the various sections such that the concrete will fill the outlet and be retarded in its flow.
  - 3. Chutes, troughs, or pipes used as aids in placing concrete shall be arranged and used so that the ingredients of the concrete will not be separated. Chutes and troughs shall be of metal or metal-lined. When steep slopes are necessary, the chutes shall be equipped with baffle boards or a reversed section at the outlet. Open troughs and chutes shall extend, if necessary, down inside the forms or through holes left in the forms; or the ends of such chutes shall terminate in vertical downspouts.
  - 4. Pumping: The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipe line, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. Before and after this operation, the entire equipment shall be thoroughly cleaned. Water shall not be added to the concrete in the pump hopper.
- C. Place concrete as dry as possible consistent with good workmanship, never exceeding the maximum specified slump.
- D. Place concrete at such a rate that concrete is at all times plastic and flows readily between bare bars. No segregation of coarse aggregate shall occur when placing or dropping between bars.
- E. When placing is once started, carry it on as a continuous operation until placement of the section is complete.
- F. Do not pour a greater area at one time than can be properly finished without checking; this is particularly important during hot or dry weather.
- G. Do not use rettempered concrete that has been contaminated by foreign materials.

- H. Struts, stays, and braces serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached the elevation and strength rendering their service unnecessary. These temporary members shall be entirely removed from the forms.
- I. Build into concrete any nosings, inserts, anchors, structural members, ties and hangers required to secure abutting or adjacent materials. Waterstops shall be prevented from bending over or being moved out of position.
- J. Unless necessary materials and equipment are readily available to adequately protect the concrete in place, placing operations may be postponed by the Engineer when, in the opinion of the Engineer, impending conditions may result in rainfall or low temperatures which will impair the quality of the finished work. The Contractor shall pay for all delay related costs resulting from such postponements including costs for removing and replacing damaged concrete. In case rainfall should occur after placing operations are started, provide ample covering to protect the work.
- K. Whenever it is necessary to continue the mixing, placing, and finishing of concrete after daylight hours, the site of the work shall be adequately lighted so that all operations are plainly visible. Every effort shall be made to enable finishing to be done in daylight.
- L. Clean up all spilled concrete and washings thoroughly. Concrete trucks shall not be washed-out on job site. Wash trucks at off-site location in accordance with all applicable laws and ordinances.

3.04 HOT WEATHER CONCRETING

- A. Hot weather is defined as any combination of high air temperature, low relative humidity, and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in abnormal properties. Hot weather concreting shall follow the guidelines of ACI 305R, latest edition.
- B. Undesirable hot weather effects on concrete in the plastic state may include:
  - 1. Increased water demand.
  - 2. Increased rate of slump loss and corresponding tendency to add water at job site.
  - 3. Increased rate of setting resulting in greater difficulty with handling, finishing, and curing, and increasing the possibility of cold joints.
  - 4. Increased tendency for plastic cracking.
  - 5. Increased difficulty in controlling entrained air content.
- C. Undesirable hot weather effects on concrete in the hardened state may include:
  - 1. Decreased strength resulting from higher water demand and increased temperature level.
  - 2. Increased tendency for drying shrinkage and differential thermal cracking.
  - 3. Decreased durability.
  - 4. Decreased uniformity of surface appearance.
- D. Placing and curing:
  - 1. Concrete shall be handled and transported with a minimum of segregation and slump loss. Concrete temperature at time of placement shall be such that the rate of evaporation for the weather conditions shall not cause cracking.
  - 2. The aggregate shall be cooled by frequent spraying in such a manner as to utilize the cooling effect of evaporation. The placement schedule shall be arranged, as approved,

in such a manner as to provide time for the temperature of the previously placed course to begin to recede. The mixing water shall be the coolest available at the site insofar as is practicable.

3. Concrete shall be placed where it is to remain.
4. Concrete shall be placed in layers shallow enough to assure vibration well into the layer below.
5. Surfaces exposed to the drying wind shall be covered up immediately after finishing with polyethylene sheets and be water cured continuously as soon as the concrete has set up. Curing compounds, in lieu of water, may not be used.
6. Joints shall be made on sound, clean concrete.
7. Finishing operations and their timing shall be guided only by the readiness of the concrete for them, and nothing else.
8. Curing shall be conducted in such a manner that at no time during the prescribed period will the concrete lack ample moisture and temperature control. Facilities must be ready to protect promptly all exposed surfaces from drying. All work determined by Engineer to be damaged from hot weather shall be removed and replaced at no cost to Owner.
9. All materials and workmanship required to meet the hot weather requirements shall be supplied at the Contractor's own expense.

### 3.05 COLD WEATHER CONCRETING

- A. Cold weather is generally defined as a period when for more than 3 successive days the mean daily temperature drops below 40 F. When temperatures above 50 F occur during more than half of any 24-hour period, the weather should no longer be regarded as "cold". The times and temperatures given for various conditions and situations are not exact values and should not be used as such. Weather conditions are variable and common sense must be used to protect the concrete. Cold weather concreting shall follow the guidelines of ACI 306R, latest edition.
- B. All materials and workmanship required to meet the cold weather requirements shall be supplied at the Contractor's own expense.
  1. Preparation:
    - a. When specific written authorization is given to permit concreting operations at temperatures below those specified in 3.03 PLACING CONCRETE, arrangements for covering, insulating, housing, or heating materials and/or newly placed concrete should be made in advance of placement and should be adequate to achieve the temperature and moisture conditions recommended herein in all parts of the concrete. All equipment and materials necessary should be at the work site before the first frosts are likely to occur, not after concrete has been placed and its temperature begins to approach the freezing point.
  2. Placement and protection:
    - a. During placement of concrete, tarpaulins, or other readily movable coverings supported on horses or framework should follow closely the placing of the concrete so that only a few feet of concrete are exposed to outside air at any time.
    - b. The housing, covering, or other protection used in curing shall remain intact at least 24 hours after artificial heating is discontinued.
    - c. All concrete placed in forms shall have a temperature between 55' and 90' after placement. Adequate means shall be provided for maintaining the surrounding air at 60 F for at least seventy-two hours after placing and at no less than 40 F for an additional four days. All methods and equipment for heating shall be

subject to approval. Insulating blankets shall be used when required to maintain a satisfactory temperature during the curing period.

- d. No dependence shall be placed on salt or other chemicals for the prevention of freezing.
- e. If heating or other protective measures need to be taken to prevent concrete from freezing, the concrete may require special curing methods to prevent rapid drying, as described in ACI 306R-78.

### 3.06 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS

- A. Shall be formed and sealed as shown on the drawings or as required in individual Specifications Sections.

### 3.07 FINISHING

- A. Surface preparation: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.
- B. The finishing shall commence immediately after the concrete is placed. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the placing operation.
- C. The finished surface shall be true to grade and cross section, free from ruts, humps, depression or other irregularities.
- D. Finish Types: Finish shall be as shown on the Drawings or as specified in individual specification sections in accordance with the following:
  - 1. Patched: Remove all fins and irregular projections. Clean form-tie holes thoroughly, coat with suitable epoxy and fill with mortar of dry consistency (see PART 2 - PRODUCTS).
  - 2. Rubbed: Use proper grout mix (see PART 2 - PRODUCTS) and point up voids with cement mortar. Thereafter, rub the entire surface with said grout mix and a carborundum stone to produce a relatively smooth, plane surface without defects and imperfections. Surface shall be properly cured. Use of plaster shall not be permitted. Upon completion of the rubbing, the surface shall be washed thoroughly with clean water.
  - 3. Float: This type of finish shall be an integral finish by float after screeding, to compact the surface evenly. Any excess surface water shall be removed before floating and no mortar shall be used for leveling.
  - 4. Steel Trowel: After striking off the wearing course to the established grade, it shall be compacted by rolling or tamping, and then floated with a wood or magnesium float or power floating machine. The surface shall be tested with a straightedge to detect high and low spots, which shall be eliminated. Floating shall be followed by steel troweling after the concrete has hardened sufficiently to prevent excess fine material from working to the surface. The finish shall be brought to a smooth surface, free from defects and blemishes. No dry cement nor mixture of dry cement and sand shall be sprinkled directly on the surface of the wearing course to absorb moisture or to stiffen the mix. After the concrete has further hardened, additional troweling may be required. This shall be done as may be directed by the Engineer. Troweling shall produce a dense, smooth, impervious surface, free from defects and blemishes.

5. Sandblasting: Sandblasting shall be done using a sharp silica sand. Exterior surfaces of concrete walls shall be sandblasted with #16 silica sand, preferably by the dry sandblasting process before wire wrapping may be started. The concrete surface shall be heavily pitted, leaving no traces of laitance, form-oil and original surface smoothness and surface color. The minimum sand consumption per 100 square feet of surface shall be 150 pounds of silica sand. Sandblasting shall not be started before the completion date of the curing period or before all tieholes have been dry-packed.
  6. Formed: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.
- E. Final finishing:
1. When the concrete has hardened sufficiently, the surface shall be given a broom finish. The broom shall be of an approved type.
  2. The strokes shall be in a transverse direction with adjacent strokes slightly overlapped and shall be made by drawing the broom without tearing the concrete, but so as to produce regular corrugations not over 1/8 inch in depth.
  3. The surface, as thus finished, shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidental disturbing during the final brooming of particles of coarse aggregate embedded near the surface.

### 3.09 CURING

- A. Protect the concrete from the effects of weather in accordance with HOT WEATHER CONCRETING AND COLD WEATHER CONCRETING in this section.
- B. Water for curing shall be as specified in PART 2 - PRODUCTS.
- C. Other curing requirements may be required in individual Specifications Sections.
- D. Membrane curing compound method:
  1. Surface of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.
  2. The curing compound shall be delivered to the work in ready-mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.
  3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100° F, unless otherwise specified by manufacturer's recommendations.
  4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 150 square feet of area, unless otherwise required by manufacturer's recommendations.
  5. In the event that the application of curing compound is delayed, the application of water as provided in this section shall be started immediately and shall be continued until application of the compound is resumed or started.

### 3.10 FIELD QUALITY CONTROL

- A. Testing will be provided by a testing laboratory employed by the Owner. The Engineer shall select the testing agency from Owner's list of approved labs. Refer to individual Specifications Sections for other Field Quality Control requirements.
- B. All testing will be paid for by Owner, except for retesting of material which fails to meet these specifications. Such retesting shall be paid for by Contractor at no expense to Owner. Contractor shall pay for curing cylinders. Testing agency shall transport cylinders.
- C. Concrete sampled from a concrete pump shall be sampled from the hose after all of the priming grout has been wasted. The end of the hose shall be placed in a horizontal position before the concrete is discharged into the sampling pan. The concrete shall not be allowed to fall into the sampling pan.
- D. The Contractor, at his expense, shall furnish the concrete required for testing.
- E. Strength, slump and air tests shall be taken in accordance with the following unless otherwise specified in individual Specifications Sections:
  - 1. Strength, slump and air tests may be taken in accordance with the placement rate per day as shown below:

Rate/Day (C.Y.)	Air	Slump	Compress. Strength	Flexural Strength
0-8	1	1	Optional	Optional
8-50	1	1	1	1
For each 50 C.Y. or fraction thereof	1	1	1	1

Additional tests may be made at the discretion of the Owner.

- 2. Compressive strength test specimens shall be made and cured in accordance with ASTM C-31; Specimens shall be tested in accordance with ASTM C-39.
  - a. Three specimens shall be made by the Engineer for each test, and these shall be broken at 7 and at 28 days, with one held in reserve.
  - b. At least one test (3 specimens) shall be made for each class of concrete poured during one day.
- 3. Flexural strength test specimens shall be prepared in accordance with AASHTO Designation T-23 and tested for flexural strength in accordance with AASHTO Designation T-97.
  - a. Four specimens shall be made by the Engineer for each test, and one shall be broken at 7 and two at 14 days, with one held in reserve.
  - b. At least one test (4 specimens) shall be made for each class of concrete placed during one day.
- 4. If a slump test does not meet the specification, a second slump test shall be made immediately on the same load. The concrete shall be accepted if the second slump test meets the specification or rejected and removed from the project if the second slump test does not meet the specification.

5. If an air test does not meet the specification, a second air test shall be made immediately upon the same load. The concrete shall be accepted if the second air test meets the specification or rejected and removed from the project if the second air test does not meet the specification.
6. Slump and air tests shall be made in accordance with ASTM C-143 and C-231, respectively.
7. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80 F and sixty minutes for temperatures above 80 F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.
8. If a compressive strength test is below the required specified strength, the Engineer shall immediately notify the Contractor or his authorized representative.
9. All costs incurred in resampling and retesting shall be paid by the Contractor if the retested strength is below the specified strength, and shall be assumed by the Owner if the retested strength is above the specified strength.

### 3.11 PROTECTION

- A. Comply with applicable parts of Section 03300 for protection of concrete. Also comply with HOT WEATHER CONCRETING and COLD WEATHER CONCRETING requirements specified herein.
- B. Provide barricades and enclosures to prevent damage to newly placed concrete.
- C. Replace concrete curb, walls and exterior flatwork damaged by construction activities as directed, at no cost to Owner.
- D. Every reasonable precaution shall be taken to protect finished surfaces from abrasions or other damage. Concrete surfaces or edges likely to be injured during the construction period shall be protected by leaving the forms in place or by erecting satisfactory covers. No fire shall be permitted in direct contact with concrete at any time. Concrete shall be adequately protected from injurious drying action by sun and wind, and from pitting by rain.

END OF SECTION

## SECTION 11330

### MUFFIN MONSTER® 30004T IN-LINE ELECTRIC GRINDER

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. This section of the specification describes the sewage grinder and motor controller. The equipment shall be installed as shown on the plans, as recommended by the supplier, and in compliance with all OSHA, local, state and federal codes and regulations.
- B. The grinder shall be capable of processing 600 GPM with a maximum headloss of 6 inches of water column.

##### 1.2 REFERENCES

- A. Grinder shall, as applicable, meet the requirements of the following industry standards:
  - 1. American Society for Testing and Materials (ASTM) A36: Standard Specification for Carbon Steel Plate
  - 2. American Society for Testing and Materials (ASTM) A536-84: Standard Specification for Ferritic Ductile Iron Castings
  - 3. American Society for Testing and Materials (ASTM) B-16.42-1979: Standard Specification for Class 40 Grey Iron Castings
  - 4. American National Standards Institute Standards (ANSI) B16.42-1979, Class 150 (Ductile Iron Class 150) Flanges.
  - 5. American Iron and Steel Institute (AISI) 303 Stainless Steel
  - 6. American Iron and Steel Institute (AISI) 4130 Heat Treated Alloy Steel
  - 7. American Iron and Steel Institute (AISI) 4140 Heat Treated Hexagon Steel
  - 8. Rockwell C
- B. Controller(s) shall, as applicable, meet the requirements of the following Regulatory Agencies.
  - 1. National Electrical Manufacturer's Association (NEMA) Standards
  - 2. National Electrical Code (NEC)
  - 3. Underwriters Laboratory (UL and cUL)

## **PART 1 GENERAL (Cont'd)**

### **1.3 DOCUMENTS**

#### **A. Shop Drawing(s)**

Supplier shall submit six (6) sets of shop drawings. Shop drawings shall include equipment descriptions, specifications, dimensional and assembly drawings, parts lists, and job specific drawings.

#### **B. Operation and Maintenance Manuals**

Supplier shall submit three (3) Operation and Maintenance manuals prepared using best commercial practices. The manuals shall include equipment descriptions, operating instructions, drawings, troubleshooting techniques, a recommended maintenance schedule, and the recommended lubricants.

### **1.4 QUALITY ASSURANCE**

Qualified suppliers shall have a minimum 25 years experience at manufacturing, support systems, two-shafted grinding equipment and motor controls with a minimum of 5,000 installations with similar equipment. Supplier shall provide a list of names and dates of installations for verification by the Engineer or Owner's Representative.

Supplier shall provide the services of a factory-trained representative to check the installation and to start-up each grinder and controller. The factory representative shall have complete knowledge of proper installation, operation, and maintenance of equipment supplied. Representative shall inspect the final installation and supervise a start-up test of the equipment.

Each grinder and controller shall be factory tested to ensure satisfactory operation.

### **1.5 DELIVERY, STORAGE AND HANDLING**

- A. The equipment shall be packaged in containers constructed for normal shipping, handling and storage.
- B. The containers shall provide adequate protection for the equipment in a dry indoor environment between +40°F and +100°F until time for installation.

### **1.6 IDENTIFICATION**

Each unit of equipment shall be identified with a corrosion resistant nameplate, securely affixed in a conspicuous place. Nameplate information shall include equipment model number, serial number, supplier's name, and location.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Grinder and motor controller shall be in compliance with these specifications and plans and shall be supplied by one of the following manufacturers:
  - 1. JWC Environmental: Muffin Monster® model No. 30004T-1206
- B. Manufacturers requesting to be selected as an approved equal shall submit certified documentation showing compliance with these specifications a minimum of ten (10) days prior to bid opening. Selected equipment manufacturers shall be added to the list of approved manufacturers.
- C. The manufacturer must certify that the unit can be returned for maintenance to the factory or a local repair facility. The certification shall include a statement that there will be no charge for repair labor.

### **2.2 GRINDER**

#### **A. GENERAL**

- 1. Each grinder shall include cutters, spacers, shafts, bearings and seals, in-line housing with pipe flanges, inspection ports, cutter stack, reducer, and motor.
- 2. The cutter cartridge and drive assembly shall be removable from the main housing as a complete assembly without further disassembly. The components of that assembly include cutters, spacers, shafts, reducer, motor, bearings, and seals.
- 3. The grinder shall be of two (2) -shaft design and be capable of continuous operation, processing wet or dry. Grinders designed with cutter and spacer cartridges rather than individual cutters and spacers, shall not be acceptable. Single shaft devices utilizing a single rotating cutter bar with stationary cutters shall not be acceptable.
- 4. Two-shaft design shall consist of two parallel shafts alternately stacked with individual intermeshing cutters and spacers positioned on the shaft to form a helical pattern. The two shafts shall counter-rotate with the driven shaft operating at approximately two-thirds (2/3) the speed of the drive shaft.

#### **B. COMPONENTS**

- 1. Individual Cutters and Spacers
  - a. The cutting chamber shall be a nominal height of 12 inches.
  - b. Individual cutters and spacers shall be 4130 heat treated alloy steel, surface ground for uniformity and through-hardened to a minimum 45-50 Rockwell C.

## **PART 2 PRODUCTS Cont'd)**

### **2.2 GRINDER(S) (Cont'd)**

#### **B. COMPONENTS (Cont'd)**

1. Individual Cutters and Spacers (Cont'd)
  - c. The inside configuration of both the individual cutters and the individual spacers shall be hexagonal so as to fit the shafts with a total clearance not to exceed 0.015 inch across the flats to assure positive drive, minimize wear on the cutters, and increase the compressive strength of the spacers.
  - d. Cutter configuration shall consist of individual 11 tooth cam cutters on both shafts. To maintain particle size, the height of the tooth shall not exceed 1/2 inch above the root diameter. Cutter to cutter root diameter overlap shall be not less than 1/16 inch or greater than 1/4 inch to maintain the best possible cutting efficiency while incurring the least amount of frictional losses. Clearance between overlapping cutters of opposing shafts shall be no greater than 0.011 inches.
  - e. The cutters shall exert a minimum force at the tooth tip of 2,051 lbs./hp during momentary load peaks.
2. Shafts
  - a. Grinder drive and driven shafts shall be made of 4140 heat treated hexagon steel with a tensile strength rating of not less than 149,000 psi.
  - b. Each hexagonal shaft shall measure a nominal two (2) inches across parallel surfaces.
3. Intermediate Shaft Support
  - a. An intermediate shaft support shall be provided in the center of the cutter stack for all grinders with 24 inch cutter stacks.
  - b. The intermediate shaft support shall provide additional support for heavier than normal influent grinder demand loads and protection for the seal assemblies.
  - c. The intermediate shaft support shall be made of a cast 303 stainless steel collar and two (2) bushings. The bushings shall act as bearings to allow the free rotation of the shafts.
3. Main Housing and Covers
  - a. The main housing shall be a solid cast structure made of A536-84 ductile iron. The one-piece flanged body shall be capable of remaining in-line if removal of the cutter cartridge and drive assembly is required for service.

## **PART 2 PRODUCTS Cont'd)**

### **2.2 GRINDER(S) (Cont'd)**

#### **B. COMPONENTS (Cont'd)**

3. Main Housing and Covers (Cont'd)
  - b. The inside profile of the main housing shall be concave to follow the radial arc of the cutters. To direct larger particles toward the cutters and assure fineness of grind, the main housing shall maintain a clearance not to exceed 5/16 inch between the major diameter of the cutter and the concave arc of the housing.
  - c. The main housing shall be provided with a covered access port for equipment inspection. Inspection port covers shall be A536-84 ductile iron.
4. Shaft Bearings and Seals
5. The radial and axial loads of the cutter shafts shall be borne by sealed, oversized, deep-groove ball bearings at each end.
6. The bearings shall be protected by a combination of a replaceable and independent tortuous path device and mechanical seals.
7. Face materials shall be tungsten carbide to tungsten carbide.
8. O-rings shall be made of Buna-N elastomers.
9. Products requiring continuous or occasional lubrication or flushing shall not be accepted.
10. The mechanical seal shall be rated at 90 psi continuous duty by the seal supplier.
11. The bearings shall be housed in a replaceable cartridge that supports and aligns the bearings and seals, as well as protects the shafts and end housings. The seal elements shall be independent of the stack height, therefore cutter stack tightness shall not affect seal performance. The seal elements shall maintain their factory set preload independent of the cutter stack tightness.
12. Seals shall meet required pressure rating regardless of cutter stack fit. The seal cartridge shall provide seal protection against axial loading on shafts and bearings during shaft deflection.
13. Each seal element shall be positively locked to its corresponding rotating or static cartridge element. This positive lock on the seal elements is critical to long seal life in applications where grit or other abrasive materials are present.

## **PART 2 PRODUCTS Cont'd)**

### **2.2 GRINDER(S) (Cont'd)**

#### **B. COMPONENTS (Cont'd)**

##### 14. Gear Housing and Cover

- a. The gear housing shall be provided with a covered access port for cutter stack tightening.
- b. The gear housing shall be A536-84 ductile iron.
- c. The cutter stack tightening cover shall be A36 carbon steel.

##### 15. Reducer

- a. The speed reducer shall be a grease-filled planetary-type of reducer with a 500% shock load capacity. The reduction ratio shall be 29:1.
- b. The input shaft of the reducer shall be directly coupled to the motor using a three (3)-piece coupling, and the output shaft of the reducer shall be directly coupled with the grinder using a two (2)-piece coupling.

##### 16. Motor

- a. The motor shall be 3 hp, TEFC, 1,725 rpm, 230/460 volt, 3 phase, 60 Hz.
- b. Motor service factor shall be 1.15, the efficiency factor not less than 85% at full load and the power factor not less than 80% at full load.
- c. Required Running Torque per Horsepower:
- d. At Momentary Load Peaks: 4,756 in-lbs/hp

##### 17. Maintenance and Service Components

**NOTE: THE FOLLOWING OPTIONAL ITEM IS RECOMMENDED FOR TEMPORARY USE DURING MAINTENANCE OPERATIONS ONLY.**

- a. A maintenance bar screen shall be sized to fit into the grinder housing when the cutter cartridge has been removed, allowing temporary resumption of flow during routine maintenance only.

### **2.3 MOTOR CONTROLLER**

#### **A. GENERAL**

1. The controller shall provide independent control of the grinder.

## **PART 2 PRODUCTS Cont'd)**

2. Controller shall be the supplier's standard UL/cUL listed Model PC2200.
3. The controller shall be rated for 3 hp, 230/460 volts, 3 phase, 60Hz.

### **B. OPERATION**

1. The controller shall be equipped with a GRINDER ON-OFF/RESET-REMOTE three (3) position selector switch.
  - a. In the ON position the grinder will run.
  - b. In the OFF/RESET position the grinder shall not run.
  - c. In the REMOTE position the grinder shall start and stop as controlled by a remotely-located dry contact.
  - d. The grinder shall only be reset by switching the GRINDER ON-OFF/RESET-REMOTE switch to the OFF/RESET position.

### **C. COMPONENTS**

1. Enclosure
  - a. Enclosures shall be NEMA 4X, fabricated of fiberglass-reinforced polyester resins, and shall be suitable for wall mounting. Doors shall have hinges and corrosion-resistant latches.
  - b. Enclosure shall house the control devices, relays, terminal blocks and reversing motor starters.
2. Control Devices
  - a. Pilot devices shall be mounted on the enclosure front panel door.
  - b. The controller shall have indicator lights for POWER ON, RUN, and FAIL.
  - c. Indicator lights shall be LED type pilot lights. Lights and the selector switches shall be heavy duty NEMA 4X type.
  - d. Control transformer shall be protected by two (2) primary fuses and one (1) secondary fuse. The 120 volt secondary shall have one (1) leg grounded.

## **PART 2 PRODUCTS Cont'd)**

### **2.3 MOTOR CONTROLLER(S) (Cont'd)**

#### **C. COMPONENTS (Cont'd)**

##### **2. Control Devices (Cont'd)**

- e. Relay contacts shall be included for GRINDER run and FAIL signal outputs. The contacts shall be rated two (2) ampere, 240 VAC, resistive load.

##### **3. Motor Starter**

- a. Starter shall be a full-voltage reversing type with 120 volt operating coils.
- b. Forward and reverse contactors on the starters shall have both mechanical and electrical interlocks.
- c. Overload relays (OL) shall be adjustable so that the range selected includes the FLA (full load amperes) rating and service factor.

#### **D. SAFETY FEATURES**

- 1. When a grinder jam condition occurs in the grinder ON or REMOTE mode the controller shall stop the grinder and reverse grinder rotation to clear the obstruction. If the jam is cleared, the controller shall return the grinder to normal operation. Up to two (2) additional reversing cycles (3 times total) may occur within 30 seconds before the controller de-energizes the grinder motor and activates the grinder fail indicator and relay.
- 2. If a power failure occurs while a grinder is running, operation will resume when power is restored.
- 3. If a power failure occurs while the grinder is in a fail condition the fail indicator shall reactivate when power is restored.
- 4. The controller shall provide overload protection for the motor through an overload relay mounted directly on the grinder starter.
- 5. Short-circuit protection requires that a properly-sized circuit breaker or fuses be installed by others.
- 6. Controller reset shall be from the local panel controls only.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

Grinder and motor controller shall be installed in accordance with the supplier's installation instructions, and in compliance with all OSHA, local, state, and federal codes and regulations.

**END OF SECTION**