MIDWAY CITY

North Center Street Trail, Water & Sewer Improvements

December 2024

Prepared By:

SUNRISE ENGINEERING

CONTRACT DOCUMENTS, STANDARD SPECIFICATIONS,
AND SPECIAL PROVISIONS

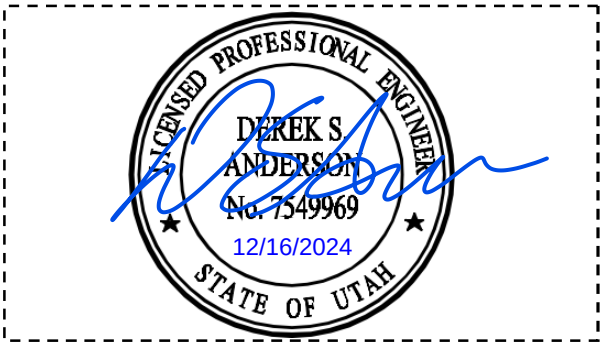
FOR

MIDWAY CITY

North Center Street Trail, Water & Sewer Improvements

December 2024

Project Engineer



Derek S. Anderson
Utah P.E. No. 7549969

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SUNRISE ENGINEERING

1180 N Mountain Springs Pkwy
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CONTRACT DOCUMENTS, STANDARD SPECIFICATIONS and SPECIAL PROVISIONS

for

MIDWAY CITY

North Center Street Trail, Water & Sewer Improvements

UDOT 2024 Standard Specification for Road and Bridge Construction (Can be found at www.udot.utah.gov)

CONTRACT DOCUMENTS

DOCUMENT 00030

REQUEST FOR BIDS

Owner: Midway City

Address: 75 North 100 West Street, Midway, Utah 84049

SEALED BIDS for the Construction of the **North Center Street Trail, Water & Sewer Improvements** Project will be received by Midway City at 75 North 100 West Street, Midway, Utah 84049 until **2:00 p.m. MST, Thursday, February 20, 2025,** and then publicly opened and read aloud. Recommendation for award will be presented to the Midway City Council at the next scheduled meeting.

PROJECT DESCRIPTION:

- Install 8" Slip Line Fold & Form sewer line and lateral connections (approximately 1,000 lineal feet along North Center Street from Burgi Lane to Alfalfa Circle and approximately 300 lineal feet near 65 North 300 East). Includes restoration of surface improvements in impacted areas.
- Install approximately 3,550 lineal feet of 10" PVC C900 DR-18 water line, approximately 250 lineal feet of 8" PVC C900 DR-18 water line, and service connections along North Center Street from 600 North to Main Street and along Alfalfa Circle. Includes restoration of surface improvements in impacted areas.
- Complete roadway improvements along North Center Street from 600 North to Main Street. Includes pulverizing existing asphalt, grading and compacting subgrade, repaving the roadway, and restoration of surface improvements in impacted areas.
- Construct approximately 6,500 lineal feet of multi-use trail along the east side of North Center Street from Main Street to Burgi Lane. The trail construction will include excavation, grading, and surfacing to create a stable path suitable for pedestrians, cyclists, and other non-motorized traffic. Safety enhancements such as trail separation from the roadway, curb and gutter adjustments, and the installation of rumble strips will be implemented. Includes restoration of surface improvements in impacted areas.

Plans and specifications have been prepared by Sunrise Engineering, LLC and will be available after January 27, 2025 on their website plan room at http://www.sunrise-eng.com. Click on "Plan Room" in the upper right hand corner of the homepage. Bidders must register and sign-in and choose to become a plan holder to obtain access to CONTRACT DOCUMENTS and DRAWINGS. Notices regarding changes/amendments to the CONTRACT DOCUMENTS and DRAWINGS will be sent to the e-mail address associated with the bidder's registration. Bidders are responsible to maintain current and correct contact information and check the plan room often to receive updates or additional documents/changes/amendments. The ENGINEER for this Contract will be Sunrise Engineering, LLC and they will be represented by Derek Anderson, P.E. as Project Engineer.

PRE-BID MEETING:

A pre-bid meeting for the Project will be held on Tuesday, February 11, 2025, at 10:00 a.m. MST at Midway City Government Offices located at 75 North 100 West Street, Midway, Utah 84049. Attendance at the pre-bid meeting is requested. Names of those in attendance will be recorded.

DOCUMENTS REQUIRED AT BID OPENING:

1. Bid forms provided. (Sections 00200, 00300, and 00355)
2. Cashier or Certified check or bid bond made payable to Midway City in an amount equal to at least five percent (5%) of the total amount of the bid. Bid bonds must be underwritten by a Surety Company approved by the U.S. Department of the Treasury. (Circular 570, latest edition).

DOCUMENT 00210, STATUS VERIFICATION SYSTEM AFFIDAVIT REQUIRED 24 HRS AFTER BID OPENING.

If all required documents are not provided, the bid may be disqualified.

Midway City reserves the right to accept or reject any or all proposals, or any part of any proposal, including the right to waive any informality in any part of any proposal within the best interest of Midway City.

Date: Dec 2024

Celeste T. Johnson
Mayor

END OF DOCUMENT

DOCUMENT 00100

INFORMATION FOR BIDDERS

SEALED BIDS for the Construction of the **North Center Street Trail, Water & Sewer Improvements** Project will be received by Midway City (herein called the "OWNER") at 75 North 100 West Street, Midway, Utah 84049 until **2:00 p.m. MST, Thursday, February 20, 2025,** and then publicly opened and read aloud. Recommendation for award will be presented to the Midway City Council at the next scheduled meeting.

Each BID must be submitted in a sealed envelope, addressed to Midway City at 75 North 100 West Street, Midway, Utah 84049. Each sealed envelope containing a BID must be plainly marked on the outside as BID for **North Center Street Trail, Water & Sewer Improvements** and the envelope should bear on the outside the name of the BIDDER, his address, his license number if applicable and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at Midway City Government Office located at 75 North 100 West Street, Midway, Utah 84049.

These instructions are to be considered with and made a part of the Contract.

All BIDS must be made on the required BID form. All blank spaces for BID Prices must be filled in, in ink or typewritten, and the BID form must be fully completed and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. Any BID may be withdrawn prior to the above scheduled time for the opening of BIDS or authorized postponement thereof. Any BID received after the time and date specified shall not be considered. No BIDDER may withdraw a BID within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the Bid Schedule by examination of the site and a review of the drawings and specifications including Addenda. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of work or of the nature of the work to be done.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the project. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the Contract.

Each BID must be accompanied by a Bid Bond payable to the OWNER for five, (5) percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the bonds of all except the three lowest responsible BIDDERS. When the Agreement is executed, the bonds of the two remaining unsuccessful BIDDERS will be returned. The Bid Bond of the successful BIDDER will be retained until the Payment Bond and Performance Bond have been executed and approved, after which it will be returned. A certified check may be used in lieu of a Bid Bond.

A Performance Bond and a Payment Bond, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the U.S. Department of the Treasury (Circular 570, latest edition) will be required for the faithful performance of the contract.

Attorneys-in-fact who sign Bid Bonds or Payment Bonds and Performance Bonds must file with each bond a certified and effective dated copy of their power of attorney.

The party or parties to whom the contract is awarded will be required to execute the Agreement and obtain the Performance Bond and Payment Bond within ten (10) calendar days from the date when Notice of Award is delivered to the bidder. The Notice of Award shall be accompanied by the necessary Agreement and bond forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may at his option consider the BIDDER in default, in which case the Bid Bond accompanying the proposal shall become the property of the OWNER.

The OWNER within 14 days of receipt of acceptable Performance Bond, Payment Bond, and Agreement signed by the party to whom the Agreement was awarded shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by written notice withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The Notice to Proceed shall be issued with the execution of the Agreement by the OWNER. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the OWNER and CONTRACTOR. If the Notice to Proceed has not been issued within the thirty (30) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as he deems necessary to determine the ability of the BIDDER to perform the work, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the evidence submitted by, or investigation of, such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the work contemplated therein.

A conditional or qualified BID will not be accepted.

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project shall apply to the contract throughout.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall in no way relieve any BIDDER from any obligation in respect to his BID.

Bidders are cautioned that they must inform themselves of the character of the work to be performed under this contract and that a deviation to any extent either way may be made from the approximate quantities, which are stated for the purpose of showing the class of work required and as a basis for determining the amount of the bid, but not to fix the amount of work to be done.

The Contractor will be paid for work actually done at the unit prices bid, regardless of differences in the estimated quantities listed in the bid proposal and the actual quantities. Final payments will be based on quantities in place, measured or determined by the Engineer at the site where work has been constructed or accomplished.

Award will be made to the lowest responsive, responsible BIDDER, for each schedule.

When a proposal is made by a firm, the firm name, and also the individual name(s) of the member(s) of the firm must be signed in full.

No alterations by erasure will be allowed and permission will not, in any case, be given for the withdrawal, modifications, or explanation of any bid.

The Owner reserves the right to reject any and all proposals and to waive any informality or defects in the proposal received.

Transfers of contract, or of interest in contracts, are prohibited. The General Contractor will be responsible for all subcontractors. 50% of all work completed must be performed by the General Contractor.

All proposals shall be made and received with the express understanding that the bidder accepts the terms and conditions contained in the complete contract bound herewith.

Neither the Engineer nor Owner shall be held responsible for any oral instructions. Any changes to the Plans and Specifications will be in the form of a written Addendum which will be furnished to all plan holders.

A **pre-bid meeting** will be held at Midway City Government Offices located at 75 North 100 West Street, Midway, Utah 84049, on Tuesday, February 11, 2025, at 10:00 a.m. MST. The purpose of this conference will be to discuss questions bidders may have on the project and clarify the intent of the Plans and Specifications. Attendance at the pre-bid meeting is encouraged but not required.

Additional information can be obtained from the ENGINEER, prior to submitting your bid from Sunrise Engineering at the following location:

1180 N Mountain Springs Pkwy, Springville, Utah 84663, Telephone Number (435) 704-5200.

END OF DOCUMENT

DOCUMENT 00200

INFORMATION REQUIRED OF BIDDER

GENERAL INFORMATION

The bidder shall furnish the following information. Failure to comply with the requirement may render the BID non-responsive and may cause its rejection. Additional sheets shall be attached as required.

1. Contractor's name and address:

   _____

   _____

   _____

2. Contractor's telephone number: _____

3. Contractor's license: Primary classification:_____

   State License No.: _____

   Supplemental classifications held, if any:_____

4. Number of years as a contractor in construction work of this type:_____

5. Names and titles of all officers of contractor's firm:

   _____ _____

   _____ _____

   _____ _____

   _____ _____

6. Name of person who inspected site of proposed work for your firm:

   Name: _____ Date of Inspection:_____

NOTE: THE FOLLOWING INFORMATION SHALL BE PROVIDED AS SEPARATE ATTACHMENTS AND SHALL BE SUBMITTED WITH BID.

7. Name and telephone number of surety company and agent who will provide the required bonds on the contract:

   Name: _____ Telephone:_____

8. Individual experience resume of person who will be designated chief construction superintendent.

a. The Contractor must assign a Project Forman/Project Manager to oversee the daily construction work. The Contractor shall assign a Project Forman/Project Manager to the construction work. The Project Forman/Project Manager shall not be removed or replaced from the project without prior approval of the City Engineer, which approval shall not be unreasonably withheld. No subcontracting of significant portions of the construction contract services shall be made without prior approval of the City.

9. List of subcontractors and major suppliers anticipated to be utilized during the contract. (Use other sheets as necessary)

10. The bidder must demonstrate the ability to perform at least 50 percent of the work without subcontracting. Information on the bidder's ability to staff the project, both in the field and in his office, and the bidder's ability to directly supply major construction equipment to the project shall be submitted for review with the bidder's proposal.

11. List of completed projects similar in nature to this project, including a reference list of at least two (2) construction contracts completed by the Contractor during the last four (4) years involving work of similar type, and complexity. This list shall include the following information for each project as a minimum:

- Name, address and telephone number of owner
- Name of Project
- Name, address and telephone number of project engineer
- Original Contract amount and change order amount.
- Date of completion of contract
- Brief description of the work involved, size, length, etc.

12. Information on the bidder's ability to staff the project, both in the field and in his office, and the bidder's ability to supply major construction equipment to the project shall be submitted for review with the bidder's proposal.

END OF DOCUMENT

DOCUMENT 00210

STATUS VERIFICATION SYSTEM AFFIDAVIT

PART 1 GENERAL

1.1 CONTRACTOR

A. Name: _____

B. Address: _____

C. Telephone number: _____

D. Facsimile number: _____

1.2 OWNER

A. The name of the OWNER is MIDWAY CITY.

1.3 CONSTRUCTION CONTRACT

A. The Construction Contract is known as

North Center Street Trail, Water & Sewer Improvements

PART 2 REQUIREMENTS

2.1 REGISTRATION AND PARTICIPATION

A. Contractor will be required by City ordinance to include the following wording in each subcontract at every tier:

> "Any contractor or subcontractor who works under or for another contractor shall certify to the main contractor by affidavit that the contractor or subcontractor has verified through the State Verification System the employment status of each new employee of the respective contractor or subcontractor, in accordance with Utah Code Section 63G-11-103. Such affidavit must be provided prior to the Notice to Proceed for the subcontractor to perform the work."

B. By submitting a proposal and/or by signing this contact, contractor certifies that it does not, nor shall during the performance of this contract knowingly employ, or subcontract with any individual contractor or entity which employs workers in violation of current Federal or State Immigration laws and Utah Code 63G-11-103.

C. Contractors and subcontractors shall produce at the City's request, such documents which are required to verify the employment status of each new employee in compliance with such said current applicable Federal and State laws.

D. If the contractor and subcontractor knowingly employs workers in violation of any such laws, including Utah Code 63G-11-103, such violation shall be cause for unilateral cancellation of the contract between contractor and the City. In the event this contract is terminated due to such a violation by the contractor or by a subcontractor of the contractor, the contractor shall be liable for any and all costs associated with such termination including, but not limited to, all costs and attorney fees and any general damages incurred by the City.

PART 3 EXECUTION

3.1 CONTRACTOR'S SUBSCRIPTION AND ACKNOWLEDGMENT

A. CONTRACTOR's signature:

_____

B. Please print name here:

_____

C. Title: _____

D. CONTRACTOR's Utah license number: _____

Acknowledgment

State of _____)
) ss.
County of _____)

The foregoing instrument was acknowledged before me this _____, 2025
by _____
(person acknowledging and title or representative capacity, if any).

_____
Notary's signature

_____
Residing at

_____
My commission expires: Notary's seal

END OF DOCUMENT

DOCUMENT 00300
BID
MIDWAY CITY

Date _____

Proposal of _____ (hereinafter called "BIDDER", organized and existing under the laws of the State of Utah, doing business as _____. *
*Insert "a corporation", "a partnership", or "an individual" as applicable.

To Midway City (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all work for the construction of **North Center Street Trail, Water & Sewer Improvements** in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to his own organization that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence work under this contract on or before a date to be specified in the Notice to Proceed and to be **substantially complete with the project within 160 consecutive calendar days thereafter.**

BIDDER further agrees to pay as liquidated damages, the sum of **$1,000** for each consecutive calendar day thereafter as provided in section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDUM:

_____

The BIDDER agrees to perform all the work described in the specifications and shown on the plans for the following bid unit prices (Figures are to be typewritten or clearly and legibly printed in ink.):

.

_____

The BIDDER agrees that this bid shall be good and may not be withdrawn for 60 calendar days as stated in the specifications after the scheduled closing time for receiving bids.

The BID unit prices shall include all labor, materials, mobilization, rentals, bailing, shoring, removal, overhead, profit, insurance, sales tax, other applicable taxes and fees, etc., to cover the finished work of the several kinds called for.

Upon receipt of written notice of the acceptance of this bid, BIDDER will execute the formal contract attached within 10 days and deliver a Surety Bond or Bonds as required by the General Conditions. The bid security amounting to five (5) percent of the base bid is hereby attached and is to become the property of the OWNER in the event the contract and bond are not executed within the time above set forth, as liquidated damages for the delay and additional expense to the OWNER caused thereby.

The Owner will award the Bid to the contractor that has the lowest responsive bid.

BID SCHEDULE

North Center Street Trail, Water & Sewer Improvements

Item No.	Item Description	Quantity	Unit	Unit Price	Amount
4.1 - General					
1	Mobilization	1	LS		
2	Traffic Control	1	LS		
				Sub-Total 4.1:	
4.2 - Water					
3	8" PVC C900 DR-18 Water Line	250	LF		
4	10" PVC C900 DR-18 Water Line	3,550	LF		
5	8" Gate Valve Assembly	4	EA		
6	10" Gate Valve Assembly	15	EA		
7	12" Gate Valve Assembly	1	EA		
8	Pot Rock Excavation	43,560	CY		
9	Remove & Dispose of Existing Fire Hydrant Assembly	5	EA		
10	Fire Hydrant Assembly	7	EA		
11	Water Service Connection	36	EA		
12	Special Construction Area (Steel Casing)	180	LF		
13	Flowable Fill (UDOT Spec)	4	CY		
14	Import / Granular Fill	13,500	CY		
15	Clay Cutoff Wall	9	EA		
				Sub-Total 4.2:	
4.3 - Sewer					
16	8" Slip Line Fold & Form Pipe	1,300	LF		
17	Lateral Connection (Top Hat Prep)	13	EA		
18	Lateral Connection (Top Hat)	13	EA		
19	Post Construction Sewer Video	1,300	LS		
20	Bypass Pumping	7	EA		
				Sub-Total 4.3:	
4.4 - Road					
21	Pulverize, Grade and Compact Road (City of Midway)	92,700	SF		
22	3" Asphalt Pavement (City of Midway)	92,200	SF		
23	7" Asphalt Patching - Remove & Replace (UDOT Spec)	400	SF		
24	2" Rotomill & 2" Pavement (UDOT Spec)	1,200	SF		
25	Pavement Marking Paint - White (UDOT Spec)	115	LF		
26	Raise/Lower & Collar Water Valve & Monument	4	EA		
27	Raise/Lower & Collar Valve Cluster	7	EA		
28	Raise/Lower & Collar Manhole	12	EA		
				Sub-Total 4.4:	

4.5 - Trail					
29	Remove Concrete Sidewalk	265	SY		
30	Remove Concrete Driveway	155	SY		
31	Remove Asphalt Pavement	2,350	SY		
32	Remove Curb and Gutter	225	LF		
33	Remove Fence	65	LF		
34	Roadway Excavation (Plan Quantity)	1,575	CY		
35	Concrete Sidewalk	4,750	SF		
36	3" Asphalt Pavement (City of Midway)	41,800	SF		
37	Untreated Base Course (Plan Quantity)	980	CY		
38	Separation Geotextile	5,100	SY		
39	Detectable Warning Surface	11	EA		
40	High Back Curb and Gutter	1,260	LF		
41	Driveway Access Curb and Gutter	800	LF		
42	Modified Curb and Gutter	85	LF		
43	Raised Crosswalk	2,050	SF		
44	Relocate Mailbox	6	EA		
45	Relocate Power Pole	6	EA		
46	Pavement Marking Paint	345	GAL		
47	Pavement Marking Paint (Stop Line, Crosswalk-12 Inch)	600	LF		
48	Pavement Message Paint	135	EA		
49	Rumble Strip	250	LF		
50	Relocate Sign Less Than 20 Sq Ft	15	EA		
51	Signage (36"x36")	12	EA		
52	Signage (18"x18")	2	EA		
53	Signage (18"x24")	2	EA		
54	Sign Post	25	EA		
55	Small Sign Tubular Steel Post Base	25	EA		
56	Ditch Slope Reconstruction	800	LF		
57	Shallow Catch Basin	5	EA		
58	6" Ductile Iron Pipe	65	LF		
59	Pot Rock Wall	5	CY		
60	Water-Tight Manhole Cover	1	EA		
				Sub-Total 4.5:	
4.6 - Trail Alternative					
61	Conduit Trenching and Sand Backfill	2,850	LF		
62	6" PVC Conduit	2,820	LF		
63	3" PVC Conduit	2,550	LF		
64	2" PVC Conduit	2,120	LF		
65	Riser Pole	10	EA		
66	Pedestal Meter	1	EA		
				Sub-Total 4.6:	
				TOTAL BID (4.1 + 4.2 + 4.3 + 4.4 + 4.5 + 4.6):	

Note: Figures are to be typewritten or clearly and legibly printed in ink. In case of discrepancy between unit price and total amount shown, the unit price shall govern. Bidder agrees to perform all work described in the CONTRACT DOCUMENTS for the unit price or lump sum.

The undersigned has checked carefully all the above figures and understands that the Owner will not be responsible for any errors or omissions on the part of the undersigned in making up this Bid.

In submitting this Bid, it is understood that the right to reject any and all Bids and to waive irregularities in the Bidding has been reserved by the Owner.

Respectfully Submitted:

	Utah License Number
Signature	
Company Name	
Title	
Company Phone Number	Company Address

END OF DOCUMENT

SECTION 00320

MEASUREMENTS AND PAYMENTS

PART 1 GENERAL

1.1 This Section covers measurement and payment practices utilized by the Engineer in performing its contract management services according to the requirements of these Specifications and other parts of the Contract Documents.

PART 2 MEASUREMENT

2.1 METHODS

The method of measurement and computations to be used in determination of quantities of material furnished, and of work performed under the Contract, will be those methods generally recognized as conforming to good engineering practice.

When items of improvement, equipment, or service referred to herein as "work" are shown on the plans and/or called for in the specifications for Contractor to furnish, install, or provide, the items of work shall be measured and paid for in one of two ways. First, if the item of work is considered incidental to other items in the Bid Schedule, no separate measurement and payment shall be made and no separate bid item in the bid schedule will appear. In this case measurement and payment for this work shall be included by Contractor in other bid items on the bid schedule. Second, when shown separately on the bid schedule, the item of work shall be measured as called for in the specifications and paid for at the contract unit price for that work.

2.2 ACCURATE PRICING

The Bidder shall include a price for all bid items in the Bid Schedule and the Schedule of Values if required. Failure to do so may render the Bid non-responsive and may cause its rejection. All bids will be checked for errors. In the event the total "amount" indicated on the Bid schedule for a bid item does not equal the product of the unit price times the estimated quantity, the unit price shall govern, and the amount will be corrected accordingly. In the event the Bid Total does not agree with the sum of the prices bid on the individual bid items, the individual item prices shall govern and the total for the Bid schedule will be corrected accordingly. Contractor shall be bound by any such corrections. For "Lump Sum" bid items, where applicable, the total shown on the Schedule of Values shall equal the amount entered for the corresponding bid item on the Bid schedule.

2.3 U.S. STANDARD MEASURE

All work completed under this Contract will be measured by U.S. standard measure for the units described herein. Work performed by Contractor will be measured in those units in accordance with the procedure described herein.

2.4 MEASUREMENT BY ENGINEER

Since the quantities appearing on the Bid Schedules are approximate only and are prepared for the comparison of bids, all work and materials are subject to measurement by Engineer. Measurement

of work performed by Contractor on Bid items with unit prices other than "lump sum" will be for the actual quantities of work performed and accepted, or material furnished in accordance with the Contract. In the case of lump sum bid items, Engineer will verify that all of the work represented by the bid item has been completed.

2.5 VARIATIONS IN QUANTITIES OF WORK

The scheduled quantities of work to be done and materials to be furnished may each be increased, decreased, or omitted at Owner's discretion without modifications to the unit price.

2.6 MEASUREMENT BY LUMP SUM

The term "Lump Sum" when used as a unit of measurement for a specific improvement or separate component of a unit shall include all work necessary to complete that entire unit, including all necessary fittings and accessories delineated by the pay limits as shown on the Drawings. If no pay limits are shown on the Drawings, then the improvement shall include all fittings and accessories within 5-feet of the item.

2.7 MEASUREMENT BY LINEAL FOOT

All work measured by the lineal foot shall be measured parallel to the centerline. For water and gas piping, no deduction will be made for valve, fittings or carrier pipe. For sewer collection piping, measurement shall be to the inside surface of connecting manholes. Piping connected to structures, except headwalls, shall be measured to a point five (5) feet outside of that structure, unless indicated otherwise on the Drawings.

A station, when used as a unit of measurement, will be 100 lineal feet.

Items measured by the lineal foot; such as pipe culverts, guardrail, under-drains, etc., will be measured parallel to the base or foundations upon which structures are placed.

2.8 MEASUREMENT BY AREA

Area computations will be made from actual horizontal and transverse measurements made on the site of the work.

Structures will be measured to the neat lines shown on the plans or as altered to fit site conditions.

2.9 MEASUREMENT BY VOLUME

In computing volumes of excavation, the average end area method will be used unless Engineer and Contractor agree, in writing, to an alternate method.

Materials to be measured by volume or by load count shall be hauled in approved vehicles and measured at the point of delivery. Vehicles for this purpose may be of any size or type, provided the body is shaped so the actual volume may be readily and accurately determined.

2.10 MEASUREMENT BY WEIGHT

The term "ton" will mean the short ton of 2,000 pounds avoirdupois.

When measurement units require weighing materials for payment, Contractor shall be responsible for providing weight measurement from commercial certified scales or from scales provided at the job site which are certified in the state wherein the work is located.

2.11 CONVERSION OF WEIGHT TO VOLUME

When requested by Contractor and approved by Engineer in writing, materials specified to be measured by the cubic yard may first be weighed and the weight converted to cubic yards for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by Engineer and agreed to by Contractor before this method of measurement of quantities is used.

2.12 SPECIFIC MANUFACTURED ITEMS

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by gauge, unit, weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerance in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

2.13 MEASUREMENT BY EACH

All work measured by each shall be an individual or single unit.

PART 3 PAYMENT

3.1 SCOPE OF PAYMENT

Contractor shall receive and accept compensation provided in the Contract as full payment for:

- Furnishing all materials, labor, equipment, tools, transportation, and incidentals required for completion of work.
- All loss or damage due to the nature of the work, action of the elements and unforeseen difficulties until final acceptance by Engineer, subject to the provisions of the General Conditions.
- All costs arising from any infringement of a patent, trademark, or copyright.
- Bids shall include all sales tax and all other applicable fees.

3.2 NON-PAYMENT

No payment will be made for:

- Work which is in excess of that described in the Contract Documents.
- Removal and replacement of defective work.
- Loss of anticipated profits.

3.3 LUMP SUM

The term "lump sum", when used as a unit for payment, shall include all work required to complete the item, including all necessary fittings and accessories, as described in the Bid Schedule.

3.4 FULL PAYMENT

Contractor shall receive and accept compensation provided for in the Contract as full payment for furnishing all materials and for performing all work under the Contract in a complete and acceptable manner and for all risk, loss, damage or expense of whatever character arising out of the nature of the work or the execution thereof.

3.5 VARIATION IN QUANTITY OF WORK

Owner reserves the right to make variations in quantities by adding to, or deleting from, quantities listed in the bid schedule in order to match the total bid with the money available in the budget.

PART 4 MEASUREMENTS AND PAYMENTS

This section seeks to more clearly identify those tasks which are specifically included in each of the respective Bid Schedule items and thereby minimize confusion that sometimes arises with regard to measurement of and payment for specific tasks comprising the Work. Inclusion or exclusion of any item or task from this Section shall in no way be construed to mean that additional payment shall be required of Owner. All materials, transportation, equipment, expenses, operations, overhead, and labor necessary to complete the work in the manner intended by the Drawings and Contract Documents and Specifications not specifically listed as a line item in the Bid Schedule or described in the following subsections shall be considered incidental to the Work and shall not cause Contractor to be eligible for additional payment by Owner. Bid items for pipe, valves, conduit, etc. shall also include any miscellaneous parts, fittings, accessories, connections, or tie-ins as necessary to complete the work in the manner intended by the Drawings and Contract Documents and Specifications.

4.1 GENERAL

ITEM 1: MOBILIZATION

Measurement and payment for mobilization will be paid as a lump sum payment based on the percentage of the job that is complete. The bid amount shall not exceed ten (10) percent of the contract amount. Furnish data and documentation to substantiate the amounts claimed under mobilization. Limit amounts included under mobilizations to the following items:

1. Moving personnel, equipment, supplies and incidentals required to the project site for operations.
2. Pre-construction video and photos.
3. Providing on-site sanitary facilities and potable water facilities as specified.
4. Contractor and Subcontractor insurance and bonds.
5. Obtaining all required permits, licenses, and fees. A UDOT encroachment permit will be required. There may be a fee associated with this permit, determined by UDOT.
6. Developing construction schedule.
7. Public relations and paper flyer notification as required.
8. Subsurface utility investigation and coordination with utility companies as required to install bid items in the regular course of the Work.
9. Providing protection of delivered materials.
10. Testing and Process Control. Contractor shall arrange for materials testing as specified in the project specifications, as quality control.

11. Contractor to provide all detailed surveying needed for construction per Section 700 – 10.1.
12. Coordination with adjacent projects.
13. Dust control and watering.
14. Noise abatement.
15. Waste clean-up and rubbish disposal and control.
16. Project Close-out operations.

ITEM 2: TRAFFIC CONTROL

Measurement and payment for traffic control will be paid as a percentage of the project complete when traffic control (TC) is fully compliant with approved TC plans. This item shall be paid for as a percentage in relationship to the project complete. This item will be compensation in full for compliance with UDOT standards providing, preparing, and submitting a traffic control plan by a Utah licensed engineer to both Midway City and UDOT for approval. Including furnishing, installing, and maintain traffic control devices through the duration of the project limits, maintaining traffic control plan and devices, flagging, certified traffic control maintainer and public notification.

4.2 – WATER

ITEM 3 & 4: 8" AND 10" PVC C900 DR-18 WATER LINE

Measurement and payment for this item will be for the linear feet of pipe installed, measured along the center line of the pipe. Payment will be made at the unit price bid per linear foot. Such payment will be compensation in full for furnishing and installing pipe complete in place including the cost of tracer wire, connection to existing water lines, magnetic marking tape, clearing, grubbing, any removal of existing pipe or valves, abandonment of existing pipe, stripping, saw-cutting, pavement removal and disposal, excavation, removal of obstructions, dewatering, shoring and bracing, bedding, compaction, fence replacement, surface restoration, landscape restoration, temporary flush valves for flushing, disinfecting, bacteria and pressure testing, fittings, sleeves, crosses, tees, thrust blocks, joint restraints, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

All bolts for water line shall be ***stainless steel***. This includes all fire hydrant and valve assemblies, flanges, and mechanical joint bolt kits.

Contractor shall hand out water shut down notification fliers to residences and business 48 hours prior to water being shut off. Contractor shall coordinate with Midway City Public Works Department to schedule connections to existing water lines and shut offs. Water shut offs may take several hours and Contractor shall coordinate work schedule with water shut off execution and potential delays. Water connection / shutdowns will only be allowed during non-business hours, relative to commercial connections. Includes coordination with businesses along each road on all water shutdowns in order not to minimize affects to businesses.

ITEM 5, 6 & 7: 8", 10", AND 12" GATE VALVE ASSEMBLY

Measurement and payment for this item will be each. Payment will be made at the unit price bid per gate valve installed. Such payment will be compensation in full for furnishing and completely installing each gate valve, can, and tracer wire complete in place including all cost of clearing, grubbing, abandoning or removal and disposal of existing gate valve and can, stripping, excavation, removal of obstructions, saw-cutting, pavement removal

and disposal, dewatering, shoring and bracing, bedding, compaction, fence replacement, surface restoration, landscape restoration, flushing, disinfecting, bacteria and pressure testing, thrust blocks, fittings, joint restraints, tracer wire, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

All bolts for water line shall be ***stainless steel***. This includes all fire hydrant and valve assemblies, flanges, and mechanical joint bolt kits.

ITEM 8: POT ROCK EXCAVATION

Measurement and payment for this item will be per cubic yard of material excavated and shall include all labor, equipment, materials, excavation, mechanical removal and disposal of pot rock, and any other requirements to complete the excavation. Payment shall be based on recorded field measurements. Quantities may vary due to field conditions.

Pot rock excavation is defined as material not capable of being excavated by normal excavation equipment. All reasonable efforts, determined by the Engineer, shall be made by the Contractor to excavate using normal equipment. Normal excavation equipment is defined as material which can be excavated with the use of a 60,000-pound track hoe. The machine shall be a Cat 330 or equivalent.

This item shall not be used without prior approval from the Engineer. When pot rock is encountered, the material shall be uncovered, and the Owner and Engineer must be notified. Failure to uncover the pot rock, notify the Owner and Engineer, and provide linear footage of the undisturbed material shall give the Contractor no right of claim to any classification other than unclassified soils.

ITEM 9: REMOVE & DISPOSE OF EXISTING FIRE HYDRANT ASSEMBLY

Measurement for payment for this item will be each. Payment will be made at the unit price bid per removal and disposal of existing fire hydrant assembly. Such payment will be compensation in full for completely removing and disposing of each fire hydrant, valve can, and removing and disposing pipe to main line, and plugging and abandoning at existing mainline (if required), including all cost of clearing, excavation, removal of obstructions, dewatering, shoring and bracing, bedding, compaction, fence replacement, surface restoration, landscape restoration, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

ITEM 10: FIRE HYDRANT ASSEMBLY

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each fire hydrant installed. Such payment will be compensation in full for completely installing each fire hydrant complete in place including all cost of clearing, grubbing, stripping, saw-cutting, pavement removal and disposal, excavation, removal of obstructions, dewatering, shoring and bracing, bedding, compaction, fence replacement, surface restoration, landscape restoration, flushing, disinfecting, testing, connecting to new main pipe, 6-inch C-900 DR-18 PVC pipe, thrust blocks, flag, valves, reducers, fittings, tracer wire, magnetic marking tape, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

All bolts for water line shall be ***stainless steel***. This includes all fire hydrant and valve assemblies, flanges, and mechanical joint bolt kits.

ITEM 11: WATER SERVICE CONNECTION

Measurement and payment for this item will be each. Payment will be made at the unit price bid per water service connection. Such payment will be compensation in full for furnishing and completely installing each service lateral connection complete in place including the cost of clearing, grubbing, stripping, excavation, removal of obstructions, saw-cutting, pavement removal and disposal, dewatering, shoring and bracing, bedding, compaction, fence replacement, surface restoration, landscape restoration, flushing, disinfecting, bacteria and pressure testing, fittings, cts poly, tracer wire, magnetic marking tape, saddle, corp stop, 1" copper setter, meter can, meter lid, connecting to property side, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

ITEM 12: SPECIAL CONSTRUCTION AREA (STEEL CASING)

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of steel casing installed. Such payment will be compensation in full for furnishing and completely installing the casing complete in place including all costs of steel casing as shown on the plans (minimum thickness of 3/8”), casing seals/end caps, casing spacers, joint restraints, fittings, clearing, grubbing, stripping, excavation, dewatering, removal of obstructions, pavement removal and disposal, shoring and bracing, bedding, compaction, surface restoration, landscape restoration, testing, and all appurtenances as specified or indicated on the Plans and the Midway City Standard Specifications and Drawings.

ITEM 13: FLOWABLE FILL (UDOT SPEC)

Measurement and payment for flowable fill will be on a cubic yard basis. Payment shall be made at the unit price bid per cubic yard. Quantities shall be calculated using certified concrete batch tickets. Such payment will be compensation in full for furnishing and installing flowable fill in place including all costs of flowable fill, grading, clearing, grubbing, stripping, excavation, removal of obstructions, removal and disposal of trench waste material, hauling, placement, shoring and bracing, testing, steel plate trench protection during curing, and all appurtenances as specified or indicated on the Plans and Specifications and the *UDOT Standards*. This item shall only be installed in UDOT right-of-way under UDOT Asphalt, and as directed by the Engineer. Contractor required to perform quality control/assurance testing as per *UDOT Specifications*.

Flowable fill specification, and placement methods shall meet UDOT Standard Specifications.

ITEM 14: IMPORT / GRANULAR FILL

Measurement and payment for this item will be per cubic yard. Payment will be made at the unit price bid per cubic yard for material placed above the bedding material and below the UBC. Such payment will be compensation for completely supplying, placing, and compacting import / granular fill material, complete in place including all cost of excavation, removal of material, grading, sweeping, fine grading, compaction, testing, surface restoration, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings. This item shall be approved by the Engineer before delivery and placement. An estimate was used for quantities. All reasonable efforts shall be made by the Contractor to utilize the native material and pulverized material. Quantities may vary due to field conditions. ***This item shall not be used without prior approval from the Engineer.***

ITEM 15: CLAY CUTOFF WALL

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each clay cutoff wall placed around the pipeline as shown on the Plans. Such payment will be compensation for completely supplying, placing, and compacting clay cutoff wall material in place including all cost of excavation, removal of material, grading, sweeping, fine grading, compaction, testing, surface restoration, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

4.3 SEWER

ITEM 16: 8" SLIP LINE FOLD & FORM PIPE

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot and shall include the prep work, materials, shipping, personnel, equipment, installation, cleanup, and all other work associated with lining existing pipes. Contractor shall supply all materials and shall install all materials included in this bid item. Included shall be the removal and disposal of deleterious materials excavated from the work area. Flushing and testing services required by the specifications shall be paid for under this item. No separate measurement will be made for cleaning and video inspecting the pipes prior to construction. This will be considered incidental and should be included in the linear foot price for fold and form pipe installation.

ITEM 17: LATERAL CONNECTION (TOP HAT PREP)

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each lateral connection preparation and shall include all materials, labor, equipment, operations, and expenses necessary to prepare an existing sewer service to have a top hat connector installed after installation of the liner. This item includes cutting the necessary opening prior to top hat installation.

ITEM 18: LATERAL CONNECTION (TOP HAT)

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each lateral connection and shall include all materials, labor, equipment, operations, and expenses necessary to install a new top hat connector at an existing sewer service after installation of the liner and prep work has been completed.

ITEM 19: POST CONSTRUCTION SEWER VIDEO

Measurement and payment for this item will be lump sum. Payment shall include collection of a closed-circuit television video which meets the requirements of the specifications. All reaches of fold and form pipe installed and associated services shall be included in the post construction sewer video.

ITEM 20: BYPASS PUMPING

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each section (manhole to manhole) requiring bypass pumping.

Such payment shall be compensation in full for bypass pumping, labor, equipment delivery, installation, onsite mobilization, road crossings devices, pumps, back-up pumps, pipe floats, fuel, back-up generator, and all other equipment, expenses, and incidentals required to maintain continuous and reliable wastewater service in all wastewater lines during construction as described in the specifications. Limits of this bid item are for each manhole-

to-manhole section of pipe (with services) that is being bypassed. Contractor shall submit construction and bypass pumping plan prior to construction. Contractor shall include redundancy in the pumping plan while pumping during any non-working hours.

4.4 ROAD

ITEM 21: PULVERIZE, GRADE, AND COMPACT ROAD (CITY OF MIDWAY)

Measurement and payment for this item will be per square foot. Payment will be made at the unit price bid per square foot of pulverized asphalt roadway. To reduce the possibility of moisture creating soft spots within the pulverized roadway, the Contractor shall grade the roadway to slope off to each side, as determined by the Engineer, once the asphalt has been pulverized. Such payment will be compensation for completely pulverizing the entire roadway a minimum of 9-inches deep, removing asphalt chunks larger than 3-inches square, matching the existing centerline of roadway and installing redheads at 50' OC, providing for a 2-percent cross-slope, grading entire roadway, compaction, deflection and proof-roll test, surface restoration, testing, traffic control, saw-cutting, and ***removal and disposal of any excess material*** that may be generated, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings. Pumping or soft spots caused by traffic or other causes shall be repaired at no additional cost to the Owner.

Excess material may be used for trench backfill.

ITEM 22: 3" ASPHALT PAVEMENT (CITY OF MIDWAY)

Measurement for payment for this item will be per square foot. Payment will be made at the unit price bid per square foot of finished asphalt. This item includes asphalt pavement on non UDOT roadways, trails, driveways, and patches. Such payment will be compensation for completely installing each square foot of 3-inch-thick asphalt complete in place including all cost of removal of obstructions, compaction, surface restoration, compaction testing, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

UBC – Untreated Base Course and Import/Granular Fill are NOT included in this item. ***Asphalt shall be laid in accordance with Section 02510 Asphalt Paving.***

ITEM 23: 7" ASPHALT PATCHING – REMOVE AND REPLACE (UDOT SPEC)

Measurement and payment for this item will be per square foot. Payment will be made at the unit price bid per square foot of asphalt removed and replaced within UDOT right-of-way. Such payment will be compensation for completely removing and replacing each square foot of patch complete in place including all cost of excavation, removal of material, supplying and placing granular borrow, untreated base course, and UDOT spec asphalt 7-inches thick minimum, saw-cutting, compaction, testing on all materials, surface restoration, and all appurtenances as specified or indicated on the Plans and Drawings or as required by UDOT specifications within UDOT right-of-way. All QC tests must be submitted to Engineer and UDOT within 24 hours of completion.

This item includes the repair of asphalt pavement within the UDOT right-of-way. The quantity of this item may vary depending on UDOT requirements concerning trench location.

ITEM 24: 2" ROTOMILL AND 2" PAVEMENT (UDOT SPEC)

Measurement and payment for this item will be per square foot. Payment will be made at the unit price bid per square foot of area rotomilled and paved within UDOT right-of-way. Such payment will be compensation for completely installing each square foot of 2" thick UDOT spec asphalt complete in place including all saw-cutting, cost of rotomilling 2" thick, removal of asphalt rotomillings and disposal at an approved location, dust control, cleaning of any rotomilling debris out of manholes and valves, supplying and placing UDOT spec asphalt 2-inches thick minimum, compaction, testing, surface restoration, and all appurtenances as specified or indicated on the Plans and Drawings or as required by UDOT specifications within UDOT right-of-way.

ITEM 25: PAVEMENT MARKING PAINT – WHITE (UDOT SPEC)

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per lineal foot of paint installed. Such payment will be compensation for completely preparing pavement surface for paint, any cleaning of roadway, striping layout, placing striping per plan and specifications (yellow), and all appurtenances as specified or indicated on the plans and specifications. Contractor shall match existing striping that was originally on the UDOT roadway. Contractor shall meet with Owner before and after starting work to note quantities. Striping equipment shall meter paint and meter shall be checked and certified for accurate measuring. Contractor shall supply meter certification upon request. Place striping in accordance with UDOT Standard Specifications. Bid quantities may vary from actual placed quantities.

ITEM 26: RAISE/LOWER & COLLAR WATER VALVE & MONUMENT

Measurement and payment for this item will be each. Payment will be made at the unit price bid per water valve and monument raised/lowered and collared. Such payment will be compensation in full for furnishing material necessary and completely raising and collaring each valve or monument complete in place to finish asphalt grade including all cost of excavation, removal of material, supplying and placing concrete collar 8-inches thick minimum, forta-ferro, testing, compaction of subbase, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings. Concrete collars shall be installed in accordance with Section 03304 – 2.06 and typical details. This item also includes any lowering of existing utility to accommodate pulverizing the roadway.

ITEM 27: RAISE/LOWER & COLLAR VALVE CLUSTER

Measurement and payment for this item will be per each. Payment will be made at the unit price bid per each valve cluster raised/lowered and collared. Such payment will be compensation for completely raising each water valve in a valve cluster with two, three, or four valves complete in place to finish asphalt grade including all cost of excavation, removal of material, supplying and placing concrete collar 8-inches thick minimum, forta-ferro, testing, compaction of subbase, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings. Concrete collars shall be installed in accordance with Section 03304 – 2.06 and typical details. This item also includes any lowering of existing utility to accommodate pulverizing the roadway.

ITEM 28: RAISE/LOWER & COLLAR MANHOLE

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each manhole raised/lowered and collared. Such payment will be compensation in full for furnishing material necessary and completely raising and collaring

each manhole complete in place including all cost of excavation, removal of material, supplying and placing whirlygig, concrete collar 8-inches thick minimum, forta-ferro, concrete testing, compaction of subbase, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway Sanitation District Standard Specifications and Drawings. Concrete collars shall be installed in accordance with Section 03304 – 2.06 and typical details. This item also includes any lowering of existing utility to accommodate pulverizing the roadway and placing protection at the invert of each manhole to protect manholes from debris.

4.5 TRAIL

ITEM 29: REMOVE CONCRETE SIDEWALK

Measurement and payment for this item will be per square foot. Payment will be made at the unit bid per square foot of concrete sidewalk removed. Such payment will be compensation in full for furnishing all labor, equipment and materials for saw-cutting, removal and proper disposal of existing concrete sidewalk offsite. This item only includes sections of concrete sidewalk indicated on the Plans for removal. Any sidewalk damaged by Contractor that is not intended to be removed shall be replaced at Contractor's expense.

ITEM 30: REMOVE CONCRETE DRIVEWAY

Measurement and payment for this item will be per square foot. Payment will be made at the unit bid per square foot of concrete driveway removed. Such payment will be compensation in full for furnishing all labor, equipment and materials for saw-cutting, removal and proper disposal of existing concrete driveway offsite. This item only includes sections of concrete driveway indicated on the Plans for removal. Any driveway damaged by Contractor that is not intended to be removed shall be replaced at Contractor's expense.

ITEM 31: REMOVE ASPHALT PAVEMENT

Measurement and payment for this item will be per square foot. Payment will be made at the unit bid per square foot of asphalt pavement that is removed. Such payment will be compensation in full for furnishing all labor, equipment and materials for saw-cutting, removal and proper disposal of existing asphalt pavement offsite. This item only includes sections of asphalt pavement indicated on the Plans for removal. Any asphalt pavement damaged by Contractor that is not intended to be removed shall be replaced at Contractor's expense.

ITEM 32: REMOVE CURB & GUTTER

Measurement and payment for this item will be per linear foot. Payment will be made at the unit bid per linear foot of curb & gutter removed. Such payment will be compensation in full for furnishing all labor, equipment and materials for saw-cutting, removal and proper disposal of existing curb & gutter offsite. This item only includes sections of curb & gutter indicated on the Plans for removal. Any curb & gutter damaged by Contractor that is not intended to be removed shall be replaced at Contractor's expense.

ITEM 33: REMOVE FENCE

Measurement and payment for this item will be per linear foot. Payment will be made at the unit bid per linear foot of fence removed. Such payment will be compensation in full for furnishing all labor, equipment and materials for removal and proper disposal of existing fence offsite. This item also includes backfill material to fill any holes as a result of the fence removal, and any temporary fencing required (may require coordination with property owner). This item only includes sections of fence indicated on the Plans for

removal. Any fence damaged by Contractor that is not intended to be removed shall be replaced at Contractor's expense.

ITEM 34: ROADWAY EXCAVATION (PLAN QUANTITY)

Measurement and payment for this item will be per cubic yard. Payment will be made at the unit bid per cubic yard of excavated material. Such payment will be compensation in full for furnishing all labor, equipment, and materials for excavation and proper disposal of roadway materials offsite. Work for this item may require saw-cutting of asphalt of concrete. Work for this item is intended for roadway excavation required within the limits of the trail as shown on the Plans.

ITEM 35: CONCRETE SIDEWALK

Measurement and payment for this item will be per square foot. Payment will be made at the unit bid per square foot of concrete sidewalk installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for placement of concrete sidewalk, including subgrade preparation, placement of untreated base course, compaction, placement of forms, placement and finishing of concrete, and all other appurtenances required for the proper installation of the concrete sidewalk as outlined in the Plans and Specifications.

ITEM 36: 3" ASPHALT PAVEMENT (CITY OF MIDWAY)

Measurement for payment for this item will be per square foot. Payment will be made at the unit price bid per square foot of finished asphalt. This item includes asphalt pavement on non UDOT roadways, trails, driveways, and patches. Such payment will be compensation for completely installing each square foot of 3-inch-thick asphalt complete in place including all cost of removal of obstructions, compaction, surface restoration, compaction testing, and all appurtenances as specified or indicated on the Plans and Specifications and the Midway City Standard Specifications and Drawings.

UBC – Untreated Base Course and Import/Granular Fill are NOT included in this item. ***Asphalt shall be laid in accordance with Section 02510 Asphalt Paving.***

ITEM 37: UNTREATED BASE COURSE (PLAN QUANTITY)

Measurement and payment for this item will be per cubic yard. Payment will be made at the unit price bid per cubic yard of untreated base course installed. Such payment will be compensation in full for completely installing shoulders along trail limits, installing base course for hardscape improvements where required including costs for grading, water conditioning, compaction, surface restoration, and all appurtenances as required by the Plans and Specifications.

ITEM 38: SEPARATION GEOTEXTILE

Measurement and payment for this item will be per square yard. Payment will be made at the unit price bid per square yard of separation geotextile installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials for placement of geotextile as required by the Plans and Specifications. Payment does not include additional measurement for overlapping materials.

ITEM 39: DETECTABLE WARNING SURFACE

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each detectable warning surface installed outside of a raised crosswalk. Such payment will be compensation in full for furnishing all labor, equipment, and materials

required for construction of a detectable warning surface including bedding material, job site sample(s), repairs, surface preparation, restoration of substrate surface, and clean-up. No adjustments in payment will be made for concrete removed to accommodate embedded units.

ITEM 40: HIGH BACK CURB AND GUTTER

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of high back curb and gutter installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for construction of high back curb and gutter including subgrade preparation, placement of untreated base course, compaction, placement of forms, placement and finishing of concrete, and completely installing high back curb and gutter to match existing, and all other appurtenances required for proper installation as outlined in the Plans and Specifications.

ITEM 41: DRIVEWAY ACCESS CURB AND GUTTER

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of driveway access curb and gutter installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for construction of driveway access curb and gutter including subgrade preparation, placement of untreated base course, compaction, placement of forms, placement and finishing of concrete and completely installing driveway access curb and gutter, and all other appurtenances required for proper installation as outlined in the Plans and Specifications.

ITEM 42: MODIFIED CURB AND GUTTER

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of modified curb and gutter installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for construction of modified curb and gutter including subgrade preparation, placement of untreated base course, compaction, placement of forms, placement and finishing of concrete and completely installing modified curb and gutter, and all other appurtenances required for proper installation as outlined in the Plans and Specifications.

ITEM 43: RAISED CROSSWALK

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each raised crosswalk installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for construction of a raised crosswalk and adjacent pedestrian access ramps including subgrade preparation, placement of untreated base course, compaction, placement of forms, placement and finishing of concrete, curb and gutter, required pavement markings, signage, installation of detectable warning surfaces and any necessary grading or transitions to ensure compliance with ADA (Americans with Disabilities Act) requirements and traffic control standards. This item includes any necessary adjustments to adjacent infrastructure such as drainage facilities, curb and gutter, and sidewalks as necessary to accommodate the raised crosswalk and adjacent pedestrian access ramps and ensure proper drainage and accessibility. There is no additional payment for variations in size, shape, or materials quantities. Removal of existing sidewalk, curb and gutter, or other infrastructure is addressed in separate pay items.

ITEM 44: RELOCATE MAILBOX

Measurement and payment for this item will be each. Payment will be made at the unit

price bid per each mailbox relocated. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for removal, protection, and re-installation of an existing mailbox as shown on the Plans. This item includes any necessary excavation, concrete work, or other adjustments required to re-install the mailbox at the correct height, alignment, and orientation in compliance with USPS regulations. This item also includes the restoration of the surrounding area at both the original and new mailbox locations, including backfilling, landscaping, and repair of any surfaces disturbed by the relocation activities. This item includes coordination with the property owner and USPS to ensure that mail service is not interrupted during the relocation process and that the new mailbox location is acceptable. There is no additional payment for variations is size, shape, or materials quantities of each mailbox.

ITEM 45: RELOCATE POWER POLE

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each power pole relocated. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for removal, protection, and re-installation of an existing power pole as shown on the Plans. This item includes coordination with utility companies, disconnection and reconnection of power lines, and any adjustments needed to ensure proper alignment and stability of the relocated power pole. There is no additional payment for variations in pole height, type, or installation depth.

ITEM 46: PAVEMENT MARKING PAINT

Measurement and payment for this item will be per gallon. Payment will be made at the unit price bid per each gallon of pavement marking paint used as specified in the Plans and Specifications. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the preparation, storage, handling, and application of pavement marking paint including any required pigments, binders, and reflective materials, to achieve the specified coverage, thickness, and color according to the Specifications and MUTCD standards. This item includes surface preparation, such as cleaning and priming, as necessary to ensure proper adhesion and durability of the paint, as well as removal of any existing markings where required. This item covers the proper mixing, thinning (if necessary), and application of the paint, including any necessary equipment calibration and maintenance to ensure accurate and efficient application. There is no additional payment for variations in application method or equipment used.

ITEM 47: PAVEMENT MARKING PAINT (STOP LINE, CROSSWALK – 12 INCH)

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of pavement marking paint (stop line, crosswalk – 12-inch) installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the preparation, storage, handling, and application of pavement marking paint for stop lines and 12-inch crosswalk lines including any required pigments, binders, and reflective materials, to achieve the specified coverage, thickness, and color according to the Specifications and MUTCD standards. This item includes surface preparation, such as cleaning and priming, as necessary to ensure proper adhesion and durability of the paint, as well as removal of any existing markings where required. This item covers the proper mixing, thinning (if necessary), and application of the paint, including any necessary equipment calibration and maintenance to ensure accurate and efficient application. There is no additional payment for variations in application method or equipment used.

ITEM 48: PAVEMENT MESSAGE PAINT

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each pavement message painted including words, symbols, and other specific marking as outlined in the Plans and Specifications. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the preparation, storage, handling, and application of pavement marking paint for pavement messages including any required pigments, binders, and reflective materials, to achieve the specified coverage, thickness, and color, and dimensions according to the Specifications and MUTCD standards. This item includes surface preparation, such as cleaning and priming, as necessary to ensure proper adhesion and durability of the paint, as well as removal of any existing markings where required. This item covers the proper mixing, thinning (if necessary), and application of the paint, including any necessary equipment calibration and maintenance to ensure accurate and efficient application. There is no additional payment for variations in size, application method, or equipment used.

ITEM 49: RUMBLE STRIP

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of rumble strip installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for installation of rumble strips including cutting, grinding, or milling the pavement surface. This item covers the precise layout and alignment of the rumble strips in accordance with the Plans and Specifications, ensuring proper spacing, depth, width, and pattern to achieve the desired audible and tactile warning effect. This item includes the removal and proper disposal offsite of materials generated during the installation process, as well as cleaning the surface before and after installation to ensure a quality finish. There is no additional payment for variations in strip depth, width, or pattern.

ITEM 50: RELOCATE SIGN LESS THAN 20 SF

Measurement and payment for this item will be each. Payment will be made at the unit price bid per each sign relocated with an area of less than 20 square feet. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for removal, protection, and stable re-installation of an existing sign (less than 20 square feet) as shown on the Plans. This item includes any necessary excavation, concrete work, or other adjustments required to re-install a sign at the correct height, alignment, and orientation. This item also includes the restoration of the surrounding area at both the original and new sign locations, including backfilling, landscaping, and repair of any surfaces disturbed by the relocation activities. There is no additional payment for variations in sign type or mounting.

ITEMS 51, 52 & 53: SIGNAGE (SIZE AS NOTED)

Measurement and payment for this item will be per each. Payment will be made at the unit price bid per each sign type installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required including posts, reflective sheeting signs, drilling for bolts / anchors, mounting brackets, hardware, concrete foundations, and all other appurtenances required to furnish and install the sign to comply with the Plans and Specifications.

ITEM 54: SIGN POST

Measurement and payment for this item will be each. Payment will be made at the unit price bid for each sign post installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required including sign posts, excavation,

placement, and securing posts in accordance with the Specifications. This item covers the proper alignment and stability of the sign post, as well as any necessary adjustments to ensure compliance with design and safety standards. There is no additional payment for variations in installation method or site conditions.

ITEM 55: SMALL SIGN TUBULAR STEEL POST BASE

Measurement and payment for this item will be each. Payment will be made at the unit price bid for each small sign tubular steel post base installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required including excavation, placement, and securing the base in accordance with the Specifications. This item covers the proper alignment, stability, and compliance with design and safety standards for the post base. There is no additional payment for variations in installation method or site conditions.

ITEM 56: DITCH SLOPE RECONSTRUCTION

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of ditch slope reconstruction completed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for excavation, reshaping, and grading of the ditch slopes to the specified dimensions and slopes. This item covers the removal and proper disposal of excess materials, as well as any required compaction, erosion control measures, and restoration of surrounding area. There is no additional payment for variations in soil conditions or material quantities.

ITEM 57: SHALLOW CATCH BASIN

Measurement and payment for this item will be each. Payment will be made at the unit price bid for each shallow catch basin installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required to supply and install a storm drain catch basin as required by the Plans and Specifications. This item includes all excavation, backfill, compaction, placement of untreated base course, placement of concrete collar and all other appurtenances required for a complete shallow catch basin installation.

ITEM 58: 6” DUCTILE IRON PIPE

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of 6” ductile iron drainage pipe installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the complete installation of the ductile iron pipe including trenching, pipe laying, jointing, and backfilling. This item covers any required connections to existing or proposed drainage systems, including fittings and appurtenances necessary to ensure proper operation and alignment of the pipe.

ITEM 59: POT ROCK WALL

Measurement and payment for this item will be per cubic yard. Payment will be made at the unit price bid per cubic yard of pot rock wall installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for construction of the pot rock wall as outlined in the Plans and Specifications. This item covers required excavation, foundation preparation, placement of materials, securing of rock material, grouting, and backfill to ensure the stability and alignment of the wall.

ITEM 60: WATER-TIGHT MANHOLE COVER

Measurement and payment for this item will be on a per each basis for furnishing and

installing water-tight manhole covers as specified in the project plans and specifications. Payment includes all labor, materials, equipment, and incidentals required for proper installation, ensuring a secure fit to the manhole frame, and making any necessary adjustments to the frame or surrounding infrastructure. This item also covers testing to confirm water-tightness and any additional sealing, coatings, or treatments required to meet project specifications and ensure long-term durability. No additional payment will be made for variations in cover size, material, or adjustments unless a documented change in scope is approved.

4.6 TRAIL ALTERNATIVE

ITEM 61: CONDUIT TRENCHING AND SAND BACKFILL

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of conduit trenching and sand backfill installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for excavation of trenches, sand bedding for conduits, backfill and compaction, and removal and disposal of excess excavated materials. Also included is coordination with Heber Light & Power.

ITEMS 62, 63 & 64: PVC CONDUIT (SIZE AS INDICATED)

Measurement and payment for this item will be per linear foot. Payment will be made at the unit price bid per linear foot of PVC conduit installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the complete installation of the PVC conduit including pipe laying and jointing, and fittings required for a proper alignment and secure installation. This item covers any coordination required with other utilities or infrastructure. Also included is coordination with Heber Light & Power.

ITEMS 65: RISER POLE

Measurement and payment for this item will be each. Payment will be made at the unit price bid for each riser pole installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the installation of a riser pole as outlined in the Plans and Specifications. This item covers all required connections, fittings, RMC & PVC conduit, brackets, and appurtenances necessary for proper installation and accessibility of each riser. This item covers any coordination required with other utilities or infrastructure. Also included is coordination with Heber Light & Power.

ITEM 66: PEDESTAL METER

Measurement and payment for this item will be each. Payment will be made at the unit price bid for each pedestal meter installed. Such payment will be compensation in full for furnishing all labor, equipment, and materials required for the installation of a pedestal meter as outlined in the Plans and Specifications. This item covers all required connections, fittings, cabinet, equipment, and appurtenances necessary for the proper installation, operation, and accessibility of each pedestal meter. This item covers any coordination required with other utilities or infrastructure. Also included is coordination with Heber Light & Power to locate each pedestal meter.

END OF DOCUMENT

DOCUMENT 00350

BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, _____ as Principal, and _____ as Surety, are hereby Held and firmly bound unto _____ as Owner in the penal sum of _____ for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors, and assigns. Signed, this _____ day of _____ , 2025 The Condition of the above obligation is such that whereas the Principal submitted to _____ a certain Bid, attached hereto and hereby made a part hereof to enter into a contract in writing, for the

_____

_____

_____

NOW, THEREFORE,

a. If said Bid shall be rejected, or in the alternate,

b. If said Bid shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said Bid) and shall furnish a bond for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said Bid, then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed upon that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by any extension of the time within which the Owner may accept such Bid; and said Surety does here by waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)
Principal

_____
Surety

IMPORTANT - Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

END OF DOCUMENT

DOCUMENT 00355

CERTIFICATE OF NON-COLLUSION

North Center Street Trail, Water & Sewer Improvements

State of Utah)
§
County of _____)

AFFIDAVIT

The undersigned of lawful age, being first duly sworn, disposes and says:

That as a condition precedent to the award of the North Center Street Trail, Water & Sewer Improvements Project as above captioned, I,_____, do solemnly swear that neither I nor my firm or company have either directly or indirectly restrained free and competitive bidding on this project by entering into any agreement, participating in any collusion, or otherwise taking any action unauthorized by Midway City, with respect to this Contract.

Contractor: _____

By: _____

Title: _____

Subscribed and sworn to before me this _____ day of_____, 2025.
by_____

_____ My Commission Expires:_____
Notary Public

SEAL

END OF DOCUMENT

DOCUMENT 00360

NOTICE OF AWARD

To: _____

_____

_____

PROJECT Description: **North Center Street Trail, Water & Sewer Improvements**

The OWNER has considered the BID submitted by you for the above-described WORK in response to its Advertisement for Bids dated January 10, 2025 and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of $_____.

You are required by the Information for Bidders to execute the Agreement and furnish the required CONTRACTOR'S Performance BOND, Payment BOND, and certificates of insurance within ten (10) calendar days from the date of this Notice to you.

If you fail to execute said Agreement and to furnish said BONDS within ten (10) days from the date of this NOTICE, said OWNER will be entitled to consider all your rights arising out of the OWNER'S acceptance of your BID as abandoned and as a forfeiture of your BID BOND. The OWNER will be entitled to such other rights as may be granted by law.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this _____ day of _____ 2025.

Midway City
Owner

BY _____
Celeste T. Johnson

Title Mayor

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

_____
(Company Name)

this the_____ day of_____, 2025.

By _____

Title _____

END OF DOCUMENT

DOCUMENT 00500

AGREEMENT

THIS AGREEMENT made this____day of_____by and between Midway City hereinafter called "OWNER" and _____doing business as (a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete construction of

   North Center Street Trail, Water & Sewer Improvements

2. The CONTRACTOR will furnish all of the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the project described herein.

3. The CONTRACTOR will commence the work required by the CONTRACT DOCUMENTS within 10 calendar days after the date of the NOTICE TO PROCEED and will be substantially complete with all work required by the CONTRACT DOCUMENTS within 160 calendar days after the date of the "Notice to Proceed", unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.

4. The CONTRACTOR agrees to perform all of the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of $_____.

5. The term "CONTRACT DOCUMENTS" means and includes the following:

   A. Request for BIDS

   B. Information for BIDDERS

   C. Information Required of BIDDER

   D. Status Verification System Affidavit

   E. BID

   F. Measurements and Payments

   G. BID BOND

   H. Certificate of Non-Collusion

   I. Agreement

   J. General Conditions

   K. Special Provisions

   L. Payment BOND

M. Performance BOND

N. NOTICE OF AWARD

O. NOTICE TO PROCEED

P. CHANGE ORDER

Q. SPECIFICATIONS prepared or issued by Sunrise Engineering, dated December 2024.

R. DRAWINGS prepared by Sunrise Engineering, dated December 2024.

S. ADDENDUM:

No. _____ , DATED _____ , 2025

No. _____ , DATED _____ , 2025

No. _____ , DATED _____ , 2025

6. The OWNER will pay to the CONTRACTOR in the manner at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.

6. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns. IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in triplicate, each of which shall be deemed an original on the date first above written.

OWNER: Midway City	CONTRACTOR: _____
BY: _____	BY: _____
Name: Celeste T. Johnson	Name: _____
Title: Mayor	Address: _____
	Title: _____

END OF DOCUMENT

DOCUMENT 00510

NOTICE TO PROCEED

To: _____ Date: _____

_____ Project: North Center Street Trail, Water

_____ & Sewer Improvements.

In accordance with the Agreement dated _____, 2025, you are hereby notified to commence work on or before _____, 2025, and you are to be substantially complete with the project within 160 consecutive calendar days thereafter. The date of completion of all work is, therefore _____, 2025.

Midway City
Owner

ACCEPTANCE OF NOTICE By Celeste T. Johnson

Receipt of the above NOTICE TO Title Mayor

PROCEED is hereby acknowledged.

_____
(Name of Company)

this the_____ day of _____2025.

By _____

Title _____

END OF DOCUMENT

SECTION 00560

North Center Street Trail, Water & Sewer Improvements

CHANGE ORDER

Order No. _____

Date: _____

NAME OF PROJECT: **North Center Street Trail, Water & Sewer Improvements**

PROJECT NUMBER: _____

CONTRACTOR: _____

CONTRACT DATE: _____

CHANGE ORDER INITIATED BY _____

The following changes are hereby made to the CONTRACT DOCUMENTS:

_____

Description of Change:

Reason for Change:

Item No.	Description of Changes	Quantity	Units	Unit Price	Decrease In Contract Price	Increase In Contract Price
	Total Decrease					
	Total Increase					
	Net (Increase) (Decrease)					

Original CONTRACT PRICE: $ _____

Current CONTRACT PRICE adjusted by previous CHANGE ORDER (s) $ _____

The new CONTRACT PRICE including this CHANGE ORDER will be $ _____

The CONTRACT TIME will be increased/decreased by_____ calendar days.

The date for completion of all work will, therefore, be by_____

The Contractor agrees to furnish all labor and materials and perform all work as necessary to complete the change order items for the price named herein, which includes all supervision and miscellaneous costs. This change order constitutes full and mutual accord and satisfaction for all time and all costs related to this change. By acceptance of this change order the Contractor agrees that the change order represents an equitable adjustment to the Contract, and further agrees to waive all right to file a claim arising out of or as a result of this change. This document will become a supplement to the Contract, and all provisions will apply hereto, upon approval by the Owner.

Recommended: _____
Engineer

Date Accepted: _____
Contractor

Date Approved: _____
Owner

END OF DOCUMENT

SECTION 00570

North Center Street Trail, Water & Sewer Improvements

FIELD ORDER

Order No. _____

Date: _____

NAME OF PROJECT: **North Center Street Trail, Water & Sewer Improvements**

PROJECT NUMBER: _____

CONTRACTOR: _____

CONTRACT DATE: _____

INITIATED BY: _____

You are hereby requested to:

_____

_____

_____

_____

_____

_____

_____

_____

_____

Recommended: _____
Engineer

Date
Accepted: _____
Contractor

Date
Approved: _____
Owner

Note: This order is not intended to serve as a change order for this contract and does not modify the requirements thereof. See Section 13 of the General Conditions.

END OF DOCUMENT

SECTION 00580

North Center Street Trail, Water & Sewer Improvements

NOTICE OF SUBSTANTIAL COMPLETION

PROJECT: **North Center Street Trail, Water & Sewer Improvements**

OWNER: _____

TO: CONTRACTOR

Name: _____

Address: _____

This Notice of Substantial Completion applies to all work included under the Contract Documents or to the following specified parts thereof:

_____

_____

_____

The work described above and performed under this Contract has been reviewed and found substantially complete and the date of SUBSTANTIAL COMPLETION for this work is hereby established as: _____. The guarantee period shall commence on this date.

Definition of Date of Substantial Completion: That Date as certified by the ENGINEER when the construction of the PROJECT, or a specified part thereof, is sufficiently completed in accordance with the CONTRACT DOCUMENTS so that the PROJECT, or specified part, can be utilized for the purposes for which it is intended.

A list of items to be completed or corrected, which are connected to or affected by the work described above, is attached hereto. The failure to include any items on such list does not alter the responsibility of the CONTRACTOR to complete all work in accordance with the CONTRACT DOCUMENTS. The date of commencement of guarantee for items in the attached list will be the date of final acceptance, unless agreed otherwise in writing.

SUNRISE ENGINEERING, LLC

Engineer

Date

Receipt of this notice is hereby acknowledged:

Contractor's Name

By:

Signature

Date

END OF DOCUMENT

SECTION 00590

North Center Street Trail, Water & Sewer Improvements

NOTICE OF FINAL ACCEPTANCE

TO: CONTRACTOR

Name: _____

Address: _____

RE: **North Center Street Trail, Water & Sewer Improvements**

OWNER: _____

A final inspection of the WORK completed under the Contract indicated above has been made and all WORK has been found to be completed. All known changes to the WORK have been documented and approved at this time and to the best of our knowledge, information and belief. The work required by this Contract has been performed and completed in accordance with the approved DRAWINGS, SPECIFICATIONS and other CONTRACT DOCUMENTS. Final payment for the Contract has therefore been requested and should follow shortly.

Thank you for your effort and cooperation towards the successful completion of this WORK.

ENGINEER: _____
Signature

Date: _____

OWNER'S Representative: _____
Signature

Date: _____

END OF DOCUMENT

DOCUMENT 00600

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____, hereinafter called
(Corporation, Partnership, or Individual)

CONTRACTOR, and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called SURETY, are held and firmly bound unto

Midway City
(Name of Owner)

75 North 100 West Street, Midway, Utah 84049
(Address of Owner)

hereinafter called OWNER, in the penal sum of_____
Dollars ($ _____) in lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the CONTRACTOR entered into a certain contract with the OWNER, dated the_____ day of _____, 2025, a copy of which is hereto attached and made a part hereof for the construction of:

_____

NOW THEREFORE, if the CONTRACTOR shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, and all insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 14, Chapter 1, Utah Code Annotated 1953, as amended, and all liabilities on this bond shall be determined in accordance with said provisions to the extent as if it was copied at length herein.

PROVIDED FURTHER, that the said SURETY for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or in the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the SPECIFICATIONS.

PROVIDED FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the day of _____ _____, 2025.

ATTEST: _____

CONTRACTOR

_____ By _____

_____

Address

(Seal) _____

_____

Witness as to CONTRACTOR

_____

_____

Address

_____

Surety

ATTEST:

_____ By _____

Witness as to Surety Attorney in Fact

_____ _____

Address Address

_____ _____

Note: If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

END OF DOCUMENT

DOCUMENT 00610

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

_____
(Name of Contractor)

_____
(Address of Contractor)

a _____ , hereinafter called
(Corporation, Partnership, or Individual)

CONTRACTOR, and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called SURETY, are held and firmly bound unto

Midway City
(Name of Owner)

75 North 100 West Street, Midway, Utah 84049
(Address of Owner)

hereinafter called OWNER, in the penal sum of _____
Dollars ($ _____) in lawful money of the United States, for the payment of which sum, well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of_____, 2025, a copy of which is hereto attached and made a part hereof for the construction of:

_____

NOW, THEREFORE if the CONTRACTOR shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the two year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, HOWEVER, that this bond is executed pursuant to the provisions of Title 14, Chapter 1, Utah Code Annotated 1953, as amended, and all liabilities on this bond shall be determined in accordance with said provisions to the extent as if it was copied at length herein.

PROVIDED FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed thereunder or in the SPECIFICATIONS accompanying the same shall in any wise affect its

obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the SPECIFICATIONS.

PROVIDED FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in _____ counterparts, each one of which shall be deemed an original, this the_____ day of _____, 2025.

ATTEST:

_____

_____
CONTRACTOR

By _____

_____
Address

(Seal)

_____
Witness as to CONTRACTOR

_____
Address

Surety

ATTEST:

_____
Witness as to Surety

By_____
Attorney in Fact

_____
Address

_____
Address

Note: If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the State where the PROJECT is located.

END OF DOCUMENT

GENERAL CONDITIONS

DOCUMENT 00700

GENERAL CONDITIONS

1. Definitions
2. Additional Instructions and Detail Drawings
3. Schedules, Reports and Records
4. Drawings and Specifications
5. Shop Drawings
6. Materials, Services and Facilities
7. Inspection and Testing
8. Substitutions
9. Patents
10. Surveys, Permits, Regulations
11. Protection of Work, Property, Persons
12. Supervision by Contractor
13. Changes in the Work
14. Changes in the Contract Price
15. Time for Completion and Liquidated Damages
16. Correction of Work
17. Subsurface Conditions
18. Suspension of Work, Termination and Delay
19. Payments to Contractor
20. Acceptance of Final Payment as Release
21. Insurance
22. Contract Security
23. Assignments
24. Indemnification
25. Separate Contracts
26. Subcontracting
27. Engineer's Authority
28. Land and Rights-of-Way
29. Guaranty
30. Arbitration
31. Taxes

1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement for Bids, Information for Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

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

1.11 DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER - The person, firm or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

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

1.22 SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 MODIFICATION TO GENERAL CONDITIONS - If there is a Federal Agency participating in the project, all modifications shall be approved by the Agency, in writing, prior to inclusion in the Contract Documents, including such requirements that may be imposed by applicable State Laws.

1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the work required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and,

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 In case of conflict between the DRAWINGS and SPECIFICATIONS, the SPECIFICATIONS shall govern. Figure dimensions on DRAWINGS shall govern over scale dimensions, and detailed DRAWINGS shall govern over general DRAWINGS.

4.3 Any discrepancies found between the DRAWINGS and SPECIFICATIONS and site conditions or any inconsistencies or ambiguities in the DRAWINGS or SPECIFICATIONS shall be immediately reported to the ENGINEER, in writing, who shall promptly correct such inconsistencies or ambiguities in writing. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR'S risk.

5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any shop drawing shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS, nor shall it relieve the CONTRACTOR from responsibility for errors or omissions in the SHOP DRAWINGS. The approval of any SHOP DRAWING which substantially deviates from the requirement of the CONTRACT DOCUMENTS shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

6. MATERIAL, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Material and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials, and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Material, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or state agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in question, furnishing all necessary labor, materials, tools, and equipment. If it is found that such Work is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

8. SUBSTITUTIONS

8.1 Whenever a material, article or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall

be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalogue number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

9. PATENTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of damage or removal by the CONTRACTOR, his employees or sub-contractors, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR. In case of failure on the part of the CONTRACTOR to restore such property, or make good such damage, or injury, the OWNER may, upon 10 days written notice proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary and the cost thereof shall be deducted from any monies due or which are to become due to the CONTRACTOR under this contract.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. The supervisor shall be present on the site at all times as required to perform adequate supervision and coordination of the WORK.

13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER, also, may at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

13.3 CLAIMS FOR EXTRA WORK. If the CONTRACTOR claims that any instruction involve extra cost under this Contract, he shall give the ENGINEER written notice thereof within forty-eight (48) hours after the receipt of such instructions, and in any event before proceeding to execute the work, except in emergency endangering life or property, and the procedure shall then be as provided for under CHANGES IN THE WORK. No such claim shall be valid unless so made.

14. CHANGES IN CONTRACT PRICE

14.1 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

a. Unit prices previously approved.

b. An agreed lump sum.

c. The actual cost for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the work. In addition there shall be added an amount to be agreed upon but not to exceed fifteen (15) percent of the actual cost of the WORK to cover the cost of general overhead and profit.

15. TIME OF COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate or progress to insure full completion within the CONTRACT TIME. It is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the

completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount of liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER.

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a contract with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1 and 15.4.2 of this article.

16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR'S expense. If the CONTRACTOR does not take action to remove such rejected WORK within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may (a) Remove such work, (b) Store the material, or (c) Complete the work at the expense of the CONTRACTOR.

17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as

inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims asserted before the date of final payment.

18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume that WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 The ENGINEER shall have the authority to suspend the WORK wholly or in part for such a period as he may deem necessary, due to unsuitable weather or to such other conditions as are considered unfavorable for the suitable prosecution of the WORK, or for such time as he may deem necessary due to the failure on the part of the CONTRACTOR to carry out orders given, or to perform any provisions of the CONTRACT. The CONTRACTOR shall immediately comply with the written order of the ENGINEER to suspend the WORK wholly or in part. The suspended WORK shall be resumed when conditions are favorable and methods are corrected, as ordered or approved in writing by the ENGINEER. In case of suspension of WORK, the CONTRACTOR shall be responsible for all materials and shall properly store them as necessary.

18.3 If the CONTRACTOR is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials, or equipment, or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK, or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient.

In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT PRICE exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess shall be paid to the CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.4 Where the CONTRACTOR'S services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.5 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.6 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of its approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days written notice to the OWNER and the ENGINEER stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

18.7 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as

the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER'S title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The OWNER will, within ten (10) days of presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all work covered by the CONTRACT DOCUMENTS. The OWNER at any time, however, after fifty (50) percent of the WORK has been completed, if he finds that satisfactory progress is being made, shall reduce retainage to five (5%) percent on the current and remaining estimates. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced below five (5) percent to only that amount necessary to assure completion. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

19.2 The request for payment may also include an allowance for the cost of such major materials and equipment which are suitably stored either at or near the site.

19.3 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.4 The OWNER shall have the right to enter the premises for the purpose of doing work not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.5 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.6 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, materials, men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The Contractor shall, upon submittal of request for final payment, include an affidavit showing satisfactory evidence that all obligations or the nature designated above have been paid, discharged, or waived. If the

CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety, or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

19.7 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there shall be added to each such payment interest at the rate of 8% commencing on the first day after said payment is due and continuing until payment is received by the CONTRACTOR.

20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and other relating to or arising out of this WORK. Any payment, however final or otherwise, shall not release the CONTRACTOR of his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND and Payment BONDS.

21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts;

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees;

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

21.2 Certificates of insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverages afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, liability insurance as hereinafter specified;

21.3.1 The CONTRACTOR'S General Public Liability and Property Damage Insurance including vehicle coverage issued to the CONTRACTOR and protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operation be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. CONTRACTOR'S Commercial General Liability shall be written with a limit of liability of not less than $1,000,000 for all damages arising out of bodily injury, including death, at any time resulting therefrom, sustained by any one person in any one accident and a limit of liability of not less than $2,000,000 aggregate for any such damages sustained by two or more persons in any one accident. Automobile Insurance shall be written with a limit of liability of not less than $1,000,000 for all property damage sustained by any one person in any one accident; and a limit of liability of not less than $1,000,000 aggregate for any such damage sustained by two or more persons in any one accident.

21.3.2 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR and SUB-CONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provision of the laws of the state in which the work is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any work is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous work under this contract at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The CONTRACTOR shall secure, if applicable, "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightening, vandalism, malicious mischief, wind collapse, riot, aircraft, and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

21.6 In addition to insurance elsewhere specified, the CONTRACTOR shall secure and maintain UNEMPLOYMENT INSURANCE to cover all persons he employs on the PROJECT.

22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within three (3) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance Bond and a Payment Bond in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the Contract or any portion thereof, or of his right, title or interest therein, or his obligations there under, without written consent of the other party.

24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease, or death, or to injury or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR and

SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, designs or SPECIFICATIONS.

25. SEPARATE CONTRACTS

25.1 The Owner reserves the right to let other contracts in connection with the PROJECT. The CONTRACTOR shall afford other CONTRACTOR'S reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself, or he may let other contracts containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTOR'S who are parties to such CONTRACTS (or the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTOR'S or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in SECTION 14 and 15.

26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which, under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 The CONTRACTOR shall not award WORK to SUBCONTRACTOR(S) in excess of fifty (50%) percent of the CONTRACT PRICE, without prior written approval of the OWNER.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTOR'S to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTOR'S and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures or construction safety.

27.4 The ENGINEER shall promptly make decisions relative to interpretation of the CONTRACT DOCUMENTS.

28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

29. GUARANTY

29.1 The CONTRACTOR shall guarantee all material and equipment furnished and WORK performed for a period of two (2) years from the date of project acceptance. The CONTRACTOR warrants and guarantees for a period of two (2) years from the date of project acceptance of the system that the completed system is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such repairs of any damage to other parts of the system resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

30. ARBITRATION

30.1 All claims, disputes and other matters in question arising out of, or relating to, the CONTRACT DOCUMENTS or the breach thereof, except for claims which have been waived by the making and acceptance of final payment as provided by Section 20, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association. This agreement to arbitrate shall be specifically enforceable under the prevailing arbitration law. The award rendered by the arbitrators shall be final, and judgment may be entered upon it in any court having jurisdiction thereof.

30.2 Notice of the demand for arbitration shall be filed in writing with the other party to the CONTRACT DOCUMENTS and with the American Arbitration Association, and a copy shall be filed with the ENGINEER. Demand for arbitration shall in no event be made on any claim, dispute, or other matter in question which would be barred by the applicable statute of limitations.

30.3 The CONTRACTOR will carry on the WORK and maintain the progress schedule during any arbitration proceedings, unless otherwise mutually agreed in writing.

31. TAXES

31.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

END OF DOCUMENT

DOCUMENT 00750

SPECIAL PROVISIONS

1. GENERAL

1.1 The CONTRACTOR shall furnish all labor, material and equipment necessary or required to complete the work in all respects as shown on the plans, as hereinafter specified. If there is a conflict between requirements of this section and requirements of other sections of these specifications, then the requirements contained in the Special Provisions shall govern.

2. TEMPORARY UTILITIES

2.1 The CONTRACTOR shall arrange for, secure and pay for directly, any and all temporary utility supplies he may require for prosecution of his work. The cost of such utilities shall be included in the contract price of other items shown on the Bid Schedule.

3. EXAMINATION OF THE SITE

3.1 The Bidder shall examine the site before submitting his proposal and inform himself regarding existing facilities and conditions affecting the proposed work. Failure to make such inspection shall in no way relieve the CONTRACTOR of any of the obligations or conditions of this specification or serve in any way as a basis for extra remuneration to the CONTRACTOR for conditions arising from unfamiliarity with the site or conditions affecting the work.

4. PROGRESS OF CONSTRUCTION

4.1 It is the intention of the Contract Documents that the progress of the work shall proceed in a systematic and expeditious manner so that a minimum of inconvenience will result to the public and the OWNER in the course of construction. With this in mind, the schedule submitted by the CONTRACTOR shall include the CONTRACTOR'S plan of operation with supporting data relative to starting and completion dates on the various phases of the work, methods, and items which are to be concurrently constructed. Such a schedule of progress will be used by the OWNER as a basis for arranging inspections and for coordination of the work of others.

The progress schedule shall be submitted by the CONTRACTOR as required in the General Conditions 10 days prior to the first payment. The progress schedule shall be in reproducible form subject to the approval of the OWNER. The CONTRACTOR shall submit copies of the progress schedule with each request for payment showing the relation of the completed work to the progress schedule.

5. COMPLIANCE WITH GOVERNMENTAL REGULATIONS

5.1 The CONTRACTOR'S equipment and operations shall comply fully with all applicable standards, regulations and requirements of existing Federal, Utah State and Local

governmental agencies. This shall include, but not necessarily be limited to, the following

5.2 UTAH CODE. The Contractor shall comply with the regulations as contained in the Utah Code Annotated Sections -- 553-33 Contracts; 44-3-28 Program of Public Works; 34-30-1 Citizens Preference; 34-30.8 Forth-hour Work Week; 34-30.9 Violation of Act; 34-30.11 Veterans Preference. Weekly certification to all government codes and regulations may be requested by the Owner.

5.3 UTAH OCCUPATIONAL SAFETY AND HEALTH ACT (1973) and EMPLOYER-EMPLOYEE SAFE PRACTICES FOR EXCAVATIONS AND TRENCHING OPERATIONS (Jan. 1, 1974) as published by Industrial Commission of Utah, including any and all amendments or revisions effective prior to performance of the work.

5.4 EQUAL EMPLOYMENT OPPORTUNITY. The Contractor shall abide by provisions of Title VI of the Civil Rights Act of 1964 (42 USC 2000e) ad amended from time to time which prohibits discrimination against any employee or applicant for employment or any applicant or recipient of services, on the basis of race, religion, color, or national origin; and further agrees to abide by Executive Order No. 11246, as amended, which prohibits discrimination on the basis of sex; 45 CFR 90 as amended, which prohibits discrimination on the basis of age; and Section 504 of the Rehabilitation Act of 1973 as amended, which prohibits discrimination on the basis of handicap.

5.5 ANTI-KICKBACK ACT. The CONTRACTOR shall comply with the regulations of the Secretary of Labor made pursuant of the Anti-Kickback Act of June 13, 1934, 40 U.S.C. 276 (c), and any amendments or modifications thereto. His contract with Subcontractors shall provide for this provision to be inserted in the Subcontract to insure be responsible for the submission of affidavits required by Subcontract, except as the Secretary or Labor may specifically provide for reasonable limitations, variations, tolerances, and exemptions from the requirements thereof.

6. UNEMPLOYMENT INSURANCE

6.1 In addition to insurance elsewhere specified, the CONTRACTOR shall secure and maintain UNEMPLOYMENT INSURANCE to cover all persons he employs on the project.

7. GENERAL PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

7.1 General: The Contractor shall carry all insurance required by Federal, State, County and local laws. The Contractor is required to carry insurance coverage sufficient to cover any injury or damage arising out of the Work and maintain such coverage during the term of this Contract. Contractor shall procure and maintain the following minimum limits and types of coverage:

TYPE OF COVERAGE	IN AN AMOUNT NOT LESS THAN
Workers' Compensation	Statutory
Employer's Workers' Compensation	$100,000 each accident

	each disease, each employee $500,000 disease aggregate
Commercial General Liability (including contractual liability for liability assumed under this single limit Contract; broad form property damage; completed operation; and explosion, collapse and underground coverage)	$1,000,000 per occurrence $2,000,000 aggregate combined
Automobile Liability, including	$1,000,000 combined single owned, hired and non-owned limit coverages

Contractor shall submit certificates evidencing compliance with the requirements of this Section to the Owner prior to beginning any Work and warrants that such coverage(s) shall be maintained in full force and effect as provided herein. Further, the Owner shall be named as an additional insured with respect to the operations to be performed under this Contract. The certificate(s) of insurance shall name the Owner as an additional insured without offset against the Owner's existing insurance and provide for a minimum of thirty (30) days notice to the Owner prior to cancellation, reduction in coverage or other substantial modification to the required certificate of insurance.

7.2 The certificate of insurance shall set forth at least the following information:

Name and address of the insured;

A statement that the Owner and Sunrise Engineering are named as additional primary insured without offset against their existing insurance policies;

The location of the operations to which the insurance applies;

The number of the policy and the type or types of insurance in force under it on the date of the certificate;

Evidence of the amounts and types of coverage specified in Paragraph 5.4.1, above;

The expiration date of the policy and the limit or limits of liability under it on the date of the certificate;

A statement that the insurance covered by the certificate applies to all of the operations on and at the site of the project which are undertaken by the insured during the life of the Contract;

A statement that all coverage is on an occurrence basis rather than a claims made basis;

A statement that the carrier agrees to the terms of the indemnification provision in the Contract;

A statement that explosion, collapse, and underground coverage is included;

A statement that a minimum of thirty (30) days notice shall be given to the Owner prior to cancellation, reduction in coverage, or other substantial modification to the required certificate.

A signature of an authorized representative of the insurance company.

In lieu of an insurance certificate setting forth all the required information, a copy of the complete policy or policies may be furnished to the Owner which contains at least the minimum coverages and names the Owner as an additional insured.

7.3 Compensation Insurance: The Contractor shall take out and maintain Workers' Compensation Insurance for all employees employed at the site of the Work during the life of this Contract in an amount not less than the statutory minimum. In case any work is sublet, the Contractor shall require each subcontractor to provide Workers' Compensation Insurance for its employees unless such employees are covered by the Contractor. The above coverage is required unless such employees are covered by the protection afforded the Contractor under a self-insurance plan or with a private carrier approved by the State Industrial Commission.

In the event any class of employees is not protected by the Workers' Compensation Insurance of the Contractor, the Contractor shall provide, and shall cause any subcontractor to provide, special insurance or Employer's Liability coverage in an amount not less than One Hundred Thousand Dollars ($100,000) per accident, One Hundred Thousand Dollars ($100,000) disease per employee and Five Hundred Thousand Dollars ($500,000) disease aggregate for the protection of such employees not otherwise protected.

7.4 Commercial General Liability: The Contractor shall procure and maintain during the life of this Contract, such Commercial General Liability insurance necessary to protect it, the Owner, Engineer, or any subcontractor performing work under this Contract, from all claims for bodily injury, including accidental death and property damage claims arising from operations under this Contract, whether such operations are the Contractor's or the subcontractor's. As an alternative, the Contractor may secure, in the name of the Owner, and pay for the Owner's protected policy for the minimum limits required. In this event, the original policy shall be filed with the Owner in lieu of a certificate of insurance. The Commercial General Liability coverage shall include completed operations and broad form property damage which covers elevator and water damage liability. The minimum limits of commercial general liability shall be an amount not less than One Million Dollars ($1,000,000) per occurrence and Two Million Dollars ($2,000,000) aggregate, combined single limit.

Such policy shall <u>not</u> exclude coverage for the following:

Injury to or destruction of any property arising out of the collapse of/or structural injury to any building or structure due:

To grading of land excavation, burrowing, filling, backfilling, tunneling, pile driving, cofferdam work, or caisson work; or

To moving, shoring, underpinning, raising or demolition of any building or structure or removal or rebuilding of any structural support thereof; or injury to or destruction of

wires, conduits, pipes, mains, sewers, or other similar property or any apparatus in connection therewith, below the surface of the ground, if such injury or destruction is caused by and occurs during the use of mechanical equipment for the purpose of grading of land, paving, excavating, drilling; or injury to or destruction of any property at any time resulting therefrom; or

Injury to or destruction of any property arising out of blasting or explosion.

7.5 Automobile Liability: The Contractor shall obtain motor vehicle insurance to cover each automobile, truck, and other vehicle used in the performance of the Contract in amounts not less than One Million Dollars ($1,000,000) combined single limit including owned, hired and nonowned coverages for all forms of bodily injury, property damages, hospital, medications, pain and suffering.

7.6 Contractor shall obtain the above-described insurance from insurance companies duly authorized to issue such policies in the State or Utah and which are "Best Rated A" or better by the A.M. Best Company, or comparable rating as determined at the sole discretion of the Owner. Contractor shall maintain such insurance coverage until all the Work has been completed and the Work has been accepted by the Owner. Owner shall not be obligated to review any of the Contractor's Certificates of Insurance, insurance policies or endorsements or to advise Contractor of any deficiencies in such documents and any receipt of copies or review by the Owner of such documents shall not relieve Contractor from or be deemed a waiver of the Owner's right to insist on strict fulfillment of Contractor's obligations under this Paragraph.

8. INTERFERING STRUCTURES AND UTILITIES RESPONSIBILITY

8.1 The CONTRACTOR shall exercise all possible caution to prevent damage to existing structures and utilities, whether above ground or underground. The CONTRACTOR shall notify all utility offices concerned at least 48 hours in advance of construction operations in which a utility agency’s facility may be involved. This shall include, but not be limited to, irrigation, water, telephone, electric, and gas. The CONTRACTOR shall be responsible for any and all changes to, relocation of, or reconnections to public utility facilities encountered or interrupted during the prosecution of the work, and all costs relating thereto shall be at the CONTRACTOR’S expense. The CONTRACTOR shall contract with any Public Utility Agencies for work required in connection with all utility interferences and handle all necessary notifications, scheduling, coordination and details. The cost of public utility interferences and/or changes shall be included in the CONTRACTOR’S unit price bide covering the major contract facility to which interference or changes are attributable.

8.2 It shall be the responsibility of the CONTRACTOR to locate and expose all existing underground structures and utilities in such a manner as to prevent damage to same. Any structure or utilities damaged by the work shall be repaired or replaced in a condition equal to or better than the condition prior to the damage. Such repair or replacement shall be accomplished at the CONTRACTOR’S expense without additional compensation from the OWNER.

8.3 The CONTRACTOR shall remove and replace such small miscellaneous structures as fences and culverts at his own expense without additional compensation from the

OWNER. The CONTRACTOR shall replace these structures in a condition as good as or better than their original conditions.

8.4 If the CONTRACTOR encounters existing structures which will prevent construction and which are not properly shown on the plans, he shall notify the OWNER before continuing with the construction in order that the OWNER may make such field revision as necessary to avoid conflict with the existing structures. The cost of waiting ("down" time) during such field revision shall be borne by the CONTRACTOR without additional cost to the OWNER. If the CONTRACTOR shall fail to so notify the OWNER when an existing structure is encountered, but shall proceed with the construction despite this interference, he shall do so at his own risk. In particular, when the location of a new construction, as shown on the Plans, will prohibit the restoration of existing structures to their original conditions, he shall notify the OWNER so a field relocation may be made to avoid the conflict.

8.5 At points where the CONTRACTOR'S operations are adjacent to or across properties of railway, telegraph, telephone, irrigation or canal, power, gas, water, or adjacent of other property (damage to which might result in considerable expense, loss, and inconvenience), no work shall be started until all arrangements necessary for the protection thereof have been made.

8.6 The CONTRACTOR shall be solely and directly responsible to the OWNERS and operators of such properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of injury or damage which may result from the carrying out of the work to be done under the Contract.

8.7 In the event or interruption to either domestic or irrigation water or to other utility services as a result of accidental breakage or as a result of being exposed or unsupported, the CONTRACTOR shall promptly notify the proper authority. The CONTRACTOR shall cooperate with the said authority in restoration of service as soon as possible and shall bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is received.

8.8 The locations of the major existing utilities, as shown on the plans, were taken from Utility Maps, and preliminary investigation had indicated they are generally reliable. However, it should be expected that some location discrepancies will occur. Neither the OWNER nor its officers or agents shall be responsible for damages to the CONTRACTOR as a result of the locations of the utilities being other than would have been the case had the obstruction been encountered along the original location.

9. FIELD RELOCATION

9.1 During the progress of construction, it is possible that minor relocations may be necessary. Such relocations shall be made only by the direction of the ENGINEER. Unforeseen obstruction encountered as a result of such relocations will not be subject to claims for additional compensation by the CONTRACTOR to any greater extent than would have been the case had the obstruction been encountered along the original location.

10. ACCEPTABILITY AND ACQUISITION OF MATERIALS

10.1 All materials incorporated in the project facility shall fully comply with the specifications. Unless otherwise clearly provided in the Specifications, all workmanship, equipment, materials, and articles incorporated in the work covered by the Contract are to be of the best available grade of their respective kinds. Whenever, in the Specifications, any material, article, device, product, fixture, form, type or construction, or process in indicated or specified by patent or proprietary name, by name of manufacture, or by catalog number, such Specifications shall be deemed to be used for the purpose of establishing a standard or quality and facilitating the description or material or process desired, and shall be deemed to be followed by the words, "or approved equal," and the CONTRACTOR may in such case, after the ENGINEER'S approval, purchase and use any item, type, or process which shall be substantially equal in every respect to that so indicated or specified.

10.2 CONTRACTOR shall, at his own expense, secure all necessary access and removal rights for acquisition of aggregate materials.

11. LAND MONUMENTS

11.1 The CONTRACTOR shall preserve existing City, County, State, and Federal land monuments wherever possible. When these monuments cannot be preserved, the CONTRACTOR shall notify the ENGINEER at least two (2) weeks in advance of the proposed construction in order that the OWNER will have ample opportunity to reference these monuments for later replacement. The CONTRACTOR shall be responsible for all monument replacement to an existing or better than condition.

12. STATE AND FEDERAL INSPECTIONS

12.1 The site of construction is to be open at all reasonable times and places for inspections by accredited representatives of the State or Federal Agencies who have regulatory or supervisory authority over any part of the work proposed or related thereto.

13. PERMITS

13.1 The Contractor is responsible to obtain all required business licenses and permits with respect to this Project. It shall be the Contractor's responsibility to notify the respective proprietor for each right-of-way.

13.2 The Contractor shall obtain an encroachment permit from UDOT for construction of the proposed sewer and water lines and trail that will be located in UDOT Right of Way which will include a traffic control plan to be submitted by the Contractor. The encroachment permit may need to be accompanied by a bond posted with UDOT. The amount of the bond is to be determined by UDOT. The Contractor shall provide the Engineer with a copy of the encroachment permit and UDOT approved traffic control plan.

14. APPROVAL OF WORKING DRAWINGS

14.1 The CONTRACTOR shall submit, in quadruplicate, to the ENGINEER for his approval such shop or working drawings and/or catalog cuts for fabricated items and manufactured

items, including mechanical and electrical equipment, as may, in the opinion of the ENGINEER be required for the construction of the work or any part thereof.

14.2 Drawings shall be submitted sufficiently in advance to allow the ENGINEER not less than ten regular working days for examining the drawings.

14.3 These drawings shall be accurate, distinct and complete and shall contain all required information, including satisfactory identification of items, units assemblies in relation to the Contract drawings and/or specifications.

14.4 When the shop drawings are approved by the ENGINEERS two sets of prints will be returned to the CONTRACTOR marked "Approved," "Approved Except as Noted," or similar notation; if changes or corrections are necessary, one set will be returned to the CONTRACTOR with such changes or corrections indicated by a brief statement and the CONTRACTOR shall correct and resubmit the drawings, in triplicate when requested by the ENGINEER.

14.5 The approval of such drawings and/or catalog cuts by the ENGINEER shall not relieve the CONTRACTOR from responsibility for correctness of dimensions, fabrication details and space requirements, or for deviations from the Contract drawings or specifications, unless the CONTRACTOR has called attention to such deviations in writing by a letter accompanying the drawings and the ENGINEER approves the change or deviations in writing at the time of submission; nor shall approval by the ENGINEER relieve the CONTRACTOR from the responsibility for errors in the shop drawings. When the CONTRACTOR does call such deviations to the attention of the ENGINEER the CONTRACTOR shall state in this letter whether or not such deviations involve any deduction or extra cost adjustments.

15. MANUFACTURER'S DIRECTIONS

15.1 All manufactured items, articles, materials, and equipment, shall be applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer's written instructions, unless herein specified to the contrary.

15.2 At the termination of the work, the CONTRACTOR shall submit three complete sets bound in the best grade, hard-backed binder of all operating and maintenance instructions presenting full details for care and maintenance of all visible surfaces and all mechanical and electrical equipment installed. The sets shall include the following information:

15.2.1 Complete description of items including catalog numbers.
15.2.2 Complete parts list for each item.
15.2.3 Name and address of local supplier.
15.2.4 Name and address of manufacturer.
15.2.5 Complete operating instructions.
15.2.6 Complete maintenance instructions.

16. EQUIPMENT AND MATERIALS SELECTION

16.1 Equipment and materials specified by name in these specifications or on the plans have been investigated and found suitable for the service and/or construction conditions anticipated. However, names are given primarily as a guide; bidding is not intended to

be restrictive only to the extent of obtaining equipment and materials which will properly and effectively do the job. Manufacturers of competitive equipment are invited to submit requests to the ENGINEER for permission to bid their equipment. Such requests must be received by the ENGINEER at least two days prior to the bid opening and must be complete with the information necessary to properly evaluate the ability of the alternate equipment to meet the requirements of the project. Information should include specification data, materials of construction, dimensions, performance curves and data, location of nearest representative and service personnel, and all other pertinent information. If alternative equipment or materials are approved, the CONTRACTOR shall, at his expense, make any changes in the structures, buildings, piping or other necessary to accommodate the alternate items.

17. ENGINEER

17.1 Any reference in these specifications or on the plans to the "ENGINEER" shall be interpreted to mean "Sunrise Engineering," Consulting Engineers for the project. This may be a principal of the firms or an authorized representative.

18. INCIDENTAL WORK

18.1 Work which is intended or required, whether described and detailed specifically in these specifications or not but which is required to complete the work shall be paid for by the CONTRACTOR. Cost for incidental work shall be included in unit prices or lump sums bid according to the Bid Schedule.

19. GUARANTEE PERIOD

19.1 Should any defect arise with the work such as leaks, breaks, etc., for a period of two (2) years from the date of project acceptance, the CONTRACTOR shall restore the work to the complete satisfaction of the OWNER at the expense of the CONTRACTOR.

19.2 In the event of settlement of trenches excavated areas for a period of two years after written acceptance of the work, the CONTRACTOR shall restore the work in accordance with these Specifications including importing select backfill, grading of trench areas and/or replacement of pavement to the satisfaction of the OWNER.

19.3 Performance bonds shall remain in effect until expiration of the guarantee period and written release by the OWNER.

20. CONTRACT LIMITS

20.1 "Qualified" or "All or nothing" type bids may be rejected by the OWNER.

21. UNDERGROUND SOIL CONDITIONS

21.1 The OWNER accepts no liability for loss or inconvenience to the CONTRACTOR as a result of uncertainty of conditions encountered in the work.

22. SIGNING AND FLAGGING

22.1 Wherever the CONTRACTOR'S operations create a hazardous condition, he shall furnish flagmen and guards as necessary or as ordered by the ENGINEER to give adequate warning to the public of any dangerous conditions encountered. He shall furnish, erect, and maintain approved fences, barricades, signs, lights and other devices that may be necessary to prevent accidents and to avoid damage and injury to the public. Flagmen and guards, while on duty and assigned to give warning to the public shall be equipped with approved red wearing apparel and a stop/slow sign which shall be kept clean and in good repair. Payment for flagging and signing shall be included in "Mobilization".

23. RIGHT-OF-WAYS AND EASEMENTS

23.1 The CONTRACTOR will be required to confine construction operations within the dedicated rights-of-way for public thoroughfares, or within areas for which construction easements have been obtained, unless he has made special arrangements with the affected property owners in advance. The CONTRACTOR will be required to protect stored materials, cultivated trees, and crops, and other items located adjacent to the proposed construction site. Property owners affected by the construction shall be notified by the CONTRACTOR at least 48 hours in advance of the time construction begins. During all construction operations, the CONTRACTOR shall construct and maintain such facilities as may be required to provide access by all property owners to their property. No person shall be cut off from access to his residence or place of business for a period exceeding 8 hours unless the CONTRACTOR has made special arrangements with the affected persons. Prior to acceptance the CONTRACTOR shall provide written notification from the property owner stating condition has been accepted after demobilization.

23.2 Portions of the construction may be located on private property. Easements and permits have been obtained by the OWNER. Easements shall provide for the use of property for construction purposes to the extent indicated on the easements. Copies of these easements and permits are available at the office of the ENGINEER for inspection by the CONTRACTOR. The CONTRACTOR shall confine his construction operation to within the easement limits or street right-of-way limits or make special arrangements with the property owners for the additional area required. Any damage to private property, either inside or outside the limits of the easements provided by the OWNER, shall be the responsibility of the CONTRACTOR. Before final payment will be authorized by the ENGINEER at the completion of the construction, the CONTRACTOR shall obtain from the permit or easement grantors a release indicating the work of restoration has been satisfactorily completed in accordance with the terms of the permit or easement. Should it be found impossible for the CONTRACTOR to obtain any of the required releases, either because of the absence of the grantors or because of impractical demand by the grantors, then the ENGINEER may waive this requirement, if, in his opinion, the CONTRACTOR has fulfilled his obligations.

24. DISPOSAL OF SURPLUS MATERIALS

24.1 The Contractor shall, at his own expense, haul and deposit all waste excavation or surplus material to approved fill sites.

25. ENGINEERING

25.1 The ENGINEER will furnish elevation bench marks at the locations shown on the drawings, and control points. Using the control points and bench marks so provided, it shall be the responsibility of the CONTRACTOR to provide all construction surveying and staking and to construct the facilities to the lines and grades indicated on the drawings. The ENGINEER may check the location, alignment, and direction of any and all facilities at any time.

25.2 The grade or flow line is assumed herein to mean the inside bottom, or invert, of the pipe or conduit. For pipe installation, the CONTRACTOR shall set grade and alignment stakes only for center points and flow line elevations or manholes. For other construction, the CONTRACTOR shall furnish the necessary stakes as may be required to properly mark and stake the work. The CONTRACTOR shall preserve in their proper places, stakes set for the lines and grades until authorized for removal by the ENGINEER. Expenses incurred in replacing stakes which are destroyed as a result of the CONTRACTOR'S neglect or carelessness shall be borne by the CONTRACTOR. The CONTRACTOR will establish all grades using a laser beam from the above placed stakes.

The CONTRACTOR shall take precaution in preserving stakes, bench marks, or alignment points, the CONTRACTOR is responsible for costs involved in re-establishing the stakes, bench marks, or alignment points unnecessarily destroyed.

25.3 After the CONTRACTOR has placed construction stakes or have provided surveying services as outlined, the CONTRACTOR will give the ENGINEER at least 48 hours notice, to obtain approval, before constructions begin.

26. CONSTRUCTION SCHEDULING AND COMPLETION TIME

26.1 Project shall be fully complete as specified in contract documents.

27. LIQUIDATED DAMAGES

27.1 If the work is not substantially completed in accordance with the above schedule, the CONTRACTOR shall pay to the OWNER, as fixed and agreed liquidated damages, to the sum per day as specified in Document 00300 BID, for each calendar day past the date specified in Document 00500 AGREEMENT and Document 510 NOTICE TO PROCEED.

28. SUSPENSION OF WORK

28.1 The ENGINEER shall have the authority to suspend the work wholly or in part, for such period as he may deem necessary, due to unsuitable weather, or to such other conditions as are considered unfavorable for the suitable prosecution of the work, or for such time as he may deem necessary due to the failure on the part of the CONTRACTOR to carry out orders given, or to perform any provisions of the Contract. The CONTRACTOR shall immediately comply with the written order of the ENGINEER to suspend the work wholly or in part. The suspended work shall be resumed when conditions are favorable and methods are corrected, as ordered or approved in writing by the ENGINEER.

In case of suspension of work from any cause whatever, the CONTRACTOR shall be responsible for all materials and shall properly store them if necessary and shall provide suitable drainage and erect temporary structures where necessary.

29. CHARACTER OF WORKMEN

29.1 Whenever, in the opinion of the ENGINEER any superintendent, foreman, or workman employed by the CONTRACTOR or his subcontractor is disrespectful, intemperate, disorderly, or otherwise objectionable, he shall at the written request of the ENGINEER, be removed and not again be employed on the work site without written consent of the ENGINEER.

30. INSPECTION

30.1 The CONTRACTOR shall furnish the ENGINEER with every reasonable facility for ascertaining whether or not the work as performed is in accordance with the requirements and intent of the Specifications and Contract. If the ENGINEER requests, the CONTRACTOR at any time before acceptance of the work shall remove or uncover such portions of the finished work as may be directed. After examination, the CONTRACTOR shall restore said portions of the work to the standards required by the Specifications.

30.2 Should the work thus exposed or examined prove acceptable the uncovered or removing and the replacing the covering and making good the parts removed, will be paid for as provided under CHANGES IN THE WORK, but should the work so exposed or examined prove unacceptable the uncovering or removing and the replacing of the covering or making good of the parts removed shall be at the CONTRACTOR'S expense. Inspection of supervision by the ENGINEER shall not be considered as direct control of the individual workman and his work. The direct control shall be solely the responsibility of the CONTRACTOR'S foremen and superintendent.

30.3 The inspection of the work shall not relieve the Contractor of any of his obligation to fulfill his Contract as herein provided, and unsuitable materials may be rejected notwithstanding that such work and material may have been previously overlooked and accepted or estimated for payment.

30.4 Should any work be covered up before approval or consent of the ENGINEER, it must, if required by the ENGINEER, be uncovered for examination at the CONTRACTOR'S expense.

END OF DOCUMENT

STANDARD SPECIFICATIONS
&
SPECIAL PROVISIONS

SECTION 00900

ENVIRONMENTAL CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The purpose of this section is to prevent discharge of sediment, dust, debris, and other construction related material or pollutants from construction sites. Sediment and debris from construction sites are a major source of pollution to air, waterways, and water systems located within Midway City and surrounding areas.

B. The Contractor shall be responsible to obtain the necessary permits prior to construction including the SWPPP, and UPDES permits if required by the State of Utah, and the Division of Water Quality.

C. The Contractor shall dispose of waste materials in accordance with Utah Administrative Code, Rule: R315. Environmental Quality, Waste Management and Radiation Control, Waste Management.

1. Any asphalt removed from a City project must be disposed of in a landfill permitted to accept of this type of material.

1.02 GENERAL REQUIREMENTS

A. Control measures shall be implemented, and shall meet the following goals and criteria:

1. Prevent or minimize discharge. The proposed control measures shall be designed to prevent or minimize, to the maximum extent practicable, the discharge of sediment, dust, debris, and other construction related pollutants from the construction site by storm water runoff into the storm drainage system, as well as into the air.

2. Prevent or minimize construction debris. The proposed control measures shall be designed to prevent or minimize, to the maximum extent practicable, the deposit, discharge, tracking by construction vehicles, or dropping of mud, sediment, debris or other potential pollutants onto the public streets and rights-of-way.

3. Use of BMP’s. The proposed control measures shall include Best Management Practices (BMP’s) available at the time. BMP’s may include but shall not be limited to, designation of limits of disturbance, temporary silt or sediment fences, sediment traps and detention ponds, straw bale sediment barriers, measures to prevent the blowing of dust or sediment from the site, storm drain inlet protection, and reinforced soil retaining systems, dust control and gabions.

4. Stabilize Site. The control measures shall be designed to preserve existing vegetation where possible. Disturbed portions of the site shall be stabilized. Stabilization practices may include temporary seeding, permanent seeding, mulching, and other appropriate measures. Stabilization measures shall be initiated as soon as practicable in disturbed portions of the site, but in no case more than 14 days after the construction activity in that portion of the site has been temporarily or permanently ceased, except under the following circumstances.

   a. If the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceases, is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable; or

   b. If construction activity on a portion of the site is temporarily ceased, and earth disturbing will resume within 21 days, temporary stabilization measures need not be initiated on that portion of the site.

B. All construction work involving the installation of BMPs and site stabilization shall be subject to inspection by the City.

PART 2 REQUIREMENTS

2.01 PERMITS

A. Developer shall obtain the required permits from the Utah Pollutant Elimination Discharge System (UPDES) Program.

2.02 DRAWINGS

A. Complete and detailed construction plans and drawings detailing the implementation of best management practices (BMP's) and site stabilization shall be submitted to the City for review and approval before ground is broken. It is the City's desire to have the BMP's and site stabilization drawings included in the approved construction plans.

PART 3 COMPLETION

A. The Permitee or Contractor shall remove all equipment, material, barricades and similar items from the right-of-way as the project is completed. Areas used for storage of excavated material will be smoothed and returned to their original contour. Vacuum sweeping or hand sweeping shall be required when the Public Works Department determines cleaning equipment is ineffective.

END OF SECTION

01030.1 DESCRIPTION

This section covers project meetings including the pre-construction meeting and other progress and/or work coordination meetings conducted to provide communication and awareness to all parties associated with the Contract.

01030.2 PRE-CONSTRUCTION CONFERENCE

Prior to the commencement of work at the site, a pre-construction conference will be held at a mutually agreed time and place to be arranged by the Engineer. The Engineer shall also provide notification to all parties expected to attend the meeting. Attendees will include the following:

- Engineer
- Project Inspector
- Owner/Owner's Representative
- Contractor/Contractor's Representative/ Subcontractors as appropriate
- Governmental Representatives as appropriate (State, County, Municipal, etc.)
- Manufacturer/Supplier Representatives/Adjoining Contractors, as appropriate.
- Utility Service Representatives as appropriate.

01030.2.1 Unless previously submitted to the Engineer, the Contractor shall bring to the conference one copy each of the following:

- Contract construction schedule in accordance with the General Conditions.
- Procurement schedule of major equipment and materials and items requiring long lead-time.
- Shop Drawings, samples or substitution proposals for items proposed as substitutions or "or equal" items.
- Schedule of work that includes the anticipated monthly payment amounts during the contract.
- A Schedule of Values of work to be paid for as lump sum items where partial payment is anticipated.

01030.2.2 The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The agenda may include but not be limited to the following items:

- Contractor's Work Schedule.
- Transmittal, review, distribution and approval of Contractor's submittals.
- Processing of applications for payment.
- Maintaining records and documents.
- Critical work sequencing.
- Field decisions and Change Orders.
- Use of project site, office and storage areas, security, housekeeping, and Owner's needs.
- Major equipment deliveries and priorities.
- Interpretation of Drawings and Specifications.
- Contractor's responsibilities for safety, first-aid and sanitation.

01030.2.3 The Engineer will preside at the pre-construction conference and will arrange for keeping minutes and distributing them to all attendees to the meeting.

01030.3 PROGRESS/COORDINATION MEETINGS

01030.3.1 The Contractor shall conduct regular on-site progress and coordination meetings at least weekly and at other times as requested by Engineer or as required by progress of the work. The Contractor, Engineer, and all Subcontractors active on the site shall be represented at each

meeting. The Contractor may, at its discretion, request attendance by representatives of its suppliers, manufacturers, and other Subcontractors. The Contractor shall be responsible for providing written notification to those deemed necessary for attendance at least 36 hours prior to the time set for the meeting.

01030.3.2 The Contractor shall preside at the meetings and maintain a file of minutes of the proceedings. The purpose of the meetings will be to review the progress of the work, maintain coordination of effort, discuss changes in scheduling, and resolve other problems which may develop.

01090.1 DESCRIPTION

Wherever in these Specifications references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronyms or abbreviations only. As a guide to the user of these Specifications, the following acronyms or abbreviations, which may appear herein, shall have the meanings indicated below.

01090.1.1 DEFINITIONS OF ABBREVIATIONS AND ACRONYMS

AAR	Association of American Railroads
AASHTO	American Association of the State Highway and Transportation Officials
ACI	American Concrete Institute
ADC	Air Diffusion Council
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturers Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute, Inc.
APWA	American Public Works Association
ARI	Air Conditioning and Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASQC	American Society of Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BLM	Bureau of Land Management (U.S. Department of Interior)
CDA	Copper Development Association
CEMA	Conveyor Equipment Manufacturer's Association
CGA	Compressed Gas Association
CFR	Code of Federal Regulations
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturer's Institute
CMA	Concrete Masonry Association
CS	Commercial Standard of NBS (U.S. Dept. of Commerce)
CTI	Cooling Tower Institute
DIP	Ductile Iron Pipe
EIA	Electronic Industries Association
EPA	U. S. Environmental Protection Agency
ETL	Electrical Test Laboratories
FEMA	Federal Emergency Management Administration
FERC	Federal Energy Regulatory Commission
FS	Forest Service (U.S. Department of Agriculture)
FWS	Fish and Wildlife Service
GI	Galvanized Iron
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials

ID	Inside Diameter
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IMC	International Mechanical Code
IME	Institute of Makers of Explosives
IPC	International Plumbing Code
ISA	Instrument Society of America
ISO	International Organization for Standardization
MBMA	Metal Building Manufacturer's Association
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NFGC	National Fuel Gas Code
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NRCS	Natural Resources Conservation Service (U.S. Department of Agriculture) (formerly SCS)
NSF	National Sanitation Foundation
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PDI	Plumbing and Drainage Institute
PE	Polyethylene
PVC	Polyvinyl Chloride
RWMA	Resistance Welder Manufacturer's Association
SAE	Society of Automotive Engineers
SMACNA	Sheet Metal and Air Conditioning Contractor’s National Association
SSPWC	Standard Specification for Public Works Construction
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
UMC	Uniform Mechanical Code
UPC	Uniform Plumbing Code
UPRR	Union Pacific Railroad
USDARD	Rural Development (U.S. Department of Agriculture) (formerly Farmers Home Administration)
WCRSI	Western Concrete Reinforcing Steel Institute
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

01090.2 REFERENCED WORKS, CODES AND STANDARDS

Whenever references to specifications, codes, standards and other publications are made to these Specifications, the following rules shall apply:

01090.2.1 TITLES OF SECTIONS AND PARAGRAPHS

Titles of sections and/or paragraphs shown in these Specifications are for convenience of reference only, and do not form a part of the Specification.

01090.2.2 APPLICABLE PUBLICATIONS

Whenever references in these specifications are made to published specifications, codes, standards, or other requirements, it shall be understood that unless a date is specified, only the

latest edition of these specifications, codes, and/or standards which have been published as of the date that the work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of, or omission from, said standards or requirements.

01090.2.3 SPECIALISTS AND SPECIAL ASSIGNMENTS

In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such direction shall be recognized as special requirements and is not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" and qualified for the assignment of the work. Nevertheless, the final responsibility for fulfilling this assignment remains with the Contractor.

01090.2.4 BUILDING CODES

Reference herein to "Building Code" shall mean the Uniform Building Code issued by the International Conference of Building Officials (ICBO). The latest edition of the code as approved and used by the local agency as of the date of award, as adopted by the agency having jurisdiction, shall apply to the work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

01090.2.5 OSHA

01090.2.5.1 OSHA REGULATIONS - References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

01090.2.5.2 OSHA STANDARDS - References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards of the U.S. Code of Federal Regulations, including all changes and amendments thereto.

01090.2.6 DOT STANDARDS/SPECIFICATIONS

References to "State DOT Specifications" or "State DOT Requirements" shall mean the Specifications for Excavation on State Highway Right-of-Way and/or Standard Specifications for Road and Bridge Construction, including all amendments thereto, issued by the State agency responsible for highways wherein the Contract is located and any other written requirements or provisions issued by that agency which are contained in these Contract Documents.

01090.2.7 FEDERAL PIPELINE SAFETY STANDARDS

Reference to "Federal Pipeline Safety Standards" shall mean Title 29, Parts 191 and 192, Federal Pipeline Safety Minimum Standards, U.S. Code of Federal Regulations including all changes and amendments thereto.

01090.2.8 STATE GAS PIPELINE SAFETY STANDARDS

References to "State Gas Pipeline Safety Standards" shall mean the appropriate section/s of the legal code or regulations adopted in the State wherein the work is located, including all changes and amendments thereto.

01090.3 STANDARDS IMPOSED BY OTHER AGENCIES OR ORGANIZATIONS

01090.3.1 PROPERTY BELONGING TO OTHER AGENCIES OR ORGANIZATIONS

Construction may occur on property owned or administered by agencies or organizations other than the Owner, such as federal and/or state departments of transportation, the U. S. Forest Service, the U. S. Bureau of Land Management, the U.S. Fish and Wildlife, counties, canal companies, irrigation companies, utility companies, other federal and state agencies, municipal governments, etc. Work which is to take place on such property may be required to be in accordance with special construction requirements of that agency or organization as well as these specifications.

01090.3.2 ADDITIONAL INFORMATION AND SPECIFICATIONS

Information will be provided on the plans to indicate areas of the Work which fall on property owned or administered by agencies and organizations other than the Owner. Specifications from agencies which are affected by the work will be provided in the Appendix to the Contract Documents. Those specifications provided in the Appendix shall be considered part of the Contract Documents and the Contractor shall include sufficient compensation in its bid to cover the work required for compliance thereto.

01090.4 CONFLICTS

In case of conflict between codes, reference standards, Drawings and the other Contract Document, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor required therefrom. The Contractor shall assume the most stringent requirements apply when preparing bids for this Contract.

01300.1 DESCRIPTION

This section covers procedures to be followed by the Contractor when providing information to the Owner and/or Engineer to obtain approval of materials, equipment, procedures, etc. described in the Specifications and Drawings.

01300.2 SHOP DRAWINGS AND MATERIALS SUBMITTALS

01300.2.1 NUMBER OF COPIES OF SUBMITTALS

The Contractor shall furnish electronic copies of each shop drawing and pertinent materials information sheet to the Engineer for review. A full set of submittals shall be provided to the Engineer seven (7) days prior to commencement of construction activity. Following review and approval, an electronic copy shall be returned to the Contractor for his records.

01300.2.2 SHOP DRAWINGS

01300.2.2.1 CONTRACTOR REVIEW - The Contractor's shop drawing submittals shall be reviewed by a qualified representative of the Contractor, prior to submission to the Engineer. Such review shall be made to ensure the accuracy and compliance with the technical requirements and performance described and illustrated in the Drawings and Specifications.

01300.2.2.2 CONTENT - Shop drawings shall include drawings, pictures and sketches with sufficient details and explanations to reflect the Contractor's interpretations of components and required configurations not shown on the drawings, so that a documented record of such can be approved for incorporation in the Work. These drawings shall be accurate, distinct, and complete and shall contain all required information, including satisfactory identification of items and unit assemblies in relation to the Drawings and/or Specifications.

01300.2.2.3 TIMELY SUBMITTAL - Shop drawings shall be submitted sufficiently in advance to allow the Engineer not less than ten regular working days prior to manufacturing for examining the drawings.

01300.2.2.4 ENGINEER APPROVAL - When the shop drawings are approved by the Engineer, an electronic copy will be returned to the Contractor marked "Approved", "Revise as Noted", "Rejected", "Approved Except as Noted", or similar notification. If changes or corrections are necessary, an electronic copy with such changes or corrections indicated by a brief statement will be provided, and the Contractor shall correct and resubmit the drawings to the Engineer.

Fabrication work shall not commence until the Engineer has reviewed the pertinent shop drawing/s and returned an electronic copy to the Contractor marked either "Approved" or "Approved - Except as Noted". Corrections indicated on such submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as the basis of claims for extra work.

Approval of shop drawings will not be required for reinforcing steel that is detailed by the Contractor in accordance with the Plans and Specifications. Any change from the Plans and Specifications made by the Contractor in any aspect of the Work shall be approved by the Engineer in a written Change Order prior to any work being altered from that already approved for construction.

001300.2.3 MATERIALS INFORMATION SUBMITTALS

In keeping with 01300.2.1 above, the Contractor shall assemble and submit an electronic copy of each manufacturer's catalog cuts and materials information sheets pertaining to materials and equipment to be furnished and installed in the Work. Failure to submit all materials information may result in the Contractor's partial payments to be withheld until submittals are complete.

01300.2.4 CONTRACTOR LIABILITY

The Contractor shall assume all responsibility and risk for any re-work or other costs resulting from errors in Contractor submittals. The Contractor shall be responsible for showing accurate dimensions and details of connections required to ensure the function of the equipment and/or component of the Work being illustrated.

01300.3 SAMPLES

01300.3.1 NUMBER OF SUBMITTALS

Whenever requested by the Engineer, the Contractor shall submit at least one sample of each item or material indicated in the Specifications to the Engineer for inspection and acceptance and do so at no additional cost to the owner.

01300.3.2 TIMELY AND ORDERLY SUBMITTAL

Samples shall be submitted sufficiently in advance of placement of orders that the Engineer shall have not less than ten regular working days for examining and testing the material for acceptance prior to delivery to the job site. Samples shall be submitted in an orderly sequence and appropriately identified so that dependent materials or equipment can be assembled and reviewed without causing delays in the work or mistakes in their identity.

01300.3.3 SELECTION OF COLORS AND TEXTURES

Unless otherwise specified, the Owner and the Engineer will select all colors and textures of specified items from the manufacturer's standard colors and standard materials, products, or equipment lines.

01300.4 OPERATIONS AND MAINTENANCE MANUALS

01300.4.1 STRUCTURE OF OPERATIONS AND MAINTENANCE MANUALS

The Contractor shall furnish to the owner electronic copies of Operations and Maintenance manuals. A table of contents shall be provided which indicates all equipment in the Operations and Maintenance manuals.

01300.4.2 CONTENTS

The Contractor shall include in the Operations and Maintenance Manuals the following information for each item of mechanical, electrical, and instrumentation equipment:

- Care and maintenance of all finished exposed surfaces.
- Complete operating instructions, including location of controls, special tools or other equipment required, related instrumentation, and other equipment needed for operation.
- Preventive maintenance procedures and schedules.

- Complete parts lists, by generic title, identification number, and catalog number, complete, with exploded views of each assembly.
- Disassembly and reassembly instructions.
- Name and location of nearest supplier and spare parts warehouse.
- Name and location of manufacturer.
- Recommended start-up, testing and troubleshooting procedures.
- Prints of the record drawings, including diagrams and schematics, as required under the electrical and instrumentation portions of these specifications.

01300.4.3 SCHEDULE OF DELIVERY

Operations and Maintenance manuals shall be submitted in final form to the owner before seventy-five (75) percent of the Work is completed. Any discrepancies found by the owner and Engineer in the Operations and Maintenance manuals shall be corrected by the Contractor prior to final acceptance of the project.

01300.5 SCHEDULE OF VALUES

At the time of the pre-construction conference, the Contractor shall submit a Schedule of Values of the Work measured as lump sum bid items. On the Schedule, those items shall be subdivided into component parts in sufficient detail as to form a basis for determining progress payments during construction. Quantities, and/or prices, shown on the Schedule shall equal the total contract price for each lump sum item. Information provided on the Schedule will be reviewed and approved by the Engineer when found acceptable. That information will then be incorporated into the data used for preparing the Application for Payment by the Engineer.

01300.6 CONTRACT CONSTRUCTION SCHEDULE

A construction schedule, prepared in accordance with requirements of the General Conditions, shall be submitted to the Engineer at the pre-construction conference. Unless required otherwise in Special Provisions, such schedule shall show the anticipated time of completion, approximate start dates of identifiable segments of the Work, and anticipated value of the work expected to be completed in monthly time periods within the contract period.

01300.7 PROCUREMENT SCHEDULE

At the time of the pre-construction meeting (see Section 01030), the Contractor shall submit a procurement schedule to the Engineer. This plan shall include all equipment and materials required for the Work included in the Contract that are not readily available and will require off-site manufacture and lead time which can affect the progress of the Work. The plan shall show at least the following information:

- Equipment/Material Name
- Anticipated amount of time for ordering, manufacturing, and shipping to Work site.
- Anticipated dates for ordering, receiving and installing.

01300.8 CONSTRUCTION PHOTOGRAPHY/VIDEO RECORDS

When required in the Contract Documents and prior to commencement of any of the Work, the Contractor shall prepare photography/video records of all areas of the Contract work site and provide copies of such records to the Engineer. Such records shall become the property of the owner and may be used for determining the condition of work site/s and degree of restoration required for completion of the Work (see also Section 2000).

SECTION 01450

TESTING AND PROCESS CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the responsibility of the Developer or Contractor to adequately test native materials and construction materials, and to furnish the City with manufacturer's certifications of material quality.

1.02 QUALITY ASSURANCE

A. The developer or Contractor shall be responsible for all sampling, delivery of samples to a qualified testing agency, testing, and delivery of test results or materials certifications to City at no charge to the City. Testing and certifications reports shall be approved by the City as to conformance to City construction specifications prior to final inspection and/or acceptance by the City of any materials or workmanship.

1.03 SUBMITTALS

A. Field Test Report: When possible, submit original reports immediately to Engineer or inspector, but in no case later than end of following day.

B. Laboratory Test Report: Submit original report to Engineer within 24 hours after test results are determined.

PART 2 EXECUTION

2.01 SAMPLING

A. Sampling of materials shall be as specified in each test.

B. The City Engineer or City Inspector may require that sampling be performed in their presence, in which case the Developer or Contractor shall be notified of this requirement in writing at the time the building permit is issued, or at the preconstruction meeting, or when construction drawings are released by the City for construction, as applicable.

C. The presence of a City Inspector shall not relieve the Developer/Contractor of any requirement in this Section.

D. Each sample or test shall be accompanied by the following written data, which shall be reported to the City with test results:

1. Name of Project
2. Name of Developer/Contractor
3. Project Street Address

4. Appropriate Test Name (Material Type Borrow, UBC, Asphalt etc.)
5. Date of Sampling
6. Sample Number (if more than one sample per day)
7. Name of technician who performed the testing
8. Location of sample (Depth, Station, Offset etc.)

2.02 TESTING AGENCY

A. All materials testing, whether in a laboratory or in the field, shall be conducted by a testing agency approved by the City.

2.03 SOIL CLASSIFICATION TEST

A. The soil classification test shall be conducted to determine the suitability of native soils for road subbase and building foundations.

B. The soil classification test shall conform to AASHTO M-146 of latest revision.

C. The soil shall be classified according to AASHTO soil classifications.

D. One soil classification test shall be required for each test area. A test area shall be limited to one parcel of one soil type, a maximum 1,000 feet long and maximum 5 acres.

E. In test areas of less than 2 acres, the City Engineer may waive this requirement.

F. The soil sample shall be taken from a test area at a minimum depth of 24 inches below the future design grades, of native soil, and shall be free from foreign material, asphalt, concrete, ice or manmade materials.

G. Where deep footings or pile foundations are proposed, soil classification tests at several depths may be required in each test area.

H. The results of all determinations shall be reported in writing to City Engineer.

2.04 COMPACTION TEST OF SOIL AND UNTREATED BASE COURSE

A. Laboratory tests to establish maximum laboratory density shall be determined in accordance with AASHTO T-180, Method D for A-1 classification soils and AASHTO T-99, Method D for all other soils.

B. Samples to determine laboratory density shall be taken from the stockpiled backfill or from the uncompacted base course in place.

C. The acceptance of soil and base course with respect to compaction, shall be based upon the average density of all density tests made in a lot.

1. Field density tests shall be as specified by AASHTO T-191 or by use of a portable nuclear density testing device. Field density tests shall be taken at a depth equal to ½ the maximum depth of the lift tested.

2. A lot shall equal the amount of soil or untreated base course compacted in each production day.

3. The developer/contractor shall be responsible to test soil and UBC in accordance with Section 02250, Soil Compaction.

4. The location of sampling sites within the lot shall be chosen on a random basis by use of a suitable random number table.

D. The test results of all samples tested shall be reported to the City Engineer. A test lot shall be accepted when the average of the density tests is not less than the density required for that improvement as specified in Section 02250. No one density test shall be less than 91%.

E. Compaction tests not conforming to required specifications may be rejected and recompaction or related construction efforts to obtain compaction shall be at the Developer's expense.

2.05 PROOF ROLL OF ROADWAY SUBGRADE

A. Proof Roll Test shall be performed in presence of City Engineer or City Representative to determine the structural integrity of the subgrade, street section, and trail section.

B. The Proof Roll Test shall be performed as follows:

1. The contractor shall provide a loaded 10 wheel dump truck or water truck to drive over the subgrade material.

2. The loaded truck shall be driven slowly over the subgrade to locate soft spots in the subgrade surface.

3. Soft spots in the subgrade shall be identified and marked by the City Engineer.

4. It shall be the developer's/contractor's responsibility to remove the rejected subgrade material to depth determined by City Engineer, to eliminate soft spots. The rejected material shall be replaced with A-1-a granular backfill approved by City Engineer.

2.06 GRADATION TEST OF UNTREATED BASE COURSE

A. The gradation of untreated base course shall be determined in accordance with AASHTO T-27.

B. The total amount of material passing the No. 200 sieve shall be determined by washing in water in accordance with AASHTO T-11.

C. The acceptance of road base with respect to gradation shall be based upon the average of all determinations in a lot. A lot shall be limited to one source of road base and limited to one subdivision plat or one development. One sample shall be required for each 1,000

tons of untreated base course in a test lot. When the test lot is less than 100 tons, the requirement for the gradation test may be waived by the City Engineer.

D. The location of sampling sites within a test lot shall be chosen on a random basis by a suitable random number table.

E. All material not conforming to the specified gradations may be rejected at the Developer's expense.

2.07 EXTRACTION - GRADATION TESTING OF BITUMINOUS SURFACE COURSE

A. Samples of the bituminous surface course or asphalt concrete shall be tested with respect to gradation and bitumen content in accordance with Utah Department of Highways Test Procedure 8-946 and 8-947 if required by the City Engineer.

B. Mix design shall be submitted to the City Engineer for approval 5 working days before work is to begin.

C. Acceptance of bituminous surface course with respect to gradation and bitumen content shall be based upon the average of the determinations made in a lot.

1. A lot shall equal the amount of bituminous surface course placed in each production day.

2. When a lot exceeds 1,000 tons, a minimum of three (3) samples shall be taken in each lot.

3. When a lot is 1,000 tons or less, a minimum of two (2) samples shall be taken.

4. Samples shall be taken at the time of lay-down of bituminous surface course and before compaction. Samples shall be taken from the mat behind the lay-down machine.

5. Sampling shall be timed to represent the entire production day. The time of day, date of sample, station and offset location shall be clearly marked with the sample.

6. If the average asphalt is less than 2.5% of optimal content, the Contractor may be required to lay an additional lift or slurry seal, based on the City Engineer's recommendation.

2.08 COMPACTION TESTING OF BITUMINOUS SURFACE COURSE

A. Laboratory tests to establish the maximum laboratory density of bituminous surface course shall be determined by the "Marshall Test" in accordance to ASTM D-1559.

B. Samples to determine maximum laboratory density shall be taken at the time of lay-down of bituminous surface course and before compaction.

C. Acceptance of bituminous surface course with respect to compaction shall be based upon the average determination of field density tests made in a lot.

1. Field density tests shall be by a portable nuclear density testing device or by laboratory density analysis of core samples.

2. A test lot shall be the total linear foot of a paver pass of surface course placed and compacted in each construction day.

3. One field density test shall be taken every 200 feet per paver pass or at a minimum of 2 tests per day whichever is greater, randomly located in the test lot by use of a suitable random number table.

D. The test lot shall be accepted with respect to density when the average of all density determinations is not less than the density required by Section 02510. Any individual areas falling below the required density are subject to removal and replacement at the discretion of the City Engineer.

E. Core Tests

1. Acceptance of the completed bituminous surface course with respect to thickness shall be based on the average thickness of a test lot.

   a. A test lot shall equal approximately 4,000 square yards of completed roadway.
   b. A lot shall be divided into sublots of approximately 2,000 square yards.

2. One thickness test, randomly selected by use of a random number table, shall be taken within each sublot. A minimum of three core tests will be taken.

3. A lot shall be accepted when the average thickness of all sublots is not less than 3/8 inch the total designated bituminous surface course thickness and when no individual sublot shows a deficient thickness of more than ½ inch.

4. Lots or sublots that are not acceptable because of deficient thickness shall be brought into compliance by placing additional surface course as directed by the Engineer.

5. The removed core will be replaced with low strength concrete.

2.09 COMPRESSIVE STRENGTH TESTING OF CONCRETE CYLINDERS

A. Samples of concrete shall be taken at the construction site, molded in standard cylinder shapes, allowed to cure, and tested with respect to comprehensive strength when required by the City Engineer.

B. All samples of concrete shall be taken in conformance to AASHTO T-141 of the latest revision.

C. Acceptance of concrete with respect to compressive strength shall be based upon the average determination of all "strength tests" made in a lot.

1. A test lot shall be the quantity of concrete placed at one job in a construction day.

2. For each 50 cubic yards of concrete in a test lot, three (3) compressive "strength tests" shall be run, except that for lots of less than 5 cubic yards, the number of "strength tests" per lot shall be the average strength of three standard cylinders.

3. The making, curing and compressive strength testing of concrete cylinders shall conform to AASHTO T-22 and AASHTO T-23.

D. Concrete may be rejected if desired strengths are not obtained at the Developer's expense.

2.10 ADDITIONAL CONCRETE TESTING

A. Slump Test: Determine slump in accordance with AASHTO T-152.

B. Air Test: Determine normal weight concrete air content; AASHTO T-152 and light weight concrete air content; AASHTO T-196.

C. When requested by Engineer, test concrete in place by impact hammer, sonoscope, or other nondestructive device:

1. To determine relative strengths in various locations in Work.
2. To aid in evaluating concrete strength.
3. To select areas to be cored.

2.11 CERTIFICATIONS FOR WATER SYSTEM VALVES

A. In certain water system equipment, steel items and pipe listed below, a manufacturer's certificate shall be furnished with each unit of equipment, certifying conformance to the applicable requirements of City Standard Specifications:

1. Gate Valves
2. Butterfly Valves
3. Steel Reinforcing Bars
4. Structural Steel
5. Corrugated Metal Pipe
6. Polyvinyl Chloride Pipe
7. ABS Composite (Truss) and Solid Wall Pipe

2.12 SUMMARY TABLE OF TESTS AND CERTIFICATIONS

A. The following is a summary of the tests, number of samples per test and certificates that are required for construction work and developments in City. This summary is provided as a reference guide. For details governing each item, refer to the appropriate test specification herein.

Test Subject	Specific Test	Location
Soil Classification	AASHTO M-145	See Section 01450, 2.03.D
Compaction of Soil & Base Course	Lab Density- AASHTO T-99 Method D or AASHTO T-180 Method D	As needed to establish laboratory density
	Embankment & Base Course Field Density- Portable Nuclear Equipment or AASHTO T-191 Backfill Field Density- Portable Nuclear Equipment or AASHTO T-191	See Section 02250, 2.01.A
Base Course Gradation	Sieve Analysis- AASHTO T-27 Passing No. 200 Sieve- AASHTO T-11	See Section 01450, 2.06.C
Extraction-Gradation Test of Bituminous Surface Course	UDOT Test Procedure 8-946 & 8-947	See Section 01450, 2.07.C.2 & 2.07.C.3
Compaction of Bituminous Surface Course	Lab Density- Marshall Test, ASTM D-1559 Field Density- Portable Nuclear Equipment	See Section 01450, 2.08.C.3
Core Tests	4" Core Sample	See Section 01450, 2.08.E.2
Concrete Test Cylinders	AASHTO T-23	See Section 01450, 2.09.C.2
Pressure Reducing & Regulating Valves	Manufacturer's Certificate	1 for each valve
Gate Valve	Manufacturer's Certificate	1 for each valve over 12" diameter
Butterfly Valves	Manufacturer's Certificate	1 for each valve
Steel Re-Bar	Manufacturer's Certificate	1 for each 1,000 pounds of one grade
Structural Steel	Manufacturer's Certificate	1 for each lot of one shape, one grade
Corrugated Metal Pipe	Manufacturer's Certificate	1 for each 500 lineal feet of one size, one class
Polyvinyl Chloride Pipe	Manufacturer's Certificate	1 for each 500 lineal feet of one size, one class
A.B.S. Pipe	Manufacturer's Certificate	1 for each 500 lineal feet of one size, one class

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construction Facilities: Progress cleaning.

B. Temporary Utilities: Electricity, water, and sanitary facilities.

C. Temporary Controls: Barriers and protection of the installed work.

D. Requirements for controlling surface and subsurface environmental conditions at the construction site, and related areas under the CONTRACTOR's responsibility.

E. Requirements for removal of physical evidence of temporary controls upon completion of work.

1.02 REFERENCES

A. UOSH Construction Standards Chapter D: Occupational Health and Environmental Controls.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Materials: CONTRACTOR's choice.

PART 3 EXECUTION

3.01 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition

3.02 TEMPORARY ELECTRICITY

A. Cost: By Contractor; provide and pay for power service required from utility source.

3.03 TEMPORARY HEATING

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

3.04 TEMPORARY WATER SERVICE

A Provide, maintain and pay for suitable quality water service required for construction operations at time of project mobilization.

3.05 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures, at the time of project mobilization.

3.06 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.

B. Provide protection for plants designated to remain. Replace damaged plants.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

3.07 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to prevent damage.

C. Prohibit traffic from landscaped areas.

3.08 NOISE CONTROL

A. Use equipment that is equipped with noise attenuation devises. Comply with UOSH Construction Standards Chapter D rules and regulations and local Laws and Regulations.

B. The Contractor shall comply with UDOT 2017 Standard Specifications, Section 01355, 3.6 Noise Control or most current UDOT Specifications.

3.09 DUST AND MUD CONTROL

A. The Contractor will be required to obtain a permit from Utah Division of Air Quality to minimize fugitive dust from the construction activities.

B. The Contractor will be required to stockpile all excavated and stored material within the existing roadway areas. No construction equipment will be allowed to contact vegetated or wetland areas.

C. Provide suitable equipment to control dust or air pollution caused by construction operations.

D. Provide suitable mud and dirt containment, so work site, access roadways and properties adjacent to the work site are kept clean.

E. The Contractor shall provide all labor, equipment, and materials, and shall use efficient methods wherever and whenever required to prevent dust nuisance or damage to persons, property, or activities, including, but not limited to crops, orchard, cultivated fields, wildlife habitats, dwellings and residences, agricultural activities, recreational activities, traffic, and similar conditions. Methods of mixing, handling, and storing cement, pozzolan, and concrete aggregate shall include means of eliminating atmospheric

discharges of dust.

F. The City Engineer and/or Construction Manager has authority to stop any construction activity contributing to dust levels which are excessive or in violation of Federal, State, or local laws. All expenses resulting from such a work stoppage is the responsibility of the Contractor.

3.10 SURFACE WATER CONTROL

A. Control all on-site surface water. Provide proper drainage so flooding of the site or adjacent property does not occur.

B. Provide and maintain ample means and devices with which to promptly remove and properly dispose of all water entering the site.

C. Immediately prior to suspension of construction operations for any reason, provide proper and necessary drainage of work area.

D. Provide berms or channels as necessary to prevent flooding or saturation of subgrade. Promptly remove all water collecting in depressions.

E. Dispose of water in a manner that will not cause damage to adjacent areas of facilities.

3.11 POLLUTION CONTROL

A. Soil: Prevent contamination of soil from discharge of noxious substances (including engine oils, fuels, lubricants, etc.) during construction operations. Excavate and legally dispose of any such contaminated soil off-site, and replace with acceptable compacted fill and/or topsoil.

B. Water: Prevent disposal of waste, effluent, chemicals or other such substances adjacent to or into streams, waterways, sanitary sewers, storm drains, or public waterways. Perform any emergency measures that may be required to contain any spillage.

C. Air: Control atmospheric pollutants. Develop a fugitive dust control plan and submit it to the Executive Secretary at the Division of Air Quality for approval prior to beginning construction activities.

3.12 EROSION CONTROL

A. Use measures such as berms, dikes, dams, sediment basins, fiber mat netting, gravel mulches, slopes, drains and other erosion control devices or methods to prevent erosion and sedimentation.

B. Provide construction and earthwork methods which control surface drainage from cut, fill, borrow, and waste disposal areas, to prevent erosion and sedimentation.

C. Inspect earthwork during execution to detect any evidence of the start of erosion. Apply corrective measures as required.

D. Obtain and execute a UPDES storm water discharge permit from the Division of Water Quality prior to beginning construction activities.

END OF SECTION

01580.1 DESCRIPTION

In general, the Contractor is responsible for providing and maintaining access to the Work, handling and storing of materials and equipment, safety and security within the Work site, and coordination and cooperation with the Owner, its representatives, governing authorities and other contractors working for the Owner in accordance with the provisions of the General Conditions. This section contains specific requirements which apply to these responsibilities.

01580.1.1 RELATED WORK AND REFERENCED SECTIONS

Section 02005 – Traffic Control

01580.1.2 SUBMITTALS

Not used.

01580.1.3 DEFINITIONS

Not used.

01580.2 WORK SITE ACCESS

01580.2.1 INVESTIGATION OF WORK SITE AREA

The Contractor shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting ingress and egress to the site of the work.

01580.2.2 HAUL ROADS

It shall be the Contractor's responsibility to construct and maintain any new haul roads required for its construction operations.

01580.2.3 USE OF PUBLIC STREETS AND ALLEYWAYS

Nothing herein shall be construed to entitle the Contractor to the exclusive use of any public street, alleyway, or parking area during the performance of the Work, unless shown otherwise in the Contract Documents.

01580.2.4 CLOSURE OF PUBLIC ROADWAYS

No street, road, or highway shall be closed to the public without first obtaining permission from the proper governmental authorities and the Engineer. Where excavation is being performed in streets or highways, one lane in each direction shall be kept open to traffic at all times, unless otherwise authorized by the Contract Documents or the Engineer. Toe boards, or other measures, may be required by the Engineer to retain excavated material when deemed necessary.

01580.2.5 INTERFERENCE WITH UTILITIES

The Contractor shall so conduct operations as not to interfere unnecessarily with the infrastructure of utility companies or other agencies in such streets, alleyways, or parking areas.

01580.3 PUBLIC SAFETY AND ACCESS

Fire hydrants, approaches to fire stations, police stations and hospitals on or adjacent to the Work shall be kept accessible at all times. Appropriate measures shall be taken by the Contractor, to assure the use of sidewalks, and the proper functioning of all gutters, sewer inlets, water mains, drainage facilities and other infrastructure.

The Contractor's responsibility for Work safety or liability for Work site accidents is not lessened by the presence of the Engineer or his or another inspector performing monitoring of Work site safety conditions.

See also Section 02005 – Traffic Control.

01580.4 CONTRACTOR'S USE OF THE WORK SITE

The Contractor's use of the Work site shall be limited to its construction operations. Written approval by the Engineer will be required for any other use of the site, such as material and equipment storage, personnel vehicle parking, on-site fabrication facilities and field office.

01580.5 OFF-SITE STORAGE

The Contractor shall make arrangements for, bear any use costs associated with, and obtain written permission from the Engineer prior to using any off-site storage or shop areas or facilities determined necessary for execution of the Work. Storage facilities shall be equipped with fences and/or lockable entries that will prevent entry by unauthorized parties. Before off-site storage facilities are placed in use, the Contractor shall provided the Owner keys or combinations to locking devices used to secure the facility.

01580.6 COOPERATION WITH OTHER CONTRACTORS

Prior to authorizing other contractors to work on or adjacent to the Work site, the Owner shall notify the Contractor in writing and provide the name and address of the contractor, the name of its supervisor, a description of the work to be performed, and a schedule which shows the dates and planned segments of the work to be completed by the other contractor. In the event that conflicts or interferences occur between the Contractor and the other contractor's operation, the Engineer shall be notified immediately. The Engineer shall then take appropriate action needed to resolve the problem.

SECTION 01700

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Closeout procedures.

B. Final cleaning.

C. Adjusting.

D. Project record documents.

1.02 RELATED SECTIONS

A. Section 01500 - Construction Facilities and Temporary Controls: Progress cleaning.

1.03 CLOSEOUT PROCEDURES

A. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

B. Provide submittals to Engineer Owner that are required by governing or other authorities.

C. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

1.04 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

C. Clean site; sweep paved areas, rake clean landscaped surfaces.

D. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 ADJUSTING

A. Adjust operating Products and equipment to ensure smooth and unhindered operation.

1.06 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Reviewed Shop Drawings, Product Data, and Samples.

6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:

1. Manufacturer's name and product model and number.

2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.

F. Record Drawings: Legibly mark each item to record actual construction including:

1. See Record Drawing Section 00700 4.04 for details.

2. Final Payment will not be made until Record Drawings have been submitted to Engineers.

G. Submit documents to Engineer with claim for final Application for Payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

02000.1 DESCRIPTION

This section describes various tasks associated with project execution and close out. Mobilization shall include: preparatory work and materials necessary for obtaining clearances for the Work; moving personnel, equipment, supplies and incidentals to and from the Project Site; quality control; clean-up; temporary utilities and quarters; permits, bonds and insurance; dust abatement, storm water control, and noise abatement; waste and rubbish disposal and control; sanitation; and project close-out operations.

02000.1.1 RELATED WORK AND REFERENCED SECTIONS

Section 01200 - Contract Closeout
Section 01510 - Protection of Existing Property
Section 01520 - Environmental Controls
Section 02005 - Traffic Control

02000.1.2 SUBMITTALS

02000.1.2.1 VISUAL RECORDS - The Contractor shall furnish at least one copy of all visual records, as described below in 02000.3.2, to the Owner.

02000.1.2.2 SERVICE CONNECTION LOCATION AND DOCUMENTATION – When service connections are included in the scope of work the Contractor shall deliver all signed tie-sheets (see 02000.3.3 below) to the Engineer not less than forty-eight hours prior to when the service connection is to be installed.

02000.1.3 DEFINITIONS

Sign - A complete assembly including panel and posts, with fasteners, installed at designated locations.

Visual Record – Photography/Video in electronic format of areas potentially liable for disturbance as a result of the Work required by this Contract.

Service Connection Interview & Documentation - Interviews with potential system users and the documentation of location data for service connections to the respective property from utility lines being installed under this Contract.

Tie Sheets - Forms provided by the Engineer for use in documenting the location of service connection/s of system users.

Service Connection - Piping extending from the main utility line to the property line, or designated connecting point, of any user of the system.

02000.2 MATERIALS

02000.2.1 SIGN PANELS

5/8-inch thick (A or B) exterior grade plywood sheets with best quality exterior enamel paint for face painting and lettering, fastened to posts with at least four 1/2-inch galvanized bolts.

02000.2.2 POSTS

4x4 Cedar or treated Pine commercial fence posts at least eight-feet long or as shown on the Drawings.

02000.2.3 VISUAL RECORD

Records shall be made on professional quality, standard digital format.

02000.3 CONSTRUCTION REQUIREMENTS

02000.3.1 PROJECT SIGN

The Contractor shall provide project signs, which includes furnishing all materials and labor to fabricate, deliver, install and maintain any and all project identification signs as detailed on Drawings and at location(s) shown thereon.

02000.3.2 VISUAL RECORDS

Prior to any disturbance of the area, the Contractor shall produce a digital record of photography/video of all areas, including but not limited to right-of-ways, streets and roadways, haul-roads and access routes, storage areas, construction sites, and buildings or structures, which will be, or may be, affected by the Work. Such photography/video will be of a quality to allow accurate determination of location, size, and condition of existing features and improvements taken prior to any occupancy or execution of Work by the Contractor. Additionally, photography/video for each street shall be separated into different chapters. Photographs should be taken while the camera is stationary, not from a moving vehicle or other means. Digital records are subject to approval by the engineer and owner. Construction may not begin until the engineer has approved the visual record.

02000.3.3 SERVICE CONNECTION LOCATION AND DOCUMENTATION

Unless called for differently, the Contractor shall contact and interview the owners of all properties indicated on the Drawings and obtain from them sufficient information for location of workable service connections for each property. The Contractor shall document those locations on the tie sheets and obtain a confirmation signature from the connection owner.

02000.4 METHOD OF MEASUREMENT

02000.4.1 MOBILIZATION

Mobilization shall be measured by the lump sum.

02000.4.2 PROJECT SIGN

Measurement for project signs shall be made by counting each sign installed and accepted.

02000.4.3 VISUAL RECORDS

Pre-Construction Photography/Video shall be measured by the lump sum.

02000.4.4 SERVICE CONNECTION DOCUMENTATION

Service Connection Documentation shall be measured by the lump sum.

02000.5 BASIS OF PAYMENT

02000.5.1 The accepted quantity(s) shall be paid for at the contract unit price for:

PAYMENT ITEM	UNIT
Mobilization	Lump Sum

02000.5.2 PAYMENT SCHEDULE

The amount bid or identified in a schedule of values for Mobilization shall not exceed 10% of the total contract bid amount. The following payment schedule percentages shall be based on amount bid or identified in a schedule of values for Mobilization up to a maximum of 10% of the total contract bid.

Partial payments for Mobilization will be made in accordance with the payment schedule table below.

MOBILIZATION PAYMENT SCHEDULE

Payment	Amount	When Paid
1ST	25% of mobilization	With first partial payment after 3% of the original contract amount earned by the Contractor.
2ND	25% of mobilization	When amount earned by Contractor is 10% of the original contract price.
3RD	25% of mobilization	When amount earned by Contractor is 50% of the original contract price.
4TH (last)	25% of mobilization	When project is complete and accepted.

02005.1 DESCRIPTION

This section covers furnishing and maintaining all traffic control devices, flaggers and pilot vehicles necessary for protection of the Work, the workers and the traveling public in accordance with these Contract Documents. The requirements of this section are not intended to supersede, but shall supplement, the provisions contained in the "Manual of Uniform Traffic Control Devices" issued by the U.S. Department of Transportation, and any other applicable state or local traffic control regulations.

02005.1.1 RELATED WORK AND REFERENCED SECTIONS

Section 01580 – Work Site Management
Section 02206 – Access Roads and Temporary Use of Roads

02005.1.2 SUBMITTALS

The Contractor, upon request of the Owner or Engineer, shall submit detailed traffic control plans for specific areas of the Work.

02005.1.3 DEFINITIONS

Traffic Control Devices - All temporary traffic control and warning devices required to warn traffic of, and to guide it through, construction areas as required under this Contract, including, but not limited to: portable cones and barricades, signs, channeling devices, paint striping, lighting devices, flags, etc.

Flaggers - Qualified and alert persons equipped with safety warning devices who direct traffic through construction areas.

Traffic Lane - Ten (10) feet of clear street width with a safe motor vehicle speed of twenty-five (25) miles per hour.

Pilot Car - Any designated and properly marked vehicle used for leading groups of vehicular traffic through construction areas.

02005.2 MATERIALS

Not Used.

02005.3 CONSTRUCTION REQUIREMENTS

02005.3.1 COORDINATION OF WORK AND TRAFFIC CONTROL

The Contractor shall endeavor to organize its work force in such a manner as to minimize the closure of public streets and roadways within the Work site. If conditions justify, the Engineer may direct the Contractor to conduct Work in specific areas and/or to specific tasks to avoid closure or interference with traffic on public streets and roadways.

02005.3.2 CLOSURE OF PUBLIC THOROUGHFARES

The Contractor shall not close any public street or roadway without prior approval by the Engineer. When closure is necessary, and approved, the street or roadway shall only be closed to through traffic and not to local traffic. Closure may extend for one city block only, or 700 feet,

whichever is less. Closure of streets and roadways shall be made with barricades meeting State DOT standards. Traffic shall be kept open on streets and roadways where no detour is possible.

02005.3.3 MAINTENANCE OF EXISTING SIGNS

Existing traffic signs other than stop, yield, and street name signs shall be maintained by the Contractor until such time as construction renders them obsolete. At that time the Contractor shall remove signs and posts without damage and deliver them as directed by the Engineer.

02005.3.4 PROTECTION OF WORK AND TRAFFIC

All obstructions and excavations, within traveled streets and roadways, shall be protected with traffic control devices meeting State DOT standards. Traffic control devices, placed within streets and roadways, shall be illuminated at night, and such illumination shall function from sunset to sunrise. Local jurisdiction may require traffic control measures greater than those of State DOT standards, in which case the Contractor shall comply with such requirements.

Whenever the Engineer finds traffic control conditions at the Work site to be inadequate to assure public safety, or the Contractor's protective facilities to be inadequate, the Engineer may require the Contractor to provide the additional necessary facilities or services. The Contractor shall bear the cost of the additional protection.

See also Subsection 01580.3.

02005.4 METHOD OF MEASUREMENT

02005.4.1 TRAFFIC CONTROL AS LUMP SUM

If traffic control appears as a separate item in the Bid Schedule, it shall be measured as a lump sum item. Therefore, with the possible exception of the items mentioned in the following two paragraphs, no separate measurement will be made for furnishing and maintaining traffic control devices, personnel, or any vehicles or other equipment used for traffic control.

02005.4.2 FLAGGING

When flagging is listed separately in the Bid Schedule, the work of flag persons will be measured by counting the number of hours put in by each separate flag person. This measurement shall include the time and/or mileage for any vehicle or other equipment required for performing the flagging work.

02005.4.3 PILOT VEHICLE

When a requirement for the use of pilot vehicles is called for separately in the Bid Schedule, that use will be measured by counting the number of hours each separate vehicle is in actual operation piloting or otherwise directing traffic.

02005.5 BASIS OF PAYMENT

02005.5.1 Unless provided for in the Contract Documents, the cost of all traffic control, including flagman, barricades, pilot cars and other devices, shall be included in the Contract Price and no separate measurement and payment will be provided.

02005.5.2 When provided in the Bid Schedule, the generally accepted quantities for traffic control shall be:

PAYMENT ITEM	UNIT
Traffic Control	Lump Sum

SUBSURFACE INVESTIGATION — SECTION 02020

02020.1 DESCRIPTION

Furnish and provide labor and equipment for investigation of existing miscellaneous pipelines, wires or cables, and other miscellaneous sub-surface features as required by the Engineer.

02020.1.1 RELATED WORK

Section 01510 - Protection of Existing Improvements

02020.1.2 SUBMITTALS

Not used.

02020.1.3 DEFINITIIONS

Not used.

02020.2 MATERIALS

The Contractor shall provide a backhoe and qualified operator; laborer with hand shovel: appropriate fuel and lubricants, necessary equipment servicing materials; and appropriate equipment for transporting the backhoe to perform the investigation. The backhoe shall be a rubber tired CASE 580 backhoe, or an approved unit of equivalent or greater size and capacity, having accumulated not more than 5,000 hours operating time.

02020.3 CONSTRUCTION REQUIREMENTS

02020.3.1 EXPOSURE BY EXCAVATION

When directed by the Engineer, the Contractor shall excavate and expose miscellaneous pipelines, structural features, soil materials and other underground features which may be present at the work site. The location and extent of exposure shall be determined on site by the Engineer. Designation of such areas shall be made in writing, usually in the form of a Work Order, by the Engineer.

02020.3.2 REPLACEMENT OF EXCAVATED MATERIALS

Work required hereunder shall include replacement of excavated materials sufficiently to restore the site to a safe condition as determined by the Engineer. Full restoration of materials such as pavement, concrete slabwork, sod, etc., in the investigated area will be accomplished in accordance with the Contract Documents and as directed by the Engineer.

02020.4 METHOD OF MEASUREMENT

02020.4.1 MEASUREMENT BY HOURS OF WORK

Measurement of subsurface investigation shall be made by counting the actual number of hours of work completed by the machine and operator to investigate miscellaneous underground features as required by the Engineer. No allowance of time will be made for transporting the backhoe to and from the job site when the backhoe is located on the site of the Contract.

02020.4.2 MEASUREMENT FOR OTHER ITEMS OF WORK

When restoration of the excavated area requires provision of pavement, concrete slabwork, sod, etc., separate measurement will be made for those materials in accordance with the respective requirement(s) for measurement of that item in the Contract Documents.

02020.5 BASIS OF PAYMENT

The accepted quantity of work will be paid for at the contract unit price of:

PAYMENT ITEM	UNIT
Subsurface Investigation	Hour

When provision of designated materials is required for restoration of the excavation, payment for such materials shall be made in accordance with the respective provisions of the Contract documents.

SECTION 02150

SHORING AND UNDERPINNING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Shoring for open excavations requiring a protective system.

1.02 REFERENCES

A. OSHA Construction Standards Chapter P: Excavations, Trenching, and Shoring.

1.03 RESPONSIBILITY

A. Contractor/Developer is solely responsible for safety. It is the Contractor/Developer's responsibility to adhere to all of OSHA's current regulations.

1.04 DEFINITIONS

A. Accepted Engineering Practices: Those requirements or practices which are compatible with standards required by a duly licensed or recognized authority.

B. Benching: A method of protecting persons and property against cave-ins by excavation the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

C. Excavation: Any man-made cut, cavity, or depression in an earth surface, including trenches, formed by earth removal and producing unsupported earth conditions (sides). If installed forms or similar structures reduce the depth-to-width relationship, and excavation may become a trench.

D. Failure: The permanent deformation or breakage of a structural member or connection; or the collapse of all or part of an excavation.

E. Protective System: Any recognized method of protecting persons and property against cave-ins, the collapse of adjacent structures, or material that may fall or roll from an excavation side or into and excavation. Protective systems include support systems, sloping and benching systems and shield systems.

F. Shield/Trenchbox: A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect persons and property within the structure without preventing a cave-in. Shields may be permanent structures or may be designed to be portable and moved along as work progresses. Portable shields used in trenches are usually referred to as "trench boxes" or "trench shields".

G. Shoring: A structure that supports the sides of an excavation and thereby protects persons and property by preventing cave-ins.

H. Sides: A vertical or inclined earth surfaces formed at the outer edges of an excavation.

I. Sloping: A method of protecting persons and property against cave-ins by excavation to form sides that are inclined away from the excavation, the angle on incline being of such a degree for the conditions of exposure that a cave-in will not occur.

J. Support System: A structure which protects persons and property by providing support to an adjacent structure, underground installation, or the sides of an excavation.

K. Trench: A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

1.05 DESIGN OF PROTECTIVE SYSTEMS

A. Use professional engineer to design support systems, shield systems, and the structural components of these systems, and sloping and benching systems to resist without failure all loads that are intended to be imposed or transmitted to them.

B. Fully compensate in design procedures for hydrostatic pressure in the excavation sides.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials shall be as per 1.05 of this section

PART 3 EXECUTION

3.01 STABILITY OF ADJACENT STRUCTURES

A. Use support systems such as shoring, bracing, or underpinning where stability of adjoining buildings, walls, sidewalks, pavements, or other structures is endangered by excavation operations.

3.02 INSPECTIONS

A. Contractor/Developer shall employ and have on site at all times a competent person, as defined by OSHA, who is responsible for excavation inspection.

B. Inspect excavations daily for evidence of possible cave-ins, indications of failure of protective systems, or other hazardous conditions.

C. Upon discovery of hazardous conditions, cease all work in the excavations until additional precautions have been taken to ensure persons and property safety.

3.03 ADDITIONAL REQUIREMENT FOR TRENCH EXCAVATION

A. Do not excavate material to a level greater than 2 feet below the bottom of the members of a support system if the system is designed to resist the forces calculated for the full

depth of the trench, and indications of a possible cave-in below the bottom of the support system are not evident while the trench is open.

END OF SECTION

SECTION 02205

COMMON FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Common fill material requirements.

1.02 REFERENCES

A. AASHTO M 145: Recommended Practice for the Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

B. AASHTO T-27: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

C. Rule R 309-550-8(3) Installation of Water Mains

D. ASTM D2774: Recommended Practice for Underground Installation of Thermoplastic Pressure Piping and PVC Pipe

E. AWWA Manual M23: PVC Pipe – Design and Installation

1.03 DEFINITIONS

A. Common Fill: Backfill material which is <u>not</u> mechanically graded.

1.04 ACCEPTANCE

A. Acceptance of common fill shall be determined by Engineer and based upon 1 sublot of 500 tons plus any additional sublots for each 500 tons or portion thereof over and above the first 500 tons of each common fill placed in any 1 week.

B. Engineer reserves the right to select and test backfill on a random basis from any location in the Work, on the site or from the backfill source.

PART 2 PRODUCTS

2.01 BORROW

A. Bank run material: free of shale, clay, slag, friable material and debris.

B. Sound, earthen material with 95% - 100% passing the 4 inch sieve.

C. Percent of material by weight passing Number 200 sieve shall not exceed 20% when tested in accordance with AASHTO T-27

2.02 IMPORT / GRANULAR FILL (AASHTO TYPE A-1-a)

A. Well graded material meeting A-1-a classification.

B. The material must be within the following limits:

Sieve Size	Percent by Weight Passing Sieve
4 inches	95 - 100
No. 4 (4.75 mm)	30 to 70
No. 200 (75 micro m)	3 to 15

2.03 SAND

A. Clean, coarse, natural sand.

B. Non-plastic when tested in accordance with ASTM D 4318.

C. 100 percent shall pass a ½ inch screen.

D. No more than 20 percent shall pass a number 200 screen.

2.04 SOURCE QUALITY CONTROL

A. Verify gradation compliance in accordance with AASHTO T-27. Select samples uniformly in time on a random basis.

PART 3 EXECUTION

3.01 INSTALLATION

A. Excavation and Backfill Operations: In accordance with Section 02225.

END OF SECTION

SECTION 02206

SELECT FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Select fill material requirements.

1.02 REFERENCES

A. AASHTO T-96: Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

B. AASHTO T-27: Standard Method for Sieve Analysis of Fine and Coarse Aggregates.

1.03 DEFINITIONS

A. Select Fill: Backfill material which is mechanically graded.

1.04 SUBMITTALS

A. Material analysis of each select fill material to be used.

1.05 ACCEPTANCE

A. Engineer reserves the right to select, reject, and test backfill on a random basis from any location in the Work or from the backfill source.

PART 2 PRODUCTS

2.01 AGGREGATES – UNTREATED BASE COURSE(UBC) & PEA GRAVEL

A. Clean, hard, tough, durable and sound mineral aggregates that consists of 95% crushed stone, crushed gravel or crushed slag; free of deleterious and organic matter; and complies with the following:

1. Aggregate Wear Under AASHTO T-96: Less than 50 percent.

2. Material shall be classified as A-1 material.

3. Aggregates - master grading band limits

a. The following limits are based on fine and course aggregate having approximately the same bulk specific gravities. The limits are wider than necessary for good job control. Sieve gradations are based upon Percent of aggregate passing by weight in accordance with AASHTO T-27 and T-11.

MASTER GRADING BAND LIMITS

Sieve Size	UNTREATED BASE COURSE(UBC) Type 1		Type 3/4		PEA GRAVEL	
	Min	Max	Min	Max	Min	Max
1-1/2"	--	--	--	--	--	--
1"	100	--	--	--	--	--
3/4"	--	--	100	--	--	--
1/2"	79	91	--	--	--	--
3/8"	--	--	78	92	--	--
No. 4	49	61	55	67	100	--
No. 16	27	35	28	38	--	3
No. 200	7	11	7	11	--	2

4. State Untreated Base Course is approved for use, refer to most current State Specification for gradation limits of the material.

5. Source quality control

   a. Verify job-mix grading band material compliance in accordance with AASHTO T-27. Select samples uniformly in time on a random basis.

B. Pea Gravel shall only be used with Engineer's approval.

2.02 DRAIN ROCK

A. Consist of hard, durable particles of stone or gravel, screened or crushed to specified size and gradation.

B. Free from vegetable matter, lumps or balls of clay, or other deleterious matter.

C. Crush or waste coarse material and waste fine material as required to meet gradation requirements.

D. Durability Index: Percentage of wear not greater than 40 percent when tested in accordance with AASHTO T-96.

E. Conform to size and grade within the limits as follows when tested in accordance with AASHTO T-27.

	¾ " Drain Rock	1-1/2" Drain Rock	3" Drain Rock
SIEVE SIZE (Square Openings)	PERCENT BY WEIGHT PASSING SIEVE	PERCENT BY WEIGHT PASSING SIEVE	PERCENT BY WEIGHT PASSING SIEVE
4 inch	100	100	100
3 inch	100	100	95-100
2 inch	100	100	50-100
1-1/2 inch	100	95-100	15-55
3/4 inch	95-100	50-100	0-20
3/8 inch	15-55	15-55	0-15
Number 4	0-10	0-25	0-10
Number 8	0-5	0-5	0-5
Number 200	0-2	0-2	0-2

2.03 GRAVEL

A. Consist of hard, durable particles or fragments of stone or gravel, screened or crushed to specified sizes and gradations.

B. Free from vegetable matter, lumps or balls of clay, alkali, adobe, or other deleterious matter.

C. When sampled and tested in accordance with specified test methods, material shall comply with the following requirements:

1. Durability index: Percentage of wear not greater than 40 percent after 500 revolutions when tested in accordance with ASTM C 131.

2. Plasticity Index: Not greater than 5 when tested in accordance with ASTM D 4318.

3. Liquid limit: Not greater than 25 percent when tested in accordance with ASTM D 4318.

D. Conform to sizes and grade within the limits as follows when tested in accordance with ASTM C 136 and ASTM C 117:

Sieve Size (Square Openings)	Percent By Weight Passing Sieve
3 inch	--
1-1/2 inch	100
Number 4	30-70
Number 8	20-60
Number 30	10-40
Number 200	0-12

2.04 BEDDING SAND & PEA GRAVEL

A. Friable river or bank aggregate, free of loam and organic matter. Graded as follows.

SIEVE	PERCENT PASSING BY WEIGHT
3/8 inch	100
Number 100	0-10

B. Pea Gravel shall only be used with Engineer's approval.

PART 3 EXECUTION

3.01 INSTALLATION

A. Excavation and Backfill Operations: In accordance with Section 02225.

END OF SECTION

SECTION 02225

EXCAVATION AND BACKFILL OPERATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements for trenching and backfilling for underground pipelines.

B. Excavating and backfilling operations adjacent to and under structures including boxes, headwalls, or other structures as required by City Engineer.

C. Backfilling and compacting operation for construction and reconstruction of roadways, embankments, streets, parking lots, and other paved surface areas.

D. Excavation permit requirements.

1.02 DEFINITIONS

A. Pipe Zone: That zone in an excavation which supports, surrounds, and extends to 1 foot above the top of the pipe barrel.

B. Bedding: Process of preparing the trench bottom to receive the pipe and the backfilling on each side of the pipe to 12 inches over the top of the pipe.

C. Roadway: Area within the street right-of-way, including the area under the street, curb, gutter, and one (1) foot behind curb.

1.03 SUBMITTALS

A. Cut Sheets: In accordance with Section 00700.

B. Material Analysis Reports: In accordance with Sections 02205 or 02206 as applicable.

C. Density Test Reports: In accordance with Section 02250.

D. Depth of backfill lift. This information shall be contingent upon type of equipment used in compaction operation. Engineer may order lesser thickness if compaction is not achieved.

1.04 STORAGE AND HANDLING

A. Stockpile excavated material in a manner as to cause a minimum of inconvenience to public travel and provide for emergency traffic as necessary.

B. Maintain free access to all existing fire hydrants, water and gas valves, and meters.

C. Maintain clearance for free flow of storm water in all gutters, conduits, and natural water courses.

D. Utilize appropriate traffic signs, markers, and procedures in all product storage and handling activities.

E. Promptly remove all other material from site.

1.05 SITE CONDITIONS

A. Unsuitable Weather Limitations: Do not place, spread, or roll any fill material during unsuitable weather conditions. Do not resume operations until moisture content of material is satisfactory.

B. Protection of Graded Areas: Protect graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or unsuitable weather, scarify surface, reshape, and compact to required density prior to further construction.

D. Prior to excavation operations, photograph existing surfaces along which Work may take place in order to determine, after construction is completed, whether any damage of existing improvements occurred prior to construction operations.

E. Grading: In compaction operations, do not vary the surface of finished aggregate base course more than 1/4" above or below grade.

PART 2 PRODUCTS

2.01 WATER

A. Make arrangements for source of water during construction and make arrangements for delivery of water to site. Comply with all local laws and regulations when securing water from water utility company at no additional cost to City.

2.02 SOIL MATERIALS

A. Over-excavation Fill: Select Fill: in accordance with Section 02206.

B. Common Fill: in accordance with Section 02205.

C. Select Fill: in accordance with Section 02206.

D. Native Backfill:

1. When approved by City Engineer, native backfill material obtained from project excavations may be used as backfill, provided organic material, rubbish, debris, rocks larger than 8 inches, and other objectionable materials are removed.

2. Bituminous pavement obtained from project excavations will not be permitted as backfill except for the following:

a. May be mixed with road subbase if material meets section 02205.2.01 gradation.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify areas to be backfilled are free of debris, snow, ice, or water and ground surfaces are not frozen.

B. Verify foundation of basement walls are braced to support surcharge forces imposed by backfilling operations.

C. Immediately prior to suspension of construction operations for any reason, provide proper and necessary drainage of work area.

3.02 PREPARATION

A. For pipelines, use means necessary to avoid displacement, and injury to, pipe and structures while compacting soil or operating equipment next to pipeline.

B. Movement of construction machinery over a pipeline at any stage is solely at Contractor's risk.

C. When excavation is required in jurisdictions other than City, satisfy all conditions of the appropriate agencies.

D. Identify required lines, grades, contours, and benchmarks.

E. Notify all affected utility companies and Blue Stakes prior to commencing excavation operation.

F. Support and protect from damage, until completion of the Work, any existing facilities and structures which exist in, pass through, or pass under the site.

3.03 CONTROL OF GROUNDWATER

A. All trenches shall be kept free from water during excavation, fine grading, pipe laying, jointing, and embedment operations.

B. Where the trench bottom is mucky or otherwise unstable because of the presence of groundwater, and in cases where the static groundwater elevation is above the bottom of any trench or bell holed excavation, such groundwater shall be lowered to the extent necessary to keep the trench free from water and the trench bottom stable when the work within the trench is in progress.

3.04 SHORING

A. Comply with Section 02150 when required by field condition.

3.05 GENERAL EXCAVATION OPERATIONS

A. If topsoil is on site, remove and store it for later use on site.

B. Excavate site to required grade for Work. Use all means necessary to control dust on or near Work and on or near all off-site borrow and disposal areas.

C. Notify Engineer of unexpected subsurface conditions.

D. Underpin adjacent structure which may be damaged by excavation work, including service utilities and pipe chases.

E. If unstable material is encountered at the bottom or face of excavation, do not perform extra excavation without Engineer's written approval. Correct unauthorized extra excavations at no cost to City.

F. Provide necessary protection to excavation walls as required. If conditions permit, slope excavation side to maintain a safe and clean working area. Remove loose materials.

G. Correct excavation beyond the specified lines and grades by filling the resulting voids with approved compacted fill. If the fill is to become the subgrade for other fill, use material approved by Engineer. Do not proceed until Engineer has approved the material and the proposed method of backfilling for over excavation errors.

3.06 EXCAVATION FOR PIPELINES

A. Trenches shall be excavated to the depths and widths required to accommodate the construction of the pipelines, as follows:

1. All additional excavation necessary for preparation of the trench bottom shall be made manually.

2. Excavation for trenches in ledge rock, cobble rock, stones, mud or other material unsatisfactory for pipe foundation, shall extend to a depth of at least 6 inches below the bottom of the pipe.

3. A bedding of special material shall be placed and thoroughly compacted with pneumatic tampers in 6-inch lifts to provide a smooth, stable foundation.

4. Special foundation material shall consist of suitable earth material free from roots sod or vegetable matter.

5. Trench bottoms shall be hand shaped as specified in paragraph (1) above.

6. The maximum width of trench, measured at the top of the pipe, shall be as narrow as possible but a minimum of 6 inches on each side of the pipe.

7. Where ground water is encountered, clay dikes and/or filter fabric may be required at a minimum of 100 feet or as directed by the City Engineer.

B. Grade bottom of trenches to provide uniform bearing surface.

C. If necessary, make bellholes and depressions required to complete joining of pipe or box.

D. In public thoroughfares and regardless of trench depth, safely barricade and limit open trenches to a maximum of 200 lineal feet in the daytime, except in traveled roadways where a maximum of 80 lineal feet of open trench will be allowed.

E. Close trenches during nighttime conditions.

3.07 GRAVEL FOUNDATION FOR PIPE

A. Wherever the subgrade material does not afford a sufficiently solid foundation to support the pipe and superimposed load; where water must be drained to maintain a dry bottom for pipe installation and at other locations as previously defined, the subgrade shall be excavated to a minimum of 12 inches and replaced with crushed rock or gravel.

B. Gravel for pipe foundations shall conform Drain Rock in Section 02206.

C. Drain Rock material shall be deposited over the entire trench width in 18-inch maximum layers, each layer shall be compacted by tamping, rolling, or vibrating.

D. The material shall be graded to produce a uniform and continuous support for the installed pipe.

3.08 BACKFILLING FOR PIPELINES

A. Backfill shall be carefully placed around and over pipes and shall not be permitted to fall directly on a pipe from such a height, or in such a manner as to cause damage.

B. Bedding requirements are as defined in the Specifications for each specific pipe material.

C. Trench backfilling above the level of the pipe bedding shall normally be accomplished with A-1 material. Native excavated materials shall be free from rocks larger than 8-inches in diameter.

D. Compaction Requirements

1. The standard proctor used for all A-1 materials shall be the laboratory standard maximum dry density as determined by AASHTO T-180.

2. The standard proctor used for all materials other than A-1 materials shall be the laboratory standard maximum dry density as determined by AASHTO T-99.

3. Under pavements, shoulders, or other surface improvements the in-place density shall be a minimum of 95% of laboratory standard maximum dry density as determined by AASHTO T-180.

4. In other areas the in-place density shall be a minimum of 92% of the maximum dry density as determined by the same laboratory method

E. Clay cut off dikes shall be constructed as required by City Engineer.

3.09 STRUCTURAL EXCAVATION

A. Provide all required shoring, cribs, cofferdams, and caissons including all pumping, bailing, draining, sheathing, bracing, and related items.

B. If conditions permit, slope excavation sides as excavation progress to maintain a safe and clean working area as required by OSHA.

C. Support excavation. Do not interfere with the bearing of adjacent foundations, pipelines, etc.

D. All unauthorized excavation below the specified structure subgrade shall be replaced with concrete, monolithic with that of the slab above or with coarse gravel thoroughly compacted into place.

E. Subgrade soil for all concrete structures shall be firm, dense, thoroughly compacted, and consolidated.

F. Subgrade soil shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workmen engaged in subgrade surfacing, laying reinforcing steel, and depositing concrete.

G. Coarse gravel or crushed stone may be used for subsoil reinforcement if results satisfactory to the City Engineer can be obtained thereby.

1. Material shall be applied in lifts of 6" or less.

2. Each lift shall be embedded in the subsoil by thorough tamping.

3. All excess soil shall be removed to compensate for the displacement of the gravel or crushed stone and the finished elevation of any subsoil reinforced in this manner shall not be above the specified subgrade.

3.10 BACKFILLING FOR STRUCTURES

A. Do not fill adjacent to structures until approval is obtained from Engineer.

B. All forms shall be removed and the excavation shall be cleaned of all trash and debris.

C. Backfill areas to contours and elevations indicated. Do not use frozen materials.

D. Do not use compaction equipment adjacent to walls or retaining walls that may cause wall to become overstressed or moved from final alignment.

E. Place select fill a minimum of 3 feet around the outside of structures.

F. Place and compact select fill materials in continuous lifts not exceeding 12" loose depth.

G. Place and compact common fill material in continuous lifts not exceeding 8" loose depth.

H. Do not disturb or damage foundation perimeter drainage, foundation, dampproofing,

foundation waterproofing and protective cover, or utilities in trenches.

I. Backfill against foundation walls simultaneously on each side. Do not backfill against walls until concrete has obtained 7 day strength.

J. Make smooth changes in grade. Blend slopes into level areas.

K. Remove surplus backfill materials from site.

L. Leave stockpile areas completely free of excess fill materials.

M. Slope grade away from structure at a minimum of 3" in 10 feet unless otherwise indicated.

N. Compaction: Each layer of material shall be compacted by hand or machine tampers or by other suitable equipment to a density equal to 95% of maximum dry density as measured by AASHTO T-180.

O. Restore any damaged structure to its original strength and condition and rebackfill to specifications.

3.11 ROADWAY EXCAVATIONS

A. In advance of setting line and grade stakes, clean subgrade area of brush, weeds, vegetation, grass, and debris. Drain all depressions or ruts which contain water.

B. A soils classification, as determined by AASHTO T-27, shall be made on the proposed subgrade, and the following shall be required based on that classification, or as approved by the City Engineer.

Road Subgrade Preparation Schedule

Soil Classification	Requirement
A-1	The subgrade shall be moistened and compacted to the equivalent of 95% of maximum dry density as measured by AASHTO T-180 and in accordance with Section 02250.
A-2, A-3, A-4 or A-5	The subgrade shall be over-excavated a minimum of 12 inches and replaced with A-1-a import / granular material, and be moistened and compacted as above.
A-6 or A-7	The subgrade shall be over-excavated a minimum of 18 inches and replaced with A-1-a import / granular material, and be moistened and compacted as above.

C. No organic material, soft clay, spongy material, or other deleterious material will be permitted in the scarified or imported subgrade layer.

D. Rough subgrades shall be shaped and graded to within a tolerance of 0.15 feet of design grade and drainage shall be maintained at all times.

E. Moisture content of the subgrade layer shall be maintained at not less than 95% or more than 105% of optimum moisture content, during the compaction process. The entire roadbed, to one foot in back of curb, must be compacted to the specified density to a minimum depth of 8 inches.

F. If removal of boulders, rubble, or existing improvements, found within the excavated area results in a lower excavation elevation than indicated, backfill over excavation in a manner approved by Engineer.

G. Remove all deposits susceptible to frost heave.

H. Excavations through or under City streets, sidewalks, street shoulders, driveways, etc. shall comply with the following requirements:

1. Material removed by excavation is not to be used as backfill or placed back into the trench under any paved portion of the street. However, sand may be used for backfill up to one foot above top of pipe.

2. The remaining trench shall be filled with select fill as per Section 02206.

3. The trench shall be filled to the existing asphalt level and guarded from traffic until set.

4. Within 10 days of the fill, sufficient fill material shall be removed and replaced with material comparable to the adjacent surface material shall meet the requirements of Section 02504 of these specifications.

5. The City Engineer shall inspect all work.

3.12 SUBGRADE PREPARATION

A. Compact subgrade surfaces to density specified for overlying backfills. Refer to Section 02250.

B. If areas of subgrade not readily capable of in-situ compaction, secure City Engineer’s authorization for extra excavation and backfill.

C. Maintain minimum overburden cover of 2 feet over pipelines or conduits during subgrade preparation.

3.13 BACKFILLING FOR PAVEMENT

A. Before beginning backfilling operations obtain Engineer's approval of excavation operation.

B. Do not damage subsurface structures or service lines.

C. Process backfill and avoid segregation. Keep base course free from pockets of coarse or fine material.

D. Deposit base course on the roadbed in a uniform manner which will provide the required

compacted thickness. Maintain moisture content.

E. Shoulders are an integral part of the embankment. Do not build shoulders to a grade higher than that of the adjacent granular base course. Maintain efficient surface runoff at all times.

F. Compaction: in accordance with Section 02250.

G. Prior to placing pavements, proof roll in accordance with Section 01450.

3.14 BLASTING

A. Blasting will not be allowed except by permission from the City Engineer.

1. The Contractor shall comply with all laws, ordinances, and applicable safety code requirements and regulations relative to the handling, storage, and use of explosives and protection of life and property.

2. And he shall be fully responsible for all damage attributable to his blasting operations.

3. Excessive blasting or overshooting will not be permitted and any material outside the authorized cross-section which may be shattered or loosened by blasting shall be removed by the Contractor.

3.15 COMPACTION OF BACKFILL

A. In accordance with Section 02250.

3.16 IMPORTED BACKFILL MATERIAL

A. In the event the native excavated material is not satisfactory for backfilling as determined by the City Engineer, the Contractor shall provide imported granular fill in accordance with Section 02205.

3.17 DISPOSAL OF EXCESS MATERIALS

A. All excess material shall be hauled away from the construction site and disposed of by the Contractor. Contractor shall verify location permits to accept excess material type.

B. Any excess material left on site shall be leveled and landscaped as approved by City Engineer.

END OF SECTION

SECTION 02245

LOW DENSITY CONCRETE BACKFILL – FLOWABLE FILL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Low density concrete backfill.

1.02 REFERENCES

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

1. ASTM C 150 - Specification for Portland Cement.

1.03 SYSTEM DESCRIPTION

A. Performance Requirements

1. Low Density Concrete Backfill:

a. Dry in-place density of not less than 30 pounds per cubic foot and not more than 36 pounds per cubic foot.

b. 28 day compressive strength shall be between 100 psi and 150 psi.

1.04 SUBMITTALS

A. Submit the proposed mix design.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Pregenerated foam: One of the following or equal:

1. Mearl Corporation, Roselle Park, N.J., Mearl Geofoam Liquid.

2.02 MATERIALS

A. Low Density Concrete Backfill Components:

1. Type II low alkali Portland cement.

2. Water.

3. Aggregate: Pregenerated foam, vermiculite, or other low weight aggregate material which will conform to the strength and density requirements specified herein.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. Low density concrete (flowable fill) may only be used for backfill when approved by the City.

2. Place low density concrete backfill in a manner so that minimal consolidation of the material occurs during and after placement.

a. Monitor wet density of the placed low density concrete backfill, and submit data on a daily basis.

b. At no time shall wet density exceed 48 pounds per cubic foot.

B. Metal plates shall be placed over trench for 48 hours to protect concrete.

END OF SECTION

SECTION 02250

SOIL COMPACTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Compaction control of native and imported backfill material.

1.02 REFERENCES

A. AASHTO M 145: Recommended Practice for the Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

B. AASHTO T-99: Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Hammer and 12-In. (305-mm) Drop.

C. AASHTO T-180: Standard Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using a 10-lb (4.54-kg) Hammer and an 18-In. (457-mm) Drop.

D. AASHTO T-238: Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.03 DEFINITIONS

A. A-1 Soils: AASHTO M 145 describes the nature of these soils.

B. Modified Proctor: The test method used for moisture-density relationship of soils as determined by the ASTM D 1557 test method.

C. Percent Compaction or Percent Density: The ratio of the field dry density to the laboratory maximum dry density expressed as a percentage.

D. Standard Proctor: The test method used for moisture-density relationship of soils as determined by the ASTM D 698 test method.

1.04 WARRANTY

A. Correct deficient conditions. Replace or repair surfacing materials and damaged facilities.

B. The method of construction repair shall be proposed in writing by Contractor for approval by Engineer prior to correcting the failed condition.

C. Failure to detect any defective work or material does not prevent later rejection of the work nor obligate Engineer for final acceptance when such defective work or material is discovered.

PART 2 EXECUTION

2.01 COMPACTION REQUIREMENTS

A. Compaction Control and Testing is to be provided by the developer/contractor. Test intervals should not exceed 200 feet or at a minimum of 2 tests per working day, whichever is greater. All test results will need to be sent to the City Engineer within 24 hours after the test is complete; otherwise they will be considered null. All testing will need to be verified by the inspector. This applies to failing results as well.

B. All manholes, catch basins, valve boxes and vertical structures shall be compacted using a jumping jack type device with maximum lifts not to exceed 6 inches or as recommended by jumping jack manufactures. Density tests shall be taken at every manhole, catch basin, valve box and vertical structures.

C. The Developer\Contractor shall be responsible to perform and pay for all testing of earth materials.

D. Moisten or de-water backfill material to obtain optimum moisture for compaction compliance.

E. The material shall be deposited in horizontal layers having a compacted thickness of no more than 12 inches for roadway and 12 inches for trenches.

F. The distribution of materials shall be such that the compacted material will be homogeneous and free from lenses, pockets, or other imperfections.

G. The material shall have the optimum moisture content required for the purpose of compaction and the moisture content shall be uniform throughout the layer, insofar as practicable.

H. Backfill shall be compacted by means of sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers of a size and type approved by the City Engineer.

I. If the required relative density is not attained, test sections will be required to determine any adjustments in compacting equipment, thickness of layers, moisture content and compactive effort necessary to attain the specified minimum relative density.

J. Approval of equipment, thickness of layers, moisture content and compactive effort shall not be deemed to relieve the Contractor of the responsibility for attaining the specified minimum relative densities.

K. The Contractor in planning his work shall allow sufficient time to perform the work connected with test sections and to permit the City Engineer to make tests for relative densities.

2.02 FIELD QUALITY CONTROL

A. Optimum Soil Density: Unless indicated otherwise.

1. In accordance with AASHTO T-180 Method D test (Modified Proctor).

2.03 COMPACTION UNDER ROADWAYS

A. Fill or embankment material shall be compacted to not less than 95% of maximum dry density as measured by AASHTO T-180.

B. Compaction shall extend one foot beyond proposed curb line.

2.04 COMPACTION UNDER SIDEWALKS, CURB AND GUTTER, AND DRIVEWAYS

A. Fill or embankment material shall be compacted to not less than 95% of maximum dry density as measured by AASHTO T-180.

B. Compaction of material shall extend to at least one foot each side of the edge of the slab.

2.05 COMPACTION OF OTHER FILLS AND EMBANKMENTS

A. Fill or embankment materials other than those mentioned above shall be compacted to not less than 92% of maximum dry density as measured by AASHTO T-180.

END OF SECTION

SECTION 02504

ASPHALT CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This is a material specification for hot mix and cold mix bituminous paving mixtures.

1.02 REFERENCES

A. AASHTO T-27: Standard Method for Sieve Analysis of Fine and Coarse Aggregate.

B. AASHTO M-17: Standard Specification for Mineral Filler for Bituminous Paving Mixtures.

C. AASHTO T-165: Standard Test Method for Effect of Water on Cohesion of Compacted Bituminous Mixtures.

D. AASHTO T-245: Standard Test Method for Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus.

E. AASHTO T-246: Standard Test Methods for Resistance to Deformation and Cohesion of Bituminous Mixtures by Means of Hveem Apparatus.

F. AASHTO T-182: Standard Test Method for Coating and Stripping of Bitumen-Aggregate Mixtures.

G. AASHTO M-156: Standard Specification for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

H. ASTM D 4215: Standard Specification for Cold-Mixed, Cold-Laid Bituminous Paving Mixture.

1.03 DEFINITIONS

A. Traffic Classifications:

1. Class I: Parking lots, driveways, light traffic residential streets, light traffic farm roads.

2. Class II: Residential streets, rural farm and residential roads.

3. Class III: Urban minor collector streets, rural minor collector roads.

4. Class IV: Urban minor arterial and light industrial and light industrial streets, rural major collector and minor arterial highways.

5. Class V: Urban freeways, expressways and principal arterial highways, rural interstate and other principal arterial highways.

1.04 SUBMITTALS

A. Mix Design: Submit each proposed mix design 14 days prior to use in the Work. Include in the report the following information.

1. Mix design method (Rice or Marshall).

a. For Marshall, use a five (5) point design.

2. Job control target data for aggregate ideal grading.

3. Permissible range limits of bitumen content in mixture.

4. Mixture's index of retained strength, AASHTO T-165

5. Additives. If none, state none are required.

6. Percent voids.

B. Source Aggregate Sample Report. Indicate rodded weight of aggregate, percentage of wear, weight loss, sand equivalent value, percent of fractured faces, amount of organic matter, plasticity of fines, and percentage of fines retained on the aggregate.

C. Pre-Approved Mix Design Data: If supplier has on record, a City approved mix design, submit name and address of supplier for each mix design 3 days prior to using asphalt concrete mix.

1.05 QUALITY ASSURANCE

A. Bitumen weights shall be determined by the mix design.

B. Use asphalt cement when recycled asphalt mixtures are indicated.

C. Do not change source of supply of paving asphalt or aggregate without Engineer's written approval.

D. Each shipment of bituminous material shall be uniform in appearance and consistency with no foaming when heated to the specified mixing temperature.

E. Do not use storage containers contaminated with other asphalt types or grades.

F. Gradation, asphalt content, marshall density, and maximum density shall be determined.

PART 2 PRODUCTS

2.01 PAVING ASPHALT

A. Provide type and grade indicated.

B. The mix design shall target 3.25% voids. However, the percent asphalt or fines may need to be adjusted to achieve optimal strength.

2.02 AGGREGATES - MATERIALS

A. Clean, hard, tough, durable and sound mineral aggregates that consist of crushed stone, crushed gravel, or crushed slag conforming to the following requirements:

1. Rodded Weight density; not less than 75 pounds per cubic foot.

2. Percentage of wear of coarse aggregate retained on the No. 8 sieve; not exceeding 40 unless specific aggregates having higher values are known to be satisfactory.

3. Weight loss; not exceeding 16 percent by weight when subject to 5 cycles of sodium sulfate.

4. The combined aggregate after going through the dryer shall have a sand equivalent value of not less than 50 percent.

B. Coarse Aggregate: Use an aggregate that the portion retained on the No. 4 sieve has not less than 50 percent of particles by weight with at least two mechanically fractured faces or clean angular faces.

C. Fine Aggregate:

1. Fine aggregate passing the No. 4 sieve may be either a natural or manufacture product containing not more than 2 percent by weight of organic matter or other deleterious substances.

2. Aggregate passing the No. 40 sieve is non-plastic.

3. 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, does not exceed 6 percent of the total sample weight.

D. Mineral Filler: When mix design indicated need, add as a separate ingredient; AASHTO M-17.

2.03 AGGREGATES - MASTER GRADING BAND LIMITS

A. Gradation D/M-1/2 will be used unless otherwise specified

B. The following gradations describe the total percent passing by weight, AASHTO T-27, and is based on fine and coarse aggregate having approximately the same bulk specific gravities.

MASTER GRADING BAND LIMITS

Sieve Size	DENSE MIXTURES Type DM-3/4 Min	Max	Type DM-1/2 Min	Max
1"				
3/4"	100			
½"	-----	-----	100	
3/8"	75	91	-----	-----
# 4	46	62	60	80
# 8	-----	-----	-----	------
# 16	22	34	28	42
# 50	11	23	11	23
# 200	5	9	5	9

2.04 AGGREGATES - JOB-CONTROL GRADING BAND LIMITS

A. The job control formula shall produce a smooth curve approximately paralleling the master grading band limits for the designated mix. If application of the tolerances results in a job control grading band outside the master grading band, the full job control tolerances shall apply. The following describes the job control grading bands.

JOB-CONTROL GRADING BAND LIMITS

Sieve Size	Amount Passing Sieve, weight % 1 Test	2 Tests	3 Tests	4 Tests	5 Tests
>1/2	± 10	± 7.3	± 6.3	± 5.6	± 5.2
3/8	± 9	± 6.9	± 5.9	± 5.3	± 4.9
No. 4	± 9	± 6.7	± 5.7	± 5.2	± 4.8
No. 8	± 7	± 5.6	± 4.8	± 4.3	± 4.0
No. 16	± 7	± 5.2	± 4.6	± 4.2	± 3.9
No. 50	± 6	± 4.3	± 3.8	± 3.4	± 3.2
No. 200	± 3	± 2.4	± 2.0	± 1.8	± 1.7

2.05 MARSHALL MIX DESIGN

A. The Marshall mix design shall be based upon AASHTO T-245, traffic classifications, and the following.

MARSHALL MIX DESIGN REQUIREMENTS

	CLASS I		CLASS II & III		CLASS IV & V	
	Min	Max	Min	Max	Min	Max
Number of Compaction Blows (each end of specimen)	34	35	50	50	75	75
Stability, lb	1500	-----	1500	-----	1750	-----
Flow, in 0.01 in. units	8	20	8	18	8	16
% Air Voids,						
Surfacing and Leveling	3	3.5	3	3.5	3	4
Base	3	6	3	6	3	6
Unconfined Compression Strength Retention, % (AASHTO T-165)	65	-----	65	-----	65	-----

B. Compensate for specific gravity and absorption of aggregate to determine bitumen content by laboratory testing.

C. Reclaimed Asphalt Pavement (RAP).

1. A maximum 15 percent by aggregate weight of RAP.

D. Dust to binder ratio should not be more than 1.4.

2.06 MIXING PLANT

A. Hot-mixed, hot-laid paving mixtures; AASHTO M-156.

2.07 SOURCE QUALITY CONTROL

A. Unconfined Compression Strength Retention: When crushed mineral aggregate which is thoroughly coated with bitumen has an index of retained strength less than 65 percent bring the strength into compliance by adding any of the following additives to the mix.

1. Antistripping agent.

2. Hydrated lime.

3. Portland cement.

B. Coating and Stripping of Bitumen-Aggregate Mixture: Immediately after mixing, the mixing shall meet the requirements of AASHTO T-182, whereby not more than 5 percent of the aggregate particles shall remain uncoated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Plant Mix Bituminous Paving: In accordance with Section 02510.

END OF SECTION

SECTION 02510

ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for bituminous surface paving on roads.

PART 2 SUBMITTALS

2.01 SECTION INCLUDES

A. Contractor shall establish a mix gradation and the amount of bituminous material shall be submitted two (2) working days prior to surfacing for the approval by the City Engineer and shall meet the requirements of the gradation selected.

B. Test Reports: Submit test reports as requested by City Engineer verifying compliance with specified standards.

PART 3 EXECUTION

3.01 ALL STREETS SHALL BE SURFACED IN ACCORDANCE WITH THE FOLLOWING:

A. 6-inch minimum untreated base course over prepared and approved subgrade.

B. 3-inch minimum compacted thickness plant mix asphalt surfacing on all streets.

C. 2-lift minimum for plant mix asphalt surfacing when final compacted pavement thickness is greater than 3 inches.

3.02 BASE COURSE

A. Base for all streets shall consist of select material, as specified in Section 02206.

B. Base shall be laid in accordance with Section 02225.

C. Surfaces shall be true to the established grade with thickness being not less than 1/4 inch from the required layer thickness and with the surface elevation varying not more than 3/8 inch in ten feet from the true profile and cross section.

3.03 BITUMINOUS SURFACE COURSE

A. Base coarse shall be free of any contamination prior to laying surface coarse.

B. The surface course shall consist of a mixture of mineral aggregate and binder.

C. Gradation of aggregate shall conform to Section 02504.

D. Regardless of the bituminous content there shall be between 3% and 3.5% voids in the mix.

E. The bituminous material for surface course shall be PG58-28 asphalt cement conforming to the requirements of ASTM D-445. 85-100 penetration asphalt cement conforming to the requirements of AASHTO M20-60 may be used when specifically approved by the City Engineer.

F. The Contractor shall apply a tack coat to all existing asphalt or concrete edges and surfaces that will be in contact with the new bituminous surface course. Tack coat shall also be applied to the new asphalt along all transverse and longitudinal asphalt seems.

1. Tack coat shall be SS-1 or 1-H.

G. The bituminous surface course shall be mixed at a mixing plant and spread and compacted on the prepared base in conformance with the lines and dimensions shown on the plans and in accordance with these Specifications.

H. All existing asphalt shall be saw cut to remove fractures, cracked or damaged asphalt.

1. Asphalt shall be saw cut in straight lines.

3.04 CONSTRUCTION METHODS AND EQUIPMENT

A. All asphalt will be laid using a lay down machine unless written approval by City Engineer.

B. The methods employed in performing the work, all equipment, tools and machinery and other appliances used in handling the materials and executing the work shall be the responsibility of the Contractor.

C. The Contractor shall make such changes in the methods employed and in the equipment used as are necessary whenever the bituminous being produced does not meet the specification herein established.

3.05 SPREADING

A. The bituminous mixtures shall be spread with self-propelled mechanical spreading and conditioning equipment capable of distributing at least a 12-foot width.

B. The City Engineer shall determine whether or not the bituminous surface course shall be spread in one or more courses.

C. No surface course shall be placed less than 1 inch in thickness.

D. The mixture shall be spread and struck off in such a manner that the finished surface shall result in a uniform smooth surface.

E. The longitudinal joints in any succeeding courses shall be offset at least 6 inches transversely to avoid a vertical joint through more than one course.

F. The temperature of the bituminous mix shall be between 250° F and 325° F when placing.

3.06 COMPACTION

A. After the mixture has been spread, the surface shall be rolled in longitudinal direction commencing at the outside edge or lower side and preceding to the higher side.

B. Each pass of the roller shall overlap the preceding pass at least one-half the width of the roller.

C. The average in place density shall be in the range of 94% to 96% of the Theoretical Maximum Specific Gravity (Rice) determined by the testing methods outlined in Section 01450 with no individual areas falling below 92% or above 97.5% of the Theoretical Specific Gravity (Rice).

D. Rolling operations shall be conducted in such a manner that shoving or distortion will not develop beneath the roller.

E. Quality Control

1. A pre-paving meeting shall be held with contractor and engineer at least two days prior to paving commencement.

2. The surface of the pavement, after compaction, shall be uniform and true to the established crown and grade.

3. The Developer/Contractor shall be responsible to test bituminous mixtures for compaction in accordance with Section 01450, TESTING AND PROCESS CONTROL.

F. Smoothness

1. When tested with a ten (10) foot straight edge placed parallel to the center line of the pavement, the surface of the pavement at any point shall not deviate from the lower edge of the straight edge by more than one-quarter of an inch. If 10 foot straight edge fails pavement smoothness shall be determined using a certified profilograph or profiler. Perform preliminary profiling and roadway smoothness evaluation to identify any defects exceeding acceptance limits as described below.

2. For speeds between 0 to 29 mph, limit profile deviations to 0.4 Inches/25 feet max and PI (Profile Index) to 66 Inches/mile max. For speeds between 30 to 44 mph, limit profile deviations to 0.4 Inches/25 feet max and PI to 35 Inches/mile max. Speeds greater than 45 mph limit profile deviations to 0.3 Inches/25 feet max and PI to 21 Inches/mile max. Use a zero blanking band for all speeds.

3. Profile Deviation: Begin traces 50 feet before edge of new pavement and end traces 50 feet after edge of new pavement. Areas exceeding profile deviation tolerance are "must grind" areas.

4. Lot is 0.1 miles (528 feet long one lane wide). Add segments shorter than 250 feet to preceding Lot. Treat partial segments longer than 250 feet as a Lot.

5. Exclude from the Lot are turn lanes, parking lanes, medians, crowns of intersecting streets, bridge decks, grades greater than 8 percent, and vertical curves less than 1,000 feet radius (including super-elevation transitions).

6. Mark all "must grind" areas on pavement to identify locations to be corrected.

7. Correct defects across the entire width of the traffic lane or shoulder either by grinding with a device approved by the Engineer or by surface replacement as approved by the Engineer.

8. Re-profile for correction verification before acceptance testing.

9. Seal areas that have been ground with a flush coat application

   i. Use CSS-1h, CSS-1, or equivalent emulsion, approximately 40 percent residual asphalt.

   ii. Apply the emulsion at 0.11 ± 0.01 gal/yd^2.

10. Notify the Engineer in writing after all corrective work has been performed and at least two working days before performing acceptance testing for pavement smoothness.

3.07 WEATHER LIMITATIONS

A. No bituminous surface shall be placed when the temperature of the air or road bed is 50° F or below, during rainy weather, when the base is wet or during other unfavorable weather conditions as determined by the City Engineer.

B. The air temperature shall be measured in the shade.

3.08 FLAGGING

A. Flaggers shall be required as directed to facilitate the safe control of traffic over highways and streets under construction at such locations as required and directed by the City Engineer.

B. Flagging shall be performed by certified, trained, and properly equipped flaggers.

C. All flagging shall be done as described in the Safety Orders covering flaggers of the Industrial Commission of Utah and in accordance with the MUTCD manual.

END OF SECTION

SECTION 02512

RESTORATION OF SURFACE IMPROVEMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Restoration of surface improvement requirements

1.02 GENERAL IMPROVEMENT REQUIREMENTS

A. The Contractor shall be responsible for the protection and the restoration or replacement of any improvements existing on public or private property at the start of work or placed there during the progress of work.

B. Existing improvements shall include but are not limited to permanent surfacing, curbs, ditches, driveways, culverts, fences and walls. All improvements shall be reconstructed to equal or better, in all respects, to the existing improvements removed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Select Fill: In accordance with Section 02206.

B. Asphalt Concrete: In accordance with Section 02504.

C. Concrete: In accordance with Section 03304.

PART 3 EXECUTION

3.01 ROAD BASE REPAIR

A. Where trenches are excavated through gravel surfaced areas such as roads and driveways, etc., the gravel surface shall be restored and maintained as follows:

1. The gravel shall be placed deep enough to provide a minimum of 6-inches of material.

2. The gravel shall be placed in the trench at the time it is backfilled. The surface shall be maintained by blading, sprinkling, rolling, adding gravel, etc., to maintain a safe uniform surface satisfactory to the Engineer. Excess material shall be removed from the premises immediately.

3. Material for use on gravel surfaces shall be obtained from sound tough durable gravel or rock meeting the requirements of Section 02206.

3.02 BITUMINOUS SURFACE REPAIR

A. Where trenches are excavated through bituminous surfaced roads, driveways or parking areas, the surface shall be restored and maintained as follows:

1. Trenches shall be backfilled with untreated base course from the pipe bedding to match existing asphalt thickness with a minimum thickness of 3 inches.

2. Pavement restoration shall include priming of pavement edges with bituminous material and placing and rolling plant mix bituminous material to the level of the adjacent pavement surfaces.

3.03 CONCRETE REPAIR

A. All concrete curbs, gutter, sidewalks, and driveways shall be removed and replaced to the next joint or scoring lining beyond the actually damaged or broken sections.

B. In the event that joints or scoring lines do not exist or are three or more feet from the removed or damaged section, the damaged portions shall be saw cut, removed, and reconstructed to neat, plane faces.

C. All new concrete shall match, as nearly as possible, the appearance of adjacent concrete improvements.

D. Where necessary, lampblack or other pigments shall be added to the new concrete to obtain the desired results.

E. All concrete work shall conform to the requirements of Section 03310 of these Specifications.

END OF SECTION

SECTION 02528

CONCRETE STRUCTURES, DRIVEWAY, SIDEWALK, CURB AND GUTTER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials, installation and tolerances for Portland cement concrete ramps, sidewalk, curbs, gutters, and driveway approaches.

1.02 SUBMITTALS

A. Cut sheets: Curb and gutter cut sheets must be submitted to the City Engineer to be reviewed and approved. Allow 7 days for each review and approval.

B. Concrete mix design must be submitted 48 hours before placement and physical-chemical analysis of aggregates, in accordance with Section 03304.

C. Test reports: Submit test reports as requested by Engineer verifying compliance with specified standards.

PART 2 PRODUCTS

2.01 BACKFILL MATERIALS

A. Common fill, in accordance with Section 02205.

B. Select fill, in accordance with Section 02206.

2.02 MATERIALS: Materials used in Portland cement concrete and reinforcing of Portland cement concrete shall meet the following requirements:

A. In accordance with Section 03304.

B. Reinforcing Steel: All bar material used for reinforcement of concrete shall be intermediate grade steel conforming to the requirements of ASTM Designation A-15 and shall be deformed in accordance with ASTM Designation A-305.

C. Welded Wire Fabric: Welded wire fabric for concrete reinforcement shall conform to the requirements of AASHTO M-55.

2.03 FORMS

A. Forms shall be substantially built and adequately braced so as to withstand the liquid weight of concrete. All linings, studding, walling and bracing shall be such as to prevent bulging, spreading, or loss of true alignment while pouring and displacement of concrete while setting.

B. Metal forms shall be used for curb and gutter work except at curves and on winding roads, unless continuous lay down machine is used, or as directed by city engineer.

C. Continuous curb lay down machine shall be used on all winding roads over 100 feet long, unless otherwise approved by City Engineer.

D. All edge forms for sidewalk pavements, curbs and gutters shall be of sufficient rigidity and adequately braced to accurately maintain line and grade.

E. Forms for curved sections shall be so constructed and placed that the finish surface of walls and edge of sidewalks, curbs and gutters will not deviated appreciably from the arc of the curve.

F. Exposed vertical and horizontal edges of the concrete in structures shall be chamfered by the placing of moldings in the forms.

2.04 PORTLAND CEMENT CONCRETE

A. In accordance with Section 03304.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces scheduled to receive concrete form work for defects that will adversely affect the execution of the work and deviations beyond allowable tolerances for installation of concrete material.

B. Do not start work until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. A minimum slope of 0.5 % shall be maintained on all concrete used for drainage purposes unless discussed with and approved by the City Engineer.

B. Joining to Existing Concrete: Cut existing concrete to provide a straight line. Make all cuts at score lines or expansion joints. If existing adjacent concrete slabs not scheduled for replacement are damaged by Contractor's operation, replace concrete at no additional cost to City. When connecting to existing curb and gutter or waterways, the existing concrete shall be drilled and dowels inserted to make the connection.

C. Subgrade: A soils classification, as determined by AASHTO T-27 shall be made on the proposed subgrade and the following preparation schedule shall be followed based on that classification:

Sidewalk, Curb and Gutter, and Driveway Subgrade Preparation Schedule

Soil Classification	Requirement
A-1	The subgrade shall be moistened and compacted to the equivalent of 95% of maximum dry density as measured by AASHTO T-180 and in accordance with Section 02250.
A-2, A-3, A-4, or A-5	The subgrade shall be over-excavated a minimum of 12 inches and replaced with A-1-a import / granular material, and be moistened and compacted as above.
A-6 or A-7	The subgrade shall be over-excavated a minimum of 18 inches and replaced with A-1-a import / granular material, and be moistened and compacted as above.

1. No organic material, soft clay, spongy material, or other deleterious material will be permitted in the scarified or imported subgrade layer.

2. Rough subgrades shall be shaped and graded at least 6 inches beyond the back of the sidewalk to within a tolerance of 0.10 feet of design grade and drainage shall be maintained at all times.

D. Compaction: As indicated, in accordance with Section 02250.

E. Select Backfill: Unless indicated otherwise, provide 6" minimum of select fill below curbs, gutter, driveway approaches, alley intersections, and sidewalks.

F. Reinforcement and Embedded Items:

1. Reinforcing steel shall be clean and free from rust, scale, paint, grease, or other foreign matter which might impair the bond. It shall be accurately bent and shall be tied to prevent displacement when concrete is poured. Reinforcing steel shall be held in place by only metal or concrete ties, braces and supports. No steel shall extend from or be visible on any finished surface.

2. The Contractor shall use concrete chairs for holding the steel away from the subgrade and spreader or other type bars for securing the steel in place. The spreader bars shall be not less than 3/8 inch in diameter.

G. Site Preparation

1. Before batching and placing concrete, all equipment for mixing and transporting the concrete shall be cleaned.

2. All debris and ice shall be removed from the places occupied by the concrete.

3. Forms shall be thoroughly wetted (except in freezing weather), or oiled.

4. Masonry filler units that will be in contact with concrete shall be well drenched (except in freezing weather).

5. Reinforcement shall be thoroughly cleaned of ice or other coatings.

6. Water shall be removed from spaces to receive concrete.

3.03 CONCRETE PLACEMENT

A. Place in accordance with Section 03310.

B. No concrete shall be placed until the surfaces have been inspected and approved by the City Engineer or Inspector.

C. When placing concrete on earth surfaces, the surfaces shall be free from frost, ice, mud, and water.

D. When the subgrade surface is dry soil or pervious material, it shall be sprayed with water immediately before placing of concrete or shall be covered with waterproof sheathing paper or a plastic membrane.

E. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing.

F. The concrete placing shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the corners of forms and reinforcing bars.

G. No concrete that is partially hardened or been contaminated by foreign material shall be deposited in the work, nor shall retempered concrete be used.

H. All concrete in structures shall be vibrator compacted during the operation of placing and shall be thoroughly worked around reinforcement and embedded fixtures and into the corners of forms.

I. Placing concrete in cold weather:

1. No concrete shall be placed where the air temperature is lower than 40 degrees Fahrenheit, at a location where the concrete cannot be covered or protected from the surrounding air.

2. When concrete is placed below a temperature of 35 degrees Fahrenheit the ingredients of the concrete shall be heated so that the temperature of the mixture shall not be less than 50 degrees or more than 100 degrees Fahrenheit.

3. Before mixing, the heated aggregates shall not exceed 175 degrees Fahrenheit.

4. Cement shall not be added while the temperature of the mixed aggregates and water is greater than 100 degrees Fahrenheit.

5. When there is likelihood of freezing during the curing period, the concrete shall be protected by means of an insulated covering to prevent freezing of the concrete for a period of not less than 7 days after placing.

6. Equipment for protecting concrete from freezing shall be available at the job site prior to placing concrete. Particular care shall be exercised to protect edges and exposed corners from freezing.

7. In the event heating is employed, care shall be taken to insure that no part of the concrete becomes dried out or is heated to temperatures above 100 degrees Fahrenheit.

8. The housing, covering, or other protection used shall remain in place and intact at least 24 hours after the artificial heating is discontinued.

9. For a period of five days the concrete shall be kept above 40 degrees F and below 100 degrees F.

3.04 CONCRETE MIXING

A. Concrete mix design must be submitted 48 hours before placement.

B. The concrete shall be mixed until there is a uniform distribution of the materials.

C. Sufficient water shall be used in mixing concrete to produce a mixture which will flatten and quake when deposited in place, but not enough to cause it to flow or exceed the water - cement ratio.

D. In no case shall the quantity of water used be sufficient to cause the collection of a surplus in the forms.

E. Ready-mixed concrete shall be mixed and delivered in accordance with the requirements set forth in Tentative Specifications for Ready-Mixed Concrete (AASHTO M-157).

F. Concrete shall be delivered and deposited in its final position within 90 minutes after adding the cement and water to the mixture.

G. Washing out of mixer trucks shall not be permitted within City rights-of-way.

3.05 CONTRACTION JOINTS

A. Sidewalks shall have contraction joints with the following requirements:

1. 5 foot intervals.

2. Approximately 3/16 inch wide.

3. Approximately one-half of slab thickness.

B. Curb and Gutter shall have contraction joints with the following requirements:

1. 10 foot intervals.

2. Approximately 3/16 inch wide.

3. Approximately one-half of slab thickness.

3.06 EXPANSION JOINTS

A. One-half (½) inch expansion joints shall be provided at 100 foot intervals in addition to locations where sidewalks and curbs adjoin existing sidewalks, curbs, or driveways.

B. Material for one-half (½) inch expansion joints shall be as defined in AASHTO M-33.

C. Expansion joints shall be installed with the top approximately one-quarter (1/4) inch below the concrete surface and extend to the bottom of the concrete.

3.07 SEALING OF EXPANSION AND CONTRACTION JOINTS

A. The sealant shall be one of the following:

1. Polysulfide polymer by Thiokol Chemical Corporation.

2. Sonolastic one-part sealant by Sonneborn-Contech Corporation.

3. Or approved equal.

B. As an alternative to the above sealant a continuous film of 4 mil thickness water-proof plastic may be placed under all concrete sidewalks, curbs and gutters on the low sides of streets.

C. Other erosion prevention measures may be used as an alternate if the developer first obtains written approval from the City Engineer concerning the types of material and procedure of installation.

3.08 FINISHING

A. Refer to Section 03345 for finishing requirements.

B. Slabs

1. The concrete shall be brought to established grade and screened, and then worked with a magnesium float.

2. The concrete shall be given a light broom finish.

3. Dry cement or a mixture of dry cement and sand should in no case be sprinkled on the surface to absorb moisture or hasten hardening.

4. Surface edges of all slabs shall be rounded to a radius of one-half (½) inch.

C. Curb and Gutter

1. Curb and gutter shall be slipped with a continuous curb machine where possible.

2. Where concrete must be poured in curb and gutter forms it shall be tamped and spaded so as to insure a thorough mixture, eliminate air pockets, and create uniform and smooth sides.

3. While the concrete is still green and not thoroughly set, the forms shall be removed and the front and top sides shall be finished with a float or steel trowel to make a uniform finished surface.

4. The top and face of the curb and also the top of the apron on combined curb and gutter must be finished true to line and grade and without any irregularities of surface noticeable to the eye.

5. The gutter shall not hold water to a depth of more than one-fourth (1/4) of an inch nor shall any portion of the surface or face of the curb or gutter depart more than one-fourth (1/4) of an inch from a straight edge ten (10) feet in length, placed on the curb parallel to the centerline of the street nor shall any part of the exposed surface present a wavy appearance.

D. Sidewalk

1. The sidewalk shall not hold water to a depth of more than one-fourth (1/4) of an inch nor shall any portion of the surface or face depart more than one-fourth (1/4) of an inch from a straight edge ten (10) feet in length, placed on the side walk parallel to the centerline of the street nor shall any part of the exposed surface present a wavy appearance.

3.09 CURING

A. Apply curing compound in accordance with Section 03310 unless water cure is indicated. Water cure is required if concrete surface sealing compound is to be applied.

B. A chemical curing agent may be used, provided it is applied in accordance with the manufacturer's specifications.

C. As soon as the concrete has hardened sufficiently to prevent damage, the finished surface shall be sprinkled with water and kept wet for at least three (3) days.

3.10 PROTECTION AND REPAIRS

A. The concrete surface must not be damaged or pitted by rain.

B. The Contractor shall provide and use, when necessary, sufficient tarpaulins to completely cover all sections that have been placed within the preceding twelve (12) hours.

C. The Contractor shall erect and maintain suitable barriers to protect the finished surface.

D. Any section damaged from traffic or other causes occurring prior to its official final acceptance shall be repaired or replaced by the Contractor at his own expense in a manner satisfactory to the City Engineer.

END OF SECTION

SECTION 02550

TRAILS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Trail construction requirements.

1.02 REFERENCES

A. AASHTO T-27: Standard Method for Sieve Analysis of Fine and Coarse Aggregate.

B. As per Section 02504

C. As per Section 02510

D. Midway City Trail System Master Plan

E. Midway City Trails Committee

F. AASHTO Guide for Development of Bicycle Facilities

1.03 DEFINITIONS

A. Trail Classifications:

1. Six foot Improved surface

2. Six foot Hard Surface

3. Eight foot Hard Surface

B. Hard Surface: A surface which has been constructed of either Asphalt or Concrete.

1.04 SUBMITTALS

A. As per Section 02504

B. As per Section 02510

PART 2 PRODUCTS

2.01 PAVING ASPHALT

A. Shall be ½-inch mix design

2.02 AGGREGATES - MATERIALS

A. Shall be 3/4-inch Untreated Base Course

B. Sub-grade shall be stable during a Test Roll as determined in Section 01450 2.05. Otherwise, the native material shall be excavated and import material installed as per Section 02225.

2.03 BRIDGES

A. Bridges shall be designed to adequately allow the passing of a 100-year flood, the bridges should also require minimal maintenance and accommodate the typical maintenance equipment.

2.04 ADA COMPLIANT

A. Trail design should be ADA compliant where possible with a slope of less-than or equal to 5 percent. When the slope of the trail is above 5 percent all other requirements of an ADA trail should still be followed. Grades should follow the requirements of the following table. For all other design criteria (stopping distances, curve radii, intersections, etc.) refer to the AASHTO Guide for Development of Bicycle Facilities.

Grade	Limit on length at that Grade
<5%	None
5-6%	800-foot
6-7%	400-foot
7-8%	200-foot
8-9%	100-foot
9-10%	50-foot
>10%	0

PART 3 EXECUTION

3.01 INSTALLATION

A. As per Section 02504

B. As per Section 02510

C. As per the current adopted Trail System Master Plan.

END OF SECTION

SECTION 02607

MANHOLES AND COVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Modular precast concrete manhole sections with tongue-and-groove joints covers, anchorage, and accessories.

1.02 RELATED SECTIONS

1.03 REFERENCES

A. AASHTO M-105: Gray Iron Castings.

B. AASHTO M-199: Precast Reinforced Concrete Manhole Sections.

C. ASTM C-923: Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

1.04 SUBMITTALS FOR REVIEW

A. Shop Drawings: Indicate manhole locations, elevations, piping, and sizes and elevations of penetrations.

B. Product Data: Provide manhole covers, component construction, features, configuration, and dimensions.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.06 GENERAL REQUIREMENTS

A. The Contractor shall furnish and install watertight cast-in-place or precast concrete manholes at the locations shown on the Drawings approved by the City Engineer.

B. Manholes shall be furnished complete with cast iron rings and covers.

C. Manhole spacing shall not exceed 400 lineal feet.

D. Manholes shall be installed at the end of each line exceeding 150 feet in length.

E. Cleanouts shall not be substituted for manholes nor installed at the end of lines greater than 150 feet in length.

F. Cleanouts on sewer laterals shall be placed every 100 feet and at all bends.

G. Flow Channels

1. The flow channel through manholes shall conform to the sewer pipe.

2. The depth of flow channels should be up to one-half to three-quarters of the diameter of the sewer pipe.

PART 2 PRODUCTS

2.01 MATERIALS

A. Manufacturers:

1. Amcor Model

2. Geneva Pipe Model

3. W.R. White Model

4. Materials and Equipment: Product options and substitutions. Substitutions: Permitted.

B. Manhole Sections: Reinforced precast concrete in accordance with AASHTO M-199 with gaskets in accordance with ASTM C-923.

C. Mortar and Grout: Type S.

2.02 COMPONENTS

A. Wall and Cone Sections

1. Manhole walls shall be constructed of 48" I.D. precast sectional, reinforced concrete pipe.

2. For pipelines of 18" diameter or larger, the manholes shall be 60" minimum I.D. Both cylindrical and taper sections shall conform to all requirements of AASHTO Designation M-170 for Reinforced Concrete Culvert Pipe with the following exceptions:

a. The throat section of the manhole shall be adjustable by use of pipe sections up to 18 inches in height.

b. The taper section shall be a maximum of 3 feet in height, shall be of eccentric conical design, and shall taper uniformly from 48 inches to 30 inches inside diameter.

c. The 48-inch inside diameter pipe used in the base section shall be furnished in section lengths of 1, 2, 3 and 4 feet as required.

d. Reinforcing steel shall consist of a circular cage with a minimum cross sectional area of three-tenths (0.3) of a square inch of steel per foot in both directions.

e. 18" space maximum between cone and lid.

3. All joint surfaces of precast sections and the face of the manhole base shall be thoroughly cleaned and wet prior to setting precast sections.

4. All joints including grade rings shall be sealed with butyl rubber gasket that is permanently flexible and non-shrinking, similar to Brandt No. 95 Cold Weather Vault Sealant.

B. Manhole Steps

1. 12" Copolymer Polypropylene Plastic Steps

2. Reinforcement: ½" grade 60 steel reinforcement.

3. Steps must meet requirements outlined in ASTM 2146-68 under Type II, Grade 16906 and AASHTO M-31.

C. Concrete Base Pad

1. Except as noted below, manhole bases shall be pre-cast concrete conforming to the requirements of Section 03310 of these Specifications.

2. Where sewer lines pass through or enter manholes the invert channels shall be smooth and semi-circular in cross section.

3. Changes of direction of flow within the manholes shall be made with a smooth curve with as long a radius as possible and a minimum of 0.2 feet of fall.

4. The floor of the manhole outside the flow channels shall be smooth and slope toward the channel at not less than ½ inch per foot.

5. For high ground water areas, precast manholes and bases shall be required.

D. Lid and Frame

1. All iron castings shall conform to the requirements of AASHTO M-105 for grey iron castings.

2. Rings and covers shall have machined bearing surfaces and a minimum cover weight of 150 pounds and minimum ring weight of 233 pounds.

3. The foundry name, year of manufacture, and “SEWER”, “STORM DRAIN”, or “IRRIGATION” shall be marked on the cover.

4. All manhole rings shall be carefully set to the grade shown on the approved drawings or as directed by the City Engineer.

5. The manhole covers shall be so installed to be within 1/4" from the asphalt surface.

6. A concrete ring 18" wide and 8" thick will be poured around lid in accordance with Section 03304.

7. All manhole lids should be vented unless directed otherwise by the city engineer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify items provided by other sections of Work are properly sized and located.

B. Verify that built-in items are in proper location and ready for roughing into Work.

C. Verify excavation for manholes is correct.

3.02 PREPARATION

A. Coordinate placement of inlet and outlet pipe or duct sleeves required by other sections.

3.03 PLACING MANHOLE SECTIONS

A. Place base pad, with top surface level.

B. Place manhole sections plumb and level, trim to correct elevations, anchor to base pad.

C. Cut and fit for pipe as required.

D. Grout vase of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.

E. Set cover frames and covers level without tipping, to correct elevations.

3.04 DROP TYPE MANHOLES

A. A drop pipe should be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert.

B. Where the difference in elevation between the incoming sewer and manhole invert is less than 24 inches, the invert shall be filleted to prevent solids deposition.

C. Drop manholes should be constructed with an outside wye drop connection. If an inside drop connection is necessary, it shall be secured to the interior wall of the manhole and provide access for cleaning.

D. Due to the unequal earth pressures that would result from the backfilling operation in the vicinity of the manhole, the entire outside drop connection shall be encased in concrete.

3.05 SCHEDULES

A. Storm Sewer Manholes: Precast concrete sections, copolymer polypropylene plastic steps, 48 inch inside dimension, to depth indicated, with bolted lid.

END OF SECTION

SPECIAL PROVISION

SEWER BYPASS PUMPING	SECTION 02626SP

02626.1 GENERAL

02626.1.1 SCOPE OF WORK

A. The Contractor shall furnish all labor, material, equipment, and incidentals required to maintain continuous and reliable wastewater service in all wastewater lines during construction.

B. During various phases of the Work, it will be necessary to construct and maintain temporary bypass sewers to maintain continuous and reliable wastewater flow in all pipes, including individual service connections. Various phases of the Work that shall require the implementation of temporary bypass sewers include, but are not limited to, connections of new sewers to existing sewers, trenchless rehabilitation of existing sewers, and pipeline inspection.

C. When the Work requires sections of sewer to be placed out of service for prolonged periods, the Contractor shall construct a temporary bypass sewer that shall discharge into either the original piping DOWNSTREAM of the affected area, or into a neighboring gravity sewer identified that flows to an unaffected area.

D. Contractor shall construct and maintain all temporary bypass sewers and be responsible for all bypass pumping of sewage that may be required to prevent backing up of sewage and allow appropriate conditions for proper inspection, rehabilitation, testing or drainage during sewer line rehabilitation, replacement, or reconnections to existing sewers. The Contractor shall immediately remove and dispose of all offensive matter spilled during the bypass pumping at his own expense.

The Contractor shall also be responsible for paying any fines imposed because of spills, backups, or overflows that occur because of the bypass pumping operations.

E. Contractor shall provide a redundant bypass pump, intake and discharge conduit, and other equipment necessary to provide continuous wastewater flow and prevent the backing up of sewage in the case of emergencies at all times.

F. Where no alternate sanitary sewer route is available or when twenty-four hours of storage is not feasible, redundant bypass pumping shall be installed.

G. Primary bypass pumps shall be critically silenced when used in residential settings or areas where excessive noise levels would create a disturbance. Redundant bypass pumping does not have to be critically silenced.

02626.1.2 RELATED WORK AND REFERENCED SECTIONS

Section 01300 – Submittals
Section 02627SP – Fold and Form Sewer Liner
Section 02628SP – Clean and Camera Sanitary Sewers

02626.1.3 SUBMITTALS

02626.1.3.1 The design, installation, and operation of the temporary pumping system shall be the Contractor's responsibility. The Contractor shall either demonstrate or employ the services of a subcontractor who can demonstrate to the Engineer and Owner that he specializes in the design and operation of temporary bypass pumping systems.

02626.1.3.2 The Contractor shall prepare a specific, detailed description of the proposed pumping system (Bypass Pumping Plan). The Bypass Pumping Plan shall be submitted and approved prior to the mobilization of any of the equipment included in the Bypass Pumping Plan. The Bypass Pumping Plan shall outline all provisions and precautions to be taken by the Contractor regarding handling of existing wastewater flows. This Bypass Pumping Plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, materials, and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of the access and bypass pumping locations for damage due to the discharge flows, and

compliance with the requirements and permit conditions specified here in. No Construction shall begin until all provisions and requirements have been reviewed and accepted by the Engineer and Owner. The plan shall include but not be limited to the following details:

1. Staging areas for pumps.
2. Sewer plugging method and types of plugs.
3. Size and location of manholes or access points for suction and discharge hose or piping.
4. Size of pipeline or conveyance system to be bypassed.
5. Number, size, material location and method of installation of suction piping.
6. Number, size, material, location, and method of installation of discharge piping.
7. Bypass pump sizes, capacities, and number of each size to be provided on-site including all primary, secondary, and spare pumping units.
8. Calculations of static lift, friction losses, and flow velocity (pump curves showing pump, operating range shall be submitted).
9. Downstream discharge plan.
10. Method of protecting discharge manholes or structures from erosion and damage.
11. Thrust and restraint block sizes and locations. Provide the details necessary to demonstrate the integrity of all suction and discharge piping including piping and fittings associated with all primary and secondary pumping units.
12. Sections showing suction and discharge piped depth, embedment, select fill and special backfill.
13. Method of noise control for each pump and any additional equipment that is included in the Bypass Pumping Plan.
14. Any temporary pipe supports and anchoring requirements.
15. Access plans to all bypass pumping locations indicate on the Drawings.
16. Calculations for selection of bypass pumping pipe size.
17. Schedule for installation of and maintenance of bypass pumping lines.
18. Plan indicating location of bypass pumping pipe locations.
19. Emergency plan for adverse weather and flooding for various phases of the Work.
20. Contractor's plan for providing continuous monitoring of the bypass pumping operation as well as the monitoring person's qualifications.

02626.2 EXECUTION

02626.2.1 BYPASS PUMPING OF FLOW IN EXISTING SEWERS

A. The Contractor shall supply pumps, conduits, power, and other equipment to divert the flow of sewage around the section in which Work is to be performed. The bypass system shall be of sufficient capacity to handle the observed peak wastewater flows in the existing system. It is the intent of these Specifications to require the Contractor to establish adequate bypass pumping as required regardless of the flow condition.

B. All bypass pumping piping shall conform to Section 15110.2.8 Pipe for Pressure Sewer Systems. Fittings shall be fully pressure rated to match the pipe DR pressure rating and the anticipated maximum pressure that will be experienced by the system.

C. The Contractor shall perform leakage and pressure tests of the bypass pumping discharge piping using clean water prior to the actual operation. The pressure and leakage test shall be conducted at one and a half times the maximum pressure the system will experience for a period of two hours. No leakage is permitted during this test. The Engineer will be given 24 hours notice prior to testing. In addition, the Contractor shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test prior to beginning the Work.

D. Each bypass pumping operation shall include the components and systems to accomplish the bypass in accordance with these Specifications.

E. The Contractor shall provide on-site manual oversight of all bypass pumping operations 24 hours per day, 7 days per week when the bypass pumping system is in operation.

F. Flows from private, commercial, and industrial users shall be handled by the Contractor during the Work without interruption.

G. The Contractor shall be required to repair, at his own expense, any damage to public or private property caused by his operations.

H. The Contractor shall immediately notify the DEQ, Owner, and Engineer should a sanitary sewer overflow (SSO) occur and take the necessary action to clean up and disinfect the spillage to the satisfaction of the DEQ and/or other governmental agency. If sewage is spilled onto public or private property, the Contractor shall wash down, clean up, and disinfect the spillage to the satisfaction of the property owner, DEQ, and/or other governmental agency.

I. The Contractor shall not be permitted to overflow, bypass, pump or by any other means convey drainage to any land, street, storm drain or water course.

J. The Contractor shall cease bypass pumping operations and return flows to the new and/or existing sewer when directed by the Owner. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto any area outside the existing wastewater system. When bypass operations are complete, all bypass piping shall be flushed with fresh water and drained into the wastewater system prior to disassembly.

K. Contractor must take care to prevent damage to existing structures. Discharge piping to gravity sewer systems shall be designed and operated in such a manner as to prevent discharge from contacting manhole walls or benching and full discharge shall go into downstream pipe with as minimal turbulence as possible. Contractor is responsible for any damage to manholes.

L. The 24-hour monitoring person shall be properly trained, experienced, and mechanically qualified such that they can quickly and effectively address any potential emergency and non-emergency situations associated with the pumps and bypass pumping system that must remain in operation for an extended period.

02626.3 METHOD OF MEASUREMENT

Measurement for the sewer bypass pumping will be made by the Each as described within this special provision, and shall include all labor, material, equipment, operations, expenses and incidentals required to maintain continuous and reliable wastewater service in all wastewater lines during construction as escribed by these Specifications. Limits of this bid item are for each manhole-to-manhole section of pipe that is being bypassed.

02626.4 BASIS OF PAYMENT

The accepted quantity will be paid for at the contract unit price for:

PAY ITEM	UNIT
Sewer Bypass Pumping	Lump Sum

02627.1 GENERAL

02627.1.1 DESCRIPTION:

02627.1.1.1 The Contractor shall furnish all labor, equipment, and materials necessary to complete the lining of sanitary sewers as stipulated herein and a shown on the Contract Drawings. The work shall include the preparation of the construction site, including cleaning and flushing of existing piping; flow control bypass pumping, protection of existing conditions during installation work; unloading; hauling; distribution and installation; testing of all pipe, fittings, scaffolding, piping, valves, boilers, etc. and other accessories as required for proper installation; protection of the site during the work, including protection of necessary watchmen, warning lights, barricades, traffic control, dust control and maintenance of detours, as needed; and the cleanup of the work site.

02627.1.1.2 It is the intent of this section to provide for the lining of the identified pipeline(s) using the **fold and form** method, and that this lining expands to fit tightly against the host pipeline. The lining shall be pressurized to hold its form against the host pipe and shall produce a hard, impermeable pipe that is continuous and tight fitting.

02627.1.2 RELATED WORK

Section 02626SP – Sewer Bypass Pumping
Section 02628SP – Clean and Camera Sanitary Sewer

02627.1.3 QUALIFICATION REQUIREMENTS:

02627.1.3.1 The fold and form system proposed (materials, methods, and workmanship) must be proven through previous successful installations to an extent and nature satisfactory to the Owner and the Engineer. Prior experience is commensurate with the size of the project being proposed herein.

02627.1.3.2 Only products incorporating the materials, methods of installation, and QA/QC procedures deemed to have the performance level desired will be accepted. Products and Installers seeking approval must meet ALL the following criteria to be deemed commercially acceptable:

- Minimum of 150,000 linear feet or 1,000-line sections must have been successfully installed.
- The Manufacturer (Licensor) shall have completed sufficient testing to document that the materials and method(s) of installation proposed will produce the desired long-term performance.
- Installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have at least three years active experience in the commercial installation of the product bid.
- The Installer's key personnel shall have at least 100,000 linear feet and/or 300-line sections of successful experience (including enough of the sizes proposed for this project) and must be on-site at all times during the installation of the products.
- Suitable documentation of the above qualifications shall be provided with, or prior to, the proposal submission.

02627.1.4 SUBMITTALS:

02627.1.4.1 After award of the Contract and before any materials are delivered to the job site, the Contractor shall submit to the Engineer the following information:

- Fold and form system Manufacturer's certification that the materials and the installation procedures to be used in the work performed meets the referenced standards and these

Specifications.

- License or certificate verifying fold and form system Manufacturer's approval of the installer; including the level of training that the Contractor's proposed installation team has completed.
- Proposed equipment information and written performance work procedures for accomplishing the items of work on this specific project.
- Technical data (i.e., material, sealant/caulking material, curing schedule including time and temperature, certifications of applicability, qualified testing results, etc.).
- Public Relations: Notification Flyers.
- Lateral Reinstatement: Products and Methods
- Inspection Information: Video recordings or electronic format of pre- and post-insertion inspections and curing logs.

02627.1.4.2 Upon approval of the Engineer, the manufacturer's recommendations shall become the basis for acceptance or rejection of actual methods of installation used in the work.

02627.1.5 DELIVERY, STORAGE, AND HANDLING:

02627.1.5.1 Protection: The Contractor shall use reasonable means to protect sewer lining materials before, during, and after installation and to protect the installed work and materials of all other trades.

02627.1.5.2 Replacement: In the event of damage to the sewer lining materials, the Contractor shall make timely repairs and replacements necessary to the approval of the Engineer at no additional cost to the Owner.

02627.1.6 WARRANTY:

02627.1.6.1 The Contractor shall warrant all work to be free from defects in workmanship and materials for a period of **one year** from the date of final completion of the project.

02627.1.7 EXISTING SEWER SYSTEM:

02627.1.7.1 Active Sewers: The Contractor shall maintain in operating condition all active sanitary and storm sewers encountered in the sewer lining installation. **This includes all required bypass pumping.**

02627.1.7.2 Existing Manhole Connections: The Contractor shall make connections in accordance with local standards and shall exercise reasonable care to prevent debris from entering sewers.

02627.2 MATERIAL AND EQUIPMENT

02627.2.1 LINER MATERIALS

- Liner material shall be equivalent to C900 PVC or an approved equal.
- The liner should be fabricated to a size that, when installed, will tightly fit the internal circumference and the length of the original conduit. Allowances should be made for the longitudinal and circumferential stretching that occurs during placement of the liner.
- The liner shall be uniform in thickness and, when subjected to the installation pressures, shall meet or exceed the designed finish wall thickness.
- The liner shall be homogeneous across the entire wall thickness.
- The wall color of the interior liner surface shall be a light reflective color to allow detailed examination and inspection with closed circuit television (CCTV).

02627.2.2 TOP HAT (LATERAL CONNECTION) MATERIALS:

02627.2.2.1 Top hat material shall be equivalent to C900 PVC or an approved equal.

02627.2.2.2 The top hats should be fabricated to a size that, when installed, will tightly fit the internal circumference of the original conduit.

02627.2.2.3 The wall color of the interior liner surface shall be a light reflective color to allow detailed examination and inspection with closed circuit television (CCTV).

02627.3 STRUCTURAL REQUIREMENTS

02627.3.1 STRUCTURAL REQUIREMENTS:

02627.3.1.1 Design shall assume no bonding to the original pipe wall.

02627.3.1.2 All liner and top hat materials shall meet C900 PVC structural properties when in place.

02627.4 TESTING REQUIREMENTS

02627.4.1 TESTING REQUIREMENTS:

02627.4.1.1 Before final approval, all work must be examined and inspected with closed circuit television (CCTV). Any defects shall be replaced according to the Engineer and Owner's approval at the Contractor's expense.

02627.5 PREPARATION

02627.5.1 INSTALLATION RESPONSIBILITIES FOR INCIDENTAL ITEMS:

- Access Points: Contractor shall locate and designate all manhole access points and open and make access points available for the work.
- Cleaning of Sewer Lines: The Contractor shall remove all roots and internal debris (including grease) from the sewer line prior to liner installation by any means necessary. Requirements for cleaning of sewer lines are contained in Section 02228SP.
- Inspection of Pipelines: Inspection of pipelines shall be performed by personnel experienced and trained in locating defects, breaks, obstacles, and service connections by CCTV.
- Infiltration: Minor infiltration is a normal condition sometimes encountered during the lining process. It is not a "changed condition" and should not be regarded as a reason for change orders. If in the opinion of the Engineer, infiltration is significant enough to adversely affect the curing process, chemical grouting or other remedies may be required. This additional work will be paid for by the Engineer as a change order.
- Site Restoration: Areas damaged or modified by the work for this project shall be repaired or restored to a condition equal to or better than the original condition. Site restoration is incidental to the Work and shall not be regarded as a reason for change orders.
- Bypassing Sewage - The Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe designated for repair. Plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system shall make the bypass. The pump(s) and bypass line(s) shall be of adequate capacity to accommodate the sewage flow. The Engineer may require a detail of the bypass plan to be submitted (Specification 02225SP).
- Public Relations: Contractor shall be responsible for contacting each home or business who will

be affected by the construction activities and informing them of the work to be done and estimated timing for the work. Written notice shall be delivered to each home or business at least 72 hours prior to installation. Notice shall include a local telephone number of the Contractor they can call to discuss the project, and how the homeowner or business will be affected. The written notice must be reviewed by the Engineer prior to the start of any work. Customers should not be without service for more than a 12-hour period. Personal contact must be made with any home or business, which cannot be reconnected within the time stated in the written notice.

- Service Connections: Determine by dye test, running water or visual inspection whether connections are active or abandoned and provide results to the Engineer prior to insertion. Engineer and Contractor shall agree prior to insertion which services are to be reopened. Only reopened services will be paid for.
- Process Water: Delta City shall allow access to water for cleaning, installation and other process related items requiring water with use of a hydrant meter and backflow assembly. Contractor shall not be charged for this water unless it is deemed that use of the water is being abused (Specification 02204SP).

02627.6 INSTALLATION

02627.6.1 INSTALLATION OF LINER:

02627.6.1.1 Installation shall be in accordance with applicable ASTM standards and the manufacturer's recommendations, which shall be available for verification by the Engineer.

02627.6.1.2 Curing schedules shall be strictly adhered to, per manufacture requirements.

02627.6.1.3 Finished pipe liner shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels to meet the following:

- The cured Liner shall be continuous over the entire length of an installation run and be free of material defects. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to inside the lined pipe.
- Any defect, which will or could affect the structural integrity, strength, capacity, or future maintenance of the installed Liner, shall be repaired at the Contractor's expense, in a manner approved by the Engineer.
- Both ends of the cured Liner shall be cut flush at the inlet and outlet points in the manhole and sealed with either Expanding Hydrophilic Rubber joint seal or approved equal.
- The top half of the liner through a manhole shall be neatly cut off (not broken or sheared off). All manholes shall be individually inspected for cut-offs and sealing works. Liner shall be cut off at the pipes and all liner removed within intermediate manholes with deflection angles greater than 45 degrees.

02627.6.1.4 The liner shall be pulled into place via the manufacturer's instructions.

02627.6.1.5 The liner shall be inflated with air with sufficient pressure to hold the liner tight to the host pipe wall prior to curing according to manufacturer's specifications.

02627.6.2 INSTALLATION LATERAL CONNECTIONS:

02627.6.2.1 It is the intent of these Specifications that lateral connections to homes or businesses be re-opened without excavation, utilizing a remotely controlled cutting device, monitored by a CCTV. The Contractor shall certify a minimum of two complete functional cutters plus key spare components are on the job site before each installation or can be quickly obtained. Engineer and Contractor shall agree upon laterals that will be reinstated. No additional payment will be made for excavations for the

purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

02627.7 MEASUREMENT AND PAYMENT

02627.7.1 MOBILIZATION

Measurement for mobilization will be as shown in Section 02000 of the Specifications and shall include, but is not limited to, all preparatory work, materials necessary for obtaining clearances for the Work, moving personnel, equipment, supplies and incidentals to the Project Site, providing protection of on-site materials, quality control, compaction testing, clean-up, temporary utilities and quarters, permits, bonds, insurance, SWPPP, storm water control, environmental controls, noise abatement, waste, rubbish disposal and control, sanitation, project close-out operations, pipe coordination and inspection, etc. This item shall also include coordination with the Engineer and Owner, and public engagement. Specifically, informing residents when services, road, or drive access will be interrupted. This item shall also include all materials, equipment, personnel, and other work needed to maintain functionality of the existing system during construction. This item shall also include all materials, equipment, personnel, and other work needed to clean, camera, and prepare the existing sewer pipes prior to installation of lining, for more detailed description, see Section 02228SP. Payment for this bid item shall be according to the payment schedule included as Section 02000 of the Specifications.

02627.7.2 TRAFFIC CONTROL

This bid item will be measured as shown in Section 02005SP and shall include all material, labor, operations and equipment necessary to provide traffic control in accordance with MUTCD, AASHTO standards, UDOT (where applicable), Section 02005SP of the Specifications, and with the Engineer's and/or Owner's direction for the duration of the Project. This item also includes the preparation and submittal of a Traffic Control Plan prior to the commencement of construction. Partial payment shall be made based on the overall percentage of the Project that is paid for at each payment request.

02627.7.3 FOLD AND FORM PIPE INSTALLATION

Fold and form lining installation shall be measured by the Lineal Foot and shall include the prep work, materials, shipping, personnel, equipment, bypass pumping**,** installation, cleanup, and all other work associated with lining existing pipes. The Contractor shall supply all materials and shall install all materials included in this bid item. Included shall be the removal and disposal of deleterious materials excavated from the work area. Flushing, testing, and disinfection services required by this Specification shall be paid for under these items. No separate measurement will be made for cleaning and video inspecting the pipes prior to construction. This will be considered incidental and should be included in the lineal foot price for fold and form pipe installation.

02627.7.4 LATERAL CONNECTION (TOP HAT PREP)

This bid item will be measured by Each and shall include all materials, labor, equipment, operations, and expenses necessary to prepare an existing sewer service to have a top hat connector installed after installation of the liner. This item includes cutting the necessary opening prior to top hat installation.

02627.7.5 LATERAL CONNECTION (TOP HAT)

This bid item will be measured by Each and shall include all materials, labor, equipment, operations, and expenses necessary to install a new top hat connector at an existing sewer service after installation of the liner and prep work has been done. This does not include work covered on other bid items.

02627.7.6 POST CONSTRUCTION SEWER VIDEO

Measurement for the post construction sewer video will be Lump Sum. The video will need to be conducted by closed circuit television and meet the requirements of 02228SP. All fold and form pipe, and associated services shall be included in the post construction sewer video.

02627.8 BASIS OF PAYMENT

02627.8.1 The accepted quantities will be paid for at the unit price for:

PAYMENT ITEM	UNIT
(Size)(Type) Fold and Form Pipe	Lineal Foot
Lateral Connection (Top Hat Prep)	Each
Lateral Connection (Top Hat)	Each
Post Construction Sewer Video	Lump Sum

SPECIAL PROVISION

CLEAN AND CAMERA SANITARY SEWERS — SECTION 02628SP

02628.1 GENERAL

02628.1.1 DESCRIPTION

The Contractor shall furnish all materials, equipment, and labor to gain access to, clean, inspect, and record images of designated sewer lines, manholes, etc. The work shall include the disposal of all debris removed from cleaned sewer lines and manholes, and the locating, and if necessary, raising of manholes; all in accordance with these Specifications and Contract Documents. The work shall include, but not necessarily be limited to, performing the following tasks in accordance with these specifications; sewer flow control; sewer pipeline cleaning, including the removal of intruding roots, the removal of intruding service connections, the removal of hardened debris and the removal of hardened grease; sewer manhole cleaning, closed circuit television (CCTV) inspection of designated sewer lines, and the digital recording of images and audio from the CCTV inspection process. The sewer lines to be cleaned and inspected are those shown on the Drawings. All sewer lines that will have fold and form liners installed will need to be cleaned and CCTV inspected prior to construction. Once the fold and form liners are complete the lines shall be inspected post construction by CCTV.

02628.2 SUBMITTALS

02628.2.1 SEWER CCTV INSPECTION VIDEO

The Contractor shall furnish at least one digital copy of all inspection videos, as described below in 02628.4, to the Engineer.

02628.3 SEWER FLOW CONTROL

When sewer line depth of flow at the upstream manhole of the sewer line being worked is greater than 20% of the pipe diameter, inspection of the sewer line shall not proceed. If the sewer line in question experiences a diurnal flow pattern, and if the depth of flow decreases such that televising is permissible, inspection may proceed during low-flow conditions. Otherwise, the flow shall be reduced to less than 20% of the pipe diameter by one of the following methods: the operation of pump station controls by Owner's personnel (as applicable), or by bypassing of the flow around the sewer line to be worked via pumping methods in accordance with Section 02225SP.

02628.4 SEWER PIPELINE/MANHOLE CLEANING

02628.4.1 OBJECTIVES

The intent of sewer pipeline/manhole cleaning is to remove foreign materials from sewer lines and manholes to restore the capacity of the lines and to allow for complete inspection using CCTV methods. Materials and obstructions to inspection to be removed from pipes and manholes shall include, but not be limited to, sludge, mud, sand, gravel, rocks, bricks, grease, pieces of broken pipe, roots, hardened debris, protruding taps, foreign materials, etc. The inspection of the sewer lines and sewer manholes shall not proceed until the cleaning and preparation has been completed to the satisfaction of the standards detailed above.

02628.4.2 CLEANING EQUIPMENT

Sewer line/manhole cleaning shall be performed with hydraulically propelled, high velocity jet or mechanically powered equipment. Selection of equipment shall be based on field conditions such as productivity, available access to the sewer line, type and quantity of debris to be removed, size, shape and condition of the sewer to be cleaned, the potential for damage to property, the ability to excavate the sewer in instances of damage resulting from the cleaning process, etc.

02628.4.2.1 Hydraulically Propelled Equipment:
The equipment used shall be of a movable dam type and be constructed in such a way that a portion of the dam may collapse at any time during the cleaning operation to protect against flooding of the sewer. The movable dam shall be equal in diameter to the pipe being cleaned and shall provide a flexible scraper around the outer periphery to insure removal of grease. Special precautions to prevent flooding of the sewers and public or private property shall be taken at all times.

02628.4.2.2 High-Velocity Jet (Hydro-Cleaning) Equipment:
All high-velocity sewer-cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size mains. Equipment shall also include a high-velocity gun for washing and scouring manhole walls and floor. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall carry its own water tanks, auxiliary engines, pumps, and hydraulically driven hose reel.

02628.4.2.3 Mechanically Powered Equipment:
Bucket machines shall be in pairs with sufficient power to perform the work in an efficient manner. Machines shall be belt operated or have an overload device. Machines with direct drive that could cause damage to the pipe will not be used. A power rodding machine shall be either a sectional or continuous rod type capable of holding a minimum of 750 feet of rod. The rod shall be specifically heat-treated steel. To ensure safe operation, the machine shall be fully enclosed and have an automatic safety clutch or relief valve.

02628.4.2.4 Vacuum machines may be used for removal of materials from manholes when other cleaning equipment is used to dislodge and transport material to the access point.

02628.4.3 SAFETY

02628.4.3.1 Contractor shall be solely responsible for safety during the performance of all Work. Contractor shall not enter into any sewer segment where hazardous conditions may exist until such time as the source of those conditions is identified and eliminated by Contractor and/or Owner. Contractor shall perform all work in accordance with the latest OSHA confined space entry regulations. Contractor shall coordinate his work with local fire, police and emergency rescue units.

02628.4.3.2 Contractor shall be responsible for any damage to public or private property resulting from his/her televising activities and shall repair or otherwise make whole such damage at no cost to Owner.

02628.4.4 EXECUTION

02628.4.4.1 GENERAL

02628.4.4.1.1 The equipment shall remove dirt, grease, rocks, sand, and other materials and obstructions from the sewer mains, laterals, and manholes.

02628.4.4.1.2 A high velocity sewer cleaner will be used for most of the cleaning work. Other equipment, such as bucket machines, rod machines, hydraulic root cutters, vacuum trucks, and balling equipment, appropriate to the need, shall be available.

02628.4.4.2 CLEANING PRECAUTIONS

02628.4.4.2.1 All necessary precautions shall be taken to protect the sewer from damage during all cleaning and preparation operations. Precautions shall also be taken to ensure that no damage is caused to public or private property adjacent to or served by the sewer or its branches. The Contractor shall pay for and

restore, at no additional costs to the Owner, any damage caused to public or private property because of such cleaning and preparation operations.

02628.4.4.2.2 Satisfactory precautions shall be taken in the use of cleaning equipment. When hydraulically propelled cleaning tools (which depend upon water pressure to provide their cleaning force) or tools which retard the flow in the sewer line are used, precautions shall be taken to ensure that the water pressure created does not damage or cause flooding of public or private property being served by the sewer. When possible, the flow of sewage in the sewer shall be utilized to provide the necessary pressure for hydraulic cleaning devices. When additional water from fire hydrants is necessary to avoid delay in normal work procedures, the water shall be conserved and not used unnecessarily. No fire hydrant shall be obstructed in case of a fire in the area served by the hydrant. All requirements shall be met when accessing a fire hydrant including but not limited to meters, backflow preventers and properly trained personnel. It shall be the Contractor's responsibility to meet all state and local requirements.

02628.4.4.3 CLEANING

02628.4.4.3.1 If cleaning of an entire sewer section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning attempted again. If results of the cleaning are favorable, the Contractor will proceed with the TV inspection. All sludge, dirt, sand, rocks and other solid or semi solid materials resulting from the cleaning operation shall be removed from the downstream manhole of the section being cleaned. The Contractor shall not be responsible for removing mortar or other material that is securely attached to the pipe walls or joints.

02628.4.4.3.2 Materials shall be disposed of from the site at least once at the end of each workday. The Contractor will be responsible for the disposal of materials removed from the sewer system. All sewer cleaning efforts shall require documentation of all quantities and types of materials removed during cleaning.

02628.4.4.3.3 The designated sewer manhole sections shall be cleaned using hydraulically propelled, high-velocity jet, or mechanically powered equipment meeting requirements from 02628.4.2 and approved by the Engineer. Cleaning shall consist of normal hydraulic jet cleaning to facilitate the internal CCTV inspection.

- Selection of the equipment used shall be based on the conditions of lines at the time the work commences. The equipment and methods selected shall be satisfactory to Engineer. The equipment shall be capable of removing dirt, grease, rocks, sand, debris, other materials and obstructions from the sewer lines and manholes.
- If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. The intent of preparatory cleaning is to provide sufficient cleaning to ensure camera passage and the internal conditions of the pipeline can be fully assessed.
- If the Engineer establishes that a particular section of the pipeline cannot be adequately cleaned due to broken, collapsed, or void areas, then inspection will be attempted up to the obstruction.

02628.4.4.4 ROOT REMOVAL

Roots shall be removed in the designated sections and manholes where root intrusion is a problem and where authorized by the Project Manager or designee. Special attention should be used during the cleaning operation to assure complete removal of roots from the joints. Any roots that could prevent the proper application of chemical sealants or could prevent the proper seating and application of cured-in-place liners shall be removed. Procedures may include the use of mechanical equipment such as rodding machines, bucket machines, winches using root cutters, porcupines and equipment such as high-velocity jet cleaners. Chemical root treatment shall be used before or following the root removal operation, depending on the manufacturer's recommendation. The Contractor shall capture and remove all roots from the line.

02628.4.4.5 CHEMICAL ROOT TREATMENT

To aid in the removal of roots, manhole sections that have root intrusion shall be treated with an acceptable herbicide. The application of the herbicide to the roots shall be done in accordance with the manufacturer's recommendations and specifications in such a manner to preclude damage to surrounding vegetation. Any damaged vegetation, so designated by Engineer, shall be replaced by the Contractor at no additional cost to the Owner. All safety precautions as recommended by the manufacturer shall be adhered to for handling and application of the herbicide.

02628.4.4.6 MATERIAL REMOVAL AND DISPOSAL

02628.4.4.6.1 All sludge, dirt, sand, rocks, grease, roots, and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Contractor shall provide appropriate screening to stop passing of materials into downstream sewers. All solid or semisolid materials dislodged during cleaning operations shall be removed from the sewer by Contractor at the downstream manhole of the sewer section being cleaned. The passing of dislodged materials downstream of the sewer segment being cleaned shall not be permitted. In such an event, as observed or detected by the Engineer or any third party, Contractor shall be responsible for cleaning the affected downstream sewers in their entirety, at no additional cost to the Owner.

02628.4.4.6.2 These materials shall become the property of the Contractor, shall be removed from the site at the end of each workday, and shall be disposed of in a lawful manner by Contractor. Copies of records of all disposals shall be furnished to the Engineer, indicating disposal site, date, amount, and a brief description of material disposed. Disposal manifests from the licensed disposal facility shall be submitted with invoices.

02628.4.4.6.3 The Contractor shall keep his haul route and work area(s) neat, clean, and reasonably free of odor, and shall bear all responsibility for the cleanup of any spill.

02628.4.4.7 ACCEPTANCE OF CLEANING OPERATION

02628.4.4.7.1 Acceptance of sanitary sewer cleaning shall be made upon the successful completion of the television inspection and shall be to the satisfaction of the Engineer. If television inspection shows the cleaning to be unsatisfactory, the Contractor shall be required to re-clean and re-inspect the sewer line at no additional cost until the cleaning is shown to be satisfactory.

02628.4.4.7.2 In addition, on all sanitary sewers which have sags or dips, to an extent that the television camera lens becomes submerged during the television inspection, the Contractor shall use a high-pressure cleaner to draw the water out of the pipe, or other means, to allow the full circumferential view of the pipe and identification of pipe defects, cracks, holes and location of service connections.

02628.5 CLOSED CIRCUIT TELEVISION INSPECTION OF SEWER LINES

02628.5.1 INTENT

It is the intent of this Specification to provide for the inspection of pipelines utilizing closed-circuit television techniques to identify the location and extent of sewer line defects to allow for a determination of rehabilitation needs, to document pre-rehabilitation line condition, and/or to document post-rehabilitation line condition.

02628.5.2 SCOPE OF WORK

02628.5.2.1 Prior to performing closed circuit television inspection activities, Contractor shall thoroughly clean the sewer line(s) designated to be televised.

02628.5.3 EQUIPMENT

02628.5.3.1 Television inspection equipment shall have an accurate footage counter that displays on a remote monitor the exact distance of the camera from the centerline of the starting manhole. The camera shall be of the remotely operated pan and tilt type. The rotating camera and lighthead configuration shall provide 240 degrees of pan and tilt angle measuring centerline to centerline and 70 degree lens viewing angle.

02628.5.3.2 The camera shall be color and shall provide a minimum of 460 lines of horizontal resolution and 400 lines of vertical resolution. The image pick-up device shall contain in excess of 379,000 picture elements (pixels). Geometrical distortion of the image shall not exceed one percent.

02628.5.3.3 The color camera shall be equipped with the necessary circuitry to allow for the remote adjustment of the optical focus and iris from the power control unit at the viewing station.

02628.5.4 INSPECTION

02628.5.4.1 Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles, and service connections by closed-circuit television inspection techniques. The interior of the pipeline shall be carefully inspected to determine the location and extent of all pipeline defects. The location of any conditions which may result in a limitation of rehabilitation techniques that could be used and/or prevent proper installation of designated rehabilitation materials in the pipelines shall be noted so that these conditions can be considered and, if necessary, corrected prior to actual rehabilitation.

02628.5.4.2 Contractor shall internally inspect, via closed circuit television inspection, the sewer segments as required. Generally, inspection shall be completed one sewer line section at a time. Access for televising purposes shall only be via existing manholes. Should access to particular sewer section be difficult and adjacent sections require television inspection, Contractor may be allowed to complete inspection in multiple sewer line sections. When multiple sewer line sections are inspected using one setup, Contractor shall zero the camera's footage metering device at each subsequent sewer manhole to establish uniform starting location of Station 0+00, in middle of each manhole, for each line section televised.

02628.5.4.3 At all defects and service connections, the camera shall be stopped and the pan and tilt features shall be used to obtain a clear picture. Where possible, the camera shall be panned to view up each lateral or point of connection. Operator shall also pan the pipe face while at 0+00 showing detail regarding pipe connection to manhole structure

02628.5.4.4 Contractor shall record these inspections on a digital format. Video shall be recorded in a non-proprietary video format to allow for playback on any PC computer. The video shall include a visual and audio narrative noting:

- Date, time of day, and depth of flow;
- Sewer segment number. Segment numbers shall be designated by Engineer.
- Upstream manhole number.
- Downstream manhole number.
- Type of sewer (e.g. sanitary, storm, combined)
- Size of sewer
- Sewer materials of construction
- Closest street address and street name on which sewer is located
- Beginning and ending tape counter numbers for each run (manhole to next manhole) of sewer inspected

- Direction of movement of camera, heading, and direction of flow
- Locations of service connections into sewer by clock position and with counter distance in feet from beginning manhole's centerline
- Location (start and end counter distances in feet from the beginning manhole's centerline) and description of obstructions, structural defects, missing pieces of pipe, longitudinal and/or circumferential cracking, joint deterioration including open and/or offset joints, ovality, leakage or evidence thereof, corrosion, erosion, break-in connections, protruding connections, mineral deposits, roots, previous repairs, grease/fats/oil deposits on pipe walls, sags, and other abnormalities with respect to the sewer's condition with counter distance in feet from the beginning manhole's centerline.
- Contractor's log shall contain the same information.

02628.5.4.5 Digital files shall visually display at a minimum the date, pipe segment number (manhole number) and distance from the centerline of the upstream manhole. The distance between manholes shall be verified by measuring tape. If the counter distance and the taping distance differ by more than 2 feet per 100 feet, the run shall be re-televised by Contractor at no additional cost to Owner.

02628.5.4.6 A digital copy shall be maintained and delivered by electronic means, which shall display the project name, project number, date of inspection, manhole segment number(s) inspected, and crew ID number. The entire length of any one sewer segment shall be on one file. No segment shall be split between two files. A file may have multiple segments, so long as an entire section is on one file. Digital files of all sections shall be provided to Engineer along with the respective television inspection field logs.

02628.5.4.7 If during television operation the television camera will not pass safely through entire sewer line section being investigated, Contractor shall, at no additional cost to Owner, set up equipment so that inspection can be performed from opposite (downstream) manhole. Where an obstruction is encountered and a reverse set up is required, the distance shall be entered into the log and verbally noted on the digital copy from which manhole the measurements are being made. If under the reverse set-up the camera again fails to pass through the entire sewer line section, inspection shall be considered complete. All obstructions in the sewer segment that prohibit passage of the television camera shall be immediately reported to the Engineer by Contractor referencing location and nature of the obstruction. No rehabilitation work shall proceed until Contractor receives direction from Engineer regarding removal of the obstruction.

02628.5.4.8 Should Contractor's televising equipment become lodged in any sewer line, it shall be removed by Contractor at his expense. This shall include, if necessary, excavation and repair of the sewer, underground utility repairs, backfilling and surface restoration. Contractor shall re-televise any line segment in which his equipment became lodged after said equipment has been removed to demonstrate to the Engineer that no damage exists as a result of his televising operations.

02628.5.5 BYPASS PUMPING / FLOW CONTROL

02628.5.5.1 Contractor shall be solely responsible for providing all labor, equipment and materials necessary to control the flow of sewage in and/or around sewer segment(s) being televised. Requirements for sewage flow control and bypass pumping are contained in Section 02225SP.

02628.5.6 ACCEPTANCE

02628.5.6.1 Contractor shall present in a digital format a continuous image in complete conformance with these Specifications of not less than ninety percent (90%) of the internal pipe surface at all times, (not based on an average throughout the pipe segment) including sags in sewer lines. A digital copy shall be accompanied by a complete log. The maximum acceptable speed of camera through sewer shall be thirty (30) feet per minute. The lighting system shall be adequate for quality color picture at least 5

feet in front of the camera's lens. Contractor shall re-clean and televise any segment for which the digital copy does not present a clear image of at least 90% of the internal pipe surface at all times, and/or is accompanied by an incomplete log.

02628.6 METHOD OF MEASUREMENT

02628.6.1 SEWER PIPELINE/MANHOLE CLEANING

02628.6.1.1 Measurement shall be made for sewer pipeline/manhole cleaning using a tape measure or other accurate measuring device to determine the total number of lineal feet of pipe and manholes that have been cleaned and accepted in accordance with these Specifications, including all labor, materials, and equipment required to perform the cleaning. The cleaning of manholes within the designated sections of pipe to be cleaned shall be considered incidental to the cleaning of the pipe and shall not be measured separately from the lineal feet of pipe cleaned.

02628.6.1.2 No separate measurement shall be made for sewer pipeline/manhole cleaning that is required as part of a separate item of work for sewer line rehabilitation.

02628.6.2 CLOSED CIRCUIT TELEVISION INSPECTION

02628.6.2.1 Measurement for closed circuit television inspection shall be made on an actual televised lineal footage basis per diameter of sewer televised and shall include the labor, materials, and equipment necessary to complete the closed-circuit television inspection including any bypass pumping/flow control which may be required.

02628.6.2.2 No separate measurement shall be made for closed circuit television inspection that is required as part of a separate item of work for sewer line rehabilitation.

02628.7 BASIS OF PAYMENT

No separate measurement will be made for cleaning and video inspecting the pipes prior to construction. This will be considered incidental and should be included in the lineal foot price for fold and form pipe installation.

SECTION 02660

PIPELINE TESTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing requirements for potable and non-potable water piping systems and sanitary sewers.

1.02 REFERENCES

A. Rule R309-550-8(7): Pressure and Leakage Testing

B. AWWA Standard C600-10: Installation of Ductile-Iron Mains and Their Appurtenances

1.03 DEFINITIONS

A. Leakage: The quantity of water required to maintain the specified hydrostatic test pressure after the pipeline has been filled with water and the air expelled.

B. Non-rigid Pipe: Any pipe which required bedding and backfill material for structural support.

1.04 SUBMITTALS

A. Pipeline Test Report: Include the following items:

1. Type of test.
2. Identification of pipe system.
3. Size, type, location and length of pipe in test section.
4. Test pressure and time.
5. Amount of leakage versus allowable.
6. Date of test approval.
7. Signature of test supervisor.
8. Signature of the City Engineer, Inspector, or City Water Superintendent witnessing and approving the test.
9. One copy of video tape.

1.05 PROJECT CONDITIONS

A. After construction of sanitary sewer lines, they shall be thoroughly cleaned and test for leakage and alignment in the presence of the City Engineer or the City Inspector before acceptance by the City.

B. Repair pipeline system at no additional cost to City until it passes subsequent retesting.

C. Recording Equipment:

1. Supply all necessary equipment to perform pressure testing.

2. Secure City's approval of pressure gages.

3. Locate all gages and recording equipment away from affect of sunshine or other weather conditions.

4. Place, vents, pressure taps and drains for the test. Repair pipeline at the completion of the test at no cost to City.

PART 2 PRODUCTS

2.01 TESTING MATERIALS

A. Medium: Water or air, as required by test.

B. Equipment: Temporary motors, pumps, pumping apparatus, pressure gages, connections, power, etc. for making the tests.

PART 3 EXECUTION

3.01 PREPARATION

A. Notify City Engineer or City Water Superintendent 48 hours in advance of test.

B. Carry out tests as pipeline construction progresses to ensure construction methods are producing satisfactory results.

3.02 TESTING FOR PRESSURE PIPELINES

A. Expel all air from the pipeline before applying the specified test pressure. Provide air release taps at points of highest elevations before testing. Insert permanent plugs after test has been completed.

B. Test pressure and duration: A minimum pressure 50 psi in excess of the designated class rating of the pipe being tested shall be maintained on the portion being tested for a minimum period of two hours, using hydraulic means to maintain the pressure. The test pressure shall not vary by more than 5 psi (plus or minus) for the duration of the test. If necessary, the test pressure shall be maintained by additional pumping during the 2 hour test duration.

C. The testing allowance: The testing allowance shall be defined as the quantity of water that must be supplied to the pipe section being tested to maintain a pressure within 5 psi of the specified hydrostatic test pressure. The quantity of water shall be accurately measured in gallons by suitable methods. No installation will be accepted if the quantity of makeup water is greater than that determined by the formula:

$$Q = \frac{LD\sqrt{P}}{148{,}000}$$

Where:
Q = quantity of makeup water in gallons per hour
L = length of pipe section being tested, in feet
D = nominal diameter of pipe, in inches
P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

D. Suitable means shall be provided by the Contractor for determining water lost by leakage under the test pressure.

E. Locate and repair the defective joints and retest until the leakage is within the specified allowance.

F. Repair any noticeable leakage even if total leakage is less than allowable.

G. Flushing:

1. After pressure testing all pipelines shall be flushed.

2. Flushing shall be accomplished through hydrants or, if a hydrant does not exist at the end of the line, the Contractor shall install a tap of sufficient size to provide for a 2.5 foot per second flushing velocity in the line.

3. The following is the flow quantity required to provide a 2.5 foot per second flushing velocity:

Pipe Size (In.)	Flow (gpm)
4	100
6	220
8	390
10	610
12	880
16	1,567

3.03 ALIGNMENT AND GRADE TEST

A. No variance will be allowed from line and grade in excess of 1/32" per inch of pipe diameter or ½" maximum provided that such variation shall not result in a level or reverse sloping invert.

B. The variation in the invert elevation between adjoining ends of pipe due to eccentricity of joining surface and pipe interior surfaces shall not exceed 1/64" per inch of pipe diameter, or ½" maximum.

3.04 OBSTRUCTION TEST

A. Visually examine pipe internally for obstructions by use high power light or mirror.

B. When required by the City Engineer, a round incompressible mandrel which is 1" less in diameter than the internal diameter of the pipeline and 2 times the diameter in length will be passed through the pipeline.

3.05 NON-RIGID PIPE DEFLECTION TEST

A. Test installed sections of non-rigid pipeline to ensure that circumferential deflection of non-rigid pipe does not exceed 5 percent. Use mandrel of proper size.

3.06 INFILTRATION TEST

A. No pipe section will be accepted if the infiltration rate exceeds 100 gallons per inch diameter per mile per 24 hours.

3.07 FLUSHING OF SANITARY SEWERS

A. All sanitary sewer lines shall be flushed and cleared prior to acceptance by the City.

B. Flushing

1. Laterals and trunk lines shall be flushed by water to remove all foreign material.

2. Wastewater and debris shall not be permitted to enter sewer lines in service, but shall be removed at the lowest manhole of the extension.

3. Other methods of cleaning may be used upon approval of the City Engineer.

4. After the lines have been thoroughly cleaned, they shall be tested between all manholes for displacement.

3.08 PIPE TESTING SCHEDULE

A. Irrigation:

1. Alignment and grade test.
2. Pressure test.

3. Operational Testing:

   a. Perform operational testing after hydrostatic test is complete, backfill is in place and sprinkler heads adjusted to final position.

   b. Demonstrate system meets coverage requirements and automatic controls function properly.

   c. Coverage requirements are based on operation of 1 circuit at a time.

B. Sub-drains:
   1. Alignment and grade test.
   2. Obstruction test.
   3. Non-rigid pipe deflection test.
   4. Pressure test for pressure pipeline systems.

C. Storm Drains:
   1. Alignment and grade test.
   2. Obstruction test.
   3. Non-rigid pipe deflection test.
   4. Pressure test for pressure pipeline systems.
   5. Video Test. All lines to be televised and videoed.
      a. Run water through gravity system prior to video inspection.
      b. Conduct test at least 30 days after backfill and prior to installation of pavements.

D. Potable Water System:
   1. Obstruction test.
   2. Bacteria test.
   3. Pressure Test
   4. If pressure test fails and line repaired, the bacteria test is again required.

END OF SECTION

SECTION 02668

WATER TRANSMISSION AND DISTRIBUTION SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe and fittings for culinary water line.

B. Valves, fire hydrants and water meters.

1.02 RELATED SECTIONS

A. Section 02205: Common Fill.

B. Section 02206: Select Fill.

C. Section 02225: Excavating and Backfill Operations.

D. Section 02250: Soil Compaction.

E. Section 02660: Pipeline Testing.

F. Section 02675: Disinfection.

G. Section 03304: Portland Cement Concrete: Concrete for thrust restraints.

1.03 REFERENCES

A. ASME B16.18: Cast Copper Alloy Solder Joint Pressure Fittings.

B. ASME B16.22: Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.

C. ASTM B88: Seamless Copper Water Tube.

D. ASTM D2241: Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).

E. ASTM D2774: Recommended Practice for Underground Installation of Thermoplastic Pressure Piping and PVC Pipe

F. ASTM D2855: Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and fittings.

G. AWWA C104-16: Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.

H. AWWA C105-10: Polyethylene Encasement for Ductile Iron Piping Systems.

I. AWWA C110-12: Ductile-Iron and Gray-Iron Fittings.

J. AWWA C111-17: Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

K. AWWA C151-09: Ductile-Iron Pipe, Centrifugally Cast.

L. AWWA C500-09: Metal-Seated Gate Valves for Water Supply Service.

M. AWWA C502-14: Dry Barrel Fire Hydrants.

N. AWWA C504-15: Rubber Seated Butterfly Valves.

O. AWWA C600-10: Installation of Ductile-Iron Water Mains and Appurtenances.

P. AWWA C900-16: Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 inch - 60 inch.

Q. UL 246: Hydrants for Fire - Protection Service.

R. R309-550-8(4) Dropping Pipe into Trench. Installation of water lines shall comply with this rule.

1.04 SUBMITTALS

A. Prior to construction submit 1 hard copy and electronic PDF copy of the manufactures specification for all products to the engineer for approval.

1.05 SUBMITTALS AT PROJECT CLOSEOUT

A. Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 SPECIAL REQUIREMENTS AND CONSIDERATIONS

A. To provide increased reliability of service and reduce head loss, dead ends shall be minimized by making appropriate tie-ins and “looping” of the water system whenever practical. Where dead-end mains do occur (permanent or temporary), a fire hydrant or approved blow-off assembly shall be installed for flushing purposes as directed by the City Engineer. Flushing devices must have the minimum sizes shown on Midway City Standard Drawing “Water-8”, but must also be sized to provide a minimum velocity of 2.5 fps in the water main.

B. Where distribution systems are installed in areas of contamination pipe and joint materials which are not susceptible to contamination, such as permeation by organic compounds, shall be used; and, non-permeable materials shall be used for all portions of the system including water mains, service connections, and hydrant leads per R309-550-5(10).

C. The standard horizontal distance between water lines and sanitary sewer lines shall be at least 10 feet. Where a water main and sewer line must cross, the water main shall be at

least 18 inches above the sewer line. Separation distances shall be measured from pipe edge to pipe edge. Adherence to all separation requirements included in Sections R309-550-7 and R309-550-12 shall be required unless a written variance is requested and granted from the Utah Division of Drinking Water and Midway City.

PART 2 PRODUCTS

2.01 All materials which may contact drinking water, including pipes, gaskets, lubricants and O-Rings, shall be ANSI-certified as meeting the requirements of NSF Standard 61, Drinking Water System Components - Health Effects. To permit field-verification of this certification, all such components shall be appropriately stamped with the NSF logo.

2.02 DUCTILE IRON WATER PIPE

A. Ductile Iron Water pipe shall be Class 50 for slip-on joint piping (Class 51 for 4-inch size) and Class 53 for mechanical joint and flanged joint piping.

B. All piping shall conform to AWWA Specification C-151 of the latest revision.

C. Pipe joints shall be the push-on rubber gasket type of mechanical joint type with plain rubber gaskets conforming to AWWA C-111 of latest revision or flanged connections conforming to AWWA C-115 of latest revision.

D. All Ductile Iron Pipe wall thicknesses shall conform to AWWA C 150-76.

E. Fittings: Fittings shall conform to AWWA Specification C 110-77 and shall have mechanical or push-on rubber gasket joints.

F. Coatings and Linings for Ductile Iron Pipe

1. All exterior surfaces of pipe and fittings shall be coated with hot coal tar approximately 1 mil thick.

2. All interior surfaces of pipe and fittings shall be coated with the standard thickness cement mortar lining in conformity with the requirements of A.S.A. Standard A21.4.

G. Markings

1. Pipe markings shall include the following, marked continuously down the length:

a. Manufacturer’s Name

b. Nominal Size

c. Class Pressure Rating

d. PVC 1120

e. NSF Logo

f. Identification Code

g. Minimum water main size is 8 inches

2.03 POLYVINYL CHLORIDE PIPE (PVC)

A. All PVC pipe used for transmission lines shall be AWWA C-900, DR-18 or as determined by the City Engineer. All PVC pipe used for secondary irrigation lines shall be AWWA C-900, DR-18 Purple pipe or as determined by the City Engineer.

B. Conformance: All PVC pipe shall conform to the latest revisions of the following specifications.

1. AWWA Spec. C-900 (PVC pressure pipe for water)

2. ASTM Spec. D-2241 (PVC plastic pipe SDR-PR and Class T)

3. Commercial Standard CS256-63 (pressure rated pipe)

4. National Sanitation Foundation Testing Laboratories (NFS)

5. Rubber Gasketing shall conform to ASTM 1869.

C. Pipe Dimensions

1. Standard lengths shall be 20 feet.

2. Wall thickness shall be in accordance with CS256-63 and ASTM d-2241.

3. Pipe ends shall be beveled to accept the gasketed coupling (4" and larger).

4. Minimum water main size is 8 inches.

D. Couplings and Fittings

1. The coupling and fittings shall be furnished by the pipe manufacturer and shall accommodate the pipe for which they are to be used.

2. They shall have a minimum pressure rating of 200 psi.

3. Insertion depth of the pipe in the coupling shall be controlled by a gauge mark or mechanical stop in the coupling which will allow for a thermal expansion and contraction.

4. All pipe couplings and fittings are required to be new thrust restrained joint fittings.

5. All bolt kits and packs shall be stainless steel with anti-seize lubricant.

6. Any flanged fitting should shall use a paper gasket.

E. Lubrication: Lubrication shall be water soluble, non-toxic, be non-objectionable in taste and odor imparted to the fluid, be non-supporting of bacteria growth, and have no deteriorating effect on the PVC or rubber gaskets.

F. Concrete Blocking

1. All fittings at bends and branches in water pipe lines shall be provided with concrete thrust blocking as shown on the Standard Drawings.

7. All bolt kits and packs shall be stainless steel with anti-seize lubricant.
and bends will be wrapped with 8 mil plastic.

3. Blocking shall be of concrete specified in Section 03304, poured in place and shall bear against solid undisturbed earth at the sides and bottom of the trench excavation and shall be shaped so as to not obstruct access to the joints of the pipe or fitting.

2.04 GATE VALVES

A. Gate valves should be used when application is 12" diameter or less.

B. Furnish gate valves that conform to the requirements of AWWA C-500, with ductile iron body, bronze mounted, double disc, parallel seat, non-rising stem design with “O” ring seals.

C. Operating Direction: Open counterclockwise.

D. Buried Valves: Unless otherwise shown or specified, valves shall be of Mechanical Joint connection design for buried service.

E. Buried Valves shall have 2" operation nuts.

2.05 BUTTERFLY VALVES

A. Butterfly valves shall be used for application greater than or equal to 14" in diameter or as approved by the City Engineer.

B. Material, in accordance with AWWA C-504.

C. Body Type

1. Valves shall be high strength cast iron ASTM A-126, Class B with 18-8 Type 304 stainless steel body seat.

2. Valve vane shall be mechanically secured with an integral 18-8 stainless steel clamp ring and 18-8 stainless steel nylon locked screws.

3. Both valve ends shall be mechanical joint per AWWA Specification C-111 and accessories (bolts, glands, and gaskets) shall be included.

4. All butterfly valves shall be of the rubber-seated tight-closing type. The rubber seat shall be a full circle 360° seat not penetrated by the valve shaft.

D. Valve Shafts

1. The valve shaft shall be one piece extending full size through the entire valve and operator with no neckdown, keyways, or holes to weaken it.

2. The valve shaft shall have 304 stainless steel journals rotating in reinforced Teflon bearings.

3. Valves shall have permanently set two-way thrust bearing.

4. Packing shall be “triple-seal” rubber designed for permanent duty in underground service.

2.06 VALVE BOXES

A. All buried valves shall be installed complete with a cast iron, 2 piece, 5 1/4 inch shaft valve box.

B. Mud Plug shall be installed in all valve boxes. 4” Thick plug with part number: VPLUG-6X4 MUD PLUG 564A / 664A is required.

2.07 TAPPING SADDLES

A. For tapping saddles used for service connections provide Romac 202NS nylon coated ductile iron service saddle with dual stainless steel straps and “IP” threads or approved equal.

2.08 LATERAL SERVICE CONNECTIONS

A. Provide and install according to standard drawings

B. Service Pipe:

1. Provide single length (no splices) of PEP pipe (copper pipe size) with compression fittings.

2. Locate service taps in the upper quadrant of the main line, approximately at 45 degrees. The minimum distance between taps is 24", with a 5 degree stager. Do not make service taps within 24" of the end of the main line.

3. Service saddles are required on all taps unless indicated otherwise.

4. In subdivision developments, the contractor shall be responsible to furnish and install the corporation type stop and laterals to a point on private property 24 inches past the street right-of-way line.

C. Meter Boxes: Plastic or asphalt-dipped corrugated metal. Fiber meter boxes are not acceptable. Provide a meter box with ring and cover of sufficient strength to withstand

loadings in vehicular traffic areas without breaking.

D. Coppersetters or metersetters shall be manufactured by Ford series 70.

E. All materials to be supplied by the Contractor, except for the meter.

2.09 HYDRANT

A. In accordance with AWWA C502.

B. 6-inch cast iron hydrant as manufactured by Waterous.

C. Cast-Iron Body Fire Hydrant: Compression type, opening against pressure and closing with pressure, base valve design, 150 psi working pressure, with 1/4" diameter minimum tapping and bronze plug in standpipe.

1. Size: Minimum 5" valve opening

2. Direction to Open Hydrant: Left

3. Size and Shape of Operating and Cap Nuts: Pentagon 1-1/2" point to flat.

4. Hose Nozzles: Two 2-1/2" National Standard Thread, cap, gasket and chain.

5. Pumper Nozzles: One 4-1/2" National Standard Thread, cap, gasket and chain.

6. Depth of Cover: 5'-0" unless indicated otherwise.

7. Connection to Main: O-ring seals and a 6" ASA 125 pound flanged inlet.

8. Pressure: Designed for a working pressure of 175 psi and a hydrostatic pressure of 350 psi.

9. Bottom connection: 6" flanged. Designed to allow the flanges at the sidewalk level to separate when hydrant is sheared off.

10. Automatic drain: Opens as the hydrant is closed.

D. Mechanical joint or flanged in accordance with AWWA C110 and AWWA C111.

E. Hydrant spacing shall not exceed 500-feet. Hydrants shall also be installed at the end of every cul-de-sac.

2.10 AIR VAC RELEASE STATIONS

A. Air Releases shall be installed at all peaks and sharp changes in gradient as determined by the City. If the waterline has service connections within the location of the peak or change in the gradient, the air release station may be eliminated at the City Engineers discretion.

B. The open end of the air relief vent pipe from automatic valves shall be provided with a

#14 mesh, non-corrodible screen and a downward elbow, and where possible, be extended to at least one foot above grade. Alternatively, the open end of the pipe may be extended to as little as one foot above the top of the pipe, if the valve's chamber is not subject to flooding, or if it meets the requirements of (7) Chamber Drainage.

C. Blow-offs or air relief valves shall not be connected directly to a sewer.

D. Adequate number of hydrants or blow-offs shall be provided to allow periodic flushing and cleaning of water lines.

E. The air relief valve shall be installed in a manner to prevent it from freezing. A shut-off valve shall be provided to permit servicing of an air relief valve.

2.11 All underground fire hydrant and valve assembly bolts shall be stainless steel. All flange and mechanical joint bolt kits to be stainless steel bolts installed with anti-seize lubricant, and using approved potable water grease, and wrapped with an approved poly wrap.

2.12 BACK FLOW PREVENTERS

A. All irrigation lines connected to culinary system shall have RP backflow devices with 3 chambers, and above ground air release with an air gap. The backflow preventer shall be manufactured by Zurn Wilkins Model Number 375 XL.

B. All backflow preventers shall be tested by a certified backflow technician, and a passing test report will need to be provided to the City.

2.13 PRESSURE REDUCING VALVES (PRV)

A. Pressure Reducing Valves shall be manufacturing by CLA-VAL or approved equal.

B. Operation: Capable of maintaining and adjustable constant downstream pressure regardless of the upstream pressure.

C. Type: Hydraulically operated using a direct-acting, spring-loaded, normally open, pilot valve-controlled diaphragm:

1. Single removable seat and a resilient disc. No "O" ring type discs permitted. No external packing glands permitted. No pistons operating main valve or pilot controls permitted.

2. Y-strainers on pilot controls, variable closing and opening speed controls and a valve position indicator.

D. Rating: 250 psi working pressure.

E. Connection: Flanged

F. Pressure Gage: Upstream and downstream of valve capable of accurately measuring system pressures.

G. Isolation Valves shall be installed on both sides of the pressure reducing valve. Where variable flow conditions will be encountered, consideration shall be given to providing parallel PRV lines to accommodate low and high flow conditions.

2.14 CROSS-CONNECTION CONTROL

A. See Chapter 10.03 of the Midway City Municipal Code for Cross-Connection Control and comply with rule R309-550-9 Cross Connections and Interconnections.

PART 3 EXECUTION

3.01 PREPARATION

A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare pipe connections to equipment with flanges or unions.

3.02 BEDDING

A. Excavate pipe trench in accordance with Section 02225 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Form and place concrete for pipe thrust restraints at any change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide thrust restraint bearing on subsoil according to standard drawings.

C. Place bedding material at trench bottom, fill materials in one continuous layer not exceeding 8 inches compacted depth; compact to 95 percent.

D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact to 95 percent.

E. Maintain optimum moisture content of bedding material to attain required compaction density.

3.03 INSTALLATION - PIPE

A. The bottom of the trench shall be cut flat, true and even to provide uniform bearing for the full length of the pipe barrel.

B. Each pipe shall be laid true to line and grade and in such manner as to form a close concentric joint with adjoining pipe to prevent sudden offsets.

C. Pipe bedding and trench backfill shall be as defined in the previous sections.

D. As work progresses, interior of pipe shall be cleared of dirt and other superfluous materials.

E. Trenches shall be kept free from water until pipe jointing has been completed. Pipe shall not be laid when condition or trench or weather is unsuitable for such work.

F. At all times when work is not in progress, all open ends of pipe and fittings shall be securely closed so that no water, earth, or other substance will enter pipe or fittings.

G. Maintain separation of water main and services from sewer piping in accordance with Utah State Plumbing Code.

H. Install pipe to indicated elevation to within tolerance of 5/8 inches.

I. Install ductile iron piping and fittings to AWWA C600.

J. Route pipe in straight line.

K. Install pipe to allow for expansion and contraction without stressing pipe or joints.

L. Install access fittings to permit disinfection of water system performed under Section 02675.

M. Slope irrigation water pipe and position drains at low points.

N. Form and place concrete for thrust restraints at each elbow or change of direction of pipe main.

O. Establish elevations of buried culinary piping to ensure not less than 5 feet of cover.

P. Establish elevations of buried irrigation piping to ensure not less than 2 feet of cover.

Q. Install metallic tape continuous over top of pipe buried 12 inches above pipe line.

R. Backfill trench in accordance with Section 02225.

S. Handling Ductile Iron Pipe

1. Pipe and fittings shall be handled in such a manner as to insure installations in sound, undamaged condition.

2. Particular care shall be taken not to injure the pipe coating and lining. Cement lining in pipe or fittings which is broken or loosened shall be cause for rejection of the pipe or fittings.

3. All damaged pipe coating shall be repaired, prior to laying the pipe or placing the backfill.

    3. Repair shall be accomplished by removing all damaged coating, wire-brushing to exposed metal, and applying two coats of coal tar coating of a type and quality to that originally in coating the pipe.

T. Cutting, Cleaning and Inspection

1. Cutting of pipe for closure pieces or for other reasons shall be done in a neat and workmanlike manner by a method which will not damage the pipe.

2. Before installation, each pipe shall be inspected for defects.

3. All defective, damaged or unsound pipe shall be rejected.

U. Location of Stub Pipes

1. The location of each stub shall be marked by placing a 2 x 4 marker at the end of the pipe and extending vertically from the end of the pipe to approximately 15 inches above the ground surface.

2. The portion of the 2 x 4 extending above ground, shall be painted as follows:

a. Green - indicating sewer stub.

b. Blue - indicating water

3. The sidewalk and curb shall be stamped in the following manner, showing locations of water, sewer, and pressure irrigation stub pipes:

a. A “W” stamp for water.

b. A “S” stamp for sewer.

c. A “PI” stamp for pressure irrigation

V. Under no circumstances shall the pipe or accessories be dropped into the trench.

W. A water system shall not install an unpressurized transmission line less than 20 feet from a concentrated source of pollution (e.g., septic tanks and drain fields, garbage dumps, pit privies, sewer lines, feed lots, etc.). Furthermore, unpressurized transmission lines shall not be placed in boggy areas or areas subject to the ponding of water, see rule R309-550-12(2).

3.04 INSTALLATION - VALVES AND HYDRANTS

A. Set valves on solid bearing.

B. Locate valves on property lines, at each intersection, and not more than 500 feet between.

C. Center and plumb valve box over valve. Set box cover flush with finished grade with concrete collar as per standard drawings.

D. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.

D. Paint hydrants Red

F. Anchorages: Provide anchorages for tees, wyes, crosses, plugs, caps, bends, valves, and hydrants. After installation, apply full coat of asphalt or other acceptable corrosion-retarding material to surfaces of ferrous anchorages.

3.05 INSTALLATION - SERVICE CONNECTIONS

A. The contractor or home owner must provide and install all parts according to the standard drawings.

B. The Engineer or Public Works Department must inspect the installation before burying or backfilling. The Contractor shall conform to the following requirements before a water meter is installed by the City:

1. Notify the Water Department at least five working days prior to the time the meter is to be installed and before backfilling.

2. The water lateral should be exposed in the street right-of-way one foot outside the property line, even if the lateral extends onto the property.

3. The end of the house lateral should be within 2 feet of the service lateral.

4. Both laterals should be exposed freely in the center of the excavation.

5. To prevent damage from possible freezing, the water lateral may be covered with materials such as sand, light gravel, straw, insulation, or similar light materials.

6. To establish the correct street right-of-way line, the property line pins must be in place or the sidewalk.

C. All of the above requirements must be complied with to the satisfaction of the City before the water meter will be installed.

D. A service charge will be assessed for crew time when the prerequisites are not met before the scheduled item for setting a meter. This fee must be paid before the meter installation will be rescheduled.

E. Any required re-setting of the water meter following initial installation shall be done by the City at the expense of the Developer or Contractor.

F. Place meter can in park strip or 1 foot behind sidewalk.

G. Install setter no closer than 24" of ground surface.

H. Lids shall be flush with top of sidewalk elevation.

3.06 DISINFECTION OF CULINARY WATER PIPING SYSTEM

A. Flush and disinfect system in accordance with Section 02675.

3.07 TESTING OF WATER PIPING SYSTEMS

A. Test pipeline system in accordance with Section 02660.

3.08 TRACER WIRE INSTALLATION

A. Copper tracer wire to be installed the total length of pipeline with a branch to each tee, cross, and fire hydrant. Copper tracer wire should be run to each lateral as shown in the Standard (See Detail).

1. Copper wire should be #12 gauge single strand jacketed wire, manufactured for underground service.

2. Wire shall be continuous without breaks. Splices shall be made with petroleum filled wire nut caps.

3. Tracer Wire to be secured to top of pipe at a minimum of every Ten feet, by means other than metallic.

4. Tracer Wire should be brought up in all fire hydrants in culinary water lines, and in the first lateral of each street for pressurized irrigation (not to exceed 500 feet).

B. A continuity test shall be performed by the contractor in the presence of the city engineer prior to paving.

3.09 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with section 02250.

B. If tests indicate Work does not meet specified requirements, remove work, replace, and retest.

END OF SECTION

SECTION 02675

DISINFECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Disinfection of potable water system.

B. Test and report results.

1.02 REFERENCES

A. AWWA A100-15: AWWA Water Wells.

B. AWWA B300-10: AWWA Hypochlorites.

C. AWWA B301-10: AWWA Liquid Chlorine.

D. AWWA C651-14: AWWA Disinfecting Water Mains.

E. AWWA C652-11: AWWA Disinfection of Water-Storage Facilities.

F. State of Utah: Public Drinking Water Regulations, Part II. Including Rule R309-550-8(10), Disinfecting Water Distribution Systems

1.03 DEFINITIONS

A. Disinfectant Residual: The quantity of disinfectant in treated water.

B. ppm: Parts per million.

1.04 SUBMITTALS

A. Contractor's evidence of experience in disinfection.

B. Bacteriological laboratory's evidence of certification.

C. Disinfection Report: 3 copies including:

1. Date issued.

2. Project name and location.

3. Treatment contractor's name, address and phone number.

4. Type and form of disinfectant used.
5. Time and date of disinfectant injection started.

6. Time and date of disinfectant injection completed.

7. Test locations.

8. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.

9. Time and date of flushing start.

10. Time and date of flushing completion.

11. Disinfectant residual after flushing in ppm for each outlet tested.

D. Bacteriological Report: 3 copies including:

1. Date issued.

2. Project name and location.

3. Laboratory's name, certification number, address, and phone number.

4. Time and date of water sample collection.

5. Name of person collecting samples.

6. Test locations.

7. Time and date of laboratory test start.

8. Coliform bacteria test results for each outlet tested.

9. Certification that water conforms or fails to conform to bacterial standards of State of Utah public drinking water regulations.

10. Bacteriologist's signature.

1.05 QUALITY ASSURANCE

A. Affidavit by manufacturer that disinfectant conforms to AWWA standards.

B. Bacteriological Laboratory: Certified by State of Utah.

1.06 PRODUCT HANDLING

A. Store and protect disinfectant in accordance with manufacturer's recommendations to protect against damage or contamination. Do not use unsuitable disinfectant.

B. Follow all instruction labeling for safe handling and storage of disinfectant materials.

1.07 REGULATORY REQUIREMENTS

A. Conform to State of Utah public drinking water regulations.

PART 2 PRODUCTS

2.01 DISINFECTANT

A. Liquid Chlorine: AWWA B301 with chlorine 99.5 percent pure by volume.

B. Sodium Hypochlorite: AWWA B300 with not less than 100 grams per liter available chlorine.

C. Calcium Hypochlorite: AWWA B300 with 65 to 70 percent available chlorine by weight in granular form.

D. Powder, tablet, or gas according to manufacturer's specification.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to starting the disinfection procedure ensure the potable water system is completed, cleaned, tested in accordance with Section 02660 and ready for disinfection.

B. Ensure that the pipeline to be disinfected is not connected to the existing system.

3.02 DISINFECTION OF WATER LINES

A. Use one of the approved methods in AWWA C651-05.

B. Chlorination shall provide a minimum of 25 ppm residual after 24-hours contact in the pipeline. In general, this residual may be expected with an application of 50 ppm although some conditions may require more.

C. Chlorine, in the form of a 1% slurry of high test calcium hypochlorite (HTH, Perchloron, Pittchlor, etc.) shall be fed into the pipeline in such a manner as to mix with the water flowing in the pipeline. (A 1% slurry results from mixing 1 pound of the calcium hypochlorite with 7.50 gallons of water.)

D. The following table provides information as to the required quantity of slurry to be used per 100 feet of pipe to provide a chlorine concentration of 50 ppm:

Pipe Size (In.)	Vol. Of 100 Ft. Length (gal.)	Required Amount of Slurry (gal.)
4	65	0.33
6	147	0.74
8	261	1.3
10	408	2.0
12	588	3.0
16	1044	5.2

E. During the process of chlorinating the pipeline all valves and other pipeline appurtenances shall be operated several times to provide sufficient contact with the chlorinating agent.

3.03 DISINFECTION OF CULINARY WELLS

A. Use one method defined under AWWA A100 as approved by City Engineer.

B. Do not start disinfection until well is thoroughly cleaned.

C. Use a disinfecting solution containing a minimum of 50 ppm residual chlorine.

3.04 DISINFECTION OF WATER STORAGE RESERVOIRS

A. Use one method defined under AWWA C652, as approved by City Engineer.

B. Do not start disinfection until water storage tank is thoroughly cleaned.

C. Provide and use necessary safety equipment for workers in contact with disinfectant or gasses they may produce.

3.05 QUALITY CONTROL - BACTERIOLOGICAL TEST

A. No samples for testing shall be taken sooner than 24 hours after system flushing.

B. Sample water at each of the following locations, as applicable:

1. Where water enters system.

2. Ends of piping runs.

3. Remote outlets.

C. Analyze water samples in accordance with State of Utah requirements.

D. If bacteriological test proves water quality to be unacceptable, repeat system treatment.

E. Water systems shall not be accepted or placed into service until a negative bacteriological test is made on water taken. Repeat dosing as necessary until a negative test is obtained. Provide a copy of the negative bacteriological test to City Engineer.

F. It shall be the developer's responsibility to submit and pay for the bacteriological test.

3.06 FLUSHING AND DISPOSAL OF DISINFECTANT

A. After the 24 hour retention period, flush the chlorinated water from the main until chlorine measurements show the concentration in the water leaving the main is no higher than that generally prevailing in the system or is acceptable for domestic use.

B. Legally dispose of disinfecting water and ensure no chlorine buildup or damage to the environment.

C. Failing to flush the line may require Contractor to replace all gaskets and valves within the system at Contractor's expense.

END OF SECTION

SECTION 02765

PAVEMENT MARKING PAINT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Furnish Acrylic Water Based pavement marking paint. Refer to this Section, article 2.02 for resin requirement.

B. Apply to hot mix asphalt or portland cement as edge lines, center lines, broken lines, guidelines, contrast lines, symbols, and other related markings.

C. Remove pavement markings.

1.02 RELATED SECTIONS Not Used

1.03 REFERENCES

A. AASHTO M 247: Standard Specification for Glass Beads Used in Traffic Paints

B. ASTM D 562: Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using a Stormer-Type Viscometer

C. ASTM D 2205: Standard Guide for Selection of Tests for Traffic Paints

D. ASTM D 2743: Standard Practices for Uniformity of Traffic Paint Vehicle Solids by Spectroscopy and Gas Chromatography

E. ASTM D 2805: Standard Test Method for Hiding Power of Paints by Reflectometry

F. ASTM D 3723: Standard Test Method for Pigment Content of Water-Emulsion Paints by Low-Temperature Ashing

G. ASTM D 3960: Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings

H. ASTM D 4451: Standard Test Method for Pigment Content of Paints by Low-Temperature Ashing

I. ASTM D 5381: Standard Guide for X-Ray Fluorescence (XRF) Spectroscopy of Pigments and Extenders

J. ASTM E 1347: Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry

K. Federal Standards

L. Manual on Uniform Traffic Control Devices (MUTCD)

M. UDOT Standard Specifications – Pavement Marking Paint Section 02765

N. ASTM E 1346 and ASTM D 2805

1.04 DEFINITIONS Not Used

1.05 SUBMITTALS Not Used

1.06 ACCEPTANCE

A. Provide documentation of the manufacturer and production batch identification for the paint used.

B. Provide fixtures such as ball valves, gate valves, or others on paint truck for the purposes of obtaining field samples.

C. Agitate the paint to allow for thorough mixing. Follow paint manufacturer's recommendation for agitation and mixing times.

D. Stop all agitation before sample is drawn.

E. Calibrate all meters on the paint truck annually and certify for application rate verification.

1. Use the following calibration tolerances for meters:

a. Paint: ± 0.1 gal

b. Beads: ± 0.5 lb/gal

2. Keep a clean, legible copy of calibration report with the paint truck.

3. Provide a copy of certification at the Engineer's request.

F. The Engineer will:

1. Visually inspect lines, legends, symbols, and messages to verify compliance with the required dimensions.

2. Inspect at a minimum at the end of each production day.

3. Verify quantities applied by either of the following methods:

a. Measuring both paint and bead tanks prior to and after application.

b. Witnessing the meter readings prior to and after application.

1) A printout of meter readings, in lieu of witnessing, may be accepted at the Engineer's discretion.

4. Sample in accordance with the UDOT Materials Manual of Instruction, Part 8-932 and the UDOT Minimum Sampling and Testing Requirements.

G. Repaint any line or legend failing to meet bead adherence and dimensional requirements.

PART 2 PRODUCTS

2.01 PAINT

A. Meet the requirements for Acrylic Water Based Paint as listed in Table 4:

Table 4

Paint Requirements				
Property	White	Yellow	Black	Test
Pigment: Percent by weight	63.0	63.0	63.0	ASTM D 3723
Total Solids: Percent by weight, minimum	79.0	79.0	79.0	ASTM D 2205
Nonvolatile vehicle: Percent by weight vehicle, minimum*	43.0	43.0	43.0	ASTM D 2205
Viscosity, KU @ 77 degrees F	80 - 95	80 - 95	80 - 95	ASTM D 562
Density, lb/gal	14.1 ± 0.3	14.1 ± 0.3	14.1 ± 0.3	ASTM D 2205
Volatile Organic Content (VOC): lb/gal, maximum	1.25	1.25	1.25	ASTM D 3960
Titanium Dioxide Content, lb/gal	1.0 min	0.2 max	N/A	ASTM D 5381
Color Definition	37875	33538	N/A	Federal Standard 595B
Directional Reflectance Minimum	90.0	50.0	N/A	ASTM E 1347
Dry Opacity: Minimum (5 mils wet)	0.95	0.95	N/A	ASTM D 2805

* Binder: 100 percent acrylic cross-linking polymer, by weight, as determined by infrared analysis and other chemical analysis available to UDOT. Refer to ASTM D 2205.

B. No-Pick-Up Time

1. Paint may not smear or track three minutes after application to the roadway using standard application equipment, at the mil thickness required, and with an ambient shaded temperature of at least 50 degrees F.

C. Additional requirements:

1. Free of lead, chromium, or other related heavy metals. Refer to ASTM D 5381.

2. Refer to ASTM D 2743, ASTM D 4451 and ASTM D 5381: Tests used to verify paint samples meet ASTM requirements.

2.02 GLASS SPHERES (BEADS) USED IN PAVEMENT MARKING PAINT

A. Specific Properties: Meet AASHTO M 247 with the following exceptions.

1. Gradation:

Longitudinal Lines:	
Passing a No. 18 sieve, percent	65-80
Passing a No. 30 sieve, percent	30-50
Passing a No. 50 sieve, percent	0 – 5
Transverse Markings:	
Passing a No. 20 sieve, percent	95 - 100
Passing a No. 30 sieve, percent	45 - 70
Passing a No. 50 sieve, percent	5 - 25
Passing a No. 80 sieve, percent	0 – 5

2. Beads: Silane adhesion coating.

3. Roundness - The glass beads will have a minimum of 80 percent true spheres.

B. Beads used in Temporary Pavement Markings meet the above or AASHTO M 247 Type II uniform gradation.

C. Glass spheres (beads) NOT required in Parking Stall Striping.

PART 3 EXECUTION

3.01 PREPARATION

A. Line Control.

1. Establish control points at 100 ft intervals on tangent and at 50 ft intervals on curves.

2. Maintain the line within 2 inches of the established control points and mark the roadway between control points as needed.

a. Remove paint that is not placed within tolerance of the established control points and replace at no expense to the Department. Refer to this Section, article 3.4.

b. Maintain the line dimension within 10 percent of the width and length dimensions defined in Standard Drawings.

B. Remove dirt, loose aggregate and other foreign material and follow manufacturer's recommendations for surface preparation.

3.02 APPLICATION

A. Apply Pavement marking paint at the following wet mil thickness requirements.

1. 20 – 25 wet mils for all longitudinal markings.

   Example Calculation: (Verify wet mil thickness)

   $$\text{Wet Mils} = \frac{(0.133681\ ft^3/gal) * 12000\ mil/ft}{(X\ ft/gal)(Z\ ft)}$$

   Where
   X = application rate. (Meter readings or dipping tanks).
   Z = line width measured in feet.
   12000 = conversion from ft to mil
   0.133681 = conversion from gallons to cubic feet.

   For information only: Approximate application rate for required mil thickness requirements.

   a. 4 inch Solid Line: From 190 to 240 ft/gal

   b. 4 inch Broken Line: From 760 to 960 ft/gal

   c. 8 inch Solid Line: From 95 to 120 ft/gal

2. 23 – 40 wet mils for all painted legends as determined by a wet mil gauge.

B. Refer to Table 1 for pavement markings that are less than required wet mils in thickness.

C. No additional payment for pavement markings placed in excess of required wet mils in thickness or exceeding dimensional requirements outlined in this Section, article 3.01 paragraph A.

D. Glass Sphere (Beads): Apply a minimum of 8 lb/gal of paint, the full length and width of line and pavement markings.

   1. Do not apply glass beads to contrast lines (black paint).

E. Begin striping operations no later than 24 hours after ordered by the Engineer.

F. At time of application apply lines and pavement markings only when the air and pavement temperature are:

   1. 50 degrees F and rising for Acrylic Water Based Paint.

3.03 CONTRACTOR QUALITY CONTROL

A. Application Rate: Verify that the paint and beads are being applied within specified tolerances prior to striping.

B. Curing: Protect the markings until dry or cured. In the event that the uncured marking is damaged the marking will be reapplied and track marks left on the pavement will be removed at no additional cost to the City.

3.04 REMOVE PAVEMENT MARKINGS

A. Use one of these removal methods:

1. High pressure water spray,

2. Sand blasting,

3. Shot blasting,

4. Grinding. (Grinding is not allowed on the final surfacing unless the Engineer grants prior written approval.)

B. Do not eliminate or obscure existing striping, in lieu of removal, by covering with black paint or any other covering.

1. The Engineer may grant prior written approval for use of black paint or other obscuring material for work durations shorter than "long term stationary" as defined in the Temporary Traffic Control section of the MUTCD.

C. Use equipment specifically designed for removal of pavement marking material.

END OF SECTION

SECTION 02832

FENCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Chain Link Fence.

B. Wood Fence.

C. Construction Fence.

1.02 RELATED SECTIONS

A. Section 03304: Concrete anchorage for posts.

1.03 REFERENCES

A. ASTM A116: Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

B. ASTM A123: Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.

C. ASTM A392: Zinc-Coated Steel Chain-Link Fence Fabric.

D. ASTM F567: Installation of Chain-Link Fence.

E. ASTM F573: Residential Zinc-Coated Steel Chain Link Fence Fabric.

F. ASTM F1083: Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

G. ASTM F1234: Protective Coating on Steel Framework for Fences.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM F567.

PART 2 PRODUCTS

2.01 CHAIN LINK FENCE MATERIAL AND COMPONENTS

A. Framing (Steel): ASTM F1083 Schedule 40 galvanized steel pipe, welded construction, coating conforming to ASTM F1234 Type A on pipe exterior and interior.

B. Fabric Wire (Steel): ASTM A392 zinc coated wire fabric.

C. Concrete: Type specified in Section 03304.

D. Line Posts: 1.9 inch O. D. galvanized pipe at 2.72 lbs per foot.

E. Corner, Gate, Pull, and Terminal Posts: 2.4 inch O.D. galvanized pipe at 2.65 lbs. Per foot.

F. Top Rail: 1.4 inch diameter, plain end, sleeve coupled.

G. Brace Rail: Minimum 1.6 inch O.D. galvanized pipe and adjustable 3/8 inch truss

H. Tension Wire: 7 gage, Bottom only

2.02 WOOD FENCE MATERIAL AND COMPONENTS

A. Slats: Redwood, cedar, combed spruce or other wood covering acceptable to the City Engineer or his representative.

B. Bottom and top rail: Minimum 2x4x8 cedar stud.

C. Corner, Gate, End, or Line Posts: Minimum size 4x4 cedar wood post.

D. Concrete: Type specified in Section 03304.

2.03 CONSTRUCTION FENCE MATERIAL AND COMPONENTS

A. Material:

1. Fabric to be wire mesh which shall conform to AASHTO Designation M-279, nominal 0.9999-inch Farm Grade with standard six (6) inch graduated spacing. The wire mesh shall have a Class 1 zinc coating.

2. Corner, gate, end or line posts shall be painted metal tee, U or Y channel, angular, or other approved shapes 6'6" in length.

PART 3 EXECUTION

3.01 CHAIN LINK FENCE INSTALLATION

A. Line Pole Spacing, Straight run, tangents or curves.

1. Uniform spacing.

2. Maximum 10 feet.

3. 100-foot radius or less, maximum 5 feet.

4. 100 to 200 foot radius, maximum 6 feet.

5. 200 to 500 foot radius, maximum 8 feet.

B. Set posts plumb, in concrete footings with top of footing 2 inches above finished grade. Slope top of concrete for water runoff.

C. Line Post Footing: Minimum 6 inches of concrete below bottom of post, 8 inches in diameter.

D. Corner, Gate, Pull, and Terminal Post Footing: Minimum 6 inches of concrete below bottom of post, 10 inches in diameter.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

F. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

G. Do not stretch fabric until concrete foundation has cured 7 days.

H. Stretch fabric between terminal posts or at intervals of 500 feet maximum, whichever is less.

I. Position bottom of fabric 2 inches above finished grade and on a straight grade between posts. Excavate if necessary, fill only with approval of City Engineer.

J. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

K. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

L. Changes in line of more than 30 degrees shall be considered as corners.

M. Fence fabric shall be placed on road side of posts unless otherwise indicated.

3.02 WOOD FENCE INSTALLATION

A. Construction Methods: The cedar posts shall be set true to line and grade in concrete bases at least two (2) feet in depth. All posts shall be sound and free from all decay, splits, multiple cracks, or any other defect which would weaken the posts or otherwise cause them to be structurally unsuitable for the purpose intended.

B. The maximum distance between posts in any section shall not exceed eight (8) feet. The top and bottom railing shall be securely fastened to the posts with galvanized nails or other acceptable means. Changes in line of 30 degrees or more shall be considered as corners. A minimum of six (6) inches of concrete shall be provided below the bottom of each post. End posts, corner posts, and gate posts shall have a concrete base at least twelve (12) inches in diameter. Bases for line posts shall also be twelve (12) inches in diameter.

C. Fence slats shall be placed on the roadway side of posts unless otherwise specified. The slats shall be placed approximately one (1) inch above the ground, and on a straight grade between posts by excavating high points of the ground. Filling depression will be permitted only upon approval of the City Engineer. The slats shall be sound and free from all major decay or defects which would weaken or otherwise cause them to be unsuitable for fence slats. Fastening to top and bottom railing shall be done with two (2) galvanized nails and screw at both the top and bottom rail.

3.03 CONSTRUCTION FENCE INSTALLATION

A. Construction Methods:

1. Metal fence posts shall be a spaced a maximum interval of sixteen (16) feet. Posts spacing measurements shall be made parallel to the ground slope. All posts shall be placed in a vertical position. Metal posts may be installed by driving, if this can be done without damage to the post. Otherwise, they shall be installed to the specified depth (2'6") in larger drilled or dug holes and backfilled and compacted.

2. Corner posts shall be braced in two directions. End and gate posts shall be braced in one direction.

3. Wire mesh fabric shall be drawn tight enough to eliminate all sag without causing the “tension crimps” to fail to function.

4. Any high points along the ground surface which interfere with the placing of wire mesh shall be excavated to provide at least two (2) inches of ground clearance.

5. Every alternate lateral wire in the mesh fabric shall be fastened to each post by means of a clamp.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel bars, wire fabric or rod mats for cast-in -place concrete.

B. Support chairs, bolsters, bar supports, and spacers for supporting reinforcement.

1.02 REFERENCES

A. AASHTO M 254: Standard Specification for Corrosion Resistant Coated Dowel Bars.

B. ACI 301: Specifications for Structural Concrete for Buildings.

C. ACI 315: Details and Detailing of Concrete Reinforcement.

D. AASHTO M-32: Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

E. AASHTO M-55: Standard Specification for Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.

F. AASHTO M-55: Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

G. ASTM A 706: Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement.

H. AWS D1.1: Structural Welding Code Steel.

I. AWS D1.4: Structural Welding Code Reinforcing Steel.

J. CRSI Document: Manual of Standard Practice.

1.03 SUBMITTALS

A. Shop drawings.

1. Indicate sizes, spacings, locations, and quantities of reinforcing steel, wire fabric, bending and cutting schedules, splicing, stirrup spacing, supporting, and spacing devices.

2. When required by Engineer, prepare shop drawings by an engineer who complies with Utah licensing law and is acceptable to Engineer.

1.04 QUALITY ASSURANCE

A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice

B. Comply with ACI 301.

C. Welders: AWS D1.1 or AWS D1.4 as applicable.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Steel: In accordance with AASHTO M-31 or ASTM A 706 deformed bars, grade and type as indicated, including supplementary requirements S1, either uncoated or as indicated. When no grade is indicated use 60 grade steel. Use ASTM A 706 steel if welding is indicated or allowed.

B. Welded Steel Wire Fabric: In accordance with AASHTO M-55 plain type; in flat sheets or coiled rolls either uncoated or as indicated.

C. Stirrup Steel: In accordance with AASHTO M-32.

D. Plain Dowel Bars for Expansion Joints: In accordance with AASHTO M-31, Grade 60.

1. Provide metal dowel cap at one end of dowel to permit longitudinal movement of dowel within concrete section. Design caps with 1 end closed.

2. Provide for movement equal to joint width plus ½".

3. For load transfer bars, paint with 1 coat of lead or tar paint conforming to AASHTO M 254 and coat ½ with grease.

2.02 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type or a patented system accepted by Engineer.

B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete.

2.03 FABRICATION

A. Fabricate reinforcement in accordance with ACI, providing for the concrete cover specified in Section 03304.

B. Locate reinforcing splices not indicated on drawings at points of minimum stress. Indicate location of splices on shop drawings.

C. Weld reinforcing bars in accordance with AWS D1.4.

PART 3 EXECUTION

3.01 PLACING

A. All reinforcement to be free of loose mill scale, loose or thick rust, dirt, paint, oil or grease.

B. Place all reinforcement in the exact position indicated. With tie wire tie bars together at alternate intersections.

C. Maintain the distance from vertical forms and between layers of reinforcement by means of prefabricated chairs, ties, hangers, or other approved devices. Placing and fastening of reinforcement in each section of the Work must be approved by Engineer before concrete is placed.

D. Overlap sheets of metal mesh one square plus 6" to maintain a uniform strength. Securely fasten at the ends, edges, and support to maintain clearances.

E. Support reinforcing steel of formed flat slabs with metal chairs, precast concrete blocks or other slab bolsters. Size chairs or bolsters to position the steel in the exact location indicated. Space chairs for supporting the top steel and bolsters for supporting the bottom steel not more than 5 feet on centers in each direction. Plastic or epoxy coat that portion of the metal support in contact with the forms to prevent rust. Tie down deck steel to beams or forms at regular intervals of not more than 5 feet on centers along the beams or forms to prevent movement of the steel during placement of the concrete.

3.02 SPLICING

A. Furnish all reinforcement in the full lengths indicated unless otherwise permitted. Splicing of bars, except where indicated is not permitted without written approval from Engineer. Stagger splices where possible.

B. Unless indicated otherwise, overlap reinforcing bars a minimum of 30 diameters to make the splice. In lapped splices, place the bars and wire in such a manner as to maintain the minimum distance for clear spacing to the surface of the concrete.

C. Do not use lap splices on bars greater in diameter than No. 11 unless approved by Engineer.

D. Weld reinforcing steel only if indicated or if authorization is made by Engineer in writing. Weld in conformance to AWS D1.4.

E. Do not bend reinforcement after embedding in hardened concrete, unless permitted by Engineer.

F. Do not permit reinforcement or other embedded metal items bonded to the concrete, to extend continuously through any expansion joint, except dowels in floors bonded on only one side of joints.

3.03 PLACING EMBEDDED ITEMS

A. Place all sleeves, inserts, anchors and embedded items prior to concrete placement. Fill voids in embedded items temporarily with readily removable material to prevent entry of concrete.

B. Give all trades whose work is related to the concrete section ample notice and opportunity to introduce and/or furnish embedded items before concrete placement.

END OF SECTION

SECTION 03304

PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Portland cement concrete material requirements.

B. Mix design requirements.

1.02 REFERENCES

A. AASHTO T- 26: Standard Method of Test for Quality of Water to be Used in Concrete.

B. ACI 211.1: Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

C. ACI 211.3: Standard Practice for Selecting Proportions for No-Slump Concrete.

D. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete.

E. ACI 306: Cold Weather Concreting.

F. AASHTO M-157: Standard Specification for Ready-Mix Concrete.

G. AASHTO M-85: Standard Specification for Portland Cement.

H. AASHTO M-152: Standard Specification for Air-Entraining Admixtures for Concrete.

I. AASHTO M-194: Standard Specification for Chemical Admixtures for Concrete.

J. AASHTO M-295: Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

1.03 DEFINITIONS

A. Average Strength (f_{cr}): The required average strength for 3 consecutive strength tests which statistically assures no more than the permissible proportions of tests will fall below specified strength.

B. Specified Strength (f_c'): The indicated strength.

1.04 SUBMITTALS

A. Mix Design: Submit each proposed mix design 48 hours prior to use in the Work. Indicate whether mixes have been designed for pumping. Include the report the following information.

1. Water-cement ratio.

2. Proportion of materials in the mix.

3. Source and type of cement.

4. Analysis of water to be used.

5. Type and name of admixtures applied. Indicate when accelerating or retarding admixtures are to be used.

6. Slump, air content and temperature of samples.

7. Unit weight of fresh and dry light weight concrete.

1.05 QUALITY ASSURANCE

A. Use the same source and type of cement, air-entraining agent, water reducing agent, other admixtures, and aggregate.

B. In proportioning materials for mixing, use scales certified by the State of Utah. Do not use volume measurement except for water and liquid admixtures.

C. Do not change the quantity of cement per cubic yard.

D. Use of admixtures will not relax hot or cold weather placement requirements.

E. Ready-mixed concrete, in accordance with AASHTO M-157 and requirements in this Section.

F. Testing Concrete: In accordance with Section 01450.

PART 2 PRODUCTS

2.01 CEMENT

A. Type II (moderate), in accordance with ASTM M-185.

2.02 WATER

A. Water used in mixing concrete shall be clean and free from oil, acid, salt, injurious amounts of alkali, organic matter or other deleterious substances. Clean, non-staining and not detrimental. Comply with AASHTO T 26.

2.03 AGGREGATES - GENERAL

A. Gravel, crushed slag, crushed stone, or other inert material, composed of hard, strong, durable particles free of injurious coatings.

B. The materials passing the No. 200 sieve shall not exceed 1.75 percent by weight in the combined coarse and fine aggregate.

2.04 ADMIXTURES

A. Air Entrainment: pH 2.0 maximum type in accordance with AASHTO M-152.

B. Water Reducing and Water Retarding Agents: In accordance with AASHTO M-194.

1. Type A: Water reducing.

2. Type B: Retarding.

3. Type C: Accelerating.

4. Type D: Water reducing and water retarding.

5. Type E: Water reducing and accelerating.

6. Type F: High range water reducing (super plasticizer). *

7. Type G: High range water reducing and retarding. *

*The relative durability factor of water reducing admixtures shall not be less than 90 and the chlorides content (as Cl-) shall not exceed 1 percent by weight of the admixtures.

C. Calcium Chloride: None allowed.

D. Pozzolan: Pozzolan conforming to the requirements of ASTM C 618, Class F, is allowed as Portland cement replacing agent under the following conditions:

1. Do not replace more than 10 percent of the Portland Cement.

2. The ratio of replacement by weight of Pozzolan to cement shall be 1.25 to 1.0.

3. The minimum cement content shall be used in the design formulas before replacement is made.

4. Loss of ignition of pozzolan is less than 3 percent and the water requirement shall not exceed 100 percent.

5. All other requirements of this section still apply.

6. Mix designs including trial batches are required for each aggregate source and for each concrete class.

E. Fly Ash: maximum 10% fly ash will be allowed.

2.05 ENTRAINING AGENT

A. An air-entraining agent shall be used in all concrete exposed to the weather. The agent shall conform to AASHTO Designations M-152.

2.06 ACI MIX DESIGN

A. The amount by which the average strength of a concrete mix exceeds the specified strength shall be based upon no more than 1 in 100 random individual strength tests falling below the specific strength.

B. Proportion the materials in accordance with ACI 211.1, 211.2 or 211.3 as applicable to produce concrete having the following properties or limitations:

CONCRETE MIX PROPERTIES				
	Concrete Class			Concrete Collar
Properties	4000	3000	2500	4500
Specified Compressive Strength f_c' at 28 days, psi	4000	3000	2500	4500
Compressive Strength at 7 days, psi (a)	2350	2000	1675	2350
Cement content (94 lb. sacks of cement per cubic yard of concrete)	6.5	5.5	5	7
Entrained air content, (% by volume)	4 to 6	5 to 7	5 to 7	4 to 6
Slump Range, in. (b)	2 to 4	2 to 4	2 to 4	2 to 3

(a) Used for monitoring and reference purposes only.
(b) Not more than 8" after adding high range water reducer admixture (super-plasticizer) to verified 2" to 3" slump concrete.

C. The use for each class of concrete is as follows:

1. 4000 psi: Reinforced structural concrete.

2. 4000 psi: Sidewalks, curb and gutter, cross gutters, pavements and unreinforced footings and foundations.

3. 3000 psi: Thrust blocks, anchors and mass concrete.

4. Concrete Collar (4500 psi): Collars around water valves, sewer manholes, survey monuments and storm drain manholes. Concrete to have a minimum of 5 pounds per cubic yard of FORTA-FERRO Macor Synthetic fiber 2.25" long or Approved Equal.

D. Water

1. Sufficient water shall be added to produce concrete with the minimum practicable slump.

2. The slump of mechanically vibrated concrete shall not exceed 4 inches.

3. No concrete shall be placed with a slump in excess of 5 inches.

4. The maximum permissible water cement ratio (including free moisture of aggregates shall be 5 and 5 3/4 gallons per bag of cement respectively for 4000 and 3000 psi air entrained concrete.

2.07 HAND MIXING

A. Do not hand mix batches exceeding 0.5 cubic yards.

2.08 HEATING, WATER AND AGGREGATE

A. Do not allow products of fuel combustion to contact the aggregate.

B. Heat aggregate and mixing water to 150 degrees F. maximum. Heat aggregates uniformly.

C. Maintain mixed concrete temperature at time of placement between 60 and 90 degrees F.

D. Do not mix cement with water or with mixtures of water and aggregate greater than 90 degrees.

PART 3 EXECUTION

3.01 DELIVERY

A. Slump: Do not transport concrete to the work location if concrete is greater than permissible slump.

B. Discharge: After the introduction of mixing water to the cement and aggregates at the batch plant, discharge concrete from truck mixer within 90 minutes.

3.02 RE-TEMPERING

A. Adding Water: When concrete arrives at site with slump below specified, water may be added once if neither the maximum approved water/cement ratio nor the maximum slump is exceeded provided that the drum turns a minimum of 90 revolutions.

B. Super-plasticizer: Premeasure and add high range water reducers (super-plasticizer) in accordance with manufacturer's instructions. Add super-plasticizer at site using truck-mounted power injection equipment capable of rapidly and uniformly distributing the admixture to the concrete. Mix for a minimum of 3 minutes prior to discharge.

C. Re-tempering after delivery time with super-plasticizer is prohibited.

3.03 CONCRETE PLACEMENT

A. In accordance with Section 03310.

END OF SECTION

SECTION 03310

CONCRETE WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cast-in-place concrete placement operations for slabs on grade, slabs on fill, structural building frame, and other concrete components.

1.02 REFERENCES

A. AASHTO M-182: Standard Specification for Burlap Cloth Made from Jute or Kenaf.

B. ACI 301: Specifications for Structural Concrete for Buildings.

C. ACI 305: Hot Weather Concreting.

D. ACI 306: Cold Weather Concreting.

E. ACI 309: Standard Practice for Consolidation of Concrete.

F. ACI 315: Details and Detailing of Concrete Reinforcement.

G. AASHTO M-148: Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

H. ASTM C-642: Standard Test Method for Specific Gravity, Absorption, and Voids in Hardened Concrete.

1.03 RELATED WORK

A. Manufacture of Portland cement concrete and its delivery to site, in accordance with Section 03304.

1.04 SUBMITTALS

A. Record of Placed Concrete: Record date, location of pour, quantity, air temperature, and test samples taken.

B. Product name, type, and chemical analysis of the following as applicable:

1. Curing compound.

2. Sealing compound.

3. Chemical hardener.

1.05 QUALITY ASSURANCE

A. Rejection: Concrete work which fails to meet one or more of the following requirements, and which cannot be brought into compliance shall be rejected. Engineer shall determine appropriate modifications or payment adjustments to be made.

1. Appearance: Concrete exposed to view with defects which adversely affect appearance of specified finish.

2. Strength: Strength of concrete fails to comply with any of the following requirements.

a. Low compressive or flexural strength.

b. Reinforcing steel size, quantity, strength, position, damage, or arrangement at variance with requirements.

c. Concrete which differs from required dimensions or location in such a manner as to reduce its strength or load carrying capacity.

d. Inadequate protection of concrete from extremes of temperature during the early stages of hardening and strength development.

e. Mechanical injury, construction fires, accidents, or premature removal of formwork likely to result in deficient strength development.

f. Workmanship likely to result in deficient strength.

3. Slab Tolerance: Field quality control as specified herein.

4. Material Sources: In accordance with Section 03304.

1.06 WARRANTY

A. Repair or replace defective or damaged work at no additional cost to City.

PART 2 PRODUCTS

2.01 ACCESSORIES

A. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.

B. Vapor Retarder: 10 mil thick clear polyethylene sheet. Type recommended for below grade application.

C. Forms: In accordance with Section 02528 and ACI 315.

D. Reinforcement: In accordance with section 03200.

E. Covering: Waterproof paper, polyethylene sheet or burlap cloth complying with AASHTO M 182, Class two.

2.02 CONCRETE SURFACE CURING COMPOUND

A. Liquid membrane, in accordance with AASHTO M-148.

B. Type of Compound: Engineer to select.

1. Type 1, clear or translucent without dye.

2. Type 1-D, clear or translucent with red fugitive dye.

3. Type 2, white pigmented.

C. Class of Vehicle: Class A, no restrictions.

D. Performance Criteria of Compound: Compatible with sealing compound, if sealing compound is to be applied over concrete curing compound.

PART 3 EXECUTION

3.01 PREPARATION

A. All exposed corners shall be chamfered (3/4" x 3/4").

B. Verify that anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not impede placing concrete.

C. Do not allow construction loads to exceed member capacity.

D. Prepare previously placed concrete by cleaning with steel brush and applying bonding compound. Apply bonding compound in accordance with manufacturer's instructions.

E. At locations where new concrete is dowelled to existing work, drill holes in existing concrete work placed at ambient temperatures above 50 degrees F. Use of admixtures will not relax cold weather placement requirements.

F. Do not disturb reinforcement, inserts, embedded parts, and formed joints.

G. Do not break or interrupt successive pours such that cold joints occur.

H. Honeycomb or embedded debris in concrete is not acceptable.

3.02 JOINTS

A. Saw cut patterns where indicated. Saw cut control joints without raveling of the concrete. A maximum of 24 hours after pouring the concrete and prior to occurrence of any surface cracking.

3.03 CONSOLIDATION

A. In accordance with ACI 309.

B. Keep spare vibrator available during concrete placement operations.

3.04 FINISHING

A. Do not add water or retemper concrete unless Engineer's approval is secured.

B. Slab Finishing Tolerance:

1. Class A finish: 1 in 1000.

2. Class B finish: 1 in 500.

3. Class C finish: 1 in 150.

C. Finishes: In accordance with Section 03345. When type of finish is not indicated, use following finishes as applicable:

1. Sidewalks, garage floors, and ramps: Broom or belt finish.

2. Exterior concrete pavement: Broom or belt finish.

3. Exterior platforms, steps, and landings, exterior and interior pedestrian ramps, not covered by other finish materials: Nonslip finish.

4. Surfaces intended to receive bonded applied cementitious applications: Scratched finish.

5. Surfaces intended to receive roofing, except future floors, waterproofing membranes, and roof surfaces which are future floors or sand bed terrazzo: Floated finish.

6. Floors and roof surfaces which are floors intended as walking surfaces or to receive floor coverings: Troweled finish.

7. Unpainted concrete surfaces not exposed to public view: Smooth as-cast form finish.

8. Unpainted concrete surfaces exposed to public view: Rubbed finish.

9. Concrete surfaces to receive paint or plaster: Grout cleaned finish.

D. Chemical Hardener: After completion of curing, apply chemical hardener in accordance with manufacturer's instructions to all interior floor slabs which are exposed in finished work and elsewhere as indicated. After final coat of chemical hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water. Do not place liquid floor hardener on floor areas scheduled to receive synthetic matrice terrazzo, or setting beds for tile, terrazzo, vinyl flooring, or like items.

3.05 CURING

A. General: Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete. Cure concrete by applying curing and sealing compound, by moisture curing, by moisture-retaining cover curing, or by combinations thereof.

B. Curing Compounds:

1. Apply curing compound to concrete slabs within 2 hours of completing final finishing operations. Apply uniformly in continuous operation. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period. Should side forms be removed before expiration of 7 days from start of curing, coat exposed surfaces with curing compound.

2. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, damproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Engineer.

C. Moisture Curing: Provide either of the following methods.

1. Keep concrete surface continuously wet by covering with water or continuous water-fog spray.

2. Cover concrete surface with absorptive cover, thoroughly saturated with water and kept continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

3.06 SEALING

A. Surface Preparation: If necessary to remove curing compound, sandblast concrete surface. Clean surface free of dirt, oil, grease and other contaminants. If necessary use proprietary cleaning compounds (not raw acids) followed by thorough water rinsing. Use high pressure water equipment providing 1,200-2,000 psi to remove detergent residues. Do not attempt application when condensation is present.

B. Application: Spray with low pressure (20 psi) airless spray equipment. Saturate the surface to the point of rejection. On vertical surfaces apply 2 coats.

C. Coverage Rates: In accordance with manufacturer’s recommendation.

D. Paint Adhersion: Always test to verify compatibility between sealant and other proposed surface treatments.

E. Warning: Remove inadvertent splashes before the solution has dried on the surface. If sealant is a hazardous material, allow use only by professional applicator. Three (3) 4-inch cylinders shall be taken and a slump and air test shall be done at the beginning of concrete placement and every 50 cubic yards thereafter.

3.07 TESTS

A. Arrange for and perform all testing required for qualification of proposed materials and the establishment of mix designs, in determining strengths for early form removal, for cylinder tests after the addition of water, and other needs of Contractor.

B. Two slump tests, one before and one after the addition of super-plasticizer.

C. Three (3) standard 4-inch cylinder samples of concrete from trucks receiving water after addition of water.

3.08 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required levels, lines, details, and elevations.

B. Structural analysis and additional testing may be required at no additional cost to Owner when the strength of a structure is considered potentially deficient.

C. Patch imperfection. Refer to Section 03345 requirements.

3.09 PROTECTION AND REPAIRS

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Random Cracks in Pavement Slabs on Grade: When cracks occur within 2 feet of expansion of construction joints, remove and repair, otherwise grout with approved epoxy grout. Use saw cuts and dowels in all cut planes.

D. All concrete curbs, gutter, sidewalks, and driveways shall be removed and replaced to the next joint or scoring lining beyond the actually damaged or broken sections.

E. In the event that joints or scoring lines do not exist or are five or more feet from the removed or damaged section, the damaged portions shall be saw cut, removed, and reconstructed to neat, plane faces.

F. All new concrete shall match, as nearly as possible, the appearance of adjacent concrete improvements.

G. Where necessary, lampblack or other pigments shall be added to the new concrete to obtain the desired results.

H. The concrete surface must not be damaged or pitted by rain.

I. The Contractor shall provide and use, when necessary, sufficient tarpaulins to completely cover all sections that have been placed within the preceding twelve (12) hours.

J. The Contractor shall erect and maintain suitable barriers to protect the finished surface.

K. Any section damaged from traffic or other causes occurring prior to its official final acceptance shall be repaired or replaced by the Contractor at his own expense in a manner satisfactory to the City Engineer.

L. Concrete surface repair method as per engineer's discretion.

M. Concrete shall not spall or show signs of spalling before the warranty expiration. All concrete with spalling shall be removed and replaced by the Contractor or Owner at his own expense. Concrete with spalling may be repaired by an approved method. The approved method must be a five step process which includes a muriatic acid wash, pressure wash with orbital nozzle, application of approved grout & cement modifier (Duraset 1000 Modified Acrylic Resin and G100 Pro-Series Grout Mix and Liquid Colorant or equal), and application of approved solvent based sealer (SuperSeal 2000 Solvent Based Acrylic Sealer or equal).

N. Curb & gutter damage shall be repaired according to the following criteria.

1. Removal and replacement of the entire section of curb and gutter is required for chips and gouges greater than ¾" deep and 3" longcracks over ¼" wide, or any damage which will result in the failure of the curb & gutter, unless an acceptable epoxy based patch is approved by the City Engineer.

2. Epoxy based patching compounds may be used as an alternative to removal and replacement for curb & gutter chips and gouges smaller than ¾" deep and 3" long. Patches shall match surrounding surface of concrete.

3. Alternative methods of repair shall be approved by the City Engineer.

O. Broken or damaged sidewalk shall be repaired according to the following criteria.

1. Epoxy based patching may be used for chips or gouges in sidewalk greater than 1/2 inch in depth but less than 3 inches in depth.

2. Removal and replacement of the entire concrete section* is required for the following types of damage:

a. Chips and gouges in or along sidewalks greater than three inches deep.

b. Cracks over ¼" in nominal width regardless of running direction.

c. Multiple cracks where the cracks are less than a sidewalk width apart.

d. Cracks that converge creating small isolated pieces of sidewalk.

e. Cracks that generally run parallel to the length of the sidewalk.

f. Cracks that circle back to the original side creating a "half moon" piece of broken concrete.

g. Cracks that allow the concrete to move vertically from the adjoining piece or section in excess of ¼" or which the inspector deems as a tripping hazard.

h. Any damage which in the inspectors' opinion was clearly the result of negligence on the part of the builder. Or damage which appears will result in failure of the sidewalk or gutter and its intended function.

*Sections may be cut and the damaged portions removed, provided no remaining or new section(s) are less than 5 feet in length. (Cut lines are considered as section lines.)

P. All concrete work shall conform to the requirements of this section.

Q. Concrete sidewalk and curb & gutter which is defective due to settlement, uneven joints, or tripping hazards may be corrected by "Concrete Lifting" as approved by Engineer. Concrete lifting shall conform to the following:

1. Concrete repair by lifting shall only be performed by a licensed contractor specializing in concrete lifting.

2. Concrete lifting shall be completed by drilling strategically placed holes in concrete. A grout, sand, Portland cement, and water mixture shall be used proportioned to harden without settlement and to sufficiently fill voids beneath the concrete. Holes shall be placed to allow for pumping the cement mixture under the concrete to lift the settled areas. Additional holes shall also be drilled to allow for filling voids created by the lifting procedure.

3. The proportion of Portland cement shall be a minimum of 5 percent by weight of dry mixture.

4. The use of the concrete lifting technique may be attempted to correct uneven adjoining sections of concrete or correct areas of defective drainage. If concrete lifting does not correct the defective concrete to the Engineers satisfaction, the concrete shall be removed and replaced.

3.10 PLACING CONCRETE IN COLD WEATHER

A. No concrete shall be placed where the air temperature is lower than 40 degrees Fahrenheit, at a location where the concrete cannot be covered or protected from the surrounding air.

B. When concrete is placed below a temperature of 35 degrees Fahrenheit the ingredients of the concrete shall be heated so that the temperature of the mixture shall not be less than 50 degrees or more than 100 degrees Fahrenheit.

C. Before mixing, the heated aggregates shall not exceed 175 degrees Fahrenheit.

D. Cement shall not be added while the temperature of the mixed aggregates and water is greater than 100 degrees Fahrenheit.

E. When there is likelihood of freezing during the curing period, the concrete shall be protected by means of an insulated covering to prevent freezing of the concrete for a period of not less than 7 days after placing.

F. Equipment for protecting concrete from freezing shall be available at the job site prior to placing concrete. Particular care shall be exercised to protect edges and exposed corners from freezing.

G. In the event heating is employed, care shall be taken to insure that no part of the concrete becomes dried out or is heated to temperatures above 100 degrees Fahrenheit.

H. The housing, covering, or other protection used shall remain in place and intact at least 24 hours after the artificial heating is discontinued.

I. For a period of five days the concrete shall be kept above 40 degrees F and below 100 degrees F.

END OF SECTION

SECTION 03345

CONCRETE FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Application procedure for concrete surface finishes.

1.02 PROJECT CONDITIONS

A. Allow concrete to cure not more than 72 hours before commencing surface finish operations, unless otherwise acceptable to Engineer.

B. Protect adjacent materials and finishes from dust, dirt and other surface or physical damage during finishing operations. Provide protections as required and remove from site at completion of Work.

C. For surfaces to be blast finished, perform abrasive blasting within 24 to 72 hours after casting. Coordinate with form work construction, concrete placement schedule, and form work removal to ensure that surfaces are blasted at same age for uniform results.

PART 2 EXECUTION

2.01 PATCH FINISHING

A. Repair surface defects immediately after form removal.

B. Make any patches in concrete to closely match color and texture of surrounding surfaces. Determine mix formula for patching mortar by trial and obtain a good color match with concrete when both patch and concrete are cured and dry.

1. Mix white and gray Portland cement as required to match surrounding concrete to produce grout having consistency of thick paint.

2. Use a minimum amount of mixing water.

3. Mix patching mortar in advance and allow to stand without frequent manipulation, without addition of water, until it has reached stiffest placeable consistency.

4. After initial set, dress surfaces of patches manually to obtain same texture as surrounding surfaces.

C. Repair defective areas.

1. Remove honeycomb and defective concrete down to sound concrete.

2. Make edges perpendicular to surface or slightly undercut.

3. Featheredges are not permitted.

4. Dampen area to be patched and at least 6" surrounding it to prevent absorption of patching mortar water.

5. Prepare bonding grout.

6. Mix to consistency of thick cream.

7. Brush into surface.

D. After surface water has evaporated from patch area, brush bond coat into surface.

1. When bond coat begins to lose water sheen, apply patching mortar.

2. Thoroughly consolidate mortar into place and strike-off to leave patch slightly higher than surrounding surface.

3. Leave undisturbed for at least 1 hour before final finish.

4. Keep patched area damp for 72 hours or apply curing compound.

5. Do not use metal tools in finishing an exposed patch.

E. Tie Holes: Unless indicated otherwise, after being cleaned and thoroughly dampened, fill the hole solid with patching mortar.

F. Whereas-cast finishes are indicated, total patched area may not exceed 1 in 500 of as-cast surface. This is in addition to form tie patches, if ties are permitted to fall within as-cast areas.

G. In any finishing process which is intended to expose aggregate on surface, patched areas must show aggregate.

1. Outer 1" of patch shall contain same aggregates as surrounding concrete.

2. For aggregate transfer finish, patching mixture shall contain same selected colored aggregates.

3. After curing, expose aggregates together with aggregates of adjoining surfaces by same process.

2.02 SLAB FINISHING

A. Broom or Belt Finish: After concrete has been placed, consolidated, struck-off, and leveled to the required tolerance, roughen surface transversely with stiff brushes, rakes, or burlap belt before final set.

B. Float Finish: After concrete has been placed, consolidated, struck-off, and leveled, do not work further until ready for floating.

1. Begin floating when water sheen has disappeared and surface has stiffness sufficient to permit operation.

2. During or after first floating, check plainness of entire surface with a 10 feet long straightedge applied at 2 or more different angles.

3. Cut down high spots and fill low spots to the required tolerance.

4. Refloat slab immediately to a uniform sandy texture.

C. Trowel Finish:

1. Float finish surface.

2. Power trowel.

3. Hand trowel as required to provide surface. Do not apply water to retemper concrete in finishing operations.

4. First troweling after power floating shall produce smooth surface relatively free of defects but which may still show some trowel marks.

5. Second trowel by hand after surfaces has hardened.

6. Leave finished surface essentially free of trowel marks, uniform in texture and appearance.

7. On surfaces intended to support floor coverings, grind off defects which would show through floor covering.

2.03 AS-CAST FORMED FINISHING

A. Rough: Patch defects, chip or rub off fins exceeding 1/4" height.

B. Smooth: Patch tie holes and defects and remove fins completely.

1. When surface texture is impaired and form joints misaligned, grind, bush hammer, or correct affected concrete as directed by Engineer.

2. Slurry grout areas evidencing minor mortar leakage to match adjacent concrete.

3. Repair major mortar leakage as a defective area.

4. When in opinion of Engineer, workmanship is less than acceptable standard, provide one of rubbed finishes at no additional cost to Owner.

2.04 RUBBED FINISHING

A. Produce following finishes on concrete with a smooth form finish.

1. Smooth Rubbed: Remove forms and perform necessary patching as soon after placement as possible.

2. Finish newly hardened concrete no later than 24 hours following form removal.

3. Wet surfaces and rub with carborundum brick or other abrasive until uniform color and texture are produced.

B. Grout Cleaned: Undertake no cleaning operations until all contiguous surfaces are completed and accessible.

1. Wet surface of concrete sufficiently to prevent absorption of water from grout.

2. Apply grout uniformly.

3. Immediately after grouting, scrub surface with cork float or stone to coat surface and fill voids.

4. While grout is still plastic, remove excess grout by working surface with rubber float or sack.

5. After-surface whitens from drying, rub vigorously with clean burlap.

6. Keep damp for at least 36 hours after final rubbing.

7. Cork Floated: Remove forms within 2 to 3 days of placement where possible.

8. Remove ties.

9. Remove all burrs and fins.

10. Dampen wall surface.

11. Apply mortar with firm rubber float or with trowel, filling all surface voids.

12. Compress mortar into voids.

13. If mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with fog sprayer.

14. Produce final texture with cork float using a swirling motion.

2.05 UNFORMED FINISHING

A. After concrete is placed, strike smooth, tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces.

B. Float to texture which is reasonably consistent with formed surfaces.

C. Continue final treatment on formed surfaces uniformly across uniformed surfaces.

END OF SECTION