STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

STANDARD LOW BID PROJECT

September 1, 2006

2ND STREET DRAINAGE SYSTEM CAMP WILLIAMS

UTAH NATIONAL GUARD
RIVERTON, UTAH

DFCM Project Number 03265480

Civil Science
3160 West Clubhouse Drive
Lehi, Utah 84043

TABLE OF CONTENTS

	Page Numbers
Title Page	1
Table of Contents	2
Notice to Contractors	3
Project Description	4
Project Schedule	5
Bid Form	6
Instructions to Bidders	8
Bid Bond	12
Contractors Sublist Form	13
Fugitive Dust Plan	16
Contractor's Agreement	23
Performance Bond	28
Payment Bond	29
Change Order Form	30
Certificate of Substantial Completion	31

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

DFCM General Conditions dated May 25, 2005.
DFCM Application and Certification for Payment dated May 25, 2005.

Technical Specifications :
Drawings:

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

NOTICE TO CONTRACTORS

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

2ND STREET DRAINAGE SYSTEM - CAMP WILLIAMS
UTAH NATIONAL GUARD – RIVERTON, UTAH
DFCM PROJECT NO: 03265480

Bids will be in accordance with the Contract Documents that will be available at 4:00 PM on Friday, September 1, 2006, and distributed in electronic format only on CDs from DFCM, 4110 State Office Building, Salt Lake City, Utah and on the DFCM web page at http://dfcm.utah.gov. For questions regarding this project, please contact Wayne Smith, DFCM, at 801-550-6536. No others are to be contacted regarding this bidding process. The construction budget this project is $ 400,000.

A **mandatory** pre-bid meeting will be held at 9:00 AM on Thursday, September 7, 2006 at Bldg. 119, Camp Williams, 17800 South Redwood Road, Riverton, Utah. All bidders wishing to bid on this project are required to attend this meeting.

Bids will be received until the hour of 3:00 PM on Tuesday, September 12, 2006 at DFCM, 4ll0 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. NOTE: Bids must be received at 4110 State Office Building by the specified time.

Bid security, in the amount of five percent (5%) of the bid, must be submitted as stated in the Instruction to Bidders.

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

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
Marla Workman, Contract Coordinator
4110 State Office Building, Salt Lake City, Utah 84114

PROJECT DESCRIPTION

This project consists of removing an existing historical rock ditch in areas and replacing it with new excavated storm drain pipe including catch basins and finishing the roadway with curb and gutter as per plans and specifications. The rock from the ditch will be saved by the National Guard and deposited at a location on site.

Contractors who wish to bid this project must be pre-qualified by providing a five year work history of successfully completed projects which are similar in scope to DFCM prior to the mandatory pre-bid meeting UNLESS the contractor has successfully completed State construction contracts within the last five years. Direct pre-qualification statements along with a short management plan of how the project will be scheduled and managed to Wayne Smith, DFCM, e-mail wfsmith@utah.gov or fax 801-538-3267.

PROJECT SCHEDULE

PROJECT NAME: **2ND STREET DRAINAGE SYSTEM - CAMP WILLIAMS UTAH NATIONAL GUARD – RIVERTON, UTAH**

DFCM PROJECT NO. : **03265480**

Event	Day	Date	Time	Place
Bidding Documents Available	Friday	September 1, 2006	4:00 PM	DFCM 4110 State Office Bldg SLC, UT or DFCM web site *
Mandatory Pre-bid Site Meeting	Thursday	September 7, 2006	9:00 AM	Bldg 119 Camp Williams 17800 So Redwood Rd. Riverton, UT
Last Day to Submit Questions	Friday	September 8, 2006	4:00 PM	DFCM 4110 State Office Bldg SLC, UT
Final Addendum Issued	Monday	September 11, 2006	4:00 PM	DFCM web site *
Prime Contractors Turn In Bid and Bid Bond / Bid Opening in DFCM Conference Room	Tuesday	September 12, 2006	3:00 PM	DFCM 4110 State Office Bldg SLC, UT
Sub-contractor List Due	Wednesday	September 13, 2006	3:00 PM	DFCM 4110 State Office Bldg SLC, UT
Project Completion	Thursday	November 30, 2006		

*** DFCM's web site address is http://dfcm.utah.gov**

BID FORM

NAME OF BIDDER _____ DATE _____

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

The undersigned, responsive to the "Notice to Contractors" and in accordance with the "Instructions to Bidders", in compliance with your invitation for bids for the **2ND STREET DRAINAGE SYSTEM CAMP WILLIAMS – UTAH NATIONAL GUARD – RIVERTON, UTAH – DFCM PROJECT NO. 03265480** and having examined the Contract Documents and the site of the proposed Work and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of labor, hereby proposes to furnish all labor, materials and supplies as required for the Work in accordance with the Contract Documents as specified and within the time set forth and at the price stated below. This price is to cover all expenses incurred in performing the Work required under the Contract Documents of which this bid is a part:

I/We acknowledge receipt of the following Addenda: _____

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

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

ADDITIVE ALTERNATE #1: Utah Avenue West

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

ADDITIVE ALTERNATE #2: 3rd Street Drainage

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

ADDITIVE ALTERNATE #3: South Area Drainage

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

I/We guarantee that the Work will be Substantially Complete no later than **November 30, 2006**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **$375.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

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

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

The undersigned Contractor's License Number for Utah is _____.

Upon receipt of notice of award of this bid, the undersigned agrees to execute the contract within ten (10) days, unless a shorter time is specified in the Contract Documents, and deliver acceptable Performance and Payment bonds in the prescribed form in the amount of 100% of the Contract Sum for faithful performance of the contract.

The Bid Bond attached, in the amount not less than five percent (5%) of the above bid sum, shall become the property of the Division of Facilities Construction and Management as liquidated damages for delay and additional expense caused thereby in the event that the contract is not executed and/or acceptable l00% Performance and Payment bonds are not delivered within the time set forth.

Type of Organization: _____ (Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

_____

Respectfully submitted,

_____
Name of Bidder

ADDRESS:

_____

_____

_____
Authorized Signature

INSTRUCTIONS TO BIDDERS

1. Drawings and Specifications, Other Contract Documents

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

2. Bids

Before submitting a bid, each contractor shall carefully examine the Contract Documents, shall visit the site of the Work; shall fully inform themselves as to all existing conditions and limitations; and shall include in the bid the cost of all items required by the Contract Documents. If the bidder observes that portions of the Contract Documents are at variance with applicable laws, building codes, rules, regulations or contain obvious erroneous or uncoordinated information, the bidder shall promptly notify the DFCM Representative and the necessary changes shall be accomplished by Addendum.

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

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

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

3. Contract and Bond

The Contractor's Agreement will be in the form bound in the specifications. The Contract Time will be as indicated in the bid. The successful bidder, simultaneously with the execution of the Contract Agreement, will be required to furnish a performance bond and a payment bond, both bearing original signatures, upon the forms provided in the procurement documents. The performance and payment bonds shall be for an amount equal to one hundred percent (100%) of the contract sum and secured from a company that meets the requirements specified in the requisite forms. Any bonding requirements for subcontractors will be specified in the Supplementary General Conditions.

4. Listing of Subcontractors

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

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

5. Interpretation of Drawings and Specifications

If any person or entity contemplating submitting a bid is in doubt as to the meaning of any part of the drawings, specifications or other Contract Documents, such person shall submit to the DFCM Project Manager a request for an interpretation thereof. The person or entity submitting the request will be responsible for its prompt delivery. Any interpretation of the proposed documents will be made only by addenda posted on DFCM's web site at http://dfcm.utah.gov. Neither the DFCM nor A/E will be responsible for any other explanations or interpretations of the proposed documents. A/E shall be deemed to refer to the architect or engineer hired by DFCM as the A/E or Consultant for the Project.

6. Addenda

Addenda will be posted on DFCM's web site at http://dfcm.utah.gov. Contractors are responsible for obtaining information contained in each addendum from the web site. Addenda issued prior to the submittal deadline shall become part of the bidding process and must be acknowledged on the bid form. Failure to acknowledge addenda may result in disqualification from bidding.

7. Award of Contract

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

8. DFCM Contractor Performance Rating

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

9. Licensure

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

10. Right to Reject Bids

DFCM reserves the right to reject any or all Bids.

11. Time is of the Essence

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

12. Withdrawal of Bids

Bids may be withdrawn on written request received from bidder prior to the time fixed for opening. Negligence on the part of the bidder in preparing the bid confers no right for the withdrawal of the bid after it has been opened.

13. Product Approvals

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

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

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

15. Debarment

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

BID BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

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

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

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

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

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

DATED this _____ day of _____, 20_____ .

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

_____

_____

By:_____

Title: _____

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

_____

_____

By:_____

Title: _____

(Affix Corporate Seal)

Surety's name and address:

_____

_____

By: _____

Attorney-in-Fact (Affix Corporate Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

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

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

_____
NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

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

INSTRUCTIONS AND SUBCONTRACTORS LIST FORM

The three low bidders, as well as all other bidders that desire to be considered, are required by law to submit to DFCM within 24 hours of bid opening a list of **ALL** first-tier subcontractors, including the subcontractor's name, bid amount and other information required by Building Board Rule and as stated in these Contract Documents, on the following basis:

PROJECTS UNDER $500,000 - ALL SUBS $20,000 OR OVER MUST BE LISTED
PROJECTS $500,000 OR MORE - ALL SUBS $35,000 OR OVER MUST BE LISTED

- Any additional subcontractors identified in the bid documents shall also be listed.
- The DFCM Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law.
- List subcontractors for base bid as well as the impact on the list that the selection of any alternate may have.
- Bidder may not list more than one subcontractor to perform the same work.
- Bidder must list "Self" if performing work itself.

LICENSURE:

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

BIDDER LISTING 'SELF' AS PERFORMING THE WORK:

Any bidder that is properly licensed for the particular work and intends to perform that work itself in lieu of a subcontractor that would otherwise be required to be on the subcontractor list, must insert the term 'Self' for that category on the subcontractor list form. Any listing of 'Self' on the sublist form shall also include the amount allocated for that work.

'SPECIAL EXCEPTION':

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

GROUNDS FOR DISQUALIFICATION:

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

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

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

(1) The contractor has established in writing that the change is in the best interest of the State and that the contractor establishes an appropriate reason for the change, which may include, but not is not limited to, the following reasons: the original subcontractor has failed to perform, or is not qualified or capable of performing, and/or the subcontractor has requested in writing to be released.
(2) The circumstances related to the request for the change do not indicate any bad faith in the original listing of the subcontractors.
(3) Any requirement set forth by the Director to ensure that the process used to select a new subcontractor does not give rise to bid shopping.
(4) Any increase in the cost of the subject subcontractor work is borne by the contractor.
(5) Any decrease in the cost of the subject subcontractor work shall result in a deductive change order being issued for the contract for such decreased amount.
(6) The Director will give substantial weight to whether the subcontractor has consented in writing to being removed unless the Contractor establishes that the subcontractor is not qualified for the work.

EXAMPLE:

Example of a list where there are only four subcontractors:

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

PURSUANT TO STATE LAW - SUBCONTRACTOR BID AMOUNTS CONTAINED IN THIS SUBCONTRACTOR LIST SHALL NOT BE DISCLOSED UNTIL THE CONTRACT HAS BEEN AWARDED.

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and

DFCM

SUBCONTRACTORS LIST

FAX TO 801-538-3677

PROJECT TITLE: _____

Caution: You must read and comply fully with instructions.

TYPE OF WORK	SUBCONTRACTOR, "SELF" OR "SPECIAL EXCEPTION"	SUBCONTRACTOR BID AMOUNT	CONT. LICENSE #

We certify that:

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

FIRM: _____

DATE: _____ SIGNED BY: _____

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

FUGITIVE DUST PLAN

The Contractor will fill out the form and file the original with the Division of Air Quality and a copy of the form with the Division of Facilities Construction & Management, prior to the issuance of any notice to proceed.

The Contractor will be fully responsible for compliance with the Fugitive Dust Control Plan, including the adequacy of the plan, any damages, fines, liability, and penalty or other action that results from noncompliance.

Utah Division of Air Quality *April 20, 1999*
GUIDANCE THAT MUST BE CONSIDERED IN DEVELOPING AND SUBMITTING A DUST CONTROL PLAN FOR COMPLIANCE WITH R307-309-3, 4, 5, 6, 7

Source Information:

1. Name of your operation (source): provide a name if the source is a construction site.

2. Address or location of your operation or construction site.

3. UTM coordinates or Longitude/Latitude of stationary emission points at your operation.

4. Lengths of the project, if temporary (time period).

5. Description of process (include all sources of dust and fugitive dust). Please, if necessary, use additional sheets of paper for this description. Be sure to mark it as an attachment.

6. Type of material processed or disturbed.

7. Amount of material processed (tons per year, tons per month, lbs./hr., and applicable units).

8. Destination of product (where will the material produced be used or transported, be specific, provide address or specific location), information needed for temporary relocation applicants.

9. Identify the individual who is responsible for the implementation and maintenance of fugitive dust control measures. List name(s), position(s) and telephone number(s).

10. List, and attach copies of any contract lease, liability agreement with other companies that may, or will, be responsible for dust control on site or on the project.

Description of Fugitive Dust Emission Activities
(Things to consider in addressing fugitive dust control strategies.)

1. Type of activities (drilling and blasting, road construction, development construction, earth moving and excavation, handling and hauling materials, cleaning and leveling, etc).

2. List type of equipment generating the fugitive dust.

3. Diagram the location of each activity or piece of equipment on site. Please attach the diagram.

4. Provide pictures or drawings of each activity. Include a drawing of the unpaved/paved road network used to move loads "on" and "off" property.

5. Vehicle miles travels on unpaved roads associated with the activity (average speed).

6. Type of dust emitted at each source (coal, cement, sand, soil, clay, dust, etc.)

7. Estimate the size of the release area at which the activity occurs (square miles). For haul or dirt roads include total miles of road in use during the activity.

Description of Fugitive Dust Emission Controls on Site

Control strategies must be designed to meet 20% opacity or less on site (a lesser opacity may be defined by Approval Order conditions or federal requirements such as NSPS), and control strategies must prevent exceeding 10% opacity from fugitive dust at the property boundary (site boundary) for compliance with R307-309-3.

1. Types of ongoing emission controls proposed for each activity, each piece of equipment, and haul roads.

2. Types of additional dust controls proposed for bare, exposed surfaces (chemical stabilization, synthetic cover, wind breaks, vegetative cover, etc).

3. Method of application of dust suppressant.

4. Frequency of application of dust suppressant.

5. Explain what triggers the use of a special control measure other than routine measures already in place, such as covered loads or measures covered by a permit condition (increase in opacity, high winds, citizen complaints, dry conditions, etc).

6. Explain in detail what control strategies/measures will be implemented off-hours, i.e., Saturdays/Sundays/Holidays, as well as 6 PM to 6 AM each day.

Description of Fugitive Dust Control Off-site

Prevent, to the maximum extent possible, deposition of materials, which may create fugitive dust on public and private paved roads in compliance with R307-309-5, 6, 7.

1. Types of emission controls initiated by your operation that are in place "off" property (application of water, covered loads, sweeping roads, vehicle cleaning, etc.).

2. Proposed remedial controls that will be initiated promptly if materials, which may create fugitive dust, are deposited on public and private paved roads.

Submit the Dust Control Plan to:

Executive Secretary
Utah Air Quality Board
POB 144820
15 North 1950 West
Salt Lake City, Utah 84114-4820

Phone: (801) 536-4000
FAX: (801) 536-4099

Fugitive Dust Control Plan Violation Report

When a source is found in violation of R307-309-3 or in violation of the Fugitive Dust Control Plan, the course must submit a report to the Executive Secretary within 15 days after receiving a Notice of Violation. The report must include the following information:

1. Name and address of dust source.

2. Time and duration of dust episode.

3. Meteorological conditions during the dust episode.

4. Total number and type of fugitive dust activities and dust producing equipment within each operation boundary. If no change has occurred from the existing dust control plan, the source should state that the activity/equipment is the same.

5. Fugitive dust activities or dust producing equipment that caused a violation of R-307-309-3 or the sources dust control plan.

6. Reasons for failing to control dust from the dust generating activity or equipment.

7. New and/or additional fugitive dust control strategies necessary to achieve compliance with R307-309-3, 4, 5, 6, or 7.

8. If it can not be demonstrated that the current approved Dust Control Plan can result in compliance with R307-309-3 through 7, the Dust Control Plan must be revised so as to demonstrate compliance with 307-309-3 through 7. Within 30 days of receiving a fugitive dust Notice of Violation, the source must submit the revised Plan to the Executive Secretary for review and approval.

Submit the Dust Control Plan to:

Executive Secretary
Utah Air Quality Board
POB 144820
15 North 1950 West
Salt Lake City, Utah 84114-4820

Phone: (801) 536-4000
FAX: (801) 536-4099

Attachments: DFCM Form FDR R-307-309, Rule 307-309

CONTRACTOR'S AGREEMENT

FOR:

_____
_____
_____

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

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

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

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

ARTICLE 1. SCOPE OF WORK. The Work to be performed shall be in accordance with the Contract Documents prepared by _____ and entitled "_____."

The DFCM General Conditions ("General Conditions") dated May 25, 2005 on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

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

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

Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete within _____ (___) calendar days after the date of the Notice to Proceed. Contractor agrees to pay liquidated damages in the amount of $_____ per day for each day after expiration of the Contract Time until the Contractor achieves Substantial Completion in accordance with the Contract Documents, if Contractor's delay makes the damages applicable. The provision for liquidated damages is: (a) to compensate the DFCM for delay only; (b) is provided for herein because actual damages can not be readily ascertained at the time of execution of this Contractor's Agreement; (c) is not a penalty; and (d) shall not prevent the DFCM from maintaining Claims for other non-delay damages, such as costs to complete or remedy defective Work.

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

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

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

ARTICLE 5. PAYMENT. The DFCM agrees to pay the Contractor from time to time as the Work progresses, but not more than once each month after the date of Notice to Proceed, and only upon Certificate of the A/E for Work performed during the preceding calendar month, ninety-five percent (95%) of the value of the labor performed and ninety-five percent (95%) of the value of materials furnished in place or on the site. The Contractor agrees to furnish to the DFCM invoices for materials purchased and on the site but not installed, for which the Contractor requests payment and agrees to

safeguard and protect such equipment or materials and is responsible for safekeeping thereof and if such be stolen, lost or destroyed, to replace same.

Such evidence of labor performed and materials furnished as the DFCM may reasonably require shall be supplied by the Contractor at the time of request for Certificate of Payment on account. Materials for which payment has been made cannot be removed from the job site without DFCM's written approval. Five percent (5%) of the earned amount shall be retained from each monthly payment. The retainage, including any additional retainage imposed and the release of any retainage, shall be in accordance with UCA 13-8-5 as amended. Contractor shall also comply with the requirements of UCA 13-8-5, including restrictions of retainage regarding subcontractors and the distribution of interest earned on the retention proceeds. The DFCM shall not be responsible for enforcing the Contractor's obligations under State law in fulfilling the retention law requirements with subcontractors at any tier.

ARTICLE 6. INDEBTEDNESS. Before final payment is made, the Contractor must submit evidence satisfactory to the DFCM that all payrolls, materials bills, subcontracts at any tier and outstanding indebtedness in connection with the Work have been properly paid. Final Payment will be made after receipt of said evidence, final acceptance of the Work by the DFCM as well as compliance with the applicable provisions of the General Conditions.

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

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

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

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

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

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

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

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

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

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

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

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

CONTRACTOR: _____

_____
Signature Date

Title: _____

State of _____)
)
County of _____)

_____
Please type/print name clearly

On this ____ day of _____, 20____, personally appeared before me, _____, whose identity is personally known to me (or proved to me on the basis of satisfactory evidence) and who by me duly sworn (or affirmed), did say that he (she) is the _____ (title or office) of the firm and that said document was signed by him (her) in behalf of said firm.

_____
Notary Public

(SEAL)

My Commission Expires _____

APPROVED AS TO AVAILABILITY OF FUNDS:

_____
David D. Williams, Jr. Date
DFCM Administrative Services Director

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT

_____
_____- Manager Date
Capital Development/Improvements

APPROVED AS TO FORM:
ATTORNEY GENERAL
May 25, 2005
By: Alan S. Bachman
Asst Attorney General

APPROVED FOR EXPENDITURE:

_____
Division of Finance Date

PERFORMANCE BOND

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

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

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

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

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

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

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

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

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____ (Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____ (Seal)

Attorney-in-Fact

STATE OF _____)
) ss.
COUNTY OF _____)

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

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

My commission expires: _____

Resides at: _____

_____

NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

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

DFCM FORM 1b 081506

PAYMENT BOND

(Title 63, Chapter 56, U. C. A. l953, as Amended)

KNOW ALL PERSONS BY THESE PRESENTS:

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

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

NOW, THEREFORE, the condition of this obligation is such that if the said Principal shall pay all claimants supplying labor or materials to Principal or Principal's Subcontractors in compliance with the provisions of Title 63, Chapter 56, of Utah Code Annotated, l953, as amended, and in the prosecution of the Work provided for in said Contract, then, this obligation shall be void; otherwise it shall remain in full force and effect.

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

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

IN WITNESS WHEREOF, the said Principal and Surety have signed and sealed this instrument this _____ day of _____, 20____.

WITNESS OR ATTESTATION:

_____

PRINCIPAL:

_____

By: _____
(Seal)

Title: _____

WITNESS OR ATTESTATION:

_____

SURETY:

_____

By: _____
Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

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

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

My commission expires: _____
Resides at: _____

_____
NOTARY PUBLIC

Agency: _____
Agent: _____
Address: _____
Phone: _____

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

DFCM FORM 1b 081506

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

CHANGE ORDER #_____

CONTRACTOR:

ARCHITECT:

AGENCY OR INSTITUTION:
PROJECT NAME:
PROJECT NUMBER:
CONTRACT NUMBER:
DATE:

CONSTRUCTION CHANGE DIRECTIVE NO.	PROPOSAL REQUEST NO.	AMOUNT		DAYS	
		INCREASE	DECREASE	INCREASE	DECREASE

	Amount	Days	Date
ORIGINAL CONTRACT			
TOTAL PREVIOUS CHANGE ORDERS			
TOTAL THIS CHANGE ORDER			
ADJUSTED CONTRACT			

DFCM and Contractor agree that the terms, contract sum, scope of the Work and time specified in this Change Order shall constitute the full accord and satisfaction, and complete adjustment to the Contract and includes all direct and indirect costs and effects related to, incidental to, and/or reasonably implied from such change in the contract terms, sum, scope of the Work and time.

Contractor:_____
Date

Architect/Engineer:_____
Date

Agency or Institution:_____
Date

DFCM: _____
Date

Funding Verification:_____
Date

Page _____ of _____page(s)

DFCM FORM 1b 081506

STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT _____ PROJECT NO: _____
AGENCY/INSTITUTION _____

AREA ACCEPTED _____

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

The DFCM - (Owner) accepts the Project or specified area of the Project as Substantially Complete and will assume full possession of the Project or specified area of the Project at _____ (time) on _____ (date).

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

_____

_____

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

☐ As-built Drawings ☐ O & M Manuals ☐ Warranty Documents ☐ Completion of Training Requirements

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

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

_____	by:	_____	
CONTRACTOR (include name of firm)		(Signature)	DATE
_____	by:	_____	
A/E (include name of firm)		(Signature)	DATE
_____	by:	_____	
USING INSTITUTION OR AGENCY		(Signature)	DATE
_____	by:	_____	
DFCM (Owner)		(Signature)	DATE

4110 State Office Building, Salt Lake City, Utah 84114 cc: Parties Noted
telephone 801-538-3018 • facsimile 801-538-3267 • http://dfcm.utah.gov DFCM, Director

DFCM FORM 1b 081506

UTAH NATIONAL GUARD CAMP WILLIAMS
DFCM PROJECT NO. 03265480

SECOND STREET DRAINAGE - BASE BID
UTAH AVENUE DRAINAGE - FIRST ALTERNATE BID
THIRD STREET DRAINAGE - SECOND ALTERNATE BID
SOUTH STORM DRAIN - THIRD ALTERNATE BID

SPECIFICATIONS AND PLAN SHEETS

DIVISION OF FACILITIES CONSTRUCTION
AND MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UT 84114

AUGUST 2006

Civil Science, Inc.
3160 West clubhouse Drive
Lehi, UT 84043
(801) 768-7200

UTAH NATIONAL GUARD CAMP WILLIAMS
DFCM PROJECT NO. 03265480

SECOND STREET DRAINAGE - BASE BID
UTAH AVENUE DRAINAGE - FIRST ALTERNATE BID
THIRD STREET DRAINAGE - SECOND ALTERNATE BID
SOUTH STORM DRAIN - THIRD ALTERNATE BID

SPECIFICATIONS AND PLAN SHEETS

DIVISION OF FACILITIES CONSTRUCTION
AND MANAGEMENT
4110 STATE OFFICE BUILDING
SALT LAKE CITY, UT 84114

AUGUST 2006

Civil Science, Inc.
3160 West Clubhouse Drive
Lehi, UT 84043
(801) 768-7200

TABLE OF CONTENTS

Page

GENERAL REQUIREMENTS
Section 01010 Summary of Work 01010-1
Section 01080 Applicable Codes 01080-1
Section 01200 Project Meetings 01200-1
Section 01300 Submittals 01300-1
Section 01400 Quality Control 01400-1
Section 01500 Temporary Facilities and Controls 01500-1
Section 01550 Measurement and Payment 01550-1
Section 01600 Material and Equipment 01600-1

DETAILED SPECIFICATIONS
Section 02200 Structural Backfill 02200-1
Section 02220 Utility Trenching, Backfilling and Compacting 02220-1
*Section 02230 Base Course 02230-1
*Section 02511 Asphaltic Concrete Paving 02511-1
*Section 02525 Curbs, Gutters, Drive Aprons and Walks 02525-1
*Section 02720 Storm Sewer System 02720-1
Section 02800 Landscaping 02800-1
*Section 03100 Concrete Formwork 03100-1
*Section 03200 Concrete Reinforcement 03200-1
*Section 03300 Cast-in-Place Concrete 03300-1
Section 03400 Precast Concrete 03400-1
Section 15064 Plastic Pipe 15064-1

CONSTRUCTION DRAWINGS AND STANDARDS
Drawings:
Second Street Drainage - Base Bid
Title Sheet 1
Index Sheet 2
Plan and Profile Sheets . . . . . 2nd-01 to 2nd-02
Detail Sheet . . . . . DT-1 to DT -2
Utah Avenue Drainage - First Alternate Bid
Title Sheet 1
Plan and Profile Sheets . . . . . UT-01 to UT-02
Third Street Drainage - Second Alternate Bid
Title Sheet 1
Plan and Profile Sheets . . . . . 3rd-01 to 3rd-02
Plan and Profile Sheet NEV-02
South Storm Drain - Third Alternate Bid
Title Sheet 1
Plan and Profile Sheets . . . . . S-01 to S-02
Detail Sheet . . . . . DT-1(s)

*DFCM Standard Specifications - Provided by King Engineering, Inc.

GENERAL REQUIREMENTS

SECTION 01010 - SUMMARY OF WORK

PROJECT LOCATION

The project is located at Camp Williams, 117800 South Camp Williams Road, Riverton, UT. Access to the site is through the Camp Williams main gate. Two forms of picture I.D. are required for entry to the site.

WORK UNDER THIS CONTRACT

The work under this contract generally includes the construction of a complete and function drainage system for the following :

Second Street - curb and gutter, storm drain collection and conveyance, ditch removal, asphalt removal and placement.

Utah Avenue - curb and gutter, storm drain collection and conveyance, ditch removal, asphalt removal and placement and retaining wall.

Third Street - curb and gutter, ditch removal, asphalt removal and placement.

South Drainage - storm drain trunkline, detention basin (with landscaping) and basin outlet system.

The project includes, but is not limited to, construction of the following:

CURB AND GUTTER

- Curb and Gutter
- Concrete Stem Wall
- Curb Cuts

PIPING AND APPURTENANCES

- Pot Hole Existing Utilities
- Smooth lined Pipe (High Density Polyethylene Pipe and Fittings)
- Catch Basins
- Manholes
- Loop Existing Water Main as Required (for storm drain)
- Raise or Lower Existing Utilities as Required (for storm drain)
- Earthwork
- Sprinkler Repair
- Replacement of Sprinkler system at Detention Basin
- Topsoil and sod in all disturbed areas

MISCELLANEOUS

- Bonds and insurance
- Submittals
- Mobilization
- Field Staking and Cut Sheet Preparation- Minor Grade and Alignments to accommodate existing utilities
- Saw Cut, Remove Replace
- Surface Restoration
- Roadbase Trench Repair
- Asphalt and Roadbase
- Rock Ditch Removal
- Relocate Rock Channel

Surveying

NOTE: Contractor will arrange compaction testing with an owner approved testing agency. The costs for initial testing will be paid by the owner. Additional testing, if required will be paid by the Contractor.

SUBSURFACE INFORMATION

The submission of a Proposal shall be conclusive evidence that the Bidder has investigated the site and is satisfied as to the conditions to be encountered, the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of the Contract Documents.

GRADES, LINES AND LEVELS

The Contractor shall be responsible for all required construction surveys.

Locations and elevations are shown on the plans.

CONTRACT DRAWINGS

Where Contractor bases his bid upon quantities scaled from Contract Drawings, he shall verify true scale with the Owner's representative prior to submitting his bid when scale is not shown or unclear.

SECTION 01080 - APPLICABLE CODES

The Contractor shall comply with the following and all applicable local codes, standards, rules and regulations of any authority having jurisdiction over the project site or the work to be performed.

International Plumbing Code (IPC), Latest Edition

Utah Department of Health Rules for Public Drinking Water Systems

Rules and Regulations Governing Excavation Work
Utah Occupational Safety and Health Administration

Williams-Steiger Occupational Safety and Health Act of 1970, Public Law 91-596

American Public Works Association, Utah Chapter, Standard Plans and Specifications, 2002.

NOTICE: Protection of life, health, and public welfare as it relates to execution of the construction contract is the responsibility of the Contractor. Neither the Owner nor the Engineer will provide observation, inspection, supervision, or any comment on plans, procedures, or actions employed at the project as they relate to safety of life, health, or public welfare. If conditions are imposed by the Engineer or Owner which interfere with, or imply actions detrimental to safety, written notice shall be issued by the Contractor and a decision shall be returned to the Contractor for action prior to effecting any unsafe procedure or condition.

CONFLICTS

In case of conflict between codes, the one having the more stringent requirements shall govern. Drawings and specifications which exceed code requirements shall govern.

SECTION 01200 - PROJECT MEETINGS

JOBSITE PROGRESS MEETINGS

Conduct periodic jobsite meetings at intervals to be determined by the Owner, for the purpose of reviewing, scheduling and coordinating project progress, as well as other matters of general interest to the project.

SECTION 01300 - SUBMITTALS

INSURANCE CERTIFICATES

Submit updated certificates as necessary to verify current coverage.

PROJECT DATA SUBMITTAL SCHEDULE

List all anticipated submittals of project data as required by the Contract Documents and such additional data as considered necessary by the Contractor. Show proposed submittal dates for each so that Engineer may schedule timely review of submittals. Update monthly to reflect current status.

SCHEDULE OF VALUES

Where payment is to be based on unit bid prices, correlate schedule of values with bid items. Where payment is to be based on fixed price, correlate schedule of values with Divisions and Sections of Specifications. If separate payment is to be requested for materials suitably stored but not installed, segregate delivered costs, including taxes, from installation which include overhead and profit.

SHOP DRAWINGS, SAMPLES AND PRODUCT DATA

General - Submittals on component parts forming a system, or that are interrelated, shall be submitted at one time as a single submittal in order to demonstrate that the items have been properly coordinated and will function as a unit. Specific submittal requirements are as follows and are required for the items of equipment and materials noted in the Submittal Register at the end of this section.

Shop Drawings - Furnish office-prepared shop drawings to scale clearly showing the interrelationship of the various portions of work including the relationship to the work of other trades prior to commencing fabrication or installation of the work. As needed, provide a written description of the methods to be used in completing the work. Include location of each item, pertinent dimensions affecting construction, description of materials, and connections. Connection details shall show size and locations of bolts and size, shape, and lengths of each weld. Identify details by reference to sheet and detail numbers shown on Contract Drawings. Use same symbols wherever practicable. Reproductions of Contract Drawings are acceptable as shop drawings only when specifically authorized in writing by the Engineer.

Samples - Submit all required physical examples to illustrate materials, equipment or workmanship, which establish standards by which completed work is judged. Must be of sufficient size and clarity, and in sufficient quantity to clearly illustrate functional characteristics and full range of colors, patterns, textures or other properties which will be actually produced.

Product Data - Submit manufacturer's schematic drawings, catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, test reports, certificates of compliance, and other descriptive data not included on shop drawings. Modify standard descriptive data to delete information which is not applicable, and clearly identify pertinent data. Show dimensions and clearances required, performance characteristics and capacities, wiring diagrams and controls, and any other pertinent data applicable to the project.

Certificate of Compliance - Furnish manufacturer's Certificate of Compliance certifying to compliance with specification requirements, applicable reference standards, and test data requirements. Include reference to the specification section and paragraph with which the product or material is intended to comply.

Submission Requirements

Submittals shall be made with a letter of transmittal to the Engineer by the Contractor, and not by subcontractors, suppliers or manufacturers.

Submit samples in number specified, or if not so specified, in triplicate.

Submit Project Data in the quantities shown in the Submittal Register located at the end of this section.

Identify all submittals with the following information, as applicable:

Project title and Engineer's project number.
Name of Contractor, Engineer, originating subcontractor or supplier.
Submittal date, and all revision dates.
Identify each product or material submittal by reference to specification section and page no., drawing no., or any other contract document reference applicable thereto.
Applicable conformance standards.

Include certification of Contractor review and conformity to contract requirements per General Conditions. Identify any deviations from Contract Documents. Provide 3" x 3" minimum space for Engineer's review stamp.

EQUIPMENT MANUALS

Installation instructions, start-up and operating instructions, inspection and maintenance instructions, replacement parts list, and manufacturer's as-built diagrams.

PROJECT RECORD DOCUMENTS

Maintenance of Documents

Maintain at jobsite one record copy of Contract Drawings, Specifications, Addenda, approved Shop Drawings, Change Orders, other modifications to the Contract, field test records and other approved documents submitted by Contractor in compliance with specification requirements.

Maintain documents at the project apart from documents used for construction. Do not use record documents for construction purposes. Maintain documents in clean, legible condition. Make documents available at all times for inspection of the Engineer and Owner.

As-built information shall be kept current in both drawings and Project Manual and shall be inserted by the Contractor and appropriate subcontractors as the project progresses under the supervision of the resident project representative. Each person making a change shall identify the change marked with the date and initials in a code and manner approved by the Engineer. Progress billings will not be paid until the resident project representative has reported to the Engineer that all record documents are complete and up-to-date as of the current billing.

Upon completion of the project, the record documents will be consolidated and delivered by the Engineer to the Owner. The Engineer will not verify the accuracy of information furnished by the Contractor, and the Contractor shall be responsible for any damage to the Owner or the Engineer arising from any errors or omissions relating to the data furnished by the Contractor, his subcontractors, suppliers and employees.

Recording

Label each document "PROJECT RECORD COPY" in 2" high printed letters. Keep record documents current. Do not permanently conceal any work until required information has been recorded.

Contract Drawings - Refer to Section 01010 -SUMMARY OF WORK, paragraph "Grades, Lines and Levels." Legibly mark most appropriate drawing to record, where applicable:

Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.

Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

Field changes of dimension and detail made during construction process.

Changes made by Change Order or Field Order

Details not on original Contract Drawings.

Shop Drawings - Maintain as record drawings. Legibly annotate shop drawings to record changes made after review. Use red felt tip marking pen for all recording.

Submittal

At completion of project, deliver record documents to the Engineer. Accompany submittal with transmittal letter, in duplicate, containing:

Date, project title and number.
Contractor's name and address.
Title and number of each record document.
Certification that each document as submitted is complete and accurate.
Signature of Contractor or his authorized representative.

Submittal Register

Provide the following submittals:

Work	Item	Type of Submittal	Time of Submittal	# Of Copies
Precast Concrete	Catch Basins	Shop Drawing/ Certificate	Prior to Shipment	3
	Manholes	Shop Drawing/ Certificate	Prior to Shipment	3
	Grout and Mastic	Shop Drawing/ Certificate	Prior to Shipment	3
Concrete	Curb & Gutter Stem Wall	Mix Design	Prior to Shipment	3
Piping	Polyethylene Pipe	Shop Drawing/ Certificate	Prior to Shipment	3
	Fittings	Shop Drawing/ Certificate	Prior to Shipment	3
Misc.	Compaction Tests	Certificate	Within 36 Hrs. of Test	3
	Construction Surveying	Cut Sheet	3 Day, Prior to Work	3
	Asphalt	Mix Design	Prior to Shipment	3
	Roadbase	Mix Design	Prior to Shipment	3
	Concrete	Mix Design	Prior to Shipment	3

SECTION 01400 - QUALITY CONTROL

TESTS AND INSPECTIONS

The Contractor will arrange compaction testing with an owner-approved testing agency. The costs for initial testing will be paid by the owner. Additional testing, if required, will be paid by the Contractor.

Utility Trenching, Backfilling, and Compacting - Section 02220
Asphalt Concrete Paving - Section 02511

REQUIREMENTS FOR INDEPENDENT TESTING CONSULTANTS

Test Reports

Testing agency shall be instructed to submit directly to Engineer, 3 copies of all reports of tests or inspections made, showing compliance, irregularities or deficiencies, identifying project, date of test, location in project, applicable specification section, applicable standard(s) for compliance, observations relating to compliance, name and signature of inspector.

CONTRACTOR RESPONSIBILITIES

Furnish above qualification data and expedite submittals when testing consultant is employed by Contractor. Provide access to the work and furnish casual labor and facilities to accommodate inspections and tests. When tests fail to meet specified requirements, Contractor shall arrange for re-testing after conditions have been corrected. Conduct such retesting at no additional expense to the Owner.

SECTION 01500 - TEMPORARY FACILITIES AND CONTROLS

GENERAL

Contractor shall be responsible for providing or arranging with subcontractors for all temporary utilities, facilities and controls during the construction period.

TEMPORARY UTILITIES

Water

Water for construction purposes is available in limited quantities from the current system at Camp William.

Electric Power and Lighting

The Contractor shall provide necessary transformers or other equipment, make necessary connections and provide necessary distribution lines for use by all trades during construction at locations so that power can be secured at any working area with no more than 100-foot extension.

SANITARY FACILITIES

Contractor shall provide and maintain, throughout project duration, adequate temporary toilet facilities in a neat and sanitary condition for all employees and authorized visitors at the site. Place facilities at approved locations near the work.

FIELD OFFICES AND STORAGE FACILITIES

Provide and maintain storage sheds, trailers or other facilities as necessary to store and protect materials, tools and equipment.

Coordinate location of all temporary office and storage facilities with Camp Williams staff.

FENCES AND BARRICADES

Provide and maintain temporary fences, barriers, lights, guardrails and barricades as indicated in the Contract Documents, or as necessary to regulate vehicular and pedestrian traffic, to secure the work and adjacent property, and to protect persons and property. Obtain necessary approvals and permits and provide temporary expedients as necessary to accommodate controls.

SECTION 01550 - MEASUREMENT AND PAYMENT

LUMP SUM BID

Payment is to be made on a lump sum basis for each of the Base Bid and Alternative Bids for all work shown on the drawings and detailed in the specifications.

SECTION 01600 - MATERIAL AND EQUIPMENT

PRODUCTS LIST

Within 30 days after date of Purchase Order, submit to Engineer a complete list of all products which are proposed for installation. Tabulate list by, and be complete for, each specifications section. Include with listing of each product the name and address of manufacturer, trade name, model or catalog designation, reference standard, manufacturer's performance and test data, and subcontractor, as applicable.

REFERENCE STANDARDS

Reference in the specifications to standard specifications or publications or technical societies or governmental agencies, such as ASTM, ANSI, AISC, ACI, AWS, Federal Specifications, or Commercial Standards shall refer to latest edition adopted and published 30 days prior to receiving bids, unless specifically noted otherwise in the Contract Documents. It shall be understood that all manufacturers, producers and their agents, of materials required shall have such reference standards available for reference and be fully familiar with their requirements as pertains to their product, material or equipment.

In case of conflict between reference standards and project specifications, project specifications shall govern. In case of conflict between reference standards and codes, the one having the more stringent requirements shall govern.

MANUFACTURER'S INSTRUCTIONS

Contractor shall obtain and distribute necessary copies of manufacturer's instructions, including two copies to the Engineer. If a conflict exists between the manufacturer's instructions and the Contract Documents, notify the Engineer in writing and obtain his instruction prior to proceeding.

PRODUCT DELIVERY, STORAGE AND HANDLING

Deliver materials, products and equipment to the project site in undamaged condition in manufacturer's original, unopened containers or packaging with identifying labels intact and legible. Arrange deliveries in accordance with the Construction Schedule and in ample time to facilitate inspection prior to installation to avoid unnecessary delays in the construction process.

Store and handle products as prescribed by manufacturer or as specified in the Contract Documents in a manner to protect from damage by moisture, weather, abuse or construction operations.

DETAILED SPECIFICATIONS

SECTION 02200 - STRUCTURAL EARTHWORK

PART I - GENERAL

DESCRIPTION

Work Included - Work under this section includes clearing and grubbing, excavation, filling, compacting, and testing for structural earthwork, around foundations, manholes,and similar buried structures, excluding utility trenching, backfilling and compacting; all as shown on the drawings and specified herein.

Related Work Specified Elsewhere
Section 01400 - Quality Control
Section 02220 - Utility Trenching, Backfilling and Compacting
Section 02800 - Landscaping

QUALITY ASSURANCE

Reference Standards - Standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. The latest edition, amendment or supplement thereto in effect 30 days before date of invitation shall apply.

American Society for Testing and Materials (ASTM)

ASTM D1557	Moisture-Unit Weight Relations of Soils and Soil Aggregate Mixtures Using 10 lb. Rammer and 18 inch drop
ASTM D2049	Relative Density of Cohesionless Soils
ASTM D2922	Density of Soil and Soil-Aggregate-In-Place by Nuclear Methods (Shallow Depth)

American Association of State Highway and Transportation Officials

AASHTO T180	Moisture-Density Relations of Soils using a 10 lb. Rammer and a 18 inch drop

SUBMITTALS - Refer to Section 01300 - Submittals. Submit the proposed sheeting and shoring methods to be employed by the Contractor.

JOB CONDITIONS

Protection

Surface Improvements - Protect from damage or restore to their original condition, all surface improvements encountered during trenching or construction. Said improvements shall include but not be limited to surfacing, sidewalks, curbs, valley gutters, trees and shrubs, other surface vegetation, driveways, mailboxes, utilities, signs, and fencing.

Underground Obstructions
Protect from damage any underground pipes, utilities or structures encountered during construction. Restore any damaged underground obstructions to their original condition at no additional expense to the Owner unless evidence of other arrangements satisfactory to all parties are presented to the Owner.

Before commencing work, obtain information concerning location, type, and extent of concealed existing utilities on the site and adjacent properties. Consult records and

personnel of local utility companies, municipal utility departments, and telephone company. File Notice of Excavation with these agencies at least two business days prior to commencing work.

Underground obstructions known to the Engineer, except service lines, are shown on the drawings or otherwise referred to in the specifications. The locations shown may prove to be inaccurate and other obstructions not shown may be encountered. In any case, it shall be the responsibility of the Contractor to verify actual locations and to protect or restore all underground obstructions encountered.

Sheeting, Shoring and Bracing

Except where banks are cut back on a stable slope, provide and maintain all sheeting and shoring necessary to protect adjoining grades and structures from caving, sliding, erosion or other damage in accordance with applicable codes and governing authorities.

Remove sheeting and shoring gradually as excavation backfilling progresses to protect the construction or other structures, utilities or property.

Blasting - No blasting will be permitted without written consent by the Owner.

Drainage - Maintain the excavations and site free from water throughout the course of the work.

Interruption of Service

Coordinate interruptions of utility services with the Owner. Make connections to the existing system requiring the interruption of service during the time (weekends, nights or holidays) designated by the Owner.

Obtain permission to cut and replace existing service lines. Notify affected users two hours in advance of and restore service within four hours after any interruption. Repair all lines at no additional expense to the Owner.

No valve or other control on the existing system shall be operated for any purpose by the Contractor. The Owner will operate all valves, hydrants, blowoffs and curb stops.

Construction in Streets - When construction operations are located within streets, make provisions at cross streets and walks for free passage of vehicles and pedestrians. Do not block streets or walks without prior approval by the Owner.

CLASSIFICATION OF EXCAVATION

Unclassified Excavation - All required excavation shall be unclassified. All required excavation except borrow shall be unclassified.

Rock Excavation - Excavation of hard cemented material which cannot be excavated by heavy earthmoving equipment until loosened by blasting, excavation or material which is too hard to be satisfactorily loosened by a D-9 caterpillar tractor or its equivalent, equipped with a hydraulic single-tooth ripper, and removal of boulders which cannot be handled by heavy earth moving equipment will be classed as rock excavation.

Common Excavation - Excavation of all material other than those above will be classed as common excavation and includes, but shall not be limited to, excavation of earth, gravel, shale, cemented material, disintegrated rock, boulders and all other materials which, without blasting,

can be satisfactorily excavated by heavy earthmoving equipment with, or without, the use of heavy rippers.

Borrow Excavation - All suitable materials required for completion of the earthwork of this Contract and which are excavated from areas outside the indicated grading and excavation limits will be classified as borrow excavation.

PART II - PRODUCTS

SUITABLE MATERIALS - All materials for construction fills and backfills shall meet specified requirements for gradation and other factors defining suitability for the intended use. All classes of suitable material shall be free from perishable matter, debris, frozen material and stones and cemented pieces larger than permitted by the specified gradation. Suitable materials are defined as follows:

Structural Fill and Backfill - Materials used for structural fill under slabs or around structural foundations shall consist of material that is free of debris, roots, organic matter, frozen matter and which is free of stones with any dimension greater than one-half of the specified loose layer thickness. Material shall also be capable of compaction to specified density.

Capillary Water Barrier - Material shall consist of clean, non-porous rock, crushed or uncrushed, meeting the following gradation:

Sieve Size	Percent Passing
1-1/2"	100
3/4"	50-100
No. 4	0

Riprap - Riprap shall be hard, dense, sound, rough fractured stone as nearly cubical as practicable. Thin slab type stones, flaking rock, and broken concrete shall not be used. The stone shall have a specific gravity of at least 2.25. The size requirements for riprap are 10" diameter maximum with at least 30% larger than 4" and 30% passing the 2" sieve.

Topsoil - Topsoil shall consist of selectively excavated, loose, friable loam reasonably free of admixtures of subsoil, refuse, stumps, roots, rocks, brush, weeds or other material which would be detrimental to the development of vegetative growth.

Unclassified Fill and Backfill Material - Fills and backfills that are not otherwise specified herein shall be constructed with any suitable excavated material of clays, silts, sands, gravels, bedrock pieces or combinations thereof which contain 100 percent particles smaller than four (4) inches. This material shall be placed in accordance with the requirements hereinafter specified.

UNSUITABLE MATERIALS - All material removed in stripping and all material containing perishable matter such as roots, sod, grass, decayed vegetable matter, debris, frozen material or materials having unsatisfactory compaction characteristics will be classified as unsuitable for use in the work. Materials which are unsuitable due to excessive moisture or incorrect gradation may be reclaimed if brought into specification by screening, manipulation, aerating, or blending with other suitable materials.

PART III - EXECUTION

PREPARATION

Field Measurements - Before commencing work, locate all baselines required for control of the work and establish required grade staking for control of excavation and embankment construction.

Site Preparation - Clear all sites to be occupied by permanent construction embankments of all logs, trees, roots, brush, tree trimmings, and other objectionable materials and debris. Grub all stumps. Clean and strip subgrades for fills and embankments of all surface vegetation, sod, and organic topsoil. Remove all combustible and other waste materials from the site and legally dispose off the site. Observe applicable fire and safety regulations when waste materials are burned.

Preservation of Trees - Refer to drawings for designation of all trees, shrubs, plants and other vegetation within the project site to remain. Do not remove trees outside of excavated or filled areas, unless their removal is authorized by the Owner. Protect trees left standing from permanent damage by construction operations.

Removal of Topsoil - Strip existing topsoil from areas to be disturbed by construction operations. Stockpile in areas designated. Keep topsoil segregated from non-organic trench excavation materials and debris.

Removal of Water

Provide and maintain dewatering equipment to remove and dispose of all surface and groundwater entering excavations, trenches, or other parts of the work. Keep each excavation dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein is completed to the extent that no damage from hydrostatic pressure, flotation, or hydraulic action will result.

Dewater all excavations for structures or trenches which extend down to or below static groundwater elevations by lowering and maintaining the groundwater surface beneath such excavations a distance of not less than 12 inches below the bottom of the excavation.

Divert or otherwise prevent surface water from entering excavated areas or trenches.

EXCAVATION

Prior to beginning excavation operations, accomplish all site preparation in accordance with these specifications. Perform excavation of every description to the lines and grades indicated on the drawings.

Closely examine soil at final grades to determine if soils are suitable. Refer questionable areas to testing laboratory. Notify Engineer of testing results and if a request for a field order or change order is apparently necessary.

If any areas are inadvertently over excavated, fill such over excavation with suitable fill material and compact to 95% of maximum density.

Complete excavation work to the grade elevations shown on the drawings within a tolerance of $\pm$ 0.1 foot.

EMBANKMENT AND BACKFILLING

Do not begin backfilling until forms and shoring have been removed, construction below grade has been observed, underground utilities systems have been inspected, tested and met specified requirements, and trash and debris have been cleaned from the excavation.

Do not cease dewatering operations until backfill has been completed.

Place excavated material in successive uniform maximum loose layers not exceeding 8 inches for the full width of the cross section in all accessible areas. Do not place fill on muddy or frozen subgrade.

Plow, step, or bench sloped surfaces steeper than 4 to 1 on which fill or backfill is to be placed so that fill material remains firm and stable. Scarify all surfaces to receive backfill to a depth of 6" before filling.

Construct fills and embankments to the lines and grades indicated on the drawings within a tolerance of ± 0.1 foot.

Use suitable materials removed from the excavation prior to obtaining material from borrow areas.

Where otherwise suitable material is too wet, aerate, dry or blend to provide the moisture content required to achieve specified compaction.

COMPACTION

During placing and compacting operations upon earth or earth-and-rock mixtures, the moisture content of material in the layers being compacted shall be near optimum and uniform throughout the layer. Maintain the moisture content of the material being placed and compacted within ±1-1/2% of optimum condition as determined by ASTM Standard D698.

Perform all compaction with equipment suited to location and material being compacted. Place and compact backfill around pipes, foundations, and other structures with care to avoid damage.

Compact fill and backfill materials to following minimum densities:

Structural Fill and Backfill	Under and adjacent to slabs, structural supports, foundations, or buttresses: 95% of maximum density
Unclassified Fill and Backfill	
Areas to Receive Pavements	95% of maximum density.
Overlot Areas	88% of maximum density.
Liquid Containing Earth Structures	95% of maximum density.

RIPRAP - Riprap shall be placed to conform to the drawing details. The larger size stones composing the riprap material shall be placed first and roughly arranged in close contact. The spaces between the larger stones shall then be filled with smaller stone and arranged in close contact. The spaces between the larger stones shall be so placed as to leave the surface evenly

stepped, conforming to the contour required. The material may be machined-placed with sufficient hand work to produce the specified results.

SURFACE RESTORATION

Subgrade Preparation - Immediately prior to placing structural slabs or foundations, shape the areas to the required lines, grades, and limits to provide finish elevations indicated, and roll with an approved heavy vibratory roller until compacted as specified. Maintain moisture content within ±1-1/2% of optimum during final rolling and until subgrade is covered by subsequent construction. Remove loose material and protect subgrade until covered.

Placing Topsoil

Place previously stockpiled or imported topsoil in all areas within the limits of the project not indicated to receive subsequent foundations, slabs on grade, walks, or other appurtenances.

Prior to placing topsoil, construct subgrades to elevation as required to develop sections shown on drawings after completion of topsoil placement. After grading, scarify areas to be topsoiled to a depth of at least 4". Perform work during periods of good weather and when subsequent disturbance from construction activity will not occur.

Uniformly distribute topsoil on the designated areas and evenly spread to a minimum thickness of 4". Perform spreading so that planting can proceed with little additional soil preparation or tillage. Do not place topsoil when subgrade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to specified grading, seeding and planting.

Finish Grading

Grade all excavated sections, filled sections, construction disturbed areas, and adjacent transition areas to finish elevations. Make finished surfaces smooth, compact, and free from irregular surface changes.

Unless indicated otherwise on drawings, finish grade areas adjacent to sidewalks and pavements within 1 inch below finish elevation of sidewalk and pavement.

FIELD QUALITY CONTROL

Density Testing and Control - Refer to Section 01400 - Quality Control for responsibilities.

Soil Compacting Tests

Conduct in accordance with requirements of ASTM D1557 or AASHTO T180.

Use method A, B, C or D as appropriate, based on soil condition and judgement of the testing laboratory. Samples tested shall be representative of materials to be placed (or altered). Obtain optimum moisture density curve for each type of material or combination of materials encountered or utilized. Use test results as a basis for compaction control. Testing includes Atterberg Limits, grain size determination, and specific gravity.

Tests for cohesionless soils shall be conducted in accordance with ASTM D2049 if a well-defined moisture-density relationship curve is not obtainable by impact compaction methods.

Density Control Conduct tests for density control during compaction operations in accordance with the requirements of:

ASTM D2922 - Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods, or,

Conduct a minimum of one test at locations designated for each lift placed or specified depth increments of fill or backfill as follows:

Foundation Walls: Every one foot vertically (per structure).
Pump Stations and Manholes: Every two feet vertically (per structure).
Slabs on Grade: For each 2,000 square feet or less.
Pavement and Walks: For each 2,000 square feet or less.
Pipe Trench: For each 500 feet or less.
All Other Areas: For each 5,000 square feet or less.

Protection

Contractor shall protect impervious linings after installation throughout the construction period and during filling operations. The lagoon shall be filled as soon as possible to protect the seal from runoff erosion on side slopes. Damage to impervious linings shall be repaired by the Contractor at no additional expense to Owner.

SECTION 02220 - UTILITY TRENCHING, BACKFILLING AND COMPACTING

PART I - GENERAL

DESCRIPTION

Work Included - Work under this section includes site preparation, earthwork and surface restoration for underground pipelines, conduits, cables and appurtenances as shown on the drawings and specified herein.

Related Work Specified Elsewhere
Section 01400 - Quality Control
Section 02200 - Structural Earthwork
Section 15064 - Plastic Pipe

QUALITY ASSURANCE

Reference Standards - Standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. The latest edition, amendment or supplement thereto in effect 30 days before date of invitation shall apply.

American Society for Testing and Materials (ASTM)

ASTM C33	Concrete Aggregates
ASTM D1557	Moisture-Unit Weight Relations of Soils and SoilAggregate Mixtures Using 10 lb. Rammer and 18 Inch Drop
ASTM D2049	Relative Density of Cohesionless Soils
ASTM D2922	Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO T180	Moisture Density Relations of Soils Using a 10 lb. Rammer and a 18 -inch Drop

SUBMITTALS - Refer to Section 01300 - Submittals. Include the following:

Samples - Test sample of pipe bedding material.

JOB CONDITIONS

Protection

Surface Improvements - Protect from damage or restore to their original condition all surface improvements encountered during trenching or construction. Improvements shall include but not be limited to surfacing, sidewalks, curbs, valley gutters, trees and shrubs, other surface vegetation, driveways, mailboxes, signs, and fencing.

Underground Obstructions

Protect from damage any underground pipes, utilities or structures encountered during construction. Restore any damaged underground obstructions to their original condition at no additional expense to the Owner unless evidence of other arrangements satisfactory to all parties are presented to the Owner.

Before commencing work, obtain information concerning location, type, and extent of concealed existing utilities on the site and adjacent properties. Consult records and personnel of local utility companies, municipal utility departments, and telephone company. File Notice of Excavation with these agencies at least two business days prior to commencing work.

Underground obstructions known to the Engineer, except service lines, are shown on the drawings or otherwise referred to in the specifications. The locations shown may prove to be inaccurate and other obstructions not shown may be encountered. In any case, it shall be the responsibility of the Contractor to protect or restore all underground obstructions encountered.

All utilities exposed during construction shall be inspected by the utility owner prior to backfilling. Contractor shall be responsible for providing adequate notice to utility owner for inspections.

Sheeting, Shoring and Bracing

Except where trench banks are cut back on a stable slope, provide and maintain all sheeting and shoring necessary to protect adjoining grades and structures from caving, sliding, erosion or other damage in accordance with applicable codes and governing authorities.

Do not remove any sheeting unless the pipe strength is sufficient to support the trench loads based on trench width measured to the back of sheeting. Remove sheeting and shoring gradually as excavations are backfilled to protect the construction and other structures, utilities or property.

Blasting - No blasting will be permitted without written consent by the Owner.

Drainage - Maintain the excavations and site free from water throughout the work. Remove any water encountered in the trench to provide firm subgrade, to permit joints to be made dry at the final grade and to prevent entrance of water into the pipeline.

Accomplish dewatering by the use of sumps and gravel blankets, well points, or drain lines.

Interruption of Service

Coordinate interruptions of utility services with the Owner. Make connections to the existing system requiring the interruption of service during the time (weekends, nights or holidays) designated by the Owner.

Obtain permission to cut and replace existing service lines to facilitate trenching. Notify affected users two hours in advance of, and restore service within four hours after any interruption. Repair all lines at no additional expense to Owner.

No valve or other control on the existing system shall be operated for any purpose by the Contractor. The Owner will operate all valves, hydrants, blowoffs and curb stops.

Sequencing - Pipeline installation shall follow trench excavation within 300 lineal feet. Trench backfill shall follow pipe installation within 100 lineal feet. Cleanup shall follow trench excavation within 1,000 lineal feet.

Construction In Streets - When construction operations are located within streets, make provisions at cross streets and walks for free passage of vehicles and pedestrians by bridging or other approved methods. Do not block streets or walks without prior approval by the Owner.

CLASSIFICATION OF EXCAVATED MATERIALS - No classification of excavated materials will be made. Perform excavation of every description and of whatever substance encountered to the depths indicated or as otherwise specified.

GUARANTEE

Trench Maintenance - Maintain all trench backfill and resurfacing thereon for a period of one year after final acceptance by the Owner. Refer to General Conditions.

PART II - PRODUCTS

EMBEDMENT MATERIALS

Concrete - 2,000 psi concrete as specified in Section 03300 - Cast-In-Place Concrete.

Granular Material - Well graded crushed stone or gravel meeting the requirements of ASTM C33, Gradation 67 (3/4" to No. 4).

Select Backfill - Selected soil free from rocks, clods and stones greater than 2" in any dimension. Screened native material may be used.

BACKFILL MATERIALS

Suitable Material - Soil obtained from the excavation that is free of frozen material, stumps, roots, brush, other organic matter, and debris. In addition, material shall meet the following requirements:

Upper Portion of Trench - Material placed within one foot of pavement subgrade or the finished surface in unpaved areas shall be soil free from rocks and stones larger than 2-1/2 inches in any dimension.

Remainder of Trench - Soil may contain a limited number of stones smaller than 6 inches in any dimension, provided they are dispersed in the surrounding material in a manner to allow specified compaction.

Public Highways - Material placed within the limits of paved surfacing, gravel shoulders or shoulder slopes shall be approved by the agency having jurisdiction over highway maintenance.

PART III - EXECUTION

PREPARATION

Field Measurements - Before commencing work, locate all initial base lines as required by the Contract Documents.

Clearing

Remove all stumps, roots, brush, other vegetation and debris from areas that will be disturbed by the construction operations.

Legally dispose of all cleared materials at public or private dumping areas off the Owner's property.

Topsoiling - Strip existing topsoil from areas to be disturbed by construction operations. Stockpile in areas designated. Keep topsoil segregated from non-organic trench excavation materials and debris.

EXCAVATING

Trenching - Excavate trenches by open cut. Conform to sheeting, shoring and bracing requirements of regulating agency or ruling authority.

Stockpiling Excavated Material

Stockpile suitable material for backfilling within construction easement.

Remove and waste off the site excavated materials not suitable or not required for backfilling.

Excavation to Grade - Accurately grade trench bottoms to provide uniform bedding depth and support for each section of pipe on compacted bedding material at every point along its

entire length, except portions of pipe sections where it is necessary to excavate for bell holes and for proper sealing of pipe joints.

Bell Holes - Dig bell holes and depressions for joints after trench bottom has been graded. Bell holes and depressions shall be only of such length, depth, and width as required for properly making the particular type of joint. The use of earth mounds for bedding the pipe will not be allowed.

Pipe Clearance In Rocks - Where rock excavation is necessary, over excavate the trench bottom a minimum of six inches below the bottom of the pipe for pipe 24 inches in diameter or less and 9 inches for pipe larger than 24 inches. Backfill overdepths with concrete or granular material. Compact granular material to 95% of maximum density.

Unstable Pipe Subgrade - Whenever wet or otherwise unstable material that is incapable of supporting pipe is encountered in the bottom of the trench, over-excavate such material to a depth suitable for construction of a stable pipe bedding. Backfill trench to proper grade with granular material and compact to 95% of maximum density.

Limiting Trench Widths

Excavate trenches to provide adequate working space and pipe clearances for proper pipe installation, jointing and embedment. Provide a minimum clearance of 3 inches on each side of the pipe for pipe 12 inches in diameter or less, 8 inches for pipe between 14 inches and 30 inches in diameter, and 12 inches for pipe larger than 30 inches in diameter.

Maximum trench width measured at the top of the pipe shall not exceed the outside diameter of the pipe plus 24 inches for pipe 24 inches in diameter or smaller and plus 30 inches for pipe larger than 24 inches.

Unauthorized Excavation

If any areas are inadvertently overexcavated, backfill such overexcavation with concrete or granular material. Compact granular material to 95% of maximum density.

If the maximum trench width is exceeded, provide concrete encasement or a higher strength of pipe at no additional expense to the Owner.

PIPE EMBEDMENT

Placing Embedment Material - Place granular pipe bedding or screened native material to a cover depth of one foot by hand to prevent damage or displacement of the pipe.

TRENCH BACKFILLING AND COMPACTING - Deposit material in layers of a thickness required to achieve the compaction specified below. Maintain moisture content of material within ±1-1/2% of optimum condition.

State Highways

100% of maximum density for paved areas and shoulder slopes.

Paved Roadways, Sidewalks and Other Areas to Receive Pavement
Top foot: 95% of maximum density.
Remainder of trench: 90% of maximum density.

Gravel Roadways
95% of maximum density.

Sodded or Lawn Areas
88% of maximum density.

Fields and All Other Areas
80% of maximum density or equal to the density of undisturbed adjacent material, whichever is greater.

Pipings In Roadways
95% of maximum density.
All other Pipings - 90% of maximum density

Method of Compaction
Mechanically compact trench backfill by means of tamping rollers, sheep foot rollers, pneumatic tire rollers, vibrating rollers or other mechanical tampers.

Compaction by jetting will be permitted under the following conditions:

- Backfill consists of fine granular material which does not contain clay or other expansive material which prevents complete water penetration.

- Areas are neither adjacent to nor will receive subsequent improvements such as pavements, and surfacing structural slabs and foundations, or other improvements.

- The procedures will not cause damage or otherwise affect the system installation causing unstable conditions or conditions less than specified. Compaction requirements shall be met.

- The Contractor shall submit proposed procedures for review to the Engineer at least 48 hours in advance of commencing the work.

Compaction by jetting will not be permitted for state highways, paved roadways, gravel roadways, structural foundations, or any other structures and improvements which sustain design loadings relative to public health and safety.

FIELD QUALITY CONTROL

Density Testing and Control - Refer to Section 01400 - Quality Control, for responsibilities.

Soil Compaction Tests

Conduct in accordance with requirements of ASTM D1557 or AASHTO T180.

Use method A, B, C or D as appropriate, based on soil condition and judgment of the testing laboratory. Samples tested shall be representative of materials to be placed (or altered). Obtain optimum moisture density curve for each type of material or combination of materials encountered or utilized. Use test results as a basis for compaction control. Testing includes Atterberg Limits, grain size determination, and specific gravity.

Tests for cohesionless soils shall be conducted in accordance with ASTM Standard D2049 if a well-defined moisture-density relationship curve is not obtainable by impact compaction methods.

Density Control - Conduct tests for density control during compaction operations in accordance with the requirements of ASTM D2922 - Tests for Density of Soil and Soil-Aggregate in Place by Nuclear Methods.

Conduct a minimum of 2 tests for every 1,000 lineal feet of trench at locations and depths designated by the Engineer. Excavate to depths directed to accommodate testing. Backfill and compact test holes as specified herein.

If minimum compaction requirements are not met as determined by these tests, Contractor shall recompact trench to the specified compaction. Such recompaction shall extend both upstream and downstream of the failed test a distance equal to half the distance from where the last compaction test was taken or 165 feet, whichever is least. Remedial compaction and retesting shall be conducted at no additional expense to the Owner. Refer to Section 01550 - Measurement and Payment, regarding completion of compaction.

SURFACE RESTORATION

Final Grading - Grade all areas disturbed by the construction operations after completion of backfilling and compacting. Areas which are to receive pavements, surfacing, topsoil, seeding or landscaping shall be graded as specified or shown on the drawings. Grade all other areas to match the existing ground line.

Topsoiling - Replace suitable topsoil to the depth of stripping over all areas disturbed by the construction that do not receive other surface treatment. Do not compact topsoil during stripping, stockpiling or placing.

Sod Replacement

Sod removed prior to excavation shall be transplanted within 24 hours after lifting unless wet or freezing conditions prohibit normal laying operations.

Prior to laying, till the sodbed to a minimum depth of 3 inches. Soil texture after tillage shall be uniform, free of wet compressed or dry lumps.

Prior to laying, inspect the sod for dead or otherwise damaged areas and replace any sections showing damage. Replacement sod shall match existing sod as closely as possible.

Lay sod smoothly edge to edge and press firmly into contact with underlying soil by rolling or tamping to eliminate air pockets. Where the sod and sod bed are too dry to produce specified results during rolling, water the dry sod and sod bed prior to commencement of rolling.

SURFACE IMPROVEMENT REPAIR AND REPLACEMENT - Replace and repair any surface improvements damaged or removed. Restore each disturbed improvement to original condition.

SECTION 02230

BASE COURSE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Subgrade preparation to lines and grades shown on the plan.

B. Place, grade and compact base and sub-base course materials.

C. Dust and surface water control.

1.02 RELATED WORK

A. Section 02220 - Excavating, Backfilling and Compaction

B. Section 02525 - Curbs, Gutters, Drive Aprons and Walks

C. Section 02511 - Asphaltic Concrete Paving

1.03 REFERENCES

A. American Society for Testing Materials (ASTM).

B. American Association of Safety and Highway Transportation Officials (AASHTO)

PART 2 PRODUCTS

2.01 BASE COURSE MATERIAL

A. Road Base for Concrete Sidewalks, Concrete Curb and Gutter, and Waterways.

1. Unwashed, hard, durable, angular pit run gravel or crushed natural stone.

2. Shall be free from shale, silt, clay, loam, friable or soluble materials.

3. Shall be free from noticeable concentrations of alkali, salt, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectional or deleterious.

4. Shall be graded within the following limits:

Sieve Size	Percent Passing By Weight
1"	100
3/4"	90-100
1/2"	30-60
3/8"	0-20
#4	0-5

B. Road Base for Pavement Preparation:

1. Shall be untreated natural stone

2. Shall not be lumpy or frozen.

3. Shall be free from noticeable concentrations of alkali, salt, shale, and petroleum products, all roots, sod, limbs, and other vegetative matter, slag, cinders, ashes and rubbish, or other material that, in the opinion of the Engineer, is objectional or deleterious.

4. Shall be graded within the following limits:

Sieve Size	Percent Passing By Weight
1"	100
1/2"	70-100
No. 4	41-68
No. 16	21-41
No. 40	10-27
No. 200	4-13

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

A. Prior to placing base course materials, the subgrade shall be scarified to a depth of not less than 6", moistened or dried to optimum moisture content, and compacted to at least 96% maximum Modified Proctor Density as determined in accordance with ASTM D1557 (AASHTO T-180), and shall be within 2% of optimum moisture content.

B. The subgrade shall then be proof rolled in the presence of the Engineer by passing loaded rubber-tired construction equipment uniformly over the surface at a constant rate. At least two (2) passes shall be made over all subgrade areas.

C. If excessively soft, loose, or disturbed soils are encountered, they shall be removed as directed by the Engineer to a maximum depth of two feet (2') and replaced and recompacted to 96% maximum Modified Proctor Density using approved subgrade

stabilizing material.

D. Ensure subgrade is to required lines and elevations.

3.02 PLACEMENT OF BASE COURSE

A. Protect against "pumping" moisture to surface by limiting travel on exposed subgrade. Where it is determined by the Owner that construction vehicle traffic (other than proof rolling) has caused subgrade instability, remove disturbed soils and replace with sand backfill at no additional cost to the Owner.

B. Apply water soluble herbicide for nonselective control of annual and perennial weeds in strict accordance with manufacturers instructions and all laws and regulations.

C. Place base course material on the prepared and accepted subgrade. The material shall be back-dumped and spread in a uniform lift thickness.

D. Handle and spread materials in a manner that will prevent segregation of sizes. When vibrating or other acceptable types of compaction equipment are used, the entire course may be placed in one layer, provided the ability of the equipment to achieve specified compaction to the full layer depth is demonstrated. In no case shall compacted lift thickness be greater than 8".

E. When base course is constructed in more than one layer, the previously placed layer shall be cleaned of loose and foreign matter. Upper layer of base course shall not be less than 1-1/2", nor shall fine materials be added to reach final grade.

F. Overstressing the subgrade soil and base course shall be avoided by utilizing equipment in spreading and dumping that exerts only moderate pressures on the soil. Avoid excessive travel on lower base course lifts. Severe rutting, cracking or yielding is an indication of overstressing the soil. Any ruts or cracks which develop in the base course during spreading or compacting shall be repaired as directed at no additional cost to Owner.

G. Base course shall be compacted to no less than 96% maximum Modified Proctor Density, as determined by ASTM D1557 (AASHTO T-180). Moisture content shall be maintained to within 1.5% of optimum throughout placing and compaction operations.

1. Compaction shall always be commenced along the edge of the area to be compacted and the roller shall gradually advance toward the center of the area to be compacted.

2. Compaction equipment shall be operated along lines parallel or concentric with the centerline of the road being constructed, and no material variation therefrom will be permitted.

H. Base course shall be substantially true to line and grade as indicated on the drawings. The surface shall be within 1/2" of required grade. Completed thickness of base course shall be within 1/2" of indicated thickness, with average thickness not less than that indicated.

I. The top surface of compacted base course shall be finished by blading or rolled with equipment designed for that purpose.

J. Temporary Graded Surface

1. When allowed by the local jurisdiction having authority, where trenches are excavated in paved traffic lanes, the surface course may be temporarily replaced by a surface consisting of base course material. The base course shall be removed and replaced with pavement as soon as conditions permit, or as required by local jurisdiction having authority.

2. The surface shall be maintained to provide for a smooth flow of traffic without holes, bumps, etc., until final acceptance of the work.

3.03 DUST AND SURFACE WATER CONTROL

A. Dust control measures shall be implemented by application of water to all work areas, storage areas, haul and access roads, or other areas affected by work.

B. All work shall be in compliance with the Federal, State and local air pollution standards, and not cause a hazard or nuisance to personnel and the public in the vicinity of the work.

C. Provide and operate at least one (1) mobile tank sprinkling unit during the contract period.

D. Other methods of dust control for haul and access roads may include chemical treatment, light bituminous treatment or other method as approved by the Owner.

E. Surface water shall be controlled to the extent that the areas to receive pavement, walks or slabs are not allowed to become wet from runoff from adjacent areas. Surface water shall be directed away from these areas but not directed toward adjacent property, buildings, or any improvement that may be damaged by water. Surface water shall not be allowed to enter sanitary sewers.

3.04 FIELD QUALITY CONTROL

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

Item	Type	Frequency

Base Course Aggregate Sampling	ASTM D75	Each day or 1 test/500 sq. yd., or as required.
Atterberg Limits	ASTM D2419, D423, and D424	As required
Sieve Analysis	ASTM C136	As required
Bearing Ratio	ASTM D1883	As required
Maximum Density	ASTM D1557, Method D	As required
In-place Density	ASTM D2167, D2922 and D3017	As required

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

END OF SECTION

SECTION 02511

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Proof roll base course to reveal soft and yielding spots.

B. Place and compact asphaltic concrete paving.

C. Pavement Markings.

D. Protection of newly placed pavement.

1.02 RELATED WORK

A. Section 01300 - Submittals: Asphaltic concrete paving mix design.

B. Section 01400 - Quality Control: For testing.

C. Section 01500 - Construction Facilities and Temporary Controls: For traffic regulation and barricades.

D. Section 02230 - Base Course

1.03 QUALITY ASSURANCE

A. Do not place asphaltic concrete paving when the air temperature in the shade and/or the roadbed temperature are below 50˚ F, or during rain, when the base course surface is wet, or during other adverse weather conditions.

B. Do not place tack coat when air temperature in the shade and the roadbed temperature are below 50˚ F, or during rain, fog, or other adverse weather conditions.

C. All work shall be performed by experienced and qualified workmen with equipment standard with the industry.

D. Approval by Engineer of sources of supply of materials shall be obtained prior to delivery of materials.

E. Comply with federal, state and/or local codes and regulations.

1.04 REFERENCES

A. American Society for Testing Materials (ASTM):

1. D1557, "Tests for Moisture - Density Relationship of Soils using 10 lb (4.5 kg) Rammer in 18 inch (457 mm) Drop".

2. D1559, "Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus".

3. D2041, "Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures".

4. D2170, "Kinematic Viscosity of Asphalts (Bitumens)".

B. THE ASPHALT INSTITUTE (A.I.) Specification Series No. 2 (SS-2).

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

1. Materials and compaction tests.
   a. AASHTO T-180

D. State of Utah Standard Specifications for Road and Bridge Construction, latest edition including Supplement #2.

1. Section 704.03 Asphaltic Cement.

1.05 SUBMITTALS

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

B. Written certification of compliance for pavement marking paint.

1.06 WARRANTY

A. See General Conditions.

1.07 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphaltic cement:

1. Viscosity Graded original, AC-10, conforming to requirements of ASTM D-3381 (AASHTO M-226, Table 2), and Section 704.03 - State of Utah Standard Specifications for Road and Bridge Construction.

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

B. Mineral aggregate:

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

2. Gradation shall be in accordance with the following:

a. Asphaltic concrete surface course:

Sieve Size	Percent Passing by Weight
1/2"	100
#4	55 - 85
#16	24 - 38
#50	9 - 21
#200	4 - 8

b. Asphaltic concrete base course:

Sieve Size	Percent Passing by Weight
3/4"	100
3/8"	75 - 91
#4	60 - 80
#16	28 - 48
#50	11 - 23
#200	5 - 9

3. Course aggregate, retained on the No. 4 sieve shall consist of clean, hard, rough, durable and sound fragments, with not less than 50 percent of particles by weight with at least one mechanically fractured face or clean angular face.

4. Fine aggregate passing the No. 4 sieve may be either a natural or manufactured product. The aggregate shall be clean, hard grained and moderately sharp, and

shall contain not more than 2 percent by weight of vegetable matter or other deleterious substances.

5. That portion of the fine aggregate passing the No. 40 sieve shall be nonplastic when tested in accordance with ASTM D-424.

6. The weight of minus 200 mesh material retained in the aggregate, as determined by the difference in percent passing a No. 200 sieve by washing and dry sieving without washing, shall not exceed 6 percent of the total sample weight. That portion of fine aggregate passing the No. 200 sieve shall be determined by washing with water in accordance with ASTM C-117.

7. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 100 pounds per cubic foot when tested in accordance with ASTM C-29.

8. The aggregate shall have a percentage of wear not exceeding forty when tested in accordance with ASTM C-131 and C-535.

9. The aggregate shall have a weighted loss not exceeding 12 percent by weight when subject to five cycles of sodium sulfate and tested in accordance with ASTM C-88, D-1073, and D-692.

2.02 ASPHALTIC CONCRETE PAVING MIXTURE

A. Combine mineral constituents and asphalt cement in proportions per mix design at a central plant to produce an asphaltic concrete pavement mix.

B. Mix design shall be based on the Marshall Method. The combined mineral aggregate plus any approved additives when mixed with the asphaltic cement in accordance with ASTM D-1559 shall conform to the following requirements:

1. Marshall Stability: 1200 pounds minimum

2. Flow (0.01 inch): 10 - 18

3. Voids Content: 1.5% to 3%

4. Asphaltic Cement Content: 5% to 6% by weight

C. The asphaltic cement shall be heated at the mixing plant to a temperature at which it can be applied uniformly to the aggregate.

D. Coarse and fine aggregate shall be stored separately at the mixing plant in a manner that will prevent intermingling.

E. When it is necessary to blend aggregates from one or more sources to produce the combined gradation, each source or size of aggregate shall be stockpiled individually. Aggregate from the individual stockpiles shall be fed through separate bins to the cold elevator feeders. They shall not be blended in the stockpile.

F. Cold aggregates shall be fed carefully to the plant so that surpluses and shortages will not occur and cause breaks in the continuous operation.

G. The aggregate shall be dried and heated to provide a paving mixture temperature in conformance with placing conditions, but not to exceed 163˚C (325˚F).

H. The heated and dried aggregates shall not contain enough moisture to cause the mixture to slump, the asphalt to foam, or the aggregate to segregate during hauling and placing.

I. The shortest mixing time consistent with satisfactory coating of the aggregate shall be used. The mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 96 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The required mixing time, as determined above, shall be in accordance with ASTM D-2489.

J. If a dryer drum mixing process is used, the mineral aggregate shall be considered satisfactorily coated with asphaltic cement when all of the particles passing the No. 4 sieve and 98 percent of the particles retained on the No. 4 sieve are coated with asphaltic cement. The moisture content of the asphaltic cement sampled behind the laydown machine prior to compaction shall not exceed 1 percent by weight.

2.03 TACK COAT

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

2.04 MARKING PAINT

A. Alkyd resin, white in color (No. 780), factory mixed, quick-drying, and non-bleeding, complying with Section 713.07 of the Utah State Department of Transportation Standard Specification for Road and Bridge Construction.

PART 3 EXECUTION

3.01 PREPARATION

A. Proofroll base course surface. Replace wet, spongy, soft, uncompactable or other unsuitable material with new base course material at no additional cost. Finish and compact repaired area as specified in Section 02230 - Base Course.

B. Ensure base course surface is to required elevation. Remove loose material from base

course surface.

C. Do not place prime coat or asphaltic concrete paving until base course installation has been approved by the Construction Manager.

3.02 TRANSPORTING THE ASPHALTIC CONCRETE PAVEMENT

A. Transport time from the mixing plant to the job site shall not exceed 1 hour.

B. Hauling truck shall have no direct frame contact with the paver or bear down on the paver during dumping operations.

3.03 TACK COAT

A. Prior to placing pavement, tack coat shall be applied to the vertical edges of concrete and "cold" pavement (over 1/2 hour old) which will be in contact with new pavement. Tack coat shall extend 12 inches onto adjacent base course material. The tack coat shall be carefully applied at a rate of 0.15 gal/SY. Tack coat shall also be applied uniformly at the same rate to the horizontal top surface of each lift of bituminous pavement prior to placing the next lift of bituminous pavement to promote a bond between the two courses of pavement. None of the material shall penetrate into the pavement and for this reason the application should be limited.

B. Prior to applying the material, the surface to be treated shall be swept or flushed free of dust or other foreign material.

C. Protect all surfaces not required to receive tack coat from any inadvertent application.

D. The temperature range of the tack coat at the time of application shall be such that the viscosity will be between 50 and 100 centistokes as determined in accordance with ASTM Designation D-2170.

E. Under no circumstances shall traffic be permitted to travel over the tacked surface. If detours cannot be provided, restrict operation to a width that will permit at least one-way traffic over the remaining portion of the roadbed. If one-way traffic is provided, the traffic shall be controlled in accordance with governing authority.

F. After application of tack coat, sufficient time shall be given to allow for complete separation of asphalt and water before paving operations begin. The tack coat shall be applied on only as many surfaces as will be paved against in the same day.

3.04 PLACEMENT OF ASPHALTIC CONCRETE PAVEMENT

A. Place asphalt pavement to provide a compacted depth as indicated on the plans. Placing the pavement shall be a continuous operation. The machine shall spread mixture and shall strike a finish that is smooth, true to cross section, uniform in density and texture, and free

from hollows and other irregularities. If any irregularities occur, they shall be corrected before final compaction of the mixture. The paving machine shall be self-propelled, equipped with hoppers, distributing screws, adjustable screeds and equalizing devices, capable of spreading hot asphaltic concrete paving mixtures without tearing, shoving or gouging, and of producing a finished surface of specified quality. Place inaccessible and small areas by hand.

B. Ensure asphalt pavement temperature is between 150 and 300 centistokes as determined with ASTM D-2170 when mixing with a pugmill, or between 220˚F and 260˚F when using the dryer-drum mixing process, immediately after placing and prior to initial rolling.

C. Ensure joints made during paving operations are straight, clean, vertical and free of broken or loose material. Carefully make joints to insure a continuous bond between old and new pavement, or between successive day's work. A continuous bond between adjoining work is required.

D. If more than 1/2 hour elapses between adjacent paving passes, the "cold joint" shall have tack coat applied to the "cold" pavement prior to placing the adjacent pass.

3.05 COMPACTION

A. Roll and compact to specified density before temperature of the mixture drops below 180˚F.

B. Compact asphalt paving course to required density, with a steelwheeled tandem roller, steel three-wheeled roller, vibratory roller, or a pneumatic-tired roller, weighing not less than five tons. Start compaction as soon as pavement will bear equipment without checking or undue displacement. Speed of roller shall be slow enough to avoid displacement of hot mixture, and any displacements occurring as a result of changing the direction of the roller, or from any other cause, shall at once be corrected by the use of rakes and of fresh mixture where required. Ensure each pass of roller overlaps previous passes by at least 1/2 of the roller width to ensure smooth surface free of roller marks. Keep roller wheels sufficiently moist so as not to pick up material. Rolling shall continue until roller marks are eliminated and no further compression is possible. The finished compacted pavement shall have a density of 93% minimum, (no test less than 93% of the density determined in accordance with ASTM D-2041), as determined by ASTM D2170.

C. Leave pavement with a uniform, dense surface.

D. Perform hand tamping in areas not accessible to rolling equipment. Thorough compaction must be achieved, and joints between curbs, headers, manholes and similar structures must be effectively sealed.

E. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature.

3.06 PAVEMENT MARKING

A. Unless otherwise directed by Construction Manager, the painting of parking stripes shall be commenced not earlier than 15 days after completion of the asphaltic concrete paving.

B. Prior to painting, broom or sweep the surface to remove dirt, loose stones or other foreign material. Solvent material that will damage pavement shall not be used as cleaning agents.

END OF SECTION

SECTION 02525

CURBS, GUTTERS, DRIVE APRONS AND WALKS

PART 1 GENERAL

1.01 WORK INCLUDED

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

B. Protection of newly constructed curbs, gutters, drive aprons and walks.

C. Curing provisions.

1.02 RELATED WORK

A. Section 02230 - Base Course

B. Section 03200 - Concrete Formwork

C. Section 03300 - Cast in Place Concrete

1.03 QUALITY ASSURANCE

A. Use workmen thoroughly trained and experienced in placing and finishing the type of work specified.

B. Comply with applicable federal, state, and local codes and regulation.

C. Comply with hot or cold weather requirements.

D. Concrete work shall be warranted against defects in materials or workmanship for a period of two (2) years, subject to applicable laws and regulations. In no case shall the Work be warranted for less than one (1) year.

1.04 REFERENCES

A. American Concrete Institute (ACI)

1. Manual of Concrete Practice, 1985, Part 2:
   a. ACI 305R-77- Hot Weather Concreting
   b. ACI 306R-78 - Cold Weather Concreting
   c. ACI 318 - Building Code Requirements

B. American Society for Testing and Materials (ASTM)

1. D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction

2. C150 - Portland Cement

3. C33 - Concrete Aggregates

4. C94 - Ready Mixed Concrete

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

D. Federal Standard (FS)

1.05 SUBMITTALS

A. Submit concrete trip tickets to Owner's representative at the time of delivery to the site.

B. Submit mix design in accordance with Section 03300.

C. Submit construction, expansion, and contraction joint layout plan for approval.

D. Submit manufacturers data for all products proposed.

1.06 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

1.07 DELIVERY AND HANDLING

A. Ready mixed concrete shall be delivered to the site only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be not more than ninety (90) minutes when ambient temperatures are below 80˚ F and not more than sixty (60) minutes when ambient temperatures are above 80˚ F.

B. Concrete which has reached initial set prior to placement, or retempered concrete is not acceptable, shall not be used in the Work, and shall be promptly removed from the project site.

1.08 PROJECT CONDITIONS

A. Concreting operations shall not be performed when air temperature at the project site falls below 40˚ F.

B. Concreting operations shall not be performed when air temperature at the project site rises above 105˚ F.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS AND MIXTURE

A. Shall be in accordance with Section 03300.

B. Cement shall comply with the requirements of ASTM C150, Type II.

C. Coarse Aggregate shall comply with the requirements of ASTM C33 and Section 03300 of these specifications.

D. Fine Aggregate shall comply with the requirements of ASTM C33 and Section 03300 of these specifications.

E. Admixtures shall not be allowed in portland cement concrete with the following exceptions:

1. Air Entraining Admixture shall comply with the requirements of ASTM C260.

F. Concrete curing compound shall comply with ASTM C309, Type II, Class A and shall restrict moisture loss to 0.055 gr./sq.cm when applied at a rate of 200 sq.ft./gal.

G. Mix design shall comply with Section 03300 of these specifications.

2.02 JOINT MATERIALS

A. Filler material shall be pre-formed, non-extruding resilient type conforming to the requirements of ASTM D544 of appropriate thickness to fill joint.

B. Joint sealant shall be polyurethane based, self leveling, one part elastomeric sealant complying with the requirements of FS-TT-S00230 Class A, Type I unless Type II is recommended for the intended application by the sealant manufacturer.

C. Select joint materials of sufficient strength, hardness and durability to withstand stiletto heel traffic without damage or deterioration.

2.03 REINFORCEMENT

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

2.04 FORMWORK

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

2.05 EQUIPMENT

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

PART 3 EXECUTION

3.01 PREPARATION

A. Remove all wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed. Concrete shall not be placed on frozen ground or in standing water.

B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.

C. Thoroughly wet the forms (except in freezing weather), or oil them; remove all standing water.

D. Thoroughly clean all transporting and handling equipment.

E. Notify the Owner at least 24 hours before placing concrete.

F. Obtain the Engineer's approval of location of construction, expansion, or control joints prior to the start of concrete placement.

G. Verify that reinforcement is free of loose mill scale, mud, paint, oil, grease, or other materials which may hinder proper bonding of concrete to reinforcement.

3.02 PLACING STEEL REINFORCEMENT

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

3.03 PLACING CONCRETE

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

3.04 SIDEWALK, DRIVEWAY, AND CURB AND GUTTER JOINTS

A. Locate all joints according to the approved joint plan, making all joints perpendicular and straight.

B. Joints for existing structures or paving removed or damaged as a result of the Work shall be replaced, matching joints in original structure as closely as possible.

C. Expansion Joints

1. Expansion joints in sidewalks shall be one half inch (½") in thickness and shall be placed where sidewalk joins existing walks, fixed objects, and at curbs at all handicap ramps using premolded expansion joint filler. Expansion joints shall not be spaced greater than 50' on center. Dowel bars are not required at expansion joints unless indicated on the drawings.

2. Expansion joints in curb and gutter shall be one half inch (½") in thickness and shall be placed between curb and gutter and storm drain structures, at changes in direction, or at intervals not exceeding 50' using premolded expansion joint filler.

3. Joint sealant shall be installed over all expansion joints. Provide and install bond breaker per the manufacturer's recommendations.

D. Contraction Joints

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

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

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

3.05 HOT WEATHER CONCRETING

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

3.06 COLD WEATHER CONCRETING

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

3.07 FINISHING

A. Concrete surfaces shall be finished smooth and true to grade by float. The finishing shall commence immediately after the concrete is placed and shall progress at a rate equal to the paving operation. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the mixing operations until the finishing is resumed.

B. Hand methods of strike off and consolidation will only be permitted when the width of pavement to be constructed is less than 10 feet or at rounded intersection where the use of machine finishing is impractical.

C. While the concrete is still plastic the entire slab surface shall be tested by the Contractor for trueness with an accurate 10 foot straightedge. Any depressions found shall be

immediately filled with fresh concrete, struck off, reconsolidated, and finished. High spots shall be struck off and refinished.

D. In advance of curing operations the pavement shall be textured by brooming. Owner shall be notified 24 hours in advance of placing and brooming operations in order to be present to review and recommend modifications to placement and finishing.

E. Finished Surface

1. The finished surface shall be true to grade and cross section, free from ruts, humps, depressions or other irregularities. The surface shall not deviate from line and grade by more than 1/8" in 10'. The determination of compliance with smoothness may be made with a straightedge or string line at the option of the Engineer. Any irregularities found shall be corrected by the Contractor using suitable grinding or grooving tools and equipment.

2. The grinding tool shall consist of a machine equipped with cutting wheels mounted on a horizontal shaft. The grinding action shall be conducted parallel to the centerline.Grinding operations may be deferred, as directed by the Engineer, whenever tearing of aggregate with the surface occurs and shall not be resumed until the concrete has hardened sufficiently to avoid tearing.

3. The finished surface across contact joints shall not deviate from a straight line by more than 1/8" in 12" when tested with a straightedge. The Contractor shall take the necessary precautions to prevent slumping of the edge of the concrete at contact joints.

4. Line and Grade Control:
   a. Contractor shall establish references at suitable intervals for line and grade control of the placing operations.
   b. Contractor shall furnish, place and maintain such supports, wire devices and materials that may be required to provide continuous line and grade reference controls to the placing machine, trimmers, or paver.

3.07 CURING

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

B. Membrane Curing Compound

1. Surfaces of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.

2. The curing compound shall be delivered to the work in ready mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.

3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100˚ F, unless otherwise specified by the manufacturer's recommendations.

4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 100 square feet, unless otherwise specified by the manufacturer's recommendations.

5. In the event that the application of curing compound is delayed, the application of water spray, ponding, or soaked tarps shall be started immediately and shall be continued until application of the compound is started or resumed.

3.08 PROTECTION

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

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

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

END OF SECTION

SECTION 02720

STORM SEWAGE SYSTEMS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Storm sewage piping

B. Inlet boxes and cleanout boxes with grates and lids as required.

C. Rip-rap

1.02 RELATED WORK

A. Section 01300 - Submittals: For manufacturer's specifications for all products.

B. Section 02220 - Trenching, Backfilling and Compacting

C. Section 03100 - Concrete Formwork

D. Section 03200 - Concrete Reinforcement

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

1.03 QUALITY ASSURANCE

A. Workmanship and methods employed in the handling, transportation, storage, bedding, and laying of pipe, fittings, associated structures and accessories shall conform to the appropriate manufacturers' recommendations and/or ASTM recommendations.

B. All products shall be inspected by Contractor, prior to installation, for damage. No damaged products will be used.

1.04 REFERENCES

A. "Manual of Standard Practices", Concrete Reinforcing Steel Institute (CRSI)

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

1. A-615, "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"

1.05 SUBMITTALS

A. Submit manufacturer's specifications for all products.

1.06 DELIVERY AND HANDLING

A. Load and unload pipe, fittings, and accessories in such a manner as to avoid shock or damage.

1.07 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 STORM SEWAGE PIPING

A. For 12" diameter and larger:

1. RCP (reinforced concrete pipe) shall meet the requirements of ASTM C-76, Class III, with push-on gasket joints conforming to ASTM C-443. Cement for the pipe shall be Portland Cement Type V, conforming to ASTM C-150.

B. For diameters smaller than 12":

1. Concrete pipe shall meet the requirements of ASTM C-14, Class III, with push-on gasket joints conforming to ASTM C-443. Cement for the pipe shall be Portland Cement, Type V, complying to ASTM C-150.

C. For diameters smaller than 12" (except road culverts which must be concrete pipe as specified in Section 2.01 B. above:

1. PVC (polyvinyl chloride) shall meet the requirements of ASTM D3034 for SDR 35. The pipe shall have integral wall bell and spigot joints conforming to ASTM D-3212, with a solid crosssection rubber ring, factory assembled, securely locked in place to prevent displacement during assembly.

2.02 INLET AND CLEANOUT BOX MATERIALS

A. Concrete, forms and reinforcement: Shall be as specified in Section 03300, 03100 and 03200, respectively.

B. Rings, Lids and Grates shall be as specified on the Drawings.

2.03 RIP-RAP

A. Rip-rap shall be as specified on the Drawings.

PART 3 EXECUTION

3.01 PREPARATION

A. When connections are to be made to any existing pipe, conduit, or other improvement, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for and expose the existing improvement before laying any pipe or conduit.

3.02 PIPE INSTALLATION

A. Bedding:

1. Bedding shall be prepared in accordance with Section 02220 - TRENCHING, BACKFILLING AND COMPACTING and as shown on the Drawings.

2. Lay all pipes on a firm bed, true to the line and grade, and abutt the end and shoulder of each pipe against the other in such a manner that there is no unevenness of any kind along the bottom half of the pipe line.

B. During all phases of pipe installation, dewater trench to prevent floating of pipe.

C. Lay pipe in the uphill direction with the bell end pointing upgrade.

D. Clean pipe joints prior to installing gaskets. Install gaskets in accordance with manufacturers' recommendations.

E. Manufacturers' Recommendations: Perform all work in strict accordance with the manufacturer's recommendations for the type of pipe being installed.

F. Prevent contact between the pipe and compaction equipment. Compaction of bedding and backfill material should generally be done in such a way so that compaction equipment is not used directly above the pipe until sufficient backfill has been placed to assure that such compaction equipment will not have a damaging effect on the pipe.

3.03 INLET AND CLEANOUT BOXES

A. Formwork: Shall be as specified in Section 03100.

B. Reinforcement: Shall be as specified in Section 03200.

C. Cast-in-place Concrete: Shall be as specified in Section 03300.

3.04 CLEANING AND FLUSHING OF STORM SEWAGE PIPING

A. Thoroughly clean all pipe lengths or units laid of all debris immediately after laying.

B. Thoroughly clean by flushing and remove all debris from the pipeline and drainage structures prior to acceptance of the work by the Construction Manager.

3.05 RIP-RAP

A. Place rip-rap in location as shown on the Drawings. Rocks shall be placed in such a manner as to assure tight interlocking; no loose piles will be allowed.

3.06 PROTECTION

A. Protect all newly poured concrete from damage by placing barricades or enclosures in accordance with Section 01500 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

END OF SECTION

SECTION 02800 - LANDSCAPING

PART I - GENERAL

DESCRIPTION

Work Included - Work under this section includes topsoil preparation, lawn seeding and sodding, shrub and tree planting, preparation and placement of stone aggregate beds, and preparation and placement of wood chip beds.

Related Work Specified Elsewhere
Section 02200 - Structural Earthwork

SUBMITTALS - Refer to Section 01300 - Submittals. Include the following:

Product Data - Submit data for all trees, shrubs, plants, and seed to be included in the work. State origin of all plants, trees and shrubs.

Certificates of Compliance - Submit certification that grass seed has been tested by a recognized laboratory for seed testing within 6 months prior to delivery. Submit performance certificates for mulching products.

PART II - PRODUCTS

TOPSOIL - Topsoil shall be loose friable loam free of stumps, roots, rocks, brush, weeds, subsoil, refuse, or other material detrimental to proper development of vegetative growth. Sphagnum peat consisting of 95% organic matter may be used to condition otherwise unacceptable soils.

MULCH

Straw Mulch - Straw mulch shall be straw of oats, barley, wheat, rye free from seed of noxious weeds; or, clean field or marsh hay free from noxious weeds. Do not use straw or hay which is in advance state of decomposition or which breaks when crimped.

Wood Cellulose Fiber - Commercial product specifically manufactured for use with grass seed. Express application requirements of product in terms of air dry weight (10% maximum allowance for moisture content).

GRASS SEED

Quality seed free of noxious seeds as Russian or Canadian Thistle, European Bindweed, Johnson Grass, or Leafy Spurge. Do not use seed that has become wet or moldy.

Indicate supplier, lot number, net weight, percent weed seed content, and guaranteed percent purity and germination.

Lawn Seed

Seed Mix, % by Wt.	33
Common Name	Kentucky Bluegrass
% Purity	99
% Germination	90
Application Rate per 1,000 sq. ft.	2 pounds

Conform to State and Federal regulations and to provisions of the Association of Official Seed Analysis.

SOD - Nursery grown, less than 1% weed content and free of perenial or annual grasses and plants. Minimum soil thickness of sod: 3/4" to 1". Cut uniform strips 18 inches wide and not less than 6 feet long. Do not use sod that has been cut more than twenty hours.

FERTILIZER

Seeding - Commercial standard brand fertilizer having 18% minimum available nitrogen and super phosphate (45% minimum P2O5).

Sod - Commercial fertilizer, 20-20-10 formula. Product conforming to State fertilizer laws, delivered in dry, uniform condition in original unopened containers bearing manufacturer's guaranteed analysis.

PART III - EXECUTION

GRASS SEEDING

General - Plant seeding in between May 1, 2003 and May 15, 2003.

Topsoil - Place and spread to thickness at location shown on drawings. Key to underlying surface by means of harrows, rollers, or other suitable equipment. Do not begin placement until areas have been graded and prepared as specified.

Soil Preparation - Remove all ground surface irregularities to eliminate low areas where water will stand. Immediately prior to seeding, lightly till soil into an even and loose seedbed at the specified line and grade.

Fertilizing - Till super phosphate in the top 2" of soil at the rate 0.4 lb. per 1000 sq. ft. prior to seeding. Follow with second applica-tion of fertilizer (minimum 18% available nitrogen) at rate of 1 lb. nitrogen per 1000 sq. ft. 6 to 8 weeks following planting.

Seeding

Apply seed with mechanical landscape drill so that seed will have about 1/4" cover. Do not drill seed in windy weather or when ground is frozen. Use broadcast or hydraulic seeding methods only in areas inaccessible to machine methods.

Contractor may elect to use hydraulic seeding equipment capable of pumping 100 gallons per minute at 100 lbs. per square inch. Provide means for estimating volume used or remaining in storage tank.

Water and maintain seeded areas for periods of 5 weeks following seeding. Avoid standing water, surface wash, or scour. Protect seeded areas from vehicle and pedestrian traffic by use of barriers and signs.

Reseed areas where stand of grass has not been produced in a 5-week period.

Mulching - Add cellulose fiber mulch in proportional quantities with water into a slurry tank and thoroughly mix. Spray mulch uniformly over seeded areas at a rate of 1,000 pounds per acre. Do not mulch in the presence of free surface water resulting from rain, melting snow, or similar causes. May be combined with hydraulic seeding operation specified above.

SODDING

Soil Preparation - Remove all sticks, stones, debris, and objects more than 1/2" in diameter. Smooth irregularities prior to any sodding.

Sodding - Lay sod by staggering joints. Run strips of sod at right angles to slopes.

Fertilizing - Fertilize sod with 20-20-10 commercial fertilizer at rates of 1 lb. nitrogen per 1000 sq. ft. Soak sod after application of fertilizer. After sod has dried sufficiently to allow effective rolling, roll with a lawn roller weighing not less than 150 lbs. to secure a tight bond to subgrade and between strip joints.

SECTION 03100

CONCRETE FORMWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Concrete formwork for on-site cast-in-place concrete curb, water, sanitary sewage and storm sewage system structures, or other improvements removed or damaged during the work.

1.02 RELATED WORK

A. Section 02720 - Storm Sewage Systems: For Inlet Boxes

B. Section 03200 - Concrete Reinforcement

C. Section 03300 - Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. Comply with federal, state, and/or local codes and regulations.

B. All work shall be performed by experienced and qualified workmen.

1.04 METHOD OF MEASUREMENT AND BASIS FOR PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 UTILITY STRUCTURE FORM MATERIALS

A. Forms shall be of suitable material and of a type, size, shape, quality, and strength to insure construction as designed.

B. Metal forms for exposed surfaces may be used when all bolt and rivet holes are countersunk so that a plane, smooth surface of the desired contour is obtained.

C. Rough lumber may be used for forming surfaces that will be covered by earth in the finished structure.

D. Forms for all surfaces that will not be completely enclosed or hidden below the permanent surface of the ground shall be made of surfaced lumber, or material which will provide a surface at least equal to surfaced lumber or plywood.

E. All lumber shall be free from knotholes, loose knots, cracks, splits, warps, or other defects affecting the strength or appearance of the finished structure. Any lumber or material which becomes badly checked or warped, prior to placing concrete, shall not be used.

PART 3 EXECUTION

3.01 PREPARATION

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

3.02 FORM CONSTRUCTION

A. Forms shall be so constructed that the finished concrete shall be of the form and dimensions shown on the plans and true to line and grade, and sufficiently rigid to resist deflection. Design of formwork and removal of forms and shores are to conform to ACI 318. The responsibility for their adequacy shall rest with the contractor.

B. All forms shall be mortar tight and so designed and constructed that they may be removed without injuring the concrete.

C. If, at any stage of the work, during or after placing the concrete, the forms sag or bulge to such an extent as to allow concrete to fall below the elevation shown on the plans, or outside the true line of the form, the concrete affected shall be removed.

D. No concrete may be deposited against the earth as a side form.

END OF SECTION

SECTION 03200

CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

A. Placing of concrete reinforcing for cast-in-place concrete water, sanitary sewage and storm sewage system structures.

1.02 RELATED WORK

A. Section 03100 - Concrete Formwork

B. Section 03300 - Cast-In-Place Concrete

1.03 QUALITY ASSURANCE

A. Comply with federal, state, and/or local codes and regulations.

B. All work shall be performed by experienced and qualified workmen.

1.04 REFERENCES

A. "Manual of Standard Practices", Concrete Reinforcing Steel Institute (CRSI)

B. American Society for Testing and Materials (ASTM):
   1. A-615, "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement"

1.05 METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. No measurement will be made.

B. Payment will be included in the lump sum contract amount.

PART 2 PRODUCTS

2.01 STEEL MATERIALS

A. Reinforcing steel:
   1. All reinforcing bar material used for reinforcement of concrete shall be intermediate Grade 60 steel conforming to the requirements of ASTM A-615.
   2. All rods shall be deformed and round.
   3. All reinforcement shall be uncoated, free from rust, scale, form oil, etc.
   4. Welded wire fabric for concrete reinforcement shall conform to ASTM A-185.

B. Accessories:

1. All accessories, including such items as chairs, spacers, saddles, etc., shall be of steel formed in such a manner and with sufficient strength to perform the intended functions. Chairs, spacers, saddles, etc., which are set in contact with forms, are to be galvanized or provided with plastic tips or coating to prevent rust spots on finish concrete surface.

C. Wire:
1. All tying steel shall not be less than 18 gage annealed iron lacing wire. All wire tie ends shall point away from forms.

PART 3 EXECUTION

3.01 PREPARATION

A. All reinforcement shall be free from loose mill scale, loose or thick rust, dirt, paint, oil, or grease, and shall present a clean surface.

3.02 PLACING STEEL REINFORCEMENT

A. Reinforcing bars shall be accurately placed as shown on the plans and shall be firmly and securely held in position in accordance with the "Manual of Standard Practice" of the Concrete Reinforcing Steel Institute, using concrete or metal chairs, spacers, metal hangers, supporting wires and other appropriate devices of sufficient strength to resist crushing under full load. Metal chairs which extend to the surface of the concrete (except where shown on the plans) and wooden supports, shall not be used.

B. Placing bars on layers of fresh concrete as the work progresses and adjusting bars during the placing of concrete will not be permitted.

C. Tack welding of reinforcing bars in place shall not be allowed.

D. Splicing:
1. Splices of bars shall be made only where shown on the Drawings or as approved by the Owner.
2. Where bars are spliced, they shall be lapped at least 30 diameters, unless otherwise shown on the plans.
3. Splicing shall be accomplished by placing the bars in contact with each other and wiring them together.

E. Bending reinforcement:
1. Bends and hooks in bars shall be made in the manner prescribed in the "Manual of Standard Practice" of the Concrete Reinforcing Steel Institute.
2. Bars shall not be bent or straightened in a manner which will injure the material.
3. Bars with kinks or unspecified bends shall not be used.

END OF SECTION

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

A. Inspection

B. Preparation

C. Placing Concrete

D. Hot Weather Concreting

E. Cold Weather Concreting

F. Expansion, Contraction and Construction Joints

G. Finishing

H. Curing

I. Field Quality Control

J. Protection

1.02 RELATED WORK

A. Section 03100 - Concrete Formwork

B. Section 03200 - Concrete Reinforcement

1.03 QUALITY ASSURANCE

A. Qualifications of Workmen:
   1. Use workmen thoroughly trained and experienced in placing and finishing the types of concrete specified.

B. Comply with federal, state and local codes and regulations.

C. Comply with hot or cold weather requirements as applicable.

1.04 REFERENCES

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

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

B. American Society for Testing and Materials (ASTM):
1. C-150, "Portland Cement"
2. C-33, "Concrete Aggregates"
3. C-94, "Ready-Mixed Concrete"

1.05 SUBMITTALS

A. A mix design and information based on trial batch test results shall be submitted to Owner at least two weeks prior to commencement of the work.

B. Results from a reputable independent testing laboratory showing concrete aggregates comply with applicable sections of ASTM C-33. Contractor shall pay for necessary tests as directed by Engineer. A minimum of one test shall be made on the aggregate used for the first 5 cubic yards of concrete and for each 50 cubic yards thereafter. Should the Engineer deem that additional testing of aggregate is necessary, he may select samples from any of the aggregate to be used and have these samples tested by a recognized laboratory of his choice. Such material shall not be used in the work until the test reports are available. Should the material fail to meet the specified requirements, the aggregate will be rejected and the expense of testing shall be borne by the Contractor. Should the tests show the aggregate to be satisfactory, the cost of additional testing will be borne by the Owner.

D. Submit manufacturer's information (catalog data) for all products.

1.06 DELIVERY, STORAGE AND HANDLING

A. Ready-mixed concrete: Concrete shall be mixed only in such quantities as are required for immediate use. The maximum allowable time between charging of the material in the mixing drum and final placing shall be ninety minutes for air temperatures below 80` F and sixty minutes for temperatures above 80` F. Concrete not placed within these time limits, or if an initial set has developed shall not be used. Tempering concrete by adding water or by other means will not be permitted.

B. Materials shall be delivered, stored, and handled so as to prevent damage by water or inclusion of foreign materials. Packaged materials shall be delivered and stored in original package, marked with brand and maker's name, until ready for use. Packages of materials showing evidence of water or other damage shall be rejected. Bulk cement shall be identified by shipping and delivery statements.

C. Cement shall not be stored longer than 4 months before usage.

1.07 MEASUREMENT AND PAYMENT

A. Payment for Cast-In-Place concrete will be included in the Lump Sum Bid Price(s) for the item requiring Cast-In-Place concrete. Such price shall include full compensation for the furnishing and placing of materials required to complete the Cast-In-Place concrete, and

for all labor, equipment, tools and incidentals needed to complete the work in conformity with the plans and specifications.

B. If any individual compressive strength test is below the specified required strength, the concrete may be accepted at a reduced price, Owner option. If Owner elects to accept at a reduced price, the price reduction shall apply to the amount of concrete represented by the strength test in accordance with the following schedule:

PSI BELOW SPECIFIED STRENGTH SPECIFICATION	PAY FACTOR
1-100	98
101-200	94
201-300	88
301-400	80

Concrete with a compressive strength of more than 400 psi below the required specified strength shall be evaluated by the Engineer for capabilities necessary to the integrity of the structure. The Engineer may accept this concrete at a pay factor of 0.80, or require that it be replaced with acceptable material. The Engineer shall make the final decision.

1.09 WARRANTY

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

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement:
1. Portland cement shall be Type II, low alkali, complying with ASTM C-150, unless otherwise specified.
2. No air-entraining type of cement will be allowed.

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

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

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

Sieve Size	Percent Passing (by weight)
3/8"	100
No. 4	95-100
No. 16	45-80
No. 50	10-30
No. 100	2-10

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

E. Admixtures:
1. The air-entraining admixture shall conform to ASTM Designation C-260 and be added at the mixer, not the job site.
2. Flyash shall NOT be used in concrete.
3. No other admixtures will be allowed unless approved by the Engineer.

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

2.02 CONCRETE MIX

A. Concrete shall consist of a mixture of Portland Cement, water, fine and coarse aggregates, and an air entraining agent.

B. The proportions of the concrete materials shall produce a mixture that will work readily into corners and angles of forms and around reinforcing steel. The mixture shall have a water content which does not exceed the maximum specified amount, and which shall have the required compressive strength.

C. The methods of measuring concrete materials shall permit proportions to be accurately controlled and easily checked. Measurement of materials for ready-mixed concrete shall conform to ASTM C-94. Engineer shall have free access to the mixing plant at all times.

D. Concrete mix shall be as follows (unless otherwise shown or specified). The proportions given below are intended to give the required strength and shall be carefully followed as to minimum quantity of cement per cubic yard of concrete and as to water/cement ratios and more cement per cubic yare of concrete will be required if tests indicate necessity for such increased quantity to achieve the design strength:

Intended Use	Coarse Aggre-gate Size (inches)	Min. Cement Content (sacks/CY)	Min. 28-Day Compressive Strength (psi)	Min. 14-Day Flexural Strength (psi)	Slump (inches)	Air Entrainment (percent)	Max. Water/ Cement Ratio
Concrete Pave-ment, Storm Drain Inlet Boxes, Curbs & Walks	3/4	6.5	4000	550	2.5-4.0	5-6.5	0.45

2.04 EQUIPMENT

A. Mixing equipment shall be subject to approval. Mixers may be of the stationary plant, paver, or truck mixer type.

B. Each mixer shall be equipped with a device for accurately measuring and indicating the quantity of water entering the concrete, and the operating mechanism shall be such that leakage will not occur when the valves are closed.

C. Adequate equipment and facilities shall be provided for accurate measurement and control of all materials, and for readily changing the proportions of the material. The batch plant shall be capable of controlling the delivery of all material to within 1% by weight of the individual material. If bulk cement is used, it shall be weighed on a separate visible scale which will accurately register the scale load at any stage of the weighing operation from zero to full capacity.

D. Mixers shall be equipped with a device for automatically measuring and indicating the time required for mixing, which device shall be interlocked to prevent the discharge of concrete from the mixer before the expiration of the mixing period. Neither speed nor volume capacity of the mixers shall exceed manufacturer's recommendations. Excessive over-mixing, requiring additions of water to preserve the required consistency, will not be permitted.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect subgrade surface and verify grade and adequacy of compaction.

B. Correct grade and compaction deficiencies.

C. Notify the Engineer in writing of readiness to place concrete in any portion of the work, This notification shall be given as far in advance of the placing of concrete as the Engineer deems necessary for him to make final inspection of the preparations at the location of the proposed concrete placing. All forms, steel, screeds, anchors, ties, and inserts shall be in place before the Contractor's notification of readiness is given to the Engineer.

D. No concrete shall be placed until forms, reinforcement, etc. has been inspected by the Engineer.

3.02 PREPARATION

A. Remove all water, wood scraps, ice, snow, frost and debris from the areas in which concrete will be placed.

B. Thoroughly clean the areas to ensure proper placement and bonding of concrete.

C. Thoroughly dampen the surfaces which will come into contact with the concrete (except in freezing weather), forms may be oiled instead; remove all standing water. Reinforcement shall be thoroughly cleaned of all ice and other coatings.

D. Thoroughly clean all transporting and handling equipment.

E. Erect and maintain suitable barriers to protect the finished surface. Any section damaged from traffic or other causes occurring prior to its official acceptance, shall be repaired or replaced by the Contractor at his own expenxe in a manner satisfactory to the Owner.

F. The concrete surface must not be damaged or pitted by rain, hail or snow.

G. Concrete shall not be placed until all reinforcement is securely and properly fastened in its correct position, and until the form ties at construction joints have been retightened, all sleeves, hangers, pipe, bolts and any other items required to be embedded in the concrete have been placed and anchored and the forms cleaned and coated as specified.

3.03 PLACING CONCRETE

A. Except by specific written authorization, concreting operations shall not be continued when a descending air temperature, in the shade and away from artificial heat, falls below 40 F, nor shall operations be resumed until ascending air temperature, in the shade and away from artificial heat, reaches 35 F.

B. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
   1. The free fall of concrete from the end of the spout or chute, or from a transporting vehicle, shall not exceed 6 feet, except when beginning a wall pour, in which case the free fall shall not exceed 2 feet.
   2. When the distance through which concrete must be dropped vertically exceeds the maximums specified above, a tremie or flexible metal spout shall be used. Flexible metal spouts having sufficient strength to hold the weight of the concrete shall be composed of conical sections not nore than 3 feet long, with the diameter of the

outlet and taper of the various sections such that the concrete will fill the outlet and be retarded in its flow.

3. Chutes, troughs, or pipes used as aids in placing concrete shall be arranged and used so that the ingredients of the concrete will not be separated. Chutes and troughs shall be of metal or metal-lined. When steep slopes are necessary, the chutes shall be equipped with baffle boards or a reversed section at the outlet. Open troughs and chutes shall extend, if necessary, down inside the forms or through holes left in the forms; or the ends of such chutes shall terminate in vertical downspouts,
4. Pumping: The equipment shall be so arranged that no vibrations result which might damage freshly placed concrete. Where concrete is conveyed and placed by mechanically applied pressure, the equipment shall be suitable in kind and adequate in capacity for the work. The operation of the pump shall be such that a continuous stream of concrete without air pockets is produced. When pumping is completed, the concrete remaining in the pipe line, if it is to be used, shall be ejected in such a manner that there will be no contamination of the concrete or separation of the ingredients. Before and after this operation, the entire equipment shall be thoroughly cleaned. Water shall not be added to the concrete in the pump hopper.

C. Place concrete as dry as possible consistent with good workmanship, never exceeding the maximum specified slump.

D. Place concrete at such a rate that concrete is at all times plastic and flows readily between bare bars. No segregation of coarse aggregate shall occur when placing or dropping between bars.

E. When placing is once started, carry it on as a continuous operation until placement of the section is complete.

F. Do not pour a greater area at one time than can be properly finished without checking; this is particularly important during hot or dry weather.

G. Do not use retempered concrete that has been contaminated by foreign materials.

H. Struts, stays, and braces serving temporarily to hold the forms in correct shape and alignment, pending the placing of concrete at their locations, shall be removed when the concrete placing has reached the elevation and strength rendering their service unnecessary. These temporary members shall be entirely removed from the forms.

I. Build into concrete any nosings, inserts, anchors, structural members, ties and hangers required to secure abutting or adjacent materials. Waterstops shall be prevented from bending over or being moved out of position.

J. Unless necessary materials and equipment are readily available to adequately protect the concrete in place, placing operations may be postponed by the Engineer when, in the opinion of the Engineer, impending conditions may result in rainfall or low temperatures which will impair the quality of the finished work. The Contractor shall pay for all delay related costs resulting from such postponements including costs for removing and

replacing damaged concrete. In case rainfall should occur after placing operations are started, provide ample covering to protect the work.

K. Whenever it is necessary to continue the mixing, placing, and finishing of concrete after daylight hours, the site of the work shall be adequately lighted so that all operations are plainly visible. Every effort shall be made to enable finishing to be done in daylight.

L. Clean up all spilled concrete and washings thoroughly. Concrete trucks shall not be washed-out on job site. Wash trucks at off-site location in accordance with all applicable laws and ordinances.

3.04 HOT WEATHER CONCRETING

A. Hot weather is defined as any combination of high air temperature, low relative humidity, and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in

abnormal properties. Hot weather concreting shall follow the guidelines of ACI 305R, latest edition.

B. Undesirable hot weather effects on concrete in the plastic state may include:
1. Increased water demand.
2. Increased rate of slump loss and corresponding tendency to add water at job site.
3. Increased rate of setting resulting in greater difficulty with handling, finishing, and curing, and increasing the possibility of cold joints.
4. Increased tendency for plastic cracking.
5. Increased difficulty in controlling entrained air content.

C. Undesirable hot weather effects on concrete in the hardened state may include:
1. Decreased strength resulting from higher water demand and increased temperature level.
2. Increased tendency for drying shrinkage and differential thermal cracking.
3. Decreased durability.
4. Decreased uniformity of surface appearance.

D. Placing and curing:
1. Concrete shall be handled and transported with a minimum of segregation and slump loss. Concrete temperature at time of placement shall be such that the rate of evaporation for the weather conditions shall not cause cracking.
2. The aggregate shall be cooled by frequent spraying in such a manner as to utilize the cooling effect of evaporation. The placement schedule shall be arranged, as approved, in such a manner as to provide time for the temperature of the previously placed course to begin to recede. The mixing water shall be the coolest available at the site insofar as is practicable.
3. Concrete shall be placed where it is to remain.
4. Concrete shall be placed in layers shallow enough to assure vibration well into the layer below.
5. Surfaces exposed to the drying wind shall be covered up immediately after finishing with polyethylene sheets and be water cured continuously as soon as the concrete has set up. Curing compounds, in lieu of water, may not be used.

6. Joints shall be made on sound, clean concrete.
7. Finishing operations and their timing shall be guided only by the readiness of the concrete for them, and nothing else.
8. Curing shall be conducted in such a manner that at no time during the prescribed period will the concrete lack ample moisture and temperature control. Facilities must be ready to protect promptly all exposed surfaces from drying. All work determined by Engineer to be damaged from hot weather shall be removed and replaced at no cost to Owner.
9. All materials and workmanship required to meet the hot weather requirements shall be supplied at the Contractor's own expense.

3.05 COLD WEATHER CONCRETING

A. Cold weather is generally defined as a period when for more than 3 successive days the mean daily temperature drops below 40 F. When temperatures above 50 F occur during more than half of any 24-hour period, the weather should no longer be regarded as "cold". The times and temperatures given for various conditions and situations are not exact values and should not be used as such. Weather conditions are variable and common sense must be used to protect the concrete. Cold weather concreting shall follow the guidelines of ACI 306R, latest edition.

B. All materials and workmanship required to meet the cold weather requirements shall be supplied at the Contractor's own expense.
   1. Preparation:
      a. When specific written authorization is given to permit concreting operations at temperatures below those specified in 3.03 PLACING CONCRETE, arrangements for covering, insulating, housing, or heating materials and/or newly placed concrete should be made in advance of placement and should be adequate to achieve the temperature and moisture conditions recommended herein in all parts of the concrete. All equipment and materials necessary should be at the work site before the first frosts are likely to occur, not after concrete has been placed and its temperature begins to approach the freezing point.
   2. Placement and protection:
      a. During placement of concrete, tarpaulins, or other readily movable coverings supported on horses or framework should follow closely the placing of the concrete so that only a few feet of concrete are exposed to outside air at any time.
      b. The housing, covering, or other protection used in curing shall remain intact at least 24 hours after artificial heating is discontinued.
      c. All concrete placed in forms shall have a temperature between 55` and 90` after placement. Adequate means shall be provided for maintaining the surrounding air at 60 F for at least seventy-two hours after placing and at no less than 40 F for an additional four days. All methods and equipment for heating shall be subject to approval. Insulating blankets shall be used when required to maintain a satisfactory temperature during the curing period.
      d. No dependence shall be placed on salt or other chemicals for the prevention of freezing.

e. If heating or other protective measures need to be taken to prevent concrete from freezing, the concrete may require special curing methods to prevent rapid drying, as described in ACI 306R-78.

3.06 EXPANSION, CONTRACTION AND CONSTRUCTION JOINTS

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

3.07 FINISHING

A. Surface preparation: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.

B. The finishing shall commence immediately after the concrete is placed. Any delay in excess of thirty minutes in performing the preliminary finishing shall constitute cause for shutting down the placing operation.

C. The finished surface shall be true to grade and cross section, free from ruts, humps, depression or other irregularities.

D. Finish Types: Finish shall be as shown on the Drawings or as specified in individual specification sections in accordance with the following:

1. Patched: Remove all fins and irregular projections. Clean form-tie holes thoroughly, coat with suitable epoxy and fill with mortar of dry consistency (see PART 2 - PRODUCTS).
2. Rubbed: Use proper grout mix (see PART 2 - PRODUCTS) and point up voids with cement mortar. Thereafter, rub the entire surface with said grout mix and a carborundum stone to produce a relatively smooth, plane surface without defects and imperfections. Surface shall be properly cured. Use of plaster shall not be permitted. Upon completion of the rubbing, the surface shall be washed thoroughly with clean water.
3. Float: This type of finish shall be an integral finish by float after screeding, to compact the surface evenly. Any excess surface water shall be removed before floating and no mortar shall be used for leveling.
4. Steel Trowel: After striking off the wearing course to the established grade, it shall be compacted by rolling or tamping, and then floated with a wood or magnesium float or power floating machine. The surface shall be tested with a straightedge to detect high and low spots, which shall be eliminated. Floating shall be followed by steel troweling after the concrete has hardened sufficiently to prevent excess fine material from working to the surface. The finish shall be brought to a smooth surface, free from defects and blemishes. No dry cement nor mixture of dry cement and sand shall be sprinkled directly on the surface of the wearing course to absorb moisture or to stiffen the mix. After the concrete has further hardened, additional troweling may be required. This shall be done as may be directed by the Engineer. Trowling shall produce a dense, smooth, impervious surface, free from defects and blemishes.
5. Sandblasting: Sandblasting shall be done using a sharp silica sand. Exterior surfaces of concrete walls shall be sandblasted with #16 silica sand, preferably by

the dry sandblasting process before wire wrapping may be started. The concrete surface shall be heavily pitted, leaving no traces of laitance, form-oil and original surface smoothness and surface color. The minimum sand consumption per 100 square feet of surface shall be 150 pounds of silica sand. Sandblasting shall not be started before the completion date of the curing period or before all tieholes have been dry-packed.

6. Formed: Immediately after the removal of forms, all fins and irregular projections shall be removed from surfaces, whether or not they are to be covered with high tensile wire and shotcrete covercoats.

E. Final finishing:

1. When the concrete has hardened sufficiently, the surface shall be given a broom finish. The broom shall be of an approved type.
2. The strokes shall be in a transverse direction with adjacent strokes slightly overlapped and shall be made by drawing the broom without tearing the concrete, but so as to produce regular corrugations not over 1/8 inch in depth.
3. The surface, as thus finished, shall be free from porous spots, irregularities, depressions, and small pockets or rough spots such as may be caused by accidental disturbing during the final brooming of particles of course aggregate embedded near the surface.

3.09 CURING

A. Protect the concrete from the effects of weather in accordance with HOT WEATHER CONCRETING AND COLD WEATHER CONCRETING in this section.

B. Water for curing shall be as specified in PART 2 - PRODUCTS.

C. Other curing requirements may be required in individual Specifications Sections.

D. Membrane curing compound method:

1. Surface of newly placed or exposed concrete shall be kept moist or wet until the curing compound is applied. The curing compound shall be applied immediately after all patching or surface finishing has been completed.
2. The curing compound shall be delivered to the work in ready-mixed form. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. The compound shall not be diluted or altered in any manner.
3. Curing compound that has become chilled to such an extent that it is too viscous for satisfactory application shall be warmed to a temperature not exceeding 100` F, unless otherwise specified by manufacturer's recommendations.
4. The curing compound shall be applied to the exposed surface at a uniform rate of 1 gallon per 150 square feet of area, unless otherwise required by manufacturer's recommendations.
5. In the event that the application of curing compound is delayed, the application of water as provided in this section shall be started immediately and shall be continued until application of the compound is resumed or started.

3.10 FIELD QUALITY CONTROL

A. Testing will be provided by a testing laboratory employed by the Owner. The Engineer shall select the testing agency from Owner's list of approved labs. Refer to individual Specifications Sections for other Field Quality Control requirements.

B. All testing will be paid for by Owner, except for retesting of material which fails to meet these specifications. Such retesting shall be paid for by Contractor at no expense to Owner. Contractor shall pay for curing cylinders. Testing agency shall transport cylinders.

C. Concrete sampled from a concrete pump shall be sampled from the hose after all of the priming grout has been wasted. The end of the hose shall be placed in a horizontal position before the concrete is discharged into the sampling pan. The concrete shall not be allowed to fall into the sampling pan.

D. The Contractor, at his expense, shall furnish the concrete required for testing.

E. Strength, slump and air tests shall be taken in accordance with the following unless otherwise specified in individual Specifications Sections:

1. Strength, slump and air tests may be taken in accordance with the placement rate per day as shown below:

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

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

2. Compressive strength test specimens shall be made and cured in accordance with ASTM C-31; Specimens shall be tested in accordance with ASTM C-39.
   a. Three specimens shall be made by the Engineer for each test, and these shall be broken at 7 and at 28 days, with one held in reserve.
   b. At least one test (3 specimens) shall be made for <u>each class</u> of concrete poured during one day.

3. Flexural strength test specimens shall be prepared in accordance with AASHTO Designation T-23 and tested for flexural strength in accordance with AASHTO Designation T-97.
   a. Four specimens shall be made by the Engineer for each test, and one shall be broken at 7 and two at 14 days, with one held in reserve.
   b. At least one test (4 specimens) shall be made for <u>each class of</u> concrete placed during one day.

4. If a slump test does not meet the specification, a second slump test shall be made immediately on the same load. The concrete shall be accepted if the second slump test meets the specification or rejected and removed from the project if the second slump test does not meet the specification.

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

3.11 PROTECTION

A. Comply with applicable parts of Section 03300 for protection of concrete. Also comply with HOT WEATHER CONCRETING and COLD WEATHER CONCRETING requirements specified herein.

B. Provide barricades and enclosures to prevent damage to newly placed concrete.

C. Replace concrete curb, walls and exterior flatwork damaged by construction activities as directed, at no cost to Owner.

D. Every reasonable precaution shall be taken to protect finished surfaces from abrasions or other damage. Concrete surfaces or edges likely to be injured during the construction period shall be protected by leaving the forms in place or by erecting satisfactory covers. No fire shall be permitted in direct contact with concrete at any time. Concrete shall be adequately protected from injurious drying action by sun and wind, and from pitting by rain.

END OF SECTION

SECTION 03400 - PRECAST CONCRETE

PART I - GENERAL

DESCRIPTION

Work Included - Work under this section includes manufacture, transportation, and erection for all precast structural concrete units as indicated on the drawings and specified herein.

Related Work Specified Elsewhere
Section 01400 - Quality Control

QUALITY ASSURANCE

Manufacturer and Erector Qualifications - Manufacturer and Erector shall be companies specializing in precast or prestressed concrete products. Submit written description of three similar projects completed within the past three years which demonstrate concrete work of the quality and scope required on this project.

Source Quality Control

Inspection

The inspector representing the Owner shall have entry to the plants, including subvendor's plants where work is being performed.

Inspection by the Owner's representative will be for general conformity and will not relieve the Contractor from requirements called for in the Contract Documents.

Inspection by the Owner's representative described above may be waived by the Owner if the fabricator is an active member of the Prestressed Concrete Institute (PCI) and Quality Control is exercised by those organizations.

Reference Standards - Standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. The latest edition, amendment or supplement thereto in effect 30 days before date of invitation shall apply.

American Society for Testing Materials (ASTM)

A36	Structural Steel
A108	Steel Bars, Carbon, Cold-Finished, Standard Quality
A185	Welded Steel Wire Fabric for Concrete Reinforcement
A416	Uncoated Seven-Wire Stress-Relieved Strand for Prestressed Concrete
A496	Deformed Steel Wire for Concrete Reinforcement
A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A616	Rail-Steel Deformed and Plain Bars for Concrete Reinforcement
C33	Concrete Aggregates
C150	Portland Cement
C330	Lightweight Aggregates for Structural Concrete
C-478-94	Specifications for Precast Reinforced Concrete Manhole Sections

State Department of Highways, Division of Highways, State of Utah
Standard Specifications for Road and Bridge Construction

U. S. Army Corps of Engineers

CRD-C 588	Specification for Non-Shrink Grout

American Concrete Institute (ACI)

ACI 301	Specifications for Structural Concrete for Buildings
ACI 318	Building Code Requirements for Reinforced Concrete
ACI 347	Recommended Practice for Concrete Formwork
ACI 525	Minimum Requirements for Thin-Section Precast Concrete Construction
ACI 512	Recommended Practice for Precast Concrete Floor and Roof Units

American Welding Society (AWS)

AWS D1.1	Structural Welding Code
AWS D1.4	Structural Welding Code - Reinforcing Steel

Prestressed Concrete Institute (PCI)

PCI MNL-116	Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products

Testing Agency - Perform mix design studies, sampling and testing by a commercial testing laboratory approved by the Owner, or if specifically approved by the Owner in writing, by a laboratory maintained by fabricator of the precast units. Refer to Section 01400 - Quality Control, for testing agency requirements.

SUBMITTALS - Refer to Section 01300 - Submittals. Include the following:

Shop Drawings - Shop drawings shall include the following:
Layout plan, dimensions, and finishes.
Size and location of reinforcing steel.
Size and locations of inserts, anchors and blockouts.
Bearing conditions, connection and anchorage details.
Member identification marks to facilitate correct field placement.
For prestressed units, include estimated camber and size and location of prestressing strands.

Project Data - Manufacturer's standard literature including products, specifications, and recommended installation instructions. Submit at time of delivery, manufacturer's Certificate of Compliance with project specifications, stating all materials and mix design. Include compliance with Reference Standards stated previously. Include certified test results on concrete strength tests and records of prestressing results if requested by the Engineer.

Design Calculations - Submit with shop drawings for approval prior to starting fabrication. Include 3 sets or a reproducible set.

Certificates - Submit at time of delivery, manufacturer's Certificate of Compliance with project specifications and reference standards, stating all materials and mix design. Include certified results of concrete strength tests and prestressing records.

PRODUCT DELIVERY, STORAGE AND HANDLING

Support members while transporting to minimize the effect of road shock. Securely fasten to prevent tipping or racking of members. Identify each member with a mark for correct field placement. Store members by blocking with timbers for uniform support to prevent damage to edges and staining. During extended periods of storage, cover members with tarpaulins or stout non-staining paper. Handle members to prevent damage such as cracking, spalling, and staining.

Do not erect members damaged while transporting or handling until repairs have been made. If restoration to original condition cannot be made, the members will be rejected. Perform all repairs in the field by personnel employed by the manufacturer.

PART III - EXECUTION

FABRICATION AND MANUFACTURE

General - Fabricate precast concrete members in a plant currently certified under the PCI Plant Certification Program and in conformance with the PCI Manual MNL-116.

Forming

Cast members in horizontal position on level. Support platforms to prevent sagging during casting and curing operations. Steel or plywood panel forms shall conform to PS1, Grade B-B. Cast members monolithically without allowing cold joints to occur. Provide finished members with straight, true edges and surfaces free of honeycombs and voids.

Provide each unit true to size and dimensions with no twists or bends with clean accurate arises, all within the tolerance limits specified.

Blockouts - Accurately form and place blockouts and preformed holes 6 inches or larger as shown on approved shop drawings.

Embedded Items - Accurately place weld plates, lifting devices and other embedded items as shown on drawings.

Finishes - Provide manufacturer's standard finish for following surfaces:

Underside or Concealed	"As-cast" finish, major imperfections repaired
Top Surfaces	Wood float finish, major imperfections repaired
Exposed Vertical Ends	Strands recessed, "sacked" finish
Top Surface of Floor Slabs	Raked or artificially roughened finish for composite action with floor topping slabs

Curing - Cure members by steam, radiant heat or other suitable method to obtain minimum compressive strengths specified.

Design Deviations - Deviations from exact cross sections, or deviations from connection details, inserts, or as otherwise shown on the drawings will be permitted to allow fabricators to best adapt their manufacturing procedures, provided such deviation will provide an equivalent installation without additional expense to the Owner.

SITE PREPARATION - Check all lines, levels and dimensions of previously constructed work. Examine bearing surfaces to receive members for defects or conditions that will adversely affect execution, permanence or quality of the work. Do not start erection until defective conditions are corrected.

MANHOLES

GENERAL. 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. Manholes shall be furnished complete with cast iron rings and covers.

FOUNDATION PREPARATION. Dewatering of the site shall conform to the requirements for sewer trench dewatering in these Specifications. Adequate foundation for all manhole structures shall be obtained by removal and replacement of unsuitable material with well graded granular material; or by tightening with coarse ballast rock, or by such other means as provided for foundation preparation of the connected sewers, or as required by the City Engineer. Where water is encountered at the site, all cast in place bases shall be placed on a one-piece waterproof membrane, so placed as to prevent any movement of the water into the fresh concrete. Precast base sections shall be placed on a well graded granular bedding course conforming to the requirements for sewer bedding but not less than 8" in thickness and extending either to the limits of the excavation or to a minimum of 12" outside the outside limits of the base section. In the latter case, the balance of the excavated area shall be filled with select material well tamped to the level of the top of the bedding to positively prevent any lateral movement of the bedding when the weight of the manhole is placed upon it. The bedding coarse shall be firmly tamped and made smooth and level to assure uniform contact and support of the precast elements.

BASES. Precast bases shall be a minimum of 8" in thickness.

The concrete base shall be constructed so the first section of the precast manhole has a uniform bearing throughout the full circumference of the manhole wall. Sufficient mortar shall be deposited on the concrete base to provide a water tight seal between the base and the manhole wall. Concrete used in the construction of the base shall conform to 6 bag, 3000 psi concrete as specified in the concrete section of these Specifications.

Where the manholes shall have flat bottoms lines pass through or enter manholes, the invert channels shall be smooth and semi-circular in cross section carried up vertically to the crown elevation of the various pipes. Changes of direction of flow within the manholes shall be made with a smooth curve with as long a radius as possible. The floor of the manhole outside the flow channels shall be smooth and slope toward the channel at not less that 1/2 inch per foot.

WALL AND CONE SECTIONS. All manholes shall have a minimum of 60" I.D. precast, or larger as required by the Standard Drawings or Engineer, sectional, reinforced concrete pipe. Both cylindrical and taper sections shall conform to all requirements of ASTM Designation C-478-94 for Reinforced Concrete Culvert Pipe with the following exceptions:

1. The throat section of the manhole shall be adjustable, by use of pipe sections up to 12 inches in height.

2. The taper section shall be a maximum of 3 feet in height, shall be of eccentric design, and shall taper uniformly from 48 inches to 30 inches inside diameter. Flat Lids shall be used as required and shall meet H-20 loading requirement.

3. The 60-inch inside diameter pipe used in the base section shall be furnished in section lengths of 1, 2, 3 and 4 feet as required.

4. 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.

5. Steps are required in all manholes, vaults, & boxes (as indicated on the City Standard Details).

All joint surfaces of precast sections and the face of the manhole base shall be thoroughly cleaned and wet prior to setting precast sections.

Joints shall be set in mortar consisting of 1 part cement and 1-1/2 parts sand with sufficient water added to bring the mixture to workable consistency, or the joints shall be sealed with a butyl rubber gasket that is permanently flexible and non-shrinking, similar to Brandt No. 95 Cold Weather Vault Sealant.

PIPE CONNECTIONS. All pipes entering or leaving the manhole shall be placed on firmly compacted bedding, particularly within the area of the manhole excavation which normally is deeper than that of the sewer trench. Special care shall be taken to see that the openings through which pipes enter the structure are completely and firmly rammed full of mortar to ensure watertightness.

BACKFILL. Backfill around the manhole and extending at least one pipe length into each trench shall be hand placed and hand tamped with select material up to an elevation of one foot above the top of each pipe, regardless of the specifications for backfilling the sewer trenches adjacent thereto. The balance of the backfill shall conform to the requirements for trench backfilling.

COVERS AND FRAMES. All iron castings shall conform to the requirements of ASTM A 48 (Class 30) for grey iron castings. Rings and covers shall be equal to the Salt lake City Standard with machined bearing surfaces and with minimum cover weight of 150 pounds and minimum ring weight of 233 pounds. Any cover which tends to rock or tip will be rejected. In addition to the foundry name and year of manufacture, the cover shall be marked “STORM DRAIN” for storm drainage systems.

All manhole rings shall be carefully set to the grade shown on the approved drawings or as directed by the City Engineer. The manhole covers shall be so installed to match the street profile. Where work is in paved streets, not less than 6" or more than 18" shall be provided between the top of the cone or slab and the underside of the manhole casting ring for adjustment of the casting ring to street grade. Manholes Located in Grass Areas shall be subsurface

SECTION 15064 - PLASTIC PIPE

PART I - GENERAL

DESCRIPTION

Work Included - Work under this section includes furnishing and installing plastic pipe and fittings. Furnish pipe and fittings complete with all jointing materials as shown on the drawings and as specified herein.

Related Work Specified Elsewhere
Section 02200 - Structural Earthwork
Section 02220 - Utility Trenching, Backfilling and Compacting

QUALITY ASSURANCE

Pipe and Fittings Marking - Mark pipe with the following information applied at intervals of not more than 5 feet:
Nominal size and O.D. base.
Material code designation.
Applicable dimension ratio, pressure class or schedule number.
Applicable standard designation number.
Manufacturer's name or trade mark.
Seal of the testing agency that verified the suitability of the pipe material for potable water service.

Reference Standards - Standards listed hereunder and referenced elsewhere in these specifications shall become a part of this specification and are incorporated herein by reference. The latest edition, amendment or supplement thereto in effect 30 days before date of invitation shall apply.

American Society for Testing and Materials (ASTM)

ASTM D3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM	Standards Referred to in TYPE S (DOUBLE WALL) CORRUGATED HIGH DENSITY POLYETHYLENE PIPE (CHDPEP)

SUBMITTALS - Refer to Section 01300 - Submittals. Include the following:

Certificates - Submit manufacturer's certification that materials meet specification requirements.

PRODUCT DELIVERY, STORAGE AND HANDING

Protect pipe from impact, bending, compression or abrasion during handling and storage.

Store pipe on flat surface which provides even support for the pipe barrel with bell ends overhanging. Do not stack pipe higher than 5 feet. Do not store pipe and fittings in direct sunlight for periods greater than two weeks.

Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and the direct rays of the sun.

Use nylon sling to handle pipe. The use of hooks or bare cables will not be permitted.

PART II - PRODUCTS

TYPE S (DOUBLE WALL) CORRUGATED HIGH DENSITY POLYETHYLENE PIPE (CHDPEP)

Pipe and fittings shall be made of polyethylene (PE) compounds which conform with the requirement of cell class 324420C (min), as defined and described in ASTM D3350, except that carbon black content shall not exceed 5%.

Minimum parallel plate pipe stifness values shall be as follows:

Diameter	Pipe Stiffness per ASTM Test Method D-2412
12"	50 PSI
15"	42 PSI
18"	40 PSI
24"	34 PSI

The nominal size for the pipe and fittings is based on the nominal inside diameter of the pipe.

The pipe and fittings shall be free of foreign inclusions and visible defects. Fittings may be either molded or fabricated. Fittings supplied by manufacturers other than the supplier of the pipe shall not be permitted without the approval of the project engineer. The ends of the pipe shall be cut squarely and cleanly so as not to adversely effect joining.

Pipe shall have a smooth interior and annular exterior corrugations.

12- through 48-inch shall meet AASHTO M294, Type S.

Manning's n value for use in design shall not be less than 0.010.

Joint Performance

12"- through 60" pipe shall be watertight according to the requirements of the modified ASTM D3212. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested according to ASTM D1149 after 72 hour exposure in 50 PPHM ozone at 104˚ Fahrenheit. Gaskets shall be installed by the pipe manufacturer and covered with a removable wrap to ensure the gasket is free from debris. A joint lubricant available from the manufacturer shall be used on the gasket and bell during assembly.

Fittings

Fittings shall conform to AASHTO M294 or AASHTO MP7. Fabricated fittings shall be welded at all accessible interior and exterior junctions.

Material Properties

Pipe and fitting material shall be high-density polyethylene meeting ASTM D3350 minimum cell classification 335420C.

Installation

Installation shall be in accordance with ASTM D2321, with the exception that minimum cover in trafficked areas for 12- through 48-inch diameters shall be 1 ft. and for 60-inch

diameter, the minimum cover shall be 1.5 ft. The pipe shall be bedded with 1 1/4" minus granular material.

Cut pipe and tubing square with saws or pipe cutters designed specifically for the material. Protect the pipe and fittings from serrated holding devices and abrasion.

Bevel or flare the ends in accordance with the manufacturer's recommendations. Locate a depth mark with a pencil or crayon to assure the spigot end is inserted to the recommended depth.

Remove burrs and wipe off all dust and dirt from the jointing surfaces and remove cuttings from interior of pipe or tubing.

Jointing the Pipe and Tubing

Joints in underground pipelines shall be gasket or solvent cement.

Joints in pipe or tubing shall be made in accordance with manufacturer's recommendations for specific method used.

Perform all jointing operations in accordance with manufacturer's printed instructions.

Gasketed Joints - Remove all dirt and foreign material from the spigot and bell end gasket and gasket groove. Apply lubricant furnished by the pipe manufacturer to the spigot end of the pipe. Insert the spigot to the reference mark. Take care during jointing to avoid disturbing previously installed joints.

FIELD QUALITY CONTROL

Pipe Deflection (Underground Pipelines) - Mirror each section of underground pipe for vertical ring deflection. Maximum allowable ring deflection shall be 5% of the outside diameter.

CLEANING AND TESTING SANITARY SEWER LINES AND MANHOLES

Cleaning - After the lines have been laid and the trench backfilled, they shall be thoroughly cleaned. Laterals and truck lines shall be flushed by water to remove all foreign material. The scouring action shall be accomplished by hydraulic or jet cleaning. Other methods may be used upon approval of the Engineer. After the lines have been thoroughly cleaned, they shall be mirrored between all manholes for displacement.

CONSTRUCTION DRAWINGS AND STANDARDS