



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

STANDARD LOW BID PROJECT

September 2, 2010

SPANISH FORK ARMORY PARKING LOT IMPROVEMENTS

UTAH NATIONAL GUARD

SPANISH FORK, UTAH

DFCM Project Number 10206480

Stantec Consulting Inc.
3995 South 700 East, Suite 300
Salt Lake City, Utah

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Technical Specifications:
Drawings:

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/StdDocs/index.html> Standard Documents or Reference Documents. Item 7. Supplemental General Conditions are available upon request from DFCM:

DFCM Supplemental General Conditions dated July 1, 2010 *
DFCM Supplemental General Conditions revised May 11, 2010 *
DFCM Supplemental General Conditions dated July 1, 2009 *
DFCM Supplemental General Conditions dated July 15, 2008
DFCM General Conditions dated May 25, 2005
DFCM Application and Certification for Payment dated May 25, 2005.

*** NOTE: THE NEW SUPPLEMENTAL GENERAL CONDITIONS EFFECTIVE JULY 1, 2010 ADDRESSING DRUG AND ALCOHOL TESTING ARE REFERENCED AT THE LINK ABOVE.**

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

Only firms that have been invited to submit bids on this project are allowed to bid on this project.

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

SPANISH FORK ARMORY - PARKING LOT IMPROVEMENTS
UTAH NATIONAL GUARD – SPANISH FORK, UTAH
DFCM PROJECT NO: 10206480

Bids will be in accordance with the Contract Documents that will be available on **Thursday, September 2, 2010**, 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 estimate for this project is \$200,000.00.

A **mandatory** pre-bid meeting will be held at **2:00 PM on Thursday September 9, 2010**, at Spanish Fork Armory, 2751 North Main Street, Spanish Fork, Utah.. All bidders wishing to bid on this project are required to attend this meeting.

Bids will be received until the hour of **3:30 PM on Monday, September 20, 2010** at DFCM, 4110 State Office Building, Salt Lake City, Utah 84114. Bids will be opened and read aloud in the DFCM Conference Room, 4110 State Office Building, Salt Lake City, Utah. NOTE: Bids must be received at 4110 State Office Building by the specified time.

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

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

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

PROJECT DESCRIPTION

This project consists of regarding of existing gravel parking area to achieve proper drainage and adding storm drains as per drawings and specifications. New fencing will be included and curb and gutter work and asphalt paving are part of the project.

Contractor must work closely with the Guard to coordinate movement of vehicles to accommodate construction and still maintain security and safety of military equipment.

Contractor must also plan for all asphalt to be laid prior to asphalt plants closing for the season. Work must be scheduled to allow asphalt paving during weather above minimum temperatures for the asphalt to cure and have complete warranty on installation.

Contractors who have previously been previously pre-qualified by DFCM and performed work for the state within the last 3-5 years as a shortlisted contractor, do not need to apply to bid this project.

ALL other contractors wishing to submit bids for this project **MUST** comply with the following requirements to become qualified to bid on this project to be allowed to attend the mandatory pre-bid meeting. Pre Qualification Packets must be received in hard copy or electronically by DFCM no later than the date and time specied in the project schedule. Contractors will be notified by DFCM if approval is granted prior to the pre-bid meeting.

PRE-QUALIFICATION REQUIREMENTS:

Submit a 3-5 year work history of state or federal government work closely related to the scope of work as this project. List construction costs for all projects. Projects may be other than government projects but must be similar in scope and cost.

Submit an outline of the Project Team that will be assigned to this project including, manager, superintendent, sub-contractors, etc. to include individual work experience, projects completed, expertise, management skills etc.

Submit a concise Management Plan to include work schedule, risk factors of the project, lead times for ordering equipment, work process from start to finish, power outages, weather factors, agency coordination, etc.



PROJECT SCHEDULE

PROJECT NAME: SPANISH FORK ARMORY - PARKING LOT IMPROVEMENTS UTAH NATIONAL GUARD – SPANISH FORK, UTAH DFCM PROJECT NO. 10206480				
Event	Day	Date	Time	Place
Bidding Documents Available	Thursday	September.2, 2010	4:00 PM	DFCM 4110 State Office Bldg SLC, UT and the DFCM web site *
Pre Qualifiacion Requirements Due	Tuesday	September 7, 2010	2:00 PM	DFCM 4110 State Office Bldg. <i>or</i> e mail wfsmith@utah.gov
Mandatory Pre-bid Site Meeting	Thursday	September 9, 2010	2:00 PM	Spanish Fork Armory 2751 North Main, Spanish Fork, Utah
Last Day to Submit Questions	Monday	September 13, 2010	5:00 PM	<u>Wayne Smith</u> ó DFCM E-mail wfsmith@utah.gov Fax 801-538-3267
Addendum Deadline (exception for bid delays)	Thiursday	September 16, 2010	4:00 PM	DFCM web site *
Prime Contractors Turn In Bid and Bid Bond	Monday	September. 20, 2010	3:30 PM	DFCM 4110 State Office Bldg SLC, UT
Sub-contractor List Due	Tuesday	September 21, 2010	3:30 PM	DFCM 4110 State Office Bldg SLC, UT Fax 801-538-3677
Substantial Completion Date		November 30, 2010		

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



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

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 **Spanish Fork Armory -Parking Lot Improvements – Utah National Guard – Spanish Fork, Utah – DFCM Project No. 10206480** 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: _____

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

_____ DOLLARS (\$_____)

(In case of discrepancy, written amount shall govern)

I/We guarantee that the Work will be Substantially Complete by November 30, 2010, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$200.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

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

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

The undersigned Contractor's License Number for Utah is _____

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

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

Type of Organization:

(Corporation, Partnership, Individual, etc.)

Any request and information related to Utah Preference Laws:

Respectfully submitted,

Name of Bidder

ADDRESS:

Authorized Signature

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.

A bid bond properly signed by a qualified surety, as indicated on the DFCM Bid Bond form provided along with this Instruction to Bidders, in the amount of 5% of the bid, shall accompany the bid submission to DFCM. **THIS BID BOND MUST BE ON THE DFCM BID BOND FORM PROVIDED WITH THIS INSTRUCTION TO BIDDERS IN ORDER TO BE CONSIDERED AN ACCEPTABLE BID** unless only one bid is received by DFCM, or the failure to comply with the bid bond requirements is determined by the Director of DFCM to be nonsubstantial based on the following:

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

3. Contract and Bond

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

4. Listing of Subcontractors

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

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

5. Interpretation of Drawings and Specifications

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

6. Addenda

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

. Award of Contract

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

8. DFCM Contractor Performance Rating

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

9. Licensure

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

10. Permits

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

11. Right to Reject Bids

DFCM reserves the right to reject any or all Bids.

12. Time is of the Essence

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

13. Withdrawal of Bids

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

14. Product Approvals

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

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

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

16. Debarment

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

BID BOND

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

KNOW ALL PERSONS BY THESE PRESENTS:

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

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

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

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

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

DATED this _____ day of _____, 20_____.

Principal s name and address if other than a corporation :

By: _____

Title: _____

Principal s name and address if a corporation :

By: _____

Title: _____
(Affix Corporate Seal)

Surety s name and address:

By: _____
Attorney-in-Fact (Affix Corporate Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

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

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

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

NOTARY PUBLIC

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



Division of Facilities Construction and

INSTRUCTIONS AND SUBCONTRACTORS LIST FORM

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

DOLLAR AMOUNTS FOR LISTING

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

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

LICENSURE:

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

SPECIAL EXCEPTION:

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

GROUNDS FOR DISQUALIFICATION:

The Director may not consider any bid submitted by a bidder if the bidder fails to submit a subcontractor list meeting the requirements of State law. Director may withhold awarding the contract to a particular bidder if one or more of the proposed subcontractors are considered by the Director to be unqualified to do the Work or for

INSTRUCTIONS AND SUBCONTRACTORS LIST FORM
Page No. 2

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

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

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

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

E AMPLE:

Example of a list where there are only four subcontractors:

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

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

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



SUBCONTRACTORS LIST
FA TO 801-538-36

PROJECT TITLE: _____

Caution: You must read and comply fully with instructions.

Table with 4 columns: TYPE OF WORK, SUBCONTRACTOR, 'SELF OR SPECIAL EXCEPTION', SUBCONTRACTOR BID AMOUNT, CONT. LICENSE. The table contains 15 empty rows for data entry.

We certify that:

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

FIRM: _____

DATE: _____

SIGNED BY: _____

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

CONTRACTOR S AGREEMENT

FOR:

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

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

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

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

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

The DFCM General Conditions (“General Conditions”) dated May 25, 2005 and all Supplemental General Conditions (“also referred to as General Conditions”) on file at the office of DFCM and available on the DFCM website (<http://dfcm.utah.gov/StdDocs/index.html>), are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

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

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

CONTRACTOR'S AGREEMENT
PAGE NO. 2

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

WITNESS OR ATTESTATION:

PRINCIPAL:

By: _____ (Seal)

Title: _____

WITNESS OR ATTESTATION:

SURETY:

By: _____ (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

PAYMENT BOND

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

KNOW ALL PERSONS BY THESE PRESENTS:

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

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

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

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

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

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

WITNESS OR ATTESTATION:

PRINCIPAL:

By: _____ (Seal)

Title: _____

WITNESS OR ATTESTATION:

SURETY:

By: _____ Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

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

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

My commission expires: _____
Resides at: _____

NOTARY PUBLIC

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

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



CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT _____ PROJECT NO: _____

AGENCY/INSTITUTION _____

AREA ACCEPTED _____

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

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

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

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

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

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

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

_____ 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

SECTION 311200

SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Protecting existing trees and vegetation to remain.
2. Removing trees and other vegetation.
3. Clearing and grubbing.
4. Topsoil stripping.
5. Removing above-grade site improvements.
6. Disconnecting, capping or sealing, and abandoning site utilities in place.
7. Disconnecting, capping or sealing, and removing site utilities.

- B. Related Sections include the following:

1. Division 1 Section "Field Engineering" for verifying utility locations and for recording field measurements.
2. Division 1 Section "Construction Facilities and Temporary Controls" for temporary utilities, temporary construction and support facilities, temporary security and protection facilities, and environmental protection measures during site operations.
3. Division 2 Section "Building Demolition" for demolition of buildings, structures, and site improvements.
4. Division 31 Section "Tree Protection and Trimming" for protecting trees remaining on-site that are affected by site operations.
5. Division 31 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
6. Division 32 Section "Landscaping" for finish grading, including placing and preparing topsoil for lawns and planting.

1.3 DEFINITIONS

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- A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches in diameter; and free of weeds, roots, and other deleterious materials.

1.4 MATERIALS OWNERSHIP

- A. Except for materials indicated to be stockpiled or to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from the site.

1.5 SUBMITTALS

- A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.
- B. Record drawings according to Division 1 Section "Contract Closeout."
 - 1. Identify and accurately locate capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 PROJECT CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing indicated removal and alteration work on property adjoining Owner's property will be obtained by Owner before award of Contract.
- C. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

- D. Notify utility locator service for area where Project is located before site clearing.

PART 2 - PRODUCTS (Not Applicable)

2.1 SOIL MATERIALS

- A. Satisfactory Soil Materials: Requirements for satisfactory soil materials are specified in Division 2 Section "Earthwork."
 - 1. Obtain approved borrow soil materials off-site when satisfactory soil materials are not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Provide erosion-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Locate and clearly flag trees and vegetation to remain or to be relocated.
- D. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TREE PROTECTION

- A. Erect and maintain a temporary fence around drip line of individual trees or around perimeter drip line of groups of trees to remain. Remove fence when construction is complete.
 - 1. Do not store construction materials, debris, or excavated material within drip line of remaining trees.
 - 2. Do not permit vehicles, equipment, or foot traffic within drip line of remaining trees.
- B. Do not excavate within drip line of trees, unless otherwise indicated.

- C. Where excavation for new construction is required within drip line of trees, hand clear and excavate to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.
 - 1. Cover exposed roots with burlap and water regularly.
 - 2. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
 - 3. Coat cut faces of roots more than **1-1/2 inches** in diameter with an emulsified asphalt or other approved coating formulated for use on damaged plant tissues.
 - 4. Cover exposed roots with wet burlap to prevent roots from drying out. Backfill with soil as soon as possible.

- D. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations, in a manner approved by Architect.
 - 1. Employ a qualified arborist, licensed in jurisdiction where Project is located, to submit details of proposed repairs and to repair damage to trees and shrubs.
 - 2. Replace trees that cannot be repaired and restored to full-growth status, as determined by the qualified arborist.

3.3 UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

- B. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.
 - 1. Owner will arrange to shut off indicated utilities when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.

- C. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.

- D. Excavate for and remove underground utilities indicated to be removed.

- E. Removal of underground utilities is included in Division 15 mechanical or Division 16 electrical Sections.

3.4 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, grass, and other vegetation to permit installation of new construction. Removal includes digging out stumps and obstructions and grubbing roots.
 - 1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - 2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.
 - 3. Completely remove stumps, roots, obstructions, and debris extending to a depth of **18 inches** below exposed subgrade.
 - 4. Use only hand methods for grubbing within drip line of remaining trees.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
 - 1. Place fill material in horizontal layers not exceeding **8-inch** loose depth, and compact each layer to a density equal to adjacent original ground.

3.5 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - 1. Strip surface soil of unsuitable topsoil, including trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 1. Limit height of topsoil stockpiles to **72 inches**.
 - 2. Do not stockpile topsoil within drip line of remaining trees.
 - 3. Dispose of excess topsoil as specified for waste material disposal.
 - 4. Stockpile surplus topsoil and allow for respreading deeper topsoil.

3.6 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

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1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut length of existing pavement to remain before removing existing pavement. Saw-cut faces vertically.

3.7 DISPOSAL

- A. Disposal: Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials, including trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 311200

SECTION 312100

EARTHWORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Topsoil stockpiling, trenching or excavation and backfilling for utility systems and related appurtenances;
2. Excavation, backfilling and compacting for structures, pavements and sidewalks including dewatering, erosion control, and other items of earthwork as shown on Drawings and specified herein.

B. Related Documents:

1. The Contract Documents, as defined in the General Conditions, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other documents.

C. Related Sections:

1. Section 330510 - Excavating, Backfilling and Compacting for Utilities.
2. Section 311200 – Site Clearing.

1.02 SUBMITTALS

A. Test Reports:

1. Field density (compaction) test reports of each test made.
2. Optimum moisture-maximum density curves for each type of soil encountered.

B. Fill Samples and Tests:

1. Provide for each type fill material to be used on project, with testing results indicating compliance with requirements specified, for approval prior to start of work.
2. The Owner shall authorize each type of fill to be used on the project as structural fill. (See articles 2.01 through 2.04 of this section).

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1.03 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable requirements of federal, state and local laws, regulations and codes having jurisdiction at project site
- .B. Reference Standards: Applicable requirements of standards and specifications referenced herein apply to the work of this Section.
- C. Field Quality Control: Testing and Inspection: Owner will obtain and pay for services of an independent commercial testing laboratory for performing field quality control testing of soils during construction; costs of retesting because of noncompliance with requirements specified, including recompaction of deficient areas, are at Contractor's expense.

1.04 PROJECT CONDITIONS

- A. Coordination: Coordinate all work with City and Utility Company Personnel.
- B. Cooperation: Coordinate this work with the work of other Sections to avoid any delay in progress of building or any interference with progress of other work. Where required for proper construction operations, perform portions of work included in this Section separate from general building excavation as directed.
- C. Payment for Soils Work:
 - 1. The Contractor shall be responsible for the cost of preparing the site for the proposed construction including excavation, stockpiling, providing suitable fill material for satisfactory sub grade and final site preparation, removal and replacement of unsuitable material exposed on surface or encountered within existing soil as it is excavated to six inches below spread footings or slabs on grade as well as to the depth and extent specified or shown on the Drawings for installation of all site improvements including foundations, utilities, paving, sidewalks, and on-site structures. The cost for this shall be included in the Contractor's base bid, and shall be at no additional cost to Owner.
 - 2. The Owner shall have final authority and make the final decision during construction on the depth and extent to which unsatisfactory materials need to be removed and replaced. Any additional excavation, soil remediation or replacement must be authorized by the Owner prior to starting that work.
- D. Excavation Classification: All excavation work is unclassified and includes removal and disposal of earth fills, rock, rubble, trash and other materials encountered in excavation and grading operations. The Contractor's basic bid includes all costs for providing a site acceptable for the proposed construction. No additional payment shall be made for

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removal and replacement of unacceptable materials encountered during site preparation. In the event rock is encountered, rock removal shall not be performed. The Owner shall be the final authority and shall make the final decision during Construction to the depth and extent to which unsatisfactory materials must be removed and replaced.

E. Existing utilities:

1. Locations indicated are approximate
2. Contact local utility location service (Blue Stakes) 48 hours prior to excavation and verify exact locations of all existing utilities.
3. Perform necessary exploratory tests for verification if necessary. The Owner, the Architect and the Engineer will assume no responsibility for hazardous conditions, losses and accidents arising out of failure to perform by the Contractor or other Parties or both.
4. Should incorrectly charted or uncharted piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility services in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of utility owner.

F. Disposition of utilities:

1. Observe rules and regulations governing respective utilities during execution of work of this Section.
2. Adequately protect all active utilities from damage:
3. Remove or relocate active utilities only as shown or as specified.

G. Benchmarks, Monuments and Other Reference Points: Protect from damage and displacement; if disturbed or destroyed, replace at Contractor's expense.

H. Keep dirt, dust, noise and other objectionable nuisances to a minimum. The Contractor is responsible to comply with all applicable local ordinances.

I. Protection:

1. Barricades:
 - a. Furnish and maintain barricades, signs and markings for excavated areas in accordance with requirements of all local codes and as herein specified.
 - b. Paint and maintain barricades in good condition. Mount flashing yellow lights and

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maintain same.

2. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
3. Protect excavation bottom against freezing when atmospheric temperature is less than 35 degrees F.

PART 2 PRODUCTS

2.01 FILL AND BACKFILL MATERIALS - GENERAL

- A. A cut and fill balance has not been made. Contractor is responsible for establishing quantity of additional fill required or excess that must be hauled away. No additional compensation will be made for importation of additional material or for disposal of surplus material off site, as specified herein.

2.02 STRUCTURAL FILL

- A. Acceptable Materials: One or combination of following, as required, as approved by Owner and recommended by Soils Engineer:
 1. On-Site Excavated Material, excluding debris, other deleterious materials and unacceptable soils as defined by Section 2.02 B..
 2. Imported Materials
 - a. ASTM D2487 Soil Classification Groups GW, GM, GP-GM, GW-GM, SM, SW. Maximum percentage passing #200 Sieve: 15%
 - b. ASTM D2487 Soil Classification Groups SP and GP may not be used.
- B. Unacceptable Materials: ASTM D2487 Soil Classification Groups SC, CL, CH, PT, OH, OL, ML, MH, generally described as and including following:
 1. Peat, mulch and/or other highly organic swamp soils.
 2. Organic and inorganic clays of low to high plasticity.
 3. Silts and Elastic silts.

PART 3 EXECUTION

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3.01 EXAMINATION

- A. Examine areas in which work is to be performed. Report in writing to Owner all prevailing conditions that will adversely affect satisfactory execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.
- B. Starting work constitutes acceptance of the existing conditions and the Contractor shall then, at his expense, be responsible for correcting all unsatisfactory and defective work encountered.

3.02 PREPARATION

- A. The civil drawings show the original topography and proposed limits of construction.
- B. In case of conflict between final grade elevations (finish grade) shown by spot elevations and by contours, contact the Engineer for clarification before proceeding.
- C. Conform to dimensions and elevations indicated. Do not exceed plus or minus five-tenths of one-foot variation from design grading elevations shown unless approved by the Engineer in writing.
- D. Dewatering:
 - 1. Prevent ground and subsurface water from flowing into excavations, from flooding project site and surrounding properties, and from collecting and ponding; provide and maintain all temporary drainage and dewatering systems required.
 - 2. Install pumps, sumps and suction and discharge lines, as required.
 - 3. Install temporary deviations from grades indicated to channel water away from excavations.
 - 4. Leave no sumps or pockets at completion of each day's grading operations.
 - 5. If water is encountered during footing and foundation excavation, install pumps of capacity to remove water while excavations are being made and continue pumping for 24 hours following placing of concrete footings and erection of foundation walls to grade. Maintain dewatering operations until construction of permanent drainage is completed.
- E. Shoring and Bracing:
 - 1. Install as required to protect slopes and earth banks from cave-ins, and to protect adjacent surfaces and structures from settlement. Remove before backfilling is

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completed, but not until after permanent supports are in place.

2. When work is interrupted by rains, do not resume operations until moisture content and field density tests of upper 6" of in-place materials have been made by the Soils Engineer and approved by Owner.
 3. Shoring, bracing or underpinning required for the project (if any) shall be designed by a professional engineer registered in the State of Utah.
- F. Do not place fill or backfill material in water, on material containing frost, or during unfavorable weather conditions. When inclement weather is expected, grade and seal surface of fill as required to limit percolation of surface water.
- G. Establish and identify required lines, levels, contours and datum.
- H. Topsoil Stripping and Conservation: Following requirements may be waived by Soils Engineer in areas that do not contain satisfactory topsoil:
1. Remove topsoil of horticultural value from areas to be covered by new building construction and from areas to be paved, excavated, or regraded. Remove without contamination with subsoil. Strip to 6" minimum depth. Keep free of roots, stones and other undesirable materials. Do not strip topsoil when wet.
 2. Stockpile in locations convenient to areas shown to receive topsoil later or where directed by Soils Engineer. Do not stockpile to depth exceeding 8 feet. Do not drive heavy equipment over stockpiled material or spread topsoil.
- I. Proof-rolling:
1. Proof-roll over entire areas receiving fill material, after topsoil and existing fill is removed, in presence of the owner's representative.
- J. Following topsoil stripping, existing fill removal and proof-rolling operations, but before placing fill and backfill, clean ground surfaces free of all trash; debris; loose, frozen, wet or soft soil; and other undesirable surface materials before proceeding with work.
- K. Soil Remediation:
1. Undercut and remove soft or unstable soils that fail to compact and replace with acceptable fill material compacted to density specified in Section 3.04. Place soil in lifts of 12" loose depths and compact each lift to density specified when using heavy compaction equipment, and lifts not more than 4" loose depth for material compacted by hand operated tampers.
 2. Before compaction, moisten or aerate each layer as needed to provide optimum

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moisture content. Compact each layer to required percentage of density for each area classification. Do not place backfill or fill materials on surfaces that are muddy, frozen, or contain frost or ice.

3. Place backfill and fill material evenly adjacent to structures, piping or conduit to required elevations. Carry material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

3.03 GRADING

- A. Earthwork contractor shall bring finish grades to the finished grades shown on the Drawings in all areas. In landscaped areas, the landscape contractor shall complete the grading. Earthwork contractor shall remove all excess topsoil from site and stockpile only the amount necessary to complete finish work.
- B. Grade to required profiles, contours, elevations and sub grade levels shown on Drawings, with allowances made for depths required for placement of topsoil and construction of paving, walks, equipment slabs or pads and floor slabs.
 1. Lawn and landscaped areas: Finish areas to receive topsoil to within not more than 0.1 foot above or below required sub grade elevations.
 2. Walks: Shape surfaces of areas under walks to line, grade, and cross section, with finish surface within 0.1 foot of required sub grade elevation.
 3. Pavements: Shape surface under pavement to line, grade and cross section, with finish surface within ½ inch of required sub grade elevation.
 4. Building slabs: Under building slabs grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within ½ inch tolerance when tested with a 10 foot straight edge.
- C. Control grading around buildings and on site; slope ground away from buildings to prevent water from running into excavated areas or damaging other structures so that entire project is well drained and free from water pockets.
- D. Provide uniform levels and slopes between elevations shown on Drawings, and between elevations shown and existing finished grades shown to be maintained. Round abrupt changes in slopes.

3.04 STRUCTURAL FILL

- A. General:

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1. Soils Engineer based upon test results is sole judge as to when specified compaction densities have been obtained. When retesting is needed to verify that unacceptable site preparation has been remedied, the cost for retesting shall be paid by the Contractor. Compaction shall comply with the recommendations in the Geotechnical Investigation by AGECE.
2. Contractor is responsible for correcting at his expense, including costs of testing, all areas with insufficient compaction.
3. Place acceptable material in horizontal lifts not exceeding 12" in loose depth, with each lift extending for entire length and width of each area being filled. Level material which is frozen or contains frost.
4. Reduce or increase moisture content of fill by drying or uniform sprinkling with water, as required to achieve moisture content within 2% of optimum as required for specified degree of compaction.
5. Disk each layer of fill to break down oversize clods, to thoroughly mix nonuniform materials, and to secure uniform moisture content, as required to insure uniform density and proper compaction.
6. Maintain positive surface slope to allow runoff and to prevent ponding of surface water. If surface water ponds, dewater as required. Remove all saturated or disturbed soil before placing additional fill material.
7. Number of compaction equipment passes required is dependent upon degree of compaction specified. Overlap rolling passes as required to completely cover area of fill.
8. After cuts are made and existing fill is removed,, scarify entire area to 12" depth and compact to following minimum density for areas listed:
 - a. Areas Receiving Structural Fill including Foundations: 95% Modified Proctor Density (ASTM D-1557) within 2% of optimum moisture content.
 - b. Under Paving and Walk Areas: 90% Modified Proctor Density within 2% of optimum moisture content.
 - c. Under Lawn and Unpaved Areas: 85% Modified Proctor Density (ASTM D-1557).

B. Structural Fill:

1. Material: Acceptable materials complying with the requirements of Articles 2.01 and 2.02.

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2. Location: Place as sub grade under building, pools and pool decks, to a point 5 feet outside building walls and pool decks. Place as sub grade under pavements and walkways to a point 2 feet beyond edge.
3. Construct to grades and for minimum depths indicated. Undercut existing grade as required.
4. Compact to 95% of Modified Proctor Density (ASTM D-1557), at moisture content within 2% of optimum; maintain specified moisture content until placement of foundations, , and obtain Owner's approval of method used for maintaining moisture control. Compact to 90% of Modified Proctor Density (ASTM D-1557), at moisture content within 2% of optimum for concrete slabs and pavement. Compact to 85% of Modified Proctor Density (ASTM D-1557), at moisture content within 2% of optimum for retaining wall backfill.

C. Nonstructural Fill:

1. Materials: Acceptable Materials complying with requirements of Articles 2.01 and 2.02.
2. Location: Use for all other fills, unless otherwise specified or directed by Owner.
3. Construction to grades and for minimum depths indicated. Undercut existing grade as required.
4. Compact to following densities for areas listed:
 - a. Sub grade Below Paving, Walks, and Slabs on Grade: 90% of Modified Proctor Density at moisture content within 2% of optimum.
 - b. Below Grassed and Planted Areas: 85% of Standard Proctor Density.

3.05 FOUNDATION AND FOOTING EXCAVATION

- A. If grade beam foundation, excavate bottom of foundations to exact grade called for on Drawings. Do not disturb bottom of excavation. Fill over-excavated areas with concrete.
- B. Excavate 4" lower than scheduled grade beam depths for void box placement.
- C. Excavate beyond outside of walls to allow for inspection, placing and removal of forms and for installing of waterproofing and drain tile, except where concrete is authorized to be deposited directly against excavated surfaces. Leave excavation open until work has been inspected and approved.

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- D. If pile foundations, stop excavations from 6" to 12" above bottom of footing before piles are placed. After piles have been driven or drilled, remove loose or displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.

3.06 FOUNDATION BACKFILL

- A. Material: Acceptable Structural Fill material complying with requirements of Articles 2.01 and 2.02.
- B. Remove surface debris and debris in excavation before placing backfill.
- C. Do not use material which is frozen or contains frost.
- D. Allow footing and foundation walls to attain full design strength before placing backfill.
- E. Exercise care during placing and compacting operations. Place to prevent wedging action, eccentric loading, and displacement of walls or structure.
 - 1. Use hand operated compaction equipment within 4 feet of walls.
 - 2. Where fill is placed along both sides of foundation walls, place and compact simultaneously on both sides of walls.
 - 3. Repair, or remove and replace all damage to foundation walls and structure occurring during placement and compaction operations at no additional cost to Owner.
- G. Place material in horizontal lifts not exceeding 12" loose depth before compacting. Level each lift before compacting. When using hand compaction equipment, do not exceed 4" loose depth per horizontal lift.
- H. Compact all backfill to 95% of Modified Proctor Density within 2% of optimum moisture content.

3.07 TRENCHING AND BACKFILLING FOR UTILITY SYSTEMS

- A. Trench Excavation:
 - 1. Provide open cut excavation, except short sections may be tunneled if approved by consultant and demonstrated by Contractor that pipe, cable or duct can be properly installed, backfilled and compacted. Heavy construction equipment, building materials, excavated soil and vehicular traffic should not be allowed within 1/3 of the slope height from the top of any excavation.
 - 2. Excavate to necessary width, depth and alignment for proper material installation. Cut trench banks as nearly vertical as practicable, but to safety standards of governing

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authorities. Stockpile material suitable for backfilling a sufficient distance from banks to avoid overloading and cave-ins.

3. Accurately grade trench bottoms to provide uniform bearing and support for each pipe section on undisturbed soil along full pipe length, except for areas where necessary to excavate for bell holes and for sealing pipe joints. Dig holes and depressions for joints after trench bottom has been graded, so pipe rests on prepared bottom for full length. Remove all stones to avoid point bearing. When excavating in rock, provide at least 4 inches of soil cushion on all sides of pipe and accessories. The use of 3/4" (max) gravel for pipe haunching and embedment shall be acceptable when it meets the approval of the pipe manufacturer and Owner's Construction Representative.
 4. Remove wet or otherwise unstable or unacceptable material encountered beyond depths indicated and replace with sand, gravel or concrete.
- B. Excavation for Appurtenances: Excavate for manholes and similar structures, to leave 12" minimum clearance between outer surfaces and embankment or timber used to hold and protect banks. Fill over-excavation with sand, gravel or concrete.
- C. Backfilling:
1. Do not backfill until utilities systems have been inspected and accepted by the Owner.
 2. Backfill Materials: Acceptable Structural Fill materials at all other locations, complying with requirements of Articles 2.01 and 2.02.
 3. Deposit material in lifts of 12" loose depth before compacting each lift to 90% of Modified Proctor Density within 2% of optimum moisture content under paving, walks, building slabs, and other slabs on grade, and compacting to 85% of Modified Proctor Density under lawns and planting areas. When using hand compaction equipment, place material in lifts not to exceed 4" loose depth.
 4. Backfill trenches to top of ground level.
 5. Backfill trenches with concrete where trench excavations pass within 18 inches of column or wall footings and that are carried below bottom of such footings or that pass under wall footings. Place concrete to level of bottom of adjacent footing.
 6. Restore ground surface, pavements, base courses, and compacted sub grade disturbed by utilities systems trenching and backfilling work to their original condition, construction and finishes.

3.08 FIELD QUALITY CONTROL

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- A. Testing and Inspection Services: Owner will retain the services of a testing firm to perform observations, inspections and testing during execution of site work and any other tests deemed necessary to determine compliance with specifications.
- B. Contractor shall coordinate with testing firm's Inspectors and Technicians to facilitate the execution of their duties.
- C. Upon completion of excavation, testing firm shall inspect and test the work and determine the suitability of the soil and preparation of subsequent site work.
- D. Testing firm will submit to Owner reports of all observations, inspections and tests.

END OF SECTION 312100

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SECTION 321100

GENERAL SITE WORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Site earthwork work and grading.
- B. Water system construction.
- C. Storm drainage construction.

1.02 RELATED WORK

DIVISION 1 - GENERAL REQUIREMENTS.

1.03 REFERENCES

- A. APWA, Manual of Standard Specifications and Plans, latest edition. revision.

PART 2 PRODUCTS

2.01 MATERIALS

All materials which are covered by the Referenced Standards shall meet the requirements of the applicable standards as referenced in Part 3 - EXECUTION.

PART 3 EXECUTION

3.01 SITE EARTHWORK AND GRADING AND RELATED WORK

- A. All site earthwork and grading and related work shall conform to applicable sections of the APWA Manual of Standard Specifications, latest revision, requirements of the Geotechnical Engineer, the information shown on the drawings and these specifications.

3.02 EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES AND RELATED WORK

- A. All excavating, backfilling and compacting for utilities and related work shall conform to

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applicable sections of the APWA Manual of Standard Specifications, latest revision and these drawings and specifications.

3.03 DOMESTIC WATER SYSTEM AND FIRE LINE CONSTRUCTION AND RELATED WORK

- A. All domestic water system construction and related work shall conform to the applicable sections of the APWA Manual of Standard Specifications, latest revision and these drawings and specifications.
- B. All fire line construction and related work shall conform to the applicable sections of the APWA Manual of Standard Specifications, latest revision, the Uniform Fire Code, latest edition, Salt Lake City Fire Marshal requirements, and these drawings and specifications.

3.06 STORM DRAINAGE CONSTRUCTION AND RELATED WORK

- A. All storm drainage construction and related work shall conform to the applicable sections of the APWA Manual of Standard Specifications, latest revision and these drawings and specifications.

3.07 BURIED NATURAL GAS LINES AND RELATED WORK

- A. Work is to be coordinated with Questar Corporation and the routings shown on the drawings. Reference mechanical specifications for buried natural gas line requirements.

3.08 BURIED ELECTRICAL SERVICE AND RELATED WORK

- A. Work is to be coordinated with Utah Power, the Electrical Contractor, and the routings shown on the drawings. Reference electrical specifications for buried electrical line requirements.

3.09 BURIED SITE LIGHTING ELECTRICAL SERVICE AND RELATED WORK

- A. Work is to be coordinated with Utah Power, the Electrical Contractor, the Site Lighting Contractor and the Site Lighting Plan. Reference electrical specifications for buried electrical line requirements.

3.10 BURIED TELEPHONE SERVICE AND RELATED WORK

- A. Work is to be coordinated with U.S. West, the General Contractor and the routing shown on the drawings. Reference electrical specifications for telephone line requirements.

END OF SECTION 321100

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SECTION 321217

ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Work in this section includes the construction of new asphaltic concrete pavement sections.
- B. Prepare sub-grade to receive base course.
- C. Place untreated base courses, work and compact.

1.02 REFERENCE STANDARDS

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

1.03 INSPECTION AND TESTING

- A. Testing and inspection will be performed so as to minimize disruption to Work.
- B. Allow testing laboratory access to the mixing plant for verification of weights or proportions, character of materials used and determination of temperatures used in the preparation of asphaltic concrete mix.
- C. When and if required, the testing laboratory will perform laboratory tests on proposed asphaltic pavement mix(es) to determine conformity with requirements.
- D. The testing laboratory will perform one (1) series of compaction tests per 100 square yards for untreated base course and one (1) series of compaction tests per 100 square yards for each lift of asphalt surface course.
- E. When untreated base course or portion thereof has been placed and compacted in accordance with requirements, notify the testing laboratory to perform density tests. Do not place asphalt surface courses until results have been verified and base course installation approved.
- F. If compaction tests indicate that untreated base course or asphalt surface course do not meet specified requirements, remove defective work, replace and retest at own expense. core testing may be required by the Engineer to evaluate defective work.

1.04 SUBMITTALS

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- A. Certified sieve analysis of untreated base course material and samples of this material for determination of Proctor values.
- B. Certified sieve analysis of aggregate materials for asphalt pavement.
- C. Proposed asphalt pavement mix with Marshall Test results for the proposed mix.
- D. Seven (7) days prior to delivery of any bituminous paving to the job site, the Contractor shall submit the proposed job mix to the Engineer for approval. The job mix shall be submitted by the Contractor, and no bituminous mixture shall be manufactured until it has been approved. Data shall be provided that show the proposed mix will produce a mixture which meets the requirements of these specifications and the specific Marshall Test results, including density voids analysis and stability flow tests. Previously established test results will be accepted provided the tests were performed within the last six months.

PART 2 - PRODUCTS

2.01 UNTREATED BASE COURSE MATERIALS

Granular Base. Angular crushed natural stone; free from shale, organic matter and debris; graded within following limits:

<u>Sieve Size</u>	1" GRADATION	<u>Percent Passing</u>
1 inch		100
1/2-inch		79 to 91
No. 4		49 to 61
No. 16		27 to 35
No. 50		17-21
No. 200		5 to 12

- B. Primer. Homogeneous medium curing liquid asphalt; of type recommended for asphaltic paving; of grade to suit job conditions.
- C. Tack Coat. Emulsified asphalt (AC-10) to be used as the tack coat shall meet the requirements of ASTM D977-80, Grade SS-1N or ASTM D2397-79 Grade CSS-1N.

2.02 ASPHALT PAVEMENT MATERIALS

- A. Mineral Aggregate. Mineral aggregate shall consist of crushed stone, crushed gravel, or crushed slag conforming to the following requirements:
 - 1. Coarse aggregate, retained on the No. 4 sieve, shall consist of clean, hard, tough, durable and sound fragments, and shall be free from organic matter or other deleterious substances.

2. That portion of the aggregate retained on the No. 4 sieve shall have not less than 50% of particles by weight with at least one mechanically fractured face or clean angular face.
 3. 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% by weight of vegetable matter or other deleterious substances.
 4. That portion of the fine aggregate passing the No. 40 sieve shall be non-plastic when tested in accordance with AASHTO Designation T-90.
 5. 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% of the total sample weight. The portion of fine aggregate passing the No. 200 sieve shall be determined by washing with water in accordance with AASHTO Designation T-11.
 6. The aggregate shall be of uniform density and quality and shall have a rodded weight of not less than 75 lbs/cu. ft. when tested in accordance with AASHTO Designation T-19.
 7. The aggregate shall have a percentage of wear not exceeding 40 when tested in accordance with AASHTO Designation T-96.
- B. Asphalt Cement. Homogeneous; free of water; will not foam when heated to 177 C; 85/100 penetration grade; shall meet requirements of ASTM D3381; viscosity AC 10 for moderate climates.
- C. Seal Coat. Fog type as defined in Manual No. 4; The Asphalt Institute (MS-4).

2.03 ASPHALT PAVEMENT MIX

- A. Combine mineral constituents in proportions to produce a mixture conforming to following gradation requirements:

¾" GRADATION

<u>Sieve Size</u>	<u>Percent Passing By Weight</u>
¾"	100
½"	75-91
#4	46-62
#16	22-34
#50	11-23
#200	5-9

½" GRADATION

<u>Sieve Size</u>	<u>%Passing By Weight</u>
½"	100
#4	60-80
#16	28-42
#50	11-23
#200	5-9

- B. Percentage by weight of asphalt cement in mixture. 5.0% to 7.0% for surface course.
- C. Maintain thorough and uniform mixture.
- D. Bring asphalt cement and mineral constituents to required temperatures before mixing. Ensure aggregates are sufficiently dry so as not to cause foaming in mixture.

PART 3 - EXECUTION

3.01 PREPARATION

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- A. Ensure grading of sub-grade to required elevation.
- B. Scarify sub-grade, where asphalt pavement is to be placed, to a depth of minimum 8 inches.
- C. Water and thoroughly mix sub-grade until optimum moisture content is obtained when deficiency of moisture content exists. When excess of moisture exists, rework, aerate and allow sub-grade to dry until optimum moisture content is obtained.
- D. Before final rolling, shape entire section, add additional sub-soil as required and compact sub-grade to provide grades, elevation and cross-section indicated. Points of finished sub-grade surface shall be within 1 inch of elevations indicated. Compact to 95% Modified Proctor Density (ASTM D-1557) within 2% of optimum moisture content.

3.02 PLACEMENT OF UNTREATED BASE COURSE

- A. Bring sub-base course to required depth(s) and profiles indicated. Extend sub-base course minimum 6 inches beyond asphalt pavement width. Place in layers not exceeding 4 inches in depth. Compact each layer to 95% maximum laboratory density, or as shown on the plans. Properly compact areas adjacent to curbs, catch basins, manholes and other areas not accessible to rollers with mechanical or hand tamping devices. Ensure granular sub-base course materials are not contaminated with deleterious materials.
- B. Add water during compaction to bring granular material to optimum moisture content.
- C. Spread base course materials over prepared granular sub-base to a minimum compacted depth as indicated on the drawings. Compact to 96% maximum laboratory density. Ensure top surface of base course is true to lines and grades indicated, with all points within 1/2 inch of elevations indicated.
- D. Add water during compaction to bring stabilizing base course materials to optimum moisture content. When an excess moisture exists, rework stabilizing base course materials until optimum moisture content is obtained.

3.03 PLACEMENT OF ASPHALT PAVEMENT

- A. Place asphalt pavement surface course within 12 hours of priming untreated base course.
- B. Place asphalt pavement to compacted depth indicated on the drawings. The maximum compacted depth of each lift of asphalt surface course shall not exceed 3-inch thickness.
- C. Do not place asphalt pavement when surface temperature is 4⁰C or lower; or during rainy weather; or when the subgrade, sub-base, or base course is wet or frozen; or during other unfavorable weather conditions as determined by the Engineer. Ensure asphalt pavement is minimum 118⁰C immediately after placing and prior to initial rolling.

- D. Offset longitudinal joints in succeeding course at least six (6) inches transversely to avoid a vertical joint through more than one course.
- E. Compact asphalt paving surface course to required density, with approved rolling equipment. Start compaction as soon as pavement will bear equipment without checking or undue displacement. Compact each layer to 96% maximum laboratory density, or as shown on the plans.
- F. Carry out compaction in three operations in pass sequence. Ensure each pass of roller overlaps previous passes to ensure smooth surface free of roller marks. Keep roller wheels sufficiently moist so as not to pick up material.
- G. Perform hand tamping in areas not accessible to rolling equipment.
- H. Ensure joints made during paving operations are straight, clean, vertical and free of broken or loose material. Prime vertical surfaces of joints to ensure tight bond.
- I. Ensure surface of completed asphalt pavement is true to lines, profiles and elevations indicated, and is free from depressions exceeding 1/2 inch when measured with a 10 ft. straightedge.
- J. Do not allow vehicular traffic on newly paved areas until surface has cooled to atmospheric temperature, minimum of 6 hours after final installation.

3.04 ADJUSTING MANHOLE FRAMES AND VALVES

- A. Adjust manholes, valves, and other appurtenances to required elevations.
- B. Provide concrete collars when adjustments are required. Collars shall be installed in accordance with Section 321218 - Pavement Repair, and shall be placed to a minimum total pavement thickness of six (6) inches.
- C. Adjustment of manholes, valves, and other appurtenances are considered incidental to the Work and no additional payment will be made for adjustments or paving repairs.

END OF SECTION 321217

SECTION 321315

CONCRETE DRIVEWAY, WALK, CURB AND GUTTER

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Sub grade preparation for walkways, ramps, curbs and gutters, waterways.
- B. Base course for walkways, ramps, curbs and gutters, waterways.
- C. Concrete walkways, ramps, curbs and gutters, waterways and other concrete flat work, complete with reinforcement as required.

1.02 RELATED WORK

- A. Section 312100: Earthwork

1.03 REFERENCE STANDARDS

- A. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- B. ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. ASTM C33 - Concrete Aggregates.
- D. ASTM C94 - Ready-Mixed Concrete.
- E. ASTM C150 - Portland Cement.
- F. ASTM C260 - Air-Entraining Admixtures for Concrete.
- G. ASTM C309 - Liquid Membrane - Forming Compounds for Curing Concrete.
- H. ASTM C1116 - Fiber Reinforcement.
- I. ASTM D1557 - Tests for Moisture - Density Relations of Soils using 10 lb (4.5 kg) Rammer and 18 inch (457 mm) Drop.
- J. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.04 INSPECTION AND TESTING

- A. Three (3) concrete test cylinders will be taken for every 100 cu. yds. of concrete placed.
- B. One (1) additional test cylinder will be taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.

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- C. One (1) slump test will be taken for each set of test cylinders taken.

PART 2 - PRODUCTS

2.01 UNTREATED BASE COURSE MATERIAL

- A. Angular crushed natural stone; free from shale, clay and friable materials and debris; graded within following limits per ASTM C 136:

GRADATION, 1" MAXIMUM SIZE

<u>Sieve Size</u>	<u>% Passing</u>
1 inch (25 mm)	100
¾ inch (19 mm)	90 to 100
½ inch	78 to 90
3/8 inch	65 to 70
No. 4	47 to 61
No. 16	23 to 35
No. 50	10 to 20
No. 200	5 to 11

- B. Material passing the No. 40 sieve: Non-plastic and liquid limit less than twenty-five (25), when tested in accordance with AASHTO Test Methods T-89 and T-90.
- C. Percentage of wear not to exceed fifty (50) when tested in accordance with AASHTO Test Method T-96.
- D. Rodded Weight: Not less than 75 pounds per cubic foot when tested in accordance with AASHTO Test Method T-19.
- E. California Bearing Ratio Value (CBR) of eighty (80) minimum when tested in accordance with ASTM Test Method D-1883.
- F. Determine material passing the No. 200 sieve by washing in water in accordance with ASTM Test Method T-11.

2.02 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150; Type II
- B. Fine Aggregate for Concrete.
 - 1. Fine aggregate deleterious substance limits conform to the requirements of ASTM C 33 with the following exceptions:

<u>Substance</u>	<u>Max. % by Weight</u>
Clay Lumps	0.5
Coal and Lignite	0.3

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Other Substances 2.0

- 2. Grading. Well-graded fine aggregate from coarse to fine conforming the following gradation requirements:

Table with 2 columns: Sieve Size, % Passing. Rows include 3/8 inch, No. 4, No. 50, and No. 100.

C. Coarse Aggregates for Concrete.

- 1. Crushed stone, gravel, or other approved inert materials of similar characteristics, or combinations thereof, having strong and durable pieces.
2. The aggregates shall be free from vegetable matter, lumps or balls of clay, adherent films of clay, or other matter that would prevent thorough bonding.

Table with 2 columns: Substance, Max. % by Weight. Rows include Coal and Lignite, Clay Lumps, Soft Fragments, and Other deleterious substances.

- 3. Wear and Soundness. ASTM C88. Percentage of wear for coarse aggregates of not more than 40 when tested in accordance with AASHTO T-96...
4. Gradation. Per ASTM C33. Coarse aggregate for concrete shall meet the following gradation limits for the concrete class specified.

Table with 2 columns: Sieve Designation, Percent Passing (by weight). Rows include 1 inch, 3/4 inch, 1/2 inch, 3/8 inch, and No. 4.

*Not more than five percent (5%) shall pass a No. 8 sieve.

- D. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material, complying with AASHTO T-26.
- E. Air-Entraining Agent: Use in all weather-exposed concrete. Comply with ASTM C260, except the dilative durability factor in the freezing and thawing test shall not be less than 95.
- F. Fiber Reinforcement (include when specifically indicated): Synthetic fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C116, Type III.

2.03 CONCRETE MIX

- A. Mix and proportion to produce minimum 4000 psi compressive strength concrete at 28 days with maximum slump of 3 inches and 5 to 7 percent air-entrainment.
- B. Provide Ready-Mixed concrete. Comply with ASTM C 94.
- C. Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures shall not relax cold weather placement requirements. Do not use calcium chloride.
- D. Use set-retarding admixtures during hot weather only when acceptable to Engineer.

2.04 REINFORCING MATERIALS

- A. Reinforcing Bars: 60 ksi yield strength; plain deformed billet steel bars; ASTM A615; plain finish.
- B. Epoxy-Coated Reinforcing Bars (use where indicated): ASTM A775 with ASTM A 615, Grade 60 deformed billet steel bars.
- C. Welded Steel Wire Fabric: Plain type, ASTM A185; plain finish.
- D. Tie Wire: Minimum 16 gage annealed type, or patented system acceptable to Engineer.
- E. Joint Dowel Bars: Plain steel bars, ASTM A615, Grade 60 plain steel bars.
- F. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting and fastening reinforcing bars, welded wire fabric and dowels in place. Use wire bar-type complying with CRSI specifications.

2.05 FORMS

- A. Plywood, metal, metal-framed plywood or other acceptable panel type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Use flexible or curved forms for curves of a 100-foot or less radius. Provide forms with matched, tight-fitting joints and adequate stiffeners to support weight of concrete without deflection detrimental to tolerances and appearance of concrete.
- B. Slip form construction may be used subject to approval of the Engineer. Provide slip-forming

equipment with traveling side forms of sufficient dimensions, shape, and strength to support concrete laterally for a sufficient period of time during placement to produce pavement of the required cross-section. The equipment shall spread, consolidate, screed, and float finish the freshly placed concrete in such a manner as to provide a dense homogeneous pavement.

- C. Form Release Agent: Provide commercial formulation form-release agent that will not stain or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces. Comply with VOC limitation regulations.

2.06 JOINT MATERIAL

- A. Provide joint material of type, thickness, and widths indicated on the drawings.
- B. Joint Filler: Bituminous mastic complying with ASTM D 994, formed and encased between 2 layers of bituminous saturated felt or 2 layers of glass-fiber felt. Minimum ½ inch thick.
- C. Joint Sealant: Provide one of the following:
 - 1. Concrete Joint Sealer, Cold-Applied: Elastomeric type complying with ASTM C 920, Type S or M, Grade P or NS, Class 25, Use T, NT, M and O, chemically curing suitable for vehicular or pedestrian use, types of construction and substrates indicated, as recommended by Manufacturer.
 - a. Self-leveling
 - b. Shore Hardness: 40 plus or minus, 5 ASTM D 2240.
 - c. Final cure: 4 days maximum.
 - d. Service range: -10 to 150 degrees F.
 - 2. Concrete Joint Sealer, Hot-Applied: Resilient and adhesive compound type complying with ASTM D 340, Type and Grade suitable for specific application as recommended by Manufacturer.
- D. Obtain joint sealing materials from a single manufacturer for each different product required.
- E. Provide materials that are compatible with one another and with joint substrates under the conditions of service and application.

2.07 CURING MATERIALS

- A. Insulating Coverings: One of the following.
 - 1. Straw.
 - 2. Insulating blankets.
- B. Moisture-Retaining cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.

3. White burlap-polyethylene sheet.
- C. Curing Compound: White-pigmented waterborne membrane-forming curing compound free from permanent color, complying with ASTM C 309, Type I, Class B.
 - D. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

2.08 PAINTED TRAFFIC LINES AND MARKINGS

- A. Alkyd-resin ready-mixed paint, complying with AASHTO M 248, Type F. Provide approved substitute as required to comply with applicable VOC limitations.
- B. Color.
 1. Pavement and Parking Striping, Stop Bars - White.
 2. Crosswalks and Zebra Striping - White.
 3. Fire Lane Curbs - Red.
 4. Accessible Parking Markings - Blue.
- C. Non-slip Aggregate Finish (where indicated): Fused aluminum oxide granules or crushed emery as the abrasive aggregate for a non-slip finish, with aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory graded, packaged, rustproof, non-glazing, and unaffected by freezing, moisture and cleaning materials.
- D. Bonding Agent: Acrylic or styrene butadiene
- E. Epoxy Adhesive: ASTM C881, two-component material suitable for damp or dry surfaces. Material type, grade and class to suit requirements.
- F. Apply pavement markings only with equipment manufactured specifically for that purpose. Use equipment capable of applying a stripe of the desired width with a tolerance of plus or minus 1/4 inch.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Check construction staking. Notify Engineer of conflicts or slope and drainage deficiencies. Failure to check and verify or notify Engineer will result in Contractor repairing and drainage deficiencies at no additional cost to the Owner.
- B. Check form work with construction staking and drawing elevations prior to placing concrete. Adjust form work as necessary. Notify Engineer of conflicts or slope and drainage deficiencies.

3.02 PREPARATION OF SUBGRADE

- A. Ensure rough grading has brought subgrade to required elevations.
- B. Fill soft spots and hollows with additional structural fill.
- C. Level and compact subgrade, to receive granular base course for concrete walkways, ramps, curbs and gutters, to 95% of maximum laboratory density, AASHTO T-99, Method D.

3.03 PLACEMENT OF BASE COURSE

- A. Place and level untreated base course over prepared subgrade to a compacted depth indicated on drawings true to lines and levels. Compact to 95% of maximum modified proctor density, ASTM D 1557.
- B. Adjust moisture content of base course material, as determined by ASTM D 698, as necessary to plus or minus 2 percent of optimum moisture as required to obtain the specified degree of compaction.
- C. Protect placed and compacted base course. Remove and replace "softened" base course areas occurring between base course placement and concrete placement.
- D. During concrete placement, keep base sufficiently moist to prevent excessive absorption of water from freshly placed concrete.

3.04 FORM WORK

- A. Provide sufficient forms to allow continuous progress of the work and so the forms can remain in place at least 24 hours after concrete placement.
- B. Make forms sufficiently tight to prevent loss of concrete.
- C. Form vertical surfaces to full depth and securely position to required lines, dimensions, and levels. Ensure form ties are not placed so as to pass through concrete.
- D. Arrange and assemble form work to permit easy dismantling and stripping, and to prevent damage to concrete during form work removal.
- E. At construction joints, overlap forms over hardened concrete at least 6 inches. Prevent offsets or loss of concrete at construction joint. Maintain a true surface.
- F. Position expansion joint material and other embedded items accurately and support to prevent displacement.
- G. Provide formed openings for elements embedded in or passing through concrete.
- H. Apply form release agent on form work per manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

- I. Do not pry against face or visible edges of concrete to remove forms. Remove and replace sections of concrete work damaged during form removal at no additional cost to the Owner.
- J. Thoroughly clean and properly coat forms before reuse.

3.05 REINFORCEMENT PLACEMENT

- A. Reinforce concrete walks, curbs and gutters as required on the drawings.
- B. Clean reinforcement of loose rust, mill scale, earth, ice, or other bond-reducing materials.
- C. Comply with Concrete Reinforcing Steel Institute's recommended practice for placing and supporting reinforcing bars.
- D. Maintain minimum cover over reinforcement. Allow for a minimum 1-1/2 inch concrete cover unless otherwise noted.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps to prevent continuous laps.
- F. Do not extend reinforcing through expansion and contraction joints. Provide doweled joints through expansion and contraction joints, with one end of dowels fitted with capping sleeve to allow free movement.

3.06 CONCRETE PLACEMENT

- A. Before placing concrete, inspect and complete form work installation, reinforcing steel, and items to be embedded.
- B. Remove snow, ice or frost from base course surface and reinforcing before placing concrete. Don not place concrete on surfaces that are frozen.
- C. Moisten base course if required to provide uniform dampened condition at the time of concrete placement.
- D. Coordinate with the testing laboratory prior to delivery of concrete. Schedule to have a testing agent on site prior to the start of the pour.
- E. Do not discharge concrete into forms if the slump or air-entrainment does not meet the specification requirements.
- F. Do not discharge concrete if the time period from the batching at the plant to site discharge exceeds the following:
 - 1. Air temperature less than 90 degrees F.: 1-1/2 hours
 - 2. Air temperature over 90 degrees F. (without a retarder): 1 hour
 - 3. Air temperature over 90 degrees F. (with a retarder): 1-1/2 hours

- G. When concrete arrives at the site with a slump below specified, water may be added if the maximum approved water/cement ratio and maximum slump is not exceeded provided that:
 - 1. Approved mix design allows for on-site addition of water.
 - 2. Water addition can be accurately measured to within a gallon of the desired quantity.
 - 3. Water addition is followed by 3 minutes of mixing at mixing speed prior to discharge.
- H. Place concrete per ACI 301.
 - 1. Hot Weather Placement: Place per ACI 305.
 - 2. Cold Weather Placement: Place per ACI 306.1. Non-chloride accelerating admixture may be used in concrete work placed at temperatures below 50 degrees F.
- I. Maintain mixed concrete temperature at time of placement between 60 degrees F. and 90 degrees F.
- J. Do not disturb reinforcement, inserts, embedded parts and formed joints.
- K. Do not break or interrupt successive pours such that cold joints occur at locations other than expansion type joints.
- L. Honeycomb or embedded debris in concrete is not acceptable.
- M. Consolidate per ACI 309.
- N. Placement of curb and gutter by slip-form paving equipment is acceptable. Comply with the following:
 - 1. Provide adequate control for lines, grades and elevations.
 - 2. Provide equipment that will produce required cross-section, lines, grades, finish and jointing as specified for formed concrete.
 - 3. Prevent damage to adjacent curbs, gutters and pavement by equipment.
 - 4. After placement, check fresh concrete with a straight-edge to ensure the concrete complies with tolerances specified.
 - 5. Provide final finish on slip-formed curb and gutter in accordance with Section 3.07.
 - 6. If results are not acceptable, remove and replace work with formed concrete.

3.07 CONTRACTION JOINTS

- A. Construct at right angles to top surface of placement.
- B. Construct straight unless otherwise indicated.

- C. Construct traverse and longitudinal joints the same dimension.
- D. Tooled Joints (Score Lines): Maximum depth 1 inch with a top radius of $\frac{1}{2}$ inch, unless otherwise noted on the drawings.
- E. Saw Cut Joints: Saw cuts before uncontrolled shrinkage cracking occurs. Do not tear or ravel concrete during sawing.
- F. Templates: $\frac{1}{8}$ to $\frac{3}{16}$ inch wide.
- G. Sidewalks: Construct contraction joints as follows.
 - 1. At intervals equal to the width of the sidewalk and transverse to the line of the walk.
 - 2. Radial at curbs and walks.
 - 3. Place longitudinal joints in walks with width of walk in feet is greater than 2 times the walk thickness in inches (e.g. Maximum width of a 4 inch thick walk before placement of a longitudinal joint is 8 feet).
 - 4. At walk returns make joints radial.
 - 5. Match longitudinal and traverse joints with adjacent walks.
- H. Curb, Gutter, Waterway: Construction joints as follows:
 - 1. Place joints at intervals not exceeding 10 feet.
 - 2. At curb radius and walk returns make joints radial.
 - 3. Where possible, make joints of curbs coincide with joints in walks.
 - 4. Where integral curb and gutter is adjacent to concrete pavement, align joints with pavement joints where practical.

3.08 EXPANSION JOINTS

- A. Place expansion joints where indicated on the drawings and at immovable structures, when sidewalks abut curb, at points of curve, and at back of curb returns.
- B. Construct at right angles to top surface of placement.
- C. Construct straight unless otherwise indicated.
- D. Construct traverse and longitudinal joints the same dimension.
- E. Place expansion joint material to full depth and width of joint. Fit joints with filler of required profiles, set perpendicular to longitudinal axis of walks, ramps, curbs and gutters.
- F. Do not place longitudinal expansion joints in waterways

- F. Do not place expansion joints in curb returns.
- G. Do not extend reinforcement through an expansion joint. Place dowel mechanisms as required.

3.09 SEALED JOINTS

- A. Provide sealed joints where required on the drawings. Install cold or hot-applied sealant as required.
- B. Saw cut joints as necessary to provide the required sealant thickness and depth.
- C. Remove oil, grease, wax, form-release agents, curing compounds and other materials by sand or water blasting as recommended by the manufacturer of the sealant. Remove frost and moisture prior to sealing.
- D. Install sealants in uniform, continuous ribbons without gaps or air pockets with complete bonding of joint surfaces.
- E. Fill surface rabbet flush with pavement surface.
- F. Fill joints to a depth equal to 75 percent of the joint width, but not less than 3/8 inch deep or greater than 5/8 inch deep, unless otherwise indicated on the drawings.
- G. Do not overfill joints. Clean overflow or spillage from adjoining surfaces.

3.10 FINISHING

- A. Round all edges, including edges of expansion and contraction joints, with 1/2 radius edging tool, unless otherwise noted on the plans. Eliminate tool marks on concrete surfaces.
- B. Ensure finished surfaces do not vary from true lines, levels or grade by more than 1/8 inch in 10 feet (3 mm in 3 m) when measured with straightedge.
- C. Screed and float exposed surfaces to a smooth and uniform finish, free of open texturing and exposed aggregate. Avoid working mortar to surface. Remove and replace sections where the surface has been overworked at could result in spalling.
- D. Finish exposed surfaces of walks with grades of less than or equal to 6 percent with a fine-hair broom applied transverse to the line of the walk.
- E. Finish exposed surfaces of walks with grades of greater than 6 percent with a rough broom applied transverse to the centerline.
- F. Finish exposed surfaces of curbs, gutters and waterways with a medium texture broom applied longitudinal to the line of the curb, gutter or waterway.
- G. Provide detectable warnings in the concrete surface at curb ramps
- H. Do not add water to concrete surface (sprinkle) without approval of the Engineer.

3.11 CURING

- A. Apply curing compound on finished surfaces immediately after placement. Apply in accordance with manufacturer's recommendations.
- B. Do not apply curing compound to areas to receive special finishes or paint.
- C. Protect placed concrete from freezing or excessive moisture loss. Install covers or apply compounds as required. Apply compounds in accordance with manufacturer's recommendations.

3.12 PAINTING

- A. Apply traffic paint for curbs and markings at all fire lanes and other locations as indicated on the drawings.
- B. Apply with mechanical equipment to produce uniform straight edges.
- C. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

3.13 FIELD QUALITY CONTROL

- A. Line: Less than ½ inch variance in 10 feet and not more than 1 inch from true line at any location.
- B. Grade: Not more than 1/4 inch variance in 10 feet. Flood curb and gutter with water after final cure has been reached. Remove and replace any area where ponding is found to stand more than 3/8 inch deep.
- C. Walk Cross Slope: Slope indicated on plans or 4 percent maximum, 1 percent minimum.

3.14 PROTECTION

- A. Prevent damage to placed concrete.
- B. Exclude traffic or equipment from placed concrete for a minimum of 14 days.
- C. Maintain a clean surface and remove spill and surface stains until Substantial Completion.
- D. Remove and replace damaged areas, discolored areas, or cracked sections at no additional cost to the Owner.
- E. Do not backfill against placed concrete for a minimum of 7 days, unless otherwise approved by the Engineer.
- F. Do not permit paving operations (base course or asphalt) against placed curbs, gutters and waterways for a minimum of 7 days, unless otherwise approved by the Engineer.
- G. Do not permit paving operations against placed curbs and gutters without completed backfilling behind curbs.

END OF SECTION 321315

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SECTION 323114

CHAIN LINK FENCING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Galvanized steel chain-link fabric.
- B. Related Sections include the following:
 - 1. Division 31 Section "Earthwork" for filling and for grading work.

1.03 DEFINITIONS

- A. CLFMI: Chain Link Fence Manufacturers Institute.
- B. Zn-5-Al-MM Alloy: Zinc-5 percent aluminum-mischmetal alloy.

1.04 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Architect's written permission.
- B. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART 2 – PRODUCTS

2.01 CHAIN-LINK FENCE FABRIC

- A. Steel Chain-Link Fence Fabric: Provide fabric fabricated in one-piece widths for fencing in height of 12 feet and less. Comply with CLFMI's "Product Manual" and with requirements indicated below:
 - 1. Mesh and Wire Size: 2-inch mesh, 0.148-inch diameter.
 - 2. Zinc-Coated Fabric: ASTM A 392, with zinc coating applied to steel with the following minimum coating weight:
 - a. Class 1: Not less than 1.2 oz./sq. ft. of uncoated wire surface.
 - 3. Coat selvage ends of fabric that is metallic coated during the weaving process with manufacturer's standard clear protective coating.
- B. Selvage: Twisted at top selvage and knuckled at bottom.

2.02 INDUSTRIAL FENCE FRAMING

- A. Round Steel Pipe: Standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. Comply with ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. zinc; and the following strength and stiffness requirements:
 - 1. Line, Posts, 2 O.D.
 - 2. Corner, and Pull Posts, 2-1/2 O.D.
- B. Post Brace Rails: Provide brace rail with truss rod assembly for each gate, end, and pull post. Provide two brace rails extending in opposing directions, each with truss rod assembly, for each corner post and for pull posts. Provide rail ends and clamps for attaching rails to posts.
- C. Top Rails: Fabricate top rail from lengths 21 feet (6.4 m) or longer, with swaged-end or fabricated for expansion type coupling, forming a continuous rail along top of chain-link fabric.

2.03 TENSION WIRE

- A. General: Provide horizontal tension wire at the following locations:
 - 1. Location: Extended along top and bottom of fence fabric.

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- B. Metallic-Coated Steel Wire: 0.177-inch- diameter, marcelled tension wire complying with ASTM A 824 and the following:

- A. Coating: Type II, zinc coated (galvanized).

2.04 CAST-IN-PLACE CONCRETE

- A. General: Comply with ACI 301 for cast-in-place concrete.
- B. Materials: Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and potable water .

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION, GENERAL

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements specified.
 - 1. Install fencing on established lines shown on the plans.
- B. Post Setting: Set all posts in concrete footing. Protect portion of posts aboveground from concrete splatter. Place concrete around posts and vibrate or tamp for consolidation. Using mechanical devices to set line posts per ASTM F 567 is permitted. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured.

3.03 CHAIN-LINK FENCE INSTALLATION

- A. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567.
- B. Line Posts: Space line posts uniformly at **10 feet (1.22 m)**. Post Bracing Assemblies: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Install braces at end and gate posts and at both sides of corner and pull posts. Locate horizontal braces at midheight of fabric on fences with top rail and at two-thirds fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

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- D. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with 0.120-inch-diameter hog rings of same material and finish as fabric wire, spaced a maximum of 24 inches o.c. Install tension wire in locations indicated before stretching fabric.
 - 1. Top Tension Wire: Install tension wire through post cap loops.
 - 2. Bottom Tension Wire: Install tension wire within 6 inches of bottom of fabric and tie to each post with not less than same gage and type of wire.
- E. Chain-Link Fabric: Apply fabric to outside of enclosing framework. Leave **1 inch** between finish grade or surface and bottom selvage, unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
- F. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than 15 inches o.c.
- G. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - 1. Maximum Spacing: Tie fabric to line posts 12 inches o.c. and to braces 24 inches o.c.
- H. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side.

3.04 GATE INSTALLATION

- A. General: Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

3.05 ADJUSTING

- A. Gate: Adjust gate to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Lubricate hardware, gate operator, and other moving parts.

END OF SECTION 323114

SECTION 330510

EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Obtain excavation permits from state and local authorities.
- B. Excavate for utility systems and process piping systems, including manholes, catch basins, valves and other appurtenances to the points of connection with the building utility or structure piping five (5) feet outside of the building or structure.
- C. Locate and protect existing utilities, structures, landscaping, and other existing features.
- D. Dewater excavations as required.
- E. Support excavations as required.
- F. Place and compact bedding, pipe zone, and backfill materials over pipes and appurtenances to rough grade elevation.
- G. Stockpile and dispose of material

1.02 QUALITY ASSURANCE

- A. Provide soil testing during excavation and placement of fill and backfill materials in accordance with Section 014000.
- B. Perform soil testing during excavation and placement of fill, bedding, initial backfill, and backfill materials to show compliance with the requirements of the Contract Documents.

1.03 REFERENCES

- A. ASTM D422 Particle Size Analysis of Soils.
- B. ASTM D424 Calculating the Plasticity Index.
- C. ASTM D698 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, using 5.5-lb (2.49-kg) Rammer and 12-in (304.8 mm) Drop.
- D. ASTM D1556 Density of Soil In Place by the Sand-Cone Method.
- E. ASTM D1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10-pound rammer and 18-inch drop. (Modified Proctor).

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- F. ASTM D1663 Test Method for Compressive Strength of Molded Soil-Cement Cylinders.
- G. ASTM D2419 Test Method for Sand Equivalent Value of Soils and Fine Aggregate.
- H. ASTM D2487 Classification of Soils for Engineering Purposes.
- I. ASTM D2901 Test Method for Cement Content of Freshly-Mixed Soil-Cement.
- J. ASTM D2922 Density of Soil and Soil Aggregate In Place by Nuclear Methods (Shallow Depth).
- K. ASTM D3017 Test Methods for Moisture Content.
- L. ASTM D4253 Test Methods for Maximum Index Density of Soils, using a Vibratory Table.
- M. ASTM D4254 Test Methods for Minimum Index Density of Soils and Calculation of Relative Density.
- N. Federal Occupational Safety and Health Administration, *Federal Register*, Volume 37, No. 243, Sub-part P, Section 1926-652.

1.05 DEFINITIONS

- A. Suitable Material: Excavated material from the site or imported material from off-site meeting the requirements of structural fill or non-structural fill material.
- B. Unsuitable Material: Excavated material from the site that does not meet the requirements of structural fill or non-structural fill. This material shall be removed from the site.
- C. Structural Fill: Fill placed on prepared sub grade in areas which will ultimately be subjected to structural loadings due to footing, floor slabs, pavements, etc.
- D. Non-structural Fill: Fill place on prepared sub grade outside of areas which will ultimately be subjected to structural loadings due to footing, floor slabs, pavements, etc.
- E. Borrow Material: Material imported from off-site but made available at an Owner owned/designated site. It is anticipated that borrow material will meet the requirements for structural fill material. If the quantity of acceptable borrow material is not sufficient to complete the Work, the Contractor shall notify the Engineer in writing. The notification shall include an estimated quantity of material required to complete the Work and the Contractor's Geotechnical Engineer's explanation for non-complying material.

1.06 SUBMITTALS

Submit the following to the Engineer:

EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES
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- A. Certified sieve analysis of the following materials and samples of the materials when requested by the Engineer:
 - 1. bedding and initial backfill
 - 2. imported trench fill
 - 3. foundation material (if required)
- B. One optimum moisture-maximum density curve for each type of soil encountered or incorporated into the Work.
- C. Compaction testing results.
- D. For record purposes only and not for review or approval, submit shop drawings and data showing the intended plan for dewatering operations. Include locations and capacities of dewatering wells, well points, pumps, sumps, collection, and discharge lines, standby units, water disposal methods, monitoring and settlement measuring equipment, and data collection and dissemination. Submit, together with a copy of the approved UPDES permit, as applicable, not less than 15 days prior to start of dewatering operations.

PART 2 - PRODUCTS

2.01 FOUNDATION MATERIAL

Foundation material shall be granular well-graded material with a maximum aggregate size of 2 inches and not more than 5 percent passing the 200 sieve.

2.02 BEDDING, PIPE ZONE, AND INITIAL BACKFILL MATERIAL

- A. Sanitary Sewer and Storm Drain: Bedding, pipe zone, and initial backfill material shall be clean free-draining well-graded crushed gravel with a maximum aggregate size of 1inch. Crushed rock meeting the gradation requirements shown below shall be submitted for approval by the Engineer.

1-Inch Crushed Gravel

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1"	100
3/4"	90-100
1/2"	20-55
#4	0-1
#8	0-5

- B. Water, Gas, Electric, Telephone, or Buried Cables: Bedding, pipe zone, and initial backfill material shall be clean granular natural sand material, free from organic matter, conforming to the gradation requirements shown below:

3/8"	100
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EXCAVATING, BACKFILLING, AND COMPACTING FOR UTILITIES
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#4
#30

35-100
20-100

2.03 FINAL BACKFILL UNDER STRUCTURES, PAVEMENT, AND WALKS

- A. Fill and final backfill for utilities under and immediately adjacent to structures, pavement prisms, and walks shall be structural fill material consisting of clean, well-graded, non-expansive granular sand and gravel material imported from off-site with a maximum size of 3 inches, no greater than 35 percent passing the No. 200 sieve, and a liquid limit of no greater than 30 percent. The material shall be capable of attaining the required densities when compacted.
- B. Native material will be acceptable for final backfill under walks, pavement, or structures if it meets the requirements for structural fill material.

2.04 FINAL BACKFILL OUTSIDE OF STRUCTURES, PAVEMENT, AND WALKS

- A. Fill and final backfill for utilities not under or immediately adjacent to structures, pavement prisms, and walks, shall be suitable non-structural fill material consisting of excavated material from the site, free of topsoil, debris, trash, roots, and other organic matter, frozen material, and stones larger than 3 inches in any dimension. If an adequate quantity of non-structural material is not available at the site, provide imported fill or borrow material consisting of any cohesive or granular material free from topsoil, debris, trash, roots, and other organic matter, frozen material, and stones larger than 3 inches in any dimension. The material shall not contain excessive moisture and shall readily compact and support construction equipment.
- B. Whenever the native excavated material is determined by the Engineer to be unsuitable, imported acceptable material, meeting the requirements for material within rights-of-way, and capable of attaining the required densities shall be used.

2.05 PLASTIC MARKING TAPE

Plastic marking tape shall be acid and alkali-resistant polyethylene film, 6 inches wide, with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psi lengthwise and 1500 psi crosswise. The tape shall be manufactured with integral wires, foil backing, or other means to enable detection by a metal detector when the tape is buried up to 3 feet deep. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion. Tape color shall be as specified in the table below and shall bear a continuous printed inscription describing the specific utility.

<u>Tape Color</u>	<u>Utility</u>
Red	Electric
Yellow	Natural Gas, Oil, Dangerous Material

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Orange	Telephone, Telegraph, Television, Police and Fire Communications
Blue	Potable Water System
Green	Industrial and Sanitary Sewer
Green & White	Compressed Air

PART 3 - EXECUTION

3.01 PROTECTION

- A. Protect trees, shrubs, and lawn areas to receive planting, rock outcropping, and other features remaining as part of final landscaping.
- B. Protect bench marks and existing structures, roads, sidewalks, paving, and curbs against damage from vehicular or foot traffic.
- C. Protect excavations and workmen by shoring, bracing, sheet piling, underpinning, or by other methods, as required to prevent cave-ins or loose dirt from falling into excavations.
- D. Shore or otherwise support adjacent structure(s) which may be damaged by excavation work. This includes service lines, pipe chases, utilities, retaining walls, etc.
- E. Notify Engineer of any unexpected subsurface conditions. Discontinue work in the area until Engineer provides notification to resume work.

3.02 EXISTING UTILITIES

- A. The drawings show existing utilities and their locations insofar as they are known. Utility locations and sizes may vary from those shown. Underground utilities or improvements may exist which have not been shown on the plans. All reasonable precautions shall be taken to field locate, preserve, and protect any and all such improvements.

Any improvements damaged by the Contractor which are not indicated by the drawings shall be repaired by the Contractor. Compensation for such repairs shall be covered by a Field Change Order and will be negotiated with the Engineer before corrections are made. Any such improvements damaged by the Contractor which are on the drawings shall be repaired at the expense of the Contractor.

- B. Request various agencies or utility companies concerned to field-mark substructures and utilities before excavating.
- C. Where it is necessary to remove, replace, or relocate such improvements in order to

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execute the Work, coordinate with, and obtain approval from the utility company or agency concerned.

- D. If the Contractor damages any existing utility lines that are not shown, or if the locations of suspected utilities are not known to the Contractor, report immediately to the Engineer and the Owner of the utilities.

3.03 TRENCH EXCAVATING

- A. Obtain required permits from local or state agencies.
- B. In areas requiring reseeding or sodding, strip topsoil to a minimum depth of 12 inches, or as directed by the Engineer, and stockpile away from trench and other excavated materials for reuse.
- C. Vertically cut existing pavement, sidewalk, curb and gutter, driveways, etc., along the lines forming the trench in such a manner as not to damage the adjoining pavement. Break up the portion to be removed, and remove from the site of the work immediately without causing damage to the pavement outside the limits of the trench.
- D. Perform trench excavation to the alignment and grade as shown on the drawings, or as required by the Engineer.
- E. As directed by the Engineer, when unsuitable foundation material is encountered at subgrade, remove unsuitable material and replace with foundation material. Contact Engineer prior to excavation of unsuitable material and placement of foundation material to gain authorization to do so.
- F. Place excavated material in a manner that will not endanger the work and will cause the least possible interference with public travel.
- G. Provide for uninterrupted flow of irrigation ditches, streams, wastewater, and storm drainage. Provide free access to all fire hydrants, water valves, meters, and drives.
- H. Keep excavation clear of water during the progress of the Work.
- I. The Contractor shall backfill, to existing grades, and barricade all trenches within roadways and parking areas at the close of each day, unless approved by the Engineer. No trenches shall be backfilled except in these areas until pipelines are properly tested.
- J. The use of a trench digging machine will be permitted except in places where machines may cause damage to existing structures, in which case, hand methods shall be employed.
- K. Place barriers along each excavation, at each end of excavations, along soft shoulder areas within roadways, and at other locations along the excavation as may be necessary or as required by the Engineer. Trenches shall be delineated night and day as required by applicable codes until backfilling is complete.

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- L. Equipment with tracks which is to be used on pavement shall be equipped with suitable pads to prevent damage to the pavement. The Contractor shall be responsible for damage done to improved surfaces. Damaged surfaces shall be repaired or replaced by and at the expense of the Contractor in a manner satisfactory to the Engineer and at no additional cost to the Owner.
- M. Trenches, at the top of the initial backfill, shall be of necessary width for the proper laying of the pipe, but in no case shall the trench be less than 12 inches wider than the outside diameter of the pipe or more than two 2 feet wider than the pipe outside diameter.
- N. Trenches shall not be excavated until the pipe to be laid therein is on the site and is scheduled to be placed. The bottom of the trenches shall be accurately graded to a depth of 6 inches below the bottom of the pipe to allow for placing of granular pipe zone bedding material.

Care shall be taken not to excavate below the depths indicated. Where bell and spigot pipe is used, the minimum cover depth shall be maintained over the bell as well as under the straight portion of the pipe. Over-excavation shall be backfilled in 6-inch lifts to the proper grade with foundation or bedding material, as required by the Engineer, and shall be thoroughly consolidated and compacted as specified at no additional cost to the Owner.

- O. Wasting of Material. Contractor shall remove and dispose of surplus, unsuitable and excess excavated material. Contractor shall secure waste sites for excess material. No additional payment shall be made for removal and disposal of material.

3.04 ROCK EXCAVATING

- A. Rock shall be defined as follows:

1. Rock excavation shall consist of solid material and obstructions encountered with a volume in excess of 2 cubic yard. Sidewalks, pavement, and curb and gutter that cannot be excavated with a track-mounted power excavator (equivalent to Caterpillar Model No, 215C LC, rated at not less than 115 HP flywheel power and 32,000-pound drawbar pull, and equipped with a short stick and a 42-inch wide, short tip radius rock bucket rated at .81 cubic yard (heaped) capacity) without systematic drilling and blasting shall be excluded.
2. Hard and compact materials such as cemented gravels, glacial till, fractured quartzites, and relatively soft or disintegrated rock will not be considered as rock excavation. Rock excavation will not be considered as such because of intermittent drilling, blasting or ripping that is performed merely to increase production.

- B. Excavation of the material claimed as rock shall not be performed until the material has been classified and cross-sectioned by the Engineer.

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C. Rock payment lines are limited to the following:

Six (6) inches below invert elevation of pipe and two feet wider than inside diameter of the pipe, but not more than three (3) feet maximum trench width.

D. Excavate for and remove rock by the mechanical method.

1. Cut away rock at excavation bottom to form level bearing surface.
2. Remove shaled layers to provide sound and unshattered base for footings and foundations.
3. Remove excavated material.
4. For utility installations, cut away rock in bottom of trench to follow the proposed grade of the utility line. Eliminate sharp steps or protrusions.

E. Provide for visual inspection of bearing surfaces and cavities formed by removed rock.

F. Correct unauthorized rock removal in accordance with backfilling and compaction requirements of Section 330510.

3.05 STABILITY OF EXCAVATIONS

A. Slope sides of excavations to comply with OSHA 29 CFR Part 1926 or latest revision. Provide and install trench support systems where sloping is not possible because of space restrictions or stability of material excavated.

B. Provide proper support for all excavations to protect life, property, utilities, pavement, and the Work and to provide safe working conditions in the trench in accordance with Occupational Safety and Health Administration (OSHA) regulations, *Federal Register* Vol. 37, No. 243, Subpart P., Sec. 1926.652 or latest edition.

C. Contractor shall be responsible to determine when and where the use of trench support is employed over the use of trench boxes or sloping the sides of the excavation to the angle of repose of the material being excavated. Contractor shall be responsible for the support system used. Support systems shall be in accordance with Section 02160 - Excavation Support Systems.

D. Remove all timber and sheeting from excavations or trenching before backfilling. Cut sheeting off 2-feet below final grade if allowed by Engineer.

E. Contractor shall prevent damage to the existing improvements. Where existing improvements are damaged or affected as a result of the Contractor's work, the Contractor shall replace or repair such damage at no additional cost to the Owner.

3.06 DEWATERING

A. Provide all equipment, labor, materials, tools, and incidentals necessary to design, construct, install, and operate dewatering facilities for construction of the Work.

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- B. Do not discharge drainage water into storm drains unless approval by the governing agency and the Engineer is given. No discharge into sanitary sewers is allowed.
- C. Water shall not be allowed to flow through the pipe lines during construction.

3.07 BACKFILLING AND COMPACTING

- A. Assure that trenches are free of debris, snow, ice, and water and that ground surfaces are not in frozen condition.
- B. Backfill in a systematic manner and as soon as possible after pipeline installation and leak detection testing is complete.
- C. Compact materials in accordance with paragraph 3.14 Field Quality Control.
- D. Foundation. When unstable earth, muck, or other foundation material is encountered in the excavation, additional excavation shall be made as directed by the Engineer, and shall be replaced with foundation materials. A minimum of 12 inches below the pipe zone will be removed and backfilled with foundation material to give a stable sub grade.

No additional payment for foundation material will be made unless the Engineer is notified of the condition and approves the use of foundation materials.

In rock excavation where over-excavation occurs the excavation shall be backfilled with foundation material to 6 inches below the pipe zone.

- E. Bedding and Pipe Zone. Place bedding material to required thickness and consolidate or compact. Shovel-slice or rod the bedding in the haunch area to assure that the pipe remains true to grade, voids are eliminated beneath the pipe, and the bedding is properly compacted or consolidated.
- F. Initial Backfill. Place and compact initial backfill material simultaneously on each side of the pipe for the full width of the trench in layers of 6 inches or less, to a point 12 inches over the top of the pipe and in such a manner as not to injure, damage or disturb the pipe.
- G. Final Backfill.
 - 1. Under structures, pavement prisms, walks, and where specified by the Engineer, the backfill material shall be placed in continuous horizontal layers, not exceeding 6 inches in thickness or as required by Construction Manager. Adjust moisture content of fill or backfill material, as determined by ASTM D698, as necessary to ± 2 percent of optimum moisture as required to obtain specified degree of compaction. Utilize borrow material as available. Provide import structural fill material as required.
 - 2. In all areas outside of structures, pavement prisms, and walks, place non-

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structural fill or backfill material in continuous horizontal layers not exceeding 12 inches in thickness degree of compaction. Moisten or aerate native materials as necessary to ± 1 to 3 percent of optimum moisture as determined by ASTM D698.

- H. In areas where the pipe is placed near the existing ground surface, mound backfill material over pipe to a depth of 4 feet of cover, or as designated on the plans. Mounding shall be accomplished with consideration for drainage problems that may develop. Mounding shall only be used where shown on the plans.
- I. Distribute the backfill material in such a manner as to avoid the formation of lenses or layers of material differing substantially in characteristics from surrounding material. Do not include any roots, sod, frozen material or other perishable or unsuitable material in backfill.
- J. Whenever the excavated material is not suitable for backfill, furnish or transport from other areas within the project, suitable excavated material which meets the requirements for final backfill.
- K. Remove from site and dispose of excess or undesirable excavated material not suitable or required for backfill in an appropriate acceptable manner.
- L. Backfill for Appurtenances. After the manhole, catch basin, inlet, or similar structure has been constructed and the concrete has been allowed to cure for seven (7) days, backfill shall be placed in such a manner that the structure will not be damaged by the shock of falling earth. The backfill material shall be deposited and compacted as specified for final backfill, and shall be placed in such a manner as to prevent eccentric loading and excessive stress on the structure.

3.08 SPECIAL REQUIREMENTS

- A. Water Lines. Trenches shall be of a depth to provide a minimum cover of 5 feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe.
- B. Electrical Distribution System. Direct burial cable and conduit or duct line shall have a minimum cover of 24 inches from the finished grade, unless otherwise indicated.
- C. Gas Distribution. Trenches shall be excavated to the depth that will provide not less than 36 inches of cover. Trenches shall be graded as specified for pipe-laying requirements.
- D. Plastic Marking Tape. Warning tapes shall be installed directly above the pipe at a depth of 18 inches below finished grade unless otherwise shown or required by the Engineer.

3.09 SOIL STORAGE (STOCKPILE) AREAS

- A. Prepare areas to receive stockpile material. Clear and grub as necessary to prevent stockpiled material from contamination with unsuitable material.

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- B. Provide adequate drainage for stockpiles and surrounding areas by means of temporary ditches, dikes or other approved methods.
- C. Stockpile suitable excavated material in an orderly manner, and at a distance from the bank of the excavation sufficient to avoid overloading or cave-ins.
- D. Protect stockpiled material from contamination with unsuitable excavated material that may destroy the quality of the suitable stockpiled material. Replace stockpiled material, not adequately protected, that becomes unsuitable with suitable material at no cost to the Owner.
- E. Do not place stockpile material in permanent fill material locations unless approved by the Engineer.
- F. When stockpile areas are no longer needed, prior to completion of the work, grade the stockpile area to original contours and abandon/fill temporary ditches.

3.10 BORROW AREAS

- A. Excavate borrow areas in such a manner as will afford adequate drainage.
- B. Transport overburden and spoils material to the designated spoil area or otherwise dispose of as directed by the Engineer.
- C. Operate borrow areas to minimize detrimental effects on natural environmental conditions.
- D. Maintain access roads as required to permit access.
- E. Slope sides of excavations or provide excavation support systems in accordance with Section 02160.
- F. Trim and drain borrow areas to neat lines after the excavation is complete.

3.11 COLD WEATHER

- A. Contractor shall remove and dispose of snow or ice from the construction area as necessary to perform the required work. The removal of additional deposits of snow shall not be cause for the Contractor to request an extension of contract time or additional payment.
- B. The Contractor shall provide cold weather protection materials and equipment, such as heaters and blankets, as required.
- C. Excavations, trenches, excavated material, and imported material shall be protected from frost or freezing, as necessary, until the excavation or trench has been backfilled.
- D. The presence of frozen material or material containing frost shall not be cause for the Contractor to request an extension of contract time or additional payment.
- E. The Contractor shall remove and dispose of frozen material that cannot be incorporated into the backfill.

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3.12 FIELD QUALITY CONTROL

- A. Densities of in-place materials shall equal or exceed the minimum densities as indicated below when compared to the maximum dry density as determined by ASTM D698:

<u>COMPACTION REQUIREMENTS</u>		
Location or Use of Fill	Percentage of Maximum Density	
Foundation, bedding, and initial trench backfill or fill material	96	
Final fill and backfill beneath structures, paved areas (including sidewalks and gravel roadways)	96	
Final fill and backfill, not beneath paved areas or structures	90	
Topsoil	80	
Overexcavation	95	

- B. Passing overexcavation tests are required on the fills and backfills at the following frequencies:

Bedding	-	1 Test per 200 L.F. of Trench
Initial Backfill	-	1 Test per 200 L.F. of Trench
Final Backfill or Fill (outside pavement section)	-	1 Test per 200 L.F. of Trench per lift
Final Backfill or Fill (under pavement section)	-	1 Test per 50 L.F. of Trench per lift
Overexcavation	-	1 Test per 50 L.F. of Trench per lift

- C. Densities of in-place material shall be as determined by ASTM D2922.
- D. Compaction tests not meeting specification requirements shall be retested, after recompaction, at Contractor's expense. The Engineer shall select the depth that the test is to be taken. The Contractor shall be responsible to dig all density testing pits at the location and depth requested. No additional payment will be made for test pits dug for compaction tests or for replacing and recompacting the backfill material.
- E. Fill or backfill not compacted to the required density will be removed, recompacted, and retested at the Contractor's expense until the requirements are met. The retesting shall be at the Contractor's expense.
- F. Any trenches and excavation pits improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted with the surface restored to the required grade and compaction, rounded over, and smoothed off or pavement sections restored.

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- G. The Contractor shall be responsible for providing Proctor Density test results for backfill material, bedding material, and any special import backfill used. Prior to commencement of any construction the Contractor shall obtain samples of backfill material for Proctor tests. Where existing material is to be used as backfill material the Contractor shall be responsible for providing the machinery and labor to obtain soils samples of the backfill material for Proctor tests. On this project at least one sample per 1000 feet of pipe to be installed shall be required.

Additional Proctor tests may be required if backfill material changes in characteristics. Proctor tests shall be run by a Owner-approved testing laboratory. The cost of obtaining soil samples and conducting Proctor tests shall be paid by the Contractor.

No pipeline installation will begin until written results of the Proctor tests for that area have been submitted to the Engineer. The Contractor shall use the Proctor test results for testing compaction of backfill material.

3.13 LIMITS OF CONSTRUCTION

The Contractor shall complete all work within the easement lines and rights-of-way as shown on the drawings or as directed by the Engineer. All corrections for disturbance, damage, or irregularity shall be the responsibility of the Contractor and shall hold the Owner harmless of all suits, liability and damages. All ditches, canals, and roadways shall be placed back into their original or better condition.

3.14 CLEAN UP

- A. Remove all excess material, debris, sheeting, etc. from the site upon completion of the Work and dispose of properly.
- B. Keep cleanup operations to within 500 feet of excavation at all times.
- C. Failure to keep the cleanup operations to within 500 feet of excavation shall be sufficient cause for the Engineer to stop forward progress of excavating equipment and hold progress payments until the cleanup is up to acceptable limits and standards.
- D. Any pavement, trees, shrubbery, fences, poles, or other property or structures damaged, removed, or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the contract documents, state laws, municipal ordinances or the specific direction of the Engineer or through failure to employ usual and reasonable safeguards shall be replaced or repaired at the expense of the Contractor.

END OF SECTION 330510

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SECTION 334110

STORM DRAIN SYSTEMS

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. Install storm drainage pipe, catch basins, manholes, and other appurtenances.
- B. Install roof drain lines and cleanouts to a point five (5) feet outside buildings and structures.
- C. Adjust catch basins and other appurtenances to finish grade.
- D. Flush and clean all storm drainage lines.

1.02 RELATED WORK

Section 330510, Excavating, Backfilling, and Compacting for Utilities.

1.03 QUALITY ASSURANCE

All products are subject, at the discretion of the Construction Manager, to inspection and approval at the plant of the manufacturer. Any material not meeting the requirements specified herein shall be rejected and shall be removed immediately from the vicinity of other material furnished for the project.

1.04 REFERENCES

- A. ASTM A48 Gray-Iron Castings
- B. ASTM C76 Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
- C. ASTM C150 Specification for Portland Cement
- D. ASTM C443 Joints for Concrete Sewer and Culvert Pipe, Using Rubber Gasket
- E. ASTM C478 Pre-cast Reinforced Concrete Manhole Sections
- F. ASTM D2321 Standard Recommended Practice for underground Installation of Flexible Thermoplastic Sewer Pipe
- G. ASTM D3034 Type PSM Polyvinyl Chloride Sewer Pipe and Fittings
- H. AWWA C600 Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances

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- I. ANSI A21.10 Gray and Ductile Iron Fittings 2-inch through 48-inch for Water and Other Liquids
- J. ANSI A21.11 Rubber Gasket Joints for Cast-Iron and Ductile-Iron Pressure Pipe and Fittings
- K. ANSI A21.50 Thickness Design of Ductile-Iron Pipe
- L. ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids

1.05 SUBMITTALS

- A. Submit for review and approval, data on fabricated grates and frames to be used, including dimensions, weights, manufacturer, product number, and other related information.
- B. All reinforced pre-cast concrete structures shall be submitted for review and approval with suitable detail to show all necessary dimensions and reinforcing.

PART 2 - PRODUCTS

2.01 PIPE

A. Storm Drains

1. High Density Polyethylene (Smooth Interior Corrugated). AASHTO M-294 Type S, Advanced Drainage Systems ADS N-12 or approved equal.
 - a. Joints. Push-on rubber gasket
 - b. Fittings. Polyvinyl Chloride (PVC), ASTM D3034, cell classification SDR, and joints to meet pipe requirements for PVC piping.
2. Reinforced Concrete Pipe. ASTM C76, Type II cement, bell and spigot joints with rubber compression gaskets conforming to ASTM C443. Class III or as indicated on the drawings. In addition to the requirements of the referenced standards above, pipe shall not be installed prior to seven (7) days from the date of manufacture as marked on each pipe.
3. Polyvinyl Chloride (PVC). ASTM D3034, SDR 35, unless otherwise indicated on the drawings.
 - a. Cell Classification. 12454B
 - b. Joints. Solvent cement or bell and spigot with integral bell elastomeric gasket joint.
 - c. Fittings. ASTM D3034, cell classification SDR, and joints to meet pipe requirements for PVC piping

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- B. Roof Drain Laterals, 4-inch, 6-inch, 8-inch diameter. Pipe for roof drain laterals shall be same type as provided for storm drains.
 - 1. Concrete. ASTM C14, Class 3 unless otherwise indicated on the drawings.
 - a. Cement. ASTM C150, Portland Cement Type II (or IIA)
 - b. Joints. ASTM C443, Bell and Spigot Type
 - 2. High Density Polyethylene (Smooth Interior Corrugated, double-wall). Advanced Drainage Systems ADS N-12 or approved equal.
 - a. Joints. Push-on rubber gasket
 - b. Fittings. Polyvinyl Chloride (PVC), cell classification SDR, and joints to meet pipe requirements for PVC piping.
 - c. Perforations, where required on the drawings: corrugation valleys only; ASTM F405 and F667.
 - 3. Polyvinyl Chloride (PVC). ASTM D3034, SDR 35, unless otherwise indicated on the drawings.
 - a. Cell Classification. 12454B
 - b. Joints. Solvent cement or bell and spigot with integral bell elastomeric gasket joint
 - c. Fittings. ASTM D3034, cell classification SDR, and joints to meet pipe requirements for PVC piping.

2.02 CONCRETE

- A. All concrete for construction of inlet boxes, catch basins, and appurtenances shall be in accordance with Section 03300 - Cast-In-Place Concrete.
- B. Mix shall contain not less than 6½ bags of Type II cement per cubic yard. Maximum aggregate size shall be 1¾ inches.

2.03 MORTAR (GROUT)

- A. Mortar for jointing inlet boxes shall be one (1) part Portland Cement and not less than one (1) part nor more than 1½ part plaster sand, mixed with the least amount of water necessary to provide a workable mortar.

2.04 REINFORCING STEEL

Reinforcement shall be Grade 60, in accordance with Section 03200 - Concrete Reinforcement.

2.05 CATCH BASINS

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- A. Catch Basins. Pre-cast or cast-in-place concrete conforming to the drawings.
- B. The use of pre-cast catch basins shall be subject to approval by the Contractor. Subcontractor shall submit shop drawings for each type of pre-cast box. Coordination for elevations shall remain the Subcontractor's responsibility.
- C. Cast-Iron Frame and Grated Covers. ASTM A48, Class 30, of uniform quality, free from blow holes, porosity, hard spots and shrinkage defects, with non-rocking, machined bearing surfaces between frame and cover. The frame and cover shall be cleaned and painted with an asphalt coating prior to delivery to the site. Frame and grates shall meet AASHTO HS-20 loading requirements.

Frame and grate covers shall be heavy-duty type as noted on the plan.

- D. Grout. Non-shrink.

2.06 CATCH BASINS (GUTTER TYPE)

- A. Inlet Boxes. Pre-cast or cast-in-place concrete conforming to the drawings.
- B. The use of pre-cast inlet boxes shall be subject to approval by the Contractor. Subcontractor shall submit show drawings for each type of pre-cast box. Coordination for elevations shall remain the Subcontractor's responsibility.
- C. Cast-Iron Frame and Grate. ASTM A48, Class 30, of uniform quality, free from blow holes, porosity, hard spots, and shrinkage defects with non-rocking, machined bearing surfaces between ring and cover. The ring and cover shall be cleaned and painted with an asphalt coating prior to delivery to the site.

Frame and grates shall be heavy-duty type as noted on the plan.

2.07 MANHOLES

- A. Concrete Pre-Cast Sections. ASTM C478, 48-inch inside diameter unless otherwise noted on the drawings.
 - 1. Cement. ASTM C150 Portland Cement Type IIA Modified or Type V
 - 2. Base Section. Base riser with integral floor
 - 3. Cone Section. Concentric cone
 - 4. Pipe connectors
 - a. Flexible rubber boot. ASTM C023 with stainless steel clamping and retaining bands.
 - b. Pipe stubs. Same material, class, and requirements as connecting piping.

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- B. Cast-in-Place Base Section
 - 1. Concrete
 - a. Use 28-day minimum compressive strength, 3000 psi.
 - b. Use minimum 5½ bags of cement per cubic yard.
 - c. Use Type IIA Modified or Type V cement conforming to ASTM C150.
 - 2. Pipe Connectors. Use pipe stubs of same material, class, and requirements as connecting piping.
- C. Grade Rings. ASTM C478, Type IIA Modified or Type V cement conforming to ASTM C150.
- D. Frame and Cover. ASTM A48, Class 35 Gray-Iron
 - 1. Use non-vented covers with a pick hole for opening.
 - 2. Use low-profile waffle pattern cover.
 - 3. Use cover with the words "STORM DRAIN."
 - 4. Use frame and cover with machined bearing surfaces.
 - 5. Use non-slotted frame.
 - 6. Repair of defects in castings by welding or other methods will not be permitted.
 - 7. Acceptable Manufacturers D&L Supply. A 1181 WP
 - 8. Grout. Non-shrink type.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Prior to excavating for storm drain lines, verify locations of existing utilities. Notify Contractor of any conflicts with proposed alignment and grade.
- B. Line and Grade. Establish the line and grade of the storm drain line. A laser designated for such work shall be used to establish line and grade. The length of line between laser set-ups shall not exceed 500 feet. Other methods for maintaining line and grade must be approved by Contractor prior to construction.
- C. Prior to installation, inspect all pipes, manholes, and appurtenances for cracks, defects, or imperfections, and verify compliance with the specifications. Remove all defective material from the site.

3.02 EXCAVATING, BACKFILLING, AND COMPACTING

Refer to Section 330510 - Excavating, Backfilling, and Compacting for Utilities.

3.03 PIPE LAYING

- A. Lay pipe to line and grade indicated.

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- B. After being cleaned and inspected for soundness, each piece of pipe shall be laid on the previously graded trench bottom or bedding material, as required, after the bell hole has been excavated.
- C. Lay bell and spigot type pipe with the bell end upgrade. Pipe laying shall proceed upgrade.
- D. Trenches shall be dewatered and under no circumstances shall pipe be laid in water, nor shall the pipe be laid under unsuitable weather or trench conditions.
- E. Every precaution shall be taken to prevent foreign material from entering the pipe during installation. No debris, tools, clothing, or other material shall be placed in the pipe.
- F. At times when pipe laying is not in progress or at other times during construction as directed by the Contractor, the open end of the pipe shall be closed by a watertight plug or other means approved by the Contractor.
- G. Pipe installation and jointing for the various types of pipe specified shall be according to these specifications and the manufacturer's recommendations.
 - 1. Concrete Pipe. Manufacturer's recommendations.
 - 2. Ductile-Iron Pipe. AWWA C600 and manufacturer's recommendations.
 - 3. High density Polyethylene (HDPE) Pipe. ASTM D2321
 - 4. Polyvinyl Chloride (PVC) Pipe. ASTM D2321

3.04 INSTALLATION OF ROOF DRAIN LATERAL PIPING

- A. Pipe installation and joining for the various types of pipe specified shall be according to these specifications and the manufacturer's recommendations.
- B. Install piping at a grade of two (2) percent minimum and make connections to the storm drainage system at or above spring line or at elevation indicated on the drawings. Provide four (4) feet minimum cover if available.
- C. Install cleanouts when indicated, five (5) feet from buildings and in accordance with the drawings. Risers shall be the same size and material as the piping.

3.05 CATCH BASIN INSTALLATION

- A. Install catch basins at location and grades indicated.
- B. Pre-cast boxes. Place so as to be uniformly supported in proper alignment. Place compacted bedding material under pre-cast boxes if required to provide uniform and stable support.
- C. Cast-in-place boxes. Constructed in accordance with the drawings.

- D. Grade adjustment. Set catch basin or inlet box to final grade only after final elevation of pavement, gutter, ditch, or sidewalk in which it is to be placed has been established.
- E. Pipe connection. Grout openings in walls of pre-cast boxes with non-shrink grout after pipe and castings have been placed to their final position.
- F. Pre-cast boxes shall be placed and aligned to provide vertical sides.
- G. Grade rings. A maximum of 12 inches of grade rings will be allowed. If possible, one (1) grade ring should generally be installed on catch basins located in landscaped areas.
- H. Joints and lift holes. All lift holes and joints between pre-cast boxes, grade rings, or castings shall be sealed by placing a continuous bead of bitumastic material sufficient to fill the void in the joint prior to joining the items.
- I. Frame and cover installation
 - 1. In roadways. Top of casting shall be set parallel to and $\frac{1}{2}$ to $\frac{3}{4}$ inch below finished road surface. Castings shall be fully and uniformly supported. Wedges or shims used to elevate castings shall be brick or metal with concrete placed for uniform support.
 - 2. Off road. Top of castings shall be set as indicated on drawings.
- J. Any catch basins displaced or damaged prior to final acceptance shall be removed and replaced to conform to these specifications at the Subcontractor's expense.

3.06 MANHOLE INSTALLATION

- A. Install manholes at locations and grades indicated.
- B. Pre-cast bases. Place so as to be fully and uniformly supported in proper alignment. Place compacted bedding material under pre-cast base if required to provide uniform and stable support.
- C. Cast-in-place base. Provide a continuous pour of the concrete with at least 6 inches of concrete below the invert of the manhole and at least 6 inches radially outside of the outside diameter of the pre-cast riser section. The concrete shall also extend a minimum of 6 inches above the bottom of the riser section around the outside of the manhole.
 - 1. Support bottom pre-cast riser section on concrete blocks and adjust to proper alignment and grade prior to pouring the cast-in-place base.
 - 2. The pre-cast riser section shall not bear directly on any of the pipes.
 - 3. Grout all joints between cast-in-place concrete and pre-cast sections and pipe with non-shrink grout after concrete has cured.

- D. Inverts
1. Construct smooth and uniform changes in flow direction with the longest radius possible.
 2. Provide cross-sectional shape of the invert channels to match the lower halves of the inflow and outflow pipes.
 3. Extend pipes into the manhole a maximum of three (3) inches from the inside of the manhole wall.
- E. Place and align pre-cast sections to provide vertical sides.
- F. Grade rings. Provide manhole wall sections to allow for a maximum of 12 inches of grade rings on manholes located in roadways. Provide adequate manhole wall sections to avoid the use of grade rings or manholes located off roadways.
- G. Joints and lift holes. Seal all joints between pre-cast base, riser and cone sections, grade rings and castings by placing a continuous bead of mastic sealant in the joint prior to joining the items, and touching up the mastic sealant, adding additional mastic sealant as required to form a smooth, watertight joint both inside and outside with mastic sealant. In all cases, a watertight manhole is required.
- H. Ring and cover installation
1. In roadways. Set top of casting parallel to and $\frac{1}{2}$ to $\frac{3}{4}$ inch below finish road surface. Support castings fully and uniformly. Use brick or metal wedges or shims to finely adjust castings to grade. Place concrete around wedges and shims for uniform support.
 2. Off road. Top of casting shall be set approximately 6 inches above finish grade unless otherwise indicated or directed by the Contractor.
- I. Any manhole displaced or damaged prior to final acceptance shall be removed and replaced to conform to these specifications at the Subcontractor's expense.

3.07 FIELD QUALITY CONTROL

Visual inspection will be performed on all installed storm drain lines prior to acceptance. The Contractor will perform a visual inspection of all installed storm drain lines and manholes to assure conformance with the specifications. All sections of storm drain line will be "lamped" to insure that the line is straight, of uniform grade, and free of all dirt, debris, and obstructions. All broken, misaligned, or displaced pipe and manholes or other defects revealed during this visual inspection shall be corrected at the Subcontractor's expense. The Subcontractor shall furnish suitable assistance to the contractor for visual inspections.

3.08 CLEANING

- A. The interior of all storm drain lines, manholes, catch basins, and other appurtenances shall be cleaned of all dirt, debris, or other foreign material. Cleaning shall be by flushing, jetting, or other approved means to remove such foreign material.
- B. Connections between new construction and the existing system shall be plugged to prevent any debris from the new construction or from cleaning operations from entering the existing system. Any debris entering the existing system shall be removed at no expense to the construction manager.

END OF SECTION 334110