



STATE OF UTAH - DEPARTMENT OF ADMINISTRATIVE SERVICES

Division of Facilities Construction and Management

DFCM

**MULTI-STEP BIDDING PROCESS
FOR
CONTRACTORS**

**Request For Solicitation For
Construction Services**

Stage II – General Contractors Bidders List FY09

July 29, 2008

**JLTC PARKING LOT
IMPROVEMENTS - PHASE I
CAMP WILLIAMS**

**UTAH NATIONAL GUARD
RIVERTON, UTAH**

DFCM Project No. 07011480

Stantec Consulting Inc.
3995 South 700 East, Suite 300
Salt Lake City, Utah 84107

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

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

Technical Specifications:
Drawings:

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

INVITATION TO BID

ONLY FIRMS PRE-QUALIFIED DURING STAGE I OF THE RFS ARE ALLOWED TO BID ON THIS PROJECT

The State of Utah - Division of Facilities Construction and Management (DFCM) is requesting bids for the construction of the following project:

JLTC PARKING LOT IMPROVEMENTS – PHASE I
CAMP WILLIAMS - UTAH NATIONAL GUARD – RIVERTON, UTAH
DFCM PROJECT NO: 07011480

Project Description: Grading and civil work to prepare parking lot site, including underground electrical for parking lot lighting and some water lines running through the parking area. Construction Cost Estimate: \$71,000

Company	Contact	Fax	Company	Contact	Fax
Arnell-West, Inc	Jason Arnell	(801) 975-9967	Hughes General Contr	Dan Pratt	(801) 295-0530
Ascent Construction	Brad L. Knowlton	(801) 299-0663	Interior Construction Specialist	Steve Bowers	(801) 568-1490
Bailey Construction Co	Tracy Bailey	(435) 245-6413	JC Construction	John Cecala	(801) 262-7966
Benstog Construction Corp	Patrick Benstog	(801) 399-1335	Keller Construction	S. Daniel Hill	(801) 972-1063
Big-D Construction	Ryan Carter	(801) 415-6900	McCullough Engineering	Jim McCullough	(801) 466-4989
Bradley Construction	Brad Piggott	(801) 298-6308	Menlove Construction	Mike Menlove	(801) 282-6887
Broderick & Henderson	Gary Broderick	(801) 225-4697	MW Construction Inc	Bill Shuldverg	(435) 245-4660
Bud Mahas Construction	Steve Mahas	(801) 531-0314	Onyx Construction	Mike Phillips	(801) 878-8922
CECI	Brian E. Bagnell	(801) 484-4040	Rueckert Construction Co	Ken M. Rueckert	(801) 253-1774
Chad Husband Const	Richard Marshall	(801) 886-1784	Spindler Construction Corp	Gary R. Stevens	(435) 753-0728
CSM Construction Inc	Dan Noorda	(801) 280-2813	Velocity Construction	J. Scott Wilson	(435) 586-4968
Darrell Anderson Const	James Anderson	(435) 752-7606	Veritas Inc	Dan A. Parkinson	(801) 572-5899
Entelen Design-Build LLC	Steven R. Burt	(801) 517-4398	Wade Payne Const	Wade Payne	(801) 226-7772
Garff Construction	Phil Henriksen	(801) 972-1928	Wasatch West Const	JD Tyrrell	(801) 299-8541
Hidden Peak Electric Co	Derek Lee	(801) 262-5689			

The bid documents will be available at 12:00 NOON on Tuesday, July 29, 2008 in electronic format only on CDs from DFCM at 4110 State Office Building, Salt Lake City, Utah 84114, telephone (801)538-3018 and on the DFCM web page at <http://dfcm.utah.gov>. For questions regarding this project, please contact Wayne Smith, Project Manager, DFCM, at (801) 550-6536. No others are to be contacted regarding this project.

A **MANDATORY** pre-bid meeting and site visit will be held at 9:00 AM on Monday, August 4, 2008 at Building 1190, Camp Williams, 11780 South Redwood Road, Riverton, Utah. All pre-qualified prime contractors wishing to bid on this project must attend this meeting.

Bids must be submitted by 2:30 PM on Wednesday, August 13, 2008 to 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. The contractor shall comply with and require all of its subcontractors to comply with the license laws as required by the State of Utah.

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 & Management reserves the right to reject any or all bids or to waive any formality or technicality in any bid in the interest of the State.

DIVISION OF FACILITIES CONSTRUCTION AND MANAGEMENT
MARLA WORKMAN, CONTRACT COORDINATOR
4110 State Office Bldg., Salt Lake City, Utah 84114

STAGE II - MULTI-STEP BIDDING PROCESS

ONLY FIRMS PRE-QUALIFIED DURING STAGE I OF THE RFS ARE ALLOWED TO BID ON THIS PROJECT

1. Invitational Bid Procedures

The following is an overview of the invitational bid process. More detailed information is contained throughout the document. Contractors are responsible for reading and complying with all information contained in this document.

Notification: DFCM will notify each registered pre-qualified firm (via fax or e-mail) when a project is ready for Construction Services and invite them to bid on the project.

Description of Work: A description of work or plans/specifications will be given to each contractor. If required, the plans and specifications will be available on the DFCM web page at <http://dfcm.utah.gov> and on CDs from DFCM, at 4110 State Office Building, Salt Lake City, Utah 84114.

Schedule: The Stage II Schedule shows critical dates including the mandatory pre-bid site meeting (if required), the question and answer period, the bid submittal deadline, the subcontractor list submittal deadline, etc. Contractors are responsible for meeting all deadlines shown on the schedule.

Mandatory Pre-Bid Site Meeting: If a firm fails to attend a pre-bid site meeting labeled “Mandatory” they will not be allowed to bid on the project. At the mandatory meeting, contractors may have an opportunity to inspect the site, receive additional instructions and ask questions about project. The schedule contains information on the date, time, and place of the mandatory pre-bid site meeting.

Written Questions: All questions must be in writing and directed to DFCM’s project manager assigned to this project. No others are to be contacted regarding this project. The schedule contains information on the deadline for submitting questions.

Addendum: All clarifications from DFCM will be in writing and issued as an addendum to the RFS. 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.

Submitting Bids: Bids must be submitted to DFCM 4110 State Office Building, Salt Lake City, Utah 84114 by the deadline indicated on the schedule. Bids submitted after the deadline will not be accepted. Bids will be opened at DFCM on the date, time, and place indicated on the schedule.

Subcontractors List: The firm selected for the project must submit a list of all subcontractors by the deadline indicated on the schedule contained in this document.

Pre-qualified List of Contractors: Contractors shall remain on DFCM’s list of pre-qualified contractors provided: (a) they maintain a performance rating of 3.5 or greater on each project, (b) they are not suspended for failure to comply with requirements of their contract, (c) the firm has not undergone a significant reorganization involving the loss of key personnel (site superintendents, project managers, owners, etc.) to a degree such that the firm no longer meets the pre-qualification requirements outlined in Stage I, (d) the financial viability of the firm has not significantly changed, and (e) the firm is not otherwise disqualified by DFCM. Note: If a contractor fails to comply with items (a) through (e) above,

they may be removed from DFCM's list of pre-qualified contractors following an evaluation by a review committee. Contractors will be given the opportunity to address the review committee before a decision is made. Pre-qualified contractors are ONLY authorized to bid on projects within the discipline that they were originally pre-qualified under.

2. Drawings and Specifications and Interpretations

Drawings, specifications and other contract documents may be obtained as stated in the Invitation to Bid. If any firm is in doubt as to the meaning or interpretation of any part of the drawings, specifications, scope of work or contract documents, they shall submit, in writing, a request for interpretation to the authorized DFCM representative by the deadline identified in the schedule. Answers to questions and interpretations will be made via addenda issued by DFCM. Neither DFCM or the designer shall be responsible for incorrect information obtained by contractors from sources other than the official drawings/specifications and addenda issued by DFCM.

3. 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 Designer. Such written approval must occur prior to the deadline established for the last scheduled addendum to be issued. The Designer's written approval will be included as part of the addendum issued by DFCM. 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 Designer.

4. Addenda

All clarifications from DFCM will be in writing and issued as an addendum to the RFS. 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 shall result in disqualification from bidding. DFCM shall not be responsible for incorrect information obtained by contractors from sources other than official addenda issued by DFCM.

5. 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. Failure to respond may result in suspension from DFCM's list of pre-qualified contractors.

6. 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.

7. 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.

8. Time is of the Essence

Time is of the essence in regard to all the requirements of the contract documents.

9. Bids

Before submitting a bid, each bidder 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 including those added via addenda. 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 Project Manager prior to the bidding deadline. Changes necessary to correct these issues will be made via addenda issued by DFCM.

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 published deadline for the submission of bids.

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

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

10. Listing of Subcontractors

Listing of Subcontractors shall be as summarized in the "Instructions and Subcontractor's List Form", included as part of the 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 may be suspended from DFCM's list of pre-qualified contractors.

11. Contract and Bond

The Contractor's Agreement will be in the form provided in this document. The duration of the contract shall be for the time indicated by the project completion deadline shown on the schedule. The successful bidder, simultaneously with the execution of the Contractor's 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.

12. 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 DFCM 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. Alternates will be selected in prioritized order up to the construction cost estimate.

13. Right to Reject Bids

DFCM reserves the right to reject any or all Bids.

14. Withdrawal of Bids

Bids may be withdrawn on written request received from bidders within 24 hours after the bid opening if the contractor has made an error in preparing the bid.

15. DFCM Contractor Performance Rating

As a contractor completes each project, DFCM will evaluate project performance based on the enclosed "DFCM Contractor Performance Rating" form. The ratings issued on this project may affect the firm's "pre-qualified" status and their ability to obtain future work with DFCM.



Stage II PROJECT SCHEDULE

PROJECT NAME: JLTC PARKING LOT IMPROVEMENTS – PHASE I CAMP WILLIAMS – UTAH NATIONAL GUARD – RIVERTON, UTAH				
DFCM PROJECT #: 07011480				
Event	Day	Date	Time	Place
Stage II Bidding Documents Available	Tuesday	July 29, 2008	12:00 NOON	DFCM 4110 State Office Building SLC, UT and the DFCM web site*
Mandatory Pre-bid Site Meeting	Monday	August 4, 2008	9:00 AM	Building 1190 – Camp Williams 11780 South Redwood Road Riverton, UT
Deadline for Submitting Questions	Wednesday	August 6, 2008	5:00 PM	Wayne Smith – DFCM E-mail wfsmith@utah.gov Fax (801)-538-3267
Addendum Deadline (exception for bid delays)	Monday	August 11, 2008	2:00 PM	DFCM web site*
Prime Contractors Turn in Bid and Bid Bond	Wednesday	August 13, 2008	2:30 PM	DFCM 4110 State Office Building SLC, UT
Subcontractors List Due	Thursday	August 14, 2008	2:30 PM	DFCM 4110 State Office Building SLC, UT Fax 801-538-3677
Substantial Completion Date	Wednesday	November 19, 2008		

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



BID FORM

NAME OF BIDDER _____ DATE _____

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

The undersigned, responsive to the "Invitation to Bid" and in accordance with the Request for Bids for the **JLTC PARKING LOT IMPROVEMENTS – PHASE I – CAMP WILLIAMS – UTAH NATIONAL GUARD – RIVERTON, UTAH - DFCM PROJECT NO. 07011480** 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 19, 2008**, should I/we be the successful bidder, and agree to pay liquidated damages in the amount of **\$250.00** per day for each day after expiration of the Contract Time as stated in Article 3 of the Contractor's Agreement.

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

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

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

BID FORM
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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 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 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

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: _____

NOTARY PUBLIC

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

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

**Division of Facilities Construction and Management****INSTRUCTION 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 such

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

CHANGES OF SUBCONTRACTORS SPECIFICALLY IDENTIFIED ON SUBLIST FORM:

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

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

EXAMPLE:

Example of a list where there are only four subcontractors:

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

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

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



SUBCONTRACTORS LIST
FAX TO 801-538-3677

PROJECT TITLE: _____

Caution: You must read and comply fully with instructions.

Table with 4 columns: TYPE OF WORK, SUBCONTRACTOR, 'SELF' OR 'SPECIAL EXCEPTION', SUBCONTRACTOR BID AMOUNT, CONT. LICENSE #. 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 Supplemental General Conditions dated July 15, 2008 ("also referred to as General Conditions") and on file at the office of DFCM and available on the DFCM website, are hereby incorporated by reference as part of this Agreement and are included in the specifications for this Project. All terms used in this Contractor's Agreement shall be as defined in the Contract Documents, and in particular, the General Conditions.

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

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

CONTRACTOR'S AGREEMENT
PAGE NO. 2

Performance Bond and a 100% Payment Bond as well as all insurance requirements of the Contractor. Said bonds have already been posted by the Contractor pursuant to State law. The required proof of insurance certificates have been delivered to DFCM in accordance with the General Conditions before the execution of this Contractor's Agreement.

ARTICLE 3. TIME OF COMPLETION AND DELAY REMEDY. The Work shall be Substantially Complete 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 Notice to Contractors, Instructions to Bidders/Proposers and the Bid/Proposal, to the extent not in conflict therewith and other documents and oral presentations that are documented as an attachment to the contract.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

WITNESS OR ATTESTATION:

PRINCIPAL:

By: _____

(Seal)

Title: _____

WITNESS OR ATTESTATION:

SURETY:

By: _____

Attorney-in-Fact (Seal)

STATE OF _____)
) ss.
COUNTY OF _____)

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

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

My commission expires: _____

Resides at: _____

NOTARY PUBLIC

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

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

PAYMENT BOND

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

KNOW ALL PERSONS BY THESE PRESENTS:

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

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

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

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

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

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

WITNESS OR ATTESTATION:

PRINCIPAL:

By: _____ (Seal)
Title: _____

WITNESS OR ATTESTATION:

SURETY:

By: _____ (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



Division of Facilities Construction and Management

DFCM

CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT _____ PROJECT NO: _____

AGENCY/INSTITUTION _____

AREA ACCEPTED _____

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

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

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

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

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

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

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

_____ by: _____
CONTRACTOR (include name of firm) (Signature) DATE

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

_____ by: _____
USING INSTITUTION OR AGENCY (Signature) DATE

_____ by: _____
DFCM (Owner) (Signature) DATE

4110 State Office Building, Salt Lake City, Utah 84114
telephone 801-538-3018 • facsimile 801-538-3267 • <http://dfcm.utah.gov>

cc: Parties Noted
DFCM, Director

**General Contractor Performance Rating Form**

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

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

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

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

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

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

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

Signed by:	Date:	Mean Score
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Additional Comments:

**General Contractor Performance Rating Form**

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

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

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

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

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

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

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

Signed by:	Date:	Mean Score
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Additional Comments:

Project Manual

Construction Specifications

Phase 1

Civil, Electrical &

Landscape

Development

Camp Williams JLTC Buildings 1-4

July 7, 2008

DIVISION 1 GENERAL REQUIREMENTS

<u>SECTION</u>	<u>TITLE</u>
01110	SUMMARY OF WORK
01111	SITE CONDITIONS
01400	QUALITY CONTROL

DIVISION 2 SITE WORK

<u>SECTION</u>	<u>TITLE</u>
02200	EARTHWORK
02222	EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES
02230	SITE CLEARING
02513	ASPHALTIC CONCRETE PAVING
02810	IRRIGATION

DIVISION 16 ELECTRICAL

<u>SECTION</u>	<u>TITLE</u>
16001	ELECTRICAL GENERAL PROVISIONS
16110	CONDUIT RACEWAYS

SECTION 01110
SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work under this project includes construction of UTAH NATIONAL GUARD JLTC PARKING LOT IMPROVEMENTS PHASE 1, in accordance with the Contract Documents.
- B. The Work consists of the items shown on the plans and the following:

Additive Alternate 1:

Provide the square foot unit price for the material and installation of Asphaltic Concrete Paving.
- C. The Owner intends to issue one contract for all Work related to Phase 1.

1.02 CONTRACT METHOD

The Contract is a lump sum contract. All Work will be paid for based on the lump sum amount for the work done at the lump sum price bid. Work not performed will be credited back to the owner.

1.03 CONTRACT TIME

The Contract time and completion dates shall be as defined in the Agreement.

1.04 PROJECT DESCRIPTION

- A. The Work covered by this Contract will be performed on-site as shown on the drawings.

PART 2 - PRODUCTS

2.01 CONTRACTOR-FURNISHED MATERIALS AND EQUIPMENT

- A. The Contractor shall furnish and install all materials and equipment required by the Contract Documents which are necessary to complete the Work as shown on the drawings and specified herein and render the system operational.

CAMP WILLIAMS
JLTC BUILDINGS 1-4

- B. All materials incorporated into the Work shall be in accordance with applicable governmental standards, and as specified herein and shown on the drawings.
- C. All material to be incorporated into the Work shall meet the approval of the Engineer prior to placement. Any material rejected by the Engineer shall be removed from the site. Any material incorporated into the Work prior to approval of the Engineer shall be removed and replaced at the request of the Engineer. Removal and replacement of any unapproved material shall be at the Contractor's expense and at no cost to the Owner.

PART 3 - EXECUTION

3.01 STAGING AREAS

Staging areas will be determined on site during the pre-construction meeting. The Contractor is responsible for construction facilities.

3.02 TRAFFIC CONTROL

The Contractor shall provide traffic control and construction signage in accordance with applicable government regulations. Vehicular and pedestrian access to neighboring properties shall be maintained at all times.

3.03 CONSTRUCTION PERMIT

The Contractor shall obtain, if necessary, a construction permit prior to construction and shall fulfill all requirements of such permit.

END OF SECTION 01110

SECTION 01111
SITE CONDITIONS

PART 1 - GENERAL

1.01 SITE INVESTIGATION AND REPRESENTATION

- A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work, the general and local conditions, particularly those bearing upon availability of transportation, access to the site, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, or similar physical conditions at the site, the conformation and conditions of the ground, the character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract.
- B. The Contractor further acknowledges satisfaction with the character, quality, and quantity of surface and subsurface materials to be encountered from inspection of the site and from reviewing any available records of exploratory work furnished by the Contractor, Engineer, Owner or included in these Documents. Failure by the Contractor to become acquainted with the physical conditions of the site and all the available information will not relieve the Contractor of the responsibility for properly estimating the difficulty or cost of successfully performing the work.
- C. The Contractor warrants that as a result of examination and investigation of all the aforesaid data he can perform the work in a good and workmanlike manner and to the satisfaction of the Owner and Contractor. The Contractor and Owner assume no responsibility for any representations made by any of their officers or agents during or prior to the execution of this Contract, unless (1) such representations are expressly stated in the Contract; and (2) the Contract expressly provides that the responsibility is therefore assumed by the Contractor or Owner.

1.02 INFORMATION ON SITE CONDITIONS

- A. No information has been obtained by the Engineer regarding subsurface information or groundwater elevations.
- B. Some obstructions and underground utilities may not be shown. Bidders are advised to carefully inspect the existing facilities and on-going work before preparing their proposals. The removal and replacement of minor or temporary obstructions such as electrical conduits, water, waste water, storm water piping, and similar items shall be anticipated and accomplished, even though not shown or specifically mentioned.
- C. It is expected that there may be some discrepancies and omissions in the location and quantities of utilities and structures shown. Those shown are for the

CAMP WILLIAMS
JLTC BUILDINGS 1-4

convenience of the Contractor only, and no responsibility is assumed by either the Owner or the Engineer for their accuracy or completeness.

1.03 CONTRACTOR'S RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

- A. Where the Contractor's operations could cause damage or inconvenience to railway, telegraph, telephone, television, power, oil, gas, water, sewer, or irrigation systems, the operations shall be suspended until all arrangements necessary for the protection of these utilities and services have been made by the Contractor.
- B. Notify all utility offices which are affected by the construction operation at least 72 hours in advance. Under no circumstances expose any utility without first obtaining permission from the appropriate agency. Once permission has been granted, locate, expose, and provide temporary support for all existing underground utilities.
- C. Neither the Owner nor its officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.
- D. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, promptly notify the proper authority. Cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no case shall interruption of any water or utility service be allowed to exist outside working hours unless prior approval is granted.

1.04 MAJOR PUBLIC UTILITIES SERVING THE AREA OF WORK

The following is a list of the major public utilities serving the work area indicating the name and telephone number of the responsible authority of the various utilities which should be notified if conflicts or emergencies arise during the progress of the work:

<u>Name of Utility</u>	<u>Responsible Authority</u>	<u>Telephone Number</u>
Telephone	Blue Stake	(801) 662-4111
Electrical Power	Blue Stake	(801) 662-4111
Natural Gas	Blue Stake	(801) 662-4111
Water	Blue Stake	(801) 662-4111
Sanitary Sewer	Blue Stake	(801) 662-4111
Storm Drain	Blue Stake	(801) 662-4111

1.05 INTERFERING STRUCTURES

Take necessary precautions to prevent damage to existing structures whether on the surface, above ground, or underground. An attempt has been made to show major structures on the plans. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed, and it is presented simply

CAMP WILLIAMS
JLTC BUILDINGS 1-4

as a guide to possible difficulties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01111

SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 SITE INVESTIGATION AND CONTROL

- A. The Contractor shall verify all dimensions in the field and shall check field conditions continuously during construction. The Contractor shall be solely responsible for any inaccuracies built into the work due to his failure to comply with this requirement.
- B. The Contractor shall inspect related and appurtenant work and shall report in writing to the Engineer any conditions which will prevent proper completion of the work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor at his sole cost and expense.

1.02 INSPECTION OF THE WORK

- A. The work shall be conducted under the general observation of the Engineer and shall be subject to inspection by representatives of the Engineer acting on behalf of the Owner to insure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop or field inspection, as required. The Engineer shall be permitted access to all parts of the work, including plants where materials or equipment are manufactured or fabricated.
- B. The presence of the Engineer or any inspector(s), however, shall not relieve the Contractor of the responsibility for the proper execution of the work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the Engineer or any inspector(s).

1.03 COSTS

All costs for quality control shall be considered incidental to the Work and included in line item costs on the Bid Form.

PART 2 - PRODUCTS

- 2.01 All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the work until they have been inspected and accepted by the Engineer or his authorized representative. No work shall be backfilled, buried, cast in concrete, hidden or otherwise covered until it has been inspected by the Engineer or his authorized representative. Any work so covered in the absence of inspection shall be subject to uncovering. Where uninspected work cannot be uncovered,

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such as in concrete cast over reinforcing steel, all such work shall be subject to demolition, removal, and reconstruction under proper inspection, and no addition payment will be allowed therefore.

PART 3 - EXECUTION

3.01 TIME OF INSPECTION AND TESTS

- A. Samples and test specimens required under these Specifications shall be furnished and prepared for testing in ample time for the completion of the necessary tests and analysis before said articles or materials are to be used. The Contractor shall furnish and prepare all required test specimens at his own expense.
- B. Whenever the Contractor is ready to backfill, bury, cast in concrete, hide, or otherwise cover any work under the Contract, he shall notify the Engineer not less than 24 hours in advance to request inspection before beginning any such work of covering. Failure of the Contractor to notify the Engineer at least 24 hours in advance of any such inspections shall be reasonable cause for the Engineer to order a sufficient delay in the Contractor's schedule to allow time for such inspections and any remedial or corrective work required, and all costs of such delays, including its effect upon other portions of the work, shall be borne by the Contractor.

3.02 SAMPLING AND TESTING

- A. When not otherwise specified, all sampling and testing shall be in accordance with the methods prescribed in the current standards of the ASTM, as applicable to the class and nature of the article or materials considered; however, the Owner reserves the right to use any generally-accepted system of inspection which, in the opinion of the Engineer will insure the Owner that the quality of the workmanship is in full accord with the Specifications.
- B. Any waiver of any specific testing or other quality assurance measures, whether or not such waiver is accompanied by a guarantee of substantial performance as a relief from the specified testing or other quality assurance requirements as originally specified, and whether or not such guarantee is accompanied by a performance bond to assure execution of any necessary corrective or remedial work, shall not be construed as a waiver of any technical or qualitative requirements of the Specifications.
- C. Notwithstanding the existence of such waiver, the Engineer shall reserve the right to make independent investigations and tests as specified in the following subparagraph and, upon failure of any portion of the work to meet any of the qualitative requirements of the Specifications, shall be reasonable cause for the Engineer to require the removal or correction and reconstruction of any such work.
- D. In addition to any other inspection or quality assurance provisions that may be

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specified, the Engineer shall have the right to independently select, test, and analyze, at the expense of the Owner, additional test specimens of any or all of the materials to be used.

- E. Results of such tests and analysis shall be considered along with the tests or analysis made by the Contractor to determine compliance with the applicable specifications for the materials so tested or analyzed; provided, that wherever any portion of the work is discovered, as a result of such independent testing or investigation by the Engineer, which fails to meet the requirements of the Specifications, all costs of such independent inspection and investigation, and all costs of removal, correction, and reconstruction or repair of any such work shall be borne by the Contractor.

3.03 RIGHT OF REJECTION

- A. The Engineer, acting for the Owner shall have the right, at all times and places, to reject any articles or materials to be furnished hereunder which, in any respect, fail to meet the requirements of these Specifications, regardless of whether the defects in such articles or materials are detected at the point of manufacture or after completion of the work at the site. If the Engineer or inspector, through an oversight or otherwise, has accepted materials or work which is defective or which is contrary to the Specifications, such material, no matter in what stage or condition of manufacture, delivery, or erection, may be rejected by the Engineer for the Owner.
- B. The Contractor shall promptly remove rejected articles or materials from the site of the work after notification of rejection.
- C. All costs of removal and replacement of rejected articles or materials as specified herein shall be borne by the Contractor.

3.04 GUARANTEE

For a period of one (1) year, commencing on the date of final acceptance or the date that the substantial completion letter is sent, the Contractor shall upon receipt of notice in writing from the Owner, promptly make all repairs arising out of the faulty materials, workmanship, or equipment. Prior acceptance of the work in no way shall waive the Contractor's responsibility to repair any portion of the work performed under this contract. The Owner is hereby authorized to make such repairs, if ten days after giving such notice to the Contractor, the Contractor has failed to make or undertake the repairs. In cases of emergency, where in the Owner's opinion, delay could cause serious loss or damage, repairs may be made without notice being sent to the Contractor and the expenses in connection therewith shall be charged to the Contractor.

END OF SECTION 01400

SECTION 02200

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 02222 - Excavating, Backfilling and Compacting for Utilities.
2. Section 02230 – 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).

1.03 QUALITY ASSURANCE

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- 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: Contractor 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 subgrade 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 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

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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 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.

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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

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

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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 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

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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 8" 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 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

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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 subgrade 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 subgrade elevations.
 - 2. Walks: Shape surfaces of areas under walks to line, grade, and cross section, with finish surface within 0.1 foot of required subgrade elevation.
 - 3. Pavements: Shape surface under pavement to line, grade and cross section, with finish surface within ½ inch of required subgrade 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:
 - 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.
 - 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 8" 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.

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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 8" depth and compact to following minimum density for areas listed:
 - a. Areas Receiving Structural Fill: 95% Modified Proctor Density (ASTM D-1557) within 2% of optimum moisture content.
 - b. Under Paving and Walk Areas: 95% Modified Proctor Density within 2% of optimum moisture content.
 - c. Under Lawn and Unpaved Areas: 90% Modified Proctor Density (ASTM D-1557).
- B. Structural Fill:
1. Material: Acceptable materials complying with the requirements of Articles 2.01 and 2.02.
 2. Location: Place as subgrade under building, pools and pool decks, to a point 5 feet outside building walls and pool decks. Place as subgrade 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 floor and deck slabs, and obtain Owner's approval of method used for maintaining moisture control.
- C. Nonstructural Fill:
1. Materials: Acceptable Materials complying with requirements of Articles 2.01 and 2.02.

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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. Subgrade Below Paving, Walks, and Slabs on Grade: 95% of Modified Proctor Density at moisture content within 2% of optimum.
 - b. Below Grassed and Planted Areas: 90% 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.
- 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.

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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 8" 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 98% 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 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.

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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 8" loose depth before compacting each lift to 95% of Modified Proctor Density within 2% of optimum moisture content under paving, walks, building slabs, and other slabs on grade, and compacting to 90% 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 subgrade disturbed by utilities systems trenching and backfilling work to their original condition, construction and finishes.

3.08 FIELD QUALITY CONTROL

- A. Testing and Inspection Services: Contractor 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 02200

SECTION 02222

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 01400.
- 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.

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- E. ASTM D1557 Moisture-Density Relations of Soils and Soil Aggregate Mixtures using 10-pound rammer and 18-inch drop. (Modified Proctor).
- 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 subgrade in areas which will ultimately be subjected to structural loadings due to footing, floor slabs, pavements, etc.
- D. Non-structural Fill: Fill placed on prepared subgrade 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

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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:

- 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 1 inch. Crushed rock meeting the gradation requirements shown below shall be submitted for approval by the Engineer.

1-Inch Crushed Gravel

Sieve Size

Percent Passing by Weight

1"

100

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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
#4	35-100
#30	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,

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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
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

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- 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 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

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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.
- 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

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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.

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 02222.

3.05 STABILITY OF EXCAVATIONS

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- 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.
- 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.

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- 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 subgrade.

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.

- A. 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.
- B. In all areas outside of structures, pavement prisms, and walks, place non-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.
- C. 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.
- D. 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.
- E. Whenever the excavated material is not suitable for backfill, furnish or transport from other

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areas within the project, suitable excavated material which meets the requirements for final backfill.

- F. Remove from site and dispose of excess or undesirable excavated material not suitable or required for backfill in an appropriate acceptable manner.
- G. 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.
- 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.

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- 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.

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:

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<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.

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

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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 02222

SECTION 02230

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 2 Section "Tree Protection and Trimming" for protecting trees remaining on-site that are affected by site operations.
5. Division 2 Section "Earthwork" for soil materials, excavating, backfilling, and site grading.
6. Division 2 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.

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- 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.

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- 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.

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- 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.

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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.
 - 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 02230

SECTION 02513

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,

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- 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).

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2.03 ASPHALT PAVEMENT MIX

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

<u>¾" GRADATION</u>	
<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

<u>½" GRADATION</u>	
<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

- 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.

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- 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 02575 - 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.

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END OF SECTION 02513

SECTION 02810

IRRIGATION

PART 1 - GENERAL

1.01 SCOPE OF WORK:

Furnish all labor, materials, supplies, equipment, tools, and transportation, and perform all operations in connection with and reasonably incidental to the complete installation of the irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein. Items of work specifically included are:

- A. Procurement of all applicable licenses, permits, and fees.
- B. Coordination of Utility Locates ("Call Before You Dig").
- C. Verify with the appropriate water district on the location of the water service main line and complete all requirements to bring water service to the site.
- D. Coordination for, and connection to, electrical power supply for the irrigation controller.
- E. Maintenance period.
- F. Sleeving and conduit for irrigation pipe and wire.

1.02 RELATED SECTIONS:

- A. Division 2-Site Work:
 - 1. Section 02913 – Turf Sod and Soil Preparation
 - 2. Section 02950 – Plant Material

1.03 SUBMITTALS:

- A. Deliver five (5) copies of all submittals to the Construction Project Representative within 15 days from the date of Notice to Proceed. Contractor will be limited to one re-submittal for approval of all substitution requests.
- B. Materials List: Include pipe, fittings, mainline components, water emission components, control system components. Quantities of materials need not be included.
- C. Manufacturers' Data: Submit manufacturers' catalog cuts, specifications, and operating instructions for equipment shown on the materials list.
- D. Shop Drawings: Submit shop drawings called for in the installation details. Show products required for proper installation, their relative locations, and critical dimensions. Note modifications to the installation detail.

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1.04 RULES AND REGULATIONS:

- A. Work and materials shall be in accordance with the latest edition of the National Electric Code, the Uniform Plumbing Code as published by the Western Plumbing Officials Association, and applicable laws and regulations of the governing authorities.
- B. When the contract documents call for materials or construction of a better quality or larger size than required by the above-mentioned rules and regulations, provide the quality and size required by the contract documents.
- C. If quantities are provided either in these specifications or on the drawings, these quantities are provided for information only. It is the Contractor's responsibility to determine the actual quantities of all material, equipment, and supplies required by the project and to complete an independent estimate of quantities and wastage.

1.05 TESTING:

- A. Notify the Construction Project Representative three days in advance of testing.
- B. Pipelines jointed with rubber gaskets or threaded connections may be subjected to a pressure test at any time after partial completion of backfill. Pipelines jointed with solvent-welded PVC joints shall be allowed to cure at least 24 hours before testing.
- C. Subsections of mainline pipe may be tested independently, subject to the review of the Construction Project Representative.
- D. Furnish clean, clear water, pumps, labor, fittings, and equipment necessary to conduct tests or retests.
- E. Hydrostatic Pressure Test:
 - 1. Subject solvent-weld mainline pipe to a continuous hydrostatic pressure equal to 150 PSI for two hours. Test with mainline components installed.
 - 2. Backfill to prevent pipe from moving under pressure. Expose couplings and fittings.
 - 3. Leakage will be detected by visual inspection. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the pipe passes test.
 - 4. Cement or caulking to seal leaks is prohibited.
- F. Volumetric Leakage Test:
 - 1. Backfill to prevent pipe from moving under pressure. Expose couplings and fitting.
 - 2. Purge all air from the pipeline before test.
 - 3. Subject gasketed mainline pipe to an operating pressure of 150 PSI for two hours. Maintain constant pressure. The amount of additional water pumped in during the test shall not exceed 1.52 gallons per 100 joints of 3-inch diameter pipe, 1.96 gallons per 100 joints of 4-inch diameter pipe, and 2.90 gallons per

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100 joints of 6-inch diameter pipe. Replace defective pipe, fitting, joint, valve, or appurtenance. Repeat the test until the pipe passes test.

4. Cement or caulking to seal leaks is prohibited.

G. Operational Test:

1. Activate each remote control valve in sequence from controller. The Construction Project Representative will visually observe operation, water application patterns, and leakage.
2. Replace defective remote control valve, solenoid, wiring, or appurtenance to correct operational deficiencies.
3. Replace, adjust, or move water emission devices to correct operational or coverage deficiencies.
4. Replace defective pipe, fitting, joint, valve, sprinkler, or appurtenance to correct leakage problems. Cement or caulking to seal leaks is prohibited.
5. Repeat test(s) until each lateral passes all tests. Repeat tests, replace components, and correct deficiencies at no additional cost to the Owner.

1.06 GUARANTEE/WARRANTY AND REPLACEMENT:

The purpose of this guarantee/warranty is to insure that the Owner receives irrigation materials of prime quality, installed and maintained in a thorough and careful manner.

- A. For a period of one year from commencement of the formal maintenance period, guarantee/warranty irrigation materials, equipment, and workmanship against defects. Fill and repair depressions. Restore landscape or structural features damaged by the settlement of irrigation trenches or excavations. Repair damage to the premises caused by a defective item. Make repairs within seven days of notification from the Construction Project Representative.
- B. Contract documents govern replacements identically as with new work. Make replacements at no additional cost to the contract price.
- C. Guarantee/warranty applies to originally installed materials and equipment and replacements made during the guarantee/warranty period.

PART 2 - PRODUCTS

QUALITY:

Use materials which are new and without flaws or defects of any type, and which are the best of their class and kind.

SUBSTITUTIONS:

- A. Acceptable equipment manufacturers are specified on the drawings and details. Alternative equipment must be approved in writing as specified in the General Conditions. The Contractor is responsible for making any changes to the design to accommodate alternative equipment.

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- B. Pipe sizes referenced in the construction documents are minimum sizes, and may be increased at the option of the Contractor.

2.03 SLEEVING:

- A. Install separate sleeve beneath paved areas to route each run of irrigation pipe or wiring bundle.
- B. Use PVC Schedule 40 pipe with solvent welded joints for sleeving material beneath pedestrian pavements, drives and streets.
- C. Sleeving diameter is as indicated on the drawings and installation details or equal to twice that of the pipe or wiring bundle passing through the sleeve.

2.04 PIPE AND FITTINGS:

A. Mainline Pipe and Fittings:

1. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with an integral belled end.
2. Use Class 200, SDR-21, rated at 200 PSI, conforming to the dimensions and tolerances established by ASTM Standard D2241 for mainline pipe with a nominal diameter greater than or equal to 3-inches.
3. Use rubber-gasketed pipe equipped with factory installed reinforced gaskets for mainline pipe with a nominal diameter greater than or equal to 3-inches. Gasketed pipe joints must conform to the "Laboratory Qualifying Tests" section of ASTM D3139. Gasket material must conform to ASTM F477. Use rubber-gasketed deep bell ductile iron fittings conforming to ASTM A-536 and ASTM F-477 or Harco ductile iron fittings. Use lubricant approved by the pipe manufacturer.
4. Use solvent weld pipe Schedule 40 conforming to the dimensions and tolerances established by ASTM Standard D1785 for mainline pipe with a nominal diameter less than 3-inches or where a pipe connection occurs in a sleeve.
5. Use Schedule 80, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for solvent weld pipe Schedule 40. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564.
6. Epoxy coated double strap saddles, M.J. tees, schedule 80 S tees with SXT schedule 80 bushings or Harco ductile iron service tees are approved on PVC main lines for automatic control valve installation.

B. Lateral Pipe and Fittings:

1. Use rigid, unplasticized polyvinyl chloride (PVC) 1120, 1220 National Sanitation Foundation (NSF) approved pipe, extruded from material meeting the requirements of Cell Classification 12454-A or 12454-B, ASTM Standard D1784, with an integral belled end suitable for solvent welding.
2. Use Schedule 40 conforming to the dimensions and tolerances established by ASTM Standard D1785.

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3. Use solvent weld pipe for lateral pipe. Use Schedule 40, Type 1, PVC solvent weld fittings conforming to ASTM Standards D2466 and D1784 for PVC pipe. Use primer approved by the pipe manufacturer. Solvent cement to conform to ASTM Standard D2564, of a type approved by the pipe manufacturer.

C. Specialized Pipe and Fittings:

1. Copper pipe: Use Type "K" rigid pipe conforming to ASTM Standard B88. Use wrought copper or cast bronze fittings, soldered or threaded per the installation details. Use a 95% tin and 5% antimony solder.
2. Ductile iron pipe: Use Class 50 conforming to ANSI A21.51 (AWWA C151). Use a minimum of Class 53 thickness pipe for flanged piping. Use mechanical joints conforming to ANSI A 21.10 (AWWA C110) and ANSI A21.11 (AWWA C111) or flanged fittings conforming to ANSI/AWWA C110 and ANSI B16.1 (125#).
3. Use a dielectric union wherever a copper-based metal (copper, brass, bronze) is joined to an iron-based metal (iron, galvanized steel, stainless steel).
4. Assemblies calling for threaded pipe connections shall utilize PVC Schedule 80 nipples and PVC Schedule 80 threaded fittings.
5. Joint sealant: Use only teflon-type tape or teflon based paste pipe joint sealant on plastic threads as recommended by valve or fitting manufacturer. Use nonhardening, nontoxic pipe joint sealant formulated for use on water-carrying pipes on metal threaded connections.

D. Thrust Blocks:

1. Use thrust blocks for fittings on mainline pipe greater than or equal to 3-inch diameter or any diameter rubber gasketed pipe.
2. Use 3,000 PSI concrete.
3. Use 2 mil plastic.
4. Use No. 4 Rebar wrapped or painted with asphalt tar based mastic coating.

E. Joint Restraint Harness:

1. Use a joint restraint harness wherever joints are not positively restrained by flanged fittings, threaded fittings, and/or thrust blocks.
2. Use a joint restraint harness with transition fittings between metal and PVC pipe, where weak trench banks do not allow the use of thrust blocks, or where extra support is required to retain a fitting or joint.
3. Use bolts, nuts, retaining clamps, all-thread, or other joint restraint harness materials which are zinc plated or galvanized.
4. Use on mainline pipe greater than or equal to 3-inch diameter or any diameter rubber gasketed pipe.

2.05 MAINLINE COMPONENTS:

A. Master Valve Assembly: as presented in the irrigation schedule.

B. Isolation Gate Valve Assembly:

Gate valves shall conform to AWWA specification C 509. They shall be of Class 200 cast iron body, resilient-seated waterous brand and shall have a non-rising stem with rubber "O" rings. Stems shall be of cold rolled, solid bronze, high tensile

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strength. Valve shall be high strength cast iron, fully encapsulated urethane rubber wedge. Gate valves shall be hydrostatically pressure tested for 400 P.S.I and shall be designated for a working pressure of 200 P.S.I.

Gate valves shall be same size as main line. Valves 2" and larger shall have flanged end connections. Valves 1-1/2" and smaller shall have threaded end connections, non-rising stem. Buried valves shall have 2" square operating nut. No handles or wheels will be permitted. Valves inside structures shall have wheel handles. Unions shall be installed on each side of all valves except flanged valves. Each valve shall contain a resilient wedge urethane rubber seat.

C. Quick Coupling Valve Assembly:

6. Installed with double swing joint arrangement as presented in the installation details.
7. Each valve shall be a Rainbird 44 LRC heavy duty brass, two-piece, single lug locking cap. Double swing joint arrangement shall be galvanized iron pipe.
8. Quick coupler valves shall be installed within a 10" round valve box.
9. Contractor shall provide to the Owner at least 1 cap lock key and 1 quick coupling key with a swivel hose bib attached. These keys shall be delivered prior to final acceptance of the project.

D. Backflow Prevention: as presented in the irrigation schedule.

E. Manual Drain Valve:

1. All manual drains shall be Ford B11333 heavy duty brass, ball valve.
2. Each manual drain valve will be accessed by a 2 inch P.V.C. Schedule 40 pipe sleeve, capped by a Weathermatic 906L locking valve cap with a RLK-1 key enclosed within a 10" valve box.
3. Automatic drain valves shall not be used.

2.06 SPRINKLER IRRIGATION COMPONENTS:

A. Remote Control Valve (RCV) Assembly for Sprinkler and Bubbler Laterals: as presented in the irrigation schedule.

1. Use remote control valves with pressure regulating features for all pop-up spray sprinkler or bubbler laterals. Use wire connectors and waterproofing sealant to join control wires to solenoid valves. Use standard Christy I.D. tags, or approved equal, with hot-stamped black letters on a yellow background. Install a separate valve box over a 3-inch depth of 3/4-inch gravel for each assembly.
2. All pipe on the control valve manifolds shall be Schedule 80 P.V.C. pipe.
3. All control wire connections made inside the box to the valve shall be 3M-DBY connector.

B. Sprinkler Assembly: as presented in the drawings and installation details. Use the sprinkler manufacturer's pressure compensating screens to achieve 30 PSI operating conditions on each spray sprinkler and to control excessive operating pressures.

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- C. Control Wire:
 - 1. Use American Wire Gauge (AWG) No. 14-1 solid copper, Type UF or PE cable, UL approved for direct underground burial for individual control wires and spare control wires from the controller unit to each remote control valve or stub-out location. Use American Wire Gauge (AWG) No. 12-1 solid copper, Type UF or PE cable, UL approved for direct underground burial for common ground wire and spare common wires from the controller unit to each remote control valve or stub-out location.
 - 2. Color: Wire color shall be continuous over its entire length. All common or ground wires shall be White. Where more than one controller is required, a different color hot wire shall be used for each controller. Spare wires shall also be a different color from the regular wires.
 - 3. Splices: Use 3M-DBY wire connector with waterproof sealant.
 - 4. All splices shall be housed in a valve box.
- D. Controller: as presented in the drawings. Provide surge protection at the incoming power and low voltage power side grounding.

2.07 OTHER COMPONENTS:

- A. Tools and Spare Parts: Provide operating keys, servicing tools, spare parts and other items indicated in the General Notes of the drawings.
- B. Other Materials: Provide other materials or equipment shown on the drawings or installation details which are part of the irrigation system, even though such items may not have been referenced in these specifications.

PART 3 - EXECUTION

3.02 INSPECTIONS AND REVIEWS:

- A. Site Inspections:
 - 1. Verify construction site conditions and note irregularities affecting work of this section. Report irregularities to the Construction Project Representative prior to beginning work.
 - 2. Verify the water pressure on main water line provided for irrigation system. Notify the Landscape Architect if the water pressure is under 40 psi or over 80 psi and may effect the design of the irrigation system.
 - 3. Beginning work of this section implies acceptance of existing conditions.
- B. Utility Locates ("Call Before You Dig"):
 - 1. Arrange for and coordinate with local authorities the location of all underground utilities.
 - 2. Repair any underground utilities damaged during construction. Make repairs at no additional cost to the contract price.

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- C. Irrigation System Layout Review: Irrigation system layout review will occur after the staking has been completed. Notify the Construction Project Representative two weeks in advance of review. Modifications will be identified by the Construction Project Representative at this review.

3.03 LAYOUT OF WORK:

- A. Stake out the irrigation system. Items staked include: sprinklers, pipe and wire routing, control valves, isolation valves, sleeving and conduit.
- B. Install all mainline pipe and mainline components inside of project property lines.

3.04 EXCAVATION, TRENCHING, AND BACKFILLING:

- A. Excavate to permit the pipes to be laid at the intended elevations and to permit work space for installing connections and fittings.
- B. All trench bottoms shall be sloped so that the pipe will gravity drain back to the main connection point or the nearest manual drain.
- C. Minimum cover (distance from top of pipe to finish grade):
 - 1. 36-inch over electrical conduit.
 - 2. 18-inch over mainline pipe.
 - 3. 12-inch over lateral pipe.
 - 4. 18-inch over sleeved control wires.
 - 5. 18-inch for sleeves under driveways and parking areas.
- D. Trenches for irrigation lines shall be a minimum of 6 inches away from sidewalks or curbs.
- E. If more than one line is required in a single trench, that trench shall be deep and wide enough to allow for at least 6 inches of separation between pipes.
- F. No backfilling of trenches shall be done until the system has been inspected for proper trench depths, installation of equipment, control wire, and location of heads by Landscape Architect.
- G. Before trenches are backfilled, the Contractor must show redlined "as built" drawings where changes have been made.
- H. Backfill with a 2-inch min. sand envelope of fine masonry sand completely surrounding all mainline pipe and fittings.
- I. Excavated material is generally satisfactory for backfill. Backfill shall be free from rubbish, vegetable matter, frozen materials, and stones larger than 2-inches in maximum dimension. Remove from the project site material not suitable for backfill. Backfill placed next to pipe shall be free of sharp objects which may damage the pipe. In lawn areas, the top 4 inches of backfill shall be topsoil.

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- J. Backfill unsleeved pipe in either of the following manners:
 - 1. Backfill and puddle the lower half of the trench. Allow to dry 24 hours. Backfill the remainder of the trench in 6-inch layers. Compact to density of surrounding soil.
 - 2. Backfill the trench by depositing the backfill material equally on both sides of the pipe in 6-inch layers and compacting to the density of surrounding soil.
- K. Enclose pipe and wiring beneath roadways, walks, curbs, etc., in sleeves. Minimum compaction of backfill for sleeves shall be 95% Standard Proctor Density, ASTM D698-78. Use of water for compaction around sleeves, "puddling", will not be permitted.
- L. Dress backfilled areas to original grade. Incorporate excess backfill into existing site grades.
- M. Where utilities conflict with irrigation trenching and pipe work, contact the Construction Project Representative for trench depth adjustments.

3.05 SLEEVING AND BORING:

- A. Install sleeving at a depth which permits the encased pipe or wiring to remain at the specified burial depth.
- B. Extend sleeve ends six inches beyond the edge of the paved surface. Cover pipe ends and mark with stakes.
- C. Use one water pipe maximum per sleeve. Sleeve control wiring in separate sleeve.
- D. Bore for sleeves under obstructions which cannot be removed. Employ equipment and methods designed for horizontal boring.

3.06 ASSEMBLING PIPE AND FITTINGS:

- A. General:
 - 1. Keep pipe free from dirt and pipe scale. Cut pipe ends square and debur. Clean pipe ends.
 - 2. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
 - 3. All tees coming out of main lines, lateral lines, valves and other fixtures shall be horizontal so that no weight or pressure may be exerted on the top or bottom of the irrigation line.
 - 4. Trenches may be curved to change direction or avoid obstructions within the limits of the curvature of the pipe. Minimum radius of curvature and offset per 20-foot length of pipe by pipe size are shown in the following table. All curvature results from the bending of the pipe lengths. No deflection will be allowed at a pipe joint.

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SIZE	RADIUS	OFFSET PER 20' LENGTH
1 ½"	25'	7'-8"
2"	25'	7'8"
2 ½"	100'	1'-11"
3"	100'	1'-11"
4"	100'	1'-11"
6"	150'	1'-4"

B. Irrigation Pipe and Fittings:

1. Use only strap-type friction wrenches for threaded plastic pipe.
2. PVC Rubber-Gasketed Pipe:
 - a. Use pipe lubricant. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
 - b. Ductile iron fittings shall not be struck with a metallic tool. Cushion blows with a wood block or similar shock absorber.
3. PVC Solvent Weld Pipe:
 - a. Use primer and solvent cement. Join pipe in a manner recommended by the manufacturer and in accordance with accepted industry practices.
 - b. Cure for 30 minutes before handling and 24 hours before allowing water in pipe.
4. Fittings: The use of cross type fittings is not permitted.

C. Specialized Pipe and Fittings:

1. Copper Pipe:
 - a. Buff surfaces to be joined to a bright finish. Coat with solder flux.
 - b. Solder so that a continuous bead shows around the joint circumference.
2. Ductile Iron Pipe:
 - a. Join pipe in the manner recommended by manufacturer and in accordance with accepted industry practices.
3. Insert a dielectric union wherever a copper-based metal (copper, brass, bronze) and an iron-based metal (iron, galvanized steel, stainless steel) are joined.
4. PVC Threaded Connections:
 - a. Use only factory-formed threads. Field-cut threads are not permitted.
 - b. Use only Teflon-type tape or teflon based paste.
 - c. When connection is plastic-to-metal, the plastic component shall have male threads and the metal component shall have female

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threads.

5. Make metal-to-metal, threaded connections with Teflon-type tape or pipe joint compound applied to the male threads only.
6. The ends of all galvanized pipe shall be reamed and free of all inside scale or burrs. Threads shall be cut clean and sharp, and to a length equal to 1-1/8 times the length of the female thread receiving the pipe.

D. Thrust Blocks:

1. Install thrust blocks at all changes of direction at tees and angles as shown on details. Install thrust blocks at dead ends and valves at which thrust develops when closed.
2. Use cast-in-place concrete bearing against undisturbed soil. As a general rule, one cubic foot (minimum) of class AA(AE) Type II concrete is required for each thrust block.
3. Orientation and placement shall be as shown on the installation details.
4. Wrap fitting with plastic to protect bolts, joint, and fitting from concrete.
5. Where a fitting is used to make a vertical bend, use a bar to anchor the fitting to a thrust block.

E. Joint Restraint Harness:

1. Install harness in the manner recommended by the manufacturer and in accordance with accepted industry practices.

3.07 INSTALLATION OF MAINLINE COMPONENTS:

A. Isolation Gate Valve Assembly:

1. Install where indicated on the drawings.
2. Locate at least 12-inches from adjacent walls or edges of paved areas.
3. All main line gate valves shall be fitted with a 6" minimum diameter pipe sleeve and 10" round bolt down valve box.

B. Quick Coupling Valve Assembly: Install where indicated on the drawings and as per detail.

C. Backflow Prevention: Install where indicated on the drawings behind the point of connection (down stream) to the supplying utility line and shall comply with local water district or State (whichever is most restrictive) requirements.

D. Manual Drain Valve:

1. Install at all low points in the main lines.
2. Location of each manual drain shall be shown on the "as built" drawings.
3. Each manual drain valve will be accessed by a 2 inch P.V.C. Schedule 40 pipe sleeve, capped by a Weathermatic 906L locking valve cap with a RLK-1 key enclosed within a 10" valve box.

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4. Top of drain sleeve to be 3"- 6" below lid of valve box.
5. Each manual drain shall have a gravel sump, a minimum of 18" by 18" by 12" deep. The gravel shall be washed 3/4 inch rock. No pea gravel will be allowed.

3.08 INSTALLATION OF SPRINKLER IRRIGATION COMPONENTS:

A. Remote Control Valve (RCV) Assembly for Sprinkler and Bubbler Laterals:

1. Flush mainline before installation of RCV assembly.
2. Install where indicated on the drawings.
3. Wire connectors and waterproof sealant shall be used to connect control wires to remote control valve wires. Install connectors and sealant per the manufacturer's recommendations.
4. Install only one control valve to a valve box.
5. Locate valve box at least 12-inches from and align with nearby walls or edges of paved areas. Group RCV assemblies together where practical. Arrange grouped valve boxes in rectangular patterns. Allow at least 12-inches between valve boxes. Set cover of valve box even with finish grade.
6. No valve box shall rest directly upon the valve or any fixture associated with it.
7. Each valve box shall be centered on the valve it covers. Install valve no more than 12-inches below finished grade.
8. Each valve box shall have 6 inches of pea gravel placed in the bottom underneath the valve and lines.
9. Adjust RCV to regulate the downstream operating pressure.
10. Attach ID tag with controller station number to control wiring.

B. Sprinkler and Bubbler Assembly:

1. Flush lateral pipe before installing sprinkler and bubbler assembly.
2. Install irrigation heads at locations shown on the drawings.
3. Rotary pop-up heads shall be installed on double swing joints as per detail. All swing joints must drain by gravity back to the supply lines.
4. Pop-up spray heads shall be installed on flexible swing pipe as per detail.
5. Locate rotary sprinklers 6" from adjacent walls, fences, or edges of paved areas.
6. Locate spray sprinklers 3" from adjacent walls, fences, or edges of paved areas.
7. Install sprinklers and bubblers perpendicular to the finish grade.
8. Supply appropriate nozzle or adjust arc of coverage of each sprinkler for best performance and coverage uniformity.
9. Adjust the radius of throw of each sprinkler for best performance and coverage uniformity.
10. Prior to final acceptance of the project, all heads shall be raised or lowered to final lawn or planting grade.

3.09 INSTALLATION OF CONTROL SYSTEM COMPONENTS:

A. Control Wire:

1. Bundle control wires where two or more are in the same trench. Bundle with pipe wrapping tape spaced at 10-foot intervals.

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2. Two spare wires shall be run from each controller to the farthest valve under its control in all directions and any valve which is on a dead-end line and shall be labeled at both ends. Each spare wire shall be brought up to the surface in each valve box it passes through and coiled with 24 inches for future use. Each spare wire shall be tested for continuity prior to final acceptance of the project.
3. Provide a 24-inch excess length of wire in an 8-inch diameter loop at each 90 degree change of direction, at each splice, and at 100-foot intervals along continuous runs of wiring. Do not tie wiring loop. Coil 24-inch length of wire within each remote control valve box.
4. Install common ground wire and one control wire for each remote control valve. Multiple valves on a single control wire are not permitted.
5. If a control wire must be spliced, make splice with wire connectors and waterproof sealant, installed per the manufacturer's instructions. Locate splice in a valve box which contains an irrigation valve assembly, or in a separate 10-inch round valve box. Use same procedure for connection to valves as for in-line splices.
6. Unless noted on plans, install wire parallel with and below mainline pipe.
7. Encase all wire in conduit or sleeves not installed with PVC mainline pipe, as well as wire that crosses under water, attached to bridges, and under all pavement. All out of ground conduit shall be metal rigid conduit. All buried conduit can be P.V.C. conduit.
8. Sleeve sizes shall be as follows: 1-11 wires in 1-1/4" pipe; 12-15 wires in 1-1/2" pipe; etc...

B. Controller:

1. Install where indicated on drawings and in accordance with manufacturer's recommendations.
2. It shall be the Contractor's responsibility to install and supply a plugged outlet, junction box or separate breaker to furnish power to a new controller to make the controller operational and in compliance with local electrical codes.
3. Surge protection shall be provided at the incoming power and low voltage power side grounding as per national electrical code. Bond ground rods when more than one is used.

3.10 INSTALLATION OF OTHER COMPONENTS:

A. Tools and Spare Parts:

1. Prior to the Review at completion of construction, supply to the Owner operating keys, servicing tools, spare parts, and any other items indicated in the General Notes on the drawings.

B. Other Materials: Install other materials or equipment shown on the drawings or installation details which are part of the irrigation system, even though such items may not have been referenced in these specifications.

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3.11 PROJECT RECORD (AS-BUILT) DRAWINGS:

- A. The Contractor is responsible for documenting changes to the design. Maintain on-site and separate from documents used for construction, one complete set of contract documents as Project Documents. Keep documents current. Do not permanently cover work until as-built information is recorded.
- B. Record pipe and wiring network alterations. Record work which is installed differently than shown on the construction drawings. Record accurate reference dimensions, measured from at least two permanent reference points, of each irrigation system valve, each backflow prevention device, each controller or control unit, each manual drain, each sleeve end, each stub-out for future pipe or wiring connections, and other irrigation components enclosed within a valve box.
- C. Prior to construction completion, obtain from the Construction Project Representative a reproducible mylar copy of the drawings. The "as-built" information shall be permanently recorded on the mylar copies.
- D. Turn over the "Record Drawings" to the Construction Project Representative. Completion of the Record Drawings will be a prerequisite for the Review at the completion of the irrigation system installation.

3.12 MAINTENANCE:

- A. Upon completion of construction and Review by the Construction Project Representative, maintain irrigation system for a duration of 30 calendar days. Make periodic examinations and adjustments to irrigation system components so as to achieve the most desirable application of water.
- B. In the Fall of the year during the installation and guarantee period, the Contractor shall winterize the system by draining all of the water and doing everything necessary to insure protection of the system until Spring. Blowing out the lines by compressor shall be permitted during the one year guarantee.
- C. Following completion of the Contractor's maintenance period, the Owner will be responsible for maintaining the system in working order during the remainder of the guarantee/warranty period, for performing necessary minor maintenance, for trimming around sprinklers, for protecting against vandalism, and for preventing damage after the landscape maintenance operation.

3.13 CLEANUP:

- A. Upon completion of work, remove from the site all machinery, tools, excess materials, and rubbish.

3.14 FINAL INSPECTION:

- A. At the end of the guarantee period, when the lawn and landscaping have been approved, the Contractor shall call for a final inspection of the sprinkler irrigation system. There

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shall be 5 days notice given, in writing, to the Landscape Architect, prior so that the appropriate people may attend.

- B. Prior to that time, all heads shall have been adjusted to their proper pattern, radii, and height. The system will have been flushed out, checked for operation, and any defects corrected. A final list of items found in need or correction (if any), will be made and the Contractor shall correct them. Upon acceptance of the system, the Owner shall assume all responsibility for the system.

END OF SECTION 02810

SECTION 16001 –

ELECTRICAL GENERAL PROVISIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. Civil, Landscape and other applicable documents are considered a part of the electrical documents insofar as they apply as if referred to in full.

1.02 DESCRIPTION OF WORK:

- A. Extent of electrical work is indicated on drawings and/or specified in Division 16 sections of the specifications. Provide all labor, materials, equipment, supervision and service necessary for a complete electrical system.
- B. Use standard industry symbols together with the special symbols, notes and instructions indicated on the drawings. Describe the work, materials, apparatus and systems required as a portion of this work.
- C. Visit the site during the bidding period to determine existing conditions affecting electrical and other work. All costs arising from site conditions and/or preparation shall be included in the base bid. No additional charges will be allowed due to inadequate site inspection.

1.03 INTERPRETATION OF DRAWINGS AND SPECIFICATIONS:

- A. Before bidding, Contractor shall familiarize himself with the drawings, specifications and project site. Submit requests for clarification to Architect/Engineer in writing prior to issuance of final addendum. After signing the contract, the Contractor shall meet the intent, purpose and function of the contract documents. Any costs of materials, labor and equipment arising therefrom, to make each system complete and operable, is the responsibility of the Contractor.

1.04 QUALITY ASSURANCE:

- A. Comply with requirements of State and Local ordinances. If a conflict occurs between these requirements and the contract documents, the most stringent requirements shall govern. The Contractor accepts this responsibility upon submitting his bid, and no extra charge will be allowed after the contract is awarded. This shall not be construed as relieving the Contractor from complying with any requirements of the contract documents which may be in

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excess of the aforementioned requirements, and not contrary to same.

- B. Obtain all permits, inspections, etc. required by authority having jurisdiction. Include all fees in bid. Furnish a certificate of approval to the Owner's Representative from the Inspection Authority at completion of the work.
- C. Contractor shall have a current State Contracting License applicable to type of work to be performed under this contract.

1.05 RECORD DRAWINGS:

See Supplemental Conditions.

- A. **GUARANTEE:** Ensure that electrical system installed under this contract is in proper working order and in compliance with drawings, specifications and/or authorized changes. Without additional charge, replace any work or materials which develop defect, except for ordinary wear and tear, within one year from the date of substantial completion.
- B. **GENERAL:** Products are specified by manufacturer name, description and/or catalog number.
- C. Discrepancies between equipment specified and the intended function of the equipment shall be brought to the attention of the Architect/Engineer in writing prior to bidding.

PART 2 - EXECUTION

2.01 INSTALLATION:

- A. Lay out electrical work in advance of construction to eliminate unnecessary cutting, drilling, channeling, etc. Where such cutting, drilling, or channeling becomes necessary for proper installation; perform with care. Use skilled mechanics of the trades involved. Repair damage to building and equipment at no additional cost to the contract. Cutting of work of other Contractors shall be done only with the consent of that Contractor. Cutting structural members shall not be permitted.
- B. Since the drawings of floor, wall and ceiling installation are made at small scale; outlets devices equipment, etc., are indicated only in their approximate location unless dimensioned. Locate outlets and apparatus symmetrically on floors, walls and ceilings where not dimensioned, and coordinate such locations with work of other trades to prevent interferences. Verify all dimensions on the job. Do not scale the electrical drawings, but refer to the architectural and mechanical shop drawings and project drawings for dimensions as applicable.
- C. Perform for other trades, the electrical wiring and connection for all devices, equipment or apparatus. Consult architectural and mechanical and all

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applicable shop drawings to avoid switch, outlets and other equipment from being hidden behind doors, cabinets, counters, heating equipment, etc., or from being located in glass panels, etc. Relocate buried electrical devices and/or connections as directed at no additional cost.

2.02 CLEAN-UP:

- A. Clean up all equipment, conduit, fittings, packing cartons and other debris that is a direct result of the installation of the work of this Division.
- B. Clean fixtures, interiors and exteriors of all equipments, and raceways. Replace all filters in electrical equipment upon request for Substantial Completion.

2.03 STORAGE AND PROTECTION OF MATERIALS:

- A. Provide storage space for storage of materials and apparatus, and assume complete responsibility for all losses due to any cause whatsoever. In no case shall storage interfere with traffic conditions in any public thoroughfare, or constitute a hazard to persons in the vicinity. Protect completed work, work underway, and apparatus against loss or damage.

2.03 EXCAVATING FOR ELECTRICAL WORK:

- A. Complete all excavation per provisions of Division 2.

2.04 CONCRETE BASES:

- A. Concrete bases shall be provided under Division 16. Coordinate size and location of all bases and furnish all required anchor bolts, sleeves and templates as required to obtain a proper installation.

2.05 FIRE PENETRATION SEALS:

- A. Seal all penetrations for work of this section through fire rated floors, walls and ceilings to prevent the spread of smoke, fire, toxic gas or water through the penetration either before, during or after fire. The fire rating of the penetration seal shall be at least that of the floor, wall or ceiling into which it is installed, so that the original fire rating of the floor or wall is maintained as required by Article 300-21 of the National Electrical Code.
- B. Where applicable, provide OZ type CFSF/I and CAFSF/I fire seal fittings for conduit and cable penetrations through concrete masonry walls, floors, slabs, and similar structures. Where applicable, provide 3M fire barrier sealing penetration system, type PSS7904, and/or Thomas & Betts Flame Safe Fire Stop system, including wall wrap, partitions, caps and other accessories as required.

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- C. Comply with manufacturer's instructions and recommendations for installation of sealing fittings and barrier sealing systems.

2.06 PROJECT FINALIZATION AND START-UP:

- A. **FINAL REVIEW:** At the time of final review, the project foreman shall accompany the reviewing party, and remove coverplates, panel covers and other access panels as requested, to allow review of the entire electrical system.

END OF SECTION 16001

SECTION 16110

RACEWAYS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- B. This section is a Division 16 Basic Materials and Methods section, and is part of each Division 16 section making reference to electrical raceways specified herein.

1.02 DESCRIPTION OF WORK:

- A. Extent of raceways is indicated in drawings and schedules.
- B. Types of raceways in this section include the following:
 - 1. Electrical Metallic Tubing
 - 2. Flexible Metal Conduit
 - 3. Intermediate Metal Conduit
 - 4. Liquid-Tight Flexible Metal Conduit
 - 5. Rigid Metal Conduit
 - 6. Rigid Non-metallic Conduit

1.03 DUALITY ASSURANCE:

- A. Manufacturers: Firms regularly engaged in manufacture of raceway systems of types and sizes required, whose products have been in satisfactory use in similar service for not less than 3 years.
- B. NEMA Compliance: Comply with applicable requirements of NEMA standards pertaining to raceways.
- C. UL Compliance: Comply with provisions of UL safety standards pertaining to electrical raceway systems, and provide products and components which have been UL listed and labeled.
- D. NEC Compliance: Comply with requirements as applicable to construction and installation of raceway systems.

1.03 SUBMITTALS:

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- A. None required.

PART 2 - PRODUCTS

2.01 METAL CONDUIT AND TUBING:

- A. General: Provide metal conduit, tubing and fittings of types, grades, sizes and weights (wall thickness) for each service indicated. Minimum size 3/4".
- B. Rigid Steel Conduit: FS WW-C-0581 and ANSI C80.1.
- C. Intermediate Steel Conduit FS-WW-C-581
- D. Rigid Metal Conduit Fittings: FS W-F-408:
1. Use type 1 fittings for rain tight connections
 2. Use type 2 fittings for concrete tight connections
 3. Use type 3 fittings for other miscellaneous connections
- Use OZ type bushings on conduits 1 1/4" and larger
- E. Electrical Metallic Tubing (EMT): ANSI C80.3 and NEMA. Standard Publication No. RN 1.
- F. EMT Fittings: Provide insulated throat non-indenter type malleable steel fittings; concrete tight where required by application. Install OZ type B bushings on conduits 1 1/4" and larger.
- G. Flexible Metal Conduit: FS WW-C-566, of the following type:
1. Zinc-Coated Steel
 2. Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 1 and Style A.
- H. Liquid-Tight Flexible Metal Conduit: Provide liquid-tight flexible metal conduit; construct of single strip, flexible, continuous, interlocked and double-wrapped steel; galvanize inside and outside; coat with liquid-tight jacket of flexible polyvinyl chloride (PVC).
- I. Liquid-Tight Flexible Metal Conduit Fittings: FS W-F-406, Type 1, Class 3, Style G.

2.02 NON-METALLIC CONDUIT AND DUCTS:

- A. General: Provide non-metallic conduit, ducts and fittings of types, sizes and

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weights (wall thickness) for each service indicated.

- B. PVC Conduit And Tubing Fittings: NEMA Standards published No. TC 3, match to conduit/tubing type and material.
- C. PVC Accessories: Provide conduit, tubing and duct accessories of types, sizes and materials, complying with manufacturer's published product information, which mate and match conduit and tubing.

PART 3 - EXECUTION

3.01 INSTALLATION OF ELECTRICAL RACEWAYS:

- A. Install electrical raceways where indicated; in accordance with manufacturer's written instructions, applicable requirements of NEC and NECA "Standard of Installation", and complying with recognized industry practices and in accordance with the following:
 - 1. Branch Circuits, Signal and Control Circuits, and Individual Equipment Circuits Rated Less Than 100 Amps: Install in electric metallic tubing (EMT) in dry areas. Install in non-metallic plastic duct. in poured walls, below concrete slab-on-grade, or in earth fill.
 - 2. Conduit Installation Below Slab-On-Grade, or Below Grade: For slab-on-grade construction, install runs of rigid plastic conduit (PVC) below slab. Install GRC (with protective coating) for elbows passing vertically through slab-on-grade. Slope raceways as required to drain away from electrical enclosures and to avoid collection of moisture in raceway low points.
 - 3. Apply protective coating to metallic raceways in direct contact with earth or fill of any type: consisting of spirally wrapped PVC tape (1/2" minimum overlap of Scotch wrap tape or equal); or factory applied vinyl cladding (minimum thickness .02"). Completely wrap and tape all field joints.
 - 4. Mark all buried conduits which do not require concrete encasement by placing yellow plastic marker tape (minimum 6" wide) along entire length of run 12" below final grade. Where multiple small lines are buried in a common trench and do not exceed an overall width of 16", install a single line marker.
- B. Install GRC in all hazardous locations as defined by NEC. Provide suitable fittings, seal-offs, boxes, etc. to comply with requirements.
- C. Provide a minimum of 12" clearance from flues, steam and hot water piping, etc. Avoid installing raceways in immediate vicinity of boilers and similar heat emitting equipment.

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- D. Where cutting raceway is necessary, remove all inside and outside burrs; make cuts smooth and square with raceway. Paint all field threads (or portions of raceway where corrosion protection has been damaged) with primer and enamel finish coat to match adjacent raceway surface.
- E. Comply with NEC for requirements for installation of pull boxes in long runs.
- F. Cap open ends of conduits and protect other raceways as required against accumulation of dirt and debris. Pull a mandrill and swab through all conduit before installing conductors. Install a 200 lb. nylon cord in each empty conduit run.
- G. Replace all crushed, wrinkled or deformed raceway before installing conductors.
- H. Provide rigid metal conduit GRC for all bends in buried conduit greater than 30 degrees. Provide protective coating for GRC bend as specified herein.
- I. Where raceways penetrate building or vault walls and floors below grade, install rigid metal conduit (GRC) for a minimum distance of 36" on the exterior side of the floor or wall. Provide OZ, type FSK or WSK sealing bushings (with external membrane clamps as applicable) for all conduit penetrations entering building or vaults below grade.
- J. Provide OZ expansion fittings on all conduits crossing building expansion joints, both in slab and suspended.
- K. Provide OA cable supports in all vertical risers in accordance with NEC 300-19; type as required by application.
- L. Level and square raceway runs, and install at proper elevations/heights.
- M. Complete installation of electrical raceways before starting installation of cables/wires within raceways.
- N. Install liquid-tight flexible conduit for connection of motors and for other electrical equipment where subject to movement and vibration, and also where subjected to one or more of the following conditions:
 - 1. Exterior Location
 - 2. Moist or Humid Atmosphere Where Condensate Can Be Expected To Accumulate
 - 3. Corrosive Atmosphere
 - 4. Subjected to Water Spray

3.01 ADJUSTING AND CLEANING:

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- A. Upon completion of installation of raceways, inspect interiors of raceways; remove burrs, dirt and construction debris.

END OF SECTION 16110