Burns & McDonnell World Headquarters
9400 Ward Parkway
Kansas City, MO 64114
Phone: 816-333-9400
Fax: 816-333-3690
www.burnsmcd.com

Tin Cup Force Main

Issued For Bid

Project No. 119978

July 2026

Burns & McDonnell: Making our clients successful for more than 100 years

OWNER The City of Joplin, Missouri
PROJECT NAME Tin Cup Parallel Force Main

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CERTIFICATION(S)



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THE CITY OF JOPLIN, MISSOURI

TIN CUP PARALLEL FORCE MAIN

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DOCUMENT 00 11 16 – INVITATION TO BID

Burns & McDonnell Engineering Company
P.O. Box 419173
Kansas City, Missouri 64141-6173

Project Name Tin Cup Parallel Force Main
Date June 27, 2026

DESCRIPTION OF WORK OF THIS CONTRACT

You are invited to bid on a general contract. The Contract provides for the installation of approximately 4,200 linear feet of 24-inch diameter PVC force main with tracer wire, approximately 1,020 linear feet of PVC gravity main (30-inch and 8-inch), manholes, open cut of Shoal Creek, air release valves, and all associated appenditures.

BID INFORMATION

Bids will be received by the City of Joplin, Missouri until 10:00 a.m., local time, July 27, 2026. Bids received after this time will not be accepted. Bids will be opened and read aloud at Public Works Department, 602 S. Main Street, 4th Floor conference room, Joplin, Missouri.

Copies of the Bid Documents may be obtained for bidding purposes from the City of Joplin, Missouri, Public Works Department, 602 S. Main Street, 4th Floor.

A mandatory prebid conference will be held as stated in the Instructions to Bidders.

Bids will be received on a unit price basis.

Bidders shall be qualified to do business and licensed in accordance with all applicable laws of the state and local governments where the Project is located.

Bids received from Bidders who are not recorded by the City of Joplin, Missouri as having received the Bid Documents will not be opened.

Prequalification of Bidders will not be required. Owner will evaluate Bidders in accordance with the Instructions to Bidders.

Bid security in the form of a Bid Bond in the amount of 5% of total Bid price shall accompany each Bid in accordance with the Instructions to Bidders.

Bids shall be in accordance with the Bid Documents.

Bids will be publicly opened and read aloud immediately at time stated above.

ADDITIONAL PROVISIONS

The Bid shall be conditioned upon compliance with all labor related requirements including the regulations and stipulations concerning equal employment opportunity, affirmative action requirements, and minimum wage rates. Bidders must comply with the payment of hourly wage rates, including all fringe

benefits, as established by Sections 290.210-340, RsMO, as amended in 1993, pertaining to the prevailing hourly rate of wages and including fringe benefits, as established by the Department of Labor and Industrial Relations of the State of Missouri. A copy of the determination is provided within the Supplemental Conditions.

Bidders on this work will be required to comply with the City of Joplin's Affirmative Action Program set forth in City Council Resolution No. 81-57, Sections VI and VII.

OWNER'S RIGHT TO REJECT

The Owner reserves the right to reject any or all Bids and to waive irregularities therein, and all Bidders shall agree that such rejection shall be without liability on the part of the Owner for any damage or claim brought by any Bidder because of such rejections, nor shall the Bidders seek any recourse of any kind against the Owner because of such rejections. The filing of any Bid in response to this invitation shall constitute an agreement of the Bidder to these conditions.

OWNER

City of Joplin, Missouri

By: Dan Johnson

Title: Director of Public Works

END OF DOCUMENT 00 11 16

SECTION 00 21 13 – INSTRUCTIONS TO BIDDERS

ARTICLE 1 - INTRODUCTORY INFORMATION

1.01 DEFINED TERMS:

A. Terms used in these Instructions to Bidders and which are defined in the GENERAL CONDITIONS, have the meanings assigned to them in the GENERAL CONDITIONS.

B. Bid Documents shall include the following:

1. Bidding Requirements:
   a. Invitation to Bid.
   b. Instructions to Bidders.
   c. Bid Form.
   d. Bid Bond.
2. Contract Forms:
   a. Agreement.
   b. Performance and Payment Bonds.
3. Contract Conditions:
   a. General Conditions.
   b. Labor-Related Regulations.
4. Specifications.
5. Drawings.
6. Addenda issued prior to receipt of Bids.

C. Certain additional terms used in these Instructions to Bidders have the meanings indicated below which are applicable to both the singular and plural thereof.

1. Bidder - one who submits a Bid directly to Owner as distinct from a sub-bidder, who submits a bid to a Bidder.
2. Issuing Office - the office from which the Bid Documents are to be issued and where the bidding procedures are to be administered.
3. Successful Bidder - the lowest, responsible, and responsive Bidder to whom Owner on the basis of Owner's evaluation as hereinafter provided makes an award.

1.02 COPIES OF BID DOCUMENTS:

A. Complete sets of the Bid Documents may be obtained from the City of Joplin, Missouri as stated in the invitation to bid.

B. Complete sets of Bid Documents shall be used in preparing Bids; neither Owner nor Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bid Documents.

C. Owner and Engineer in making copies of Bid Documents available on the above terms do so only for the purpose of obtaining Bids on the Work and do not confer a license or grant for any other use.

1.03 QUALIFICATION OF BIDDERS:

A. Prequalification statements are not required. Owner will, however, evaluate the Bidder's qualifications following the opening of Bids. Evaluation criteria considered may include, but not be limited to:

1. Financial responsibility.
2. Experience and performance records on similar work.
3. Ability to supply construction equipment and personnel to complete the Work within the Contract Time.

4. Evidence of Bidder to do business in the state where the Project is located, or covenant to obtain such qualifications prior to award of the Contract.

B. Bidders may be requested to submit financial statement subsequent to the Bid opening. Such statements shall be submitted to Owner within 3 days after being so requested.

C. Only those Bids will be considered which are submitted by Bidders who show satisfactory completion of work of type and size comparable to the Work required by these Bid Documents.
   1. A list of comparable projects, including pertinent information and identification of the owners, may be requested.
   2. Similar experience statements may be requested for any Subcontractors named in the Bid.
   3. See ARTICLE 5 - AWARD OF CONTRACT herein for additional requirements after opening of Bids.

1.04 EXAMINATION OF CONTRACT DOCUMENTS AND SITE:

A. Before submitting a Bid, it is the responsibility of each Bidder:
   1. To thoroughly examine the Contract Documents and other related data identified in the Bid Documents (including "technical data" referred to below).
   2. To visit the Site to become familiar with and satisfy Bidder as to the general, local, and Site conditions that may in any manner affect cost, progress, and performance of the Work.
   3. To consider federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress, performance, and furnishing of the Work.
   4. To study and carefully correlate Bidder's knowledge and observations with the Contract Documents and such other related data.
   5. To promptly notify Engineer of all conflicts, errors, ambiguities, or discrepancies which Bidder has discovered in or between the Contract Documents and such other related documents.

B. Before submitting a Bid, each Bidder will be responsible to obtain such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the Site or otherwise, which may affect cost, progress, performance, and furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder, including safety precautions and programs incident thereto or which Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of the Contract Documents. This shall include local shipping facilities and availability of lands if applicable.

C. Access to the Site:
   1. On request, Owner will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as each Bidder deems necessary for submission of its Bid. Bidder must fill all holes, clean up, and restore the Site to its former conditions upon completion of such explorations, investigations, tests, and studies.
   2. The lands upon which the Work is to be performed, rights-of-way, and easements for access thereto and other lands designated for use by Bidder in performing the Work are identified in the Bid Documents. All additional lands and access thereto required for temporary construction facilities, construction equipment, or storage of Materials and Equipment to be incorporated in the Work are to be obtained and paid for by Bidder. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in the Bid Documents.

3. Property owners affected by the Work are named on the Drawings where known, but the accuracy of such ownership is not guaranteed. Bidders shall verify and make their own arrangements with such property owners for any access needed in connection with the preparation of Bids.

D. Subsurface Information:
1. Certain subsurface information has been obtained at, or in the vicinity of, the Site of the Work.
2. Copies of such subsurface information will be issued only to prospective Bidders who request such subsurface information and sign a receipt therefor.
3. There is no express or implied guarantee as to the accuracy or completeness of the subsurface information, nor of the interpretation thereof by the Owner, the Engineer, or any of their representatives.
4. The subsurface information or copies thereof do not form a part of this or any contract document issued by the Owner or Engineer.

E. The submission of a Bid will constitute an incontrovertible representation by the Bidder that it has complied with every requirement of this paragraph "Examination of Contract Documents and Site," and that the Bid Documents are sufficient in scope and detail to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

1.05 INTERPRETATIONS, MODIFICATIONS, AND ADDENDA:

A. Any Bidder who discovers ambiguities, inconsistencies, or errors or is in doubt as to the meaning or intent of any part of the Bid Documents shall promptly request Engineer to provide an interpretation. Questions may be directed to Rachelle Lowe, P.E. at 816-760-2117 or rllowe@burnsmcd.com. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by Addenda mailed or delivered to all parties recorded by Owner as having received the Bid Documents.

B. Addenda may also be issued to modify the Bid Documents as deemed advisable by Owner or Engineer.

C. Because of the time required to publish and deliver, no Addenda will be issued within the last 7 days before the date of opening Bids.

D. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

1.06 PREBID CONFERENCE:

A. A prebid conference will be held at 11 AM on July 13, 2026. Attendance is mandatory for prospective Bidders bidding as prime contractor. Prebid conference will be held at the following location:

Public Works Department
4th Floor Conference Room
602 S. Main Street
Joplin, Missouri

1.07 LABOR-RELATED REGULATIONS:

A. The Bidder's attention is directed to the special rules, regulations, and stipulations contained in Document 00 73 10.

ARTICLE 2 - BASIS OF BIDDING

2.01 SPECIFIED EQUIPMENT AND MATERIALS:

A. The Contract, if awarded, will be on the basis of Equipment and Materials specified or described in the Bid Documents without consideration of possible substitute or "or-equal" items. Whenever it is specified or described in the Bid Documents that a substitute or "or-equal" item of Equipment or Material may be furnished or used by Contractor if acceptable to Engineer, application for such acceptance will not be considered by Engineer until after the Effective Date of the Agreement. The procedure for submission of any such application by Contractor and consideration by Engineer is set forth in the GENERAL CONDITIONS and may be supplemented in the General Requirements.

2.02 INDIRECT COSTS:

A. Taxes:
   1. All applicable sales, use, compensating, or other taxes to be paid or withheld by Bidder, now imposed by any taxing authority, on Equipment and Materials to be incorporated in the Work, and on any or all other cost items entering into the Contract Price, shall be included in the Bid price.
   2. The Bidder shall include all such taxes except those on Equipment and Materials, if any, furnished by Owner or others (or exempted by the state), and Bidder shall furnish taxing authorities any information or reports pertaining thereto as required.

B. Taxes:
   1. Missouri Sales Tax Exemption - Missouri State Statutes 144.062, effective August 28, 1994, allows for a sales tax exemption to contractors constructing, repairing, or remodeling facilities, or purchasing personal property and Materials to be incorporated into and consumed in the construction of projects for a tax exempt entity. The tax exempt entity shall furnish a signed exemption certification authorizing such purchases for the construction, repair, or remodeling project to each contractor and/or subcontractor. It shall be the exempt entity's responsibility to apply for and obtain the required sales tax exemption determination. Attached at the end of these Instructions to Bidders is a copy of the Missouri Project Exemption Certificate. It shall be the Bidder's responsibility to furnish a completed copy of the exemption certificate along with a copy of the entity's exemption letter to all subcontractors, and any contractor or subcontractor purchasing Materials.

C. The cost of all construction licenses, building and other permits, and governmental inspections required by public authorities for performing the Work, which are applicable at the time Bids are opened and which are not specified to be obtained by Owner, shall be included in the Bid price.

D. The cost of all royalties and license fees on Equipment and Materials to be furnished and incorporated in the Work shall be included in the Bid price.

E. Tests, inspections, and related activities called for throughout the Bid Documents are a responsibility of Bidder unless specified otherwise. The Bid shall include all costs arising from such responsibility.

F. The cost of all electrical, water, gas, telephone, sanitary, and similar facilities and services required by Bidder in performing the Work shall be included in the Bid price unless specified otherwise.

2.03 SUBCONTRACTORS:

A. No Bid shall be based upon aggregate of Subcontractors performing more than 50 % of the total Work.
B. The experience, past performance, and ability of each proposed Subcontractor will be considered in the evaluations of Bids. Any proposed Subcontractor so requested shall furnish experience statement prior to Notice of Award.
C. If any prospective Bidder is in doubt on the acceptability of any Subcontractor, Bidder may request from Engineer a tentative approval.
D. No Bidder shall be required to employ any Subcontractor, other person, or organization against whom Bidder has reasonable objection.
E. Subcontractors shall be licensed with the City of Joplin before beginning work.

2.04 CONTRACT TIMES:

A. The number of days within which, or the dates by which, the Work is to achieve Substantial Completion and also final completion and be ready for final payment shall be set forth in the Bid Form and will be stated in the Agreement (or incorporated therein by reference to the Bid Form).
B. Provisions for liquidated damages, if any, are as set forth in the Agreement.

ARTICLE 3 - BIDDING PROCEDURE

3.01 PREPARATION OF BID:

A. One copy of the Project Manual shall be used for the Bid.
B. The Bid Form shall be filled out in detail in black ink and signed by the Bidder.
C. Bids by partnerships shall be executed in the partnership name and signed by a partner whose title shall appear under his signature, and the official address of the partnership shall be shown below the signature.
D. Bids by corporations shall be executed in the corporate name by the president or a vice president (or other corporate officer accompanied by evidence of authority to sign), and the corporate seal shall be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation shall be shown below the signature.
E. Names of all persons signing shall be printed below their signatures.
F. A power of attorney shall accompany the signature of anyone not otherwise authorized to bind the Bidder.
G. The Bid shall contain an acknowledgement of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
H. The address to which communications regarding the Bids are to be directed shall be shown.

3.02 METHOD OF BIDDING:

A. Bids will be received on a Unit Price basis as set forth in the Bid Form.
B. Firm Bids are required.

3.03 BID SECURITY:

A. Each Bid shall be accompanied by Bid security, payable to Owner, of the amount stipulated in the Invitation to Bid.
B. The required security shall be in the form of a Bid Bond on the form prescribed by the AIA, Document A310, or on similar form attached.
C. Bid Bond shall be executed by a surety meeting the requirements set forth for "Surety Bonds" in the GENERAL CONDITIONS.

D. Bid security of the Successful Bidder will be retained until Bidder has executed the Agreement and furnished the required surety Bonds as set forth in the GENERAL CONDITIONS. If the Successful Bidder fails to execute the Agreement and furnish the surety Bonds within 15 days after the date of Notice of Award, Owner may annul the Notice of Award, and the Bid security of that Bidder will be forfeited to Owner.

3.04 SUBMISSION OF BID:

A. Bids shall be submitted at the time and place designated in the Invitation to Bid.

B. Bid Documents with accompanying Bid security and other required information shall be enclosed in an opaque sealed envelope marked with the following:
   1. Project name.
   2. Name and address of Bidder.

C. If the Bid is sent by mail or other delivery system, the sealed envelope shall be enclosed in a separate envelope with the notation "Sealed Bid Enclosed" on the face thereof.

3.05 MODIFICATION OR WITHDRAWAL OF BIDS:

A. Bids may be modified or withdrawn by an appropriate document duly executed (in the manner that Bid must be executed) and delivered to the place where Bids are to be submitted at any time prior to the opening of Bids.

B. If, within 24 hours after Bids are opened, any Bidder files a duly signed written notice with Owner and promptly thereafter demonstrates to the reasonable satisfaction of Owner that there was a material and substantial mistake in the preparation of his Bid, that Bidder may withdraw its Bid, and the Bid security will be returned. Thereafter, that Bidder will be disqualified from further bidding on the Work to be provided under the Contract Documents.

ARTICLE 4 - OPENING OF BIDS

4.01 OPENING OF BIDS:

A. Bids will be opened and read aloud publicly at the place where Bids are to be submitted. An abstract of the amounts of the base Bids will not be made available.

B. All Bids shall remain open for a period of 60 days after Bids are opened.

ARTICLE 5 - AWARD OF CONTRACT

5.01 OWNER'S RIGHT TO REJECT BIDS:

A. Owner reserves the right to reject any or all Bids, including without limitation the rights to reject any or all nonconforming, nonresponsive, unbalanced, or conditional Bids and to reject the Bid of any Bidder if Owner believes that it would not be in the best interest of the Project to make an award to that Bidder, whether because the Bid is not responsive or the Bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by Owner. Owner also reserves the right to waive all informalities not involving price, times, or changes in the Work and to negotiate Contract terms with the Successful Bidder. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. Discrepancies between words and figures will be resolved in favor of the words.

B. All Bidders must agree that such rejection shall be without liability on the part of the Owner nor shall the Bidders seek any recourse of any kind against the Owner because of such

rejections. The filing of any Bid shall constitute an agreement of the Bidder to these conditions.

5.02 EVALUATION OF BIDS:

A. In evaluating Bids, Owner will consider the qualifications of the Bidders, whether or not the Bids comply with the prescribed requirements and other data, as may be requested in the Bid Form or prior to the Notice of Award.

B. Owner may consider the qualifications and experience of Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work as to which the identity of Subcontractors, Suppliers, and other persons and organizations must be submitted. Owner may also consider the operating costs, maintenance requirements, performance data, and guarantees of Equipment and Materials proposed for incorporation in the Work when such data is required to be submitted prior to the Notice of Award.

C. Owner may conduct such investigations as Owner deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of the Bidders, proposed Subcontractors, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to Owner's satisfaction within the prescribed time.

D. Owner reserves the right to reject the Bid of any Bidder who does not pass any such evaluation to Owner's satisfaction.

E. The award of the Contract, if it is awarded, will be to the lowest, responsive, responsible Bidder whose evaluation by Owner indicates to Owner that the award will be in the best interest of Project and Owner.

F. Local Preference Policy. Bidders whose principal place of business is located within a radius of 25 miles from Joplin City Hall may be given a *local preference* in the awarding of a bid.

1. If a local bidder is within three (3%) percent of the lowest bid from a non-local bidder on a bid or proposal from $3,000.00 up to $1,000,000.00, and within two (2%) percent on such bid or proposal from $1,000,000.00 up to $3,000,000.00, and within one (1%) percent on such bid or proposal from $3,000,000.00 to $5,000,000.00.

5.03 NOTICE OF AWARD:

A. After considering the basis of award and evaluation of Bids, if the Contract is to be awarded, Owner shall within 60 days after the date of opening Bids notify the Successful Bidder of acceptance of his Bid.

ARTICLE 6 - SIGNING OF AGREEMENT

6.01 When Owner gives Notice of Award to Successful Bidder, Owner will issue the required number of unbound, unsigned counterparts of the Agreement and other Contract Documents to Successful Bidder.

6.02 Within 15 days thereafter, Contractor [Successful Bidder] shall sign all copies of the Agreement leaving the dates blank, insert the properly executed Bonds, power of attorney documents, and other required documents in the appropriate places, and deliver all copies to Owner.

6.03 Within 10 days thereafter, Owner will execute all copies of the Agreement and insert the Date of Contract in the Agreement, Bonds, and other documents. Owner will bind and distribute the

executed Contract Documents as required. Each duly executed counterpart will be accompanied by a complete set of Drawings with appropriate identification.

END OF SECTION 00 21 13

DOCUMENT 00 40 00 – BID FORM

Project Name: Tin Cup Parallel Force Main

BID TO:
Owner: City of Joplin, Missouri
Public Works Department
602 S. Main Street, 4th Floor
Joplin, Missouri 64801

BID FROM:
Bidder: _____
_____
_____
_____

ARTICLE 1 - BIDDER'S INTENT

1.01 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Bid price and within the Bid time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.

ARTICLE 2 - TERMS AND CONDITIONS

2.01 Bidder accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for 60 days after the day of Bid opening. Bidder will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Bidding Requirements within 15 days after the date of Owner's Notice of Award.

ARTICLE 3 - BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents, as more fully set forth in the Agreement, that:

A. Bidder has examined and carefully studied the Bid Documents, and the following Addenda, receipt of all which is hereby acknowledged:

Number	Date
_____	_____
_____	_____
_____	_____
_____	_____

B. Bidder has visited the Site and become familiar with and is satisfied as to the general, local, and Site conditions that may affect cost, progress, performance, and furnishing of the Work.

C. Bidder is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or contiguous to the Site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site; and (2) reports and drawings of a Hazardous Environmental Condition, if any, at the Site. Bidder acknowledges that such reports and drawings are not Contract Documents and may not be complete for Bidder's purposes. Bidder acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Bid Documents with respect to Underground Facilities at or contiguous to the Site.

E. Bidder has obtained and carefully studied [or assumes responsibility for having done so] all such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions [surface, subsurface, and Underground Facilities] at or contiguous to the Site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder and safety precautions and programs incident thereto.

F. Bidder does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performing and furnishing of the Work in accordance with the times, price, and other terms and conditions of the Contract Documents.

G. Bidder is aware of the general nature of Work to be performed by Owner and others at the Site that relates to Work for which this Bid is submitted as indicated in the Contract Documents.

H. Bidder has correlated the information known to Bidder, information and observations obtained from visits to the Site, reports, and drawings identified in the Contract Documents, and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

I. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Contract Documents, and the written resolution thereof by Engineer is acceptable to Bidder.

J. The Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

K. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid; Bidder has not solicited or induced any person, firm, or a corporation to refrain from bidding; and Bidder has not sought by collusion to obtain for itself any advantage over any other Bidder or over Owner.

L. Bidder will perform the Work in compliance with all applicable trench safety standards set forth in Occupational Safety and Health Administration (OSHA) Part 1926 - Subpart P - Excavations.

ARTICLE 4 - BID PRICE

4.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

A. UNIT PRICE SCHEDULE:

Item No.	Item Description	Estimated Quantity	Unit	Unit Cost	Total Cost
1.0	Mobilization/Demobilization	1	LS	NA	$_____
2.0	Bonds and Insurance	1	LS	NA	$_____
3.0	Construction Photographs	1	LS	NA	$_____
4.0	Erosion Control, SWPPP	1	LS	NA	$_____
5.0	Install 24-inch PC 200 PVC (6.5'–12' Trench Depth)	3,191	LF	$_____	$_____
6.0	Install 24-inch PC 200 PVC (>12.1' Trench Depth)	1,010	LF	$_____	$_____
7.0	Install Pipes Under Shoal Creek	1	LS	NA	
8.0	Encasement Under Shoal Creek	1	LS	NA	$_____
9.0	Cutoff Wall Under Shoal Creek	1	LS	NA	$_____
10.0	Install 8-inch PVC Gravity Sewer (6.5' - 12' Trench Depth)	343	LF	$_____	$_____
11.0	Install 30-inch PVC Gravity Sewer (>12.1' Trench Depth)	677	LF	$_____	$_____
12.0	Install 4' Diameter Cast-in-Place Manhole	2	EA	$_____	$_____
13.0	Install 4' Diameter Outside Drop Pre-cast Polymer Manhole	1	EA	$_____	$_____
14.0	Install 6' Diameter Precast Polymer Manhole	1	EA	$_____	$_____
15.0	Install 4' Diameter Precast Polymer Manhole	3	EA	$_____	$_____
16.0	Install 3-inch Combination Air Valve/Vault	3	EA	$_____	$_____
17.0	Pavement Repair and Trench Backfill (Coyote and Cougar Drive. McClelland Blvd.)	1,070	LF	$_____	$_____
18.0	Assure Continued Operation of the Sanitary Conveyance System	1	LS	NA	$_____
19.0	Removal and Disposal of Comtaminated Material	900	CY	$_____	$_____

TOTAL BID OF –

_____

_____Dollars ($_____)

Bidder acknowledges that quantities are not guaranteed and final payment will be based on actual quantities determined as provided in the Contract Documents.

B. SUPPLIERS/MANUFACTURERS: This Bid is based upon furnishing and installing major items of Equipment by the following Suppliers/manufacturers:

No.	Item	Supplier/Manufacturer
1	PVC Pipe_____	_____
2	Air Release Valves_____	_____
3	Manholes_____	_____

C. SUBCONTRACTORS: This Bid is based upon use of the following Subcontractors:

No.	Item	Subcontractor
1	Installing PVC Pipes Under Shoal Creek	_____
2	Encasement Under Shoal Creek_____	_____
3	Cutoff Wall Under Shoal Creek____	_____

ARTICLE 5 - CONTRACT TIMES

5.01 Bidder agrees that the Work will be completed within the following time(s):

A. The Work will be Substantially Completed within 240 calendar days after the date when the Contract Times commence to run as provided in the GENERAL CONDITIONS, and completed and ready for final payment in accordance with the GENERAL CONDITIONS within 270 calendar days after the date when the Contract Times commence to run.

B. Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the Work within the times specified in the Agreement.

ARTICLE 6 - BID CONTENT

6.01 The following documents are attached to and made a condition of this Bid:

A. Required Bid security in the form of a Bid Bond in the amount of 5% of the total Bid price.

B. A tabulation of Subcontractors and other persons and organizations required to be identified in this Bid.

ARTICLE 7 - COMMUNICATIONS

7.01 Communications concerning this Bid shall be addressed to the Bidder as follows:

_____

_____

_____

Phone No. _____
FAX No. _____
e-mail address _____

ARTICLE 8 - TERMINOLOGY

8.01 The terms used in this Bid which are defined in the GENERAL CONDITIONS or Instructions to Bidders will have the meanings assigned to them.

SUBMITTED on _____, 202_.

State Contractor License No. _____. (If applicable)

If Bidder is :

An Individual

Name (type or printed): _____

By: _____ (SEAL)
(Individual's Signature)

Doing business as: _____
Business address: _____
_____

Phone No.: _____
FAX No.: _____

A Partnership

Partnership Name: _____ (SEAL)

By: _____
(Signature of general partner – attach evidence of authority to sign)

Name (type or printed): _____

Business address: _____
_____

Phone No.: _____
FAX No.: _____

A Corporation

Corporation Name: _____ (SEAL)
State of Incorporation: _____
Type (General Business, Professional, Service, Limited Liability): _____
_____

By: _____
(Signature – attach evidence of authority to sign)

Name (type or printed): _____

Title: _____

(CORPORATE SEAL)

Attest: _____
(Signature of Corporate Secretary)

Business address: _____
_____

Phone No.: _____
FAX No.: _____

END OF SECTION 00 40 00

DOCUMENT 00 43 13 – BID BOND

KNOW ALL MEN BY THESE PRESENTS: that we

_____
_____
_____

as Principal, hereinafter called the Principal, and

_____
_____
_____

a corporation duly organized under the laws of the State of _____ as Surety, hereinafter called Surety, are held and firmly bound unto

_____
_____
_____

as Obligee, hereinafter called the Owner, in the sum of _____ _____ dollars $_____, for the payment of which sum, well and truly to be made, Principal and said Surety, bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a Bid for

Tin Cup Parallel Force Main

The Contract provides for the installation of approximately 4,200 linear feet of 24-inch diameter PVC force main with tracer wire, approximately 1,020 linear feet of PVC gravity main (24-inch and 8-inch), manholes, open cut of Shoal Creek, air release valves, and all associated appenditures.

NOW, THEREFORE, if the Owner shall accept the Bid of Principal and the Principal shall enter into a Contract with the Owner in accordance with the terms of such Bid, and give such Bond or Bonds as may be specified in the Bidding or Contract Documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of Principal to enter such Contract and give such Bond or Bonds, if the Principal shall pay to the Owner the difference not to exceed the penalty hereof between the amount specified in said Bid and such larger amount for which the Owner may in good faith contract with another party to perform the Work covered by said Bid, then this obligation shall be null and void, otherwise to remain in full force and effect.

Signed and sealed this _____ day of _____ 202__.

PRINCIPAL (CORPORATE SEAL)

_____

By _____

_____

SURETY

_____

By _____

_____

ATTORNEY-IN-FACT (CORPORATE SEAL)

_____

_____

(This Bond shall be accompanied with
Attorney-in-Fact's authority from Surety)

END OF SECTION 00 43 13

AGREEMENT
BETWEEN
CITY OF JOPLIN AND _____

CITY		CONTRACTOR	
CITY OF JOPLIN **602 S. MAIN STREET** **JOPLIN, MO 64801**		Name: Address:	
Attention:		Attention:	
Department:		Phone:	Fax:
Phone: 417.624.0820 ext:	Fax: 417.624.4620	Project:	

THIS AGREEMENT made and entered into this ____ day of _____, 20____, by the parties identified above.

WITNESSETH: That whereas, the Contractor has become the lowest responsible bidder for furnishing the supervision, labor, tools, equipment, materials and supplies and for constructing the following City improvements:

TIN CUP PARALLEL FORCE MAIN & PLAN NUMBER*

The City and Contractor agree to the following:

1. **Manner and Time for Completion**. The Contractor will furnish all supervision, labor, tools, equipment, materials and supplies necessary to perform, and to perform said work at Contractor's own expense in accordance with the contract documents and any applicable City ordinances and state and federal laws within 270 calendar days from the date Contractor is ordered to proceed, which order shall be issued by the Director of Public Works within 30 days after the date of this contract.

2. **Prevailing Wages**. All labor utilized in the construction of the aforementioned improvements shall be paid a wage of no less than the "prevailing hourly rate of wages" for work of a similar character in this locality, as established and amended at any time by the Department of Labor and Industrial Relations of the State of Missouri. At any time, the contractor is found to not have paid prevailing wages, the contractor shall forfeit as a penalty to the city one hundred dollars for each underpaid worker employed, for each calendar day, or portion thereof such worker is paid less than the said stipulated rates for any work done under this contract.

3. **Insurance Requirements**. Without limiting any of the other obligations or liabilities of the Contractor, the Contractor shall secure and maintain at its own cost and expense, throughout the duration of this Contract and until the work is completed and accepted by the City of Joplin, insurance of such types and in such amounts as may be necessary to protect it and the interests of the City of Joplin against all hazards or risks of loss as hereunder specified or which may arise out of the performance of the Contract

Documents. The form and limits of such insurance, together with the underwriter thereof in each case, are subject to approval by the City of Joplin. Regardless of such approval, it shall be the responsibility of the contractor to always maintain adequate insurance coverage during the term of the Contract. Failure of the Contractor to maintain coverage shall not relieve it of any contractual responsibility or obligation or liability in general or under the Contract Documents.

The certificates of insurance, including evidence of the required endorsements hereunder or the policies, shall be filed with the City within ten (10) days after the date of the receipt of Notice of Award of the Contract to the Contractor and prior to the start of work. All insurance policies shall require that the insurance company in question provide thirty (30) days written notice prior to modification or cancellation of such insurance. Such notices shall be mailed, certified mail, return receipt requested, to:

City of Joplin - Public Works, 602 S. Main Street, Joplin, MO 64801

Such policies shall name the City as an additional insured, with limits of liability not less than the sovereign immunity limits for Missouri public entities calculated by the Missouri Department of Insurance as of January 1 each calendar year and published annually in the Missouri Register pursuant to Section 537.610, RSMo. (See, Sovereign Immunity Limits | Missouri Department of Insurance)

As of January 1, 2026, the minimum coverage for the insurance referred to herein shall be as set out below:

a. **Workers' Compensation….** Statutory coverage per RSMo 287.010 et seq

Employer's Liability……. $1,000,000.00

b. **Commercial General Liability Insurance** including coverage for Premises, Operations, Products and Completed Operations, Contractual Liability, Broad Form Property Damage, Independent Contractors, Explosion, Collapse, and Underground Property Damage and endorsed for blasting if blasting required. Such coverage shall apply to bodily injury and property damage on an "Occurrence Form Basis" with limits of at least Three Million Five Hundred Forty-Seven Thousand Six Hundred Fifty Eight and no/100 Dollars ($3,547,658.00) for all claims arising out of a single accident or occurrence and at least Five Hundred Thirty Two Thousand One Hundred Fortyh Eight and no/100 Dollars ($532,148.00) with respect to injuries and/or death of any one person in a single occurrence and an amount not less than at least $1,000,000 for all claims to property arising out of a single occurrence and at least $100,000 to any one owner with respect to damages to property. Contractor agrees that the proceeds of such insurance policy shall first be used to pay any award, damages, costs, and/or attorneys' fees incurred by or assessed against City, its employees, officers and agents, before payment of any award, damages, costs or attorneys' fees of Contractor, its employees, officers or agents. Contractor agrees to cause its insurer to name City as an additional insured on such insurance policy, including the City as an additional insured for coverage under its products-completed operations hazard, and said policy shall be primary and noncontributory.

c. **Automobile Liability Insurance** covering bodily injury and property damage for owned, non-owned and hired vehicles, with limits of at least Three Million Five Hundred Forty-Seven Thousand Six Hundred Fifty Eight and no/100 Dollars ($3,547,658.00) for all claims arising out of a single accident or occurrence and at least Five Hundred Thirty Two Thousand One Hundred Fortyh Eight and no/100 Dollars ($532,148.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

d. **Owner's and Contractor's Protective Liability Insurance** to protect the City, its agents, servants and employees from claims which may arise from the performance of this Contract, with limits of at least Three Million Five Hundred Forty-Seven Thousand Six Hundred Fifty Eight and no/100 Dollars ($3,547,658.00) for all claims arising out of a single accident or occurrence and at least Five Hundred Thirty Two Thousand One Hundred Fortyh Eight and no/100 Dollars ($532,148.00) with respect to injuries and/or death of any one person in a single accident or occurrence.

The Owner's and Contractor's Protective Liability Insurance must:

(1) Be a separate policy with the named insured being The City of Joplin, and

(2) Contain an endorsement that disclaims coverage for any claim barred by the doctrines of sovereign immunity or official immunity, except attorney's fees and other litigation costs incurred in defending a claim. Nothing contained in this policy (or this endorsement thereto) shall constitute any waiver of whatever kind of these defenses or sovereign immunity or official immunity for any monetary amount whatsoever.

e. Builders Risk Insurance for contracts involving unoccupied structures. The Contractor shall secure All Risk Builder's Risk Insurance. Unless specifically authorized by the City, the amount of such insurance shall not be less than the total contract price.

f. Subcontracts. In case any or all of this work is sublet, the Contractor shall require the subcontractor to procure and maintain all insurance required in subparagraphs (a), (b) and (c) hereof and in like amounts. Contractor shall require any and all subcontractors with whom it enters into a contract to perform work on this project to protect the City of Joplin through insurance against applicable hazards or risks and shall, upon request of the City, provide evidence of such insurance.

g. Notice. The Contractor and/or subcontractor shall furnish the City prior to beginning the work, the policy as specified in subparagraph (d), and satisfactory proof of carriage of all the insurance required by this contract, with the provision that policies shall not be canceled, modified or non-renewed without thirty (30) days written notice to the City of Joplin.

h. Legislative or Judicial Changes. In the event the scope or extent of the City's tort liability as a governmental entity as described in Section 537.600 through 537.650 RSMo is broadened or increased during the term of this agreement by legislative or judicial action, the City may require Contractor, upon 10 days written notice, to execute a contract addendum whereby the Contractor agrees to provide, at a price not exceeding Contractor's actual increased premium cost, additional liability insurance coverage as the City may require to protect the City from increased tort liability exposure as the result of such legislative or judicial action. Any such additional insurance coverage shall be evidenced by an appropriate certificate of insurance and shall take effect within the time set forth in the addendum.

4. Performance, Labor, and Materials Payment Bond. Contractor shall furnish a Performance Bond and a Labor and Materials Payment Bond with surety approved by the City and on the forms approved by the City, each bond shall be in the amount of $_____.___ (full amount of contract) conditioned upon the full and faithful performance of all major terms and conditions of this contract and payment of all labor and material suppliers. It is further mutually agreed between the parties hereto that if at any time after the execution of this agreement and the surety bond(s) hereto attached for its faithful performance and payment of labor and material suppliers, the City shall deem the surety or sureties upon such bond(s) to be unsatisfactory, or if, for any reason, such bond(s) ceases to be adequate to cover the performance of the work, the Contractor shall, at its expense, within five (5) days after the receipt of notice from the City to do so, furnish an additional bond or bonds, in such form and amount, and with such surety or sureties as shall be satisfactory to the City. In such event no further payment to the Contractor shall be deemed to be due under this contract until such new or additional security for the faithful performance of the work and the payment of labor and material suppliers shall be furnished in a manner and form satisfactory to the City. The corporate surety on any performance or payment bond must be licensed by the State of Missouri and if the required bond exceeds $25,000.00 must be listed in United States Treasury Circular 570.

5. Certification Regarding Disbarment, Eligibility, Indictments, Convictions or Civil Judgements for all Federal Aid Projects.
By signing and submitting the bid, the president or authorized official of the bidder, under penalty of perjury under the laws of the USA, shall certify that, except as noted in the exceptions, the company or any person associated therewith in the capacity of owner, partner, director, officer, principal investor, project director, manager, auditor or any position involving the administration of federal funds:
(Reference can be made to "The System for Award Management" website as a helpful resource).

a. Is not currently under suspension, debarment, voluntary exclusion or determination of ineligibility by any federal agency.

b. Has not been suspended, debarred, voluntarily excluded or determined ineligible by any federal agency within the past three years.

c. Does not have a proposed debarment or suspension pending.

d. Has not been indicted, convicted or had a civil judgment rendered against any of the listed parties by a court of competent jurisdiction in any matter involving fraud or official misconduct within the past three years.

5.1 If there are any exceptions, the bidder shall submit the exceptions on company letterhead, signed by the bidder and inserted inside the bid submitted. Exceptions will not necessarily result in denial of award but will be considered in determining bidder responsibility. For any exception noted, the bidder shall indicate to whom it applies, the initiating agency, and dates of action. Providing false information may result in criminal prosecution or administrative sanctions.

5.2 By signing the contract, the contractor shall further certify that all related subcontracts of $25,000 shall comply with this requirement. This includes all subcontractors, material suppliers and vendors.

6. Contractor's responsibility for subcontractors. The Contractor shall be as fully responsible to the City for the acts and omissions of its subcontractors, and of persons either directly or indirectly employed by them, as Contractor is for the acts and omissions of persons it directly employs. Contractor shall cause appropriate provisions to be inserted in all subcontracts relating to this work, to bind all subcontractors to Contractor by all the terms herein set forth, and insofar as applicable to the work of subcontractors and to give Contractor the same power regarding termination of any subcontract as the City may exercise over Contractor under any provisions of this contract. Nothing contained in this contract shall create any contractual relation between the subcontractor and the City or between any subcontractors.

7. General Independent Contractor Clause. This agreement does not create an employee/employer relationship between the parties. It is the parties' intention that the Contractor will be an independent contractor and not the City's employee for all purposes, including, but not limited to, the application of the Fair Labor Standards Act minimum wage and overtime payments, Federal Insurance Contribution Act, the Social Security Act, the Federal Unemployment Tax Act, the provisions of the Internal Revenue Code, Missouri Revenue and Taxation laws, Missouri Workers' Compensation and Unemployment Insurance laws. The Contractor will retain sole and absolute discretion in the judgment of the manner and means of carrying out the Contractor's activities and responsibilities hereunder. The Contractor agrees that it is a separate and independent enterprise from the public employer, that it has a full opportunity to find other business, that it has made its own investment in its business, and that it will utilize a high level of skill necessary to perform the work. This agreement shall not be construed as creating any joint employment relationship between the Contractor and the City, and the City will not be liable for any obligation incurred by the Contractor, including but not limited to unpaid minimum wages and/or overtime premiums.

8. Liquidated Damages. Time of completion of work by the Contractor is of the essence. Should Contractor, or in the case of default, the surety, fail to complete the work within the time specified in the contract, or within such extra time as may be allowed in accordance with City of Joplin Standard Specifications, Division 0000, General Requirements and Provisions, Section 0400.19, (https://www.joplinmo.org/DocumentCenter/View/12663/2025-Spec-Review-Final-Copy) Contractor (or surety) shall be liable to the City in the amount of $1000.00 per day for each and every calendar day that the contract remains uncompleted after the time allowed for completion, as liquidated damages, and not as a penalty, it being stipulated that actual damages to the City and the public arising from Contractor's failure to timely complete the work would be difficult, if not impossible, to ascertain. The amount assessed as liquidated damages may be withheld from any moneys otherwise due to Contractor from the City.

9. Termination. The City reserves the right to terminate this contract by giving at least five (5) days prior written notice to the Contractor, without prejudice to any other rights or remedies of the City should the Contractor be adjudged a bankrupt, or if Contractor should make a general assignment for the benefit of its creditors, or if a receiver should be appointed for Contractor or for any of its property, or if Contractor should persistently or repeatedly refuse or fail to supply enough properly skilled workmen or proper material, or if Contractor should refuse or fail to make prompt payment to any person supplying labor or materials for the work under the contract, or persistently disregard instructions of the City or fail to observe or perform any provisions of the contract.

10. City's Right to Proceed. In the event this contract is terminated pursuant to Paragraph 8, then the City may take over the work and prosecute the same to completion, by contract or otherwise, and Contractor and its sureties shall be liable to the City for any costs over the amount of this contract thereby occasioned by the City. In any such case, the City may take possession of, and utilize in completing the work, such materials, appliances and structures as may be on the work site and are necessary for completion of the work. The foregoing provisions are in addition to, and not in limitation of, the rights of the City under any other provisions of the contract, city ordinances, and state and federal laws.

11. Termination for Convenience of City. The City shall have the right at any time by written notice to Contractor to terminate and cancel this contract, without cause, for the convenience of the City, and Contractor shall immediately stop work. In such event City shall not be liable to Contractor except for payment for actual work performed prior to such notice in an amount proportionate to the completed contract price and for the actual costs of preparations made by Contractor for the performance of the cancelled portions of the contract, including a reasonable allowance of profit applicable to the actual work performed and such preparations. Anticipatory profits and consequential damages shall not be recoverable by Contractor.

12. Guards and Lights. The Contractor agrees that during the performance of said work, adequate barricades, guards and warning signs, lights, or devices consistent with the requirements contained in the Manual on Uniform Traffic Control Devices shall be provided by Contractor during construction.

13. Liability and Indemnity.

a. In no event shall the City be liable to the Contractor for special, indirect, or consequential damages, except those caused by the City's gross negligence or willful or wanton misconduct arising out of or in any way connected with a breach of this contract. The maximum liability of the City shall be limited to the amount of money to be paid or received by the City under this contract.

b. The Contractor shall defend, indemnify and save harmless the City, its elected or appointed officials, agents and employees from and against any and all liability, suits, damages, costs (including attorney fees), losses, outlays and expenses from claims in any manner caused by, or allegedly caused by, or arising out of, or connected with, this contract, or the work or any subcontract thereunder (the Contractor hereby assuming full responsibility for relations with subcontractors), including, but not limited to, claims for personal injuries, death, property damage, or for damages from the award of this contract to Contractor, notwithstanding any possible negligence, whether sole or concurrent, on the part of the City, its officials, agents and employees.

c. The Contractor shall indemnify and hold the City harmless from all wages or overtime compensation due any employees in rendering services pursuant to this agreement or any subcontract, including payment of reasonable attorneys' fees and costs in the defense of any claim made under the Fair Labor Standards Act, the Missouri Prevailing Wage Law or any other federal or state law.

d. The indemnification obligations of Contractor hereunder shall not be limited by any limitations as to the amount or type of damages, compensation or benefits payable by or for the Contractor, under any federal or state law, to any person asserting the claim against City, its elected or appointed officials, agents and employees, for which indemnification is sought.

e. The indemnification obligations herein shall not negate, abridge, or reduce in any way any additional indemnification rights of the City, its elected or appointed officials, agents and employees, which are otherwise available under statute, or in law or equity.

f. Contractor affirms that it has had the opportunity to recover the costs of the liability insurance required in this agreement in its contract price. Contractor's obligation under this agreement to defend, indemnify, and hold harmless any person from that person's own negligence or wrongdoing is limited to the coverage and limits of the applicable insurance required of the Contractor under this agreement.

g. The Contractor shall indemnify and hold the City harmless for any penalties, fines, fees, or costs, including costs of defense, which are charged or assessed by any Federal, state or local agency including, but not limited to, Environmental Protection Agency or Department of Natural Resources.

14. Payment for Labor and Materials. The Contractor agrees and binds itself to pay for all labor done, and for all the materials used in the construction of the work to be completed pursuant to this contract.

15. Payment. The City will pay the Contractor in accordance with the rate set forth in the contract documents on file in the Public Works Department and by this reference made a part hereof, which shall constitute full and complete compensation for the Contractor's work provided hereunder. Such compensation will be paid in progress payments (less five (5) percent retainage), as established by the City, subject to receipt of a requisition for payment and a statement of work provided by the Contractor and agreement by both the City and the Contractor that the Contractor has fully performed the work to be paid for in such progress payments in conformance with the contract. If the City or the architect or engineer determines that a higher rate of retainage is required to ensure performance of the contract, the City may withhold up to ten (10) percent retainage until the work is fully completed and accepted by the City.

16. Contract Documents. The contract documents shall consist of the following:

a. This Contract
b. All Change Orders
c. Bid Plans and Specifications
d. City of Joplin Standard Specifications (Latest Revised Edition)

e. Special Conditions & Provisions
f. Proposal
g. Statement of Bidder's Qualifications
h. Acknowledgment
i. Performance Bond
h. Payment and Material Bond
k. Instructions to Bidders
l. Non-collusion Affidavit
m. Notice to Proceed

Notice to Contractors: This contract, together with the other documents enumerated in this paragraph, forms the contract between the parties. These documents are as fully a part of the contract as if attached hereto or repeated herein. Contractor agrees to perform all of the work described in the contract documents and to comply with the terms and conditions defined therein for a total sum of _____ ($_____.____) dollars, said amount being subject to any approved addenda or change order.

17. Subsurface Conditions. Contractor agrees that information contained in the published reports and public actions of the Missouri Division of Geology and Land Survey shall be conclusive and binding upon the Contractor as to what subsurface conditions at the job site are reasonably anticipated or reasonably foreseeable. Contractor acknowledges and agrees that it shall not be entitled to any adjustment in the Contract Sum or Contract Times for any concealed condition of any nature, including but not limited to unknown physical conditions of an unusual nature which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, in addition to the information contained in the published reports and public actions of the Missouri Division of Geology and Land Survey. Contractor recognizes that it has assumed the risks of concealed conditions and is being compensated for assuming these risks.

18. Conflict of Interest. In accepting this contract, Contractor certifies that no member or officer of its firm or corporation is an officer or employee of the City of Joplin, Missouri, or any of its boards or agencies, and further that no officer or employee of the City has any financial interest, direct or indirect, in this contract. All applicable federal regulations and provisions of R.S.Mo. Section 105.450 et seq. shall not be violated.

19. Assignment. Contractor shall not assign any interest in this contract, and shall not transfer any interest in the same (whether by assignment or novation), without prior written consent of the City thereto, provided, however, that claims for money due or to become due to the Contractor from the City under this Contract may be assigned to a bank, trust company, or other financial institution without such approval. Notice of such assignment or transfer shall be furnished in writing promptly to the City and the bond surety. Any such assignment is expressly subject to all rights and remedies of the City under this agreement, including the right to change or delete activities from the Contract or to terminate the same as provided herein, and no such assignment shall require the City to give any notice to any such assignee of any actions which the City may take under this agreement.

20. Nondiscrimination. Contractor agrees in the performance of this contract not to discriminate on the ground or because of race, creed, color, national origin or ancestry, sex, religion, handicap, age, status as a protected veteran or status as a qualified individual with a disability, or political opinion or affiliation, against any employee of Contractor or applicant for employment and shall include a similar provision in all subcontracts let or awarded hereunder. The parties hereby incorporate the requirements of 41 C.F.R. §§ 60-1.4(a)(7), 29 C.F.R. Part 471, Appendix A to Subpart A, 41 C.F.R. § 60-300.5(a)ii and 41 C.F.R. § 60-741.5(a), if applicable.

a. This contractor and subcontractor shall abide by the requirements of 41 C.F.R. § 60-300.5(a). This regulation prohibits discriminations against qualified protected veterans and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified protected veterans.

b. This contractor and subcontractor shall abide by the requirements of 41 C.F.R. § 60-741.5(a). This regulation prohibits discrimination against qualified individuals on the basis of disability and requires affirmative action by covered prime contractors and subcontractors to employ and advance in employment qualified individuals with disabilities.

21. Nonresident/Foreign Contractors. Contractor shall procure and maintain during the life of this contract:

a. If Contractor is a foreign corporation, a certificate of authority to transact business in the State of Missouri from the Secretary of State, unless exempt pursuant to the provisions of Section 351.570 R.S.Mo.

b. A certificate from the Missouri Director of Revenue evidencing compliance with the transient employer financial assurance law, unless exempt pursuant to the provisions of Section 285.230 RSMo.

22. Notices. All notices required or permitted hereinunder and required to be in writing may be given by FAX or by first class mail addressed to City and Contractor at the addresses shown above. The date of delivery of any notice given by mail shall be the date falling on the second full day after the day of its mailing. The date of delivery of notice by FAX transmission shall be deemed to be the date transmission occurs, except where the transmission is not completed by 5:00 p.m. on a regular business day at the terminal of the receiving party, in which case the date of delivery shall be deemed to fall on the next regular business day for the receiving party.

23. Records and Audits. Contractor shall maintain accounts and records, including personnel, property, and financial records, adequate to identify and account for all costs pertaining to the Contract and such other records as may be deemed necessary by the City to assure proper accounting for all project funds. These records will be made available for audit purposes to the City or any authorized representative and will be retained for three years after the expiration of this Contract.

24. Authorized Employees. Contractor acknowledges that Section285.530, RSMo, prohibits any business entity or employer from knowingly employing, hiring for employment, or continuing to employ an unauthorized alien to perform work within the State of Missouri. Contractor therefore covenants that is not knowingly in violation of subsection 1 or Section 285.530, RSMo, and that it will not knowingly employ, hire for employment, or continue to employ any unauthorized aliens to perform work on the Project, and that its employees are lawfully to work in the United States.

25. Interest of Contractor and Employees. Contractor covenants that he/she presently has no interest and shall not acquire interest, direct or indirect, in the study area or any parcels therein or any other interest which would conflict in any manner or degree with the performance of his services hereunder. The Contractor further covenants that in the performance of this Contract, no person having any such interest shall be employed.

26. Interest of Members of a City. No member of the governing body of the City and no other officer, employee, or agent of the City who exercises any functions or responsibilities in connection with the planning and carrying out of the program shall have any personal financial interest, direct or indirect, in this Contract, and the Contractor shall take appropriate steps to assure compliance.

27. Interest of Other Local Public Officials. No member of the governing body of the locality and no other public official of such locality, who exercises any functions or responsibilities in connection with the planning and carrying out of the program, shall have any personal financial interest, direct or indirect, in this Contract, and the Contractor shall take appropriate steps to assure compliance.

28. Affidavit for Contracts Over $5,000.00. That pursuant to Missouri Revised Statute Sections 285.525 through 285.550, if this contract exceeds the amount of $5,000.00 and Contractor is associated with a business entity, Contractor shall provide an acceptable notarized affidavit stating that the associated business entity is enrolled in and participates in a federal work authorization program with respect to the employees working in connection with the contracted services, and that said business entity does not knowingly employ any person who is an unauthorized alien in connection with the contracted services. Additionally, Contractor must provide documentation for said business entity evidencing current enrollment in a federal work authorization program.

29. City Benefits. Contractor shall not be entitled to any of the benefits established for the employees of the City nor be covered by the Worker's Compensation Program of the City.

30. Occupational License: Contractor shall obtain and maintain an occupational license with the City of Joplin, Missouri, if required by city code and any required state or federal license. The cost for this occupational license shall be borne by the Contractor. No contract will be executed by the City until this occupational license has been obtained and that the Contractor is current on any City taxes is verified.

31. Safety Training. Pursuant to Missouri Revised Statute Section 292.675, Contractors and subcontractors who sign a contract to work on public works projects must provide a 10-hour OSHA construction safety program, or similar program approved by the Department of Labor and Industrial Relations, to be completed by their on-site employees within sixty (60) days of beginning work on

the construction project. Contractors and subcontractors in violation of this provision will forfeit to the public body $2,500 plus $100 a day for each employee who is employed without training. Public bodies and contractors may withhold/assess these penalties from the payment due to those contractors and subcontractors if found to be in non-compliance.

32. Compliance with Laws. Contractor agrees to comply with all applicable federal, state and local laws or rules and regulations applicable to the provision of services and products hereunder. Contractor affirmatively states that payment of all local, state, and federal taxes and assessments owed by Contractor is current.

33. Entire Agreement. This agreement contains the entire agreement of the parties. No modification, amendment, or waiver of any of the provisions of this agreement shall be effective unless in writing specifically referring hereto and signed by both parties.

34. Remedies. Except as may be otherwise found in the contract documents, all claims, disputes, counter-claims, and other matters in question between the Owner and Contractor arising out of or related to this agreement or the breech thereof, will be decided by arbitration if the parties hereto mutually agree, or in a court of competent jurisdiction within the state in which the Owner is located.

35. Jurisdiction. This agreement and every question arising hereunder shall be construed or determined according to the laws of the State of Missouri. Should any part of this agreement be adjudicated, venue shall be proper only in the Circuit Court of Jasper County, Missouri.

IN WITNESS WHEREOF, the parties hereto have set their hands and seals on the day and year herein stated.

CERTIFICATE OF DIRECTOR OF FINANCE

I certify that the expenditure contemplated by this document is within the purpose of the appropriation to which it is to be charged and that there is an unencumbered balance of appropriated and available funds to pay therefore.

_____

Leslie Haase, Director of Finance

APPROVED AS TO FORM

_____

Peter Edwards, City Attorney

CONTRACTOR:

By: _____

Printed Name: _____

Title: _____

CITY OF JOPLIN, MISSOURI

_____

Daniel Johnson, P.E., Public Works Director

CONTRACTOR'S BOND NO.

FOR CITY CONTRACTS
PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: That

(Contractor)

a Corporation, hereinafter called Principal, and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF JOPLIN, MISSOURI
602 S. MAIN STREET, JOPLIN, MO 64801

hereinafter called OWNER, in the total aggregate penal sum of _____ AND ___/100 DOLLARS ($_____.__) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

TIN CUP PARALLEL FORCE MAIN

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, or any extensions thereof, which may be granted by the OWNER, with or with-out notice to the SURETY and during the one year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.
PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment of the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

IN WITNESS, whereof, this the _____ day of _____, 20____.

ATTEST: (SEAL)

_____ _____
Secretary Principal

Approved as to form this _____ day

of _____, 20____. By _____
Signature

_____ By _____
Peter Edwards, City Attorney Printed Name/Title

ATTEST: (SEAL)

_____ _____
Secretary Surety

Approved this _____ day of

_____, 20_____. By _____
Signature

_____ By _____
Leslie Haase, Director of Finance Printed Name/Title

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list

(Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

CONTRACTOR'S BOND NO.
FOR CITY CONTRACTS
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That

(CONTRACTOR)

a Corporation, hereinafter called Principal, and

_____

(Name of Surety)

_____

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF JOPLIN, MISSOURI
602 S. MAIN STREET, JOPLIN, MO 64801

hereinafter called OWNER, and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of _____ AND ___/100 DOLLARS ($_____.__) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20___, a copy of which is hereto attached and made a part hereof for the construction of:

TIN CUP PARALLEL FORCE MAIN

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal or coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, all insurance premiums on said work, and for all labor cost incurred in such WORK including the stipulation in said contract requiring the payment of not less than the prevailing hourly rate of wages as found by the Department of Labor and Industrial Relations of the State of Missouri or by final judicial determination of the Courts of the State of Missouri, including that by a SUBCONTRACTOR, and to any mechanic or material man lien holder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCONTRACTORS, any persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

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

PROVIDED, FURTHER, that no suit or action shall be commended hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL, shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need to be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, it being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction thereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan documents shall include any alteration, addition, extension or modification of any character whatsoever.
PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS, whereof, this the _____ day of _____, 20____.

ATTEST: (SEAL)

_____
Secretary

_____
Principal

Approved as to form this _____ day

of _____, 20____.

By _____
Signature

_____
Peter Edwards, City Attorney

By _____
Printed Name/Title

ATTEST: (SEAL)

_____
Secretary

_____
Surety

Approved this _____ day of

_____, 20_____.

By _____
Signature

_____
Leslie Haase, Director of Finance

By _____
Printed Name/Title

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

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

NOTICE OF AWARD 00 51 00

TO: _____
_____
_____
_____

PROJECT Description: TIN CUP PARALLEL FORCE MAIN

The OWNER has considered the BID submitted by you on _____, 2026 for the above-described WORK in response to its Invitation to Bid, and Information for Bidders.

You are hereby notified that your BID has been accepted in the amount of _____ and ____/100 DOLLARS ($_____.___).

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

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

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

Dated this _____ day of _____, 2026.

OWNER:

THE CITY OF JOPLIN, MISSOURI

By _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE OF AWARD is hereby acknowledged

By _____

Title: _____

this the _____ day of _____, 2026

SECTION 00 00 55 00- NOTICE TO PROCEED

TO: _____

_____

_____

_____

DATE: _____

PROJECT Description: CITY OF JOPLIN

TIN CUP PARALLEL FORCE MAIN

_____

You are hereby notified to commence WORK in accordance with the Agreement dated _____, 2026 on or before _____, 2026 and you are to complete the WORK within 270 consecutive calendar days thereafter. The date of completion of all WORK is therefore _____, 2027.

CITY OF JOPLIN MISSOURI

By: _____

_____

Title

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged by _____

_____

this the _____ day of _____, 20___.

By: _____

Printed Name: _____

Title: _____

END OF SECTION 00 55 00

CONTRACTOR'S BOND NO.

FOR CITY CONTRACTS
PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS: That

(Contractor)

a Corporation, hereinafter called Principal, and

_____
(Name of Surety)

_____
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF JOPLIN, MISSOURI
602 S. MAIN STREET, JOPLIN, MO 64801

hereinafter called OWNER, in the total aggregate penal sum of _____ AND ___/100 DOLLARS ($_____.__) lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20____, a copy of which is hereto attached and made a part hereof for the construction of:

TIN CUP PARALLEL FORCE MAIN

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, or any extensions thereof, which may be granted by the OWNER, with or with-out notice to the SURETY and during the one year guaranty period and if the PRINCIPAL shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void, otherwise to remain in full force and effect.
PROVIDED, FURTHER, that the said SURETY, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed thereunder or the SPECIFICATIONS accompanying same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that it is expressly agreed that the BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment of the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the CONTRACT as so amended. The term "Amendment", wherever used in this BOND, and whether referring to this BOND, the Contract or the Loan Documents shall include any alteration, addition, extension, or modification of any character whatsoever.

IN WITNESS, whereof, this the _____ day of _____, 20____.

ATTEST: (SEAL)

_____ _____
Secretary Principal

Approved as to form this _____ day

of _____, 20____. By _____
Signature

_____ By _____
Peter Edwards, City Attorney Printed Name/Title

ATTEST: (SEAL)

_____ _____
Secretary Surety

Approved this _____ day of

_____, 20_____. By _____
Signature

_____ By _____
Leslie Haase, Director of Finance Printed Name/Title

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list

(Circular 570 as amended) and be authorized to transact business in the state where the Project is located.

CONTRACTOR'S BOND NO.
FOR CITY CONTRACTS
PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That

(CONTRACTOR)

a Corporation, hereinafter called Principal, and

_____

(Name of Surety)

_____

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

THE CITY OF JOPLIN, MISSOURI
602 S. MAIN STREET, JOPLIN, MO 64801

hereinafter called OWNER, and unto all persons, firms, and corporations who or which may furnish labor, or who furnish materials to perform as described under the contract and to their successors and assigns in the total aggregate penal sum of _____ AND ___/100 DOLLARS ($_____.__) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the principal entered into a certain contract with the OWNER, dated the _____ day of _____, 20___, a copy of which is hereto attached and made a part hereof for the construction of:

TIN CUP PARALLEL FORCE MAIN

NOW, THEREFORE, if the PRINCIPAL shall promptly make payment to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extensions or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal or coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK, all insurance premiums on said work, and for all labor cost incurred in such WORK including the stipulation in said contract requiring the payment of not less than the prevailing hourly rate of wages as found by the Department of Labor and Industrial Relations of the State of Missouri or by final judicial determination of the Courts of the State of Missouri, including that by a SUBCONTRACTOR, and to any mechanic or material man lien holder whether it acquires its lien by operation of State or Federal law; then this obligation shall be void, otherwise to remain in full force and effect.

PROVIDED, that beneficiaries or claimants hereunder shall be limited to the SUBCONTRACTORS, any persons, firms, and corporations having a direct contract with the PRINCIPAL or its SUBCONTRACTORS.

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

PROVIDED, FURTHER, that no suit or action shall be commended hereunder by any claimant: (a) Unless claimant, other than one having a direct contract with the PRINCIPAL, shall have given written notice to any two of the following: The PRINCIPAL, the OWNER, or the SURETY above named within ninety (90) days after such claimant did or performed the last of the work or labor, or furnished the last of the materials for which said claim is made, stating with substantial accuracy the amount claimed and the name of the party to whom the materials were furnished, or for whom the work or labor was done or performed. Such notice shall be served by mailing the same by registered mail or certified mail, postage prepaid, in an envelope addressed to the PRINCIPAL, OWNER, or SURETY, at any place where an office is regularly maintained for the transaction of business, or served in any manner in which legal process may be served in the state in which the aforesaid project is located, save that such service need to be made by a public officer. (b) After the expiration of one (1) year following the date of which PRINCIPAL ceased work on said CONTRACT, it being understood, however, that if any limitation embodied in the BOND is prohibited by any law controlling the construction thereof, such limitation shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

PROVIDED, FURTHER, that it is expressly agreed that this BOND shall be deemed amended automatically and immediately, without formal and separate amendments hereto, upon amendment to the Contract not increasing the contract price more than 20 percent, so as to bind the PRINCIPAL and the SURETY to the full and faithful performance of the Contract as so amended. The term "Amendment", wherever used in this BOND and whether referring to this BOND, the contract or the loan documents shall include any alteration, addition, extension or modification of any character whatsoever.
PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS, whereof, this the _____ day of _____, 20____.

ATTEST: (SEAL)

_____
Secretary

_____
Principal

Approved as to form this _____ day

of _____, 20____.

By _____
Signature

_____
Peter Edwards, City Attorney

By _____
Printed Name/Title

ATTEST: (SEAL)

_____
Secretary

_____
Surety

Approved this _____ day of

_____, 20_____.

By _____
Signature

_____
Leslie Haase, Director of Finance

By _____
Printed Name/Title

NOTE: Date of BOND must not be prior to date of Contract.

If CONTRACTOR is partnership, all partners should execute BOND.

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

DOCUMENT 00 72 00 – GENERAL CONDITIONS

ARTICLE 1 - DEFINITIONS AND TERMINOLOGY

1.01 CONTRACT DOCUMENTS:

A. The Contract Documents establish the rights and obligations of the parties and shall consist of the following:
   1. The Agreement.
   2. Contractor's Bid (including documentation accompanying the Bid and any post-bid documentation submitted and accepted prior to Notice of Award) when attached as an exhibit to the Agreement.
   3. Notice to Proceed.
   4. Bonds.
   5. General Conditions.
   6. Specifications.
   7. Contract Drawings.
   8. Addenda relating to any of the Contract Documents.
   9. Modifications issued on or after the Effective Date of Agreement including Written Amendments, Change Orders, Work Change Directives, Field Orders, and Engineer's written interpretations and clarifications.

B. Reports and drawings of subsurface and physical conditions and approved Submittals by Contractor are not Contract Documents.

C. Only printed or hard copies of items listed in subparagraph 1.01A are Contract Documents. Files in electronic media format of text, data, graphics, and the like that may be furnished by Owner to Contractor are not Contract Documents.

1.02 DEFINITIONS:

A. Wherever used in these General Conditions or elsewhere in the Contract Documents, the following terms have the meanings indicated below, which are applicable to both the singular and plural thereof:
   1. "Addenda" - written or graphic changes or interpretations of the Contract Documents issued by Engineer prior to the opening of Bids.
   2. "Agreement" - the written agreement between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.
   3. "Application for Payment" - the form acceptable to Engineer which is to be used by Contractor during the course of the Work in requesting progress and final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.
   4. "Asbestos" - any material that contains more than 1% asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.
   5. "Bid" - the formal offer of the Bidder submitted on the prescribed Bid Form together with the required Bid security and all information submitted with the Bid that pertains to performance of the Work.
   6. "Bidder" - any person, firm, or corporation submitting a Bid for the Work or their duly authorized representatives.

Portions of this document, Copyright, by Engineers Joint Contract Documents Committee (EJCDC), 1983 through 1996 and by Burns & McDonnell Engineering Company, Inc., 1974 through 2008. Cautionary note: many parts of this document vary significantly from EJCDC standard documents.

7. "Change Order" - a written document signed by Owner and Engineer authorizing an addition, deletion, or revision in the Work, or an adjustment in the Contract Price or the Contract Time issued on or after execution of the Agreement.
8. "Contract Drawings" - drawings and other data designated as Contract Drawings prepared by Engineer for this Contract which show the character and scope of the Work to be performed and are referred to in the Contract Documents.
9. "Contract Price" - the total monies payable to Contractor under the Contract Documents as stated in the Agreement.
10. "Contract Times" - the number of days or the dates stated in the Agreement to: (i) achieve Substantial Completion; and (ii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
11. "Contractor" - the person, firm or corporation with whom Owner has entered into the Agreement.
12. "Date of Contract", "Effective Date of the Agreement" - the date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.
13. "Day" - a calendar day of 24 hours measured from midnight to the next midnight shall constitute a day.
14. "Engineer" or "Engineer-Architect" - Burns & McDonnell Engineering Company, a Missouri Corporation, or its duly authorized representatives.
15. "Engineer's Consultant" - an individual or entity having a contract with Engineer to furnish services as Engineer's independent professional associate or consultant with respect to the Project.
16. "Equipment" - a product with operational or nonoperational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.
17. "Field Order" - a written order issued by Engineer which orders minor changes in the Work in accordance with Paragraph 8.05 but which does not involve a change in the Contract Price or the Contract Times.
18. "General Requirements" - Sections of DIVISION 01of the Specifications. The General Requirements pertain to all sections of the Specifications.
19. "Hazardous Waste" - the term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.
20. "Law" - law of the place of the Project which shall govern the performance hereunder.
21. "Laws and Regulations," "Laws or Regulations" - laws, rules, regulations, ordinances, codes and/or orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
22. "Lien" - charges, security interests, or encumbrances on Project funds, real property, or personal property.
23. "Materials" - products substantially shaped, cut, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form a part of the Work.
24. "Notice of Award" - the written notice by Owner to the apparent successful Bidder stating that upon compliance by the apparent successful Bidder with the conditions precedent enumerated therein, within the time specified, Owner will sign and deliver the Agreement.

25. "Notice to Proceed" - the written notice by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform Contractor's obligation under the Contract Documents.
26. "Owner" - the public body or authority, corporation, association, partnership, or individual with whom the Contractor has entered into the Agreement and for whom the Work is to be provided.
27. "Partial Utilization" - placing a portion of the Work in service for the purpose for which it is intended (or a related purpose) before reaching Substantial Completion of all the Work.
28. "PCBs" - Polychlorinated biphenyls.
29. "Petroleum" - petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60°Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.
30. "Project" - the total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.
31. "Project Manual" - The bound documentary information prepared for bidding and constructing the Work. A listing of the contents of the Project Manual, which may be bound in one or more volumes, is contained in the table(s) of contents.
32. "Radioactive Material" - source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.
33. "Resident Project Representative" - the authorized representative of Owner who is assigned to the construction Site or any part thereof.
34. "Reference Drawings" - drawings not specifically prepared for this Contract, but which contain information pertinent to the Work.
35. "Samples" - physical examples of Equipment, Materials, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.
36. "Shop Drawings" - all drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.
37. "Site" - lands or areas indicated in the Contract Documents as being furnished by Owner upon which the Work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by Owner which are designated for the use of Contractor.
38. "Specifications" - those portions of the Contract Documents consisting of written technical descriptions of the Work, and covering the Equipment, Materials, workmanship, and certain administrative details applicable thereto.
39. "Subcontractor" - an individual, firm, or corporation having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
40. "Submittals" - all Shop Drawings, product data, and Samples which are prepared by Contractor, a Subcontractor, manufacturer, or Supplier, and submitted by Contractor to Engineer as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe proper installation, operation and maintenance, or technical properties.
41. "Substantial Completion" - the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer as evidenced by his definitive certificate of

Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be used for the purposes for which it was intended.

42. "Supplier" - a manufacturer, fabricator, supplier, distributor, materialman, or vendor.
43. "Underground Facilities" - all pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems, or water.
44. "Unit Price Work" - Work to be paid on the basis of Unit Prices.
45. "Work" - the entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work is the result of performing services, the furnishing of Bonds and insurance, furnishing labor, and furnishing and incorporating Materials and Equipment into the construction, all as required by the Contract Documents.
46. "Work Change Directive" - a written directive to Contractor, issued on or after the effective Date of the Agreement and signed by Owner and recommended by Engineer, ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in Article 4 or to emergencies under Paragraph 6.12. A Work Change Directive may not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in Paragraph 9.01B.
47. "Written Amendment" - a written amendment to the Contract Documents, signed by Owner and Contractor on or after the Effective Date of the Agreement, and normally dealing with the nonengineering or nontechnical rather than strictly Work-related aspects of the Contract Documents.
48. "electronic equipment compliance" or "electronically compliant" – means that equipment, devices, items, systems, software, hardware, and firmware included in the Work or used to produce the Work shall properly, appropriately, and consistently function and accurately process date and time data (including without limitation: calculating, comparing, and sequencing).

1.03 TERMINOLOGY:

A. Whenever used in these General Conditions or elsewhere in the Contract Documents, the following terminology shall have the intent and meaning specified below:
   1. The words "as indicated" refer to the Drawings and "as specified" refer to the remaining Contract Documents.
   2. The terms "responsible" or "responsibility" mean that the party to which the term applies shall assume all responsibilities thereto.
   3. The term "approve", when used in response to Submittals, requests, applications, inquiries, reports and claims by Contractor, will be held to limitations of Engineer's responsibilities and duties or specified in these General Conditions. In no case will "approval" by Engineer be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

4. When applied to Equipment and Materials, the words "furnish", "install", and "provide" shall mean the following:
   a. The word "provide" shall mean to furnish, pay for, deliver, assemble, install, adjust, clean and otherwise make Materials and Equipment fit for their intended use.
   b. The word "furnish" shall mean to secure, pay for, deliver to Site, unload and uncrate Equipment and Materials.
   c. The word "install" shall mean to assemble, place in position, incorporate in the Work, adjust, clean, and make fit for use.
   d. The phrase "furnish and install" shall be equivalent to the word "provide."

ARTICLE 2 - PRELIMINARY MATTERS

2.01 DELIVERY OF BONDS:

A. When Contractor delivers the executed Agreements to Owner, Contractor shall also deliver to Owner such Bonds as Contractor may be required to furnish in accordance with Paragraph 5.01.

2.02 COPIES OF DOCUMENTS:

A. Owner will furnish to Contractor copies of the Contract Documents as stated in the General Requirements.

2.03 COMMENCEMENT OF CONTRACT TIMES; NOTICE TO PROCEED:

A. The Contract Times will commence to run on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within 30 days after the Effective Date of the Agreement. In no event will the Contract Times commence to run later than the 75th day after the day of Bid opening or the 30th day after the Effective Date of the Agreement, whichever date is earlier.

2.04 STARTING THE PROJECT:

A. Contractor shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the Site prior to the date on which the Contract Times commence to run.

2.05 BEFORE STARTING CONSTRUCTION:

A. Before starting construction and undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby; however, Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, or discrepancy in the Contract Documents, unless Contractor had actual knowledge thereof or should reasonably have known thereof.

B. Within ten days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for review:
   1. An estimated construction progress schedule indicating the starting and completion dates of the various stages of the Work.
   2. A preliminary procurement schedule.
   3. A preliminary schedule of Submittal submissions.

4. A preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by Contractor at the time of submission.

C. Before any Work at the Site is started, Contractor shall deliver to Owner, with a copy to Engineer, certificates and other evidence of insurance requested by Owner which Contractor is required to purchase and maintain in accordance with the Agreement.

2.06 PRECONSTRUCTION CONFERENCE:

A. Within 20 days after the Effective Date of the Agreement, but before Contractor starts the Work at the Site, a conference attended by Contractor, Engineer, and others as appropriate will be held to discuss the schedules referred to in Paragraph 2.05B to discuss procedures for handling Submittals, processing Applications for Payment, and to establish a working understanding among the parties as to the Work.

2.07 FINALIZING SCHEDULES:

A. At least ten days before submission of the first Application for Payment, a conference attended by Contractor, Engineer, and others as appropriate will be held to finalize the schedules submitted in accordance with Paragraph 2.05B. The finalized construction progress schedule will be acceptable to Engineer as providing an orderly progression of the Work to completion within the Contract Times, but such acceptance will neither impose on Engineer responsibility for the progress or scheduling of the Work nor relieve Contractor from full responsibility therefor. The finalized schedule of Submittal submissions will be acceptable to Engineer as providing a workable arrangement for processing the submissions. The finalized schedule of values will be acceptable to Engineer as to form and substance.

ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 INTENT:

A. The Contract Documents comprise the entire agreement between Owner and Contractor concerning the Work. The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the Law of the place of the Project.

B. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, Materials, or Equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for.

1. When words which have a well-known technical or trade meaning are used to describe Work, Materials, or Equipment, such words shall be interpreted in accordance with that meaning.
2. Reference to standard specifications, manuals, or codes of any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual, or code (whether or not specifically

incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of Owner, Contractor, or Engineer, or any of their consultants, agents, or employees from those set forth in the Contract Documents, nor shall it be effective to assign to Engineer, or any of Engineer's consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.10C or 8.10D.

3. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Paragraph 8.04.

C. If, during the performance of the Work, Contractor finds a conflict, error, or discrepancy in the Contract Documents, Contractor shall so report to Engineer in writing at once and before proceeding with the Work affected thereby shall obtain a written interpretation or clarification from Engineer; however, Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof or should reasonably have known thereof.

D. In case of any conflict between manufacturers' data and the Contract Documents, the Contract Documents will take precedence unless the manufacturers' data conforms to data submitted with the Bid with a statement that the Bid is conditioned upon furnishing the Equipment and Materials defined in the manufacturers' data submitted therewith.

E. Applicable codes and standards referenced in these Contract Documents establish minimum requirements for Equipment, Materials, and Work and are superseded by more stringent requirements of Contract Documents when and where they occur.

F. The Specifications are separated into Divisions and Sections for convenience in defining the Work. Contract Drawings are separated according to engineering disciplines and other classifications. This sectionalizing and the arrangement of Contract Drawings shall not control the Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

3.02 AMENDING AND SUPPLEMENTING CONTRACT DOCUMENTS:

A. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:
   1. A formal Written Amendment.
   2. A Change Order (pursuant to Paragraph 9.01D).

B. As indicated in Paragraphs 10.01B and 11.01A, Contract Price and Contract Times may only be changed by a Change Order or Written Amendment.

C. In addition, the requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in the following way:
   1. A Field Order (pursuant to Paragraph 8.05).
   2. Engineer's written interpretation or clarification (pursuant to Paragraph 8.04).

3.03 OWNERSHIP AND REUSE OF DOCUMENTS:

A. All Contract Documents and copies thereof furnished by Engineer shall remain his property. With the exception of those copies signed in connection with the execution of the Agreement, all Contract Documents shall be returned to Engineer on request upon completion of the Work.

B. Neither Contractor nor any Subcontractor or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner shall have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Engineer; and they

shall not reuse any of the documents on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.

ARTICLE 4 - AVAILABILITY OF LANDS; PHYSICAL CONDITIONS; REFERENCE POINTS

4.01 AVAILABILITY OF LANDS:

A. Owner shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of Contractor. Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by Owner, unless otherwise provided in the Contract Documents.

B. If Contractor believes that any delay in Owner's furnishing these lands, rights-of-way, or easements entitles Contractor to an extension of the Contract Times, Contractor may make a claim therefor as provided in Article 11.

C. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of Materials and Equipment.

D. Contractor shall confine his operations to the construction limits indicated.

4.02 UNFORESEEN SUBSURFACE CONDITIONS:

A. Contractor shall promptly notify Engineer in writing of any subsurface or latent physical conditions encountered at the Site which differ materially from those specified or indicated, or which could be reasonably interpreted from examination of the Site and available subsurface information at the time of bidding.

B. Engineer will promptly investigate those conditions and advise Owner if further surveys or subsurface tests are necessary. Promptly thereafter, Owner will obtain the necessary additional surveys and tests and furnish copies of results to Engineer and Contractor.

C. If Engineer finds that the subsurface or latent physical conditions encountered at the Site differ materially from those specified or indicated, or which could have been reasonably interpreted from examination of the Site and available subsurface information at the time of bidding, then a Change Order will be issued incorporating the necessary revisions.

4.03 PHYSICAL CONDITIONS - UNDERGROUND FACILITIES:

A. Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the Site is based on information and data furnished to Owner or Engineer by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and,
2. Contractor shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof as provided in Paragraph 6.12 and repairing any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price.

B. Not Shown or Indicated: If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated in the Contract Documents and which Contractor could not reasonably have been expected to be aware of, Contractor shall, promptly after

becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by Paragraph 6.13), identify the owner of such Underground Facility and give written notice thereof to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and the Contract Documents will be amended or supplemented to the extent necessary. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility as provided in Paragraph 6.12. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and which Contractor could not reasonably have been expected to be aware of. If the parties are unable to agree as to the amount or length thereof, Contractor may make a claim therefor as provided in Articles 10 and 11.

4.04 REFERENCE POINTS:

A. Engineer will provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work (unless otherwise specified in the General Requirements), shall protect and preserve the established reference points, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel. Contractor shall be responsible for any mistakes or loss of time that may result from their loss or disturbance.

B. Contractor shall make such surveys as are required for establishing pay limits and determining quantities for progress pay estimates. He shall furnish Engineer with one copy of all field notes of such surveys.

4.05 ASBESTOS, PCBS, PETROLEUM, HAZARDOUS WASTE, OR RADIOACTIVE MATERIAL:

A. Owner shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material uncovered or revealed at the Site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the Site. Owner shall not be responsible for any such materials brought to the Site by Contractor, Subcontractor, Suppliers, or anyone else for whom Contractor is responsible.

B. Contractor shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by Paragraph 6.13), and (ii) notify Owner and Engineer (and thereafter confirm such notice in writing). Owner shall promptly consult with Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such hazardous condition or take corrective action, if any. Contractor shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after Owner has obtained any required permits related thereto and delivered to Contractor special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract

Times as a result of such Work stoppage or such special conditions under which Work is agreed by Contractor to be resumed, either party may make a claim therefor as provided in Articles 10 and 11.

C. If after receipt of such special written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim therefor as provided in Articles 10 and 11. Owner may have such deleted portion of the Work performed by Owner's own forces or others.

D. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, Engineer, Engineer's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages arising out of or resulting from such hazardous condition, provided that: (i) any such claim, cost, loss or damage is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (ii) nothing in this subparagraph 4.05D shall obligate Owner to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

E. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Engineer, Engineer's Consultants, and the officers, directors, partners, employees, agents, other consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages arising out of or relating to such hazardous condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this subparagraph 4.05E shall obligate Contractor to indemnify any person or entity from and against the consequences of that person's or entity's own negligence.

F. The provisions of Paragraphs 4.02 and 4.03 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material uncovered or revealed at the Site.

ARTICLE 5 - BONDS

5.01 PERFORMANCE AND OTHER BONDS:

A. Contractor shall furnish performance and payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as otherwise provided by Law or Regulation or by the Contract Documents. Contractor shall also furnish such other Bonds as are required by the Contract Documents. All Bonds shall be in the forms prescribed by Law or Regulation or by the Contract Documents and be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Financial Management Service, Surety Bond Branch, U.S. Department of the Treasury.

B. The Bonds shall be automatically increased in amount and extended in time without formal and separate amendments to cover full and faithful performance of the Contract in the event of Change Orders, regardless of the amount of time or money involved. It is Contractor's responsibility to notify his surety of any changes affecting the general scope of the Work or change in the Contract Price or Contract Times.

C. Bonds signed by an agent must be accompanied by a certified copy of the authority to act.
D. Date of Bonds shall be the same as the Effective Date of the Agreement.
E. If at any time during the continuance of the Contract, the surety on any Bond becomes unacceptable to Owner for financial reasons, Owner has the right to require additional and sufficient sureties which Contractor shall furnish to the satisfaction of Owner within ten days after notice to do so.
F. If the surety on any Bond furnished by Contractor is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of Paragraph 5.01A, Contractor shall within five days thereafter substitute another Bond and surety, both of which must be acceptable to Owner.

ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES

6.01 SUPERVISION AND SUPERINTENDENCE:

A. Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the Work, but Contractor shall not be responsible for the negligence of others in the design or selection of a specific means, method, technique, sequence, or procedure of construction which is indicated in and required by the Contract Documents. Contractor shall be responsible to see that the finished Work complies accurately with the Contract Documents.
B. Contractor shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the Site and shall have authority to act on behalf of Contractor. All communications given to the superintendent shall be as binding as if given to Contractor.
C. When manufacturer's field services in connection with the erection, installation, start-up, or testing of Equipment furnished under this Contract, or instruction of Owner's personnel thereon are specified, Contractor shall keep on the Work, during its progress or as specified, competent manufacturer's field representatives and any necessary assistants.

6.02 LABOR, EQUIPMENT, AND MATERIALS:

A. Contractor shall provide competent, suitably qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site Except in connection with the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the Site shall be performed during regular working hours, and Contractor will not permit overtime work or the performance of Work on Saturday, Sunday, or any legal holiday without Owner's written consent given after prior written notice to Engineer.
B. Unless otherwise specified in the General Requirements, Contractor shall furnish and assume full responsibility for all Equipment and Materials, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up, and completion of the Work.
C. All Equipment and Materials shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by Engineer, Contractor shall furnish satisfactory

evidence [including reports of required tests] as to the kind and quality of Equipment and Materials. All Equipment and Materials shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective to assign to Engineer, or any of Engineer's consultants, agents, or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 8.10C and 8.10D.

D. All Equipment and Materials incorporated in the Work shall be designed to meet the applicable safety standards of federal, state, and local Laws and Regulations.

E. Electronic Equipment Compliance:

1. Contractor warrants that all equipment, devices, items, systems, software, hardware or firmware provided under this Contract shall be electronically compliant, meaning that they shall properly, appropriately, and consistently function and accurately process date and time data (including without limitation: calculating, comparing, and sequencing). This warranty supercedes anything in the Specifications or other Contract Documents which might be construed inconsistently. This warranty is applicable whether the equipment, device, item, system, software, hardware, or firmware is specified with or without reference to a manufacturer's name, make, or model number.

6.03 ADJUSTING PROGRESS SCHEDULE:

A. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) adjustments in the progress schedule to reflect the impact thereon of new developments; these will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.04 SUBSTITUTES OR "OR-EQUAL" ITEMS:

A. Whenever an item of Equipment or Material is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, appearance, and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent, or "or-equal" item or no substitute is permitted, other items of Equipment or Material of other Suppliers may be submitted by Contractor to Engineer for review under the circumstances described below.

1. "Or-Equal" Items: If in Engineer's sole discretion an item of Equipment or Material proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For purposes of this Paragraph 6.04A.1, a proposed item of Equipment or Material will be considered functionally equal to an item so named if:

a. In the exercise of reasonable judgment Engineer determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;

b. Contractor certifies that: (i) there is no increase in cost to Owner; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

2. Substitute Items:
   a. If in Engineer's sole discretion an item of Equipment or Material proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.04A.1, it will be considered a proposed substitute item.
   b. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of Equipment or Material proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of Equipment or Materials will not be accepted by Engineer from anyone other than Contractor.
   c. The procedure for review by Engineer will be as set forth in paragraph 6.04A.2.d, as may be supplemented in the General Requirements and as Engineer may decide is appropriate under the circumstances.
   d. Contractor shall first make written application to Engineer for review of a proposed substitute item of Equipment or Material that Contractor seeks to furnish or use. The application shall certify that the proposed substitute item will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified. The application will state the extent, if any, to which the use of the proposed substitute will prejudice Contractor's achievement of Substantial Completion on time; whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents [or in the provisions of any other direct contract with Owner for work on the Project] to adapt the design to the proposed substitute item; and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by Engineer in evaluating the proposed substitute item. Engineer may require Contractor to furnish additional data about the proposed substitute item.

B. If a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or use a substitute means, method, sequence, technique, or procedure of construction acceptable to Engineer, if Contractor submits sufficient information to allow Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents. The procedure for review by Engineer will be similar to that provided in Paragraphs 6.04A.2 as applied by Engineer and as may be supplemented in the General Requirements.

C. Engineer will be allowed a reasonable time within which to evaluate each proposed substitute or "or-equal" item. Engineer will be the sole judge of acceptability, and no substitute or "or-equal" will be ordered, installed, or used until Engineer's review is complete, which will be evidenced by either (i) a Change Order for a substitute, or (ii) an approved Submittal for an "or-equal." Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

D. Engineer will record time required by Engineer and Engineer's Consultants in evaluating substitute proposed or submitted by Contractor pursuant to Paragraphs 6.04A.2 and 6.04B and in making changes in the Contract Documents [or in the provisions of any other direct contract with Owner for work on the Project] occasioned thereby. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer and Engineer's Consultants for evaluating each such proposed substitute.

6.05 CONCERNING SUBCONTRACTORS, SUPPLIERS, AND OTHERS:

A. Contractor shall not employ any Subcontractor, Supplier, or other person or organization (including those acceptable to Owner and Engineer as indicated in Paragraph 6.05B), whether initially or as a substitute, against whom Owner or Engineer may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other person or organization to furnish or perform any of the Work against whom Contractor has reasonable objection.

B. If the Contract Documents require the identity of certain Subcontractors, Suppliers, or other persons or organizations [including those who are to furnish the principal items of Equipment and Materials] to be submitted to Owner within the required time after Bid opening prior to the Effective Date of the Agreement for acceptance by Owner and Engineer and if Contractor has submitted a list thereof, Owner's or Engineer's acceptance (either in writing or by failing to make written objection thereto) of any such Subcontractor, Supplier, or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable substitute, the Contract Price will be increased by the difference in the cost occasioned by such substitution, and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by Owner or Engineer of any such Subcontractor, Supplier, or other person or organization shall constitute a waiver of any right of Owner or Engineer to reject defective Work.

C. Contractor shall be fully responsible to Owner and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier, or other person or organization, nor shall it create any obligation on the part of Owner or Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier, or other person or organization except as may otherwise be required by Laws and Regulations.

D. All Work performed for Contractor by a Subcontractor will be pursuant to an appropriate agreement between Contractor and the Subcontractor which specifically binds the Subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer and contains waiver provisions. Contractor shall pay each Subcontractor a just share of any insurance moneys received by Contractor on account of losses under policies issued.

6.06 PATENT FEES AND ROYALTIES:

A. Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product, or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Engineer its

use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents.

B. Contractor shall indemnify and hold harmless Owner and Engineer and anyone directly or indirectly employed by either of them from and against all claims, damages, losses, and expenses (including attorneys' fees and court and arbitration costs) arising out of any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product, or device not specified in the Contract Documents, and shall defend all such claims in connection with any alleged infringement of such rights.

6.07 PERMITS:

A. Unless otherwise provided in the Contract Documents, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids. Contractor shall pay all charges of utility owners for connections to the Work, and Owner shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

6.08 LAWS AND REGULATIONS:

A. Contractor shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

B. If Contractor observes that the Specifications or Drawings are at variance with any Laws or Regulations, Contractor shall give Engineer prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in Paragraph 3.02. If Contractor performs any Work knowing or having reason to know that it is contrary to such Laws or Regulations, and without such notice to Engineer, Contractor shall bear all costs arising therefrom; however, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with such Laws and Regulations.

6.09 USE OF PREMISES:

A. Contractor shall confine construction equipment, the storage of Equipment and Materials, and the operations of workers to the Project Site and land and areas identified in and permitted by the Contract Documents and other land and areas permitted by Laws and Regulations, rights-of-way, permits, and easements, and shall not unreasonably encumber the premises with construction equipment or other equipment and materials. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work. Should any claim be made against Owner or Engineer by any such owner or occupant because of the performance of the Work, Contractor shall promptly attempt to settle with such other party by agreement or otherwise resolve the claim by arbitration or at Law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner and Engineer harmless from and against all claims, damages, losses, and expenses (including, but not limited to, fees of engineers, architects, attorneys and other professionals, and court and arbitration costs) arising directly, indirectly or consequentially out of any action, legal or equitable, brought by any such other party against Owner or Engineer to the extent based on a claim arising out of Contractor's performance of the Work.

B. During the progress of the Work, Contractor shall keep the premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work. At the completion of the Work, Contractor shall remove all waste materials, rubbish, and debris from and about the premises as well as all tools, appliances, construction equipment and machinery, and surplus materials, and shall leave the Site clean and ready for occupancy by Owner. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

C. Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.10 RECORD DOCUMENTS:

A. Contractor shall maintain in a safe place at the Site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Test Records, Field Orders, and written interpretations and clarifications (issued pursuant to Paragraph 8.04) in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Submittals shall be available to Engineer for reference. Upon completion of the Work, these record documents and Submittals shall be delivered to Engineer for Owner.

B. Receipt and acceptance of record documents will be a prerequisite for final payment on the Contract.

6.11 SAFETY AND PROTECTION:

A. Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:

1. All employees on the Work and other persons and organizations who may be affected thereby;
2. All the Work and Materials and Equipment to be incorporated therein, whether in storage on or off the Site; and
3. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation, or replacement in the course of construction.

B. Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury, or loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury or loss to any property referred to in Paragraph 6.12A.2 or 6.12A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Engineer or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor). Contractor's duties and responsibilities for the safety

and protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to Owner and Contractor in accordance with Paragraph 13.09A that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

C. Contractor shall designate a responsible representative at the Site whose duty shall be the prevention of accidents. This person shall be Contractor's superintendent unless otherwise designated in writing by Contractor to Owner.

6.12 EMERGENCIES:

A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor, without special instruction or authorization from Engineer or Owner, is obligated to act to prevent threatened damage, injury, or loss. Contractor shall give Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Engineer determines that a change in the Contract Documents is required because of the action taken in response to an emergency, a Change Order will be issued to document the consequences of the changes or variations.

6.13 SUBMITTALS:

A. After checking and verifying all field measurements and after complying with applicable procedures specified in the General Requirements, Contractor shall submit to Engineer for review and acceptance in accordance with the accepted schedule of submissions, copies of Submittals which will bear the required information that Contractor has satisfied Contractor's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as Engineer may require. The data shown on Submittals will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to enable Engineer to review the information as required.

B. Before submission of each Submittal, Contractor shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers, and similar data with respect thereto and reviewed or coordinated each Submittal with other Submittals and with the requirements of the Work and the Contract Documents.

C. At the time of each submission, Contractor shall give Engineer specific written notice of each variation that the Submittal may have from the requirements of the Contract Documents, and in addition, shall cause a specific notation to be made on each Submittal submitted to Engineer for review and approval of each such variation.

D. Engineer will review Submittals with reasonable promptness, but Engineer's review and acceptance will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences, or procedures of construction (except where a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required by Engineer, and shall return the required number of corrected copies of Submittals and resubmit as required for review and acceptance. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous Submittals.

E. Engineer's review and acceptance of Submittals shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents. Contractor shall in writing call Engineer's attention to each and every variation at the time of submission. Engineer will show approval of each such variation by a specific written notation thereof incorporated in or accompanying the Submittal. Acceptance by Engineer shall not relieve Contractor from responsibility for errors or omissions in the Submittals.

F. Where a Submittal is required by the Specifications, any related Work performed prior to Engineer's review and acceptance of the pertinent submission will be the sole expense and responsibility of Contractor.

6.14 CONTINUING THE WORK:

A. Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Paragraph 14.03 or as Contractor and Owner may otherwise agree in writing.

6.15 INDEMNIFICATION:

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Engineer, Engineer's Consultants, and the officers, directors, partners, employees, agents, and other consultants and subcontractors of each and any of them from and against all claims, damages, losses and expenses, direct, indirect, or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and court and arbitration costs) arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss, or expense:

1. Is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (including the Work itself) including the loss of use resulting therefrom, and
2. Is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, any person, or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by Laws and Regulations regardless of the negligence of any such party.

B. In any and all claims against Owner or Engineer or any of their consultants, agents, or employees by any employee of Contractor, any Subcontractor, any person, or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.16A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts, or other employee benefit acts.

ARTICLE 7 - OWNER'S RESPONSIBILITIES

7.01 COMMUNICATIONS:

A. Owner shall issue all communications to Contractor or through Engineer.

7.02 CHANGE OF ENGINEER:

A. In case of termination of the employment of Engineer, Owner shall appoint an engineer against whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer. Any dispute in connection with such appointment shall be subject to arbitration.

7.03 REQUIRED DATA:

A. Owner shall furnish the data required of Owner under the Contract Documents promptly and shall make payments to Contractor promptly after they are due as provided in Paragraphs 13.04A and 13.09A.

7.04 LANDS AND EASEMENTS:

A. Owner's duties in respect of providing lands and easements are set forth in Paragraphs 4.01.

7.05 CHANGE ORDERS:

A. Owner is obligated to execute Change Orders as indicated in Paragraph 9.01.

7.06 INSPECTIONS AND TESTS:

A. Owner's responsibility in respect of certain inspections, tests and approvals is set forth in Paragraph 12.03B.

7.07 STOPPING THE WORK:

A. In connection with Owner's right to stop Work or suspend Work, see Paragraphs 12.06 and 14.02. Paragraph 14.02A deals with Owner's right to terminate services of Contractor under certain circumstances

7.08 LIMITATIONS ON OWNER'S RESPONSIBILITIES:

A. Owner shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Owner will not be responsible for Contractor's failure to perform the Work in accordance with the Contract Documents.

ARTICLE 8 - ENGINEER'S STATUS DURING CONSTRUCTION

8.01 OWNER'S REPRESENTATIVE:

A. Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Engineer as Owner's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of Owner and Engineer.

8.02 VISITS TO SITE:

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous on-Site inspections to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform to the Contract Documents. On

the basis of such visits and on-Site observations as an experienced and qualified design professional, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defects and deficiencies in the Work.

8.03 PROJECT REPRESENTATION:

A. Owner may furnish Resident Project Representative and assistants to observe the performance of the Work.
   1. Communications pertaining to Submittals, written interpretations, and Change Orders shall be directed to Engineer at his home office with copies to Resident Project Representative.
   2. Communications pertaining to day-to-day operations at the Site shall be directed to Resident Project Representative.
   3. Resident Project Representative and his assistants will conduct observations of the Work in progress to determine that the Work is proceeding in accordance with the Contract Documents.
   4. Resident Project Representative will not have authority to permit any deviation from the Contract Documents, except with concurrence of Engineer.

8.04 CLARIFICATIONS AND INTERPRETATIONS:

A. Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of drawings or otherwise) as Engineer may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If Contractor believes that a written clarification or interpretation justifies an increase in the Contract Price or an extension of the Contract Times and the parties are unable to agree to the amount or extent thereof, Contractor may make a claim therefor as provided in Article 10 or Article 11.

8.05 AUTHORIZED VARIATIONS IN WORK:

A. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner, and also on Contractor who shall perform the Work involved promptly.

8.06 REJECTING DEFECTIVE WORK:

A. Engineer will have authority to disapprove or reject Work which Engineer believes to be defective, and will also have authority to require special inspection or testing of the Work as provided in Paragraph 12.05B, whether or not the Work is fabricated, installed, or completed.
B. Resident Project Representative will have authority, subject to final decision of Engineer, to disapprove or reject any defective workmanship, Equipment, or Material.

8.07 SUBMITTALS, CHANGE ORDERS, AND PAYMENTS:

A. In connection with Engineer's responsibility for Submittals, see Paragraph 6.14.
B. In connection with Engineer's responsibilities as to Change Orders, see Articles 9, 10, and 11.
C. In connection with Engineer's responsibilities in respect of Applications for Payment, see Article 13.

8.08 DETERMINATIONS FOR UNIT PRICES:

A. Owner will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Owner will review with Contractor the Owner's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise).

B. Engineer's written decisions thereon will be final and binding upon Owner and Contractor, unless, within ten days after the date of any such decision, either Owner or Contractor delivers to the other party to the Agreement and to Engineer written notice of intention to appeal from such a decision.

8.09 DECISIONS ON DISPUTES:

A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. Claims, disputes, and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and claims under Articles 10 and 11 in respect of changes in the Contract Price or Contract Times will be referred initially to Engineer in writing with a request for a formal decision in accordance with this Paragraph, which Engineer will render in writing within a reasonable time. Written notice of each such claim, dispute, and other matter will be delivered by the claimant to Engineer and the other party to the Agreement promptly (but in no event later than 30 days) after the occurrence of the event giving rise thereto, and written supporting data shall be delivered to Engineer and the other party within 60 days after such occurrence unless Engineer allows an additional period of time to ascertain more accurate data in support of the claim.

B. When functioning as interpreter and judge under Paragraphs 8.08 and 8.09A, Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Engineer with respect to any such claim, dispute, or other matter (except any which have been waived by the making or acceptance of final payment as provided in Paragraph 13.11) will be a condition precedent to any exercise by Owner or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute, or other matter.

8.10 LIMITATIONS ON ENGINEER'S RESPONSIBILITIES:

A. Neither Engineer's authority to act under this Article 8 or elsewhere in the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority shall give rise to any duty or responsibility of Engineer to Contractor, any Subcontractor, any Supplier, or any other person or organization performing any of the Work, or to any surety for any of them.

B. Whenever in the Contract Documents the terms "as directed", "as required", "as allowed", "as approved", or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper", or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review, or judgment of Engineer as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to Engineer any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraphs 8.10C or 8.10D.

C. Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the performance of the Work. Engineer will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

D. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

E. The presence or absence of Engineer or his representative will not act to relieve Contractor of any responsibility or of any guarantee of his performance. Neither will observation by Engineer or his representative in any way be understood to relieve Contractor of any responsibility for proper supervision of the Work at all times.

F. Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, tests and approvals, and other documentation required to be delivered by Paragraph 13.08A will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals that the results certified indicate compliance with, the Contract Documents.

G. The limitations upon authority and responsibility set forth in this Paragraph 8.10 shall also apply to Engineer's Consultants, Resident Project Representative, and assistants.

ARTICLE 9 - CHANGES IN THE WORK

9.01 GENERAL:

A. Without invalidating the Agreement and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work; these will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which shall be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

B. If Owner and Contractor are unable to agree as to the extent, if any, of an increase or decrease in the Contract Price or an extension or a shortening of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefore as provided in Article 10 or 11.

C. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified, and supplemented as provided in Paragraphs 3.02A and 3.02C, except in the case of an emergency as provided in Paragraph 6.13 and except in the case of uncovering Work as provided in Paragraph 12.05B.

D. Owner and Contractor shall execute appropriate Change Orders (or Written Amendments) covering:

1. Changes in the Work which are ordered by Owner pursuant to Paragraph 9.01A, are required because of acceptance of defective Work under Paragraph 12.09 or correcting defective Work under Paragraph 12.10, or are agreed to by the parties;
2. Changes in the Contract Price or Contract Times which are agreed to by the parties; and
3. Changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 8.09A, provided that, in lieu

of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the progress schedule as provided in Paragraph 6.15.

E. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 10 - CHANGE OF CONTRACT PRICE

10.01 GENERAL:

A. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities, and obligations assigned to or undertaken by Contractor shall be at his expense without change in the Contract Price.

B. The Contract Price may only be changed by a Change Order or a Written Amendment. Any claim for an increase or decrease in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to Engineer promptly (but in no event later than 15 days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within 60 days after such occurrence (unless Engineer allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the claimant is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Price shall be determined by Engineer in accordance with Paragraph 8.09A if Owner and Contractor cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this Paragraph 10.01B.

C. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Price shall be determined in one of the following ways:
   1. By mutual acceptance of a lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 10.03A.2.a) or a unit price.
   2. On the basis of the Cost of the Work (determined as provided in Paragraphs 10.02A and 10.02B) plus a Contractor's Fee for overhead and profit (determined as provided in Paragraphs 10.03A and 10.03B).

10.02 COST OF THE WORK:

A. The term Cost of the Work means the sum of all costs necessarily incurred and paid by Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project.

B. The term Cost of the Work shall not include any of the following:
   1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks, and other personnel employed by Contractor whether at the Site or in Contractor's principal or a branch office for general administration of the

Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 10.02A.1 or specifically covered by Paragraph 10.02A.4, all of which are to be considered administrative costs covered by the Contractor's fee.

2. Expenses of Contractor's principal and branch offices other than Contractor's office at the Site.
3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work, and charges against Contractor for delinquent payments.
4. Cost of premiums for all Bonds and for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 10.02A.5.i above).
5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied, and making good any damage to property.
6. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraph 10.02A.

10.03 ELECTRONIC EQUIPMENT COMPLIANCE:

A. In no event shall Contractor be entitled to an increase in the Contract Price based upon any failure or delay by Contractor in supplying equipment, materials, work, or services that are electronically compliant or failure or delay by Contractor's Subcontractors or Suppliers in providing equipment, materials, work, or services as a result of Subcontractors' or Suppliers' lack of electronic equipment compliance in their own operations, systems, or processes used to provide or deliver equipment, material, work, or services.

10.04 RIGHT OF AUDIT:

A. Owner shall have the right to inspect and audit all of Contractor's books, records, correspondence, instructions, drawings, receipts, payment records, vouchers, and memoranda relating to the Work, and Contractor shall preserve all such records and supporting documentation for a period of three years after date of Final Payment. Contractor hereby grants to Owner the authority to enter Contractor's premises for the purpose of inspection of such records and supporting documentation or, at Contractor's option, Contractor may make such records and supporting documentation available to Owner at a location satisfactory to Owner.

B. All of the records and supporting documentation shall be open to inspection and subject to audit and reproduction by Owner or its authorized representative for any and all purposes, including but not limited to (i) compliance with the Contract Documents; (ii) proper pricing of Change Orders; and (iii) claims submitted by or against Contractor or any Subcontractor or Supplier in connection with any performance under the Contract Documents.

ARTICLE 11 - CHANGE OF CONTRACT TIMES

11.01 GENERAL:

A. The Contract Times may only be changed by a Change Order or a Written Amendment. Contractor, in undertaking to complete the Work within the Contract Times, shall take into consideration and make allowances for all of the ordinary delays and hindrances incident to such Work, whether growing out of delays in securing equipment or materials or workmen or otherwise.

B. Adjustments to the Contract Times will be made for delays in completion of the Work from causes beyond Contractor's control, including the following:
   1. Federal embargoes, priority orders, or other restrictions imposed by the United States Government.
   2. Unusual delay in fabrication or shipment of Equipment or Materials required in the Work, whether ordered by Contractor or furnished by Owner or others under separate contract.
   3. Strikes and other labor disputes.
   4. Delays caused by court proceedings.
   5. Change Orders.
   6. Neglect, delay, or default of any other contractor employed by Owner.
   7. Unusual construction delays resulting from weather conditions abnormal to the geographical area and to the season of the year such as above normal continuous days of precipitation, above normal amount of precipitation within a 24 hour period, or above normal days of extreme cold or hot temperature conditions affecting installation/application due to manufacturers or specifications limitations. These conditions will not be cause for extensions of time if abnormal weather conditions do not affect the stage of construction. All claims for extension of time due to abnormal weather conditions must be substantiated with evidence from a weather bureau or other authoritative source. Weather conditions normal to the geographical area and to the season of the year shall be taken into consideration in the Bid. Normal conditions shall be defined as the average number of days, amounts, or both over a 5-year period averaged per season.
   8. Conflicts, errors or discrepancies in the Contract Documents reported to Engineer as provided in these General Conditions.
   9. Any failure or delay by Contractor in supplying equipment, materials, work, or services that are electronically compliant or failure or delay by Contractor's Subcontractors or Suppliers in providing equipment, materials, work, or services as a result of Subcontractors' or Suppliers' lack of electronic equipment compliance in their own operations, systems, or processes used to provide or deliver equipment, material, work, or services shall not be considered to be caused by events beyond Contractor's control. Such electronic equipment compliance problems shall not constitute a basis for delay in completion of the Work, adjustment to the Contract Times, or an excuse for Contract nonperformance.

C. Owner shall award extensions of the Contract Times on account of such causes of delay, provided that adequate evidence is presented to enable Engineer to determine with exactness the extent and duration of delay for each item involved.

D. No extension to the Contract Times will be granted for delays involving only portions of the Work, or which do not directly affect the time required for completion of the entire Work.

E. Any claim for an extension to the Contract Times shall be delivered in writing to Owner and Engineer within 15 days of the occurrence of the event giving rise to the claim. All claims for adjustment to the Contract Times will be determined by Engineer if Owner and Contractor cannot otherwise agree. Any change to the Contract Times resulting from any such claim will be incorporated in a Change Order or a Written Amendment.

F. All time limits stated in the Contract Documents are of the essence of the Agreement. The provisions of this Article 11 shall not exclude recovery for damages (including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and court and arbitration costs) for delay by either party.

ARTICLE 12 - WARRANTY AND GUARANTEE; TESTS AND INSPECTIONS; CORRECTION, REMOVAL, OR ACCEPTANCE OF DEFECTIVE WORK

12.01 WARRANTY AND GUARANTEE:

A. Contractor warrants and guarantees to Owner and Engineer that all Work will be in accordance with the Contract Documents and will not be defective. Prompt notice of all defects shall be given to Contractor. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided in this Article 12.

B. No provision in the Contract Documents nor any specified guarantee time limit shall be held to limit Contractor's liability for defects to less than the legal limit of liability in accordance with the Law.

C. All Equipment and Materials furnished by Contractor for the Work shall carry a written guarantee from the manufacturer or Supplier of such items when called for in the Specifications. Written guarantees shall be submitted to Engineer with other Submittals. Engineer will transmit such guarantees to Owner for review.

12.02 ACCESS TO THE WORK:

A. Engineer and Engineer's representatives, other representatives of Owner, testing agencies, and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting, and testing. Contractor shall provide proper and safe conditions for such access.

12.03 TESTS AND INSPECTIONS:

A. Contractor shall give Engineer timely notice of readiness of the Work for all required inspections, tests, or approvals and shall cooperate with inspection and testing personnel.

B. Owner shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the Contract Documents except:
   1. for inspections, tests, or approvals covered by Paragraphs 12.03C and 12.03D below;
   2. that costs incurred in connections with tests or inspections conducted pursuant to Paragraph 12.05B shall be paid as provided in said Paragraph 12.05B; and
   3. as otherwise specifically provided in the Contract Documents.

C. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested, or approved, Contractor shall assume full responsibility therefor, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection, testing, or approval.

D. Contractor shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with Owner's or Engineer's acceptance of a Supplier of Materials or Equipment proposed to be incorporated in the Work, or of Materials or Equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

E. All inspections, tests, or approvals other than those required by Laws or Regulations of any public body having jurisdiction shall be performed by organizations acceptable to Owner and Contractor [or by Engineer if so specified\.

F. If any Work (including the work of others) that is to be inspected, tested, or approved is covered without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Engineer timely notice of Contractor's intention to cover the same and Engineer has not acted with reasonable promptness in response to such notice.

G. Neither observations by Engineer nor inspections, tests, or approvals by others shall relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

12.04 DEFECTIVE WORK:

A. The term "defective" is used in these documents to describe Work that is unsatisfactory, faulty, not in conformance with the requirements of the Contract Documents, or not meeting the requirements of any inspection, test, approval, or acceptance required by Law or the Contract Documents.

B. Any defective Work may be disapproved or rejected by Engineer at any time before final acceptance even though it may have been overlooked and included in a previous Application for Payment.

C. Prompt notice will be given by Engineer to Contractor of defects as they become evident.

12.05 UNCOVERING WORK:

A. If any Work is covered contrary to the written request of Engineer, it shall, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

B. If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, material, and equipment. If it is found that such Work is defective, Contractor shall bear all direct, indirect, and consequential costs of such uncovering, exposure, observation, inspection, and testing and of satisfactory reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals); and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefor as provided in Article 10. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to such uncovering, exposure, observation, inspection, testing, and reconstruction; and, if the parties are unable to agree as to the amount or extent thereof, Contractor may make a claim therefor as provided in Articles 10 and 11.

12.06 OWNER MAY STOP THE WORK:

A. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor or any other party.

12.07 CORRECTION OR REMOVAL OF DEFECTIVE WORK:

A. If required by Engineer, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Engineer, remove it from the Site and replace it with nondefective Work. Contractor shall bear all direct, indirect, and consequential costs of such correction or removal (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals) made necessary thereby.

12.08 ONE-YEAR CORRECTION PERIOD:

A. If within one year after the Date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work, or, if it has been rejected by Owner, remove it from the Site and replace it with nondefective Work. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or the rejected Work removed and replaced, and all direct, indirect, and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys, and other professionals) will be paid by Contractor. In special circumstances where a particular item of Equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

12.09 ACCEPTANCE OF DEFECTIVE WORK:

A. If, instead of requiring correction or removal and replacement of defective Work, Owner [and, prior to Engineer's recommendation of final payment, also Engineer] prefers to accept it, Owner may do so. Contractor shall bear all direct, indirect, and consequential costs attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Engineer as to reasonableness and to include but not be limited to fees and charges of engineers, architects, attorneys, and other professionals). If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefor as provided in Article 10. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

12.10 OWNER MAY CORRECT DEFECTIVE WORK:

A. If Contractor fails within a reasonable time after written notice of Engineer to proceed to correct and to correct defective Work or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 12.07, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days' written notice to Contractor, correct and remedy any such deficiency. In exercising the rights and remedies under this Paragraph, Owner shall proceed expeditiously.

B. To the extent necessary to complete corrective and remedial action, Owner may exclude Contractor from all or part of the Site, take possession of all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment, and machinery at the Site and incorporate in the Work all Equipment and Materials stored at the Site or for which Owner has paid Contractor but which are stored elsewhere.

C. Contractor shall allow Owner, Owner's representatives, agents, and employees such access to the Site as may be necessary to enable Owner to exercise the rights and remedies under this Paragraph.

D. All direct, indirect, and consequential costs of Owner in exercising such rights and remedies will be charged against Contractor in an amount approved as to reasonableness by Engineer, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefor as provided in Article 10. Such direct, indirect, and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs, and all costs of repair and replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

E. Contractor shall not be allowed an extension of the Contract Times because of any delay in performance of the Work attributable to the exercise by Owner of Owner's rights and remedies hereunder.

ARTICLE 13 - PAYMENTS TO CONTRACTOR AND COMPLETION

13.01 SCHEDULE OF VALUES:

A. The schedule of values established will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

13.02 APPLICATION FOR PROGRESS PAYMENT:

A. At least 20 days before each progress payment is scheduled (but not more often than once a month), Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents.

B. Beginning with the second Application for Payment, each Application shall include an affidavit of Contractor stating that all previous progress payments received on account of the Work have been applied on account to discharge Contractor's legitimate obligations associated with prior Applications for Payment.

C. If payment is requested on the basis of Equipment and Materials not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that Owner has received the Equipment and Materials free and clear of all liens, charges, security interests, and encumbrances (which are hereinafter in these General Conditions referred to as "Liens") and evidence that the Equipment and Materials are covered by appropriate property insurance and other arrangements to protect Owner's interest therein, all of which will be satisfactory to Owner.

D. The amount of retainage with respect to progress payments will be as stipulated in Paragraph 13.04G.

13.03 CONTRACTOR'S WARRANTY OF TITLE:

A. Contractor warrants and guarantees that title to all Work, Materials, and Equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

13.04 REVIEW OF APPLICATION FOR PROGRESS PAYMENT:

A. Engineer will, within ten days after receipt of each Application For Payment, either indicate in writing a recommendation of payment and present the Application to Owner, or return the

Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application. Ten days after presentation of the Application for Payment with Engineer's recommendation, the amount recommended will (subject to the provisions of the last sentence of Paragraph 13.04D) become due and when due will be paid by Owner to Contractor.

B. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's on-Site observations of the Work in progress as an experienced and qualified design professional and on Engineer's review of the Application for Payment and the accompanying data and schedules that the Work has progressed to the point indicated; that, to the best of Engineer's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under Paragraph 9.08, and to any other qualifications stated in the recommendation); and that Contractor is entitled to payment of the amount recommended. However, by recommending any such payment, Engineer will not thereby be deemed to have represented that exhaustive or continuous on-Site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents, or that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or Owner to withhold payment to Contractor.

C. Engineer's recommendation of final payment will constitute an additional representation by Engineer to Owner that the conditions precedent to Contractor's being entitled to final payment as set forth in Paragraph 13.09 have been fulfilled.

D. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make such representations to Owner. Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:
   1. The Work is defective, or completed Work has been damaged requiring correction or replacement.
   2. Written claims have been made against Owner or Liens have been filed in connection with the Work.
   3. The Contract Price has been reduced by Written Amendment or Change Order.
   4. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 12.10, or
   5. Of Engineer's actual knowledge of the occurrence of any of the events enumerated in Paragraph 14.02B.
   6. Of Contractor's unsatisfactory prosecution of the Work in accordance with the Contract Documents.
   7. Contractor's failure to make payment to Subcontractors, or for labor, Materials, or Equipment.

E. Owner may refuse to make payment of the full amount recommended by Engineer because claims have been made against Owner on account of Contractor's performance of furnishing of the Work, or Liens have been filed in connection with the Work, or there are other items entitling Owner to a set-off against the amount recommended, but Owner must give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action.

F. When all grounds for withholding payment are removed, payment will be made in the amounts withheld because of them.

G. Progress payments will be in the amount of 90% of the amount of the Application for Payment less the sum of all previous payments. When the amount retained by Owner becomes equal to 5% of the Contract Price, the remaining progress payments will be made in full, provided Contractor's performance is satisfactory in the opinions of Engineer and Owner.

13.05 SUBSTANTIAL COMPLETION:

A. When Contractor considers the entire Work ready for its intended use, Contractor will notify Owner and Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Engineer issue a certificate of Substantial Completion.

B. Within a reasonable time thereafter, Owner, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion. If Engineer does not consider the Work substantially complete, Engineer will notify Contractor in writing giving his reasons therefor. If Engineer considers the Work substantially complete, Engineer will prepare and deliver to Owner a tentative certificate of Substantial Completion which will fix the Date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment.

C. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within fourteen days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefor. If, after consideration of Owner's objections, Engineer considers the Work substantially complete, Engineer will within said fourteen days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from Owner.

D. At the time of delivery of the tentative certificate of Substantial Completion, Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, heat, utilities, insurance, and warranties.

E. Unless Owner and Contractor agree otherwise in writing and so inform Engineer prior to Engineer's issuing the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

F. Owner shall have the right to exclude Contractor from the Work after the Date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

13.06 PARTIAL UTILIZATION:

A. Use by Owner of any finished part of the Work, which has specifically been identified in the Contract Documents, or which Owner, Engineer, and Contractor agree constitutes a separately functioning and useable part of the Work that can be used by Owner without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

1. Owner at any time may request Contractor in writing to permit Owner to use any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If Contractor agrees, Contractor will certify to Owner and Engineer that said

part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Contractor at any time may notify Owner and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the Work to be substantially complete, Engineer will notify Owner and Contractor in writing giving the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of Paragraph 13.05 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

2. Owner may at any time request Contractor in writing to permit Owner to take over operation of any such part of the Work although it is not substantially complete. A copy of such request will be sent to Engineer and within a reasonable time thereafter, Owner, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Engineer that such part of the Work is not ready for separate operation by Owner, Engineer will finalize the list of items to be completed or corrected and will deliver such list to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties, and guarantees for that part of the Work, which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.
3. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of Paragraph 5.02I in respect of property insurance.

13.07 FINAL INSPECTION:

A. Upon written notice from Contractor that the Work or an agreed portion thereof is complete, Engineer will make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to remedy such deficiencies.

13.08 FINAL APPLICATION FOR PAYMENT:

A. After Contractor has completed all such corrections to the satisfaction of Engineer and delivered all maintenance and operating instructions, schedules, guarantees, Bonds, certificates of inspection, marked-up record documents, and other documents - all as required by the Contract Documents, and after Engineer has indicated that the Work is acceptable (subject to the provisions of Paragraph 13.11), Contractor may make application for final payment following the procedure for progress payments.

B. The final Application for Payment shall be accompanied by all documentation called for in the Contract Documents, together with complete and legally effective releases or waivers (satisfactory to Owner) of all Liens arising out of or filed in connection with the Work. In lieu

thereof and as approved by Owner, Contractor may furnish receipts or releases in full; an affidavit of Contractor that the releases and receipts include all labor, services, Material, and Equipment for which a Lien could be filed, and that all payrolls, Equipment and Material bills, and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible, have been paid or otherwise satisfied; and consent of the surety, if any, to final payment. If any Subcontractor or Supplier fails to furnish a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

13.09 FINAL PAYMENT AND ACCEPTANCE:

A. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation--all as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application to Owner for payment. Thereupon, Engineer will give written notice to Owner and Contractor that the Work is acceptable (subject to the provisions of Paragraph 13.11). Otherwise, Engineer will return the Application to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Thirty days after presentation to Owner of the Application and accompanying documentation, in appropriate form and substance, and with Engineer's recommendation and notice of acceptability, the amount recommended by Engineer will become due and will be paid by Owner to Contractor.

B. If, through no fault of Contractor, final completion of the Work is significantly delayed and if Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment and recommendation of Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. The written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

C. The Final Pay Estimate will include all sums remaining to be paid.

13.10 CONTRACTOR'S CONTINUING OBLIGATION:

A. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. Neither recommendation of any progress or final payment by Engineer, nor the issuance of a certificate of Substantial Completion, nor any payment by Owner to Contractor under the Contract Documents, nor any use or occupancy of the Work or any part thereof by Owner, nor any act of acceptance by Owner nor any failure to do so, nor any review and approval of a Submittal, nor the issuance of a notice of acceptability by Engineer pursuant to Paragraph 13.09, nor any correction of defective Work by Owner will constitute an acceptance of Work not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents (except as provided in Paragraph 13.11).

13.11 WAIVER OF CLAIMS: THE MAKING AND ACCEPTANCE OF FINAL PAYMENT WILL CONSTITUTE:

A. A waiver of all claims by Owner against Contractor, except claims arising from unsettled Liens, from defective work appearing after final inspection pursuant to Paragraph 13.07, or from failure to comply with the Contract Documents or the terms of any special guarantees specified therein; however, it will not constitute a waiver by Owner of any rights in respect of Contractor's continuing obligations under the Contract Documents; and

B. A waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled.

ARTICLE 14 - SUSPENSION OF WORK AND TERMINATION

14.01 OWNER MAY SUSPEND WORK:

A. Owner may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than 90 days by notice in writing to Contractor and Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, directly attributable to any suspension if Contractor makes an approved claim therefor as provided in Articles 10 and 11.

14.02 OWNER MAY TERMINATE:

A. Upon the occurrence of any one or more of the following events:
   1. If Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state Law in effect at such time relating to the bankruptcy or insolvency;
   2. If a petition is filed against Contractor under any chapter of the bankruptcy Code as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state Law in effect at the time relating to bankruptcy or insolvency;
   3. If Contractor makes a general assignment for the benefit of creditors;
   4. If a trustee, receiver, custodian, or agent of Contractor is appointed under applicable Law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;
   5. If Contractor admits in writing an inability to pay its debts generally as they become due;
   6. If Contractor persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable Equipment or Materials or failure to adhere to the progress schedule established under Paragraph 2.07 as revised from time to time);
   7. If Contractor disregards Laws or Regulations of any public body having jurisdiction;
   8. If Contractor disregards the authority of Engineer; or
   9. If Contractor otherwise violates in any substantial way any provisions of the Contract Documents;

B. Owner may, after giving Contractor (and the surety, if there be one) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the Site and take possession of the Work and of all Contractor's tools, appliances, construction equipment, and machinery at the Site and use the same to the full

extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all Equipment and Materials stored at the Site or for which Owner has paid Contractor but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct, indirect, and consequential costs of completing the Work (including but not limited to fees and charges of engineers, architects, attorneys and other professionals, and court and arbitration costs), such excess will be paid to Contractor. If such costs exceed such unpaid balance, Contractor shall pay the difference to Owner. Such costs incurred by Owner will be approved as to reasonableness by Engineer and incorporated in a Change Order, but when exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.

C. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due to Contractor by Owner will not release Contractor from liability.

D. Upon seven days' written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy, elect to abandon the Work and terminate the Agreement. In such case, Contractor shall be paid for all Work executed and any expense sustained plus reasonable termination expenses, which will include, but not be limited to, direct, indirect, and consequential costs (including, but not limited to, fees and charges of engineers, architects, attorneys and other professionals, and court and arbitration costs).

14.03 CONTRACTOR MAY STOP WORK OR TERMINATE:

A. If, through no act or fault of Contractor, the Work is suspended for a period of more than 90 days by Owner or under an order of court or other public authority, or Engineer fails to act on any Application for Payment within 30 days after it is submitted, or Owner fails for 30 days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days' written notice to Owner and Engineer, terminate the Agreement and recover from Owner payment for all Work executed and any expense sustained plus reasonable termination expenses. In addition and in lieu of terminating the Agreement, if Engineer has failed to act on an Application for Payment or Owner has failed to make any payment as aforesaid, Contractor may upon seven days' written notice to Owner and Engineer stop the Work until payment of all amounts then due. The provisions of this Paragraph shall not relieve Contractor of the obligations under Paragraph 6.15 to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with Owner.

ARTICLE 15 - RESOLUTION OF DISPUTES

15.01 ARBITRATION:

A. All claims, disputes and other matters in question between Owner and Contractor arising out of, or relating to the Contract Documents or the breach thereof (except for claims which have been waived by the making or acceptance of final payment as provided by Paragraph 13.11) will be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association then obtaining subject to the limitations of this Article 15. This agreement so to arbitrate and any other agreement or consent to arbitrate entered into in accordance herewith as provided in this Article 15 will be specifically enforceable under the prevailing law of any court having jurisdiction.

B. No demand for arbitration of any such claim, dispute, or other matter that is required to be referred to Engineer initially for decision in accordance with Paragraph 8.09A will be made until the earlier of:
   1. The date on which Engineer has rendered a decision, or
   2. The tenth day after the parties have presented their evidence to Engineer if a written decision has not been rendered by Engineer before that date.

C. No demand for arbitration of any such claim, dispute, or other matter will be made later than 30 days after the date on which Engineer has rendered a written decision in respect thereof in accordance with Paragraph 8.09A; and the failure to demand arbitration within said 30 days' period shall result in Engineer's decision being final and binding upon Owner and Contractor.

D. If Engineer renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence but will not supersede the arbitration proceedings, except where the decision is acceptable to the parties concerned. No demand for arbitration of any written decision of Engineer rendered in accordance with Paragraph 8.08 will be made later than ten days after the party making such demand has delivered written notice of intention to appeal as provided in Paragraph 8.08.

E. Notice of the demand for arbitration shall be filed in writing with the other party to the Agreement and with the American Arbitration Association, and a copy shall be sent to Engineer for information. The demand for arbitration shall be made within the thirty-day or ten-day period specified in Paragraphs 15.01B through 15.01D as applicable, and in all other cases within a reasonable time after the claim, dispute or other matter in question has arisen, and in no event shall any such demand be made after institution of legal or equitable proceedings based on such claim, dispute, or other matter in question would be barred by the applicable statute of limitations.

F. No arbitration arising out of or relating to the Contract Documents shall include by consolidation, joinder, or in any other manner any other person or entity (including Engineer, Engineer's agents, employees, or consultants) who is not a party to this Contract unless:
   1. The inclusion of such other person or entity is necessary if complete relief is to be afforded among those who are already parties to the arbitration.
   2. Such other person or entity is substantially involved in a question of Law or fact which is common to those who are already parties to the arbitration and which will arise in such proceedings, and
   3. The written consent of the other person or entity sought to be included and of Owner and Contractor has been obtained for such inclusion, which consent shall make specific reference to this paragraph; but no such consent shall constitute consent to arbitration of any dispute not specifically described in such consent or to arbitration with any party not specifically identified in such consent.

G. The award rendered by the arbitrators will be final, judgment may be entered upon it in any court having jurisdiction thereof, and will not be subject to modification or appeal except to the extent permitted by Sections 10 and 11 of the Federal Arbitration Act (9 U.S.C. SS 10,11).

H. Contractor shall carry on the Work and maintain the progress schedule during any arbitration proceedings, unless otherwise agreed by Contractor and Owner in writing.

ARTICLE 16 - MISCELLANEOUS

16.01 GIVING NOTICE:

A. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a

member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

16.02 COMPUTATION OF TIME:

A. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the Law of the applicable jurisdiction, such day will be omitted from the computation.

B. A calendar day of 24 hours measured from midnight to the next midnight shall constitute a day.

16.03 CLAIMS, CUMULATIVE REMEDIES:

A. Should Owner or Contractor suffer injury or damage to person or property because of any error, omission, or act of the other party or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable time of the first observance of such injury or damage. The provisions of this Paragraph shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

B. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon Contractor by Paragraphs 6.16A, 12.01, 12.08, 12.10, 13.03, and 14.02A and all of the rights and remedies available to Owner and Engineer thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee, or by other provisions of the Contract Documents, and the provisions of this Paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply. All representations, warranties, and guarantees made in the Contract Documents will survive final payment and termination or completion of the Agreement.

END OF SECTION 00 72 00

DOCUMENT 00 73 00 – LABOR-RELATED REGULATIONS

ARTICLE 1 - EQUAL EMPLOYMENT OPPORTUNITY

A. Contractor agrees to comply, and cause each Subcontractor, if any, to comply with all federal and state Laws, Regulations, and directives pertaining to equal employment opportunity in connection with this Contract, including but not limited to employment, procurement of materials, and lease of equipment therefor.

ARTICLE 2 - WAGE RATE STIPULATIONS

A. It is the statutory policy of the State of Missouri "that a wage of no less than the prevailing hourly rate of wages for work of a similar character in the locality in which the Work is performed, shall be paid to all workmen employed by or on behalf of any public body engaged in public works exclusive of maintenance work." Sections 290.210 through 290.340 RSMO 1986.

B. The BID, AGREEMENT, and BONDS shall be based upon the required payment by Contractor and his Subcontractors of not less than the prevailing hourly rate of wages, including the prevailing rate for legal holidays and overtime work, for each craft or type of workman required to execute the Contract, as determined now or hereafter by the Division of Labor Standards, State of Missouri.

C. Contractor and each Subcontractor shall keep an accurate record showing the names and occupations of all workmen employed, together with actual wages paid to each workman. At all reasonable times, such records shall be open to inspection. Contractor and each Subcontractor shall file with the contracting public body upon completion of the public work and prior to final payment therefor an affidavit stating that he has fully complied with the provisions of Sections 290.210 through 290.340.

D. Contractor shall forfeit as a penalty to Owner, ten dollars for each workman employed, for each calendar day, or portion thereof, such workman is paid less than the said stipulated rates for any work done under this Contract, by Contractor or any Subcontractor under Contractor.

E. Contractor's Bonds shall include provisions as will guarantee the faithful performance of the prevailing hourly wage clause as provided by Contract. Section 290.250.

F. During the life of this Contract, the prevailing hourly rate of wages is subject to change by the Division of Labor Standards or by court decision, as provided by Law. Any such change shall not be the basis of any claim by Contractor against Owner, nor will deductions be made by Owner against any sums due Contractor by reason of any such change.

G. The Division of Labor Standards, State of Missouri Wage Rate determinations are included as an appendix to this document.

H. Determination of the prevailing wage value applicable to the work being performed by each individual worker shall be in accordance with 8 CSR30-3.060, "Occupational Titles of Work Descriptions" of the Missouri Code of State Regulations.

I. Prior to application for final payment, the Contractor shall submit a fully and properly completed "Affidavit, Compliance with the Prevailing Wage Law".

END OF SECTION 00 73 00

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section summarizes the Work covered in detail in the complete Contract Documents.

B. Owner: The City of Joplin is contracting for Work described in the Contract Documents.

1. Contract Identification: Tin Cup Parallel Force Main.
2. Work Site Location: The force main alignment generally begins at the Filmore Bridge Lift Station located on the west side of Coyote Drive just south of Shoal Creek. From here it routes west for approximately 400 feet, then extends north across Shoal Creek to Betsy Lane where it then turns east back to Coyote Drive. At Coyote Drive, it routes north along the west edge of Coyote Drive to Cougar Drive. Here the alignment turns northeast routing along Cougar Drive to McClelland Boulevard, crossing McClelland Boulevard and turning east routing on the north side of McClelland Boulevard to a point at the intersection of McClelland Boulevard and McClelland Park Road. At this point the alignment crosses to the south side of McClelland Boulevard, routes along the east side of McClelland Park Road, then routes southeast into McClelland Park. The alignment then parallels the existing force main alignment and ends at the force main extension provided by others.
3. Gravity Main Work Site Location: The accompanying gravity sewer main starts at an existing manhole north of the Filmore Bridge Lift Station. The gravity main runs parallel with the force main, crossing Shoal Creek and extending along Betsy Lane, where it ends at a manhole on Betsy Lane, approximately 75 feet west of Coyote Drive.

C. Engineer: The Contract Documents were prepared by Burns & McDonnell Engineering Company, Inc., 9400 Ward Parkway, Kansas City, Missouri 64114.

D. Construction Manager: The Contractor is Construction Manager for the Project and is the Project's Constructor. In the Contract Documents, the terms "Construction Manager" and "Contractor" are synonymous.

1.02 PROJECT DESCRIPTION:

A. Description of Project:

The project generally provides for the installation of approximately 4,200 linear feet of 24-inch diameter PVC force main with tracer wire, approximately 1,020 linear feet of PVC gravity main (24-inch and 8-inch), manholes, open cut of Shoal Creek, air release valves, and all associated appenditures.

1.03 CONTRACTOR'S USE OF PREMISES:

A. Exclusive Use: During the construction period, Contractor shall have full use of the premises for execution of the Work. Use of premises is limited only by Owner's right to perform duties and functions as stated in the GENERAL CONDITIONS and in this Section.

1.04 WORK SEQUENCE:

A. General: Construction sequence shall be determined by Contractor subject to Owner's need for continuous operation of existing facilities.

B. Continuous Service of Existing Facilities: Exercise caution and schedule operations to ensure that the functioning of existing sanitary conveyance system will not be disrupted. Shutdown of Owner's operating facilities to perform the Work shall be held to a minimum length of time and shall be coordinated with Owner who shall have control over the timing and schedules of such shutdowns.

C. Substantially Completed Areas: Owner intends to place in service, in accordance with the provisions for use of completed Work set forth in the GENERAL CONDITIONS.

1.05 MEASUREMENT AND PAYMENT:

A. Unit Price Contracts: All Work indicated on the Contract Drawings and specified in the Contract Documents shall be included in the "Unit Price Schedule" in the Agreement. A Unit Price is an amount proposed by Contractor and stated in the Agreement as a price per unit of measurement for materials or services.

1.06 COPIES OF DOCUMENTS:

A. Furnished Copies: After execution of Agreement, Contractor will be furnished at no cost, a maximum of 3 sets of Contract Documents consisting of full-size Contract Drawings including revised Drawings, and the Project Manual, in addition to those used in execution of the Agreement.

B. Additional Copies: Additional copies of above documents will be supplied by Engineer upon request at $100 per one set of Drawings and one copy of Project Manual.

1.07 LIST OF DRAWINGS:

A. Contract Drawings:

1. Each sheet of the Contract Drawings bears the following general title: Tin Cup Force Main.
2. Individual sheet numbers and titles are as stated on index sheet under "Contract Drawings".

PART 2 - PRODUCTS - NOT APPLICABLE.

PART 3 - EXECUTION – NOT APPLICABLE.

END OF SECTION 01 11 00

SECTION 01 25 00 – SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes administrative and procedural requirements for handling requests for substitutions made after award of the Contract.

1.02 RELATED REQUIREMENTS:

A. Requirements for submitting Contractor's construction progress schedule and the Submittal schedule: Sections 01 32 00 and 01 33 00.

1.03 DEFINITIONS:

A. Definitions in this Article do not change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, Materials, Equipment, and methods of construction required by the Contract Documents proposed by the Contractor after award of the Contract are considered to be requests for substitutions. The following are not considered to be requests for substitutions:

1. Revisions to the Contract Documents requested by Owner or Engineer.
2. Specified options of products and construction methods included in the Contract Documents.

1.04 SUBMITTALS:

A. Substitution Request Submittal: Engineer will consider written requests for substitution if received within 60 days after commencement of the Work. Requests received more than 60 days after commencement of the Work may be considered or rejected at the discretion of Engineer.

1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and according to procedures required for Change Order proposals. Requests for substitution shall not be submitted in the form of a Request for Information (RFI).
2. Identify the Equipment or Material, the fabrication, or installation method to be replaced in each request. Include related Specification Section/Article and Drawing numbers.
3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
    a. Statement indicating why specified product or method of construction cannot be provided.
    b. Coordination information, including a list of changes or modifications needed to other parts of the Work, that will be necessary to accommodate the proposed substitution.
    c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    d. Product data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. Identification of available sales, maintenance, repair, and replacement services.

g. A statement indicating the effect of the substitution on Contractor's construction progress schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on the overall Contract Times. If specified product cannot be provided within the Contract Times, provide letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delay in delivery.

h. An itemized estimate of costs that will result directly or indirectly from approval of the substitution, including:
   (1) A proposal of the net change, if any, in the Contract Price.
   (2) Costs of redesign required by the proposed change.
   (3) Costs of resulting claims as determined in coordination with other contractors having work on the Project affected by the substitution.

i. Statement indicating whether or not incorporation or use of the substitute is subject to payment of any license fee or royalty.

j. Contractor's certification that the proposed substitution conforms to requirements in the Contract Documents, will perform adequately the functions and achieve the results called for by the general design, is similar in substance to that specified, and is suitable for same use as that indicated and specified.

k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

4. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of the substitution within 2 weeks of receipt of the request, or one week of receipt of additional information or documentation, whichever is later. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS:

A. Conditions: Engineer will receive and consider Contractor's request for substitution when the following conditions are satisfied, as applicable as determined by Engineer. If the following conditions are not satisfied, Engineer will return the requests without action except to record noncompliance with these requirements.

1. Extensive revisions to the Contract Documents are not required.
2. Proposed substitution is in keeping with the general intent of the Contract Documents and will produce indicated results.
3. Substitution request is timely, fully documented, and properly submitted.
4. The specified product or method of construction cannot be provided within the Contract Times. Engineer will not consider the request if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
5. The requested substitution offers Owner a substantial advantage, in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials and where Contractor certifies that the substitution will overcome the incompatibility.
8. The specified product or method of construction cannot be coordinated with other materials and where Contractor certifies that the proposed substitution can be coordinated.
9. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.

B. Engineer's review and acceptance of Submittals shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents. Engineer's acceptance of Submittals not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval of a substitute. Acceptance by Engineer shall not relieve Contractor from responsibility for errors or omissions in the Submittals.

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 25 00

SECTION 01 27 00 - MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes provisions for measurement and computation of payment for the Work. The various Unit Prices and Lump Sum Prices listed in the Unit Price Schedule on the Bid Form, all aggregating to the Contract Price, shall constitute full payment for all Work required by the Contract Documents.

1.02 UNIT PRICE PAYMENT AMOUNTS:

A. The unit price and payment made for each item listed shall constitute full payment for labor, materials not furnished by Owner, equipment, shoring, removal, clearing, grubbing, overhead, profit, insurance, incidentals, etc. to perform the Work required for which separate payment is not otherwise provided. Cost of all applicable taxes, permits, etc. shall be included in the cost of construction of this Project.

B. Even though an item of the Work is included in the Contract Documents, if it is not both covered herein and specifically itemized on the Unit Price Schedule on the Bid Form, payment for the item shall not be separately made. Such Work shall be considered a necessary part of or incidental to its related Work.

C. The Contractor shall be paid only for quantities installed and approved by the Owner or the Resident Project Representative. Measurement for payment on a unit price basis shall be as described below. Payment for each unit installed shall be made according to the unit price bid, as listed in the Unit Price Schedule.

D. The quantities listed on the Unit Price Schedule are estimated and are only to be used as a basis for estimating the probable cost of the Work and for the comparison of bids submitted for the Work. The Contractor will be paid for the units of work actually installed (quantity) times the unit price bid for the appropriate line item as listed in the Unit Price Schedule.

1.03 LUMP SUM PAYMENT AMOUNTS:

A. The lump sum and payment made for each item listed shall constitute full payment for labor, materials not furnished by Owner, equipment, shoring and trench safety provisions, removal, clearing, grubbing, overhead, profit, incidentals, etc. to perform the Work required for which separate payment is not otherwise provided. Cost of all applicable taxes, permits, etc. shall be included in the cost of construction of this Project.

B. Even though an item of the Work is included in the Contract Documents, if it is not both covered herein and specifically itemized on the Unit Price Schedule on the Bid Form, payment for the item shall not be separately made. Such Work shall be considered a necessary part of or incidental to its related Work.

1.04 SPECIFIC MEASUREMENT AND PAYMENT PROVISIONS FOR INDIVIDUAL PAY ITEMS:

A. General: The following paragraphs provide general descriptions of the Work and associated measurement and payment provisions for each of the pay items listed in the Bid Form.

B. Bid Item 1.0 – MOBILIZATION / DEMOBILIZATION - “Mobilization / Demobilization” shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Mobilization shall include the preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies and incidentals to the project site, for the establishment of all office, buildings, and other facilities necessary for work

on the project, and for all other work and operations which must be performed or costs incurred prior to beginning work on the various items on the project site (including, but not limited to, all contractor pre-construction documentation and meetings, preparing schedules, submittals, submitting pre-construction photos, etc.).

1. Payment: Payment will be made for costs associated with Mobilization and Demobilization with 50% being paid after initial Mobilization to site and 50% being paid after Demobilization from the Site.

C. Bid Item 2.0 - BONDS AND INSURANCE – "Bonds and Insurance" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Payment shall be full compensation for furnishing all bonds and insurance required by the Contract Documents.

D. Bid Item 3.0 - CONSTRUCTION PHOTOGRAPHS – "Construction Photographs" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Payment shall be full compensation for conforming to requirements found in the Contract Documents.

E. Bid Item 4.0 - EROSION CONTROL, SWPPP – "Erosion Control, SWPPP" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Payment shall be full compensation for conforming to the project's stormwater pollution prevention plan including plan development and approval, installation, maintenance, and ultimately removal following completion of work of best management practice measures.

F. Bid Item 5.0 - INSTALL 24-INCH PC 200 PVC (6.5' – 12' TRENCH DEPTH) – "Install 24-inch PC 200 PVC (6.5' – 12' Trench Depth)" shall be paid for on a linear foot (LF) basis at the unit price listed on the Unit Price Schedule. Work performed and accepted under this item will be measured along the center of the excavated trench. Payment will be for all excavation, dewatering, pipe, placement of bedding/embedment, backfill, tracer wire, joint restraint systems, connections to existing pipes, all necessary fittings, testing, surface restoration including final grading and seeding, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

G. Bid Item 6.0 - INSTALL 24-INCH PC 200 PVC (>12.1' TRENCH DEPTH) – "Install 24-inch PC 200 PVC (>12.1' Trench Depth)" shall be paid for on a linear foot (LF) basis at the unit price listed on the Unit Price Schedule. Work performed and accepted under this item will be measured along the center of the excavated trench. Payment will be for all excavation, dewatering, pipe, placement of bedding/embedment, backfill, tracer wire, joint restraint systems, connections to existing pipes, all necessary fittings, testing, surface restoration including final grading and seeding, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

H. Bid Item 7.0 – INSTALL PIPE UNDER SHOAL CREEK – "Install Pipe Under Shoal Creek" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Item shall include the preparatory work, streambank stabilization, and operations, including, but not limited to, those necessary for the installation of parallel PVC pipes under Shoal Creek.

I. Bid Item 8.0 – ENCASEMENT UNDER SHOAL CREEK – "Encasement Under Shoal Creek" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Item shall include the preparatory work and operations, including, but not limited to, those necessary for the installation of the concrete encasement under Shoal Creek.

J. Bid Item 9.0 – CUTOFF WALL UNDER SHOAL CREEK – "Cutoff Wall Under Shoal Creek" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Item shall include the preparatory work and operations, including, but not limited to, those necessary for the installation of the Cutoff Wall under Shoal Creek.

K. Bid Item 10.0 - INSTALL 8-INCH PVC GRAVITY SEWER (6.5' – 12' TRENCH DEPTH) –

"Install 8-inch PVC gravity sewer (6.5' – 12' Trench Depth)" shall be paid for on a linear foot (LF) basis at the unit price listed on the Unit Price Schedule. Work performed and accepted under this item will be measured along the center of the excavated trench. Payment will be for all excavation, dewatering, pipe, placement of bedding/embedment, backfill, connections to manholes, all necessary fittings, testing, surface restoration including final grading and seeding, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

L. Bid Item 11.0 - INSTALL 30-INCH PVC GRAVITY SEWER (>12' TRENCH DEPTH) – "Install 30-inch PVC gravity sewer (>12' Trench Depth)" shall be paid for on a linear foot (LF) basis at the unit price listed on the Unit Price Schedule. Work performed and accepted under this item will be measured along the center of the excavated trench. Payment will be for all excavation, dewatering, pipe, placement of bedding/embedment, backfill, connections to manholes, all necessary fittings, testing, surface restoration including final grading and seeding, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

M. Bid Item 12.0 – INSTALL 4' DIAMETER CAST-IN-PLACE MANHOLE – "Install 4' Diameter Cast-In-Place Manhole" shall be paid for by each (EA) manhole installed complete at the unit price listed on the Unit Price Schedule. Payment will be for all excavation, dewatering, crushed stone layer, cast-in-place manhole including pipe connectors, connections to existing and proposed piping, joint sealant and wrap, poured in place reinforced concrete 12-inch base, frame and cover, testing, backfill, surface restoration, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

N. Bid Item 13.0 – INSTALL 4' DIAMETER OUTSIDE DROP PRE-CAST POLYMER MANHOLE – "Install 4' Diameter Outside Drop Pre-Cast Polymer Manhole" shall be paid for by each (EA) manhole installed complete at the unit price listed on the Unit Price Schedule. Payment will be for all excavation, dewatering, crushed stone layer, pre-cast polymer manhole including pipe connectors, connections to existing and proposed piping, joint sealant and wrap, poured in place reinforced concrete 12-inch base, frame and cover, testing, backfill, surface restoration, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

O. Bid Item 14.0 – INSTALL 6' DIAMETER PRE-CAST POLYMER MANHOLE – "Install 6' Diameter Pre-Cast Polymer Manhole" shall be paid for by each (EA) manhole installed complete at the unit price listed on the Unit Price Schedule. Payment will be for all excavation, dewatering, crushed stone layer, pre-cast polymer manhole including pipe connectors, connections to existing and proposed piping, joint sealant and wrap, poured in place reinforced concrete 12-inch base, frame and cover, testing, backfill, surface restoration, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

P. Bid Item 15.0 – INSTALL 4' DIAMETER PRE-CAST POLYMER MANHOLE – "Install 4' Diameter Pre-Cast Polymer Manhole" shall be paid for by each (EA) manhole installed complete at the unit price listed on the Unit Price Schedule. Payment will be for all excavation, dewatering, crushed stone layer, pre-cast polymer manhole including pipe connectors, connections to existing and proposed piping, joint sealant and wrap, poured in place reinforced

concrete 12-inch base, frame and cover, testing, backfill, surface restoration, and all other materials, labor, and incidentals necessary to perform work. Excavation shall include, but not be limited to soil, stones, stumps, debris, concrete, structures, footings, foundations, and any other obstacles that may obstruct the work.

Q. Bid Item 16.0 - INSTALL 3-INCH COMBINATION VALVE AND VAULT – "Install 3-inch Combination Valve and Vault" shall be paid for by each (EA) complete combination valve assembly and vault installed complete at the unit price listed on the Unit Price Schedule. Payment shall be full compensation for all complete valve assemblies including tapping saddle, isolation valve, associated piping and fittings, vault riser, top slab, lid, vent, insulation, and incidentals necessary to complete the combination valve/vault assembly.

R. Bid Item 17.0 - PAVEMENT REPAIR AND TRENCH BACKFILL (COYOTE AND COUGAR DRIVE. MCCLELLAND BLVD.) – "Pavement Repair and Trench Backfill (Coyote and Cougar Drive. McClelland Blvd.)" shall be paid for on a linear foot (LF) basis at the unit price listed on the Unit Price Schedule. Payment shall be full compensation to repair pavement including saw cutting the existing road surface, restore trench backfill following pipe installation and install non reinforced concrete pavement as required in the City of Joplin standard detail found in these Contract Documents.

S. Bid Item 18.0 –ASSURE CONTINUED OPERATION OF THE SANITARY CONVEYANCE SYSTEM – "Assure Continued Operation of the Sanitary Conveyance System" shall be paid on a lump sum (LS) basis at the unit price listed on the Unit Price Schedule. Payment shall be full compensation for installing and operating all necessary temporary systems designed to assure continued operation of the sanitary conveyance system throughout construction, and removal of all temporary system elements upon substantial completion.

T. Bid Item 19.0 – REMOVAL AND DISPOSAL OF CONTAMINATED MATERIALS – "Removal and Disposal of Contaminated Materials" shall be paid for on a cubic yard (CY) basis at the unit price listed on the Unit Price Schedule. Payment shall be for all measures necessary for removal and disposal of materials contaminated by heavy metals on the project in accordance with federal, state, City of Joplin requirements, and as directed by the Engineer. The contractor shall utilize and comply with all requirements of the City of Joplin's standard operating procedures. Unit Prices shall only include those additional costs associated with hauling contaminated materials beyond the distance the contractor is disposing of excess, or unsuitable, materials. Only contaminated soil and chat shall be placed in the repository, no demolition materials shall be paid for under contaminated material removal. At the beginning of the project, the contractor and engineer shall agree upon the quantity of contaminated material to be placed in a truck. Measurements shall be made by averaging bucket counts of the excavation equipment and measurement of the truck bed volume after leveling off a filled truck. Payment shall be full compensation for furnishing all labor, equipment, disposal fees, and the performance of all work necessary for additional hauling of "Contaminated Materials".

PART 2 - PRODUCTS - Not Applicable.

PART 3 - EXECUTION - Not Applicable.

END OF SECTION 01 27 00

SECTION 01 31 00 – PROJECT COORDINATION AND MEETINGS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
   1. Coordination drawings.
   2. Project meetings.
   3. Requests for information (RFIs).

1.02 RELATED REQUIREMENTS:

A. For preparing and submitting Contractor's construction progress schedule: Section 01 32 00.
B. For Submittal Requirements: Section 01 33 00.
C. For coordinating closeout of the Contract: Section 01 78 00.

1.03 DEFINITIONS:

A. RFI: Request for information prepared by Contractor and submitted to Engineer seeking interpretation or clarification of the Contract Documents.

1.04 COORDINATION:

A. The Contractor shall coordinate the completion of their activities with work performed by the Owner, any other Contractors, and other entities, to facilitate proper installation and construction. This includes all requirements specified in each Section of the contract.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Make adequate provisions to accommodate items scheduled for later installation.
   3. Where availability of space is limited, coordinate installation of different components to allow optimum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of others to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of construction progress schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of Submittals.
   5. Progress meetings.
   6. Project closeout activities.
   7. Startup and adjustment of systems.
   8. Project closeout activities.

1.05 PROJECT MEETINGS:

A. Preconstruction Conference:
   1. Engineer will conduct a meeting within 20 days after the Effective Date of the Agreement, to review items stated in the following agenda and to establish a working understanding between the parties as to their relationships during performance of the Work.
   2. Preconstruction conference shall be attended by:
      a. Representative(s) of Contractor including Contractor's superintendent.
      b. Engineer and Resident Project Representative.
      c. Representative(s) of Owner.
   3. Meeting Agenda:
      a. Construction schedules.
      b. Phasing.
      c. Critical Work sequencing and long-lead items.
      d. Designation of key personnel and their duties; lines of communication.
      e. Project coordination.
      f. Procedures and Processing of:
         (1) RFIs.
         (2) Field decisions.
         (3) Substitutions.
         (4) Submittals.
         (5) Change Orders.
         (6) Applications for Payment.
      g. Procedures for testing.
      h. Procedures for preparing and maintaining record documents.
      i. Use of Premises:
         (1) Office, work, storage, laydown, and parking areas.
         (2) Owner's requirements.
         (3) Work restrictions and hours.
      j. Construction facilities, controls, and construction aids.
      k. Temporary utilities.
      l. Safety and first-aid.
      m. Security.
      n. Deliveries of Equipment and Materials.
   4. Location of Meeting: At or near the Project Site
   5. Reporting:
      a. Within three working days after the meeting, Engineer will prepare and distribute minutes of the meeting to Owner and Contractor.
      b. Contractor shall provide copies to Subcontractors and major Suppliers.

B. Coordination Schedules:
   1. Engineer will conduct a meeting at least ten days before submission of the first Application for Payment to finalize the initial coordination schedules requested under Section 01 32 00 - Construction Progress Schedules and Reports.
   2. The meeting shall be attended by:
      a. Representative(s) of Contractor including Contractor's superintendent and scheduler.
      b. At Owner's option, representatives of principal Subcontractors and Suppliers.
      c. Engineer and Resident Project Representative.
      d. Representative(s) of Owner.

C. Construction Progress Meetings:
1. Contractor will schedule and conduct a meeting at least monthly and at other times requested by Engineer. Representatives of the Owner, Engineer, and Contractor shall be present at each meeting. With Engineer's concurrence, Contractor may request attendance by representatives of Subcontractors, Suppliers, or other entities concerned with current program or involved with planning, coordination, or performance of future activities. All participants in the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.
2. Contractor and each Subcontractor represented shall be prepared to discuss the current construction progress report and any anticipated future changes to the schedule. Each Subcontractor shall comment on the schedules of Contractor and other Subcontractors and advise if their current progress or anticipated activities are compatible with that Subcontractor's Work.
3. If one Subcontractor is delaying another, Contractor shall issue such directions as are necessary to resolve the situation and promote construction progress.
4. Meeting Agenda:
   a. Review of construction progress since previous meeting.
   b. Field observations, interface requirements, conflicts.
   c. Issues which may impede construction schedule.
   d. Off-Site fabrication.
   e. Delivery schedules.
   f. Submittal schedules and status.
   g. Site use; coordination with other contractors.
   h. Temporary facilities, controls, and services.
   i. Hours of Work.
   j. Hazards and risks.
   k. Housekeeping.
   l. Quality and Work standards.
   m. RFIs.
   n. Status of Change Orders.
   o. Documentation of information for payment requests.
   p. Corrective measures and procedures to regain construction schedule if necessary.
   q. Revisions to construction schedule.
   r. Review of proposed activities for succeeding Work period.
   s. Review proposed Contract modifications for:
      (1) Effect on construction schedule and on completion date.
   t. Other business.
5. Location of Meetings: At or near Project Site.
6. Reporting:
   a. Within three working days after each meeting, Contractor will prepare and distribute minutes of the meeting to Owner and Engineer.
   b. Contractor shall distribute copies to principal Subcontractors and Suppliers.

1.06 REQUESTS FOR INFORMATION (RFI):

A. Procedure: Promptly on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI with the content specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.

2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's Work or work of Subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
   1. Project name.
   2. Date.
   3. Name of Contractor.
   4. Contract number and title.
   5. Name of Engineer.
   6. RFI number, numbered sequentially.
   7. Specification Section number and title and related paragraphs, as appropriate.
   8. Drawing number and detail references, as appropriate.
   9. Field dimensions and conditions, as appropriate.
   10. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Times or the Contract Price, Contractor shall state impact in the RFI.
   11. Contractor's signature.
   12. Attachments: Include drawings, descriptions, measurements, photos, product data, Shop Drawings, and other information necessary to fully describe items needing interpretation.

C. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
   1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Engineer's Action: Engineer will review each RFI, determine action required, and return it. Allow seven working days for Engineer's response for each RFI. RFIs received after 1:00 p.m. local time will be considered as received the following working day.
   1. The following RFIs will be returned without action:
      a. Requests for approval of Submittals.
      b. Requests for approval of substitutions.
      c. Requests for coordination information already indicated in the Contract Documents.
      d. Requests for adjustments in the Contract Times or the Contract Price.
      e. Requests for interpretation of Engineer's actions on Submittals.
      f. Incomplete RFIs or RFIs with numerous errors.
   2. Multiple RFIs addressing similar or identical issues may be addressed by Engineer with a single broad response.
   3. Engineer's action may include a request for additional information, in which case Engineer's time for response will start again upon Contractor's response and resubmittal.
   4. If Contractor believes the RFI response warrants change in the Contract Times or the Contract Price, notify Engineer in writing within ten days of receipt of the RFI response.

E. On receipt of Engineer's action, update the RFI log and promptly distribute the RFI response to affected parties. Review response and notify Engineer within seven days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include Electronic log with not less than the following:
   1. Project name.
   2. Name and address of Contractor.
   3. Contractor representative name and telephone number.
   4. Name and address of Engineer.
   5. RFI number including RFIs that were dropped and not submitted.
   6. RFI description.
   7. Date the RFI was submitted.

8. Date Engineer's response was received.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION 01 31 00

SECTION 01 32 00 – CONSTRUCTION PROGRESS SCHEDULES AND REPORTS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Preliminary construction progress schedule.
   2. Construction progress schedule.
   3. Schedule of Submittals.
   4. Schedule of values.
   5. Construction progress reports.
   6. Daily construction reports.
   7. Field condition reports.
   8. Special reports.

1.02 RELATED REQUIREMENTS:

A. For submitting and distributing meeting and conference minutes: Section 01 31 00 – "Project Coordination and Meetings."
B. For submitting schedules and reports: Section 01 33 00 – "Submittals."
C. For submitting construction photographs: Section 01 32 33 – "Project Photographs."

1.03 REFERENCE STANDARDS:

A. Associated General Contractors of America (AGC):
   1. Construction Planning and Scheduling.

1.04 DEFINITIONS:

A. Activity: A discrete part of a contract that can be identified for planning, scheduling, monitoring, and controlling the construction Work. Activities included in a construction schedule consume time and resources but shall not include planned work stoppages. Activities shall not normally reflect the Work of more than one trade.
   1. Critical activities are activities on the critical path and have zero or negative float. Critical activities must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.
B. "Baseline" schedule: The schedule submitted and accepted by Engineer for the Work.
C. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Price, unless otherwise approved by Engineer.
D. CPM: Critical path method (CPM), which is a method of planning and scheduling a construction contract where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Contract.
E. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Contract duration and contains no float.
F. Event: The starting or ending point of an activity. An event has no duration.
G. Float: The measure of leeway in starting and completing an activity.
   1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
   2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total float is the measure of leeway in starting or completing an activity without adversely affecting an intermediate deadline or the planned Contract completion date.

H. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

I. Milestone: A key or critical point in time for reference or measurement. A milestone has no duration.

J. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

K. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.05 SUBMITTALS:

A. Qualification Data: For consultant.

B. Schedule of Submittals: Submit in specified electronic format. Arrange the following information in a tabular format:
   1. Scheduled date for first submittal.
   2. Specification Section number and title.
   3. Submittal category (technical or informational).
   4. Name of Subcontractor or Supplier.
   5. Description of the Work covered.
   6. Scheduled date for Engineer's final release or approval.

C. Preliminary Construction Progress Schedule: Submit in specified electronic format and three opaque hard copies.
   1. Acceptance of cost-loaded preliminary construction schedule will not constitute acceptance of schedule of values for cost-loaded activities.

D. Construction Progress Schedule: Submit initial schedule, large enough to show entire schedule for entire construction period to Engineer for review and acceptance.
   1. Submit electronically, using software indicated, labeled to comply with requirements for Submittals. Include type of schedule (Initial or Updated) and date.
   2. Submit three opaque paper copies.

E. Schedule of Values: Submit with initial construction progress schedule to Engineer for review and approval in specified electronic format and three hard copies of schedule.

F. Construction Progress Reports: Submit two copies every two weeks.

G. Daily Construction Reports: Submit two copies at monthly intervals.

H. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

I. Special Reports: Submit two copies at time of unusual event.

1.06 COORDINATION:

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate construction progress schedule with the schedule of values, list of subcontracts, schedule of Submittals, Material and Equipment procurement, progress reports, payment requests, and other required schedules and reports.
   1. Secure time commitments for performing critical elements of the Work from parties involved.
   2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 SCHEDULE OF SUBMITTALS:

A. Preparation: Submit a schedule of Submittals, arranged in chronological order by dates required by construction progress schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates as required in Section 01 33 00 – "Submittals."
   1. Coordinate Submittals schedule with list of subcontracts, the schedule of values, and "Baseline" construction progress schedule.
   2. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include Submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
   3. Final Submittal: Submit concurrently with the first complete submittal of construction progress schedule.

2.02 CONTRACTOR'S CONSTRUCTION PROGRESS SCHEDULE, GENERAL:

A. Time Frame: Extend schedule from date established in the Notice to Proceed to date of Final Completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 30 calendar days, unless specifically allowed by Engineer.
   2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, Submittals, approvals, purchasing, fabrication, and delivery.
      a. Pipe
      b. Valves
      c. Polymer Concrete Manholes
   3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 – "Submittals" in schedule. Coordinate Submittal review times in Contractor's construction progress schedule with schedule of Submittals.
   4. Startup and Testing Time: Include not less than two days for startup and testing.
   5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer's administrative procedures necessary for certification of Substantial Completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Phasing: Arrange list of activities on schedule by phase.
   2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 11 00 – "Summary of Work". Delivery dates indicated stipulate the earliest possible delivery date.
   3. Work Restrictions: Show the effect of the following items on the schedule:
      a. Uninterruptible services.
      b. Use of premises restrictions.
      c. Seasonal variations.
      d. Environmental control.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
E. Contract Modifications: For each proposed Contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall schedule.

2.03 PRELIMINARY CONSTRUCTION PROGRESS SCHEDULE:

A. Bar-Chart Schedule: Submit preliminary horizontal bar-chart-type construction schedule within seven days of date in the Notice to Proceed.
   1. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work.
B. Preliminary Schedule of Values:
   1. Initiate a preliminary value assigned to each significant construction activity.
   2. Values shall give an indication of cash requirement prediction, with total equal to Contract Price.
   3. Submit within ten days of Effective Date of Contract to Engineer and Owner for review.

2.04 CONSTRUCTION PROGRESS SCHEDULE (GANTT CHART):

A. Gantt-Chart Schedule: After submittal of preliminary construction progress schedule as stated above, submit a detailed construction progress schedule within 30 days after the Notice to Proceed. Base the schedule on the preliminary construction progress schedule and incorporate review comments and other feedback.
B. The schedule shall show the Work in a horizontal bar chart or other graphic format suitable for displaying scheduled and actual progress.
   1. The schedule shall indicate phases of the Work, starting date, interim milestones, and dates of Substantial Completion and Final Completion.
   2. Breakdown Work phases into separate time bar for each significant construction activity entry, with dates Work is expected to begin and be completed. Within each time bar, indicate estimated completion percentage in 10% increments.
   3. Scale and spacing shall allow room for notation and revisions.
   4. Sheet Size: Minimum 11 x 17 inches.
C. Provide sub-schedules to define in more detail critical portions of schedules, including inspections and tests.
D. Coordinate construction progress schedule with schedule of values, schedule of Submittals schedule, procurement schedule, progress reports, and payment requests.
E. Engineer will review and comment on construction progress schedule and, upon agreement between Engineer and Contractor on necessary changes:
   1. Contractor shall distribute copies as specified of the accepted "baseline" schedule to Engineer. Contractor shall provide additional copies to Subcontractors and other parties required to comply with scheduled dates, one copy to each party.
F. Revise the construction progress schedule after each meeting, event, or activity where revisions have been recognized and accepted to reflect impacts of new developments on the schedule.
G. Update and submit three copies to Engineer of the revised schedule at least once each month to show actual progress compared to the originally accepted "baseline" schedule and any proposed changes in the schedule of remaining Work. Include with construction progress report.

2.05 SCHEDULE OF VALUES:

A. Based on the preliminary draft schedule of values, reviewed by Engineer and Owner, submit finalized schedule of values acceptable to Engineer as to form and basic details. Submit final within 30 days after Notice to Proceed.

B. Coordinate preparation of schedule of values with preparation and content of construction progress schedule.

C. Content:

1. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing values for progress payments during construction.
2. Follow the construction progress schedule breakdown of Work activities as format for listing component items and assigning values.
3. For each major line item, list sub-values of major products or operations under the item.
   a. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
   b. For items on which progress payments will be requested for stored materials received, but not installed, break down the value into:
      (1) The cost of the materials, delivered and unloaded, including taxes paid unless taxes are exempted.
      (2) The total installed value.
   c. The sum of all values listed in the schedule shall equal the total Contract Price.

2.06 REPORTS:

A. Construction Progress Reports:

1. Submit a report on actual construction progress every two weeks. More frequent reports may be required should the Work fall behind the accepted schedule.
   a. Format shall be on 8-1/2 x 11-inch paper, submitted to Engineer in two copies.
2. Construction progress reports shall consist of the revised construction progress schedule and a narrative report which shall include but not be limited to the following:
   a. Comparison of actual progress to planned progress shown on originally accepted schedule.
   b. Summary of activities completed since the previous construction progress report.
   c. Summary of activities planned for next reporting period.
   d. Planned, earned, and spent earned value analysis for the month.
   e. Identification of problem areas.
   f. A description of current and anticipated delaying factors, if any.
   g. Impact of possible delaying factors.
   h. Proposed corrective actions.
3. Submit a construction progress report to Engineer with each application for partial payment. Work reported complete but not readily apparent to Engineer must be substantiated with supporting data when requested by Engineer.
4. If a schedule update reveals that, through no fault of Owner, the Work is likely to be completed later than the Contract completion date, Contractor shall:
   a. Establish a plan for making up lost time.
      (1) Increase number of workers, or
      (2) Increase amount or kinds of tools, or
      (3) Work overtime or additional shifts, or
      (4) A combination of the above 3 actions.
   b. Submit plan to Owner and Engineer before implementing the plan.

c. Take actions as necessary to get the Work back on schedule at no additional cost to Owner.

B. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project Site:
1. List of Subcontractors at Project Site.
2. Approximate count of personnel at Project Site, and breakdown by craft.
3. Equipment at Project Site.
4. Material deliveries.
5. High and low temperatures and general weather conditions.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events (refer to special reports).
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Emergency procedures.

C. Field Condition Reports: Promptly on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit a request for information (RFI). Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

D. Special Reports:
1. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
2. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project Site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.01 CONSTRUCTION PROGRESS SCHEDULE:

A. Construction Progress Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule before each regularly scheduled construction progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate actual completion percentage for each activity.

B. Distribution: Distribute copies of accepted schedule to Engineer, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

SECTION 01 32 33 – CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section specifies administrative and procedural requirements for construction photographs.

1.02 SUBMITTALS:

A. Submit prints as specified in Section 01 33 00 – "Submittals" and in PART 3 - this Section.

B. Photographer shall submit two sample prints of the type and quality required during construction, for review and acceptance by Engineer.

1.03 QUALITY ASSURANCE:

A. All photographs shall be taken and processed by a qualified and established commercial photographer experienced in construction photography.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC REQUIREMENTS: SPECIFIED IN PART 3, THIS SECTION.

PART 3 - EXECUTION

3.01 PROGRESS SITE PHOTOGRAPHS:

A. Contractor shall be responsible for photographs of the Site to show the existing and general progress of the Work. Photographs shall be taken of the following areas and at the following times.

1. Existing Site conditions before Site work is started. Number of views shall be adequate to cover the force main and gravity main route with a maximum interval between photographs of 200-feet.
2. Progress of the Work from clearing throughout construction. There shall be three different views taken at each site along the route showing progress on or about the first of each month.
3. Finished Project after completion of Work. Number of views shall be adequate to show the finished Work.
4. If Project is not completed during the Contract Time or authorized extensions, photographs shall continue to be taken at no increase in Contract Price.

B. Digital Images:

1. Submit a complete set of digital image electronic files as a Project record document.
   a. Provide images in JPEG format, with minimum sensor size of 10.0 megapixels.
   b. Provide image resolution of not less than 1600 by 1200 pixels.
   c. Submit images that have same aspect ratio as the sensor, uncropped.

C. Identification:

1. Identify each electronic photograph with a label which contains the Contract name and Contract number, date of exposure, and description of view.
2. Identify electronic media with date digital photographs were taken.

D. Deliver electronic media files to Engineer.

3.02 ROUTE PHOTOGRAPHS:

A. Contractor shall be responsible for photographs along the entire construction route showing the condition of the terrain prior to any alterations by Contractor and before construction is started.

These same views shall be rephotographed after completion of all construction. Three days' notice shall be given to Engineer and Owner prior to this Work to allow them to accompany photographer.

B. The principal reason for obtaining photographs is so that items such as cracked curbs, shrubs, lawns, broken pavement or sidewalks, plugged culverts in driveways, or other problems along the construction route may be more clearly shown and recorded. This will to some degree preclude the possibility of post construction litigation with property owners adjacent to the Work.

C. Photographs shall be taken at intervals of not more than 200 feet and at other intervals deemed necessary to record detailed conditions, possible field conflicts, and as may be designated by Engineer.

D. Each photograph shall be identified in the view using an identification board stating the Contract name and Contract number, station number, street or other suitable identification, date and sequential view number.

E. Contractor shall keep a log of all photographs noting detailed information or comments pertinent to each photograph.

F. Digital Images:
   1. Submit a complete set of digital image electronic files as a Project record document.
      a. Provide images in JPEG format, with minimum sensor size of 10.0 megapixels.
      b. Provide image resolution of not less than 1600 by 1200 pixels.
      c. Submit images that have same aspect ratio as the sensor, uncropped.

G. Identification:
   1. Identify electronic media with date digital photographs were taken.

H. Deliver and electronic media files to Engineer.

3.03 ADDITIONAL PHOTOGRAPHS:

A. From time to time Engineer may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order, and are not included in the Contract Price or an Allowance.
   1. Engineer will give the photographer three days' notice, where feasible.
   2. In emergency situations, the photographer shall take additional photographs within 24 hours of Engineer's request.
   3. Circumstances that could require additional photographs include, but are not limited to:
      a. Substantial Completion of a major phase or component of Work.
      b. Owner's request for special publicity photographs.
      c. Special events planned at Project Site.
      d. Immediate follow-up when on-site events result in construction damage or losses.
      e. Extra record photographs at time of final acceptance.

END OF SECTION 01 32 33

SECTION 01 33 00 – SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes definitions, descriptions, transmittal, and review of Submittals.

1.02 RELATED REQUIREMENTS:

A. Section 01 31 00 – "Project Coordination Meetings."
B. Section 01 32 00 – "Construction Progress Schedules and Reports."
C. Section 01 32 33 – "Construction Photographs."
D. Section 01 78 00 – "Contract Closeout."

1.03 GENERAL INFORMATION:

A. Definitions:
   1. Shop Drawings, product data, and Samples are technical Submittals prepared by Contractor, Subcontractor, manufacturer, or Supplier and submitted by Contractor to Engineer as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe installation, operation, maintenance, or technical properties, as specified in each Division of the Specifications.
      a. Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.
      b. Product data includes standard printed information on materials, products, and systems; not custom-prepared for this Project, other than the designation of selections from available choices.
      c. Samples include both fabricated and unfabricated physical examples of materials, products, and Work; both as complete units and as smaller portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mock-ups are a special form of Samples which are too large to be handled in the specified manner for transmittal of Sample Submittals.
   2. Informational Submittals are those technical reports, administrative Submittals, certificates, and guarantees not defined as Shop Drawings, product data, or Samples.
      a. Technical reports include laboratory reports, tests, technical procedures, technical records, and Contractor's design analysis.
      b. Administrative Submittals are those nontechnical Submittals required by the Contract Documents or deemed necessary for administrative records. These Submittals include maintenance agreements, Bonds, Project photographs, physical work records, statements of applicability, copies of industry standards, Project record data, schedules, security/protection/safety data, and similar type Submittals.
      c. Certificates and guarantees are those Submittals on Equipment and Materials where a written certificate or guarantee from the manufacturer or Supplier is called for in the Specifications.
   3. Refer to ARTICLES 1.03 and 1.04 of this Part for detailed lists of Submittals and specific requirements.
B. Quality Requirements:
   1. Submittals such as Shop Drawings and product data shall be of suitable quality for legibility and reproduction purposes. Every line, character, and letter shall be clearly legible. Drawings such as reproducibles shall be useable for further reproduction to yield legible hard copy.

2. Documents submitted to Engineer that do not conform to specified requirements shall be subject to rejection by Engineer, and upon request by Engineer, Contractor shall resubmit conforming documents. If conforming Submittals cannot be obtained, such documents shall be retraced, redrawn, or photographically restored as may be necessary to meet such requirements. Contractor's failure to initially satisfy the legibility quality requirements will not relieve Contractor from meeting the required schedule for Submittals.

C. Language and Dimensions:
   1. All words and dimensional units shall be in the English language.
   2. Metric dimensional unit equivalents maybe stated in addition to the English units. However, English units of measurement shall prevail.
   3. All words shall be in the English language.

D. Submittal Completeness:
   1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable Engineer to review the information effectively.
   2. Where standard drawings are furnished which cover a number of variations of the general class of Equipment, each drawing shall be annotated to indicate exactly which parts of the drawing apply to the Equipment being furnished. Use hatch marks to indicate variations that do not apply to the Submittal. The use of "highlighting markers" will not be an acceptable means of annotating Submittals. Annotation shall also include proper identification of the Submittal permanently attached to the drawing.
   3. Reproductions or copies of Contract Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. Contractor may use a reproduction of Contract Drawings for erection drawings to indicate information on erection or to identify detail drawing references. Whenever the Drawings are revised to show this additional Contractor information, Engineer's title block shall be replaced with Contractor's title block, and Engineer's professional seal shall be removed from the drawing. Contractor shall revise these erection drawings for subsequent Engineer revisions to the Contract Drawings.

E. Form of Submittals:
   1. Submittals and other Project documents shall be transmitted in electronic format as specified.
      a. Selected Submittals may be provided in paper ("hardcopy") copies only with advance approval of Engineer, and using procedures specified herein.
      b. Equipment instruction books and operating manuals shall be provided in paper copies in addition to specified electronic format.
   2. Electronic Format:
      a. Scanned Submittals and documents are not acceptable. Transmit Submittals and Project documents in:
         (1) Nonproprietary, native electronic format incorporating any necessary reference files, or
         (2) Adobe *PDF files created directly from native electronic format, or
         (3) Engineer-approved equal.
         (4) Electronic submittal PDF files are not to be combined files or collections of files/drawings. Each drawing document must stand alone.
         (5) Each file will be right reading and orientation the same for all consecutive resubmissions.
         (6) For any given Submittal, the filename and format shall be consistent for initial submission and subsequent revisions of the same. Use consistent naming

convention throughout. Reference to revision or dates shall not be included in a filename.

(7) Nonconforming Submittals are subject to rejection by Engineer.

b. Provide "as-constructed" Submittals, record documents, Equipment instruction books and operating manuals, and other documents on CD-ROM in Adobe *PDF format as required and approved by Owner.

c. Equipment instruction books and operating and maintenance manuals shall be in Adobe *PDF format combined in one pdf file for the complete O&M manual, or divided into pdf files that represent entire volumes (corresponding to hardcopy volumes). The pdf files shall be completely bookmarked with links within the index sheet to the different sections within the manuals/volumes, corresponding to the defined tabs within the hardcopy version.

(1) Digital delivery media shall be Engineer's and Owner's File Transfer Protocol (FTP) site(s).

1.04 TECHNICAL SUBMITTALS:

A. Items shall include, but not be limited to, the following:

1. Manufacturer's specifications.
2. Catalogs, or parts thereof, of manufactured Equipment.
3. Shop fabrication and erection drawings.
4. Bills of material and spare parts list.
5. Instruction books and operating manuals.
6. Performance tests on Equipment by manufacturers.
7. Concrete mix design information.
8. All drawings, catalogs or parts thereof, manufacturer's specifications and data, Samples, instructions, and other information specified or necessary:
   a. For Engineer to determine that Equipment and Materials conform to the design concept and comply with intent of the Contract Documents.
   b. For proper erection, installation, operation, and maintenance of Equipment and Materials which Engineer will review for general content but not for basic details.
   c. For Engineer to determine what supports, anchorages, structural details, connections, and services are required for Equipment and Materials, and effects on contiguous or related structures and Equipment and Materials.

B. Schedule of Submittals:

1. Prepare for Engineer's concurrence, a schedule for submission of all Submittals specified or necessary for Engineer's approval of the use of Equipment and Materials proposed for incorporation in the Work or needed for proper installation, operation, or maintenance. Submit the schedule with the procurement schedule and construction progress schedule. Schedule submission of all Submittals to permit review, fabrication, and delivery in time so as to not cause a delay in the Work of Contractor or his Subcontractors or any other contractors as described in the Contract Documents.
2. In establishing schedule for Submittals, allow 20 days in Engineer's office for reviewing original Submittals and 15 days in Engineer's office for reviewing resubmittals.
3. Submittals requiring revision shall be resubmitted.
4. The schedule shall indicate the anticipated dates of original submission for each item and Engineer's approval thereof, and shall be based upon at least one resubmission of each item.
5. Schedule all Submittals (Shop Drawings, product data, and Samples) required prior to fabrication or manufacture for submission within 30 days of the Notice to Proceed.

Schedule Submittals pertaining to storage, installation, and operation at the Site for Engineer's approval prior to delivery of the Equipment and Materials.

6. Resubmit Submittals the number of times required for Engineer's "Submittal Approved." However, any need for resubmittals in excess of the number set forth in the accepted schedule, or any other delay in obtaining approval of Submittals, will not be grounds for extension of the Contract Times, provided Engineer completes his reviews within the times specified.
7. Where a Submittal is required by the Contract Documents or the accepted schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertaining Submittal will be at the sole expense and responsibility of Contractor.

C. Transmittal of Submittals:
1. All Submittals (Shop Drawings, product data, and Samples) for Equipment and Materials furnished by Contractor, Subcontractors, manufacturers, and Suppliers shall be submitted to Engineer by Contractor.
2. After checking and verifying all field measurements, transmit all Submittals to Engineer for approval as follows:
   a. Electronic Submittal Cover:
      (1) The first page of each electronic submittal shall be reserved for an information block that contains the Project name and number, Contract title and number, the submittal filename, number, and resubmittal number where applicable, applicable Specification Section and Article number.
      (2) Include an electronic letter of transmittal containing the Drawing number and title, sheet number (if applicable), revision number, and electronic filename. Unidentifiable Submittals will be returned for proper identification.
   b. Check and approve Submittals of Subcontractors, Suppliers, and manufacturers prior to transmitting them to Engineer. Contractor's submission shall constitute a representation to Owner and Engineer that Contractor approves Submittals and has determined and verified all design criteria, quantities, dimensions, field construction and installation criteria, materials, catalog numbers, compliance with Laws and Regulations, and similar data, and Contractor assumes full responsibility for doing so; and Contractor has coordinated each Submittal with the requirements of the Work and the Contract Documents.
   c. At the time of each submission, call to the attention of Engineer in the letter of transmittal any deviations from requirements of the Contract Documents.
   d. Make all modifications noted or indicated by Engineer and return the required number of revised Submittals until approved. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by Engineer on previous Submittals. After Submittals have been approved, submit copies thereof for final distribution. Previously approved Submittals transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the Submittal and resubmit for review.
   e. Following completion of the Work and prior to final payment, furnish record documents and approved Samples and Shop Drawings necessary to indicate "as constructed" conditions, including field modifications, in the number of copies specified. Furnish additional copies for insertion in Equipment instruction books and operating manuals as required. All such copies shall be clearly marked "PROJECT RECORD."

(1) Submit a final record copy of the Master Field Drawing list which shall indicate the final revision status of each drawing on the list.

f. Keep a copy or sample of each Submittal in good order at the Site.

3. Quantity Requirements:
   a. Except as otherwise specified, transmit all Shop Drawings in the following quantities:
      (1) Initial Submittal:
         (a) Electronic - One copy to Engineer.
      (2) Resubmittals:
         (a) Electronic - One copy to Engineer.
      (3) Submittal for final distribution:
         (a) Electronic - One copy to Engineer.
      (4) As-constructed documents:
         (a) Paper – one copy to Engineer.
         (b) Electronic - One copy to Engineer and One copy to Owner.
   b. Transmit Submittals of product data as follows:
      (1) Initial Submittal:
         (a) Electronic - One copy to Engineer.
      (2) Resubmittals:
         (a) Electronic - One copy to Engineer.
      (3) Submittal for final distribution:
         (a) Electronic - One copy to Engineer.
   c. Transmit Submittals of Equipment instruction books and operating manuals as follows:
      (1) Initial Submittal:
         (a) Electronic - One copy to Engineer. One copy to Owner.
      (2) Resubmittals:
         (a) Electronic - One copy to Engineer. One copy to Owner.
      (3) Submittal for Final Distribution:
         (a) Electronic - One copy to Engineer. One copy to Owner.
   d. When all Submittals have been updated to "as-constructed" conditions, transmit to Engineer and to Owner in electronic format.
   e. Owner may copy and use for internal operations and staff training purposes any and all document Submittals required by this Contract and approved for final distribution, whether or not such documents are copyrighted, at no additional cost to Owner. If permission to copy any such Submittal for the purposes stated is unreasonably withheld from Owner by Contractor or any Subcontractor, manufacturer, or Supplier, Contractor shall provide to Engineer 50 copies plus the number of copies required by Contractor at each final distribution issue.

D. Engineer's Review:
   1. Engineer will review and take appropriate action on Submittals in accordance with the accepted schedule of Submittals. Engineer's review and approval will be only to determine if the items of Equipment and Materials covered by the Submittals will, after installation or incorporation in the Work, conform to information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents.
   2. Engineer's review and approval will not extend to design data reflected in Submittals which is peculiarly within the special expertise of Contractor or Contractor's

Subcontractors or Suppliers. Review and approval of a component item as such will not indicate approval of the assembly in which the item functions.

3. Engineer's review and approval of Shop Drawings, product data, or Samples will not relieve Contractor of responsibility for any deviation from requirements of the Contract Documents unless Contractor has in writing called Engineer's attention to such deviation at the time of submission, and Engineer has given written concurrence in and approval of the specific deviation. Approval by Engineer shall not relieve Contractor from responsibility for errors or omissions in Submittals.

E. Submittal Action Stamp:

1. Engineer's review action will appear on all Submittals of Contractor when returned by Engineer. Review status designations listed on Engineer's action stamp are defined as follows:

A - SUBMITTAL APPROVED: Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is approved for incorporation in the Work. Contractor is to proceed with fabrication or procurement of the items and with related Work. Copies of the Submittal are to be transmitted to Engineer for final distribution.

B - SUBMITTAL APPROVED AS NOTED (RESUBMIT): Signifies Equipment and Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is approved for incorporation in the Work in accordance with Engineer's notations. Contractor is to proceed with fabrication or procurement of the items and with related Work in accordance with Engineer's notations and is to submit a revised Submittal responsive to notations marked on the returned Submittal or written in the letter of transmittal.

C - SUBMITTAL RETURNED FOR REVISION (RESUBMIT): Signifies Equipment and Material represented by the Submittal appears to conform with the design concept and comply with the intent of the Contract Documents but information is either insufficient in detail or contains discrepancies which prevent Engineer from completing his review. Contractor is to resubmit revised information responsive to Engineer's annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related Work is not to proceed until the Submittal is approved.

D - SUBMITTAL NOT APPROVED (SUBMIT ANEW): Signifies Equipment and Material represented by the Submittal does not conform with the design concept or comply with the intent of the Contract Documents and is disapproved for use in the Work. Contractor is to provide Submittals responsive to the Contract Documents.

E - PRELIMINARY SUBMITTAL: Signifies Submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the Contract Documents must be deferred until additional information is furnished. Contractor is to submit such additional information to permit layout and related activities to proceed.

F - FOR REFERENCE, NO APPROVAL REQUIRED: Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts,

standard sheets, bulletins and similar data, all of which are useful to Engineer or Owner in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. Engineer reviews such Submittals for general content but not for basic details.

G - DISTRIBUTION COPY (PREVIOUSLY APPROVED): Signifies Submittals which have been previously approved and are being distributed to Contractor, Owner, Resident Project Representative, and others for coordination and construction purposes.

1.05 INFORMATIONAL SUBMITTALS:

A. Informational Submittals are comprised of technical reports, administrative Submittals, and guarantees which relate to the Work, but do not require Engineer approval prior to proceeding with the Work. Informational Submittals include:
   1. Hydrostatic testing of pipes.
   2. Field test reports.
   3. Concrete cylinder test reports.
   4. Certification on Materials:
      a. Cement tests.
   5. Soil test reports.
   6. Temperature records.
   7. Shipping or packing lists.
   8. Job progress schedules.
   9. Equipment and Material delivery schedules.
   10. Progress photographs.
   11. Warranties and guarantees.

B. Transmittal of Informational Submittals:
   1. All informational Submittals furnished by Subcontractors, manufacturers, and Suppliers shall be submitted to Engineer by Contractor unless otherwise specified.
      a. Electronic Submittal Cover:
         (1) The first page of each electronic submittal shall be reserved for an information block that contains the Project name and number, Contract title and number, the submittal filename, number, and resubmittal number where applicable, applicable Specification Section and Article number.
         (2) Include an electronic letter of transmittal containing the Drawing number and title, sheet number (if applicable), revision number, and electronic filename. Unidentifiable Submittals will be returned for proper identification.
      b. At the time of each submission, call to the attention of Engineer in the letter of transmittal any deviations from requirements of the Contract Documents.
   2. Quantity Requirements:
      a. Technical reports and administrative Submittals except as otherwise specified:
         (1) Electronic: One to Engineer.
      b. Written Certificates and Guarantees:
         (1) Electronic: One to Engineer.
   3. Test Reports:
      a. Responsibilities of Contractor, Owner, and Engineer regarding tests and inspections of Equipment and Materials and completed Work are set forth elsewhere in these Contract Documents.

b. The party specified responsible for testing or inspection shall in each case, unless otherwise specified, arrange for the testing laboratory or reporting agency to distribute test reports as follows:
   (1) Owner: Two copies.
   (2) Engineer: One copy.
   (3) Resident Project Representative: One copy.
   (4) Contractor: Two copies.
   (5) Manufacturer or Supplier: One copy.

C. Engineer's Review:
   1. Engineer will review informational Submittals for indications of Work or Material deficiencies.
   2. Engineer will respond to Contractor on those informational Submittals which indicate Work or Material deficiency.

PART 2 - EXECUTION - NOT APPLICABLE.

PART 3 - EXECUTION - NOT APPLICABLE.

END OF SECTION 01 33 00

SECTION 01 42 00 – DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 SUMMARY:

A. Definitions:

1. Basic contract definitions used in the Contract Documents are defined in the GENERAL CONDITIONS. Definitions and explanations are not necessarily either complete or exclusive, but are general for the Work.
2. General Requirements are the provisions or requirements of DIVISION 01 Sections, and which apply to the entire Work of the Contract.

1.02 RELATED REQUIREMENTS:

A. Specification standards and associations applicable to the Work are specified in each Section.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATIONS:

A. Specification Format: The Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's (CSI) Section Format and Master Format numbering system. Some portions may not fully comply, and no particular significance will be attached to such compliance or noncompliance.

1. Divisions and Sections: For convenience, a basic unit of Specification text is a "Section," each unit of which is numbered and named. These are organized with related Sections, into "Divisions," which are recognized as the present industry consensus on uniform organization and sequencing of Specifications. The Section title is not intended to limit meaning or content of Section, nor to be fully descriptive of requirements specified therein, nor to be an integral part of text.
2. Section Numbering: Used for identification and to facilitate cross-references in Contract Documents. Sections are placed in numeric sequence; however, numbering sequence is not complete, and listing of Sections in Table of Contents at beginning of the Project Manual must be consulted to determine numbers and names of Specification Sections in these Contract Documents.
3. Page Numbering: Numbered independently for each Section. Section number is shown with page number at bottom of each page, to facilitate location of text.
4. Parts: Each Section of Specifications generally has been subdivided into three basic "parts" for uniformity and convenience (PART 1 - GENERAL, PART 2 - PRODUCTS, and PART 3 - EXECUTION). These "Parts" do not limit the meaning of text within. Some Sections may not contain all three "Parts" when some are not applicable, or may contain more than three "Parts" to add clarity to organization of Section.
5. Underscoring of Titles: Used strictly to assist reader of Specification in scanning text for key words in content. No emphasis on or relative importance is intended except where underscoring may be used in body of text to emphasize a duty, critical requirement, or similar situation.
6. Project Identification: Project file number and identification are recorded at bottom of each page of Specifications to minimize possible misuse of Specifications, or confusion with other Project Specifications.

B. Specification Content:

1. These Specifications apply certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:
    a. Imperative and Streamlined Language: These Specifications are written in imperative and abbreviated form. This imperative language of the technical

Sections is directed at the Contractor, unless specifically noted otherwise. Incomplete sentences shall be completed by inserting "shall," "the Contractor shall," and "shall be," and similar mandatory phrases by inference in the same manner as they are applied to notes on the Drawings. The words "shall be" shall be supplied by inference where a colon (:) is used within sentences or phrases. Except as worded to the contrary, fulfill (perform) all indicated requirements whether stated imperatively or otherwise.

b. Specifying Methods: The techniques or methods of specifying requirements varies throughout text, and may include "prescriptive," "compliance with standards," "performance," "proprietary," or a combination of these. The method used for specifying one unit of Work has no bearing on requirements for another unit of Work.

c. Overlapping and Conflicting Requirements: Where compliance with two or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, notify Engineer in writing for a decision, which Engineer will render in writing within a reasonable time.

d. Abbreviations: Throughout the Contract Documents are abbreviations implying words and meanings which shall be appropriately interpreted. Specific abbreviations have been established, principally for lengthy technical terminology and in conjunction with coordination of Specification requirements with notations on Drawings and in schedules. These are normally defined at first instance of use. Organizational and association names and titles of general standards are also abbreviated.

C. Assignment of Specialists: In certain instances, Specification text requires that specific Work be assigned to specialists in the operations to be performed. These specialists shall be engaged for performance of those units of Work, and assignments are requirements over which Contractor has no choice or option. These assignments shall not be confused with, and are not intended to interfere with, enforcement of building codes and similar regulations governing the Work, local trade and union jurisdictions, and similar conventions. Nevertheless, final responsibility for fulfillment of Contract requirements remains with Contractor.

D. Trades: Except as otherwise specified or indicated, the use of titles such as "carpentry" in Specification text, implies neither that the Work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"), nor that specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

1.04 DRAWING SYMBOLS:

A. Except as otherwise indicated, graphic symbols used on Drawings are those symbols recognized in the construction industry for purposes indicated. Refer instances of uncertainty to Engineer for clarification.

1.05 INDUSTRY STANDARDS:

A. Applicability of Standards: Except where the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents. Such standards are made a part of the Contract Documents by reference and are stated in each Section.

1. Referenced standards, referenced directly in Contract Documents or by governing regulations, have precedence over non-referenced standards which are recognized in industry for applicability to the Work.

2. Where compliance with an industry standard is required, the latest standard in effect at time of opening Bids shall govern.
3. Where an applicable code or standard has been revised and reissued after the effective date of the Contract and before performance of Work affected by the revision, Engineer will decide whether to issue a Change Order to proceed with the revised standard.
4. In every instance the quantity or quality level shown or specified shall be the minimum to be provided or performed. The actual installation may comply exactly, within specified tolerances, with the minimum quantity or quality specified, or it may exceed that minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum values, as noted, or appropriate for the context of the requirements. Refer instances of uncertainty to Engineer for a decision before proceeding.
5. Each entity engaged in construction on the Project is required to be familiar with industry standards applicable to that entity's construction activity. Copies of applicable standards are not bound with the Contract Documents.
    a. Where copies of standards are needed for performance of a required construction activity, Contractor shall obtain copies directly from the publication source.

B. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where such acronyms or abbreviations are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards generating organization, authority having jurisdiction, or other entity applicable to the context of the text provision.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION 01 42 00

SECTION 01 57 00 – TEMPORARY BARRIERS AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes General Requirements for:
   1. Safety and Protection of Work and Property.
   2. Barriers.
   3. Security and Protection Facilities Installation.
   4. Environmental Controls.
   5. Access Roads and Parking Areas.
   6. Traffic Control and Use of Roadways.

1.02 RELATED REQUIREMENTS:

A. Section 01 10 00 - "Summary of Work" for work restrictions and limitations.

PART 2 - PRODUCTS- NOT APPLICABLE

PART 3 - EXECUTION

3.01 SAFETY AND PROTECTION OF WORK AND PROPERTY:

A. General:
   1. Provide for the safety and protection of the Work and of Materials and Equipment to be incorporated therein, whether in storage on or off the Site. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all Work and Equipment and Materials free from injury or damage. At the end of each day, all new Work likely to be damaged shall be appropriately protected.
   2. Notify Engineer immediately at any time operations are stopped due to conditions which make it impossible to continue operations safely or to obtain proper results.
   3. Construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, floors, pits, trenches, manholes, and ducts free of water.

B. Property Other than Owner's:
   1. Provide for the safety and protection of property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of construction. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.
   2. Names and telephone numbers of representatives of agencies and utilities having jurisdiction over streets and utilities in the Work area can be obtained from Engineer. Concerned agencies or utilities shall be contacted a minimum of 24 hours prior to performing Work, closing streets and other traffic areas, or excavating near underground utilities or pole lines.
   3. Operation of valves or other appurtenances on existing utilities, when required, shall be by or under the direct supervision of the owning utility.
   4. Where fences are to be breached on private property, the owners thereof shall be contacted and arrangements made to ensure proper protection of any livestock or other property thus exposed.
   5. The applicable requirements specified for protection of the Work shall also apply to the protection of existing property of others.
   6. Before acceptance of the Work by Owner, restore all property affected by Contractor's operations to the original or better condition.

3.02 BARRIERS:

A. General:
   1. Furnish, install, and maintain suitable barriers as required to prevent public entry, to protect the public, and to protect the Work, existing facilities, trees, and plants from construction operations. Remove when no longer needed or at completion of Work.
   2. Materials may be new or used, suitable for the intended purpose, but shall not violate requirements of applicable codes and standards or regulatory agencies.
   3. Barriers shall be of a neat and reasonable uniform appearance, structurally adequate for the required purposes.
   4. Maintain barriers in good repair and clean condition for adequate visibility. Relocate barriers as required by progress of Work.
   5. Repair damage caused by installation and restore area to original or better condition. Clean the area.

B. Tree and Plant Protection:
   1. Preserve and protect existing trees and plants at the Site which are designated to remain and those adjacent to the Site.
   2. Provide temporary barriers around each, or around each group of trees and plants. Construct to a height of six feet around trees, and to a diameter at the drip line or five feet from trunk, whichever is greater, to adequately protect plants.
   3. Consult with Engineer and remove agreed-on roots and branches which will interfere with construction. Employ qualified tree surgeon to remove and to treat cuts.
   4. Protect root zones of trees and plants as follows:
      a. Do not allow vehicular traffic or parking.
      b. Do not store materials or products.
      c. Prevent dumping of refuse or chemically injurious materials or liquids.
      d. Prevent puddling or continuous running water.
   5. Carefully supervise excavating, grading and filling, and subsequent construction operations to prevent damage.
   6. Remove and replace, or suitably repair, trees and plants which are damaged or destroyed due to construction operations, and which were designated to remain.

3.03 ENVIRONMENTAL CONTROLS:

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
   1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
   1. Comply with work restrictions specified in Contract Documents.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
   1. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.

2. Hold the areas of bare soil exposed at one time to a minimum.
3. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
4. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
5. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
6. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control:
1. Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
2. Provide methods to control surface water to prevent damage to the Project, the Site, or adjoining properties.
3. Provide temporary control measures such as berms, dikes, and drains.
4. Control fill, grading, and ditching to direct surface drainage away from excavations, pits, tunnels, and other construction areas; and to direct drainage to proper runoff.
5. Provide, operate, and maintain hydraulic equipment of adequate capacity to control surface and groundwater.

E. Tree and Plant Protection: Install temporary fencing located outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Noise Control:
1. Comply with OSHA standards.

G. Dust Control:
1. Provide positive methods and apply dust control materials to minimize raising dust from construction operations; and to prevent airborne dust from dispersing into the atmosphere.

H. Debris Control and Clean-Up:
1. Keep the premises free at all times from accumulations of debris, waste materials, and rubbish caused by construction operations and employees. Responsibilities shall include:
   a. Adequate trash receptacles about the Site, emptied promptly when filled.
   b. Periodic cleanup to avoid hazards or interference with operations at the Site and to maintain the Site in a reasonably neat condition.
   c. The keeping of construction materials such as forms and scaffolding neatly stacked.
2. Prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.
3. Final cleanup is specified in Section 01 78 00 - Contract Closeout.

I. Pollution Control:
1. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.
2. Provide equipment and personnel, perform emergency measures required to contain any spillages, and remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-Site in approved locations, and replace with suitable compacted fill and topsoil.

3. Take special measures to prevent harmful substances from entering public waters, sanitary, or storm sewers.

3.04 ACCESS ROADS AND PARKING AREAS:

A. Existing On-Site Roads and Parking Areas:

1. Do not allow existing on-Site streets, parking facilities, or walks to be used for construction traffic, equipment, or personnel.

3.05 TRAFFIC CONTROL AND USE OF ROADWAYS:

A. Traffic Controls:

1. Comply with requirements of authorities having jurisdiction.
2. Protect existing site improvements to remain including curbs, pavement, and utilities.
3. Maintain access for fire-fighting equipment and access to fire hydrants.
4. Provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow on haul routes, at Site entrances, on-Site access roads, and parking areas. This includes traffic signals and signs, flagmen, flares, lights, barricades, and other devices or personnel as necessary to adequately protect the public.
5. Remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified condition when no longer required.
6. Provide and maintain suitable detours or other temporary expedients if necessary.
7. Bridge over open trenches where necessary to maintain traffic.
8. Consult with governing authorities to establish public thoroughfares which will be used as haul routes and Site access. All operations shall meet the approval of owners or agencies having jurisdiction.

B. Maintenance of Roadways:

1. Repair roads, walkways, and other traffic areas damaged by operations. Keep traffic areas as free as possible of excavated materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.
2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

END OF SECTION 01 57 00

SECTION 01 60 00 – EQUIPMENT AND MATERIALS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes administrative and procedural requirements governing Contractor's selection of products for use in the Project.

1.02 RELATED REQUIREMENTS:

A. The following Sections contain requirements that relate to this Section:
B. For the applicability of industry standards to products specified: DIVISIONS 31 through 33.
C. For submittal of Contractor's construction progress schedule and the Submittal schedule: Sections 01 32 00 and 01 33 00.
D. For handling requests for substitutions made after award of the Contract: Section 01 25 00.

1.03 DEFINITIONS:

A. Definitions used in this Article are not intended to change the meaning of other terms used in these Contract Documents, such as "specialties," "systems," "structures," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.
    1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "Material," "Equipment," "system," and terms of similar intent.
        a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
        b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50% or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50%) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.
    2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
    3. "Equipment" is a product with operational or nonoperational parts, whether motorized, or manually operated, that may require service connections, such as wiring or piping.

1.04 SUBMITTALS:

A. Submittal of preliminary procurement schedule is specified in Section 01 32 00 - Construction Progress Schedules and Reports.
B. Submittals for products are specified in Section 01 33 00 and in applicable Sections of DIVISIONS 31 through 33.

1.05 QUALITY ASSURANCE:

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.
B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.06 TRANSPORTATION AND SHIPMENT:

A. Shipment Preparation:
   1. Contractor shall require manufacturers and Suppliers to prepare products for shipment in a manner to facilitate unloading and handling, and to protect against damage, deterioration, or unnecessary exposure to the elements in transit and storage. Provisions for protection shall include the following:
      a. Crates or other suitable packaging materials.
      b. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and accumulation of dirt in motors, electrical equipment, and machinery.
      c. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel.
      d. Grease packing or oil lubrication in all bearings and similar items.

B. Marking: Each product item shall be tagged or marked as identified in the delivery schedule or on Submittals. Complete packing lists and bills of material shall be included with each shipment. Each piece of every item need not be marked separately, provided that all pieces of each item are packed or bundled together and the packages or bundles are properly tagged or marked.

1.07 PRODUCT DELIVERY, STORAGE, AND HANDLING:

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
   1. Schedule delivery to minimize long-term storage at the Site and to prevent overcrowding of construction spaces. Allow ample time to avoid delay of the Work.
   2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to the Site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected. Inspect shipment to assure:
      a. Product complies with requirements of Contract Documents and reviewed Submittals.
      b. Quantities are correct.
      c. Containers and packages are intact and labels are legible.
      d. Products are properly protected and undamaged.
   5. Store products at the Site in a manner that will facilitate inspection and measurement of quantity or counting of units. Mark deliveries of component parts of Equipment to identify the Equipment, to permit easy accumulation of parts, and to facilitate inspection and measurement of quantity or counting of units.
   6. Store heavy Materials away from the Project structure in a manner that will not endanger the supporting construction.
   7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, and with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
   8. Protect motors, electrical Equipment, plumbing fixtures, and machinery of all kinds against corrosion, moisture deteriorations, mechanical injury, and accumulation of dirt or other foreign matter.

9. Protect exposed machined surfaces and unpainted iron and steel as necessary with suitable rust-preventive compounds.
10. Protect bearings and similar items with grease packing or oil lubrication.
11. Handle and store steel plate, sheet metal, and similar items in a manner to prevent deformation.
12. For storage of pipe and other products on easements and rights-of-way in residential and commercial areas, do not exceed the minimum required by scheduled laying operations, and conform to all requirements of public authorities. Store or place pipe along roads, set back from shoulder or curb, and at an angle tending to deflect vehicles if struck. Place or block pipe to preclude its accidental movement.

B. Handling:
1. Provide equipment and personnel necessary to unload and handle products, by methods to prevent damage or soiling to products, or packaging.
2. Handle by methods to prevent bending or overstressing. Where lifting points are designated, lift components only at those points.
3. Provide additional protection to surrounding surfaces as necessary to prevent damage.

C. Maintenance of Storage:
1. Inspect stored products on a scheduled basis.
2. Verify that storage facilities comply with manufacturer's product storage requirements, including environmental conditions continually maintained.
3. Verify that surfaces of products exposed to elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.
4. For mechanical and electrical Equipment in long-term storage, provide manufacturer's service instructions to accompany each item, with notice of enclosed instructions on exterior of package. Service Equipment on a regularly scheduled basis.

D. Protection After Installation: Provide substantial coverings as necessary to protect installed products from damage from subsequent construction operations. Remove coverings when no longer needed or as specified.

1.08 EXISTING EQUIPMENT AND MATERIALS:

A. Products Not to be Reused:
1. Equipment and Materials designated to be removed but not reused or delivered to Owner, shall become the property of the Contractor and shall be removed from the Site.

PART 2 - PRODUCTS

2.01 PRODUCT SELECTION:

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise specified or indicated, new at the time of installation.
1. Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.
2. Continued Availability: Where, because of the nature of its application, Owner is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the manufacturer has published assurances that the products and its parts are likely to be available to Owner at a later date.
3. Conform to applicable Specifications, codes, standards, and regulatory agencies.
4. Comply with size, make, type, and quality specified, or as specifically approved in writing by Engineer.

5. Manufactured and Fabricated Products:
    a. Design, fabricate, and assemble in accordance with the best engineering and shop practices.
    b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
    c. Equipment and Materials shall be suitable for service conditions intended.
    d. Equipment capacities, sizes, and dimensions indicated or specified shall be adhered to unless variations are specifically approved in writing by Engineer.
    e. Provide labels and nameplates where required by regulatory agencies or to state identification and essential operating data.
6. Do not use products for any purpose other than that for which designed.
7. To the fullest extent possible, provide products of the same kind from a single source.

PART 3 - EXECUTION

3.01 INSTALLATION OF PRODUCTS:

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place except as required for proper movement and performance, and accurately located and aligned with other Work.
    1. Obtain and distribute copies of manufacturer's printed instructions and recommendations if not a part of Submittals, containers, or packaging to parties involved in the installation, including a copy to Engineer.
    2. Maintain one complete set of instructions at the Site during installation and until completion.
    3. Handle, install, connect, clean, condition, and adjust products in accordance with such instructions and in conformance with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

B. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 01 60 00

SECTION 01 78 00 – CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes administrative and procedural requirements for Contract closeout including, but not limited to, the following:
   1. Inspection procedures.
   2. Project record document submittal.
   3. Instruction book and operating manual submittal.
   4. Submittal of warranties.
   5. Final cleaning.

B. Closeout requirements for specific construction activities are included in the appropriate Sections of the Specifications.

1.02 RELATED REQUIREMENTS:

A. Prerequisites to Substantial Completion and Final Acceptance: GENERAL CONDITIONS.
B. Submittals: Section 01 33 00.
C. Warranties: Section 01 78 36.

1.03 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.
   1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion is claimed, show 100% completion for the portion of the Work claimed as Substantially Complete.
      a. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Price.
      b. If 100% completion cannot be shown, include a list of incomplete items, the value of incomplete Work, and reasons the Work is not complete.
   2. Advise Owner of pending insurance changeover requirements.
   3. Submit specific warranties, workmanship Bonds, maintenance agreements, final certifications, and similar documents.
   4. Obtain and submit releases enabling Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
   5. Submit record drawings, instruction books and operating manuals, final project photographs, damage or settlement surveys, property surveys, and similar final record information.
   6. Deliver tools, spare parts, extra stock, and similar items.
   7. Complete start-up testing of systems and instruction of Owner's operation and maintenance personnel. Discontinue and remove temporary facilities from the Site, along with mockups, construction tools, and similar elements.
   8. Complete final cleanup requirements.
   9. Touch up and otherwise repair and restore marred, exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, Engineer will either proceed with inspection or advise Contractor of unfilled requirements. Engineer will prepare the Certificate of Substantial Completion following inspection or advise Contractor of construction that must be completed or corrected before the certificate will be issued.

1. Engineer will repeat inspection when requested and assured by Contractor that the Work is Substantially Complete.
2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 FINAL ACCEPTANCE:

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following. List exceptions in the request.
   1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include insurance certificates for products and completed operations where required.
   2. Submit an updated final statement, accounting for final additional changes to the Contract Price.
   3. Submit a certified copy of Engineer's final inspection list of items to be completed or corrected, endorsed and dated by Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance and shall be endorsed and dated by Engineer.
   4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the Date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
   5. Submit consent of surety to final payment.
   6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
   7. Submit a final liquidated damages settlement statement.

B. Reinspection Procedure: Engineer will reinspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except for items whose completion is delayed under circumstances acceptable to Engineer.
   1. Upon completion of reinspection, Engineer will prepare a certificate of final acceptance. If the Work is incomplete, Engineer will advise Contractor of Work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
   2. If necessary, reinspection will be repeated.

1.05 RECORD DOCUMENT SUBMITTALS:

A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure, fire-resistant location. Provide access to record documents for Engineer's reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark which drawing is most capable of showing conditions fully and accurately. Where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
   1. Record information concurrently with construction progress.
   2. Mark record sets with red erasable pencil. Use other colors to distinguish between variations in separate categories of the Work. Mark each document "PROJECT RECORD" in neat, large, printed letters.
   3. Mark new information that is important to Owner but was not shown on Contract Drawings or Shop Drawings.

4. Note related Change Order numbers where applicable.
5. Organize record drawing sheets into manageable sets. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set.
6. Upon completion of the Work, submit record drawings to Engineer for Owner's records.
7. Include the following:
    a. Horizontal and vertical locations of underground utilities and appurtenances including all installed valves and fittings, referenced to permanent surface improvements.
    b. Where Submittals are used for mark-up, record a cross-reference at corresponding location on Drawings.
    c. Field changes of dimension and detail.
    d. Changes made by Change Order or other Modifications.
    e. Details not on original Contract Drawings.

C. Record Specifications: Maintain one complete copy of the Project Manual including Addenda. Include with the Project Manual one copy of other written construction documents, such as Change Orders and Modifications issued in printed form during construction.
1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.
2. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.
3. Note related record drawing information and product data.
4. Upon completion of the Work, submit record Specifications to Engineer for Owner's records.
5. Include the following:
    a. Manufacturer, trade name, catalog number, and Supplier of each product and item of Equipment actually installed, particularly optional and substitute items.
    b. Changes made by Addendum, Change Order, or other Modifications.
    c. Related Submittals.

D. Record Product Data: Maintain one copy of each product data Submittal. Note related Change Orders and markup of record drawings and specifications.
1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the Site and from the manufacturer's installation instructions and recommendations.
2. Give particular attention to concealed products and portions of the Work that cannot otherwise be readily discerned later by direct observation.
3. Upon completion of markup, submit complete set of record product data to Engineer for Owner's records.

E. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record keeping and Submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete miscellaneous records, and place in good order. Identify miscellaneous records properly and bind or file, ready for continued use and reference. Submit to Engineer for Owner's records.

F. Instruction Books and Operating Manuals: Organize operation and maintenance data into suitable sets of manageable size as specified in Section 01 33 00.

G. Electronic Documentation:
1. In addition to paper copies, provide electronic versions of record documents showing "as-constructed" conditions, "as-constructed" construction progress schedule, master field

drawing list showing final revisions, instruction books, and operating manuals on CD-ROM in Adobe *PDF.

H. Warranties and Bonds: Specified in GENERAL CONDITIONS, Section 01 33 00, and Section 01 78 36.

1.06 SPARE PARTS:

A. Products Required:
   1. Provide to Owner the quantities of products, spare parts, maintenance tools, and maintenance materials specified in individual Sections, in addition to that required for completion of Work.
   2. Products shall be identical to those installed in the Work. Include quantities required from Supplier or manufacturer of original purchase to avoid variations in manufacture.

B. Storage, Maintenance:
   1. Coordinate with Owner. Deliver and unload spare products to Owner at Project Site and obtain receipt prior to final payment.
   2. For portions of the Work accepted and occupied by Owner prior to Substantial Completion, deliver the applicable spare products to Owner at time of acceptance. Obtain receipt.
   3. Maintain spare products in original containers with labels intact and legible, until delivery to Owner.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 CLOSEOUT PROCEDURES:

A. Operation and Maintenance Instructions: Arrange for each installer of Equipment that requires regular maintenance to meet with Owner's personnel at Project Site to provide instruction in proper operation and maintenance. Provide instruction by manufacturer's representatives if installers are not experienced in operation and maintenance procedures. Include a detailed review of the following items:
   1. Instruction books and operating manuals.
   2. Record documents.
   3. Spare parts and materials.
   4. Tools.
   5. Lubricants.
   6. Identification systems.
   7. Control sequences.
   8. Cleaning.
   9. Warranties and bonds.
   10. Maintenance agreements and similar continuing commitments.

3.02 FINAL CLEANING:

A. General: Contractor shall keep the Site premises free from accumulations of waste materials, rubbish, and other debris resulting from the Work. Regular Site cleaning is included in Section 01 57 00.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning.
   1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion.

a. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition, free of stains, films, and similar foreign substances. Clean concrete floors to a "broom clean" condition.
b. Wipe surfaces of mechanical Equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition.
c. Remove debris and surface dirt from limited-access spaces including trenches, equipment vaults, manholes, and similar spaces.
d. Clean the Site, including landscape development areas, of rubbish, litter, and other foreign substances. Sweep paved areas broom clean; remove stains, spills, and other foreign deposits. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

2. Remove temporary structures, tools, equipment, supplies, and surplus materials.
3. Remove temporary protection devices and facilities which were installed to protect previously completed Work.
4. Special Cleaning: Cleaning for specific units of Work is specified in applicable Sections of Specifications.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

D. Compliance: Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the Site and dispose of lawfully.
1. Extra materials of value remaining after completion of associated Work become Owner's property. Dispose of these materials as directed by Owner.

E. Repairs:
1. Repair damaged protective coated surfaces.
2. Repair roads, walks, fences, and other items damaged or deteriorated because of construction operations.
3. Restore all ground areas affected by construction operations.

END OF SECTION 01 78 00

SECTION 01 78 36 – WARRANTIES

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
   1. Refer to the GENERAL CONDITIONS for terms of the Contractor's period for correction of the Work.

1.02 RELATED SECTIONS:

A. The following Sections contain requirements that relate to this Section:
   1. Procedures for submitting warranties: Section 01 33 00.
   2. Contract closeout procedures: Section 01 78 00.
   3. Specific requirements for warranties on products and installations specified to be warranted: DIVISIONS 31 through 33.
   4. Certifications and other commitments and agreements for continuing services to Owner: Specified throughout the Contract Documents.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of the warranty on the Work that incorporates the products. Manufacturer's disclaimers and limitations on product warranties do not relieve Suppliers, manufacturers, and Subcontractors required to countersign special warranties with Contractor.

1.03 DEFINITIONS:

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by manufacturer to Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for Owner.

1.04 WARRANTY REQUIREMENTS:

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of the Contract Documents. Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Expressed warranties made to Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the Law. Expressed warranty periods shall not be interpreted as limitations on the time in which Owner can enforce such other duties, obligations, rights, or remedies.
   1. Rejection of Warranties: Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, Owner reserves the right to refuse to accept the Work, until Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.05 SUBMITTALS:

A. Submit written warranties to Engineer prior to the date certified for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the Date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of Engineer.

B. When the Contract Documents require Contractor, or Contractor and a Subcontractor, Supplier, or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by required parties. Submit a draft to Owner, through Engineer, for approval prior to final execution.
   1. Refer to DIVISIONS 31 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Bind warranties and bonds in heavy-duty, commercial-quality, durable three-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
   1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
   2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," and as required by Section 01 33 00.
   3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 01 78 36

DIVISION 03 – CONCRETE

SECTION 03 10 00 – CONCRETE FORMWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

A. This Section includes formwork for cast-in-place concrete.

1.03 RELATED REQUIREMENTS:

A. Section 03 20 00 – Concrete Reinforcement.
B. Section 03 30 00 – Cast-in-Place Concrete.

1.04 REFERENCE STANDARDS:

A. Applicable Standards:
   1. American Concrete Institute (ACI):
      a. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.
      b. ACI 301- Specifications for Structural Concrete.
      c. ACI 318 - Building Code Requirements for Reinforced Concrete.
      d. ACI 347R - Guide to Formwork for Concrete.
      e. ACI 350 - Code Requirements for Environmental Engineering Concrete Structures.
      f. ACI 350.5 - Specifications for Environmental Concrete Structures.
   2. ASTM International (ASTM):
      a. ASTM C31/C31M REV A– Standard Practice for Making and Curing Concrete Test Specimens in the Field.
      b. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
      c. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

PART 2 - PRODUCTS

2.01 MATERIALS FOR FACING:

A. Where concrete will be exposed to view after construction:
   1. Use exterior grade plywood at least 5/8 inch thick or steel forms capable of producing a smooth, uniform appearance.
   2. Do not use form-facing materials with raised grain, torn surfaces, worn edges, dents, or other defects that will impair the texture of concrete surfaces.
B. Where concrete will not be exposed to view after construction:
   1. Exterior grade plywood at least 5/8 inch thick.
   2. Steel.
   3. Wood fiberboard.
   4. Dressed lumber free of loose knots.
C. Treat forms with commercially available form releasing agents that will not bond with, stain, or adversely affect concrete surfaces. Agents shall not impair subsequent treatment of concrete surfaces depending upon bond or adhesion, nor shall it impede the wetting of surfaces to be

cured with water or curing compounds. Form releasing agents shall be VOC compliant with a maximum VOC content of 3.8 lbs./gal. (450 g/L), or less where area restrictions are more stringent.

D. Clean forms of sawdust, dust, dirt, and other foreign materials.

2.02 FORM TIES:

A. Break back, coil, or screw type, except where otherwise specified.
B. Use water-seal coil type in walls below grade and in walls of water bearing structures. Removable through-wall tapered ties shall not be used.
C. Coil type shall leave conical depression in concrete.
D. Space as required against pressure of fresh concrete.
E. The portion of the form tie remaining in place shall provide for a clearance of two times the minimum dimension of the tie, but not less than 3/4 inch, from the formed surface.

2.03 CHAMFER STRIPS:

A. Chamfer: 3/4 inch except where otherwise indicated.
B. Place in all forms to provide chamfer where concrete will have exposed projecting corners.

PART 3 - EXECUTION

3.01 FORM CONSTRUCTION:

A. Conform to ACI 301, 318, and 347R. Shop Drawings for formwork, shoring, and reshoring are not required to be submitted for approval.
B. Adequately brace, stiffen, and support forms to prevent perceptible deflection or settlement, and to hold plumb, level, and true to line.
C. Construct and maintain forms to the tolerances given in ACI 117.
D. Construct sufficiently tight to prevent mortar leakage.
E. Avoid offsets between adjacent forms and construct so that shores, braces, and stiffening members are in line with those below.
F. Space studs and stringers as required to support facing against concrete pressure, but not more than 12 inches for 5/8-inch plywood or 16 inches for 3/4-inch plywood. Maximum deflection of facing materials reflected on concrete surfaces exposed to view shall be 1/240 of the span between structural members of the formwork.
G. Use wales, strongbacks, shores, and bracing as required.
H. Form all necessary openings or chases for piping, ductwork, and similar items where indicated or as required for the Work.
I. Construct forms to be removable in sections without marring concrete surface.
J. Surface of forms shall provide a smooth, dense, plane surface to finished concrete where exposed to view.
K. Contractor shall be responsible for structural adequacy, design, engineering, and construction of the formwork.
L. Stay-in-place metal forms shall not be used.

3.02 TIME-IN-PLACE FOR FORMS:

A. It is the responsibility of Contractor to consider all applicable factors and leave the formwork in place until it is safe to remove them.
B. All removal shall be performed in a manner which will prevent damage to the concrete and ensure the complete safety of the structure.

C. Where forms support more than one element, the forms shall not be removed until the form removal criteria are met by all supported elements.

D. Evidence that concrete has gained sufficient strength to permit removal of forms supporting weight of concrete shall be determined by tests on control cylinders. All control cylinders shall be stored in the structure or as near the structure as possible so they receive the same curing conditions and protection methods as given those portions of the structure they represent. Control cylinders shall be removed from the molds at an age of no more than 24 hours. All control cylinders shall be prepared and tested in accordance with ASTM C31/C31M REV A and ASTM C39/C39M at the expense of Contractor by an independent laboratory that complies with ASTM C1077. Control cylinders shall be tested within 4 hours after removal from the Site.

E. Forms shall not be removed unless the minimum time or minimum compressive strength requirements below are met.

1. Formwork Not Supporting Weight of Concrete:
    a. Formwork for walls, columns, sides of beams, gravity structures, slabs-on-ground and other vertical type formwork not supporting the weight of concrete shall remain in place 24-hours minimum after concrete placement is completed.
2. Formwork Supporting Weight of Concrete:
    a. Formwork supporting weight of concrete and shoring shall not be removed until structural members have acquired sufficient strength to safely support their own weight and any construction or other superimposed loads to which the supported concrete may be subjected. At a minimum, no forms or shoring shall be loosened or removed until control concrete test cylinders indicate the concrete has attained the following compressive strengths for the respective structural members:

Structural Member	Percent of Design Compressive Strength
Unshored slab and beam forms or forms which can be removed without disturbing shores	70
Slab or beam shoring	85

END OF SECTION 03 10 00

SECTION 03 20 00 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and DIVISION 01 Specification Sections, apply to this Section.

1.02 SUMMARY:

A. This Section includes steel reinforcement bars, ties, welded wire fabric, bolsters, chair supports, and accessories.

1.03 RELATED WORK SPECIFIED ELSEWHERE:

A. Section 03 10 00 - Concrete Formwork.
B. Section 03 30 00 - Concrete.

1.04 REFERENCE STANDARDS:

A. Applicable Standards:
   1. ASTM International (ASTM):
      a. A615/A615M- Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
      b. A706/A706M- Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
      c. A1064/A1064M– Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
   2. American Concrete Institute (ACI):
      a. 301- Specifications for Structural Concrete.
      b. SP 66 - Detailing Manual.
      c. 318- Building Code Requirements for Structural Concrete.
      d. 117 - Specifications for Tolerances for Concrete Construction and Materials.
   3. American Welding Society (AWS):
      a. A5.5 - Low Alloy Steel Electrodes for Shielded Metal Arc Welding.
      b. B2.1 - Welding Procedure and Performance Qualification.
      c. D1.4- Structural Welding Code Reinforcing Steel.
   4. Concrete Reinforcing Steel Institute (CRSI):
      a. Manual of Standard Practice.

1.05 SUBMITTALS:

A. Submit as specified in DIVISION 01.
B. Include, but not limited to, the following:
   1. Complete bar schedule, bar details, and erection drawings to conform to ACI SP 66.
   2. Drawing with each type of bent bar marked with identification mark. Straight bars shall have mark number or be identified by size and length.
   3. Erection drawings shall be clear, easily legible, and to a minimum scale of:
      a. 1/4 inch = 1 foot (1:50).
      b. 1/8 inch = 1 foot (1:100) if bars in each face are shown in separate views.
   4. Size and location of all openings.
   5. Concrete protective cover.
   6. Grade of steel.
   7. Lap splice lengths.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Store steel reinforcement blocked up off the ground and in orderly stacks.
B. Store only bars with the same identifying label in the same stack.

1.07 TESTING:

A. Perform at the mill for each heat.
B. Submit certified test results upon request.

PART 2 - PRODUCTS

2.01 REINFORCEMENT BARS, TIES, AND STIRRUPS:

A. Materials:
   1. Conform to ASTM A615, Grade 60, except as otherwise specified.
   2. Cold-drawn wire for spiral column ties shall conform to ASTM A1064.
   3. Reinforcement indicated or specified to be welded shall conform to ASTM A706.
B. Fabrication of Bars:
   1. Fabricate with cold bends conforming to the recommended dimensions shown in ACI 318.
   2. Fabricate bars according to the tolerances given in ACI 117.
   3. Field fabrication will be allowed only if Contractor has equipment to properly fabricate steel.
   4. Attach metal or plastic tags with identifying mark or length corresponding to mark number or length on Drawing. Straight bars shall have mark number or size and length. Bent bars shall have mark number.
   5. Contractor may, at his option, continue steel reinforcement through openings in walls and slabs, then field-cut the opening so that there will be the required concrete cover between ends of bars and edge of opening.

2.02 WELDED WIRE REINFORCEMENT:

A. Conform to ASTM 1064.
B. Wire sizes W1.4 and smaller shall be galvanized.
C. Provide mats only. Rolled fabric is not acceptable.

2.03 BOLSTERS, CHAIRS, AND ACCESSORIES:

A. Conform to ACI SP 66 and the CRSI Manual of Standard Practice.
B. Provide all spacers, bolsters, chairs, ties, and other devices necessary to properly space, place, support, and fasten steel reinforcement in place during the concrete placement.
C. Metal accessories shall be galvanized or plastic-coated where legs will be exposed in finished concrete surfaces.
D. Do not use rocks, broken bricks, wood blocks, or concrete fragments for support of steel reinforcement.

2.04 PRECAST CONCRETE BLOCK BAR SUPPORTS:

A. May be used only for bar supports in slabs on ground.
B. Conform to ACI SP-66 and the CRSI Manual of Standard Practice.
C. Each block shall have a minimum of 9 square inches (5800 square millimeters) of bearing area. Space as required by the particular condition of weight, bearing surface, and rigidity of the steel reinforcement.

PART 3 - EXECUTION

3.01 PLACEMENT OF STEEL REINFORCEMENT:

A. Place all steel reinforcement before concrete is cast in accordance with approved erection drawings, ACI 117, ACI 318, and the CRSI Manual of Standard Practice.

B. Remove oil, mill scale, pitting, mud, loose rust, ice, and other materials that would reduce bond from bars before placing.

C. Tie securely with 16 gage (1.6 mm) or larger annealed iron wire.

D. Place to maintain concrete cover to conform to ACI 117 and ACI 318, unless otherwise indicated.

E. Splice steel where indicated. Splices shall be in full contact and shall conform to ACI 318.
   1. Unless otherwise indicated, lap splices shall be Class B as defined by ACI 318.
   2. Splice steel using Cadweld Series T-splices where indicated or approved.
      a. Provide a manufacturer's representative to give on site instructions to all welders who will perform the splices in the field.
      b. Contractor shall have the manufacturer's representative instruct, observe, and approve in writing those persons doing the welding.
      c. Contractor shall arrange for the manufacturer's representative to return at the request of the Engineer.
   3. Any additional Contractor-proposed splice shall be submitted for acceptance of location and splice length.

F. Lap welded wire reinforcement in accordance with of ACI 318, but not less than the length of one mesh plus 2 inches (50 mm).

G. Connection of reinforcement bars to steel shapes or plate shall be with a Cadweld Series B-splice.

H. Do not bend bars embedded in hardened or partially hardened concrete without approval from Engineer. If bending is permitted, conform to procedures of ACI 301 unless otherwise prescribed by the governing building code.

I. Do not weld reinforcing bars unless specifically indicated. Where welding is indicated, provide bars conforming to ASTM A706/A706M and comply with AWS D1.4.

END OF SECTION 03 20 00

SECTION 03 30 00 – CONCRETE

PART 1 - GENERAL

1.01 GENERAL PROJECT REQUIREMENTS

A. All cast-in-place concrete construction for this project shall conform to the requirements of ACI 301-20, "Specifications for Structural Concrete" as referenced herein, along with any additional or modified requirements specified in these Contract Documents.

B. Should conflict between ACI 301-20 and this specification exists, notify Engineer promptly for clarification. Do not continue with Work unless written clarification from the Engineer has been provided.

1.02 RELATED DOCUMENTS:

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.03 SUMMARY:

A. This Section includes concrete and related items.

1.04 RELATED REQUIREMENTS:

A. Section 03 10 00 - Concrete Formwork.

B. Section 03 20 00 - Concrete Reinforcement.

1.05 REFERENCE STANDARDS:

A. Comply with the provisions of the following codes, specifications, and standards, except as otherwise indicated. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

1. American Concrete Institute (ACI):
   a. 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   b. 301 - Specifications for Concrete Construction.
   c. 302.1R - Guide for Concrete Floor and Slab Construction.
   d. 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   e. 305.1 – Specification for Hot Weather Concreting
   f. 306R - Committee Report on Cold Weather Concreting.
   g. 306.1 – Standard Specification for Cold Weather Concreting
   h. 308.1 - Standard Specification for Curing Concrete.
   i. 309R - Guide for Consolidation of Concrete.
   j. 318 - Building Code Requirements for Structural Concrete.
2. ASTM International (ASTM):
   a. B370 - Copper Sheet and Strip for Building Construction.
   b. C31/C31M - Practice for Making and Curing Concrete Test Specimens in the Field.
   c. C33 - Concrete Aggregates.
   d. C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens.
   e. C40 - Test Method for Organic Impurities in Fine Aggregates for Concrete.
   f. C42 - Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
   g. C88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   h. C114 - Test Methods for Chemical Analysis of Hydraulic Cement.

i. C117 - Test Method for Material Finer than 75µ (No. 200) Sieve in Mineral Aggregates by Washing.
j. C136 - Test Method for Sieve Analysis of Fine and Coarse Aggregates.
k. C142 - Test Method for Clay Lumps and Friable Particles in Aggregates.
l. C143 - Test Method for Slump of Hydraulic Cement Concrete.
m. C150 - Portland Cement.
n. C172 - Practice for Sampling Freshly Mixed Concrete.
o. C192/C192M - Practice for Making and Curing Concrete Test Specimens in the Laboratory.
p. C231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
q. C233 - Test Methods for Air-Entraining Admixtures for Concrete.
r. C260 - Air-Entraining Admixtures for Concrete.
s. C289 - Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
t. C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
u. C430 - Test Method for Fineness of Hydraulic Cement by the 45µ (No. 325) Sieve.
v. C494 - Chemical Admixtures for Concrete.
w. C566 - Test Method for Total Evaporable Moisture Content of Aggregate by Drying.
x. C595/C595M - Blended Hydraulic Cements.
y. C618 - Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
z. C881 - Epoxy-Resin-Base Bonding Systems for Concrete.
aa. C1107 - Packaged Dry, Hydraulic Cement Grout (Nonshrink).
bb. C1116 – Standard Specifications for Fiber-Reinforced Concrete.
cc. C1193 - Guide for Use of Joint Sealants.
dd. C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
ee. C1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ff. C1293 - Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
gg. C1315 - Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
hh. C1567 - Standard Test Method for Determining the Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ii. C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
jj. C1778 - Standard Guide for Reducing the Risk of Deleterious Alkali-Aggregate Reaction in Concrete
kk. D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction. (Nonextruding and Resilient Bituminous Types).
ll. D1752 - Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

3. Concrete Plant Manufacturers Bureau (CPMB):
   a. 100 - Concrete Plant Standards.

b. 102 - Recommended Guide Specifications for Batching Equipment and Control Systems in Concrete Batch Plants.

4. Plant Mixer Manufacturers Division (PMMD):
   a. 100 - Concrete Plant Mixer Standards.
5. Federal Specification (FS):
   a. SS-S-200 - Sealants, Joint: Two-Component, Jet-Blast-Resistant, Cold-Applied, for Portland Cement Concrete Pavement.
   b. TT-S-227 - Sealing Compound: Elastomeric Type, Multi-Component (for Calking, Sealing, and Glazing in Buildings and Other Structures).
6. National Bureau of Standards (NBS) Specifications for Scales.
7. Truck Mixer Manufacturers Bureau (TMMB):
   a. Truck Mixer, Agitator and Front Discharge Concrete Carrier Standards.
8. US Army Corps of Engineers (USACE)
   a. CRD C48: Standard Test Method for Water Permeability of Concrete

1.06 SUBMITTALS:

A. Submit as specified in Division 01.
B. Include, but not limited to, product data and Shop Drawings of the following:
   1. Nonshrink grouts.
   2. Admixtures.
   3. Bonding agents.
   4. Curing agents.
   5. Expansion joint materials.
   6. Formwork spray agents.
   7. Joint sealants.
   8. Waterstops.
C. Mill Certificates:
   1. Submit to Engineer a minimum of one copy for each cement shipment.
D. Concrete Mix Design:
   1. Submit the following test data for each mix design for approval prior to placing concrete. Resubmit for any change in each mix design
      a. Concrete:
         (1) Fine and coarse aggregate, water and cement sources.
         (2) Mix proportions, slump and air content.
         (3) Data on 30 consecutive satisfactory compressive strength tests and standard deviation calculations, laboratory trial batch strength curves.
            (a) Strength tests shall include any Type D admixtures used in final mix design.
      b. Cement:
         (1) Mill certificate.
         (2) ASTM C430.
      c. Fine Aggregate:
         (1) ASTM C33.
         (2) ASTM C40.
         (3) ASTM C88.
         (4) ASTM C117.
         (5) ASTM C136.
         (6) ASTM C142.
         (7) Fineness modulus.

(8) ASTM C1260 or approved service records.

d. Coarse Aggregate:
(1) ASTM C33.
(2) ASTM C88.
(3) ASTM C136.
(4) ASTM C142.
(5) ASTM C1260 or approved service records.

E. Construction Joint layout
1. Dimensioned drawings showing location of all wall and slab construction joints.

1.07 QUALITY ASSURANCE:
A. Field Testing: Shall be performed by an ACI Concrete Field-Testing Technician Grade 1.
1. Reference Section 3.08 for concrete testing requirements.
B. Submit qualification records of field testing and finishing technicians prior to placing concrete.

PART 2 - PRODUCTS

2.01 CONCRETE:
A. Materials:
1. Cementitious Materials:
a. Provide one of the following:
(1) Portland cement conforming to ASTM C150, Type II.
(a) 15 to 25% Fly ash may be used as the pozzolan. See below for definition of fly ash.
(2) Blended hydraulic cement conforming to ASTM C595, Type IL.
(a) 15 to 25% Fly ash may be used as the pozzolan. See below for definition of fly ash.
(b) Type IL cement shall also be in compliance with one of the following:
1). Designated MS
2). Type IL cement blended with fly ash as specified, shall achieve a maximum expansion of 0.10% at 6 months when tested in accordance with ASTM C1012. Submit documentation with mix design submittal to demonstrate compliance.
b. The maximum amount retained on the No. 325 sieve shall be 10% as determined in accordance with ASTM C430.
c. The cement used shall have less than 0.6% alkali content (% Na_2Oeq = $\%Na_2O+\%0.658\ K_2O$).
d. Use one brand of cement throughout the Project unless otherwise approved by Engineer.
2. Supplementary Cementitious Materials:
a. Fly Ash: Fly ash shall conform to ASTM C618, Class C.
(1) Class C fly ash shall have a Dunstan ratio no greater than 3.0. The Dunstan Ratio (R shall be defined as (CaO-5)/Fe2O3) expressed as a percent.
(2) The Calcium Oxide (CaO) content shall be below 15%.
b. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.
3. Fine Aggregate:
a. Conform to ASTM C33, except deleterious substances shall not exceed (by weight):
(1) Clay Lumps: 0.25%.

(2) Material Finer than No. 200 (75µ) Sieve: 2.0%.
(3) Coal and Lignite: 0.25% except use sand containing not more than 0.05% coal and lignite when used in concrete for finished floor surfaces.
(4) Other Deleterious Substances: 0.25%.

b. Fineness modulus shall be between 2.3 and 3.1.
c. Approved service record of 3 years with a history indicating that the fine aggregate is not chemically reactive.
d. Fine aggregate considered deleterious or potentially deleterious shall not be used without approval.
e. Maintain fine aggregate free of ice and frozen lumps.

4. Coarse Aggregate:
   a. Conform to ASTM C33, except deleterious substances shall not exceed the following percentages (by weight):
      (1) Clay lumps and friable particles.....1.0.
      (2) Shale or shale-like material.....1.0.
      (3) Coal and lignite..... 0.05.
      (4) Material finer than No. 200 sieve..... 1.5.
      (5) Sum of all deleterious material..... 3.0.
   b. Approved service record of 3 years with a history indicating that the coarse aggregate is not chemically reactive.
   c. For a new coarse-aggregate source, when 3 years' approved service records are not available, or when the service records are unacceptable; the aggregate shall be evaluated for potential reactivity. Aggregate must be considered innocuous in accordance with petrographic examination by ASTM C295 or when tested in accordance with ASTM C1260. Alternatively, aggregate may be considered non-reactive when tested in accordance with ASTM C1293.
   d. Coarse aggregate considered deleterious or potentially deleterious shall not be used without approval.
   e. Maintain coarse aggregate free of ice and frozen lumps.
   f. Grading Requirements:
      (1) Conform to Table 3 of ASTM C33
      (2) See Concrete Qualities Required paragraph below for maximum aggregate size.
5. Mixing Water:
   a. Only potable water will be acceptable.
6. Admixtures:
   a. Water-Reducing Type:
      (1) Conform to ASTM C494, Type A, D, F, and G.
      (2) Conform to manufacturer's recommendations for use.
      (3) Technical assistance of the manufacturer's field representative shall be furnished upon request.
   b. Air-Entraining Type:
      (1) Conform to ASTM C260.
      (2) Conform to manufacturer's recommendations for use.
      (3) Technical assistance of the manufacturer's field representative shall be furnished upon request.
   c. Retarding Type:
      (1) Use only with Engineer’s written concurrence.
      (2) Conform to ASTM C494, Type D.

d. Storage: Admixtures shall be stored in such a manner as to avoid contamination, evaporation, freezing, temperature changes, settling, or any damage which would adversely affect their characteristics.

B. Laboratory Testing of Materials for Use in Concrete:
1. An approved independent testing laboratory shall be selected and paid by Contractor to perform all required laboratory tests of materials proposed for use in the production of concrete and to determine mix proportions when laboratory trial batches are required.

C. Concrete Qualities Required:
1. The following qualities and testing requirements are applicable for all concrete types:
a. Compressive-strength determinations shall be made from concrete cylinders tested in accordance with ASTM C39.
b. Air content shall be tested in accordance with ASTM C231.
c. Slump of concrete shall be tested in accordance with ASTM C143. Slump shall not exceed 8 inches after the addition of all admixtures.
d. Chloride Ion Content:
(1) Maximum water-soluble chloride ion content, in percent by weight of cement:
(a) 0.10 for all concrete unless otherwise specified.
(2) Testing shall be in accordance with ASTM C1218 and reported at an age between 28 and 42 days.
2. Type A: Concrete for structural elements:
a. This concrete type applies to all structural concrete.
b. Minimum 28-day compressive strength: 4000 psi
c. Aggregate size: No. 57 or No. 67.
d. Slump: 4 inches prior to addition of admixtures. Slump range shall be plus or minus 1 inch. Allowable slump range shall not exceed 8 inches.
e. Air Content:
(1) For No. 57 or No. 67 aggregate: 6% ±1.5%.
f. Maximum water-cement Ratio: 0.45

D. Mix Proportions:
1. Concrete shall be homogeneous, readily placeable, uniformly workable, and finishable; proportioned to conform to ACI 211.1.
a. Mix proportions for all concrete, unless otherwise specified, shall be selected preferably on the basis of field strength test records; but in the case where sufficient or suitable strength test data is not available, concrete shall be proportioned on the basis of laboratory trial mix design.
b. Field Strength Test Records: Field strength test records shall be representative of the concrete types specified herein. Field strength test records shall have been obtained within the past 24 months and spanning no less than 45 days for concrete within 1000 psi of that specified. A compressive strength test is defined as the average 28-day compressive strength of two 6-inch by 12-inch or three 4-inch by 8-inch companion cylinders made conforming to ASTM C172 and ASTM C31 and tested conforming to ASTM C39
(1) Calculation of the standard deviation, and the average required compressive strength, f_{cr}`, shall be in accordance with ACI 301 Section 4.2.3.2(b) and 4.2.3.3.
c. Laboratory Trial Batch: When laboratory trial batches are used as a basis for determining mix proportions, all such Work shall be performed by the laboratory as specified in PART 2, Paragraph 2.01.B. - Laboratory Testing of Materials for Use in Concrete, this Section.

(1) Laboratory trial batches shall be used to establish a water-cement ratio, compression-strength curve with at least three points, each representing the strength of a separate trial batch. At least one point shall be above and one below the strength required. Each point on the curve shall represent the average of at least three cylinders tested at 28 days or an earlier age when approved by Engineer. The slump and air content shall be at the maximum limits specified in PART 2, Paragraph 2.01.C. - Concrete Qualities Required, this Section.

(2) A point on the water-cement ratio, compressive-strength curve shall be selected that will provide an average compressive strength at least 1,200 psi greater than the specified minimum strength.

(3) Laboratory trial batches shall be used to determine the drying shrinkage of concrete trial mixes. A drying shrinkage test shall be conducted for every mix design proposed for the project. Drying shrinkage tests shall be conducted including all admixtures required in proposed mix designs. Three test specimens shall be prepared for each drying shrinkage test. Test specimens (4 inch by 4 inch by 11 inch prisms) shall be molded, cured, dried, and measured in accordance with ASTM C157 except with modifications listed below.

(a) After 7 days in the lime saturated water the specimen shall be removed and measured to determine the base length for drying shrinkage calculations. This point shall be considered day zero for time measurement. Specimens shall be immediately placed in a humidity-controlled room maintained at 73° F, ±3°F and 50 percent, ±4 percent relative humidity for the remainder of the test (21 days after day zero measurement). Final length measurement shall be conducted at 28 days after the addition of water to the cement during the mixing operations.

E. Mixing and Delivery:

1. Conform to ACI 304R.
   a. Ready-mixed concrete shall be produced and delivered conforming to ASTM C94 as applicable.
2. Cement temperature, when added to mix, shall not exceed 170°F (77°C).
3. Adjust the amount of mix water to compensate for the moisture content of the aggregates.
4. Concrete Plant:
   a. Conform to "Concrete Plant Mixer Standards" of the Plant Mixer Manufacturers Division, Concrete Plant Manufacturers Bureau, and "Concrete Plant Standards" of the Concrete Plant Manufacturers Bureau.
   b. Before test sampling and placing concrete, water may be added at Project Site, subject to limitations of ACI 301. Water added to concrete having a slump below the specified minimum shall be at Contractor's risk. If the water added produces a slump greater than the specified maximum, the concrete will be rejected. If water is added, the concrete shall be remixed for a minimum of 25 revolutions. Water shall not be added after the truck mixer has begun to discharge concrete.
   c. Contractor shall furnish Owner with a concrete delivery ticket for each load of concrete. The ticket shall have the following information recorded:
      (1) Serial number of tickets.
      (2) Time batched.
      (3) Time arrived on jobsite.
      (4) Specified compressive strength of concrete at 28 days.
      (5) Amount of concrete (by volume).

(6) Batch weights of all cementitious materials, aggregates, admixtures and water.
(7) Mix number.
(8) Amount of water with-held (by volume).
(9) Amount of all water added at jobsite by Contractor.
(10) Name of ready-mix batch plant.
(11) Date.
(12) Truck number.
(13) Name of purchaser.

5. Plant and truck mixer uniformity shall be tested according to ASTM C94. Frequency of tests shall be as specified in PART 3, this Section.

2.02 GROUT:

A. Grout for Dry Packing:
1. Volume: 1 part Portland cement to 2 parts sand.
2. Keep water to a minimum as required for placing by the dry packing method.
3. Place after the mixed grout has been allowed to stand for 2 hours.
4. The sand and cement shall be as specified for concrete.

B. Flowable Nonshrinking Grout:
1. Required for setting handrail posts, for setting equipment recommended by the manufacturer to be set with nonshrinking grout, and in other places indicated.
2. Grout shall be nonmetallic and conform to ASTM C1107.
3. Prepare and place conforming to manufacturer's printed instructions.
4. For equipment bases, the concrete surfaces shall be grit blasted or roughened with a chipping hammer prior to grouting. The foundation plates shall be cleaned of any grease, oil, paint, primers, or epoxy coatings.

C. Grout for tie-hole patching:
1. Where tie hole is in contact with finished drinking water, product shall be ANSI/NSF 61 certified.
a. Master Builder Solutions, MasterSeal 590.
b. Engineer approved equal.
2. For all other locations:
a. Dayton Superior 1107 Advantage Grout.
b. Euclid Chemical, Speed Plug.
c. W.R Meadows, Meadow-Plug.
d. Engineer approved equal.

2.03 CONCRETE ACCESSORIES:

A. Flexible Waterstops:
1. Polyvinyl chloride (PVC) materials shall meet the requirements of CRD-C-572.
a. Use where waterstops are called for unless noted otherwise.
2. Provide factory fabricated waterstop corner transitions and intersections leaving only straight butt joint splices for the field.
3. Use for all locations unless otherwise specified.

2.04 CURING AGENT:

A. Apply to all concrete surfaces unless otherwise indicated or specified.
B. Curing agent shall conform as follows:

1. ASTM C309, Type 1: Use where concrete surface is not exposed to direct sunlight after placement and for conditions where hot concreting does not apply.
2. ASTM C309, Type 1-D: Use where slabs are exposed to direct sunlight for a period of seven days minimum after placement. Curing and sealing agent with fugitive dye shall be readily distinguishable upon the concrete surface for at least four hours after application but shall be inconspicuous within seven days after application.
3. ASTM C309, Type 2: Use as specified in PART 3, Article 3.05 - Hot Weather Concreting, this Section.
4. Silicate-based liquid surface densifiers are prohibited as curing compounds.

C. Curing compound used on floors to be sealed, painted, tiled, topped, dampproofed, waterproofed, or covered with resilient floor covering shall be guaranteed not to interfere with application of sealer, paint, tile mortar, or tile adhesive after a 28-day curing period.

D. Curing compound shall be VOC compliant with a maximum VOC content of 2.9 lbs./gal (350 g/L), or less where Project location regulations are more stringent.

PART 3 - EXECUTION

3.01 PREPARATION FOR CONCRETE PLACEMENT:

A. Openings Through Concrete: Provide openings through concrete as indicated and for the proper installation of all equipment, piping, wiring, ductwork and similar items, installed under this Contract. Form all openings prior to placement of concrete unless noted otherwise.

B. Installation of Embedded Items:
1. Provide for accurate installation of embedded items installed under this Contract.
2. Securely fix floor drains in place to prevent flotation while placing concrete. Uniformly and accurately slope finish floor slab toward the drains.
3. Embedded items shall be as indicated or specified, or as selected by Contractor and approved by Engineer.
4. During cold weather, protect pipe sleeves, shear pockets, and blockouts from moisture which may freeze, expand, and crack the sleeve, pocket or blockout and concrete structure.
5. Grease or tape anchor bolt threads to protect from concrete splatter.

C. Installation of Joints:
1. Construction Joints:
   a. Location:
      (1) Locate joints, which are not indicated or specified, in conformance with [ACI 318] [and] [ACI 350].
      (2) Unless noted otherwise, construction joints shall be spaced no more than 25'-0" apart in vertical walls only. Flatwork or slabs may be placed in sections with a maximum area of 3000 square ft and a maximum aspect ratio of 1:1.5 (width:length).
      (3) Obtain Engineer's approval of joints located by Contractor prior to preparation of reinforcing steel drawings.
   b. Preparation and Installation:
      (1) Clean and break laitance or other foreign material from bonding surface.
      (2) Tighten forms remaining in place (where applicable) to prevent seepage between forms and hardened concrete.
      (3) Provide waterstops as indicated or specified and as required in any new construction joint requested by Contractor.
   c. Waterstops:

(1) Install in all construction joints where indicated.
(2) Install conforming to manufacturer's printed instructions. All joints and splices of PVC waterstop shall be 100% fused. Use thermostatically controlled splicing iron as recommended by manufacturer.

2. Expansion Joints:
   a. Install filler, backer rod and sealant in strict conformance with manufacturer's written instructions.
   b. Reinforcing steel shall not extend through expansion joints unless indicated otherwise.
   c. Attach rigid joint filler to the face of the joint prior to placing adjacent concrete. The filler shall occupy the entire width of the joint.
   d. Install sealant backer rod for sealant except where indicated to be omitted. Install bond breaker where indicated.
   e. Clean joints surfaces immediately before application of sealant.
   f. Install joint sealants to conform to ASTM C1193. Tool sealants to provide smooth, uniform bead with a slightly concave surface, eliminate air pockets, and ensure sealant contact and adhesion with sides of joint.
   g. Protect joints from moisture and ice during freezing.
3. Contraction Joints: As specified in this PART 3, Article 3.03 - Finishing, this Section.

D. Cutting and Bonding to Existing Concrete:
1. Cutting Existing Concrete:
   a. Use methods and equipment that will avoid damage to adjacent parts of the structure from heavy blows or vibration.
   b. Cut existing concrete with power concrete saw where possible to prevent spalling and chipping and to form neat, straight edge.
   c. Remove all loose or cracked concrete resulting from cutting existing concrete, leaving only sound, undamaged concrete adjacent to new Work.
   d. Leave access opening edges with a neat, true grout surface to the opening size indicated.
   e. Cut reinforcing steel with sufficient length remaining (approximately 38 bar diameters) for bending and lapping into new construction.
2. Bonding to Existing Concrete:
   a. Roughen concrete to 1/4-inch (6-mm) amplitude by use of a pneumatic chipping hammer or other approved means.
   b. Thoroughly clean the concrete surface and apply the bonding agent in accordance with manufacturer's written instructions.

3.02 PLACING OF CONCRETE:

A. Conventional Placing:
1. General Requirements:
   a. Conform to ACI 304R.
   b. Bonding surfaces, including reinforcement, shall be clean, free of laitance and foreign materials.
   c. Place concrete on properly prepared and unfrozen subgrade and only in dewatered excavation and forms.
   d. Use forms for all concrete except where otherwise indicated or specified. Footings entirely below grade may be earth formed.
   e. Do not place concrete that has partially hardened or has been contaminated by foreign materials.

f. Prevent mud or foreign materials from entering the concrete or forms during placement operations.

2. Conveying:
   a. Convey concrete from the mixer and deposit in place by methods which will prevent the segregation or loss of materials.
   b. Equipment for chuting, pumping, and pneumatically conveying concrete shall be of such size and design as to provide a practically continuous flow of concrete at the delivery end.
   c. Aluminum conveying equipment shall not be used.
3. Depositing:
   a. Place concrete in continuous horizontal lifts not to exceed 2 feet, and place concrete against bulkheads and keyways at vertical joints.
   b. Maximum free drop of concrete shall be 5 feet, in walls 10 inches or less in thickness, with 1-foot additional drop allowed for each inch of wall thickness over 10 inches, with a maximum drop of 10 feet.
   c. When vapor barrier is used, keep lapped joints closed and take precautions to avoid puncturing the barrier.
4. Consolidation of Concrete:
   a. Consolidate concrete in conformance with ACI 309R. Characteristics and application of concrete vibrators shall be as set forth in Table 5.1.5.
   b. Provide an adequate number of vibrators of sufficient capacity to keep up with the maximum rate of concrete placement. Keep on hand adequate standby equipment in good operating condition.
   c. Vibrate concrete only until the concrete is thoroughly consolidated and the voids filled, as evidenced by the leveled appearance of the concrete at the exposed surface and the embedment of the surface aggregate.
   d. Insert internal vibrators vertically to the full depth of the layer being placed and into the previous layer. Do not drag vibrators through the concrete. Insert and withdraw vibrator slowly with the vibrator running continuously so that no hole will be left in the concrete. Do not flow concrete from one location to another by use of a vibrator.
   e. Consolidate concrete layer to full depth when using a surface vibrator. Use thinner layers or a more powerful vibrator if necessary to achieve complete consolidation.
   f. Use form vibrators only where sections are too thin or where sections are inaccessible for internal vibrators.
5. Time Requirements:
   a. Place concrete at a sufficient rate to assure that lifts below have not taken initial set before fresh concrete is deposited.
   b. Place concrete within one and a half hours after the introduction of water. This period may be adjusted provided that the combined air temperature, relative humidity, and wind velocity are such that the plasticity of the fresh concrete is satisfactory for placement and consolidation, and that the specified mixing water is not exceeded. Concrete which has partially set shall not be retempered but shall be discarded. Concrete exceeding 95°F shall be discarded.
   c. If desired, submit a request to exceed the time limits above along with a description of the precautions to be taken. When discharge is permitted after more than 90 minutes have elapsed or 300 revolutions of the drum, slump and temperature shall be verified and air shall be verified for air-entrained mixes.

B. Placing Concrete at Joints:

1. Take precautions to ensure tight, well-bonded construction joints with no air pockets or voids.
2. Take special precautions to avoid bending or displacing waterstop while placing concrete around it.
3. Delay construction at a joint a minimum of 16 hours where placement is continued past joint, except where otherwise indicated.

3.03 FINISHING:

A. Unformed Surfaces:
   1. Screed Finish:
      a. Use as first stage for all concrete finishes.
      b. Use as final finish on surfaces that will be covered by additional concrete, grout placement, or mortar setting bed except as otherwise specified.
      c. Place, consolidate, strike off, and level concrete, eliminating high and low spots.
      d. Immediately after screeding, use a wood float, darby, or bullfloat to eliminate high and low spots and to embed large aggregate.
   2. Floated Finish:
      a. Use as second stage of all finishes except for scratch finishes.
      b. Use as final finish on interior steps and ramps, and for surfaces intended to receive waterproofing, roofing, and insulation.
   3. Normal trowel finish:
      a. Float-finish and trowel the surface with multiple passes. Hand-trowel the surface smooth and free of trowel marks.
      b. Addition of water to surface during finishing is prohibited.
      c. Unless noted otherwise on the Drawings, use as final finish for floors intended as walking surfaces.
   4. Contraction Joints:
      a. Locate as indicated.
      b. Maintain true alignment with straightedge.
      c. Joints shall be grooved except where sawed joints are indicated.
         (1) Slab on grade joints shall be sawed.
      d. Grooved (Tooled) Joints:
         (1) Perform during the finishing process.
         (2) Width of groove shall not exceed 1/4 inch (6 mm).
         (3) Depth of groove shall be at least 1 inch (25 mm).
      e. Sawed Joints:
         (1) Cut joints with power blade as soon as concrete surface is firm enough to resist tearing or damage by the blade and before random shrinkage cracks can occur. (Usually required 4 to 12 hours after finishing.)
         (2) Make joints approximately 1/8 inch (3 mm) wide with depth equal to 1/4 the slab thickness unless otherwise indicated.
         (3) Seal where indicated with the same type sealant specified for expansion joint sealant.
   5. Floor Flatness and Levelness:
      a. Finish to a true uniform surface so that surface irregularities do not exceed 3/8 inch in 10 feet, except at floor drains.
B. Formed Surfaces:
   1. Repair surface defects as specified in PART 3, Paragraph 3.03.C. - Repair of Defective Surfaces, this Section.

C. Repair of Defective Surfaces:
   1. Defined as any concrete surface showing misalignment, rock pockets, poor joints, holes from ties, voids, honeycomb, or any other defective area at time of form removal.
   2. Repairing:
      a. Repair as soon as forms have been removed.
      b. Chip surface back to minimum depth of 1/2 inch, chip edges perpendicular to surface, prewet depression and brush with neat cement immediately before patching.
      c. Patch surfaces using stiff mortar with same sand-cement ratio as original concrete and with minimum water for placing. Blend with white cement to match concrete color.
      d. Compact mortar into depressions so that after curing, hole is filled and mortar is flush with surface. Use hammer and ramming rod for compacting the holes.
      e. Moist-cure for 3 days or use curing compound.
      f. Engineer shall be notified of areas containing defects or where reinforcing steel is exposed, prior to determination of repair method.

3.04 CURING:

A. Cure concrete by one of the following methods in accordance with ACI 308.1:
   1. Leaving in forms for a minimum of 7 days when the temperature is at least 50°F. When temperatures are below, follow requirements of cold weather concreting.
   2. When absorbent wood forms are used, keep formwork wet until removed.
   3. Use of saturated bats, soaker hoses, or sprinkler for a minimum of 7 days. Keep concrete continuously wet.
   4. Using polyethylene sheets applied in full contact with surfaces.
   5. Using one coat of a liquid membrane forming compound as specified. Apply immediately after removal of forms (which have been continuously wet); or in case of a slab, after the concrete has been finished and has hardened sufficiently to walk on.
      a. [Immediately after spraying the liquid membrane forming compound, backroll with a short nap roller to achieve uniform coverage over the surface.]
   6. Curing of concrete during hot or cold weather shall conform to PART 3 - Hot Weather Concreting and Cold Weather Concreting, this Section.

3.05 HOT WEATHER CONCRETING:

A. Work shall conform to all requirements of ACI Specification 305.1, Specification for Hot Weather Concreting, except as modified by these contract documents.
B. Follow the requirements of ACI 305.1 if any of the following conditions occur:
   1. When the temperature is 90ºF or above.
   2. When the temperature is likely to rise above 90ºF within the 24-hour period after concrete placement.
   3. When there is any combination of high air temperature, low relative humidity, and wind velocity which would impair either concrete strength or quality.
C. Fresh concrete shall have a maximum temperature of 95ºF at time of discharge.
D. Dampen subgrade and forms with cool water immediately prior to placement of concrete.
E. Protect freshly placed concrete immediately after placement so that the rate of evaporation as determined by ACI 305.1 Equation 3.1.3 does not exceed 0.2 pound per square foot per hour.
F. Protect concrete with suitable insulation if rapidly decreasing nighttime temperatures occur, which would cause thermal shock to concrete placed during warm daytime temperatures.

G. Protect the concrete with temporary wet covering during any appreciable delay between placement and finishing.
H. Begin curing unformed surfaces immediately after finishing and continue for 24 hours. Curing shall consist of application and maintenance of water-saturated material to all exposed surfaces; horizontal, vertical, and otherwise. After the 24-hour interval, continue curing using one of the following methods:
   1. Moist curing for 6 days.
   2. Application of one coat of curing compound as specified.
   3. Application and maintenance of curing paper or heat-reflecting plastic sheets for 6 more days.
I. Strip forms and apply curing compound as specified. Do not allow concrete surfaces to dry prior to application of curing compound.

3.06 COLD WEATHER CONCRETING:

A. Work shall conform to all requirements of ACI 306.1, Standard Specification for Cold Weather Concreting, except as modified by the requirements of these Contract Documents.
   1. Modification to Section 3.2.2: Temperature shall be measured twice per day until protection may be terminated
   2. Modification to Section 3.4.5: Refer to Section 03 10 00 to determine when forms may be removed.
B. Follow the requirements of ACI 306.1 if any of the following conditions apply:
   1. When the temperature is 40ºF or is likely to fall below 40ºF during the 24-hour period after concrete placement.
C. Minimum temperature for concrete as mixed shall be as indicated in Table 3.2.1 of ACI 306.1. Maximum temperature for concrete as mixed shall be 20ºF greater than the corresponding minimum temperature, unless a higher temperature is required by an accepted curing method.
D. Place and maintain concrete so that its temperature is never less than the temperature indicated in Table 3.2.1 of ACI 306.1. Maintain the required temperature for the time duration indicated on Tables 5.1 and 7.1 of ACI 306R.
E. Monitor temperature of concrete in place at corners or edges of formwork as applicable.
F. Air Heaters:
   1. Do not expose concrete to carbon monoxide or carbon dioxide fumes from heaters or engines.
   2. Salamanders will not be permitted.
   3. Heaters shall be indirect fired heaters which use a heat exchanger to avoid direct contact with combustion air or portable hydronic heaters.
   4. Personnel shall be present at all times to maintain safe, continuous operation of heating system.
G. Control temperature and humidity of protected concrete so that excessive drying of concrete surfaces does not occur.
H. Calcium chloride will not be permitted as a concrete accelerator or to thaw frozen subgrade prior to concrete placement.
I. The maximum allowable temperature drop during the first 24-hour period after protection is discontinued shall be as indicated on line 1 of Table 5.1 of ACI 306R.
J. Cure the concrete in accordance with Chapter 10 of ACI 306R.

3.07 LOW-STRENGTH CONCRETE:

A. Low-Strength Concrete:
   1. Defined as either:

a. Concrete whose average, of any sets of three consecutive 28-day compressive strength tests, is below the required 28-day strength.
b. Concrete whose individual 28-day strength test (average of two 6-inch by 12-inch cylinders or three 4-inch by 8-inch cylinders) is more than 500 psi below the required 28-day strength.

2. Should concrete meet either definition of low-strength concrete as a minimum, the Contractor shall take the following steps:
   a. Increase the cement content. The increase shall be based on a statistical evaluation of the strength data, the design water-cement ratio, compressive-strength curve, and acceptable mix-design literature as follows:
      (1) If sufficient concrete has been furnished to accumulate 30 tests, these should be used to establish a new target average strength in accordance with ACI 318, Section 5.3.
      (2) If less than 30 tests have been made, the new target average strength should be at least as great as the average strength used in the initial selection of the mix proportions. Increase the target average strength based on a statistical evaluation of the available strength data, the design water-cement ratio, compressive-strength curve, and acceptable mix-design literature. If the statistical average equals or exceeds the initial mix-design level, a further increase in the average level is required.
   b. Remove and replace with acceptable concrete when the quality and location of the low-strength concrete is such that Engineer considers the strength or durability of the structure is impaired and so orders.
3. Low-strength concrete shall be considered defective Work as defined in General Conditions.

B. Potentially Low-Strength Concrete: Defined as concrete whose 7-day test (average of two 6-inch by 12-inch cylinders or three 4-inch by 8-inch cylinders) is less than 70% of the specified minimum 28-day compressive strength.

3.08 TESTING:

A. Field Testing of Concrete Plant and Mixing Trucks:
   1. The concrete plant shall be inspected and tested to ensure conformance with ACI 304R and the "Concrete Plant Standards of the Concrete Plant Manufacturers Bureau." The scales shall be calibrated at the initial setup and at 3-month intervals thereafter.
   2. Mixing trucks shall be inspected and tested to ensure conformance with ACI 304R and "Truck Mixer and Agitator Standards of the Truck Mixer Manufacturers Bureau" of the National Ready-Mix Concrete Association. Tests shall be done at initial setup and every 3 months thereafter.
   3. Inspect and submit test reports.

B. Construction Testing Service
   1. An independent material testing service for field testing shall be selected as required in the General Conditions. The material testing service shall furnish test equipment, test cylinder molds, and certified personnel to perform all required field tests, make the required concrete test cylinders, and deliver test cylinders to the testing laboratory. The prescribed tests shall be made in the presence of or with the concurrence of the Owner.
   2. Contractor shall schedule and coordinate with the independent testing service.
   3. If additional compressive strength tests are desired by the contractor to obtain additional data points for scheduling purposes the contractor shall pay for the additional tests.

C. Field Testing of Concrete and Making of Concrete Test Cylinders:

1. Field testing personnel shall be on Site throughout placement of concrete.
2. Concrete sampling for tests and cylinder making shall be done conforming to ASTM C172. Samples shall be taken at random and at the point of truck discharge.
3. Perform the following tests:
   a. Prepare test cylinders conforming to ASTM C31, with not less than two sets of cylinders from each day's placement for each 100 cubic yards or fraction thereof.
      (1) A set of cylinders is defined as the following for different cylinder sizes:
         (a) 6-inch by 12-inch: 4 cylinders
         (b) 4-inch by 8-inch: 5 cylinders
   b. Slump test conforming to ASTM C143. Perform tests on the first batch produced each day, for every 50 cubic yards or fraction thereafter, and with every set of test cylinders. Additional tests shall be run when directed by Engineer.
   c. Air content test conforming to ASTM C231. Perform for first batch of day and with each set of test cylinders.
   d. The batch of concrete being tested for slump or air content shall not be placed until acceptable results are obtained.
   e. Discard concrete used for slump and air tests.
   f. Perform concrete and air temperature tests for first batch of day and with each set of test cylinders. Additional readings shall be taken when directed by Engineer.
   g. Any batch of concrete with slump or air content not in conformance with Specifications shall be rejected.
   h. Furnish slump, air content, and temperature test results to the testing laboratory for inclusion in the cylinder test reports.

D. Laboratory Testing Concrete During Construction:
1. Laboratory shall cure and test concrete cylinders conforming to ASTM C192 and C39, testing 1 cylinders at 7 days of age, three 4-inch cylinders at 28 days of age and one hold.
2. Contractor shall have the right to observe all phases of concrete cylinder curing and testing. Should Contractor observe any deviations from the prescribed testing procedures that he considers detrimental to concrete strength test results, he shall immediately notify Owner in writing.
3. Contractor shall make arrangements with the testing laboratory to receive copies of test reports. The cost of providing a maximum of two copies of each report to the Contractor will be paid by Owner.
4. Should the test results indicate low strength concrete as defined in PART 3, Article 3.07 - Low-Strength Concrete, this Section, Contractor shall take immediate corrective action.
5. Should the statistical data indicate an excessive margin of safety, the concrete mix may be modified subject to Engineer's approval.
6. Should the material tests taken during construction indicate nonconformance with the Specifications, Contractor shall take immediate corrective action.

3.09 REPAIR, REPLACEMENT, AND FIELD MODIFICATIONS:

A. Embedded items and concrete that are misplaced or damaged during construction shall not be repaired, replaced, or field-modified without approval of Engineer.

END OF SECTION 03 30 00

DIVISION 9 – FINISHES

SECTION 09 90 00 – PROTECTIVE COATINGS

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes coating of exterior and interior surfaces throughout the Project and which are listed in PART 2, with systems specified on "coating system" sheets at the end of this Section.

B. Coating systems include surface preparation, prime coat (first coat), finish coats (second and third coats), inspection, cleaning, and touch-up of surfaces and equipment. Shop preparation, prime coat, and finish coats to be shop-applied, may be specified elsewhere or referenced to this Section so that a complete system is specified and coordinated.

1. Where surface preparation and first (prime) coat are specified in other Sections to be shop-applied, such as for structural steel, hollow metal doors or equipment, only the touch-up and finish coats are a part of field painting. Surface preparation is the required degree of preparation prior to application of first (prime) coat regardless if done in shop or field.
2. If materials are provided without shop primer such as miscellaneous steel or sheet metal, then surface preparation, first, second, and third coats are a part of field painting.

1.02 RELATED REQUIREMENTS:

A. Shop Painting and Coatings: All applicable Divisions.

B. Factory Prefinished Items: All applicable Divisions.

1.03 REFERENCE STANDARDS:

A. Applicable Standards:

1. American National Standards Institute (ANSI):
   a. A13.1 - Scheme for the Identification of Piping Systems.
   b. Z53.1 - Safety Color Code for Marking Physical Hazards.
2. American Society for Testing and Materials (ASTM):
   a. D4259 - Abrading Concrete.
3. Society for Protective Coatings (SSPC) Surface Preparation Specifications:
   a. SP1 - Solvent Cleaning: Removes oil, grease, soil, drawing and cutting compounds, and other soluble contaminants.
   b. SP2 - Hand Tool Cleaning: Remove loose material. Not intended to remove adherent mill scale, rust, and paint.
   c. SP3 - Power Tool Cleaning: Removes loose material. Not intended to remove all scale or rust.
   d. SP5 - White Metal Blast Cleaning: Removes all scale, rust, foreign matter. Leaves surface gray-white uniform metallic color.
   e. SP6 - Commercial Blast Cleaning: Two-thirds of every nine square inches free of all visible residues; remainder only light discoloration.
   f. SP10 - Near-White Blast Cleaning: At least 95% of every nine square inches shall be free of all visible residues.
   g. SP11 - Power Tool Cleaning to Bare Metal.
   h. SP13 – Surface Preparation of Concrete.

1.04 SUBMITTALS:

A. Submit as specified in DIVISION 1.

B. Includes, but not limited to, the following:

1. Schedule of products and paint systems to be used. Schedule shall include the following information:
    a. Surfaces for system to be applied.
    b. Surface preparation method and degree of cleanliness.
    c. Product manufacturer, name, and number.
    d. Method of application.
    e. Dry film mil thickness per coat of coating to be applied.
2. Color charts for selection and acceptance.
3. Technical and material safety data sheets.
4. Certification(s) by coating manufacturer(s) that all coatings are suitable for service intended as stated on each coating system sheet. If manufacturer has an equivalent product as that specified, and it is suitable for the intended purpose, Contractor shall submit the recommended product for approval at no increase in cost, and state reasons for substitution.
5. Contractor shall certify in writing to the Engineer/Architect that applicators have previously applied all the systems in this Specification and have the ability and equipment to prepare the surfaces and apply the coatings correctly.

C. Submittals for industrial maintenance coatings shall be prepared by, or have assistance in preparation of, a corrosion engineer or industrial coatings technical representative of the coating manufacturer.

1.05 QUALITY ASSURANCE:

A. Include on label of container:
1. Manufacturer's name, product name, and number.
2. Type of paint and generic name.
3. Color name and number.
4. Storage and temperature limits.
5. Mixing and application instructions, including requirements for precautions which must be taken.
6. Drying, recoat, or curing time.

B. A coating report shall be completed daily by Contractor at each phase of the coating system starting with surface preparation. These shall be submitted on the form attached at end of this Section.

C. In the event a problem occurs with coating system, surface preparation, or application, Contractor shall require coating applicator and coating manufacturer's technical representative to promptly investigate the problem and submit results to Engineer/Architect.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Delivery of Materials:
1. Deliver in sealed containers with labels and information legible and intact. Containers shall also have correct labels with required information.

1.07 REGULATORY REQUIREMENTS:

A. In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the U.S. EPA and the local and regional jurisdictions. Notify Engineer/Architect of any coating specified herein that fails to conform to the requirements for the location of the Project or location of application.

B. Lead Content: Use only coatings that are totally lead free.

C. Chromate Content: Do not use coatings containing zinc-chromate or strontium chromate.

D. Asbestos Content: Materials shall not contain asbestos.

E. Mercury Content: Materials shall not contain mercury or mercury compounds.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS:

A. Proprietary names and product numbers are specified in most systems for material identification from these manufacturers:
   1. Ameron Protective Coatings Systems Group, PPG.
   2. Carboline Company, Inc.
   3. Tnemec Company, Inc.
   4. Sherwin-Williams.

2.02 GENERAL:

A. Materials furnished for each coating system must be compatible to the substrate.
B. When unprimed surfaces are to be coated, entire coating system shall be by the same coating manufacturer to assure compatibility of coatings.
C. When shop-painted surfaces are to be coated, ascertain whether finish materials will be compatible with shop coating. Inform Engineer/Architect of any unsuitable substrate or coating conditions.

2.03 COATING SYSTEMS:

A. Specified on the "Protective Coating System" sheets at the end of this Section.

2.04 SURFACES TO BE COATED:

A. System E-1:
   1. Item: Iron and Steel Piping, Valves, Pumps, Pipe Supports and Related Accessories. Interior Exposure, Exterior Surfaces and Non-potable Liquid Immersion:
      a. Reference: DIVISION 33
      b. Location: As indicated

2.05 SURFACES NOT TO BE COATED:

A. Do not field coat any of the following items unless specifically noted otherwise.
   1. Copper, stainless steel, aluminum, FRP fabrications, Conduit, PVC piping.

2.06 COLOR CODING OF PIPING AND PHYSICAL HAZARDS:

A. Color Coding of Piping: Exterior and interior by color coding entire pipe.
   1. General:
      a. Coat piping with solid colors as specified below for entire length of pipe in exposed finished and unfinished areas. Exclude areas in pipe chases and furred areas.
      b. Coat all other piping in colors matching adjacent surfaces. If adjacent area is unfinished, paint in color determined by Engineer/Architect.
      c. Identify piping with legend and arrows as specified below. Apply after completion of finish coating.
   2. Color Scheme:

Description	Color	Notes
Sanitary	Dark Gray	Confirm color with owner during submittal process

   3. Location of Legends and Arrows:
      a. Place on piping near connections to Equipment, adjacent to valves or fittings, on both sides of walls penetrated, and at intervals not to exceed 50 feet (15 meters).
      b. Place arrows adjacent to or below legends depending upon visibility. Place arrows in direction of flow. For dual-flow piping, indicate both directions.
      c. Locate legends to be visible from normal line of vision above floor level. Legend locations subject to approval of Engineer/Architect.
   4. Letter Size:
      a. Block-style letters, all capitals, conforming to ANSI A13.1.

B. Color Coding of Piping: Exterior and interior by color band.
   1. General:
      a. Coat piping in colors as selected by Engineer/Architect for entire length of pipe in exposed finished and unfinished areas. Exclude areas above suspended ceilings except for band and legend, in pipe chases and furred areas.
      b. After completion of finish coating, identify piping with band, legend, and arrow as specified below.
   2. Location of Legends and Arrows:
      a. Color band, legends, and arrows on piping near connections to Equipment, adjacent to valves or fittings, on both sides of walls penetrated, and at intervals not to exceed 50 feet (15 meters).
      b. Place arrows adjacent to or below legends depending upon visibility. Place arrows in direction of flow. For dual-flow piping, indicate both directions.
      c. Locate legends to be visible from normal line of vision above floor level. Legend locations subject to approval of Engineer/Architect.
   3. Letter and Band Size:
      a. Block-style letters, all capitals, conforming to ANSI A13.1, and as follows. Band full circumference of pipe.

Outside Diameter of Pipe or Covering	Width of Banding	Size of Letters and Arrows
Less than 3/4" (19 mm)	6" (150 mm)	Approved metal tag or band
3/4" to 1-1/4" (19 mm to 32 mm)	8" (200 mm)	1/2" (13 mm)
1-1/2" to 2" (38 mm to 50 mm)	10" (250 mm)	3/4" (19 mm)
2-1/2" to 6" (64 mm to 150 mm)	12" (300 mm)	1-1/4" (32 mm)
8" to 10" (200 mm to 250 mm)	24" (600 mm)	2-1/2" (64 mm)
Over 10" (250 mm)	32" (800 mm)	3-1/2" (89 mm)

C. Color Coding Physical Hazards: Exterior and interior.
   1. General:
      a. Paint areas indicated to identify physical hazard areas as required by ANSI Z53.1.
      b. All colors shall conform to Federal Safety Color Code requirements.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION:

A. Prepare surfaces for each coating system conforming to SSPC or ASTM surface preparation specifications listed.
   1. If grease or oils are present, SSPC-SP1 shall precede any other method specified for metal substrates.
   2. Remove surface irregularities such as weld spatter, burrs, or sharp edges prior to specified surface preparation.
B. Depth of profile will be as specified or as recommended by the manufacturer for each system, but in no instance shall it exceed one-third of the total dry film thickness of complete system.
C. Prepare only those areas which will receive the first coat of the system on the same day.
   1. On steel substrates, apply coating before rust bloom forms.

3.02 APPLICATION:

A. Apply coatings in accordance with coating manufacturer's recommendations.
B. Use properly designed brushes, rollers, and spray equipment for all applications.
C. On unprimed surfaces apply first coat of the system the same day as surface preparation.
D. Dry film thickness of each system shall meet the minimum specified. Maximum dry film thickness shall not exceed the minimum more than 20% or coating manufacturer's

requirements if less. Where a dry film thickness range is specified, the range shall not be less than or exceeded.

E. Shop and field painting shall remain 3 inches (75mm) away from unprepared surface of any substrate such as areas to be welded or bolted.

F. Environmental Conditions:
   1. Atmospheric temperature must be 50°F (10°C) or higher during application, unless otherwise approved by coating manufacturer. Do not apply coatings when inclement weather or freezing temperature may occur within coating recoat cure times.
   2. Wind velocities for exterior applications shall be at a minimum to prevent overspray or fallout and not greater than coating manufacturer's limits.
   3. Relative humidity must be less than 85%. The ambient temperature and the temperature of the surface to be painted must be at least 5°F (2.8°C) above the dew point.
   4. Provide adequate ventilation in all areas of application to ensure that at no time does the content of air exceed the Threshold Limit Value given on the manufacturer's Material Safety Data Sheets for the specific coatings being applied.

G. Recoat Time: In the event a coating, such as an epoxy, has exceeded its recoat time limit, prepare the applied coating in accordance with manufacturer's recommendations.

H. Protection:
   1. Cover or otherwise protect surfaces not to be painted. Remove protective materials when appropriate.
   2. Mask, remove, or otherwise protect finish hardware, machined surfaces, grilles, lighting fixtures, and prefinished units as necessary.
   3. Provide cover or shields to prevent surface preparation media and coatings from entering orifices in electrical or mechanical Equipment. Where ventilation systems must be kept in operation at time of surface preparation, take precautions to shield intakes and exhausts to prevent the materials from entering system or being dispersed.
   4. Provide signs to indicate fresh paint areas.
   5. Provide daily cleanup of both storage and working areas and removal of all paint refuse, trash, rags, and thinners. Dispose of leftover containers, thinners, rags, brushes, and rollers which cannot be reused in accordance with applicable regulations.
   6. Do not remove or paint over Equipment data plates, code stamps on piping, or UL fire-rating labels.

3.03 INSPECTION:

A. Contractor shall provide and use a wet film gauges to check each application approximately every 15 minutes in order to immediately correct film thickness under or over that specified.

B. Contractor shall provide and use a dry film gauge to check each coat mil (mm) thickness when dry, and the total system mil (mm) thickness when completed.

C. Use holiday or pinhole detector on systems over metal substrates to detect and correct voids when indicated on system sheet.

D. Check air temperature and temperature of the substrate at regular intervals to be certain surface is 5°F (2.8°C) or more above the dew point.

3.04 CLEANING AND REPAIRS:

A. Remove spilled, dripped, or splattered paint from surfaces.

B. Touch up and restore damaged finishes to original condition. This includes surface preparation and application of coatings specified.

C. Provide remainder of open paint cans to owner for touch ups.

END OF SECTION 09 90 00

BURNS McDONNELL

PROTECTIVE COATING SYSTEM

System: E-1

SERVICE: Steel & Iron – Nonpotable Liquid Immersion, Normal to Severe Exposure. Interior of Tank or Basin. Exterior of Steel, Piping, or Equipment in Tank or Basin.

Surface Preparation: Shop or Field First Coat: SSPC-SP10 and profile depth of 1.5 to 2.5 mils (38 to 63 microns).
Field Touch-Up (of Shop-applied first coat): Same as for First Coat.

First Coat: High solids amine, polyamidoamine, or polyamide epoxy coating with minimum 78% solids by volume. Apply at 5.0 to 7.0 mils (125 to 175 microns) dry film thickness.

Second Coat: Same as first coat.

System Total: Minimum 10.0 mils (250 microns) dry film thickness. Check for voids with holiday or pinhole detector.

Volatile Organic Content: Maximum 2.8 lb/gal (340 g/L).

COATING MANUFACTURER	PRODUCT DESIGNATION		
	FIRST COAT	**TOUCH UP**	**SECOND COAT**
PPG	Amerlock 2 or 400	Same as first coat	Same as first coat
Carboline	Carboguard 890	Same as first coat	Same as first coat
Sherwin-Williams	Macropoxy 646 FC B58W610/B58V600	Same as first coat	Same as first coat
Tnemec	Hi-Build Epoxoline Series 66HS	Same as first coat	Same as first coat

DIVISION 31 - EARTHWORK

SECTION 312050 - SITE PREPARATION AND EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes all subgrade preparation, fly ash stabilized subgrade, excavating, trenching, filling, embankment construction, backfilling (including controlled low-strength material (CLSM)), compacting, grading, riprapping, topsoiling, and all related items necessary to complete the Work indicated or specified.

1.02 REFERENCES:

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM) (Equivalent AASHTO standards may be substituted as approved):
   a. C33 - Concrete Aggregates.
   b. C88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   c. C94/C94M - Ready-Mix Concrete.
   d. C150 - Portland Cement.
   e. C173/C173M - Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
   f. C231 - Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
   g. C403/C403M - Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
   h. C618 - Coal Fly Ash and Raw or Natural Pozzolan for Use as a Mineral Admixture in Concrete.
   i. D75 - Practice for Sampling Aggregates.
   j. D422 - Test Methods for Particle-Size Analysis of Soils.
   k. D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3) (600 kN-m/m^3).
   l. D1140 - Test Methods for Amount of Material in Soils Finer than the No. 200 (75 μm) Sieve.
   m. D1241 - Materials for Soil-Aggregate Subbase, Base, and Surface Courses.
   n. D1556 – Test Method for Density and Unit Weight of Soil In-place by the Sand Cone Method.
   o. D1557- Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3) (2,700 kN-m/m^3).
   p. D2167 - Test Method for Density and Unit Weight of Soil in-Place by the Rubber Balloon Method.
   q. D2487 - Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   r. D3776 – Test Methods for Mass per Unit Area (Weight) of Fabric.
   s. D4253 - Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

t. D4254 - Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
u. D4318 - Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
v. D4546 - Test Methods for One-Dimensional Swell or Settlement Potential of Cohesive Soils.
w. D4632 - Test Method for Grab Breaking Load and Elongation of Geotextiles.
x. D4751 - Test Method for Determining the Apparent Opening Size of a Geotextile.
y. D4832 - Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
z. D4833 - Test Method for Index Puncture Resistance of Geotextiles, Gemembranes, and Related Products.
aa. D5084 - Test Method for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
bb. D5239 - Practice for Characterizing Fly Ash for use in Soil Stabilization
cc. D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

2. Occupational Safety and Health Administration (OSHA):
   a. 29 CFR Part 1926 - Safety and Health Regulations for Construction.
3. Standard Specifications for Road Construction, State of Missouri.

1.03 SUBMITTALS:

A. Submit as specified in DIVISION 1.
B. Includes, but not limited to, the following:
   1. Test results from laboratory testing of proposed borrow material.
   2. Test results from laboratory testing of granular material and trench stabilization material.
   3. Test results from laboratory testing of CLSM.
   4. Erosion control plan.
   5. Dewatering Plan.
   6. Sheeting and Shoring Excavation Plan.
C. Where selecting an option for excavation, trenching, and shoring in compliance with local, state, or federal safety regulations such as OSHA 29 CFR Part 1926 or successor regulations, which require design by a registered professional engineer, submit (for information only and not for Engineer approval) the following:
   1. Copies of design calculations and notes for sloping, benching, support systems, shield systems, and other protective systems prepared by or under the supervision of a professional engineer legally authorized to practice in the jurisdiction where the Project is located.
   2. Documents provided with evidence of registered professional engineer's seal, signature, and date in accordance with appropriate state licensing requirements.

1.04 QUALITY ASSURANCE:

A. Sampling and Testing:
   1. Tests to determine conformance with all requirements of this Specification for quality and properties of all Contractor -secured materials, including borrow materials (both on or off Site) proposed for use, shall be performed by an independent, commercial laboratory retained and compensated by Contractor, and approved by Engineer.
   2. When incorporating materials into the Project, quality control testing will be performed during construction by a testing laboratory retained and compensated by Owner.

1.05 PROJECT CONDITIONS:

A. Lines and grades shall be as indicated. Owner will furnish benchmarks, base lines, and reference points as necessary to permit Contractor to lay out and construct the Work properly.

B. Carefully maintain all benchmarks, monuments, and other reference points and replace as directed by Engineer if disturbed or destroyed.

C. Temporary Erosion and Sediment Controls: Furnish, install, construct, and maintain temporary measures to control erosion and minimize the siltation of intermittent streams and the pollution of private properties. Temporary erosion and sediment control measures shall be constructed in substantial compliance with local, state, federal, and jurisdictional agency's regulations and Contract Drawings (if applicable). Temporary erosion and sediment control measures shall be maintained until completion of the Work.

D. Disposition of Utilities:

1. Existing underground utilities are shown on Contract Drawings using the best information available at the time of Drawing preparation. Contractor shall identify, locate and protect all underground utilities which may be affected by construction under this Contract before starting excavation or other Site construction activities which could damage existing utilities.
2. Remove or relocate only as indicated, specified, or directed. Provide a minimum 48-hours' notice to Engineer and receive written notice to proceed before interrupting any utility service.
3. Adequately protect from damage all active utilities and remove or relocate only as indicated or approved.
4. Report active, inactive, and abandoned utilities encountered in excavating and grading operations that are not indicated on Contract Drawings. Remove, plug, or cap as directed by Engineer.
5. Provide as-constructed drawings of Underground Facilities either not shown or found at locations that differ from those shown on Contract Drawings.

E. Survey work, to accurately determine locations and elevations shall be performed during construction by Professional Surveyor registered in the state of Missouri. Surveyor shall be retained and compensated by Contractor. Contractor shall notify Engineer prior to commencing survey work.

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED:

A. Suitable Materials: Materials suitable for use in embankment and fill include material that is free of debris, roots, organic matter, frozen matter, and which is free of stone having any dimension greater than 2 inches.

1. Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands generally exclusive of clayey and silty material with the following properties:
   a. Are free-draining.
   b. Impact compaction will not produce a well-defined moisture-density relationship curve.
   c. Maximum density by impact methods will generally be less than by vibratory methods.
   d. Generally, less than 15% by dry weight of soil particles pass a No. 200 square-mesh sieve.
2. Cohesive materials include materials made up predominately of silts and clays generally exclusive of sands and gravel with the following properties:

a. Impact compaction will produce a well-defined, moisture-density relationship curve.
b. Are not free draining.

B. Unsuitable Materials: Materials unsuitable for use in embankment and fill include all material that contains debris, roots, organic matter, frozen matter, shale particles, or material containing gravel or stone with any dimension greater than 2 inches, or other materials that are determined by Engineer as too wet or otherwise unsuitable for providing a stable subgrade or stable foundation for structures.

C. Material used for embankment or fill:
1. For soils used below structural elements, such as footings, slabs, pavements, and mats, that portion of material passing the No. 40 square-mesh sieve shall have a liquid limit not exceeding 40 and a plasticity index not exceeding 25 when tested in accordance with ASTM D4318.

D. All Materials encountered, regardless of type, character composition and condition thereof, shall be considered "unclassified" for the purpose of payment. Determine quantity of various materials to be excavated prior to submitting Bid. Rock encountered shall be handled at no extra cost to Owner.

E. Waste Materials:
1. Waste materials, as described for purposes of this Section, consist of unsuitable materials, excess suitable material, rock, demolition debris, and other materials considered unacceptable for use as fill, and which are not environmentally contaminated. Waste materials shall not include environmental pollutants, hazardous substances, contaminated products, by-products, samples, or waste materials of any kind that are regulated under environmental laws.
2. Dispose of waste materials in accordance with Paragraph 3.03F.

2.02 BORROW MATERIALS:

A. Suitable fill materials, granular materials, and topsoil obtained from locations arranged for by Contractor (off the Site). Required to the extent sufficient suitable materials are not obtained from excavation and trenching.

B. Obtain, excavate, haul, handle, place, and compact borrow materials.

C. Borrow materials shall not exhibit characteristics of high shrink-swell potential as determined from Atterberg limit tests (ASTM D4318) and/or swell tests (ASTM D4546) unless otherwise specified herein.

2.03 GRANULAR MATERIAL:

A. Crushed stone or crushed gravel indicating a loss of not more than 15% after 5 cycles when tested for soundness with sodium sulfate as described in ASTM C88 and conforming to one of the following gradations:

Standard Square Mesh Sieve			ASTM C33 No. 67 Stone
U.S. Size or No.	Metric Opening	Percent Passing	Percent Passing
1 inch	25.00 mm	--	100
3/4-inch	19.00 mm	100	90 to 100
1/2-inch	12.50 mm	60 to 100	--
3/8-inch	9.50 mm	--	20 to 55
No. 4	4.75 mm	0 to 5	0 to 10
No. 8	2.36 mm	--	0 to 5

Use at all locations where granular material is required unless otherwise indicated or specified.

B. Pipe Bedding/Embedment Material shall be of the following gradation:

Standard Square Mesh Sieve U.S. Size or No.	ASTM C33 Percent Passing
1-inch	100
3/4 -inch	90 to 100
3/8-inch	20 to 55
No. 4	0 to 10
No. 8	0 to 5

2.04 EMBANKMENT AND FILL MATERIAL:

A. Material shall be free of roots or other organic matter, refuse, ashes, cinders, frozen earth, or other unsuitable material.

B. Use suitable material sufficiently friable for embankment to provide a dense mass free of voids and capable of satisfactory compaction.

C. Do not use material containing gravel, stones, or shale particles greater in dimension than one-half the depth of the layer or lift to be compacted.

D. Moisture content shall be that required to obtain specified compaction of the soil or as indicated.

E. Perform moisture curing by wetting or drying of the material as required to attain required compaction criteria.

2.05 TRENCH STABILIZATION MATERIAL:

A. Granular material as specified or conform to ASTM D1241, Gradation A or B, well-graded, with not more than 10% passing No. 200 (75 μm) sieve.

2.06 RIPRAP:

A. Riprap Material:

1. Quarry-run stone with stones weighing 80 to 150 pounds (36 to 68 kilograms) each. At least 90% shall weigh more than 80 pounds (36 kilograms) each.
2. Stones shall be durable, free from cracks, seams, and other defects which would tend to increase deterioration from natural causes.
3. Dirt, sand, or clay shall not exceed 5% by weight.
4. Quantity of rock with an elongation greater than 3:1 shall not exceed 20% of the mass. No stone shall have an elongation greater than 4:1.
5. Not more than 10% of the stone shall show splitting, crumbling, or spalling when subjected to 5 cycles of the sodium soundness test as required by ASTM C88.
6. In lieu of conforming to above specified test requirements, material with a proven history of satisfactory performance may be approved for use in the Work provided certification of this history is acceptable to Engineer.

B. Filter Materials:

1. Filter Blanket:

a. Material shall be (crushed natural stone) (crushed rock) with the following gradation:
Standard Square-Mesh Sieve

U.S. Size or No.	Metric Opening	Percent Passing by Weight
4-inch	100.00 mm	100
3-inch	75.00 mm	80 to 100
2-inch	50.00 mm	70 to 90
3/4-inch	19.00 mm	45 to 60
No. 4	4.75 mm	20 to 30
No. 10	2.00 mm	5 to 15
No. 40	425 μm	0 to 5

b. Gradation shall not vary from low limit on one sieve to high limit on adjacent sieve or vice versa.
c. Sampling procedure shall conform to ASTM D75.
d. Material shall not have a loss of more than 15% after 5 cycles when tested for soundness with sodium sulfate as described in ASTM C88.

2. Geotextile Fabric
   a. Geotextile Fabric shall be a nonwoven fabric consisting of continuous chain polymeric filaments or yarns of polyester, or polypropylene formed into a stable network by needle punching.
   b. Geotextile Fabric shall be resistant to mildew and rot, ultraviolet radiation, insects and rodents.
   c. Geotextile Fabric shall conform to the following minimum requirements which shall be the minimum average roll values for the roll of geotextile:
      (1) Weight: 15 oz/sq yd (510 g per sq meter) as determined by ASTM D3776.
      (2) Puncture Strength: 195 lbs (867 N) as determined by ASTM D4833.
      (3) Grab Tensile Strength: 380 lbs (1690 N) as determined by ASTM D4632.
      (4) Elongation at Failure: 50% as determined by ASTM D4632.
      (5) Apparent Opening Size: 100 sieve as determined by ASTM D4751.

2.07 CONTROLLED LOW-STRENGTH MATERIAL (CLSM OR FLOWABLE FILL):

A. Materials:
1. Portland cement Type I or Type II conforming to ASTM C150.
2. Fly ash conforming to ASTM C618 for Class C.
3. Fine aggregate (sand) conforming to ASTM C33.
4. Water, clean and potable, conforming to ASTM C94.
5. Shrinkage compensator shall be proportioned in accordance with the manufacturer's recommendations, and as tested by ASTM C940.
6. Admixtures for air entrainment or other purposes conforming to ASTM C173 or C231, or other appropriate standards referenced by manufacturer.

7. Bentonite in proportions indicated or as required for the Project within areas of U.S. Army Corps of Engineers flood protection systems.

B. Mix Design:
1. Submit details of the proposed mix design along with strength test results from an approved laboratory retained by Contractor. Commercial brand mixtures that have documented prior mix design strength history may be used with prior submittal of appropriate test results, mix design indicating conformance with these requirements, and approval by Engineer.
2. Mix design shall permit adjustments in proportions of fine aggregate and/or water to achieve proper solid suspension and optimum flowability with approval of Engineer, and providing for the calculated yield to be maintained at one cubic yard for the given batch weights.
3. Mix design shall meet requirements for minimum and/or maximum strengths indicated.
4. Consistency of the mix shall be that of a batter, not thin and/or watery.
5. Typical design for trial mixes of CLSM (flowable fill), unless otherwise indicated to provide a minimum volume of one cubic yard, is as follows:
   a. Removable CLSM:

(1)	Cement	150 lbs
(2)	Class C Fly Ash	0 lbs
(3)	Sand	3085 lbs
(4)	Water	460 lbs

6. Removable CLSM shall be used unless otherwise specified or indicated.
7. Bentonite powder, if required, shall be blended with the cement and fly ash prior to adding any water to the mix, with a minimum of 20% by dry weight of combined cement and fly ash cementitious material. Blending and mixing of bentonite shall be complete and uniform, without balling-up or concentration of bentonite in clumps. Proportions of mix and mixing placement shall not adversely affect overall physical properties required for the in-place CLSM, yet provide for self-healing of any cracks that may develop over time due to shrinkage or other forces upon CLSM.
8. Flowable fill (CLSM) shall exhibit the following physical properties:
   a. Removable CLSM Mixes:
      (1) Minimum unconfined compressive strength of 75 psi at 28 days.
      (2) Maximum unconfined compressive strength of 150 psi at 28 days.
      (3) In place compressive strength of a maximum of 110% of design compressive strength after 1 year.
   b. Provide for set-up within 12 hours.
   c. Evaporation of bleed water shall not result in shrinkage of more than 1/8-inch per foot of flowable fill (CLSM) thickness.
   d. Unit weight of 90 to 120 pounds per cubic foot, as measured at the point of placement after transport.

PART 3 - EXECUTION

3.01 DEMOLITION:

A. Remove existing structures and improvements as required or as indicated to perform new construction.

B. Carefully dismantle, in a manner to avoid damage, all materials and equipment indicated to be relocated or returned to Owner.

C. Material or equipment, specified or indicated to be relocated or returned to Owner, that is damaged due to Contractor 's negligence shall be repaired or replaced, as determined by Engineer, at no additional cost to Owner.
D. Materials not indicated or specified to be relocated or returned to Owner shall become property of Contractor and be disposed of as specified in "Waste Materials," this Part.
E. Perform demolition work to protect existing facilities, structures, and property which are to remain, against damage from operations, falling debris, or other cause.
F. Make provisions for temporarily accommodating flows in existing facilities that are to be relocated or disturbed.
G. Take precautions to guard against movement or settlement, and provide shoring and bracing as necessary.
H. If at any time safety of existing structure to remain is endangered, cease operations, notify Engineer, and do not resume operations prior to approval.
I. Remove concrete by jack hammering, sawing, core drilling, or other approved method.
J. Remove existing pavement by jack hammering, sawing, scarifying, or other approved methods except as follows:
    1. Existing asphaltic or portland cement concrete pavement shall be sawed at point where pavement indicated to remain ends and pavement indicated to be removed begins.
    2. Existing portland cement concrete pavement shall be removed back to the nearest joint unless otherwise indicated or approved by Engineer.

3.02 SITE PREPARATION:

A. Sediment (Silt) Fence:
    1. Install silt fence as indicated and as follows:
        a. On the downslope side(s) of all disturbed areas.
        b. On the downslope side(s) of all stockpile areas.
    2. Inspection:
        a. Daily in areas of active construction or equipment operation.
        b. Weekly in areas with no construction or equipment operation.
        c. Within 24 hours of each 0.5-inch or greater rainfall event.
        d. Complete inspection reports after each inspection and submit to Engineer within 2 working days.
    3. Maintenance:
        a. Remove sediment from behind silt fence when it reaches one-third the height of fence. Place removed sediment in topsoil stockpile areas.
        b. Any silt fence damaged so it can not perform its intended function shall be replaced as indicated or as directed by Engineer.
        c. Remove silt fence after area has been surfaced or seeded and has been accepted by Engineer.
B. Construction Access:
    1. Immediately remove by shoveling and/or sweeping all sediment tracked from the construction area onto Site access roads. Place sediment in stockpile areas.
C. Clearing and Grubbing:
    1. Perform only in areas where earthwork or other construction operations are to be performed.
    2. Protect tops, trunks, and roots of existing trees which are to remain on Site.
    3. Clear areas and dispose of other trees, brush, and vegetation before starting construction.
    4. Remove tree stumps and roots larger than 3 inches in diameter and backfill resulting excavations with compacted, suitable material.

5. Dispose of debris from clearing and grubbing at a location off the Site, as arranged for by Contractor, at no additional cost to Owner. Contractor may burn combustible products to the extent and in a manner permitted under controlling air pollution and fire safety regulations and ordinances.
    a. All burning shall be at Contractor's sole risk and expense. Contractor shall obtain necessary burn permits from local fire protection agency.
    b. Burning shall be done under continuous direction of competent personnel at all times and in a manner to preclude jeopardy to all property and vegetation that is to remain.
    c. Minimum requirement for burning is use of an approved air curtain destructor designed, installed, and operated in such a manner that complete combustion is assured.
        (1) Combustion pit dimensions shall be as required by the air curtain. Pit may be unlined or lined as required for stability. Pit construction shall include provisions for clean-out prior to backfill.
        (2) Air curtain devices shall produce an adequate quantity of air at velocity required to ensure complete combustion. Air curtain shall provide complete and uniform coverage of the burning pit.
        (3) Upon completion of burning, material remaining in the pit shall be removed and wasted off the Site.
        (4) Backfill pit as specified for "Embankment and Fill," this Section.
6. Place debris buried on the Site a minimum of 5 feet below finished grade in areas approved by Engineer. Indicate locations of buried debris on Contractor-furnished construction record drawings.
7. Contractor may claim and salvage any timber or other debris which may be considered of value, but shall not delay in any manner either this Contract or other work with salvaging operations.

D. Stripping:
1. Remove topsoil from areas within limits of excavation, trenching and borrow, and areas designated to receive embankment and compacted fill as follows:
2. Scrape areas clean of all brush, grass, weeds, roots, and other material.
3. Strip to depth of approximately 6 inches or to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required to segregate topsoil, or as directed by Engineer.
4. Stockpile topsoil in areas where it will not interfere with construction operations or existing facilities. Stockpiled topsoil shall be reasonably free of subsoil, debris, and stones larger than 2 inches in diameter.
5. Remove waste from the Site.

3.03 EXCAVATION AND TRENCHING:

A. Sheeting and Bracing:
1. Design, furnish, place, maintain, and subsequently remove, to extent required, a system of temporary supports for cut and cover, open cut, or trench excavations, including bracing, dewatering, and associated items to support sides and ends of excavations where excavation slopes might endanger in-place or proposed improvements, extend beyond construction right-of-ways, or as otherwise specified or indicated.
2. Provide all materials on Site prior to start of excavation in each section, and make such adjustments as are required to meet unexpected conditions.

3. Space and arrange sheeting and bracing as required to exclude adjacent material and according to stability of excavation slopes.
4. Assess existing conditions including adjacent property and possible effects of proposed temporary works and construction methods; and select and design such support systems, methods, and details as will assure safety to the public, adjacent property, and the completed Work.
5. Modify or relocate underground facilities, at no additional cost to Owner, if existing underground facilities interfere with Contractor's proposed method of support.
6. Use caution in areas of underground facilities, which shall be exposed by hand or other excavation methods acceptable to Owner.
7. Perform sheeting, shoring, and bracing in accordance with safety and protection requirements of the Contract Documents.
8. Provide sheeting, shoring, and bracing for trench excavation in subgrade of excavation when required to prevent movement of the main excavation support system.
9. Provide shoring, sheeting, and bracing as indicated or as needed to meet the following requirements:
    a. Prevent undermining and damage to all structures, buildings, underground facilities, pavements, and slabs.
    b. Perform excavations with vertical banks where necessary for construction activities or as indicated, and also within all limits of excavation noted on Drawings.
    c. Design excavation support system and components to support lateral earth pressures, unrelieved hydrostatic pressures, utility loads, traffic and construction loads, and building and other surcharge loads to allow safe and expeditious construction of permanent structures without movement or settlement of the ground, and to prevent damage to or movement of adjacent buildings, structures, underground facilities, and other improvements. Design shall account for staged removal of bracing to suit the sequence of concrete placement for permanent structures and backfill.
    d. Except as otherwise specified herein, shoring and sheeting materials may be extracted and reused at Contractor's option; however, Contractor shall remove and replace any existing structure or underground facility damaged during shoring and sheeting. Remove sheeting and bracing as backfill progresses. Fill voids left after withdrawal with sand or other material approved by Engineer.
    e. Where shoring and sheeting materials must be left in-place in the completed Work to prevent settlements to or damage within adjacent structures or as directed by Engineer, backfill the excavation to 3 feet below finished grade and remove the remaining exposed portion of shoring before completing backfill. If soldier piles and wood lagging are used for shoring, remove wood lagging to within 3 feet of finished grade in incremental steps of approximately 6 inches as backfill is placed, or to Contractor's design if more stringent. Location of all shoring and sheeting left in-place shall be documented on Contractor-furnished construction record drawings and provided to Engineer and Owner.
10. Contractor shall be solely responsible for proper design, installation, operation, maintenance, and any failure of any component of the system. Review by Engineer of drawings and data submitted by Contractor shall not in any way be considered to relieve Contractor from full responsibility for errors therein or from the entire responsibility for complete and adequate design and performance of the sheeting and shoring system.
11. Provision for Contingencies:

a. Performance of components of the support system shall be monitored for both vertical and horizontal movement daily.
b. Provide a contingency plan or alternative procedure for implementation, if system does not adequately perform.
c. Keep materials and equipment necessary to implement the contingency plan readily available.

12. Damages:
    a. Document all existing damage to adjacent facilities and submit information to Owner prior to performing any excavation. Documentation shall include a written description, diagrams, measurements, and appropriate photographs.
    b. Repair all damage resulting from Contractor's excavation and remove and replace all undermined pavements with Owner-approved equal, either concrete or asphalt, at no expense to Owner.

B. Explosives: Blasting will not be permitted.

C. Excavation for Structures:
1. Excavate area adequate to permit efficient erection and removal of forms.
2. Trim to neat lines where details call for concrete to be deposited against earth.
3. Excavate by hand in areas where space and access will not permit use of machines.
4. Notify Engineer immediately when excavation has reached the depth indicated.
5. Overexcavate and replace any localized zones of excessively wet, unstable, organic, yielding, or low bearing capacity materials as directed by Engineer. Restore bottom of excavation to proper elevation with compacted granular material in areas overexcavated. Correct at no additional cost to Owner when overexcavated without authority or to stabilize bottom rendered unsuitable through negligence or improper dewatering or other operations.
6. Top with 3-inch concrete seal coat where indicated and where required to provide satisfactory subgrade for structural base slabs.

D. Trenching for Underground Utilities:
1. Side Walls:
    a. Make vertical or sloped within specified trench width limitations below a plane 12 inches above top of pipe.
    b. Make vertical or sloped (stepped) as required for stability, above a plane 12 inches above top of pipe.
    c. Excavate without undercutting sidewalls.
2. Trench Depth:
    a. Excavate to depth sufficient to provide the minimum bedding requirements for the pipe being placed.
    b. Do not exceed that indicated where conditions of bottom are satisfactory.
    c. Increase depth as necessary to remove unsuitable supporting materials.
    d. Maintain a minimum of 4 feet of soil cover above top of pipe.
3. Trench Bottom:
    a. Protect and maintain when suitable natural materials are encountered.
    b. Remove rock fragments and materials disturbed during excavation or raveled from trench walls.
    c. Restore to proper subgrade with trench stabilization material when overexcavated. Correct at no additional cost to Owner when trench is overexcavated without authority or to stabilize bottom rendered unsuitable through negligence or improper dewatering or other operations.
4. Trench Width:

a. Excavate trench to a width which will permit satisfactory jointing of pipe and thorough tamping of bedding and backfill.
b. Do not exceed following trench widths:
(1) For single pipe installation, maintain trench widths below a plane 12 inches above top of pipe as follows:

	Trench Width	
Nominal Pipe Size	Minimum	Maximum
Less than 24"	Pipe od + 1'	Pipe od + 2'
24" to 60"	Pipe od + 2'	Pipe od + 4'

(2) Above plane defined in (1), no maximum limit.
(3) Maximum trench width limitations shall apply in all areas more than 3 feet from manhole or structure walls.
(4) Maximum width shall be as near the minimum specified as can be controlled by construction equipment and methods used.

5. Fill and Embankment Areas: Perform trenching only after compacted fill or embankments have reached an elevation of not less than 1 foot above top of pipe.
6. Limit maximum length of open trench to 30 feet in advance of the pipe installation.
7. Test Pits:
a. Excavate test pits sufficiently in advance of trenching to enable adequate planning of construction procedure.
b. Locate as follows:
(1) When unstable material is suspected that may require special protective measures.
(2) Where groundwater may require special handling methods.
(3) Where indicated or otherwise approved.
(4) Where interference or conflict with other utilities or structures could affect alignment of pipe.
c. To depth required to obtain information desired.

E. Dewatering
1. Control grading around excavations to prevent surface water from flowing into excavation areas.
2. Drain or pump as required to continually maintain, including days not normally worked, all excavations free of water or mud from any source, and discharge to approved drains or channels. Commence when water first appears and continue as required to keep excavation free of standing water during entire time excavation is open.
3. Use pumps of adequate capacity to ensure rapid drainage of area, and construct and use drainage channels and subdrains with sumps required.
4. When water is found in excavation due to Contractor negligence, remove unsuitable excessively wet subgrade materials and replace with approved compacted fill material as directed by Engineer and at no additional cost to Owner.

F. Waste Materials:
1. Remove unsuitable materials from Work area as excavated.
2. Material shall become property of Contractor and shall be disposed of off Site at locations arranged for by Contractor.

3.04 EARTHWORK:

A. Subgrades:
   1. General:
      a. Excavate or backfill as required to construct subgrades to elevations and grades indicated.
      b. Remove all unsuitable material and replace with acceptable fill material and perform all wetting, drying, shaping, and compacting required to prepare subgrade.
   2. Subgrade for Fills and Embankments: Roughen by discing or scarifying and wet or dry top 6 inches as required to bond with fill or embankment.
   3. Subgrade for Roadways, Drives, Parking Areas:
      a. Extend subgrade the full width of pavement or base course, plus 1 foot in each direction.
      b. Cohesive Soil Subgrades: Compact the top 6 inches of subgrade for traffic areas and railroads in embankment or excavation to a minimum of 95% of maximum dry density within the moisture content range from 2% below optimum to 2% above optimum. Optimum moisture and maximum dry density shall be determined by ASTM D698.
      c. Cohesionless Soil Subgrades: Compact the top 6 inches of subgrade for traffic areas and railroads in embankment or excavation to not less then 80% of relative dry density as determined by ASTM Methods D4253 and D4254.
   4. Subgrades for Concrete Slabs on Grade, Mats, and Footings:
      a. Compact cohesive soil subgrades to a minimum of 95% of maximum dry density within the moisture content range from 2% below optimum to 2% above optimum. Optimum moisture and maximum dry density shall be determined by ASTM D698.
      b. Where subgrade consists of cohesionless granular materials, compact to not less than 80% relative density as determined by ASTM D4253 and D4254.

B. Embankments and Fills:
   1. Construct embankments to contours and elevations indicated, using suitable approved material from excavations and borrow areas:
      a. Place fill material in maximum 8-inch loose lifts.
      b. Place embankment only on subgrades approved by Engineer.
      c. Do not place snow, ice, or frozen earth in fill; do not place fill on a frozen surface.
   2. Obtain compaction by the controlled movement of compaction equipment approved by Engineer during placing and grading of layers and to minimum density specified for indicated locations.
   3. Except as indicated or specified otherwise, compact cohesive soils to a minimum of 95% of maximum dry density within the moisture content range from 2% below optimum to 2% above optimum. Optimum moisture and maximum dry density shall be as determined by ASTM D698.
   4. In areas of fill supporting structures or under paved areas, compact cohesive soils to a minimum of 95% of maximum dry density within the moisture content range from 2% below optimum to 2% above optimum. Optimum moisture and maximum dry density shall be as determined by ASTM D698.
   5. Except as indicated or specified otherwise, compact cohesionless soils to not less than 75% relative density as determined by ASTM Method D4253 and D4254.

C. Pipe Embedment:
   1. Pipe bedding shall be as indicated, using granular material.
   2. Place granular embedment as follows:
      a. With level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length.

b. Form depression under each joint so that no part of bell or coupling is in contact with trench when pipe is placed in position.
c. Add second layer simultaneously to both sides of pipe with care to avoid displacement.
d. Complete promptly after completion of jointing operations.
e. Substitute for any part of earth backfill to within 2 feet of final grade at Contractor's option.

3. Compact granular embedment as follows:
   a. In loose lifts not exceeding 12 inches in depth.
   b. Rod, spade, or use pneumatic or vibratory equipment:
      (1) As required to obtain not less than 80% relative density as determined by ASTM Method D4253 and D4254.
      (2) Throughout depth of embedment.
   c. Compaction using flooding or water spraying techniques will not be allowed.
4. Earth pipe embedment shall be as indicated and shall be used at impervious trench checks. Shape trench bottom to fit pipe and backfill throughout depth of trench with impervious materials. Compact to minimum of 95% of maximum dry density within the moisture content range from 2% below optimum to 2% above optimum. Optimum moisture and maximum dry density shall be determined by ASTM D698.

D. Backfilling:
1. Backfill for structures and trenches shall be as specified in "Embankments and Fills," this Section, with the following additional provisions:
2. Structures:
   a. Backfill only after concrete has attained 70% design strength.
   b. Backfill adjacent to structures only after a sufficient portion of structure has been built to resist imposed load.
   c. Remove all debris from excavation prior to placement of material.
   d. Place backfill in level loose lifts of thickness within compacting ability of equipment used but not to exceed 8 inches in thickness.
   e. Perform backfilling simultaneously on all sides of structures.
   f. Exercise extreme care in use of heavy equipment in areas adjacent to structures. Equipment operated within 10 feet of any wall shall not exceed 20,000 pounds gross weight.
   g. Material above a 45^{o} plane intersecting the footing shall not include rock fragments incapable of passing a 6-inch screen, and no shale whether disintegrated or not.
3. Trenches:
   a. Backfill for trenches shall be as specified for structures and as follows:
      (1) Complete promptly upon completion of pipe embedment and approval to proceed.
      (2) Use hand methods to a plane 12 inches above top of pipe.
      (3) Mechanical methods shall be acceptable where hand backfill is not required.
      (4) Backfill in lifts of thickness within compacting ability of equipment used, but not greater than 8 inches.
      (5) Until compacted depth over conduit exceeds 3 feet, do not drop fill material over 5 feet. Distance may then be increased 2 feet for each additional foot of cover.
4. Controlled Low - Strength Material (CLSM):

a. Place CLSM (flowable fill) by means of chute, drop pipe, pump, bucket, or other method approved by Engineer to maintain consistency, flowability, and strength of in-place final product. Fill all voids and place to indicated grades or minimum elevations noted without use of a vibrator.
b. Open ends of area to be backfilled shall be plugged or built-up with a temporary bulkhead arrangement to prevent loss of CLSM during placement or during curing.
c. Prevent movement of any adjacent structure or pipe conduit:
    (1) Anchor pipe or structure to prevent uplift or movement prior to placement of CLSM.
    (2) Prevent intrusion of CLSM into interior sections of structure or pipe.
    (3) If any such movement or intrusion occurs, affected structures or pipe shall be cleaned and may require excavation, removal, and replacement of CLSM to intended final fill elevation.
d. CLSM is intended for placement within a hole that is dry or maintained with a positive dewatering operation. If it is necessary to place CLSM under water, method for placement and mix design shall be submitted to Engineer for approval at least 10 working days prior to any intended pours.
e. Monitor surface elevation of placed CLSM and document any shrinkage or settlement of initial placement volume. Provide information of shrinkage and/or settlement of initial lift to Engineer prior to placement of any additional layers or completion of CLSM placement to final indicated elevation.CSLM shall not be covered with soil or other imposed loading until a minimum compressive strength of 30 psi is attained or until a minimum of 12 hours' cure time has elapsed. Minimum strengths shall be demonstrated by laboratory test results or if permitted by Engineer, by failure to deform or crush the fill with an equivalent 30 psi applied loading in the field.
g. Protect CSLM from freezing while curing with insulated blankets or other approved methods.
h. Where air may become trapped under slabs due to grade beams or other structural components, holes shall be drilled at locations indicated, or as directed by Engineer to allow for uniform placement of CLSM entirely within the void region. Plugs shall be installed to confine CLSM, as needed. It is not intended that raising or leveling of any slabs or structural elements shall occur from placement methods.

E. Site Grading:
1. Excavate, fill, compact fill, and rough grade to bring Project area outside buildings to subgrades as follows:
    a. For surfaced areas, to underside of respective surfacing or base course.
    b. For areas to receive topsoil, to a minimum of 4 inches below finished grade.
    c. When rock is encountered in grading areas outside buildings, overexcavate to depth specified and backfill to grade with compacted fill:
        (1) Under surfaced areas, to 6 inches below top of respective subgrades for such areas.
        (2) Under lawn and planted areas, to 24 inches below finished grade, except that boulder or protruding rock outcrop, if so indicated, shall be left undisturbed.
2. Grading:
    a. Grade and compact all areas within Project area, including excavated and filled sections and adjacent transition areas, reasonably smooth, and free from irregular surface changes.

b. Degree of finish for rough grading shall be that ordinarily obtained from blade grader or scraper operations except as otherwise specified with due allowance for topsoil (and sod).
c. Finished grades shall generally be not more than 0.1 foot above or below those indicated.
d. Finish all ditches, swales, and gutters to drain readily.
e. Unless otherwise indicated, slope the subgrade evenly to provide drainage away from all structures in all directions at a grade not less than 1/4 inch per foot for a minimum distance of 10 feet.
f. Provide roundings at top and bottom of banks and at other breaks in grade.

3.05 TOPSOILING:

A. Material: Use the most suitable material obtained from stripping operations and borrow when required.
1. Placement:
a. Clear areas free of vegetation, rock, and other materials which would interfere with grading and tillage operations.
b. Bond topsoil to subgrade by scarifying subgrade to a depth of 2 inches.
c. Spread topsoil to a minimum depth of 4 inches where grading operations have left less than 4 inches of topsoil in place.
d. Grade topsoil to bring areas to grades as indicated, to ensure that all surfaces are left in an even and properly compacted condition, and to prevent ponding of water in depressions.
2. Cleanup:
a. Clean surface free of all stones or other objects larger than 2 inches in least dimension, all roots, brush, wire, grading stakes, and other objectionable materials.
b. Keep paved areas clean and promptly remove rock and dirt dropped upon surfacing.

3.06 MAINTENANCE:

A. Protect newly graded and topsoiled areas from actions of the elements.
B. Fill and repair settling or erosion occurring prior to acceptance of the Work, and reestablish grades to required elevations and slopes.
C. Under provisions of the guarantee, correct any settlement of embankment, fill, or backfill and damages created thereby within 1 year after acceptance of the Work. Make repairs within 10 days after notification by Owner of settlement.

3.07 FIELD QUALITY CONTROL:

A. Compaction:
1. Contractor will, through services of an independent laboratory, test all embankments, fills, and subgrades under this Contract to determine conformance with specified density relationships.
2. Method of test may be either of the following at Engineer's option:
a. ASTM D1556
b. ASTM D2167.
c. ASTM D6938.
3. The frequency of in-place compaction testing including density and moisture content will be as follows:
a. At least one test for every 200 cubic yards of fill placed in trenches or surrounding structures.

b. At least one test for every 500 square feet per lift in structural fill or on subgrades for foundations.
c. At least one test for every shift of compaction operations on a mass fill.

4. At least one test when Engineer suspects quality of moisture control or effectiveness of compaction. Remove or scarify fill failing to meet required densities and recompact as necessary to achieve specified results.
5. Removal of in-place material and replacement with approved new material will be required if scarifying and recompaction do not produce the required densities.
6. Perform at least one classification test (ASTM D2487) and one moisture-density test (ASTM D698) on soil used in fill or backfill operations during construction.
   a. Each sample shall be taken from trenches or other excavations as directed by Engineer and should be generally representative of distinguishably differing materials encountered and used for backfill or fill.
   b. Perform one set of tests at the beginning of excavation and one additional set of tests when material properties vary (more or less plastic, different color, more or less granular, or other conditions) from the material initially tested.
   c. Additional tests shall be performed when directed by Engineer.

B. Controlled Low-Strength Material (CLSM):
   1. Determine unconfined compressive strength using cylinders of CLSM sampled, handled, cured, and tested in accordance with ASTM D4832. Perform a minimum of one set of four cylinders for every 150 cubic yards of CLSM placed but not less than one set for each day's placement, unless otherwise directed by Engineer.
   2. Determine bearing strength, if required by Engineer, using penetration testing in accordance with ASTM C403.
   3. Test flow of CLSM, if required by Engineer, in accordance with ASTM C939.

C. Subgrades:
   1. Engineer will inspect all subgrades to determine conformance with indicated lines and grades.
   2. Subgrades for roadways, drives, parking areas, and railroads shall have a maximum deviation of not more than 1/2 inch in any 10 feet when tested with a 10-foot straightedge applied parallel with and at right angles to centerlines of subgrade areas. Actual grade shall not be more than 0.1 foot from indicated grade.

END OF SECTION 312050

SECTION 33 11 00 – PRESSURE PIPE

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes all pressure pipe, fittings, specials, and appurtenances.

B. Related Work Specified Elsewhere:

1. Section 33 31 50 - Pipe Installation.
2. Section 33 12 16 – Utility Valves and Accessories.
3. Section 09 90 00 - Protective Coatings.

1.02 REFERENCE STANDARDS:

A. Applicable Standards:

1. American Association of State Highway and Transportation Officials (AASHTO).
2. American Water Works Association (AWWA):
   a. AWWA C110 - Ductile-Iron and Gray-Iron Fittings.
   b. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   c. AWWA C150 - Thickness Design of Ductile-Iron Pipe.
   d. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water.
   e. AWWA C153 - Ductile-Iron Compact Fittings.
   f. AWWA C219 - Bolted, Sleeve-Type Couplings for Plain-End Pipe.
   g. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 In. Through 60 In. (100 mm Through 1,500 mm).
   h. AWWA M23 - PVC Pipe-Design and Installation.
   i. AWWA M41 - Ductile-Iron Pipe Fittings.
3. American National Standards Institute (ANSI):
   a. ANSI B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
   b. ANSI B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.
4. American Society for Testing and Materials (ASTM):
   a. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength.
   b. ASTM D1248 - Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable.
   c. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
   d. ASTM G62 - Standard Test Methods for Holiday Detection in Pipeline Coatings.
5. National Sanitation Foundation (NSF):
   a. NSF 61 - Drinking Water System Components - Health Effects.
6. Society for Protective Coatings (SSPC):
   a. SP1 - Solvent Cleaning.
   b. SP3 - Power Tool Cleaning.
   c. SP7 - Brush-Off Blast Cleaning.
   d. SP10 - Near-White Blast Cleaning.

1.03 SUBMITTALS:

A. Submit as specified in Division 01.

B. Submit the following for acceptance prior to fabrication:

1. Pipe and joint details.
2. Special, fitting, and coupling details.
3. Laying and installation schedule.
4. Specifications, data sheets, and affidavits of compliance for protective shop coatings and linings.
5. Manufacturer's design calculations including, but not limited to, wall thickness and deflection under specified live and dead loads.

C. Certificates and Affidavits: Furnish the Following Prior to Shipment:
1. Affidavit of compliance with applicable standard.
2. Test certificates.

1.04 QUALITY ASSURANCE:

A. Manufacturers shall be experienced in the design and manufacture of pipe, fittings, specials, or appurtenances for a minimum period of 5 years.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Conform to guidelines found in AWWA M23 - PVC Pipe-Design and Installation.

PART 2 - PRODUCTS

2.01 PIPE REQUIREMENTS:

A. Furnish pipe of materials, joint types, and sizes as indicated or specified.

B. Pipe shall be designed to withstand all stresses resulting from external loads and internal pressures listed in the following table plus applicable allowance for surge unless otherwise specified:

Nominal Pipe Size	Design Cover Depth	Live Load	Design Internal Working Pressure	Design Maximum Test Pressure
24	4-16 ft	H-20	60	120

C. Pipe Marking: All pipe and fittings shall be marked conforming to the applicable standard specification under which the pipe is manufactured and as otherwise specified.

2.02 DUCTILE-IRON PIPE:

A. Design and Manufacture of Pipe:
1. Ductile-iron pipe shall conform to AWWA C115, C150 and C151 except as otherwise specified.

B. Dimensions: The minimum thickness as defined by pressure class for mechanical or push-on-type joint ductile-iron pipe shall be as follows:

Nominal Pipe Size	Minimum Pressure Class
24	250

1. Minimum thickness for ductile-iron pipe threaded for screw-on flanges shall be in accordance with AWWA C115.
2. Pipe with grooved barrel for any type of restrained joint shall have wall thickness increased to provide a minimum wall thickness conforming to AWWA C606.

C. Joints:
1. Mechanical and Push-On Type:
   a. Provide mechanical or push-on-type joints for all buried pipe less than 30 inches in diameter unless otherwise specified or indicated. Provide push-on-type joints for sizes 30 inches in diameter and greater.
   b. Joints shall conform to AWWA C111.
2. Flanged:
   a. Provide flanged joints for all interior pipe where specified or indicated.
   b. Flanges for pipe shall be ductile iron and conform to the applicable provisions of AWWA C110 and C115 and shall be drilled ANSI B16.1 Class 125.
3. Sleeved or Coupled:
   a. Provide for sleeves or couplings where indicated.
   b. Furnish pipe ends suitable for receiving style of sleeve or coupling indicated or specified.
   c. Provide anchored couplings where restraint is required to withstand specified operating or hydrostatic test pressure and where indicated.
4. Restrained:
   a. Furnish for all fittings and where joint restraint is required to offset internal pipeline forces.
   b. Provide restrained joints of following approved types:
      (1) Restrained mechanical joint.
      (2) Restrained push-on joint.
      (3) Anchored couplings.
   c. Mechanical joint retainer glands shall be Megalug manufactured by EBAA Iron, Inc. or approved equal.

D. Fittings:
1. Fittings shall conform to AWWA C110 or C153 and shall have a pressure rating of not less than that specified for pipe.
2. All fittings shall be ductile iron.
3. Fittings for pipe with mechanical joint shall have mechanical joints.
4. Fittings for pipe with push-on joints shall be mechanical joint.

5. Include all specials, taps, plugs, flanges, and wall fittings as required.
6. Provide openings for air valve, drain, sampling, sensing, testing, and other connections with threaded bosses or flange outlets sized and located where indicated.

E. Lining:
1. Pipe and Fittings:
a. All piping and fittings shall be lined with an amine-cured novalac epoxy containing a minimum of 20% by volume of ceramic quartz pigment. The lining shall be Protecto 401 as manufactured by INDURON Protective Coatings, Birmingham, Alabama or NovoCoat SP-2000W as manufactured by NovoCoat Protective Coatings, Addison, Texas.
b. Surface preparation shall consist of grit-shot blasting or sandblasting surface to near-gray finish, comparable to SSPC-SP10.
c. Lining shall be applied within 8 hours of surface preparation. The number of coats of lining applied and the time between coats shall be as recommended by the lining manufacturer.
d. Total Thickness: A nominal 40 mils.
e. Joint surface coating shall be Protecto Joint Compound with Protecto 401 lining system or Novo Coat SP-2000W with Novo Coat lining system. Coal tar is prohibited. Total thickness shall be 6 mils nominal and 10 mils maximum.
f. Testing:
(1) Lining shall be tested over 100% of the pipe barrel and fitting surface with a nondestructive 4,000-volt test.
(2) All holidays shall be repaired per lining manufacturer's recommendation.
(3) A voltage confirmation test shall be performed for each production shift or change in detector operator.

F. Coating:
1. All iron pipe and fittings shall be coated with manufacturer's standard bituminous paint coating.

2.03 PVC PIPE:

A. Materials:
1. Materials shall conform to AWWA C900.
2. Gaskets shall conform to ASTM F477 and be synthetic rubber.

B. Design of Pipe: Design shall conform to AWWA C900 and as specified:
1. Internal Loading:
a. Internal pressure specified plus allowance for surge pressure conforming to AWWA C900.
b. Hydrostatic test pressure as specified.
2. External Loading:
a. Earth dead load cover at 120 pcf plus AASHTO H-20 live loads.
b. 5% deflection limit.
c. Bedding condition as indicated.
3. Use E' of 700 and bedding angle of 90°.

C. Dimensions: The minimum pressure class for PVC pipe shall be as follows:

Nominal Pipe Size	Minimum Pressure Class
24	200

D. Diameters: PVC pressure pipe shall have Cast-Iron-Pipe-Equivalent (CI) outside diameters.
E. Joints: Pipe shall be furnished with integral bell-type pipe ends designed for joint assembly using elastomeric gaskets.
F. Fittings:
   1. Fittings shall conform to AWWA C110 or C153 and be ductile iron. Fittings shall be mechanical joint or push-on-type joint.
G. Marking: Identification markings on pipe shall conform to AWWA C900.

2.04 SLEEVES AND COUPLINGS:

A. Sleeves:
   1. AWWA C110 mechanical joint ductile-iron solid sleeve type:
      a. Pipe end space shall not exceed one-third of the sleeve laying length.
      b. Interior, exposed, exterior, or buried service as indicated.

B. Couplings:
   1. Center sleeve and compression gland-type end ring conforming to AWWA C219.
   2. Center sleeve shall be without pipe stop.
   3. Couplings for joining direct buried, exposed exterior, vault or pit installations of iron, or PVC pipe up to 12-inch diameter shall be iron. Provide lined and coated steel couplings for larger pipe diameters.
   4. Fastener bolts shall be ductile iron or stainless steel for iron couplings and high-strength, low-alloy steel for steel couplings. Bolts for direct buried coupling installations shall be stainless steel.
   5. Center sleeve and end rings shall be:
      a. Ductile or malleable iron for iron couplings.
      b. Steel for steel couplings.
   6. Lining and Exterior Coating:
      a. Use for all steel couplings intended for direct bury, exposed exterior, vault or pit installations.
      b. Completely coat center sleeve and end rings.
      c. Two-part epoxy or nylon fuse-coated to a minimum 10 mils thickness.
      d. Line interior of all steel couplings intended for exposed-interior installations. Coat exterior with normal shop coating.

C. Flanged Coupling Adapters:
   1. Flanged end and body to be one unit conforming to AWWA C219. Coupling end to be compression gland type with follower ring.
   2. Adapters for joining direct buried, exposed exterior, vault or pit installations of iron pipe shall be iron.

3. Adapters for joining exposed interior iron pipe may be steel or iron.
4. Flanged end bolt circle, bolt size, and spacing shall conform to the applicable provisions of ANSI B16.1 and shall be drilled Class 125 for iron adapters. Flanges on steel adapters shall be AWWA C207, Class D, drilled ANSI B16.1 Class 125.
5. Bolts and nuts shall be ductile iron for iron adapters and high-strength, low-alloy steel for steel adapters.
6. Anchor studs shall not be used where joint restraint is required. Furnish adapters with tie rod harness assemblies where indicated.
7. Lining and Exterior Coating for Steel Adapters:
   a. Two-part epoxy or nylon fuse-coated to a minimum 10 mils thickness.
   b. Completely coat adapter sleeve and end follower gland plus line interior for adapters intended for exposed exterior, vault or pit installations.
   c. Line interior of all adapters intended for exposed interior installations. Coat exterior with normal shop coating.

D. Anchored Couplings:
1. Furnish where joint restraint required to offset internal pipeline forces.
2. Provide harnessed sleeve couplings and flanged coupling adapters with tie rod harnesses where indicated.
   a. Harnesses shall consist of lugs or clamps welded or otherwise securely fastened to opposite joint elements with tie bolts between opposing lugs. "Dog ear" lugs shall be fabricated as indicated.
   b. Design of harnesses for steel pipe shall conform with applicable provisions of AWWA M11.
3. Provide expansion couplings with limit rods.
4. Provide couplings for grooved and shouldered type joints conforming to AWWA C606.
   a. Furnish grooved ends on ductile-iron end pipe.
   b. Furnish shouldered ends on steel pipe.
5. Mechanical joint retainer glands shall not be used where joint restraint is required unless indicated. When indicated, retainer glands shall be Megalug manufactured by EBAA Iron, Inc.

E. Insulated Couplings:
1. Couplings shall be insulated to prevent electrical conductivity where indicated.
2. Insulated coupling design shall be otherwise conforming to the standard types and styles specified.

F. Dismantling Couplings: [Dismantling Joint]:
1. Consists of a mechanical joint fitting located between two pipe flanges with restraining rods across the mechanical joint section, providing a restrained system with integral space for removal of adjacent equipment.
2. Shall conform to AWWA C-219.
3. Materials shall be steel.
4. When connected to DIP system, install insulating flange kit.

2.05 GASKETS AND BOLTING MATERIALS:

A. Provide all gaskets, bolts, lubricant, and other accessories required to install pipe, fittings, and specials complete and ready for service.

B. Gaskets for flanged joints shall conform to ANSI B16.21, 1/8-inch thick full-face synthetic rubber or American Cast Iron Pipe Company Toruseal 1/8-inch thick full-face gasket or U.S. Pipe Company Flange-Type 1/8-inch thick ring gasket. Provide full-face gaskets for all pump and equipment connections.
C. Gaskets for ductile iron flanged pipe and fittings 12 inch and smaller shall have "nominal" inside diameters, not the larger inside diameters per ANSI B16.21.
D. Bolts for flanged joints shall conform to ASTM A307, Grade B. Nut and bolt heads shall be hexagonal.
E. Gaskets and bolts for other than flanged joints shall be as otherwise specified for pipe and pipe joints.

PART 3 - EXECUTION

3.01 INSTALLATION:
A. Specified in Section 33 31 50.

3.02 FIELD TESTING:
A. Specified in Section 33 31 50.

3.03 FIELD PROTECTIVE COATING:
A. Specified in Section 09 90 00.

END OF SECTION 33 11 00

SECTION 331216 - UTILITY VALVES AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes all valves and accessories.

B. Related Work Specified Elsewhere:

1. Pipe Installation: SECTION 333150.
2. Protective Coatings: SECTION 099000.

1.02 REFERENCES:

A. Applicable Standards:

1. American National Standards Institute (ANSI):
   a. B16.1 - Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250 and 800.
2. American Society for Testing and Materials (ASTM):
   a. A126 - Gray Iron Castings for Valves, Flanges and Pipe Fittings.
   b. A536 - Ductile Iron Castings.
3. American Water Works Association (AWWA):
   a. C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
   b. C512 - Air-Release, Air/Vacuum, and Combination Air Valves for Waterworks Service.
   c. C517 – Resilient-Seated Cast-Iron Eccentric Plug Valves.
   d. C550 - Protective Epoxy Interior Coatings for Valves and Hydrants.
   e. C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

1.03 SUBMITTALS:

A. Submit as specified in DIVISION 1.

B. Include, but not limited to, the following:

1. Catalog data or illustrations showing principal dimensions, parts, and materials.
2. Spare parts list referenced to illustration of parts.
3. Assembly and disassembly or repair instructions.

C. Certificates and Affidavits: Furnish prior to shipment. Include the following:

1. Test certificates.
2. Affidavit of compliance with applicable AWWA Standard.

1.04 QUALITY ASSURANCE:

A. Manufacturers shall be experienced in the design and manufacture of specific valves and accessories for a minimum period of 5 years.

1.05 DELIVERY, STORAGE, AND HANDLING:

A. Ship all valves with suitable end covers to prevent entrance of foreign material into valve body.

B. Protect valve threads, flanges, stems, and operators from damage.

C. Ship valves to the Project Site tagged with the valve type and size.

1.06 RESPONSIBILITY:

A. Actuators, their controls, and accessories shall be the responsibility of the valve manufacturer for sizing, assembly, certification, field testing, and any adjustments necessary to operate the valve as specified.

PART 2 - PRODUCTS

2.01 ECCENTRIC PLUG VALVES:

A. Acceptable Manufacturers:
   1. DeZurik, a unit of General Signal Corporation.
   2. Henry Pratt Company.
   3. Milliken Valve Company, Inc.
   4. Val-Matic Valve and Manufacturing Corporation.
   5. Victaulic Company of America

B. Design:
   1. Quarter-turn nonlubricated eccentric type with resilient faced plug. Valves with vane type seat rings are not acceptable. Shutoff up to scheduled rating with pressure in reverse direction where scheduled.
   2. Conform to criteria indicated in Valve Schedule table.
   3. Flanged valve ends shall be faced and drilled to conform to ANSI B16.1, Class 125 for thickness and drilling.
   4. Port areas for valves 24-inch and larger valves shall be at least 70% of full pipe area.
   5. Plugs shall be eccentric type with no backing ring or frame.
   6. Valve body cavity shall be smooth without protrusions or baffles.

C. Materials and Construction:
   1. Bodies shall be of ASTM A126, Class B cast iron.
   2. Valve plug shall be ASTM A126, Class B cast iron or ASTM A536 ductile iron. Resilient plug facing or replaceable style body seats shall be synthetic rubber, neoprene, or Buna N compound suitable for use with wastewater applications.
   3. Seat rings shall be threaded, or welded of corrosion-resistant 18-8 stainless steel, nickel, or Monel conforming to AWWA C504. Sprayed or plated mating seat surfaces are not acceptable.
   4. Bearings shall be replaceable. Sleeve type and thrust bearings in the upper and lower journals shall be corrosion-resistant stainless steel or bronze.
   5. Shaft seals shall be multiple O-ring, self-adjusting U-cup or chevron type packing conforming to AWWA C504. Pull-down packing is not acceptable.
   6. Shaft seals shall be field adjustable or replaceable without valve disassembly.
   7. All exposed fastening hardware shall be zinc plated or stainless steel.

D. Actuators:
   1. Manual Actuators:
      a. All valves shall open counterclockwise.
      b. Provide indicators to show position of plug.
      c. Nut operators shall be AWWA 2-inch size for operation by valve key, wrench head lever, or a chain lever.
      d. Worm gear actuators shall be totally enclosed, grease sealed, gear type furnished with AWWA nut, crank, handwheel, or chainwheel. All valves with reverse pressure capacity requirement shall be provided with worm gear actuators. Worm gear actuators shall be self-locking at all variable opening positions and sized to meet the torque ratings of AWWA C504. The shaft in a worm gear actuator shall have a nonmetallic or bronze sleeve type bearing. Submit manufacturer's parts and materials drawings.
      e. Handwheels shall be located in positions indicated or as otherwise determined when manufacturer's drawings are submitted.

E. Valve Controls:
   1. Operate valve actuator to perform control function required.

a. Open or close valve.
b. Maintain metered flow rate.
c. Pump stop-check service with functions indicated and specified.

2. Include all pilot valves, needle valves, strainers, interconnecting piping, fittings, positioners, solenoid valves, limit switches, and other accessories essential to valve function factory-assembled on valve body or operator.
   a. Small control valves shall be bronze or brass; piping shall be copper.
   b. Provide solenoid valves, limit switches, positioners, and other accessories as specified.

F. Testing: Furnish certified copies of results of tests prior to shipment. All valves shall be subjected to an AWWA C504 procedure cycle life and pressure leak test at 150 psi and a body hydrostatic test at 300 psi. Valves shall be capable of providing drip-tight shutoff up to the full leak test rating. Certify reverse pressure capacity.

G. Valve Schedule:

Size	Location	Installation	Body Type	Valve Ends	Shaft Position	Actuator Type
24-inch	Connection VV	Exposed	C.I.	Flg.	Horizontal	Worm Gear/HW
14-inch	Connection VV	Exposed	C.I.	Flg.	Horizontal	Worm Gear/HW
3-inch	All ARV Vaults	Exposed	C.I.	Flg.	Horizontal	Worm Gear/LV

H. Shop Painting: Apply interior coating conforming to AWWA C550 to exposed ferrous metal surfaces. Provide affidavit or certificate of compliance per AWWA C550.

2.02 AIR VALVES:

A. Acceptable Manufacturers:
   1. A.R.I.
   2. Approved equal.

B. Design: Conform to AWWA C512 and as specified.
   1. Valve shall be heavy-duty combination air release, sewage style.
   2. Body and cover shall be ductile iron.
   3. Float shall be stainless steel.
   4. All internal parts shall be stainless steel.

C. Operation:
   1. Release air when filling line.
   2. Admit air when emptying line.
   3. Release accumulated air while pipeline is full and operating under pressure.

D. Connection:
   1. Connect air valves through flanged outlets.
   2. Connecting fittings and pipe shall be bronze, brass, or copper rated for 150 psi service.
   3. Isolation valves shall be provided for all air valves and shall be plug valves.
   4. Couplings or unions indicated between pipeline and air valve piping shall be insulated style.

E. Valve Schedule:
   1. As provided on Contract Drawings.

2.03 SHOP PAINTING:

A. Prepare surfaces and paint or coat all valves, floor stands, valve boxes, corporation stops, and all related accessories standard of the manufacturer unless otherwise specified herein.
B. Paint and coatings shall be suitable for the service intended.
C. Submit type of paint or coating proposed with drawings and data for Engineer approval prior to fabrication.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Comply with provisions of AWWA C600 and as specified.
B. Thoroughly clean and remove all shipping materials prior to setting. Operate all valves from fully opened to totally closed.
C. Install eccentric plug valves in reverse position, flow and pressure against the plug face when closed, in lines with solids or stringy materials. When installed horizontally with shaft in the horizontal, the plug shall rotate open to the top recess of the valve body.
D. Equip with anchorage where indicated.

3.02 FIELD PAINTING: Surface preparation and finish painting are specified in SECTION 099000.

3.03 FIELD TESTING:

A. Perform on piping and valves as specified in SECTION 333150 and for the following:
   1. Eccentric plug valves.
   2. Air and air/vacuum valves.

END OF SECTION 331216

SECTION 333100 - GRAVITY PIPE

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes all gravity pipe, fittings and specials.

B. Related Work Specified Elsewhere:

1. Utility Structures: SECTION 333900.
2. Pipe Installation: SECTION 333150.
3. Protective Coatings: SECTION 099000.

1.02 REFERENCES:

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM):
   a. C150 - Portland Cement.
   b. D1248 - Polyethylene Plastics Molding and Extrusion Materials.
   c. D1784 – Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds.
   d. D2680 - Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping.
   e. D3034 - Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
   f. D3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals.
   g. F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
   h. F679 - Poly(Vinyl Chloride) (PVC) Large - Diameter Plastic Gravity Sewer Pipe and Fittings.
2. American Water Works Association (AWWA):
   a. M23 – PVC Pipe – Design and Installation
3. Federal Specification (FS):
   a. SS-S-00210 - Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.

1.03 SUBMITTALS:

A. Submit as specified in DIVISION 1.

B. Submit the following for acceptance prior to fabrication:

1. Pipe and joint details.
2. Special, fitting and coupling details.
3. Laying and installation schedule.

C. Certificates and Affidavits:

1. Submit as specified in DIVISION 1.
2. Furnish the following prior to shipment:
   a. Affidavit of compliance with applicable standard.
   b. Test certificates.

1.04 QUALITY ASSURANCE:

A. Manufacturer:

1. Experienced in the design, manufacture and commercial supplying of the specific material for a minimum period of five years.
2. Experienced in the design, manufacture, and commercial supplying of the specific size of pipe for a minimum period of three years.
3. Certify to above minimum experience requirements.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Conform to manufacturer's guidelines as well as guidelines published in AWWA M23.

PART 2 - PRODUCTS

2.01 PIPE REQUIREMENTS:

A. Furnish pipe of materials, joint types, sizes, and strength classes indicated or specified. Higher strengths may be furnished at Contractor's option. Furnish maximum pipe lengths produced by the manufacturer.

B. Pipe shall be designed to withstand all stresses resulting from external loads as listed in the following table:

Pipe Size	Cover Depth	Design Live Load
24-inch	4 – 12 feet	H-20
24-inch	12 – 20 feet	H-20
8 inch	4 – 12 feet	H-20
8 inch	12 – 20 feet	H-20

C. Pipe Bedding: As specified and as indicated.

D. Pipe Marking:

1. All pipe, fittings and specials shall be marked conforming to the applicable standard specification under which the pipe is manufactured and as otherwise specified.
2. Mark field location of fittings and specials by station.

E. Pipe Gaskets: All elastomeric gaskets and seals shall be synthetic rubber.

2.02 PVC SEWER PIPE:

A. Materials and Manufacture: Conform to ASTM F679 for pipes with smooth interior and exterior. All PVC piping shall be as specified and modified herein.

1. Minimum wall thickness of ASTM F679 pipes shall be SDR-26.
2. Minimum pipe stiffness, when measured at 5% deflection, shall be as follows:
   a. 115 psi for ASTM F679 pipes.
3. Joints:
   a. Compression-type with the elastomeric ring gasket confined in the annular space between the bell end or socket and the spigot end of pipe.
   b. Elastomeric gasket ring joints shall conform to the requirements of ASTM D3212 or ASTM F477. Gaskets shall be neoprene or other synthetic rubber material.
   c. Plain end of pipe shall be marked with a reference line to facilitate assembly inspection.
4. Connections: Furnish any special flexible couplings required for manhole tie-ins or connections to other rigid structures.

B. Inspection and Testing:

1. Primarily by manufacturer's testing laboratory and quality control personnel.
2. Perform to avoid, insofar as possible, delivery of defective pipe.
3. May be witnessed by Owner, Engineer, or approved independent testing laboratory.
   a. Independent testing laboratory, when used, shall be retained by Owner at no expense to Contractor.

b. Contractor and manufacturer shall cooperate with Owner's inspection and test personnel. Permit unrestricted access, furnish reasonable space and facilities, and provide 5 working days advance notice of test schedule.

4. Contractor shall provide 3 copies each of certified test reports to Engineer.
   a. Include stiffness and deflection, dimension, and hydrostatic joint tests per ASTM D3034, D3212, F679, F794, and F949.
   b. Furnish prior to delivery.

C. Handling and Delivery:
   1. Do not deliver until tests on representative specimens have been performed.
   2. Use equipment and methods adequate to preserve quality of pipe and to protect joint elements.

2.03 GASKETS AND BOLTING MATERIALS:

A. Provide all gaskets, bolts, lubricant, and other accessories required to install pipe, fittings and specials complete and ready for service.

B. Gaskets and bolts for other than flanged joints shall be as otherwise specified for pipe and pipe joints.

PART 3 - EXECUTION

3.01 INSTALLATION: Specified in SECTION 333150.

3.02 FIELD TESTING: Specified in SECTION 333150.

END OF SECTION 333100

SECTION 333150 - PIPE INSTALLATION

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes handling, installation and testing of pipe, fittings, specials, and appurtenances as indicated or specified.

B. Related Work Specified Elsewhere:

1. Gravity Pipe: SECTION 333100.
2. Pressure Pipe: SECTION 331100.
3. Utility Valves and Accessories: SECTION 331216.
4. Protective Coatings: SECTION 099000.

1.02 REFERENCES:

A. Applicable Standards:

1. American Society for Testing and Materials (ASTM):
   a. D2321 - Underground Installation of Flexible Thermoplastic Sewer Pipe.
   b. F1417 - Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air.
2. American Water Works Association (AWWA):
   a. C105 - Polyethylene Encasement for Ductile-Iron Pipe Systems.
   b. C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.
   c. M23 - PVC Pipe - Design and Installation.
3. Federal Specifications (FS):
   a. SS-S-00210 - Sealing Compound, Preformed Plastic, For Expansion Joints and Pipe Joints.

1.03 DELIVERY, STORAGE AND HANDLING:

A. Handle in a manner to ensure installation in sound and undamaged condition.

1. Do not drop or bump.
2. Use slings, lifting lugs, hooks, and other devices designed to protect pipe, joint elements, linings, and coatings.

B. Ship, move, and store with provisions to prevent movement or shock contact with adjacent units.

C. Handle with equipment capable of work with adequate factor of safety against overturning or other unsafe procedures.

PART 2 - PRODUCTS Specified in respective Sections, this Division.

PART 3 - EXECUTION

3.01 INSTALLATION - GENERAL:

A. Use equipment, methods, and materials ensuring installation to lines and grades indicated.

1. Maintain within tolerances specified or acceptable laying schedule.
   a. Alignment: $\pm$2 inch for all pipe.
   b. Grade: $\pm$1 inch for pressure pipe.
      $\pm$1/2 inch for gravity pipe.
2. Do not lay on blocks unless pipe is to receive total concrete encasement.
3. Accomplish horizontal and vertical curve alignments with bends, bevels, and joint deflections.

a. Limit joint deflection with ductile-iron pipe to conform to AWWA C600.
b. Use short specials preceding curves as required.

4. Obtain acceptance of method proposed for transfer of line and grade from control to the Work.

B. Install pipe of size, materials, strength class, and joint type with embedment indicated for plan location.

C. Insofar as possible, install pipe with bell ends in direction of laying. Obtain Engineer approval for deviations therefrom.

D. Clean interior of all pipe, fittings, and joints prior to installation. Exclude entrance of foreign matter during installation and at discontinuance of installation.
1. Close open ends of pipe with snug-fitting closures.
2. Do not let water fill trench. Include provisions to prevent flotation should water control measures prove inadequate.
3. Remove water, sand, mud, and other undesirable materials from trench before removal of end cap.

E. Brace or anchor as required to prevent displacement after establishing final position.

F. Perform only when weather and trench conditions are suitable. Do not lay in water.

G. Observe extra precaution when hazardous atmospheres might be encountered.

H. Install tracer wire (10-gauge AWG solid single copper) on all new sanitary force main piping.

3.02 JOINTING:

A. General Requirements:
1. Locate joint to provide for differential movement at changes in type of pipe embedment, impervious trench checks, and structures.
a. Not more than 8 inches from structure wall, or
b. Support pipe from wall to first joint with concrete cradle structurally continuous with base slab or footing.
c. As indicated.
2. Perform conforming to manufacturer's recommendations.
3. Clean and lubricate all joint and gasket surfaces with lubricant recommended.
4. Use methods and equipment capable of fully seating or making up joints without damage.
5. Check joint opening and deflection for specification limits.

B. Special Provisions for Jointing Ductile-Iron Pipe:
1. Conform to AWWA C600.
2. Visually examine while suspended and before lowering into trench.
a. Paint bell, spigot, or other suspected portions with turpentine and dust with cement to check for cracks invisible to the eye.
b. Remove turpentine and cement by washing when test is satisfactorily completed.

C. Special Provisions for Jointing PVC Pipe:
1. Conform to ASTM D2321. Pressure pipe installation shall also conform to AWWA M23.
2. Excavate bell holes at each joint or coupling to provide full length barrel support of the pipe and to prevent point loading at the bells or couplings.
3. Connect pipe to new or existing rigid structures or manhole tie-ins with manhole couplings.

3.03 CUTTING:

A. Cut in neat manner without damage to pipe.

B. Observe Specifications regarding joint locations.
C. Cut cast-iron, ductile-iron, and steel pipe with carborundum saw or other acceptable method per manufacturer's instructions.
   1. Smooth cut by power grinding to remove burrs and sharp edges.
   2. Repair lining as required and approved.

3.04 CLOSURE PIECES:

A. Connect two segments of pipeline or a pipeline segment and existing structure with short sections of pipe fabricated for the purpose.
B. Observe Specifications regarding location of joints, type of joints, and pipe materials and strength classifications.
C. May be accomplished with sleeve coupling:
   1. Of length such that gaskets are not less than 3 inches from pipe ends.
   2. Wrap exterior of buried steel couplings with polyethylene encasement conforming to AWWA C105.

3.05 TEMPORARY PLUGS:

A. Plugs:
   1. Test plugs as manufactured by pipe supplier.
   2. Fabricated by Contractor of substantial construction.
   3. Watertight against heads up to 20 feet of water.
   4. Secured in place in a manner to facilitate removal when required to connect pipe.

3.06 CONNECTIONS TO EXISTING STRUCTURES:

A. Connect pipe to existing structures and pipelines where indicated.
B. Prepare structure by making an opening with at least 3 inches clearance all around fitting to be inserted.
C. Observe pertinent articles of Specifications pertaining to joint locations and closures.
D. Repair wall opening with nonshrinking grout.

3.07 POLYETHYLENE ENCASEMENT:

A. Encase pipe, fittings, valves, and other appurtenances with polyethylene film as indicated or specified.
B. Materials:
   1. Polyethylene material shall be as follows:
      a. Conform to AWWA C105.
      b. Class C (Black).
   2. Adhesive tape shall be as follows:
      a. Approximately 2 inches wide and plastic backed.
      b. Capable of bonding securely to metal surfaces and/or polyethylene material.
      c. Polyken No. 900, Scotchrap No. 50, or Engineer-approved equal.
C. Installation:
   1. Perform to conform to AWWA C105.
   2. Use adhesive tape to fasten polyethylene film in place.
   3. Minimize exposure of polyethylene film to sunlight.
   4. Wrap pipe, valves, fittings, and couplings per AWWA C105 installation standards.

3.08 FIELD TESTING:

A. Acceptance Tests for Gravity and Low-Pressure Pipelines:

1. Alignment:
   a. Sewer shall be inspected by flashing a light between manholes or by physical passage where space permits.
   b. Contractor shall clean pipe of excess mortar, joint sealant, and other dirt and debris prior to inspection.
   c. Determine from Illumination or Physical Inspection:
      (1) Presence of any misaligned, displaced, or broken pipe.
      (2) Presence of visible infiltration or other defects.
   d. Correct defects as required prior to conducting leakage tests.
2. Leakage Test:
   a. Exfiltration testing of all manholes shall be performed by Contractor and shall be tested separately from the pipe.
      (1) Manholes shall be tested by plugging all openings in a watertight manner which will withstand the hydrostatic pressure when manhole is filled with water.
      (2) Testing shall commence 12 hours after manhole has contained the test water.
      (3) Manholes having a depth greater than 25 feet shall be tested for only 25 feet head of water. Manholes 25 feet deep or less shall be tested full of water.
      (4) Exfiltration shall not exceed 1.14 gallons per day per vertical foot of manhole.
   b. Dewater pipe and manholes upon completion of testing.
3. Air Testing: Perform air tests per ASTM F1417 for plastic pipe sizes up to and including 42 inches in diameter.
   a. Furnish all facilities required including:
      (1) Necessary piping connections.
      (2) Test pumping equipment.
      (3) Pressure gauges or manometers.
      (4) Bulkheads.
      (5) All miscellaneous items required.
   b. Obtain approval of equipment and acceptance of methods proposed for use.
   c. Conduct initial test on first section of pipe laid by each crew.
      (1) Include a minimum of 10 lengths of pipe but not to exceed 300 feet.
      (2) Perform before backfilling.
      (3) Satisfactorily complete test before crew is permitted to continue pipe installation.
   d. Test remaining pipe in sections determined by Contractor and approved by Engineer.
   e. A wetted interior pipe surface on clay pipe is desirable and will produce more consistent test results.
   f. Plug ends of line and cap or plug all connections to withstand internal test pressures.
   g. Introduce low-pressure air until internal air pressure is 4.0 psi greater than the average back pressure of ground water above the pipe invert.
   h. Allow two to five minutes for air pressure to stabilize. Adjust pressure to 3.5 psi and start test.
   i. Time required for pressure to decrease 1.0 psi from 3.5 to 2.5 psig greater than the average back pressure of any ground water above the pipe invert shall not be less than the minimum test time in the following table for the given diameters:

Minimum Test Times (Minutes) in Plastic Pipe

Nominal Pipe Diameter	Minimum Time (min.)*	Length for Min. Time	Time for Longer Length(s)*
8 in.	7:34	298 ft.	1.520 L**
24 in.	22:40	99 ft.	13.674 L**

* For 0.5 psi pressure test drop, required test times shall be exactly one-half the values shown.
** L is the pipe length in feet.

j. Repeat test as necessary after all leaks and defects have been repaired.

B. Acceptance Tests for Pressure Pipelines:
1. Perform hydrostatic pressure and leakage tests.
   a. Conform to AWWA C600 procedures.
      (1) As modified herein.
      (2) Shall apply to all pipe materials specified.
   b. Perform after backfilling.
2. Test separately in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs.
   a. Select test segments such that adjustable seated valves are isolated for individual checking.
   b. Contractor shall furnish and install test plugs.
      (1) Including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs.
      (2) Be responsible for any damage to public or private property caused by failure of plugs.
3. Limit fill rate of line to available venting capacity. Fill rate shall be regulated to limit velocity in lines when flowing full to not more than 0.05 to 1 fps.
4. Contractor shall be responsible for providing water for testing.
5. Pressure and Leakage Test:
   a. Test pressure shall not be less than 2 times the working pressure at the highest point along the test section.
   a. Be at least 2-hour duration. Maintain pressure throughout test $\pm$5 psi of test pressure.
   b. Leakage test shall be conducted concurrently with the pressure test.
   c. Acceptable when leakage does not exceed that determined by the following formula:
      (1) In English units:
      $L = 0.0000075\ SD(P)^{1/2}$, in which
      L = allowable leakage, in gallons per hour
      S = length of pipe tested, in feet
      D = nominal diameter of the pipe, in inches
      P = average actual leakage test pressure in psig
   d. These formulas are based on an allowable leakage of 11.65 gpd/mile/in of nominal diameter at a pressure of 150 psi.
   e. When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/hr/in of nominal valve size shall be allowed.
   f. Repeat test as necessary.
      (1) After location of leaks and repair or replacement of defective joints, pipe, fittings, valves or hydrants. All visible leaks are to be repaired regardless of the amount of leakage.
      (2) Until satisfactory performance of test.

g. Owner and/or Engineer will witness pressure and leakage test.

C. Deflection Testing:

1. Maximum installed deflections of flexible pipe shall be as follows:

Type of Pipe	Deflection - Percent of Mean Internal Diameter
PVC Pipe	5

2. Contractor shall deflection test flexible pipe after backfill has been in place 30 days.
   a. Provide rigid ball or mandrel deflection testing equipment and labor.
   b. Obtain approval of equipment and acceptance of method proposed for use. Test shall be performed without mechanical pulling devices.
   c. Remove and replace pipe exceeding deflection limits.

3.09 FIELD PAINTING: Specified in SECTION 099000.

END OF SECTION 333150

SECTION 333900 - UTILITY STRUCTURES

PART 1 - GENERAL

1.01 SUMMARY:

A. This Section includes the following structures and related appurtenances:
   1. Manholes.
   2. Air valve vaults.
   3. Concrete anchor and thrust blocks.

B. Related Work Specified Elsewhere:
   1. Concrete: DIVISION 3.

C. Applicable Standards:
   1. American Society for Testing and Materials (ASTM):
      a. A48 - Gray Iron Castings.
      b. C76 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
      c. C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
      d. C478 - Precast Reinforced Concrete Manhole Sections.
      e. C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
   2. Federal Specification (FS):
      a. SS-S-00210 - Sealing Compound, Preformed Plastic, for Expansion Joints and Pipe Joints.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Concrete: Reinforced, 4000 psi.

B. Castings:
   1. Manhole Steps:
      a. Manhole steps shall not be provided.
   2. Manhole Frames and Covers:
      a. As noted on Contract Drawings.
   3. Conform to Drawings in all essentials of design. Weight shall be within 10% of that listed for pattern.
   4. Machine-bearing surfaces to provide even seating.

PART 3 - EXECUTION

3.01 MANHOLES:

A. Unless otherwise noted on the plans, manholes shall be precast polymer concrete construction.

B. Manhole manufacturer shall have a minimum 5-years of experience manufacturing polymer concrete manholes in conformance with ASTM C 478.

C. Manufacturer shall be U.S. Composite Pipe, Inc. or approved equal.

D. Design:
   1. Shop drawings shall be provided sealed by a licensed Professional Engineer that confirm design for all applicable live (H-20) and dead loads.
   2. Concrete shall have a minimum unconfined compressive strength of 9,000 psi when measured in accordance with ASTM C 497.

3. Manhole wall thickness shall be designed to resist loading from hydrostatic pressure with a minimum safety factor of 2.0 for full depth condition. In no case shall the wall thickness be less than 7-inches for a 72-inch diameter manhole.
4. Manholes shall be provided with an extended (4-inch minimum) precast polymer concrete base.
5. Manhole shall conform to ASTM C478 with rubber O-ring or ASTM C443 two-fin serrated flat gasket to concrete joint or with FS SS-S-00210 preformed plastic to concrete joint.

E. Cast-in-place reinforced concrete manhole.
1. Conform to Drawings.
2. Provide Submittal for precast and cast-in-place reinforced concrete manholes prior to installation.
3. Caulk and repair any leaks or remove entire Work and rebuild to obtain watertight construction.

F. Manhole Frames and Cover:
1. Manhole frames and covers shall be as noted on Contract Drawings.
2. Set frame level to proper grade on full bed of mortar.

G. Connections:
1. Install piping using a flexible-rubber, entrance- hole gasket joint of pattern approved by the Engineer.

H. Invert Channels:
1. Polymer concrete flow channel inserts shall be provided.
2. Make changes in direction of flow with smooth curves of as large a radius as size of manhole permits.
3. Make changes in size and grade smoothly and uniformly.
4. Slope floor of manhole adjacent to channels as indicated.
5. Finish channel bottom smoothly without roughness, irregularity, or pockets.

3.02 AIR VALVE VAULT:

A. Design:
1. Precast as indicated.
2. Precast concrete footings.
3. Riser of ASTM C478 pipe.
4. Top slab shall be precast as indicated.

B. Installation:
1. Install at station indicated.
2. Set top of footing at center of pipe. Include fiberglass batt to prevent transmission of loads to pipe barrel.

C. Manhole Frame and Cover:
1. Manhole frames and covers shall be as noted on Contract Drawings.

D. Insulation Fill:
1. Insulate all air-valve vaults equipped with surface vent piping. Insulate inside of vault around piping and air valve to prevent freezing.
2. Use water-repellent granular form of vermiculite known as masonry fill insulation.
3. Fill to depth to cover top of air valve. Do not block air valve's vent-piping outlet.
4. Install by pouring; do not rod or tamp.

3.03 CONCRETE ANCHOR AND THRUST BLOCKS:

A. Install at tees, elbows, bends, and dead ends where indicated.

B. Place against undisturbed earth or rock.
C. Of design as indicated on Contract Drawings:
    1. Removable thrust blocks shall be constructed by using a sheet of 3/8-inch plywood to prevent concrete adherence to pipe, fittings, or accessories.
    2. Apply two coats of coal-tar coating to minimum 20-mil dry-film thickness on anchor bars, straps, and hardware.

END OF SECTION 333900