

Project Manual
ISSUED FOR BID

FOR
JOHNSTOWN RESERVOIR REPAIR
WELD COUNTY, COLORADO
DAM ID - 040132
CONSTRUCTION FILE NUMBER C-0625A

JULY, 2021

PREPARED FOR:



Johnstown
Colorado

450 S PARISH AVE.
JOHNSTOWN, CO 80534

PREPARED BY:



J&T Consulting, Inc.

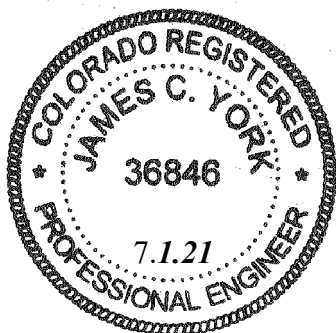
305 DENVER AVENUE – SUITE D
FORT LUPTON, CO 80621
PHONE: 303-857-6222
FAX: 303-857-6224

CERTIFICATION SHEET

JOHNSTOWN RESERVOIR REPAIR

WATER DIVISION 1, WATER DISTRICT 4
WELD COUNTY, COLORADO
DAM ID - 040132
SEO FILE NUMBER C-0625A

I hereby certify that these plans and specifications for the Johnstown Reservoir Repair were prepared under my direct supervision for the Owner thereof.



By: _____
James C. York, P.E. No 36846

Approved on this ____ day of _____, 20__.

By: _____
State Engineer

Bill McCormick, P.E.
Chief Dam Safety Branch
Colorado P.E. # 29127

SECTION 00 01 10

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>
00 01 10	Table of Contents
BIDDING REQUIREMENTS	
00 11 16	Invitation to Bid
00 21 13	Instructions to Bidders
00 41 43	Bid Form
00 43 13	Bid Bond
00 45 13	Proposed Subcontractors Form
00 45 19	Noncollusion Affidavit of Prime Bidder
CONTRACTING REQUIREMENTS	
00 51 00	Notice of Award
00 52 43	Agreement
00 55 00	Notice to Proceed
00 61 13	Performance and Payment Bond Forms
00 63 36	Field Order Form
00 63 49	Work Change Directive Form
00 63 63	Change Order Form
00 72 00	Standard General Conditions of the Construction Contract
00 73 00	Supplementary Conditions
DIVISION 01 - GENERAL REQUIREMENTS	
01 00 00	Special Conditions
01 11 00	Summary of Work
01 20 00	Measurement and Payment Procedures
01 30 00	Administrative Requirements
01 32 16	Construction Progress Schedules
01 33 00	Submittal Procedures
01 40 00	Quality Requirements
01 50 00	Temporary Facilities and Controls
01 60 00	Product Requirements
01 70 00	Execution and Closeout Requirements
DIVISION 03 - CONCRETE	
03 10 00	Concrete Forming and Accessories
03 20 00	Concrete Reinforcing

03 30 00 Cast-in-Place Concrete
03 35 00 Concrete Finishing
03 39 00 Concrete Curing

DIVISION 05 – METALS

05 52 00 Metal Railings

DIVISION 31 - EARTHWORK

31 05 13 Soils for Earthwork
31 05 16 Aggregates for Earthwork
31 10 00 Site Clearing
31 23 16 Excavation
31 23 17 Trenching
31 23 19 Dewatering and Drainage
31 23 20 Test Pits
31 23 23 Fill
31 25 13 Erosion Controls
31 37 00 Riprap
31 63 26 Drilled Concrete Piers (Caissons)

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 91 13 Soil Preparation
32 91 19 Landscape Grading
32 92 19 Seeding

DIVISION 33 – PIPE AND FITTINGS

33 11 13 Ductile Iron Pipe and Fittings

DIVISION 35 – WATERWAY AND MARINE CONSTRUCTION AND EQUIPMENT

35 20 16.26 Sluice Gates

GEOTECHNICAL EVALUATIONS

“Geotechnical Evaluation, Johnstown Reservoir Outlet Structure, Weld County, Colorado” by Cesare, Inc., dated February 19, 2021.

“Johnstown Reservoir Outlet Structure, Outlet Structure and Access Ramp Foundations, Addendum No. 1”, by Cesare, Inc., dated May 6, 2021.

END OF SECTION

00 01 10 - 2

SECTION 00 11 16

INVITATION TO BID

PDF copies of the bids should be submitted via email to J.C. York at jcyork@j-tconsulting.com by 4:00 P.M., local time, July 27, 2021, for the Johnstown Reservoir Repair project.

A Pre-Bid conference will be held via online meeting July 9, 2021 at 9:00 A.M. The conference is mandatory.

The work to be performed for the Johnstown Reservoir Repair Project generally consists of constructing a concrete outlet and spillway tower, a riprap lined emergency spillway, installing concrete manholes, removing and replacing an existing toe drain, grading around and within the reservoir, and various site improvements. The Town and the Engineer will be providing construction observations during construction. Construction material testing will be required and paid for by the Town.

All bids must be in accordance with the Contract Documents on file at the Town Hall, 450 South Parish Avenue, Johnstown, CO 80534.

Copies of the Contract Documents for use in preparing Bids may be obtained from: J&T Consulting, Inc., 305 Denver Avenue, Suite D, Fort Lupton, Colorado 80621. Please contact J.C. York, P.E. by phone at (303) 857-6222 or by e-mail at jcyork@j-tconsulting.com to receive a copy of the bid documents electronically at no charge.

Questions concerning the Contract Documents shall be directed in writing to J.C. York, P.E., at the above email address. Questions will be accepted until 5:00 P.M., July 23, 2021.

Bids will be received on a unit price basis. A Bid award is anticipated by August 6, 2021, and it is anticipated that execution of Contract Documents will be on or before August 20, 2021. Substantial Completion of the Work is required by January 31, 2022. Final Completion of the Work is required by March 2, 2022.

A Bid Bond and Performance and Payment Bonds will be required.

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 Owner to make an award to that Bidder. Owner also reserves the right to waive informalities.

SECTION 00 21 13

INSTRUCTIONS TO BIDDERS

ARTICLE 1 – DEFINED TERMS

- 1.01 Terms used in these Instructions to Bidders have the meanings indicated in the General Conditions and Supplementary Conditions. Additional terms used in these Instructions to Bidders have the meanings indicated below:
- A. *Issuing Office* – The office from which the Bidding Documents are to be issued and where the bidding procedures are to be administered. The Issuing Office is as defined in the Invitation to Bid.

ARTICLE 2 – COPIES OF BIDDING DOCUMENTS

- 2.01 Complete sets of the Bidding Documents in the number and for the amount stated in the advertisement or invitation to bid may be obtained from the Issuing Office.
- 2.02 Complete sets of Bidding Documents shall be used in preparing Bids; neither Owner nor Engineer assumes any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Bidding Documents.
- 2.03 Owner and Engineer, in making copies of Bidding Documents available on the above terms, do so only for the purpose of obtaining Bids for the Work and do not authorize or confer a license for any other use.

ARTICLE 3 – QUALIFICATIONS OF BIDDERS

- 3.01 Only Bidders that attended mandatory pre-bid conference shall be able to submit a bid.
- A. Each bid must contain evidence of Bidder's qualifications to do business in the state of Colorado, where the Project is located or covenant to obtain such qualifications prior to award of the contract.
- 3.02 Bidder is advised to carefully review those portions of the Bid Form requiring Bidder's representations and certifications.

ARTICLE 4 – EXAMINATION OF BIDDING DOCUMENTS, OTHER RELATED DATA, AND SITE

- 4.01 Subsurface and Physical Conditions
- A. Geotechnical evaluation by Cesare, Inc. dated February 19, 2021.
- 4.02 Underground Facilities
- A. Information and data shown or indicated in the Bidding Documents with respect to existing Underground Facilities at or contiguous to the Site is based upon information and data

furnished to Owner and Engineer by owners of such Underground Facilities, including Owner, or others.

4.03 Hazardous Environmental Condition

- A. No known Hazardous Environmental Condition(s) have been identified at this Site.

4.04 Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to subsurface conditions, other physical conditions, and Underground Facilities, and possible changes in the Bidding Documents due to differing or unanticipated subsurface or physical conditions appear in Paragraphs 4.02, 4.03, and 4.04 of the General Conditions. Provisions concerning responsibilities for the adequacy of data furnished to prospective Bidders with respect to a Hazardous Environmental Condition at the Site, if any, and possible changes in the Contract Documents due to any Hazardous Environmental Condition uncovered or revealed at the Site which was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work, appear in Paragraph 4.06 of the General Conditions.

4.05 On request, Owner will provide Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies as Bidder deems necessary for submission of a Bid. Bidder shall fill all holes and clean up and restore the Site to its former condition upon completion of such explorations, investigations, tests, and studies. Bidder shall comply with all applicable Laws and Regulations relative to excavation and utility locates.

4.06 It is the responsibility of each Bidder before submitting a Bid to:

- A. examine and carefully study the Bidding Documents, and the other related data identified in the Bidding Documents;
- B. visit the Site and become familiar with and satisfy Bidder as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work;
- C. become familiar with and satisfy Bidder as to all federal, state, and local Laws and Regulations that may affect cost, progress, and performance of the Work;
- D. carefully study all: (1) reports of geotechnical investigations and all drawings of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities) that have been identified in Paragraph 4.02 of the Supplementary Conditions as containing reliable "technical data";
- E. consider the information known to Bidder; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and the Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder, including applying any specific means, methods, techniques, sequences, and procedures of construction expressly required by the Bidding Documents; and (3) Bidder's safety precautions and programs;

- F. agree at the time of submitting its Bid that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of its Bid for performance of the Work at the price(s) bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents;
 - G. become aware of the general nature of the work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents;
 - H. promptly give Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder discovers in the Bidding Documents and confirm that the written resolution thereof by Engineer is acceptable to Bidder; and
 - I. determine that the Bidding Documents are sufficient to indicate and convey understanding of all terms and conditions for the performance of the Work.
- 4.07 The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article 4, that without exception the Bid is premised upon performing and furnishing the Work required by the Bidding Documents and applying any specific means, methods, techniques, sequences, and procedures of construction that may be shown or indicated or expressly required by the Bidding Documents, that Bidder has given Engineer written notice of all conflicts, errors, ambiguities, and discrepancies that Bidder has discovered in the Bidding Documents and the written resolutions thereof by Engineer are acceptable to Bidder, and that the Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

ARTICLE 5 – PRE-BID CONFERENCE

- 5.01 **A Pre-Bid Conference will be held via online meeting on July 9, 2021 at 9:00 A.M. local time.** Representatives of Owner and Engineer will be present to discuss the Project.
- 5.02 Bidders **are required to attend** and participate in the conference.
- 5.03 A site walk of the project will follow the Pre-Bid Conference for all interested Bidders.
- 5.04 Engineer will transmit to all prospective Bidders of record such Addenda as Engineer considers necessary in response to questions arising at the conference. Oral statements may not be relied upon and will not be binding or legally effective.

ARTICLE 6 – SITE AND OTHER AREAS

- 6.01 The reservoir and associated improvements are identified in the Bidding 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 Contractor.

ARTICLE 7 – INTERPRETATIONS AND ADDENDA

- 7.01 All questions about the meaning or intent of the Bidding Documents are to be submitted to Engineer in writing. 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 Engineer as having received the Bidding Documents. No questions received less than five days prior to the date for opening of Bids will be answered. Only questions answered by Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.
- 7.02 Addenda may be issued to clarify, correct, or change the Bidding Documents as deemed necessary by Owner or Engineer.

ARTICLE 8 – BID SECURITY

- 8.01 A Bid must be accompanied by Bid security made payable to Owner in an amount of **five percent** of Bidder’s maximum Bid price and in the form of a certified check, bank money order, or a Bid bond (on the form attached) issued by a surety meeting the requirements of Paragraphs 5.01 and 5.02 of the General Conditions.
- 8.02 The Bid security of the Successful Bidder will be retained until such Bidder has executed the Contract Documents, furnished the required contract security and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Bidder fails to execute and deliver the Contract Documents and furnish the required contract security within seven days after the Notice of Award, Owner may consider Bidder to be in default, annul the Notice of Award, and the Bid security of that Bidder will be forfeited. Such forfeiture shall not be Owner’s exclusive remedy if Bidder defaults. The Bid security of other Bidders whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of seven days after the Effective Date of the Agreement or 61 days after the Bid opening, whereupon Bid security furnished by such Bidders will be returned.
- 8.03 Bid security of other Bidders whom Owner believes do not have a reasonable chance of receiving the award will be returned within seven days after the Bid opening.

ARTICLE 9 – CONTRACT TIMES

- 9.01 The dates by which the Work is to be substantially completed and ready for final payment are set forth in the Agreement.

ARTICLE 10 – LIQUIDATED DAMAGES

- 10.01 Provisions for liquidated damages, if any, are set forth in the Agreement.

ARTICLE 11 – SUBSTITUTE AND “OR-EQUAL” ITEMS

- 11.01 The Contract, if awarded, will be on the basis of materials and equipment specified or described in the Bidding Documents without consideration of possible substitute or “or-equal” items. Whenever it is specified or described in the Bidding Documents that a substitute or “or-equal” item of material or equipment 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.

- 11.02 Contractor shall not be required to employ any Subcontractor, Supplier, individual, or entity against whom Contractor has reasonable objection.

ARTICLE 12 – PREPARATION OF BID

- 12.01 The Bid Form is included with the Project Manual.
- 12.02 All blanks on the Bid Form shall be completed in ink and the Bid Form signed in ink. Erasures or alterations shall be initialed in ink by the person signing the Bid Form.
- 12.03 A Bid by a corporation 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. 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.
- 12.04 A Bid by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature), accompanied by evidence of authority to sign. The official address of the partnership shall be shown.
- 12.05 A Bid by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm shall be shown.
- 12.06 A Bid by an individual shall show the Bidder's name and official address.
- 12.07 A Bid by a joint venture shall be executed by each joint venturer in the manner indicated on the Bid Form. The official address of the joint venture shall be shown.
- 12.08 All names shall be printed in ink below the signatures.
- 12.09 The Bid shall contain an acknowledgment of receipt of all Addenda, the numbers of which shall be filled in on the Bid Form.
- 12.10 Postal and e-mail addresses and telephone number for communications regarding the Bid shall be shown.
- 12.11 The Bid shall contain evidence of Bidder's authority and qualification to do business in the state where the Project is located, or Bidder shall covenant in writing to obtain such authority and qualification prior to award of the Contract and attach such covenant to the Bid. Bidder's state contractor license number, if any, shall also be shown on the Bid Form.

ARTICLE 13 – BASIS OF BID; COMPARISON OF BIDS

- 13.01 Sum of the unit prices
 - A. Bidders shall submit a Bid filling in all unit price items as the basis as set forth in the Bid Form.

ARTICLE 14 – SUBMITTAL OF BID

- 14.01 With each copy of the Project Manual, a copy of the Bid Form is enclosed. The Bid Form shall be completed, with the Bid security, and all other forms including the proposed subcontractors form and non-collusion affidavit, shall be enclosed in an envelope as described below.
- 14.02 A Bid shall be submitted no later than the date and time prescribed and at the place indicated in the Invitation to Bid and shall be enclosed in a plainly marked package with the Project title (and, if applicable, the designated portion of the Project for which the Bid is submitted), the name and address of Bidder, and shall be accompanied by the Bid security. If a Bid is sent by mail or other delivery system, the sealed envelope containing the Bid shall be enclosed in a separate package plainly marked on the outside with the notation “BID ENCLOSED.” A mailed Bid shall be addressed to place as stipulated in the Invitation to Bid (P.O. Box for US Mail and street address for private mail carriers).

ARTICLE 15 – MODIFICATION AND WITHDRAWAL OF BID

- 15.01 A Bid may be modified or withdrawn by an appropriate document duly executed in the same manner that a Bid must be executed and delivered to the place where Bids are to be submitted prior to the date and time for the opening of Bids.

ARTICLE 16 – OPENING OF BIDS

- 16.01 Bids will be opened at the time and place indicated in the Invitation to Bid. An abstract of the amounts of the base Bids and major alternates, if any, will be made available to Bidders after the opening of Bids.

ARTICLE 17 – BIDS TO REMAIN SUBJECT TO ACCEPTANCE

- 17.01 All Bids will remain subject to acceptance for the period of time stated in the Bid Form, but Owner may, in its sole discretion, release any Bid and return the Bid security prior to the end of this period.

ARTICLE 18 – EVALUATION OF BIDS AND AWARD OF CONTRACT

- 18.01 Owner reserves the right to reject any or all Bids, including without limitation, nonconforming, nonresponsive, unbalanced, or conditional Bids. Owner further reserves the right to reject the Bid of any Bidder whom it finds, after reasonable inquiry and evaluation, to not be responsible. Owner may also 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. Owner also reserves the right to waive all informalities not involving price, time, or changes in the Work and to negotiate contract terms with the Successful Bidder.
- 18.02 More than one Bid for the same Work from an individual or entity under the same or different names will not be considered. Reasonable grounds for believing that any Bidder has an interest in more than one Bid for the Work may be cause for disqualification of that Bidder and the rejection of all Bids in which that Bidder has an interest.

- 18.03 In evaluating Bids, Owner will consider 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.
- 18.04 In evaluating Bidders, Owner will consider the qualifications of Bidders and may consider the qualifications and experience of Subcontractors, Suppliers, and other individuals or entities proposed for those portions of the Work for which the identity of Subcontractors, Suppliers, and other individuals or entities must be submitted as provided in the Supplementary Conditions.
- 18.05 Owner may conduct such investigations as Owner deems necessary to establish the responsibility, qualifications, and financial ability of Bidders, proposed Subcontractors, Suppliers, individuals, or entities proposed for those portions of the Work in accordance with the Contract Documents.
- 18.06 If the Contract is to be awarded, Owner will award the Contract to the Bidder whose Bid is in the best interests of the Project.

ARTICLE 19 – CONTRACT SECURITY AND INSURANCE

- 19.01 Article 5 of the General Conditions, as may be modified by the Supplementary Conditions, sets forth Owner’s requirements as to performance and payment bonds and insurance. When the Successful Bidder delivers the executed Agreement to Owner, it shall be accompanied by such bonds.

ARTICLE 20 – SIGNING OF AGREEMENT

- 20.01 When Owner issues a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Agreement along with the other Contract Documents which are identified in the Agreement as attached thereto. Within 7 days thereafter, Successful Bidder shall sign and deliver the required number of counterparts of the Agreement and attached documents to Owner. Within ten days thereafter, Owner shall deliver one fully signed counterpart to Successful Bidder with a complete set of the Drawings with appropriate identification.

ARTICLE 21 – SALES AND USE TAXES

- 21.01 Owner is exempt from Colorado state sales and use taxes on materials and equipment to be incorporated in the Work.

ARTICLE 22 – RETAINAGE

- 22.01 Requirements for retainage are addressed in the Agreement.

END OF SECTION

00 21 13 - 7

SECTION 00 41 43

BID FORM

00 41 43 - 1

END OF SECTION

00 41 43 - 2



BID FORM

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Item Number	Description	Quantity	Unit	Unit Price	Total Price
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PHASE 1 ITEMS

General Items

1	Project Mobilization/Demobilization	1	LS		
2	Erosion Control	1	LS		
3	Dewatering Required to Complete the Project	1	LS		
4	Construction Staking	1	LS		
5	Clearing, Grubbing, Striping/Stockpiling/Replacing Topsoil	1	LS		
6	Site Restoration of all Disturbed Areas (final grading, seeding, mulching)	1	LS		
Phase 1 General Items Subtotal					

Reservoir Infrastructure

7	Embankment Excavation	4,115	CYD		
8	Embankment Backfill	3,935	CYD		
9	Remove and Dispose of Existing 16 in Clay Outlet Pipe and Concrete Vault	1	LS		
10	Concrete Outlet Tower Structure, Including Sluice Gate, Steel Grate, Trash Screens	1	LS		
11	40ft Precast Concrete Bridge, Including Footer, Connections and Appurtenances	1	LS		
12	1-1/2 in Diameter Galvanized Steel Handrail, Including all Appurtenances	99	LF		
13	Concrete Mud Mat	6	CYD		
14	24 in Restrained Joint, Concrete Encased, Ductile Iron Class 250 Outlet Pipe	91	LF		
15	4ft Diameter Concrete Flat-Top Manhole, Including Connection to Perforated Toe Drain Pipe.	1	LS		
16	4 ft Diameter Concrete Flat-Top Manhole, Including Connection to Existing RCP Pipe	1	LS		
17	Fill Around Manhole	33	CYD		
18	Remove and Replace Existing Toe Drain with 8" Contech A-2000 Perforated Toe Drain Pipe, Including No 8 or No 89 Aggregate Filter Gravel, and ASTM C-33 Concrete Sand Bedding	200	LF		
19	Utility Conflicts/Contingency - Additional requirements for modifying utilities not identified in drawings and/or for utility repair. Contractor to provide schedule of values and breakdown of required materials and labor for installation for review and approval before this allowance will be used.	1	X	\$45,000	\$45,000
Phase 1 Reservoir Infrastructure Subtotal					\$45,000

Phase 1 Total	
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BID FORM

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Item Number	Description	Quantity	Unit	Unit Price	Total Price
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PHASE 2 ITEMS (Additive Alternate)

General Items

1	Project Mobilization/Demobilization	1	LS		
2	Erosion Control	1	LS		
3	Construction Staking	1	LS		
4	Clearing, Grubbing, Striping/Stockpiling/Replacing Topsoil	1	LS		
5	Site Restoration of all Disturbed Areas (final grading, seeding, mulching)	1	LS		
Phase 2 General Items Subtotal					

Reservoir Infrastructure

6	Crest and Slope Fill, Bring Crest to Minimum 4986 Elevation All Around Reservoir	805	CYD		
7	6" Thick CDOT Class 6 Roadbase on Reservoir Crest	1,510	CYD		
8	18" Thick D50 = 9" Type L Soil Riprap on Emergency Spillway	615	CYD		
9	Utility Conflicts/Contingency - Additional requirements for modifying utilities not identified in drawings and/or for utility repair. Contractor to provide schedule of values and breakdown of required materials and labor for installation for review and approval before this allowance will be used.	1	X	\$10,000	\$10,000
Phase 2 Reservoir Infrastructure Subtotal					

Phase 2 Total					
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SECTION 00 43 13

BID BOND

Any singular reference to Bidder, Surety, Owner or other party shall be considered plural where applicable.

BIDDER *(Name and Address)*:

SURETY *(Name and Address of Principal Place of Business)*:

OWNER *(Name and Address)*:

BID

Bid Due Date:

Description *(Project Name and Include Location)*:

BOND

Bond Number:

Date *(Not earlier than Bid due date)*:

Penal sum _____ \$ _____
(Words) (Figures)

Surety and Bidder, intending to be legally bound hereby, subject to the terms set forth below, do each cause this Bid Bond to be duly executed by an authorized officer, agent, or representative.

BIDDER

SURETY

Bidder's Name and Corporate Seal (Seal) _____ (Seal)
Surety's Name and Corporate Seal

By: _____
Signature

By: _____
Signature (Attach Power of Attorney)

Print Name

Print Name

Title

Title

Attest: _____
Signature

Attest: _____
Signature

Title

Title

1. Bidder and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors, and assigns to pay to Owner upon default of Bidder the penal sum set forth on the face of this Bond. Payment of the penal sum is the extent of Bidder's and Surety's liability. Recovery of such penal sum under the terms of this Bond shall be Owner's sole and exclusive remedy upon default of Bidder.
2. Default of Bidder shall occur upon the failure of Bidder to deliver within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents.
3. This obligation shall be null and void if:
 - 3.1 Owner accepts Bidder's Bid and Bidder delivers within the time required by the Bidding Documents (or any extension thereof agreed to in writing by Owner) the executed Agreement required by the Bidding Documents and any performance and payment bonds required by the Bidding Documents, or
 - 3.2 All Bids are rejected by Owner, or
 - 3.3 Owner fails to issue a Notice of Award to Bidder within the time specified in the Bidding Documents (or any extension thereof agreed to in writing by Bidder and, if applicable, consented to by Surety when required by Paragraph 5 hereof).
4. Payment under this Bond will be due and payable upon default of Bidder and within 30 calendar days after receipt by Bidder and Surety of written notice of default from Owner, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.
5. Surety waives notice of any and all defenses based on or arising out of any time extension to issue Notice of Award agreed to in writing by Owner and Bidder, provided that the total time for issuing Notice of Award including extensions shall not in the aggregate exceed 120 days from Bid due date without Surety's written consent.
6. No suit or action shall be commenced under this Bond prior to 30 calendar days after the notice of default required in Paragraph 4 above is received by Bidder and Surety and in no case later than one year after Bid due date.
7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.
8. Notices required hereunder shall be in writing and sent to Bidder and Surety at their respective addresses shown on the face of this Bond. Such notices may be sent by personal delivery, commercial courier, or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.
9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent, or representative who executed this Bond on behalf of Surety to execute, seal, and deliver such Bond and bind the Surety thereby.
10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted from this Bond shall be deemed to be included herein as if set forth at length. If any provision of this Bond conflicts with any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.
11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

SECTION 00 45 13

PROPOSED SUBCONTRACTORS FORM

LIST OF SUBCONTRACTORS

Herewith is the list of subcontractors referenced in the bid submitted by:

(Bidder)

To: (Owner) Town of Johnstown

Dated and which is an integral part of the Bid Form.

The following work will be performed (or provided) by subcontractors and coordinated by us:

WORK SUBJECT	NAME

END OF SECTION

SECTION 00 45 19

NONCOLLUSION AFFIDAVIT OF PRIME BIDDER

STATE OF _____
COUNTY OF _____

_____, being first duly sworn, deposes and says that:

- (1) He is the _____ of _____, the Bidder that has submitted the attached Bid;
- (2) He is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;
- (3) Such Bid is genuine and is not a collusive or sham bid;
- (4) Neither the said Bidder nor any of its officers, partner, owners agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived, or agreed, directly or indirectly, with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication or conference with any other Bidder, or to fix any overhead, profit or cost element of the bid price or the bid price of any other Bidder, or to secure through the collusion, conspiracy, connivance or unlawful agreement any advantage against the Town of Johnstown or persons interested in the proposed Contract; and
- (5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant.

Signed:

Subscribed and sworn to before me this ____ day of _____, 20__, by
_____, as
(Affiant)
_____, of _____, a
(title) (Bidder), a
_____, organized pursuant to
(corporation or partnership)
the laws of the State of _____.

Notary Public

My Commission Expires _____

SECTION 00 51 00

NOTICE OF AWARD

TO: NAME
ADDRESS
ADDRESS CONTINUED

DATE: _____

Town of Johnstown
Johnstown Reservoir Repair Project

The Town has considered the Bid submitted by you for the above described Work in response to its Request for Bids dated _____, and Instructions to Bidders.

You are hereby notified that your Bid has been accepted for Work in the amount or amounts shown on your Bid Proposal and Bid Schedule.

You are required by the Instructions to Bidders to execute the Contract and furnish the Performance Bond, the Payment Bond, certificates of insurance, and other documentation within 10 calendar days from the date of this notice.

If you fail to execute said Contract and to furnish said Bonds within 7 calendar days from the date of this Notice, the Town will be entitled to consider all your rights arising out of the Town's acceptance of your Bid as abandoned and as a forfeiture of your Bid Security as liquidated damages, and not as a penalty, for the delay and extra work caused thereby and also to compensate the Town for the difference between your bid and the next lowest bid. The Town 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 Town.

Insurance certificates required for this Project shall be sent to Town of Johnstown, Attention: NAME, 450 South Parish Avenue, Johnstown, Colorado 80534.

TOWN OF JOHNSTOWN

By: _____

Title: _____

Attest: _____

ACKNOWLEDGEMENT OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged by Contractor.

By: _____ Date: _____

Title

SECTION 00 52 43

AGREEMENT

THIS AGREEMENT, entered into as of the ____ day of DATE, by and between the Town of Johnstown, hereinafter called "Owner" and _____, hereinafter called "Contractor." This Construction Agreement is referred to herein as either the "Agreement" or the "Contract".

In consideration of the mutual covenants and obligations hereinafter set forth, it is agreed by and between the parties hereto as follows:

Article 1. Contract Documents. The contract documents consist of this Agreement, exhibits to this Agreement, the conditions of the Contract (General, Supplementary, and other conditions), the drawings consisting of ____ sheets, specifications, Notice of Award, Notice to Proceed, Contractor's Bid, and all addenda issued prior to, and all modifications issued after execution of this Agreement. These form the Contract, and all are as fully a part of the Contract as if attached to this Agreement.

Article 2. Contractor's Representations.

In order to induce Owner to enter into this Contract, Contractor makes the following representations:

- a. Contractor has familiarized itself with the nature and extent of the Contract Documents, work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the work.
- b. Contractor has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumes responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports, studies or similar information or data in respect to said Underground Facilities are or will be required by Contractor in order to perform and furnish the work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of Section 4.03 of the General Conditions.
- c. Contractor has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- d. Contractor has given Owner written notice of all conflicts, errors or discrepancies that he has discovered in the Contract Documents and the written resolution thereof by Owner is acceptable to Contractor.

Article 3. Assignment. It is understood that the Owner enters into this Agreement based on the special abilities and representations of the Contractor and that this Agreement shall be considered as an agreement for personal services. Accordingly, the Contractor shall neither assign any responsibilities, nor delegate any duties arising under this Agreement without the prior written consent of the Owner.

Article 4. Scope of Work. Contractor shall provide all necessary labor, supervision, equipment, tools, and materials. Contractor acknowledges it has reviewed and agrees to comply with the performance of this Agreement. The work is generally described as follows:

Traffic control, erosion control, dewatering, construction staking, vacuum truck / probe potholing, clearing/grubbing/stripping/stockpiling, excavation, fill, grading, hauling, riprap and bedding, concrete structures and foundations, sluice gates and operators, hand rails, pipelines, ductile iron and pvc pipelines and fittings, valves, vaults, manholes, duct banks, and equipment, fencing, and restoration of disturbed areas.

Article 5. Time of Completion. Contractor shall begin work within seven (7) days after notice to proceed and agrees to substantially complete all work within 90 calendar days following the notice to proceed. Final completion is required 30 days after substantial completion. Any extensions of the time limit set forth above must be agreed upon in writing by the parties hereto. Weather days that result in no work being performed by the Contractor will be added to the 90 calendar days. Weather days shall be agreed to by Owner or Engineer and shall be acknowledged in writing.

Liquidated Damages. The Town and the Contractor recognize that time is of the essence in this Contract and that the Town will suffer financial loss if the Work is not substantially completed within the time specified in paragraph above, plus any extensions thereof allowed by the Town by written Change Order. They also recognize the delays, expense, and difficulties involved in proving, in a legal proceeding, the actual loss suffered by the Town if the Work is not substantially complete on time. Accordingly, rather than requiring any such proof, the Town and the Contractor agree that as liquidated damages for delay (but not as a penalty) the Contractor shall pay the Town One Thousand Dollars (\$1,000.00) for each day that expires after the time specified in the Time of Completion paragraph until the Work is complete. It is agreed that this is a reasonable estimate of the damages likely to be suffered by the Town for late completion of the Work. If the Contractor shall fail to pay such liquidated damages promptly upon demand therefor, the Surety on the Performance Bond shall pay such damages. Also, the Town may withhold all, or any part of, such liquidated damages from any payment due the Contractor.

Delay Related Damages. The parties recognize and agree that in the event the Contractor does not timely achieve substantial completion on the Project the "Owner" will suffer actual and consequential damages. These damages may include, but are not limited to, interest on construction loans, additional engineering and construction observation fees, and fines from the State of Colorado. Contractor agrees that it shall be liable for Owner's actual and consequential damages as a result of late completion and that the Owner shall have the right to withhold payment to Contractor to the extent of Owner's potential liability for damages as a result of Contractor's late completion. This provision shall supersede and govern over any other conflicting term or provision in the contract documents.

Article 6. Contract Sum. The Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents, the unit price basis at the rates for the respective items on the Bid Schedule, attached as "Exhibit A". The total amount of the individual work items shall be: \$ [REDACTED].

Article 7. Payment Procedures. Contractor shall submit Applications for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Owner as provide in Article 14 of the General Conditions.

- a. Progress Payments. All progress payments will be on the basis of the progress of the Work as established in the Section 2.07 of the General Conditions and in the case of Unit Price Work, based on the number of units completed.
- b. Retainage. Owner shall retain from progress payments, until payment is due under the terms and conditions governing final payments, amounts as follows:
 - (1) Retention of five percent (5%) of payments authorized until the Work is complete.
 - (2) Upon completion and acceptance of the Work, all retained amounts will be released to Contractor under the terms and conditions governing final payment. Consent of the Surety shall be obtained before retainage is paid by Owner. Consent of the Surety, signed by an agent, must be accompanied by a certified copy of such agent's authority to act for the Surety.
 - (3) Retainage shall apply to materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing upon which Contractor requests progress payment.
 - (4) Retainage withheld by the Owner shall not be subject to substitution by the Contractor with securities or any arrangements involving an escrow or custodianship therefore.

Article 8. Hazardous Materials. The parties shall deal with hazardous materials and environmental conditions at the work site in accordance with Section 4.06 of the General Conditions.

Article 9. Performance Guarantee.

- a. The Contractor shall fully and faithfully comply with all terms of this Contract for the Work described herein and hereby guarantees the workmanship and materials for a period of two years, commencing on the date of the Owner and Town's final acceptance of the Work. Contractor agrees to repair or replace, any workmanship or materials that become defective, within said two year period, even though notice thereof may be given by the Owner after said two year period. Repairs or replacement shall be at the Contractor's sole cost and expense. The necessity of repairs or replacement is at the sole determination of the Owner.
- b. The Contractor shall fully and faithfully discharge the Contractor's obligation with respect to the Work during the installation and construction period and with respect to those that may arise as a result of the Contractor's two year guaranty.
- c. The performance and completion of the warranty work are to be further guaranteed by Performance, Payment and Guarantee Bonds in an amount at least equal to the Contract Price, in the form and substance attached herewith.

Article 10. Owner's Representative. The Resident Project Representative (RPR) will be Owner's employee or agent at the Site, will act as directed by and under the supervision of the Owner,

and will confer with Engineer regarding RPR's actions in accordance with the Supplementary Conditions, Article 9.

Article 11. Notice. Any notice to be sent pursuant to this Agreement shall be deemed delivered if mailed to the other party at the following addresses. Any such notice shall be sent certified or registered mail, return receipt requested, postage prepaid.

Contractor	:	COMPANY NAME ADDRESS ADDRESS CONTINUED
Engineer:		J.C. York, P.E. J&T Consulting, Inc. 305 Denver Avenue, Suite D Fort Lupton, CO 80621
Owner:		NAME, TITLE Town of Johnstown 450 South Parish Avenue Johnstown, CO 80534

Article 12. Colorado Labor Preference. In accordance with C.R.S. § 8-17-101, et. seq., Colorado labor shall be employed to perform the work as provided by law.

Article 13. Bid Preference - Public Projects. In accordance with C.R.S. § 8-19-101, et. seq., Colorado resident bidders shall be allowed a preference against a nonresident bidder from a state or foreign country equal to the preference given are required by the state or foreign country in which the nonresident bidder is a resident to perform the work as provided by law.

Article 14. Discrimination and Affirmative Action. The Contractor agrees to comply with the letter and spirit of all applicable state and federal laws respecting discrimination and unfair employment practices

Article 15. Bribery and Corrupt Influences; Abuse of Public Office. The signatories hereto aver that they are familiar with C.R.S. § 18-8-301, et. seq. (Bribery and Corrupt Influences) and C.R.S. § 18-8-401. et. seq.,(Abuse of Public Office), and that no violation of such provisions is present.

Article 16. Illegal Aliens.

- a. The Contractor shall not knowingly employ or contract with an illegal alien to perform work under this Contract. The Contractor certifies that:
 - (1) Contractor does not knowingly employ or contract with any illegal aliens;
 - (2) Contractor has confirmed or attempted to confirm the employment eligibility of all employees who are newly hired for employment in the United State; and
 - (3) Contractor shall not enter into a contract with a subcontractor that fails to certify

to the Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this Contract.

- b. The Contractor shall comply with all reasonable requests made in the course of an investigation by the Colorado Department of Labor and Employment.
- c. If the Contractor fails to comply with any requirement of this provision, the Owner may terminate this Contract for cause and the Contractor shall be liable for actual and consequential damages to the State.
- d. A Contractor that operates as a sole proprietor hereby swears or affirms under penalty of perjury that the Contractor:
 - (1) Is a citizen of the United States or otherwise lawfully present in the United States pursuant to federal law; and shall produce proper identification prior to the effective date of this Contract.

Article 17. Binding on Successors. Except as herein otherwise provided, this Contract shall inure to the benefit of and be binding upon the parties, or any subcontractors hereto, and their respective successors and assigns in respect of all covenants, agreements and obligations contained in the Contract Documents.

Article 18. Attorney Fees. DELETED.

Article 19. Survival of Certain Contract Terms. Notwithstanding anything herein to the contrary, the parties understand and agree that all terms and conditions of this Contract and the exhibits and attachments hereto which may require continued performance or compliance beyond the termination date of the Contract shall survive such termination date and shall be enforceable by the Owner as provided herein in the event of such failure to perform or comply by the Contractor or its subcontractors.

Article 20. Complete Agreement. This Agreement constitutes the sole agreement between the parties concerning the subject matter hereunder and all prior negotiations, representations, understandings or agreements concerning the subject matter hereunder are hereby canceled. No modification, change or alteration of the Agreement shall be of any legal force or effect unless in writing, signed by all the parties hereto.

Article 21. Compliance with Applicable Laws. At all times during the performance of this Contract, the Contractor shall strictly adhere to all applicable Federal and State laws that have been or may hereafter be established.

Article 22. Venue, Governing Law. The venue in any and all legal actions regarding or arising out of the Agreement covered herein shall be solely in the district court in and for the COUNTY OF WELD, State of Colorado. This Agreement shall be governed by the laws of the State of Colorado.

Article 23. Partial Invalidity. If any provision of this Agreement are in violation of any statute or rule of law of the State of Colorado, then such provision shall be deemed null and void to the extent that they may be violative of law, but without invalidating the remaining provisions hereof.

Article 24. Original Counterparts. This Agreement may be executed in counterparts, each of which will be an original, but all of which together shall constitute one and the same instrument. This Contract is to be executed in quadruplicate.

Article 25. OSHA Requirements. Contractor agree that it alone bears the responsibility for providing a safe and healthy work environment and shall provide its employees with adequate orientation and training to safely perform the scope of work set forth in this contract. Contractor shall at all times comply with the safety and health regulations of the Occupational Safety and Health Act of 1970 (29CFR 1926) including all amendments and modifications thereto. In the event there is a conflict between the safety and health provisions of federal, state and local regulations, the more stringent provision shall prevail. Contractor acknowledges and agrees that with respect to the scope of work under this contract, it shall comply with all obligations and assume all responsibilities imposed upon the “controlling contractor” as such term is defined and construed under all OSHA rules and regulations. The Contractor shall adhere to all federal, state and local safety and health regulations, laws and ordinances.

Article 26. No Waiver of Governmental Immunity. The Owner, Town of Johnstown, its elected officials, officers and employees are relying upon, and do not waive or intend to waive by any provision in this Agreement, the monetary limitations or any other rights, immunities and protections provided by the Colorado Governmental Immunity Act, C.R.S. Sec. 24-10-101 et seq. as amended or otherwise available to the Town. Nothing herein shall operate as a waiver of any right the Town of Johnstown has of governmental immunity under Colorado law which is specifically herein reserved.

Article 27. Independent Contractor. Contractor is a separate, legal entity from the Town of Johnstown and the parties make this Agreement accordingly with the understanding that Contractor at all times is acting as an independent contractor and not an employee or agent of the Town. All persons retained by Contractor to perform services pursuant to this Agreement shall be employees or independent contractors of Contractor and are not employees, contractors or agents of the Town. Contractor does not have the authority to bind the Town of Johnstown by contract or otherwise.

Article 28. Indemnification by Contractor. Contractor shall defend, indemnify and hold the Town of Johnstown harmless from any damages, including but not limited to any loss, liability, expenses, suit or claim, or claim for injury to persons, or damage to property arising out of the activities of the Contractor or its subcontractors pursuant to this Agreement. Expenses shall include all out of pocket expenses, attorney fees, expert costs and related litigation fees.

Article 29. Approval required. This Agreement is subject to the final approval of the Johnstown Town Council and signature by the Mayor of Johnstown.

Article 30. Miscellaneous.

- a. Terms used in this Contract which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

IN WITNESS WHEREOF, the parties hereto have executed this Contract the day and year first above

written.

TOWN OF JOHNSTOWN

CONTRACTOR

Mayor

Title: _____

ATTEST: _____

ATTEST: _____

Town Clerk

Corporate Secretary

STATE OF COLORADO)

)**ss.**

COUNTY OF)

The foregoing instrument was acknowledged before me this ____ day of _____, 2021
by _____ as Mayor and _____ as Town Clerk of the Town of Johnstown.

My commission expires:

Witness my hand and official seal.

Notary Public

SECTION 00 55 00

NOTICE TO PROCEED

TO: .
(Contractor)

Date: _____, 2021

Project:
Johnstown Reservoir Repair Project
Town of Johnstown

(Address)

You are hereby notified to commence work in accordance with the Contract dated ____, 2021, on or before ____, 2021, and you are to substantially complete the work within 90 consecutive calendar days thereafter. The date of final completion of all work is 30 calendar days after substantial completion and therefore March 2, 2022. The Bid Security submitted with your proposal is herewith returned to you.

TOWN OF JOHNSTOWN

By: _____

Title: _____

Address: 450 South Parish Avenue
Johnstown, CO 80534
Telephone: (970) 587-4664

ACCEPTANCE OF NOTICE

Receipt of the above Notice to Proceed is hereby acknowledged by

_____, (Contractor)

this the _____ day of _____, 2021.

By: _____

Title: _____

Telephone: _____

SECTION 00 61 13

PERFORMANCE AND PAYMENT BOND FORMS

PERFORMANCE BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____
_____ ("Principal") and _____
_____ ("Surety"), hereby jointly and severally bind ourselves, our respective
heirs, executors, administrators, successors and assigns, to pay the Town of Johnstown, State of Colorado
("Owner") the sum of _____
_____ Dollars (\$ _____), in United States currency.

WHEREAS, Principal has, by means of a written agreement dated _____,
entered into a contract with Owner for the construction of Johnstown Reservoir Repair Project, Town of
Johnstown, which contract is by reference made a part hereof the same as though fully set forth herein
(the "Contract");

NOW, THEREFORE, the conditions of this obligation are as follows:

FIRST. Principal shall: (1) faithfully perform each and every term and condition of said Contract
on Principal's part; (2) fully indemnify and save harmless the Owner from all costs and damages which
Owner may suffer by reason of Principal's failure to do so; and (3) fully reimburse and repay Owner all
outlay and expenses which Owner may incur in making good any default.

SECOND. For a period of two years from Owner's final acceptance of the work performed
pursuant to said Contract, the material furnished and used and the workmanship employed in the
construction of the improvements described in the Contract shall be free from all defects. The Principal
shall make such repairs as required to remedy any defects of which the Owner has given the Principal
written notice prior to the expiration of the one-year warranty period hereby provided.

THIRD. Provided the Owner has given written notice to the Principal of defects in the Principal's
performance of the Contract prior to the expiration of the two-year warranty period provided for above,
this bond will remain in effect until defects have been remedied in accordance with the Owner's plans and
specifications to the Owner's satisfaction.

FOURTH. If Principal or any of Principal's subcontractors fail to duly pay for any labor,
materials, team hire, sustenance, provisions, provender, or other supplies used or consumed by Principal
or Principal's subcontractor in performance of the Contract, or fails to pay any person who supplies rental
machinery, tools, or equipment, in the prosecution of the Contract, Surety will pay the same in an amount
not exceeding the sum specified in this bond together with interest at the rate allowed by statute.

FIFTH. The Owner shall not be joined in any action against the Principal or Surety on this bond
to enforce payment for amounts lawfully due from the Principal or Principal's subcontractors for work
performed under the Contract, nor shall the Owner be liable for the payment of any costs or expenses of
such action.

SIXTH. In addition to all other conditions hereof, this bond includes all provisions set forth in section 38-26-106, Colorado Revised Statutes.

If all the above conditions are fully satisfied, this obligation shall be null and void; otherwise it shall remain in full force and effect.

For value received, Surety further agrees that, any Contract provision to the contrary notwithstanding, Surety's obligations hereunder shall not be affected in any way by any of the following and expressly waives notice of the same:

1. Any extension of time granted to Principal in which to perform the Contract.
2. Any change in the Plans, Drawings, Specifications, Contract or other Contract Documents.

An action on the performance provisions of this bond may be brought by the Owner or any person entitled to the benefits of this bond within five years from the time the cause of action arises.

Principal and Surety are jointly and severally liable under the provisions hereof and actions against either or both may proceed without prior action against the other, and both may be joined in one action.

SIGNED AND SEALED THIS _____ day of _____, 2021.

PRINCIPAL

SURETY

(Name of Company)

(Name of Company)

By: _____

By: _____

Address:

Address:

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, that we, _____
_____ ("Principal"), and _____
_____ ("Surety"), hereby bind ourselves, our respective heirs,
executors, administrators, successors and assigns jointly and severally to pay the Town of Johnstown,
State of Colorado ("Owner"), the sum of _____
_____ Dollars (\$ _____), in United States currency.

WHEREAS, the Principal has, by means of a written agreement dated _____,
entered into a contract with the Owner for the construction of Johnstown Reservoir Repair Project, Town
of Johnstown which contract is by reference made a part hereof the same as though fully set forth herein
("Contract");

NOW, THEREFORE, the conditions of this obligation are as follows:

FIRST. The principal shall at all times promptly make payments of all amounts lawfully due to
all persons supplying or furnishing him or his subcontractors with labor, materials, rental machinery,
tools, or equipment used or performed in the prosecution of the Contract and, further, shall indemnify and
save harmless the Owner to the extent of any payments in connection with the carrying out of any such
contract which the Owner may be required to make under the law.

SECOND. If the Principal or its subcontractor fails to duly make such payments, the Surety shall
pay the same together with interest at the rate allowed by statute.

THIRD. The Owner shall not be joined in any action by a claimant against the Principal and the
Surety on this bond nor shall the Owner be liable for payment of any costs or expenses of such suit.

FOURTH. In addition to all other conditions hereof, this bond includes all provisions set forth in
section 38-26-105, Colorado Revised Statutes.

If these conditions are fully satisfied, this obligation shall be null and void; otherwise it shall
remain in full force and effect.

For value received, Surety further agrees that, any Contract to the contrary notwithstanding,
Surety's obligations hereunder shall not be affected in any way by any of the following and expressly
waives notice of the same:

1. Any extension of time granted to Principal in which to perform the Contract.
2. Any change in the Plans, Drawings, Specifications, Contract or other Contract Documents.

An action on the payment provisions of this bond may be brought by the Owner or any person
entitled to the benefits of this bond at any time within five years from date of final settlement of the
Contract.

Principal and Surety are jointly and severally liable under the provisions hereof and actions

against either or both may proceed without prior action against the other, and both may be joined in one action.

SIGNED AND SEALED THIS _____ day of _____, 2021.

IN PRESENCE OF:

Principal
By: _____
(Name) (Title)

ATTEST: (As to Corporation)

Secretary

(CORPORATE SEAL)

Surety
By: _____
Attorney-in-fact

COUNTERSIGNED:

() Resident Agent

Print Name

Street Address

City and State

Give local address and phone number:

(SEAL OF SURETY)

SECTION 00 63 36

Field Order Form

Field Order

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Attention:

You are hereby directed to promptly execute this Field Order issued in accordance with General Conditions Paragraph 9.04.A, for minor changes in the Work without changes in Contract Price or Contract Times. If you consider that a change in Contract Price or Contract Times is required, please notify the Engineer immediately and before proceeding with this Work.

Reference: _____
(Specification Section(s)) (Drawing(s) / Detail(s))

Description:

Attachments:

Engineer:

Receipt Acknowledged by Contractor: _____ **Date:** _____

Copy to Owner

Work Change Directive Form

Work Change Directive

No. _____

Date of Issuance: _____ Effective Date: _____

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

Contractor is directed to proceed promptly with the following change(s):

Item No.	Description

Attachments (list documents supporting change):

Purpose for Work Change Directive:

Authorization for Work described herein to proceed on the basis of Cost of the Work due to:

- Nonagreement on pricing of proposed change.
- Necessity to expedite Work described herein prior to agreeing to changes on Contract Price and Contract Time.

Estimated change in Contract Price and Contract Times:

Contract Price \$ _____ (increase/decrease) Contract Time _____ (increase/decrease)
days

Recommended for Approval by Engineer:	Date
Authorized for Owner by:	Date
Received for Contractor by:	Date
Received by Funding Agency (if applicable):	Date:

Change Order

No. _____

Date of Issuance:

Effective Date:

Project:	Owner:	Owner's Contract No.:
Contract:		Date of Contract:
Contractor:		Engineer's Project No.:

The Contract Documents are modified as follows upon execution of this Change Order:

Description:

Attachments (list documents supporting change):**CHANGE IN CONTRACT PRICE:****CHANGE IN CONTRACT TIMES:**

Original Contract Price:

\$ _____

[Increase] [Decrease] from previously approved
Change Orders No. _____ to No. _____:

\$ _____

Contract Price prior to this Change Order:

\$ _____

[Increase] [Decrease] of this Change Order:

\$ _____

Contract Price incorporating this Change Order:

\$ _____

Original Contract Times: Working days Calendar days

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] from previously approved Change Orders No.
_____ to No. _____:

Substantial completion (days): _____

Ready for final payment (days): _____

Contract Times prior to this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

[Increase] [Decrease] of this Change Order:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

Contract Times with all approved Change Orders:

Substantial completion (days or date): _____

Ready for final payment (days or date): _____

RECOMMENDED:

By: _____

Engineer (Authorized Signature)

Date: _____

Approved by Funding Agency (if applicable):

ACCEPTED:

By: _____

Owner (Authorized Signature)

Date: _____

ACCEPTED:

By: _____

Contractor (Authorized)

Date: _____

Date: _____

STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

TABLE OF CONTENTS

	Page
Article 1 – Definitions and Terminology	1
1.01 Defined Terms.....	1
1.02 Terminology	5
Article 2 – Preliminary Matters	6
2.01 Delivery of Bonds and Evidence of Insurance.....	6
2.02 Copies of Documents.....	6
2.03 Commencement of Contract Times; Notice to Proceed	6
2.04 Starting the Work.....	7
2.05 Before Starting Construction	7
2.06 Preconstruction Conference; Designation of Authorized Representatives	7
2.07 Initial Acceptance of Schedules	7
Article 3 – Contract Documents: Intent, Amending, Reuse.....	8
3.01 Intent.....	8
3.02 Reference Standards	8
3.03 Reporting and Resolving Discrepancies	8
3.04 Amending and Supplementing Contract Documents	9
3.05 Reuse of Documents	10
3.06 Electronic Data.....	10
Article 4 – Availability of Lands; Subsurface and Physical Conditions; Hazardous Environmental Conditions; Reference Points	10
4.01 Availability of Lands	10
4.02 Subsurface and Physical Conditions	11
4.03 Differing Subsurface or Physical Conditions.....	11
4.04 Underground Facilities	13
4.05 Reference Points	14
4.06 Hazardous Environmental Condition at Site.....	14
Article 5 – Bonds and Insurance	16
5.01 Performance, Payment, and Other Bonds	16
5.02 Licensed Sureties and Insurers	16
5.03 Certificates of Insurance	16
5.04 Contractor’s Insurance.....	17
5.05 Owner’s Liability Insurance	18
5.06 Property Insurance	18
5.07 Waiver of Rights	20
5.08 Receipt and Application of Insurance Proceeds	21
5.09 Acceptance of Bonds and Insurance; Option to Replace.....	21

5.10	Partial Utilization, Acknowledgment of Property Insurer	21
Article 6 – Contractor’s Responsibilities		
6.01	Supervision and Superintendence	22
6.02	Labor; Working Hours.....	22
6.03	Services, Materials, and Equipment	22
6.04	Progress Schedule	23
6.05	Substitutes and “Or-Equals”	23
6.06	Concerning Subcontractors, Suppliers, and Others	25
6.07	Patent Fees and Royalties	26
6.08	Permits.....	27
6.09	Laws and Regulations.....	27
6.10	Taxes	28
6.11	Use of Site and Other Areas	28
6.12	Record Documents.....	29
6.13	Safety and Protection	29
6.14	Safety Representative	30
6.15	Hazard Communication Programs	30
6.16	Emergencies	30
6.17	Shop Drawings and Samples	30
6.18	Continuing the Work	32
6.19	Contractor’s General Warranty and Guarantee.....	32
6.20	Indemnification	33
6.21	Delegation of Professional Design Services	34
Article 7 – Other Work at the Site.....		
7.01	Related Work at Site	34
7.02	Coordination.....	35
7.03	Legal Relationships.....	35
Article 8 – Owner’s Responsibilities		
8.01	Communications to Contractor.....	36
8.02	Replacement of Engineer.....	36
8.03	Furnish Data	36
8.04	Pay When Due	36
8.05	Lands and Easements; Reports and Tests	36
8.06	Insurance	36
8.07	Change Orders.....	36
8.08	Inspections, Tests, and Approvals	36
8.09	Limitations on Owner’s Responsibilities	36
8.10	Undisclosed Hazardous Environmental Condition.....	37
8.11	Evidence of Financial Arrangements	37
8.12	Compliance with Safety Program.....	37
Article 9 – Engineer’s Status During Construction		
9.01	Owner’s Representative.....	37
9.02	Visits to Site	37
9.03	Project Representative	38

9.04	Authorized Variations in Work	38
9.05	Rejecting Defective Work	38
9.06	Shop Drawings, Change Orders and Payments	38
9.07	Determinations for Unit Price Work	38
9.08	Decisions on Requirements of Contract Documents and Acceptability of Work	39
9.09	Limitations on Engineer’s Authority and Responsibilities.....	39
9.10	Compliance with Safety Program.....	40
Article 10 – Changes in the Work; Claims		40
10.01	Authorized Changes in the Work	40
10.02	Unauthorized Changes in the Work	40
10.03	Execution of Change Orders.....	40
10.04	Notification to Surety.....	41
10.05	Claims.....	41
Article 11 – Cost of the Work; Allowances; Unit Price Work.....		42
11.01	Cost of the Work.....	42
11.02	Allowances.....	44
11.03	Unit Price Work	45
Article 12 – Change of Contract Price; Change of Contract Times.....		45
12.01	Change of Contract Price.....	45
12.02	Change of Contract Times.....	47
12.03	Delays.....	47
Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work.....		48
13.01	Notice of Defects	48
13.02	Access to Work	48
13.03	Tests and Inspections	48
13.04	Uncovering Work	49
13.05	Owner May Stop the Work.....	49
13.06	Correction or Removal of Defective Work.....	49
13.07	Correction Period.....	50
13.08	Acceptance of Defective Work	51
13.09	Owner May Correct Defective Work.....	51
Article 14 – Payments to Contractor and Completion.....		52
14.01	Schedule of Values	52
14.02	Progress Payments	52
14.03	Contractor’s Warranty of Title	54
14.04	Substantial Completion.....	55
14.05	Partial Utilization	55
14.06	Final Inspection.....	56
14.07	Final Payment	56
14.08	Final Completion Delayed.....	57
14.09	Waiver of Claims	58

Article 15 – Suspension of Work and Termination	58
15.01 Owner May Suspend Work	58
15.02 Owner May Terminate for Cause	58
15.03 Owner May Terminate For Convenience.....	59
15.04 Contractor May Stop Work or Terminate	60
Article 16 – Dispute Resolution	60
16.01 Methods and Procedures.....	60
Article 17 – Miscellaneous.....	61
17.01 Giving Notice.....	61
17.02 Computation of Times	61
17.03 Cumulative Remedies.....	61
17.04 Survival of Obligations.....	61
17.05 Controlling Law	61
17.06 Headings.....	61

ARTICLE 1 – DEFINITIONS AND TERMINOLOGY

1.01 *Defined Terms*

- A. Wherever used in the Bidding Requirements or Contract Documents and printed with initial capital letters, the terms listed below will have the meanings indicated which are applicable to both the singular and plural thereof. In addition to terms specifically defined, terms with initial capital letters in the Contract Documents include references to identified articles and paragraphs, and the titles of other documents or forms.
1. *Addenda*—Written or graphic instruments issued prior to the opening of Bids which clarify, correct, or change the Bidding Requirements or the proposed Contract Documents.
 2. *Agreement*—The written instrument which is evidence of the agreement between Owner and Contractor covering the Work.
 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 or 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 one percent 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 offer or proposal of a Bidder submitted on the prescribed form setting forth the prices for the Work to be performed.
 6. *Bidder*—The individual or entity who submits a Bid directly to Owner.
 7. *Bidding Documents*—The Bidding Requirements and the proposed Contract Documents (including all Addenda).
 8. *Bidding Requirements*—The advertisement or invitation to bid, Instructions to Bidders, Bid security of acceptable form, if any, and the Bid Form with any supplements.
 9. *Change Order*—A document recommended by Engineer which is signed by Contractor and Owner and authorizes an addition, deletion, or revision in the Work or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement.
 10. *Claim*—A demand or assertion by Owner or Contractor seeking an adjustment of Contract Price or Contract Times, or both, or other relief with respect to the terms of the Contract. A demand for money or services by a third party is not a Claim.
 11. *Contract*—The entire and integrated written agreement between the Owner and Contractor concerning the Work. The Contract supersedes prior negotiations, representations, or agreements, whether written or oral.

12. *Contract Documents*—Those items so designated in the Agreement. Only printed or hard copies of the items listed in the Agreement are Contract Documents. Approved Shop Drawings, other Contractor submittals, and the reports and drawings of subsurface and physical conditions are not Contract Documents.
13. *Contract Price*—The moneys payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of Paragraph 11.03 in the case of Unit Price Work).
14. *Contract Times*—The number of days or the dates stated in the Agreement to: (i) achieve Milestones, if any; (ii) achieve Substantial Completion; and (iii) complete the Work so that it is ready for final payment as evidenced by Engineer's written recommendation of final payment.
15. *Contractor*—The individual or entity with whom Owner has entered into the Agreement.
16. *Cost of the Work*—See Paragraph 11.01 for definition.
17. *Drawings*—That part of the Contract Documents prepared or approved by Engineer which graphically shows the scope, extent, and character of the Work to be performed by Contractor. Shop Drawings and other Contractor submittals are not Drawings as so defined.
18. *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.
19. *Engineer*—The individual or entity named as such in the Agreement.
20. *Field Order*—A written order issued by Engineer which requires minor changes in the Work but which does not involve a change in the Contract Price or the Contract Times.
21. *General Requirements*—Sections of Division 1 of the Specifications.
22. *Hazardous Environmental Condition*—The presence at the Site of Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material in such quantities or circumstances that may present a substantial danger to persons or property exposed thereto.
23. *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.
24. *Laws and Regulations; Laws or Regulations*—Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
25. *Liens*—Charges, security interests, or encumbrances upon Project funds, real property, or personal property.
26. *Milestone*—A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

27. *Notice of Award*—The written notice by Owner to the Successful Bidder stating that upon timely compliance by the Successful Bidder with the conditions precedent listed therein, Owner will sign and deliver the Agreement.
28. *Notice to Proceed*—A written notice given by Owner to Contractor fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform the Work under the Contract Documents.
29. *Owner*—The individual or entity with whom Contractor has entered into the Agreement and for whom the Work is to be performed.
30. *PCBs*—Polychlorinated biphenyls.
31. *Petroleum*—Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees 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 Waste and crude oils.
32. *Progress Schedule*—A schedule, prepared and maintained by Contractor, describing the sequence and duration of the activities comprising the Contractor's plan to accomplish the Work within the Contract Times.
33. *Project*—The total construction of which the Work to be performed under the Contract Documents may be the whole, or a part.
34. *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.
35. *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.
36. *Resident Project Representative*—The authorized representative of Engineer who may be assigned to the Site or any part thereof.
37. *Samples*—Physical examples of materials, equipment, 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.
38. *Schedule of Submittals*—A schedule, prepared and maintained by Contractor, of required submittals and the time requirements to support scheduled performance of related construction activities.
39. *Schedule of Values*—A schedule, prepared and maintained by Contractor, allocating portions of the Contract Price to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

40. *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.
41. *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.
42. *Specifications*—That part of the Contract Documents consisting of written requirements for materials, equipment, systems, standards and workmanship as applied to the Work, and certain administrative requirements and procedural matters applicable thereto.
43. *Subcontractor*—An individual or entity having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.
44. *Substantial Completion*—The time at which the Work (or a specified part thereof) has progressed to the point where, in the opinion of Engineer, the Work (or a specified part thereof) is sufficiently complete, in accordance with the Contract Documents, so that the Work (or a specified part thereof) can be utilized for the purposes for which it is intended. The terms “substantially complete” and “substantially completed” as applied to all or part of the Work refer to Substantial Completion thereof.
45. *Successful Bidder*—The Bidder submitting a responsive Bid to whom Owner makes an award.
46. *Supplementary Conditions*—That part of the Contract Documents which amends or supplements these General Conditions.
47. *Supplier*—A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or Subcontractor.
48. *Underground Facilities*—All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.
49. *Unit Price Work*—Work to be paid for on the basis of unit prices.
50. *Work*—The entire construction or the various separately identifiable parts thereof required to be provided under the Contract Documents. Work includes and is the result of performing or providing all labor, services, and documentation necessary to produce such construction, and furnishing, installing, and incorporating all materials and equipment into such construction, all as required by the Contract Documents.
51. *Work Change Directive*—A written statement 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 subsurface or physical conditions under which the Work is to be performed or to emergencies. A Work Change Directive will not change the Contract Price or the Contract Times but is evidence that the parties expect that the change ordered 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.

1.02 *Terminology*

A. The words and terms discussed in Paragraph 1.02.B through F are not defined but, when used in the Bidding Requirements or Contract Documents, have the indicated meaning.

B. *Intent of Certain Terms or Adjectives:*

1. The Contract Documents include the terms “as allowed,” “as approved,” “as ordered,” “as directed” or terms of like effect or import to authorize an exercise of professional judgment by Engineer. In addition, the adjectives “reasonable,” “suitable,” “acceptable,” “proper,” “satisfactory,” or adjectives of like effect or import are used to describe an action or determination of Engineer as to the Work. It is intended that such exercise of professional judgment, action, or determination will be solely to evaluate, in general, the Work for compliance with the information in the Contract Documents and with the design concept of the Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective is not intended to and shall not be effective to assign to Engineer any duty or authority to supervise or direct the performance of the Work, or any duty or authority to undertake responsibility contrary to the provisions of Paragraph 9.09 or any other provision of the Contract Documents.

C. *Day:*

1. The word “day” means a calendar day of 24 hours measured from midnight to the next midnight.

D. *Defective:*

1. The word “defective,” when modifying the word “Work,” refers to Work that is unsatisfactory, faulty, or deficient in that it:
 - a. does not conform to the Contract Documents; or
 - b. does not meet the requirements of any applicable inspection, reference standard, test, or approval referred to in the Contract Documents; or
 - c. has been damaged prior to Engineer’s recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with Paragraph 14.04 or 14.05).

E. *Furnish, Install, Perform, Provide:*

1. The word “furnish,” when used in connection with services, materials, or equipment, shall mean to supply and deliver said services, materials, or equipment to the Site (or some other specified location) ready for use or installation and in usable or operable condition.
 2. The word “install,” when used in connection with services, materials, or equipment, shall mean to put into use or place in final position said services, materials, or equipment complete and ready for intended use.
 3. The words “perform” or “provide,” when used in connection with services, materials, or equipment, shall mean to furnish and install said services, materials, or equipment complete and ready for intended use.
 4. When “furnish,” “install,” “perform,” or “provide” is not used in connection with services, materials, or equipment in a context clearly requiring an obligation of Contractor, “provide” is implied.
- F. Unless stated otherwise in the Contract Documents, words or phrases that have a well-known technical or construction industry or trade meaning are used in the Contract Documents in accordance with such recognized meaning.

ARTICLE 2 – PRELIMINARY MATTERS

2.01 Delivery of Bonds and Evidence of Insurance

- A. When Contractor delivers the executed counterparts of the Agreement to Owner, Contractor shall also deliver to Owner such bonds as Contractor may be required to furnish.
- B. *Evidence of Insurance:* Before any Work at the Site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with Article 5.

2.02 Copies of Documents

- A. Owner shall furnish to Contractor up to ten printed or hard copies of the Drawings and Project Manual. Additional copies will be furnished upon request at the cost of reproduction.

2.03 Commencement of Contract Times; Notice to Proceed

- A. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement or, if a Notice to Proceed is given, 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 sixtieth day after the day of Bid opening or the thirtieth day after the Effective Date of the Agreement, whichever date is earlier.

2.04 *Starting the Work*

- A. Contractor shall start to perform the Work on the date when the Contract Times commence to run. 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. *Preliminary Schedules:* Within 10 days after the Effective Date of the Agreement (unless otherwise specified in the General Requirements), Contractor shall submit to Engineer for timely review:
 - 1. a preliminary Progress Schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;
 - 2. a preliminary Schedule of Submittals; and
 - 3. a preliminary Schedule of Values for all of the Work which includes quantities and prices of items which when added together equal the Contract Price and subdivides the Work into component parts in sufficient detail to serve as the basis for progress payments during performance of the Work. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work.

2.06 *Preconstruction Conference; Designation of Authorized Representatives*

- A. Before any Work at the Site is started, a conference attended by Owner, Contractor, Engineer, and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in Paragraph 2.05.A, procedures for handling Shop Drawings and other submittals, processing Applications for Payment, and maintaining required records.
- B. At this conference Owner and Contractor each shall designate, in writing, a specific individual to act as its authorized representative with respect to the services and responsibilities under the Contract. Such individuals shall have the authority to transmit instructions, receive information, render decisions relative to the Contract, and otherwise act on behalf of each respective party.

2.07 *Initial Acceptance of Schedules*

- A. At least 10 days before submission of the first Application for Payment a conference attended by Contractor, Engineer, and others as appropriate will be held to review for acceptability to Engineer as provided below the schedules submitted in accordance with Paragraph 2.05.A. Contractor shall have an additional 10 days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until acceptable schedules are submitted to Engineer.
 - 1. The Progress Schedule will be acceptable to Engineer if it provides an orderly progression of the Work to completion within the Contract Times. Such acceptance will not impose on Engineer responsibility for the Progress Schedule, for sequencing, scheduling, or progress of

the Work, nor interfere with or relieve Contractor from Contractor's full responsibility therefor.

2. Contractor's Schedule of Submittals will be acceptable to Engineer if it provides a workable arrangement for reviewing and processing the required submittals.
3. Contractor's Schedule of Values will be acceptable to Engineer as to form and substance if it provides a reasonable allocation of the Contract Price to component parts of the Work.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

3.01 *Intent*

- A. The Contract Documents are complementary; what is required by one is as binding as if required by all.
- 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 labor, documentation, services, materials, or equipment that reasonably may be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the indicated result will be provided whether or not specifically called for, at no additional cost to Owner.
- C. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided in Article 9.

3.02 *Reference Standards*

- A. Standards, Specifications, Codes, Laws, and Regulations
 1. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.
 2. No provision of any such standard, specification, manual, or code, or any instruction of a Supplier, shall be effective to change the duties or responsibilities of Owner, Contractor, or Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents. No such provision or instruction shall be effective to assign to Owner, Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors, any duty or authority to supervise or direct the performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of the Contract Documents.

3.03 *Reporting and Resolving Discrepancies*

- A. *Reporting Discrepancies:*

1. *Contractor's Review of Contract Documents Before Starting Work:* Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures therein and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor discovers, or has actual knowledge of, and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.
2. *Contractor's Review of Contract Documents During Performance of Work:* If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents, or between the Contract Documents and (a) any applicable Law or Regulation, (b) any standard, specification, manual, or code, or (c) any instruction of any Supplier, then Contractor shall promptly report it to Engineer in writing. Contractor shall not proceed with the Work affected thereby (except in an emergency as required by Paragraph 6.16.A) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in Paragraph 3.04.
3. Contractor shall not be liable to Owner or Engineer for failure to report any conflict, error, ambiguity, or discrepancy in the Contract Documents unless Contractor had actual knowledge thereof.

B. *Resolving Discrepancies:*

1. Except as may be otherwise specifically stated in the Contract Documents, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:
 - a. the provisions of any standard, specification, manual, or code, or the instruction of any Supplier (whether or not specifically incorporated by reference in the Contract Documents); or
 - b. the provisions of any Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

3.04 *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 by either a Change Order or a Work Change Directive.
- B. The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, by one or more of the following ways:
 1. A Field Order;
 2. Engineer's approval of a Shop Drawing or Sample (subject to the provisions of Paragraph 6.17.D.3); or

3. Engineer's written interpretation or clarification.

3.05 *Reuse of Documents*

- A. Contractor and any Subcontractor or Supplier shall not:
 1. 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 or its consultants, including electronic media editions; or
 2. reuse any such Drawings, Specifications, other documents, or copies thereof on extensions of the Project or any other project without written consent of Owner and Engineer and specific written verification or adaptation by Engineer.
- B. The prohibitions of this Paragraph 3.05 will survive final payment, or termination of the Contract. Nothing herein shall preclude Contractor from retaining copies of the Contract Documents for record purposes.

3.06 *Electronic Data*

- A. Unless otherwise stated in the Supplementary Conditions, the data furnished by Owner or Engineer to Contractor, or by Contractor to Owner or Engineer, that may be relied upon are limited to the printed copies (also known as hard copies). Files in electronic media format of text, data, graphics, or other types are furnished only for the convenience of the receiving party. Any conclusion or information obtained or derived from such electronic files will be at the user's sole risk. If there is a discrepancy between the electronic files and the hard copies, the hard copies govern.
- B. Because data stored in electronic media format can deteriorate or be modified inadvertently or otherwise without authorization of the data's creator, the party receiving electronic files agrees that it will perform acceptance tests or procedures within 60 days, after which the receiving party shall be deemed to have accepted the data thus transferred. Any errors detected within the 60-day acceptance period will be corrected by the transferring party.
- C. When transferring documents in electronic media format, the transferring party makes no representations as to long term compatibility, usability, or readability of documents resulting from the use of software application packages, operating systems, or computer hardware differing from those used by the data's creator.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; HAZARDOUS ENVIRONMENTAL CONDITIONS; REFERENCE POINTS

4.01 *Availability of Lands*

- A. Owner shall furnish the Site. Owner shall notify Contractor of any encumbrances or restrictions not of general application but specifically related to use of the Site with which Contractor must comply in performing the Work. Owner will obtain in a timely manner and pay for easements for permanent structures or permanent changes in existing facilities. If Contractor and Owner are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the

Contract Price or Contract Times, or both, as a result of any delay in Owner's furnishing the Site or a part thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

- B. Upon reasonable written request, Owner shall furnish Contractor with a current statement of record legal title and legal description of the lands upon which the Work is to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's or construction lien against such lands in accordance with applicable Laws and Regulations.
- 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.

4.02 *Subsurface and Physical Conditions*

A. *Reports and Drawings:* The Supplementary Conditions identify:

- 1. those reports known to Owner of explorations and tests of subsurface conditions at or contiguous to the Site; and
- 2. those drawings known to Owner of physical conditions relating to existing surface or subsurface structures at the Site (except Underground Facilities).

B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:

- 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or
- 2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
- 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

4.03 *Differing Subsurface or Physical Conditions*

A. *Notice:* If Contractor believes that any subsurface or physical condition that is uncovered or revealed either:

- 1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in Paragraph 4.02 is materially inaccurate; or
- 2. is of such a nature as to require a change in the Contract Documents; or
- 3. differs materially from that shown or indicated in the Contract Documents; or

4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents;

then Contractor shall, promptly after becoming aware thereof and before further disturbing the subsurface or physical conditions or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), notify Owner and Engineer in writing about such condition. Contractor shall not further disturb such condition or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

- B. *Engineer's Review:* After receipt of written notice as required by Paragraph 4.03.A, Engineer will promptly review the pertinent condition, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto, and advise Owner in writing (with a copy to Contractor) of Engineer's findings and conclusions.

C. *Possible Price and Times Adjustments:*

1. The Contract Price or the Contract Times, or both, will be equitably adjusted to the extent that the existence of such differing subsurface or physical condition causes an increase or decrease in Contractor's cost of, or time required for, performance of the Work; subject, however, to the following:
 - a. such condition must meet any one or more of the categories described in Paragraph 4.03.A; and
 - b. with respect to Work that is paid for on a unit price basis, any adjustment in Contract Price will be subject to the provisions of Paragraphs 9.07 and 11.03.
2. Contractor shall not be entitled to any adjustment in the Contract Price or Contract Times if:
 - a. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner with respect to Contract Price and Contract Times by the submission of a Bid or becoming bound under a negotiated contract; or
 - b. the existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the Site and contiguous areas required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or
 - c. Contractor failed to give the written notice as required by Paragraph 4.03.A.
3. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times, or both, a Claim may be made therefor as provided in Paragraph 10.05. However, neither Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.

4.04 *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, including Owner, or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

1. Owner and Engineer shall not be responsible for the accuracy or completeness of any such information or data provided by others; and
2. the cost of all of the following will be included in the Contract Price, and Contractor shall have full responsibility for:
 - a. reviewing and checking all such information and data;
 - b. locating all Underground Facilities shown or indicated in the Contract Documents;
 - c. coordination of the Work with the owners of such Underground Facilities, including Owner, during construction; and
 - d. the safety and protection of all such Underground Facilities and repairing any damage thereto resulting from the Work.

B. *Not Shown or Indicated:*

1. If an Underground Facility is uncovered or revealed at or contiguous to the Site which was not shown or indicated, or not shown or indicated with reasonable accuracy in the Contract Documents, Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by Paragraph 6.16.A), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence or location of the Underground Facility. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility.
2. If Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued to reflect and document such consequences. An equitable adjustment shall be made in the Contract Price or Contract Times, or both, to the extent that they are attributable to the existence or location of any Underground Facility that was not shown or indicated or not shown or indicated with reasonable accuracy in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment in Contract Price or Contract Times, Owner or Contractor may make a Claim therefor as provided in Paragraph 10.05.

4.05 *Reference Points*

- A. Owner shall 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, shall protect and preserve the established reference points and property monuments, and shall make no changes or relocations without the prior written approval of Owner. Contractor shall report to Engineer whenever any reference point or property monument 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 or property monuments by professionally qualified personnel.

4.06 *Hazardous Environmental Condition at Site*

- A. *Reports and Drawings:* The Supplementary Conditions identify those reports and drawings known to Owner relating to Hazardous Environmental Conditions that have been identified at the Site.
- B. *Limited Reliance by Contractor on Technical Data Authorized:* Contractor may rely upon the accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner or Engineer, or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors with respect to:
 - 1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto; or
 - 2. other data, interpretations, opinions and information contained in such reports or shown or indicated in such drawings; or
 - 3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions or information.
- C. Contractor shall not be responsible for any Hazardous Environmental Condition 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. Contractor shall be responsible for a Hazardous Environmental Condition created with any materials brought to the Site by Contractor, Subcontractors, Suppliers, or anyone else for whom Contractor is responsible.
- D. If Contractor encounters a Hazardous Environmental Condition or if Contractor or anyone for whom Contractor is responsible creates a Hazardous Environmental Condition, Contractor shall immediately: (i) secure or otherwise isolate such condition; (ii) stop all Work in connection with such condition and in any area affected thereby (except in an emergency as required by Paragraph 6.16.A); and (iii) notify Owner and Engineer (and promptly 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 condition or take corrective action, if any. Promptly after consulting with Engineer, Owner shall take such actions as are necessary to

permit Owner to timely obtain required permits and provide Contractor the written notice required by Paragraph 4.06.E.

- E. Contractor shall not be required to resume Work in connection with such condition or in any affected area until after Owner has obtained any required permits related thereto and delivered written notice to Contractor: (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 on the amount or extent, if any, of any adjustment in Contract Price or Contract Times, or both, as a result of such Work stoppage or such special conditions under which Work is agreed to be resumed by Contractor, either party may make a Claim therefor as provided in Paragraph 10.05.
- F. If after receipt of such 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 the portion of the Work that is in the area affected by such condition to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or on the amount or extent, if any, of an adjustment 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 Paragraph 10.05. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.
- G. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition, provided that such Hazardous Environmental Condition: (i) was not shown or indicated in the Drawings or Specifications or identified in the Contract Documents to be included within the scope of the Work, and (ii) was not created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.G shall obligate Owner to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- H. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to a Hazardous Environmental Condition created by Contractor or by anyone for whom Contractor is responsible. Nothing in this Paragraph 4.06.H shall obligate Contractor to indemnify any individual or entity from and against the consequences of that individual's or entity's own negligence.
- I. The provisions of Paragraphs 4.02, 4.03, and 4.04 do not apply to a Hazardous Environmental Condition uncovered or revealed at the Site.

ARTICLE 5 – BONDS AND INSURANCE

5.01 *Performance, Payment, 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 of Contractor's obligations under the Contract Documents. These bonds shall remain in effect until one year after the date when final payment becomes due or until completion of the correction period specified in Paragraph 13.07, whichever is later, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other bonds as are required by the Contract Documents.
- B. All bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the 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. All bonds signed by an agent or attorney-in-fact must be accompanied by a certified copy of that individual's authority to bind the surety. The evidence of authority shall show that it is effective on the date the agent or attorney-in-fact signed each bond.
- C. 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 5.01.B, Contractor shall promptly notify Owner and Engineer and shall, within 20 days after the event giving rise to such notification, provide another bond and surety, both of which shall comply with the requirements of Paragraphs 5.01.B and 5.02.

5.02 *Licensed Sureties and Insurers*

- A. All bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.03 *Certificates of Insurance*

- A. Contractor shall deliver to Owner, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain.
- B. Owner shall deliver to Contractor, with copies to each additional insured and loss payee identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Contractor or any other additional insured) which Owner is required to purchase and maintain.

- C. Failure of Owner to demand such certificates or other evidence of Contractor's full compliance with these insurance requirements or failure of Owner to identify a deficiency in compliance from the evidence provided shall not be construed as a waiver of Contractor's obligation to maintain such insurance.
- D. Owner does not represent that insurance coverage and limits established in this Contract necessarily will be adequate to protect Contractor.
- E. The insurance and insurance limits required herein shall not be deemed as a limitation on Contractor's liability under the indemnities granted to Owner in the Contract Documents.

5.04 *Contractor's Insurance*

- A. Contractor shall purchase and maintain such insurance as is appropriate for the Work being performed and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform any of the Work, or by anyone for whose acts any of them may be liable:
 - 1. claims under workers' compensation, disability benefits, and other similar employee benefit acts;
 - 2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;
 - 3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;
 - 4. claims for damages insured by reasonably available personal injury liability coverage which are sustained:
 - a. by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or
 - b. by any other person for any other reason;
 - 5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and
 - 6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.
- B. The policies of insurance required by this Paragraph 5.04 shall:
 - 1. with respect to insurance required by Paragraphs 5.04.A.3 through 5.04.A.6 inclusive, be written on an occurrence basis, include as additional insureds (subject to any customary exclusion regarding professional liability) Owner and Engineer, and any other individuals or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers, directors, members, partners,

employees, agents, consultants, and subcontractors of each and any of all such additional insureds, and the insurance afforded to these additional insureds shall provide primary coverage for all claims covered thereby;

2. include at least the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;
3. include contractual liability insurance covering Contractor's indemnity obligations under Paragraphs 6.11 and 6.20;
4. contain a provision or endorsement that the coverage afforded will not be canceled, materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to Paragraph 5.03 will so provide);
5. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing, or replacing defective Work in accordance with Paragraph 13.07; and
6. include completed operations coverage:
 - a. Such insurance shall remain in effect for two years after final payment.
 - b. Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions, to whom a certificate of insurance has been issued, evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter.

5.05 *Owner's Liability Insurance*

- A. In addition to the insurance required to be provided by Contractor under Paragraph 5.04, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents.

5.06 *Property Insurance*

- A. Unless otherwise provided in the Supplementary Conditions, Owner shall purchase and maintain property insurance upon the Work at the Site in the amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in the Supplementary Conditions or required by Laws and Regulations). This insurance shall:
 1. include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of

them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee;

2. be written on a Builder's Risk "all-risk" policy form that shall at least include insurance for physical loss or damage to the Work, temporary buildings, falsework, and materials and equipment in transit, and shall insure against at least the following perils or causes of loss: fire, lightning, extended coverage, theft, vandalism and malicious mischief, earthquake, collapse, debris removal, demolition occasioned by enforcement of Laws and Regulations, water damage (other than that caused by flood), and such other perils or causes of loss as may be specifically required by the Supplementary Conditions.
 3. include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of engineers and architects);
 4. cover materials and equipment stored at the Site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Engineer;
 5. allow for partial utilization of the Work by Owner;
 6. include testing and startup; and
 7. be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Engineer with 30 days written notice to each other loss payee to whom a certificate of insurance has been issued.
- B. Owner shall purchase and maintain such equipment breakdown insurance or additional property insurance as may be required by the Supplementary Conditions or Laws and Regulations which will include the interests of Owner, Contractor, Subcontractors, and Engineer, and any other individuals or entities identified in the Supplementary Conditions, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them, each of whom is deemed to have an insurable interest and shall be listed as a loss payee.
- C. All the policies of insurance (and the certificates or other evidence thereof) required to be purchased and maintained in accordance with this Paragraph 5.06 will contain a provision or endorsement that the coverage afforded will not be canceled or materially changed or renewal refused until at least 30 days prior written notice has been given to Owner and Contractor and to each other loss payee to whom a certificate of insurance has been issued and will contain waiver provisions in accordance with Paragraph 5.07.
- D. Owner shall not be responsible for purchasing and maintaining any property insurance specified in this Paragraph 5.06 to protect the interests of Contractor, Subcontractors, or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount will be borne by Contractor, Subcontractors, or others suffering any such loss, and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

- E. If Contractor requests in writing that other special insurance be included in the property insurance policies provided under this Paragraph 5.06, Owner shall, if possible, include such insurance, and the cost thereof will be charged to Contractor by appropriate Change Order. Prior to commencement of the Work at the Site, Owner shall in writing advise Contractor whether or not such other insurance has been procured by Owner.

5.07 *Waiver of Rights*

- A. Owner and Contractor intend that all policies purchased in accordance with Paragraph 5.06 will protect Owner, Contractor, Subcontractors, and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) in such policies and will provide primary coverage for all losses and damages caused by the perils or causes of loss covered thereby. All such policies shall contain provisions to the effect that in the event of payment of any loss or damage the insurers will have no rights of recovery against any of the insureds or loss payees thereunder. Owner and Contractor waive all rights against each other and their respective officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for all losses and damages caused by, arising out of or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work; and, in addition, waive all such rights against Subcontractors and Engineer, and all other individuals or entities identified in the Supplementary Conditions as loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) under such policies for losses and damages so caused. None of the above waivers shall extend to the rights that any party making such waiver may have to the proceeds of insurance held by Owner as trustee or otherwise payable under any policy so issued.
- B. Owner waives all rights against Contractor, Subcontractors, and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them for:
1. loss due to business interruption, loss of use, or other consequential loss extending beyond direct physical loss or damage to Owner's property or the Work caused by, arising out of, or resulting from fire or other perils whether or not insured by Owner; and
 2. loss or damage to the completed Project or part thereof caused by, arising out of, or resulting from fire or other insured peril or cause of loss covered by any property insurance maintained on the completed Project or part thereof by Owner during partial utilization pursuant to Paragraph 14.05, after Substantial Completion pursuant to Paragraph 14.04, or after final payment pursuant to Paragraph 14.07.
- C. Any insurance policy maintained by Owner covering any loss, damage or consequential loss referred to in Paragraph 5.07.B shall contain provisions to the effect that in the event of payment of any such loss, damage, or consequential loss, the insurers will have no rights of recovery against Contractor, Subcontractors, or Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them.

5.08 *Receipt and Application of Insurance Proceeds*

- A. Any insured loss under the policies of insurance required by Paragraph 5.06 will be adjusted with Owner and made payable to Owner as fiduciary for the loss payees, as their interests may appear, subject to the requirements of any applicable mortgage clause and of Paragraph 5.08.B. Owner shall deposit in a separate account any money so received and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof, and the Work and the cost thereof covered by an appropriate Change Order.
- B. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within 15 days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

5.09 *Acceptance of Bonds and Insurance; Option to Replace*

- A. If either Owner or Contractor has any objection to the coverage afforded by or other provisions of the bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within 10 days after receipt of the certificates (or other evidence requested) required by Paragraph 2.01.B. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

5.10 *Partial Utilization, Acknowledgment of Property Insurer*

- A. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work as provided in Paragraph 14.05, no such use or occupancy shall commence before the insurers providing the property insurance pursuant to Paragraph 5.06 have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be canceled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR’S RESPONSIBILITIES

6.01 *Supervision and Superintendence*

- A. Contractor shall supervise, inspect, 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 the means, methods, techniques, sequences, and procedures of construction. Contractor shall not be responsible for the negligence of Owner or Engineer in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated in and expressly required by the Contract Documents.
- B. At all times during the progress of the Work, Contractor shall assign a competent resident superintendent who shall not be replaced without written notice to Owner and Engineer except under extraordinary circumstances.

6.02 *Labor; Working Hours*

- 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.
- B. Except as otherwise required for the safety or protection of persons or the Work or property at the Site or adjacent thereto, and except as otherwise stated in the Contract Documents, all Work at the Site shall be performed during regular working hours. Contractor will not permit the performance of Work on a Saturday, Sunday, or any legal holiday without Owner’s written consent (which will not be unreasonably withheld) given after prior written notice to Engineer.

6.03 *Services, Materials, and Equipment*

- A. Unless otherwise specified in the Contract Documents, Contractor shall provide and assume full responsibility for all services, materials, equipment, 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 performance, testing, start-up, and completion of the Work.
- B. All materials and equipment incorporated into the Work shall be as specified or, if not specified, shall be of good quality and new, except as otherwise provided in the Contract Documents. All special warranties and guarantees required by the Specifications shall expressly run to the benefit of Owner. If required by Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the source, kind, and quality of materials and equipment.
- C. All materials and equipment shall be stored, applied, installed, connected, erected, protected, used, cleaned, and conditioned in accordance with instructions of the applicable Supplier, except as otherwise may be provided in the Contract Documents.

6.04 *Progress Schedule*

- A. Contractor shall adhere to the Progress Schedule established in accordance with Paragraph 2.07 as it may be adjusted from time to time as provided below.
1. Contractor shall submit to Engineer for acceptance (to the extent indicated in Paragraph 2.07) proposed adjustments in the Progress Schedule that will not result in changing the Contract Times. Such adjustments will comply with any provisions of the General Requirements applicable thereto.
 2. Proposed adjustments in the Progress Schedule that will change the Contract Times shall be submitted in accordance with the requirements of Article 12. Adjustments in Contract Times may only be made by a Change Order.

6.05 *Substitutes and "Or-Equals"*

- A. Whenever an item of material or equipment 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 substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be submitted to Engineer for review under the circumstances described below.
1. "*Or-Equal*" Items: If in Engineer's sole discretion an item of material or equipment 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 the purposes of this Paragraph 6.05.A.1, a proposed item of material or equipment will be considered functionally equal to an item so named if:
 - a. in the exercise of reasonable judgment Engineer determines that:
 - 1) it is at least equal in materials of construction, quality, durability, appearance, strength, and design characteristics;
 - 2) it will reliably perform at least equally well the function and achieve the results imposed by the design concept of the completed Project as a functioning whole; and
 - 3) it has a proven record of performance and availability of responsive service.
 - b. Contractor certifies that, if approved and incorporated into the Work:
 - 1) there will be no increase in cost to the Owner or increase in Contract Times; and
 - 2) it will conform substantially 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 material or equipment proposed by Contractor does not qualify as an "or-equal" item under Paragraph 6.05.A.1, it will be considered a proposed substitute item.
- b. Contractor shall submit sufficient information as provided below to allow Engineer to determine if the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.
- c. The requirements for review by Engineer will be as set forth in Paragraph 6.05.A.2.d, as supplemented by the General Requirements, and as Engineer may decide is appropriate under the circumstances.
- d. Contractor shall make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application:
 - 1) shall certify that the proposed substitute item will:
 - a) perform adequately the functions and achieve the results called for by the general design,
 - b) be similar in substance to that specified, and
 - c) be suited to the same use as that specified;
 - 2) will state:
 - a) the extent, if any, to which the use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time,
 - b) whether 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 other work on the Project) to adapt the design to the proposed substitute item, and
 - c) whether incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty;
 - 3) will identify:
 - a) all variations of the proposed substitute item from that specified, and
 - b) available engineering, sales, maintenance, repair, and replacement services; and
 - 4) shall 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.

- B. *Substitute Construction Methods or Procedures:* If a specific means, method, technique, sequence, or procedure of construction is expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The requirements for review by Engineer will be similar to those provided in Paragraph 6.05.A.2.
- C. *Engineer's Evaluation:* Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to Paragraphs 6.05.A and 6.05.B. Engineer may require Contractor to furnish additional data about the proposed substitute item. Engineer will be the sole judge of acceptability. No "or equal" or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by a Change Order in the case of a substitute and an approved Shop Drawing for an "or equal." Engineer will advise Contractor in writing of any negative determination.
- D. *Special Guarantee:* Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.
- E. *Engineer's Cost Reimbursement:* Engineer will record Engineer's costs in evaluating a substitute proposed or submitted by Contractor pursuant to Paragraphs 6.05.A.2 and 6.05.B. Whether or not Engineer approves a substitute so proposed or submitted by Contractor, Contractor shall reimburse Owner for the reasonable charges of Engineer for evaluating each such proposed substitute. Contractor shall also reimburse Owner for the reasonable charges of Engineer for making changes in the Contract Documents (or in the provisions of any other direct contract with Owner) resulting from the acceptance of each proposed substitute.
- F. *Contractor's Expense:* Contractor shall provide all data in support of any proposed substitute or "or-equal" at Contractor's expense.

6.06 *Concerning Subcontractors, Suppliers, and Others*

- A. Contractor shall not employ any Subcontractor, Supplier, or other individual or entity (including those acceptable to Owner as indicated in Paragraph 6.06.B), whether initially or as a replacement, against whom Owner may have reasonable objection. Contractor shall not be required to employ any Subcontractor, Supplier, or other individual or entity to furnish or perform any of the Work against whom Contractor has reasonable objection.
- B. If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other individuals or entities to be submitted to Owner in advance for acceptance by Owner by a specified date prior to the Effective Date of the Agreement, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the Bidding Documents or the Contract Documents) of any such Subcontractor, Supplier, or other individual or entity so identified may be revoked on the basis of reasonable objection after due investigation. Contractor shall submit an acceptable replacement for the rejected Subcontractor, Supplier, or other individual or entity, and the Contract Price will be adjusted by the difference in the cost occasioned by such replacement, and an appropriate Change Order will be issued. No acceptance by Owner of any such Subcontractor, Supplier, or other individual or

entity, whether initially or as a replacement, 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 individuals or entities performing or furnishing any of the Work just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents:
1. shall create for the benefit of any such Subcontractor, Supplier, or other individual or entity any contractual relationship between Owner or Engineer and any such Subcontractor, Supplier or other individual or entity; nor
 2. shall 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 individual or entity except as may otherwise be required by Laws and Regulations.
- D. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other individuals or entities performing or furnishing any of the Work under a direct or indirect contract with Contractor.
- E. Contractor shall require all Subcontractors, Suppliers, and such other individuals or entities performing or furnishing any of the Work to communicate with Engineer through Contractor.
- F. The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.
- G. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as a loss payee on the property insurance provided in Paragraph 5.06, the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Engineer, and all other individuals or entities identified in the Supplementary Conditions to be listed as insureds or loss payees (and the officers, directors, members, partners, employees, agents, consultants, and subcontractors of each and any of them) for all losses and damages caused by, arising out of, relating to, or resulting from any of the perils or causes of loss covered by such policies and any other property insurance applicable to the Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.07 *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. To the fullest extent permitted by Laws and Regulations, Owner shall indemnify and hold harmless Contractor, and its officers, directors, members, partners, employees, agents, consultants, and subcontractors from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals, and all court or arbitration or other dispute resolution costs) arising out of or relating to 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 specified in the Contract Documents, but not identified as being subject to payment of any license fee or royalty to others required by patent rights or copyrights.
- C. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to 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.

6.08 *Permits*

- A. Unless otherwise provided in the Supplementary Conditions, 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, or, if there are no Bids, on the Effective Date of the Agreement. Owner shall pay all charges of utility owners for connections for providing permanent service to the Work.

6.09 *Laws and Regulations*

- A. Contractor shall give all notices required by and shall comply with all Laws and Regulations applicable to the 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 performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such Work. However, it shall not be Contractor's responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor of Contractor's obligations under Paragraph 3.03.
- C. Changes in Laws or Regulations not known at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids) having an effect on the cost or time of performance of the Work shall be the subject of an adjustment in Contract Price or Contract Times. If Owner

and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

6.10 *Taxes*

- A. Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.11 *Use of Site and Other Areas*

A. *Limitation on Use of Site and Other Areas:*

1. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and other areas permitted by Laws and Regulations, and shall not unreasonably encumber the Site and other areas with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof, or of any adjacent land or areas resulting from the performance of the Work.
2. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by arbitration or other dispute resolution proceeding or at law.
3. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Engineer, or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

B. *Removal of Debris During Performance of the Work:* During the progress of the Work Contractor shall keep the Site and other areas free from accumulations of waste materials, rubbish, and other debris. Removal and disposal of such waste materials, rubbish, and other debris shall conform to applicable Laws and Regulations.

C. *Cleaning:* Prior to Substantial Completion of the Work Contractor shall clean the Site and the Work and make it ready for utilization by Owner. At the completion of the Work Contractor shall remove from the Site all tools, appliances, construction equipment and machinery, and surplus materials and shall restore to original condition all property not designated for alteration by the Contract Documents.

D. *Loading Structures:* 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.

6.12 *Record Documents*

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

6.13 *Safety and Protection*

- A. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Such responsibility does not relieve Subcontractors of their responsibility for the safety of persons or property in the performance of their work, nor for compliance with applicable safety Laws and Regulations. 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 persons on the Site or who may be affected by the Work;
 - 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 relating to the safety of persons or property, or to the protection of persons or property 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 other 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.
- C. Contractor shall comply with the applicable requirements of Owner's safety programs, if any. The Supplementary Conditions identify any Owner's safety programs that are applicable to the Work.
- D. Contractor shall inform Owner and Engineer of the specific requirements of Contractor's safety program with which Owner's and Engineer's employees and representatives must comply while at the Site.
- E. All damage, injury, or loss to any property referred to in Paragraph 6.13.A.2 or 6.13.A.3 caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier, or any other individual or entity directly or indirectly employed by any of them to perform 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 any of them, or anyone for whose acts

any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier, or other individual or entity directly or indirectly employed by any of them).

- F. Contractor's duties and responsibilities for safety and for 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 14.07.B that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.14 *Safety Representative*

- A. Contractor shall designate a qualified and experienced safety representative at the Site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.15 *Hazard Communication Programs*

- A. Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the Site in accordance with Laws or Regulations.

6.16 *Emergencies*

- A. In emergencies affecting the safety or protection of persons or the Work or property at the Site or adjacent thereto, Contractor 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 or are required as a result thereof. If Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued.

6.17 *Shop Drawings and Samples*

- A. Contractor shall submit Shop Drawings and Samples to Engineer for review and approval in accordance with the accepted Schedule of Submittals (as required by Paragraph 2.07). Each submittal will be identified as Engineer may require.

1. *Shop Drawings:*

- a. Submit number of copies specified in the General Requirements.
- b. Data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data to show Engineer the services, materials, and equipment Contractor proposes to provide and to enable Engineer to review the information for the limited purposes required by Paragraph 6.17.D.

2. *Samples:*

- a. Submit number of Samples specified in the Specifications.

- b. Clearly identify each Sample as to material, Supplier, pertinent data such as catalog numbers, the use for which intended and other data as Engineer may require to enable Engineer to review the submittal for the limited purposes required by Paragraph 6.17.D.
- B. Where a Shop Drawing or Sample is required by the Contract Documents or the Schedule of Submittals, any related Work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

C. *Submittal Procedures:*

1. Before submitting each Shop Drawing or Sample, Contractor shall have:
 - a. reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents;
 - b. determined and verified all field measurements, quantities, dimensions, specified performance and design criteria, installation requirements, materials, catalog numbers, and similar information with respect thereto;
 - c. determined and verified the suitability of all materials offered with respect to the indicated application, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
 - d. determined and verified all information relative to Contractor's responsibilities for means, methods, techniques, sequences, and procedures of construction, and safety precautions and programs incident thereto.
2. Each submittal shall bear a stamp or specific written certification that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.
3. With each submittal, Contractor shall give Engineer specific written notice of any variations that the Shop Drawing or Sample may have from the requirements of the Contract Documents. This notice shall be both a written communication separate from the Shop Drawings or Sample submittal; and, in addition, by a specific notation made on each Shop Drawing or Sample submitted to Engineer for review and approval of each such variation.

D. *Engineer's Review:*

1. Engineer will provide timely review of Shop Drawings and Samples in accordance with the Schedule of Submittals acceptable to Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the 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 means, methods, techniques, sequences, or procedures of construction (except where a particular means, method, technique, sequence, or procedure of construction is specifically and expressly called for 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.

3. Engineer's review and approval shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has complied with the requirements of Paragraph 6.17.C.3 and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample. Engineer's review and approval shall not relieve Contractor from responsibility for complying with the requirements of Paragraph 6.17.C.1.

E. *Resubmittal Procedures:*

1. Contractor shall make corrections required by Engineer and shall return the required number of corrected copies of Shop Drawings and submit, as required, new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

6.18 *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 15.04 or as Owner and Contractor may otherwise agree in writing.

6.19 *Contractor's General Warranty and Guarantee*

- A. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective. Engineer and its officers, directors, members, partners, employees, agents, consultants, and subcontractors shall be entitled to rely on representation of Contractor's warranty and guarantee.
- B. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:
 1. abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, Suppliers, or any other individual or entity for whom Contractor is responsible; or
 2. normal wear and tear under normal usage.
- C. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:
 1. observations by Engineer;
 2. recommendation by Engineer or payment by Owner of any progress or final payment;

3. the issuance of a certificate of Substantial Completion by Engineer or any payment related thereto by Owner;
4. use or occupancy of the Work or any part thereof by Owner;
5. any review and approval of a Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Engineer;
6. any inspection, test, or approval by others; or
7. any correction of defective Work by Owner.

6.20 *Indemnification*

- A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, members, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that 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 but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable .
- B. In any and all claims against Owner or Engineer or any of their officers, directors, members, partners, employees, agents, consultants, or subcontractors by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph 6.20.A 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, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.
- C. The indemnification obligations of Contractor under Paragraph 6.20.A shall not extend to the liability of Engineer and Engineer's officers, directors, members, partners, employees, agents, consultants and subcontractors arising out of:
 1. the preparation or approval of, or the failure to prepare or approve maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or
 2. giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

6.21 *Delegation of Professional Design Services*

- A. Contractor will not be required to provide professional design services unless such services are specifically required by the Contract Documents for a portion of the Work or unless such services are required to carry out Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. Contractor shall not be required to provide professional services in violation of applicable law.
- B. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of Contractor by the Contract Documents, Owner and Engineer will specify all performance and design criteria that such services must satisfy. Contractor shall cause such services or certifications to be provided by a properly licensed professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to Engineer.
- C. Owner and Engineer shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided Owner and Engineer have specified to Contractor all performance and design criteria that such services must satisfy.
- D. Pursuant to this Paragraph 6.21, Engineer's review and approval of design calculations and design drawings will be only for the limited purpose of checking for conformance with performance and design criteria given and the design concept expressed in the Contract Documents. Engineer's review and approval of Shop Drawings and other submittals (except design calculations and design drawings) will be only for the purpose stated in Paragraph 6.17.D.1.
- E. Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.

ARTICLE 7 – OTHER WORK AT THE SITE

7.01 *Related Work at Site*

- A. Owner may perform other work related to the Project at the Site with Owner's employees, or through other direct contracts therefor, or have other work performed by utility owners. If such other work is not noted in the Contract Documents, then:
 - 1. written notice thereof will be given to Contractor prior to starting any such other work; and
 - 2. if Owner and Contractor are unable to agree on entitlement to or on the amount or extent, if any, of any adjustment in the Contract Price or Contract Times that should be allowed as a result of such other work, a Claim may be made therefor as provided in Paragraph 10.05.
- B. Contractor shall afford each other contractor who is a party to such a direct contract, each utility owner, and Owner, if Owner is performing other work with Owner's employees, proper and safe

access to the Site, provide a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work, and properly coordinate the Work with theirs. Contractor shall do all cutting, fitting, and patching of the Work that may be required to properly connect or otherwise make its several parts come together and properly integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering such work; provided, however, that Contractor may cut or alter others' work with the written consent of Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this Paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

- C. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7, Contractor shall inspect such other work and promptly report to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent defects and deficiencies in such other work.

7.02 *Coordination*

- A. If Owner intends to contract with others for the performance of other work on the Project at the Site, the following will be set forth in Supplementary Conditions:
 - 1. the individual or entity who will have authority and responsibility for coordination of the activities among the various contractors will be identified;
 - 2. the specific matters to be covered by such authority and responsibility will be itemized; and
 - 3. the extent of such authority and responsibilities will be provided.
- B. Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility for such coordination.

7.03 *Legal Relationships*

- A. Paragraphs 7.01.A and 7.02 are not applicable for utilities not under the control of Owner.
- B. Each other direct contract of Owner under Paragraph 7.01.A shall provide that the other contractor is liable to Owner and Contractor for the reasonable direct delay and disruption costs incurred by Contractor as a result of the other contractor's wrongful actions or inactions.
- C. Contractor shall be liable to Owner and any other contractor under direct contract to Owner for the reasonable direct delay and disruption costs incurred by such other contractor as a result of Contractor's wrongful action or inactions.

ARTICLE 8 – OWNER’S RESPONSIBILITIES

8.01 *Communications to Contractor*

- A. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Engineer.

8.02 *Replacement of Engineer*

- A. In case of termination of the employment of Engineer, Owner shall appoint an engineer to whom Contractor makes no reasonable objection, whose status under the Contract Documents shall be that of the former Engineer.

8.03 *Furnish Data*

- A. Owner shall promptly furnish the data required of Owner under the Contract Documents.

8.04 *Pay When Due*

- A. Owner shall make payments to Contractor when they are due as provided in Paragraphs 14.02.C and 14.07.C.

8.05 *Lands and Easements; Reports and Tests*

- A. Owner’s duties with respect to providing lands and easements and providing engineering surveys to establish reference points are set forth in Paragraphs 4.01 and 4.05. Paragraph 4.02 refers to Owner’s identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions and drawings of physical conditions relating to existing surface or subsurface structures at the Site.

8.06 *Insurance*

- A. Owner’s responsibilities, if any, with respect to purchasing and maintaining liability and property insurance are set forth in Article 5.

8.07 *Change Orders*

- A. Owner is obligated to execute Change Orders as indicated in Paragraph 10.03.

8.08 *Inspections, Tests, and Approvals*

- A. Owner’s responsibility with respect to certain inspections, tests, and approvals is set forth in Paragraph 13.03.B.

8.09 *Limitations on Owner’s Responsibilities*

- A. The 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.

8.10 *Undisclosed Hazardous Environmental Condition*

A. Owner's responsibility in respect to an undisclosed Hazardous Environmental Condition is set forth in Paragraph 4.06.

8.11 *Evidence of Financial Arrangements*

A. Upon request of Contractor, Owner shall furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract Documents.

8.12 *Compliance with Safety Program*

A. While at the Site, Owner's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Owner has been informed pursuant to Paragraph 6.13.D.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

9.01 *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.

9.02 *Visits to Site*

A. Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer, for the benefit of Owner, will determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous inspections on the Site 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 generally to the Contract Documents. On the basis of such visits and observations, Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work.

B. Engineer's visits and observations are subject to all the limitations on Engineer's authority and responsibility set forth in Paragraph 9.09. Particularly, but without limitation, during or as a result of Engineer's visits or observations of Contractor's Work, 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.

9.03 *Project Representative*

- A. If Owner and Engineer agree, Engineer will furnish a Resident Project Representative to assist Engineer in providing more extensive observation of the Work. The authority and responsibilities of any such Resident Project Representative and assistants will be as provided in the Supplementary Conditions, and limitations on the responsibilities thereof will be as provided in Paragraph 9.09. If Owner designates another representative or agent to represent Owner at the Site who is not Engineer's consultant, agent or employee, the responsibilities and authority and limitations thereon of such other individual or entity will be as provided in the Supplementary Conditions.

9.04 *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 compatible with the design concept of the completed Project as a functioning whole as indicated by 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. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, or both, and the parties are unable to agree on entitlement to or on the amount or extent, if any, of any such adjustment, a Claim may be made therefor as provided in Paragraph 10.05.

9.05 *Rejecting Defective Work*

- A. Engineer will have authority to reject Work which Engineer believes to be defective, or that Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer will also have authority to require special inspection or testing of the Work as provided in Paragraph 13.04, whether or not the Work is fabricated, installed, or completed.

9.06 *Shop Drawings, Change Orders and Payments*

- A. In connection with Engineer's authority, and limitations thereof, as to Shop Drawings and Samples, see Paragraph 6.17.
- B. In connection with Engineer's authority, and limitations thereof, as to design calculations and design drawings submitted in response to a delegation of professional design services, if any, see Paragraph 6.21.
- C. In connection with Engineer's authority as to Change Orders, see Articles 10, 11, and 12.
- D. In connection with Engineer's authority as to Applications for Payment, see Article 14.

9.07 *Determinations for Unit Price Work*

- A. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations

on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding (except as modified by Engineer to reflect changed factual conditions or more accurate data) upon Owner and Contractor, subject to the provisions of Paragraph 10.05.

9.08 *Decisions on Requirements of Contract Documents and Acceptability of Work*

- A. Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work thereunder. All matters in question and other matters between Owner and Contractor arising prior to the date final payment is due relating to the acceptability of the Work, and the interpretation of the requirements of the Contract Documents pertaining to the performance of the Work, will be referred initially to Engineer in writing within 30 days of the event giving rise to the question.
- B. Engineer will, with reasonable promptness, render a written decision on the issue referred. If Owner or Contractor believes that any such decision entitles them to an adjustment in the Contract Price or Contract Times or both, a Claim may be made under Paragraph 10.05. The date of Engineer's decision shall be the date of the event giving rise to the issues referenced for the purposes of Paragraph 10.05.B.
- C. Engineer's written decision on the issue referred will be final and binding on Owner and Contractor, subject to the provisions of Paragraph 10.05.
- D. When functioning as interpreter and judge under this Paragraph 9.08, 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.

9.09 *Limitations on Engineer's Authority and Responsibilities*

- A. Neither Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise, or performance of any authority or responsibility by Engineer shall create, impose, or give rise to any duty in contract, tort, or otherwise owed by Engineer to Contractor, any Subcontractor, any Supplier, any other individual or entity, or to any surety for or employee or agent of any of them.
- B. 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 the Work in accordance with the Contract Documents.
- C. Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other individual or entity performing any of the Work.
- D. 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 14.07.A 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.

- E. The limitations upon authority and responsibility set forth in this Paragraph 9.09 shall also apply to the Resident Project Representative, if any, and assistants, if any.

9.10 *Compliance with Safety Program*

- A. While at the Site, Engineer's employees and representatives shall comply with the specific applicable requirements of Contractor's safety programs of which Engineer has been informed pursuant to Paragraph 6.13.D.

ARTICLE 10 – CHANGES IN THE WORK; CLAIMS

10.01 *Authorized Changes in the Work*

- A. Without invalidating the Contract and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions, or revisions in the Work by a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).
- B. If Owner and Contractor are unable to agree on entitlement to, or on the amount or extent, if any, of an adjustment in the Contract Price or Contract Times, or both, that should be allowed as a result of a Work Change Directive, a Claim may be made therefor as provided in Paragraph 10.05.

10.02 *Unauthorized Changes in the Work*

- A. 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, or supplemented as provided in Paragraph 3.04, except in the case of an emergency as provided in Paragraph 6.16 or in the case of uncovering Work as provided in Paragraph 13.04.D.

10.03 *Execution of Change Orders*

- A. Owner and Contractor shall execute appropriate Change Orders recommended by Engineer covering:
 - 1. changes in the Work which are: (i) ordered by Owner pursuant to Paragraph 10.01.A, (ii) required because of acceptance of defective Work under Paragraph 13.08.A or Owner's correction of defective Work under Paragraph 13.09, or (iii) agreed to by the parties;
 - 2. changes in the Contract Price or Contract Times which are agreed to by the parties, including any undisputed sum or amount of time for Work actually performed in accordance with a Work Change Directive; and
 - 3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to Paragraph 10.05; 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 6.18.A.

10.04 *Notification to Surety*

- A. If the provisions of any bond require notice to be given to a surety 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), the giving of any such notice will be Contractor's responsibility. The amount of each applicable bond will be adjusted to reflect the effect of any such change.

10.05 *Claims*

- A. *Engineer's Decision Required:* All Claims, except those waived pursuant to Paragraph 14.09, shall be referred to the Engineer for decision. A decision by Engineer shall be required as a condition precedent to any exercise by Owner or Contractor of any rights or remedies either may otherwise have under the Contract Documents or by Laws and Regulations in respect of such Claims.
- B. *Notice:* Written notice stating the general nature of each Claim shall be delivered by the claimant to Engineer and the other party to the Contract promptly (but in no event later than 30 days) after the start of the event giving rise thereto. The responsibility to substantiate a Claim shall rest with the party making the Claim. Notice of the amount or extent of the Claim, with supporting data shall be delivered to the Engineer and the other party to the Contract within 60 days after the start of such event (unless Engineer allows additional time for claimant to submit additional or more accurate data in support of such Claim). A Claim for an adjustment in Contract Price shall be prepared in accordance with the provisions of Paragraph 12.01.B. A Claim for an adjustment in Contract Times shall be prepared in accordance with the provisions of Paragraph 12.02.B. Each Claim shall be accompanied by claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant believes it is entitled as a result of said event. The opposing party shall submit any response to Engineer and the claimant within 30 days after receipt of the claimant's last submittal (unless Engineer allows additional time).
- C. *Engineer's Action:* Engineer will review each Claim and, within 30 days after receipt of the last submittal of the claimant or the last submittal of the opposing party, if any, take one of the following actions in writing:
 - 1. deny the Claim in whole or in part;
 - 2. approve the Claim; or
 - 3. notify the parties that the Engineer is unable to resolve the Claim if, in the Engineer's sole discretion, it would be inappropriate for the Engineer to do so. For purposes of further resolution of the Claim, such notice shall be deemed a denial.
- D. In the event that Engineer does not take action on a Claim within said 30 days, the Claim shall be deemed denied.

- E. Engineer's written action under Paragraph 10.05.C or denial pursuant to Paragraphs 10.05.C.3 or 10.05.D will be final and binding upon Owner and Contractor, unless Owner or Contractor invoke the dispute resolution procedure set forth in Article 16 within 30 days of such action or denial.
- F. No Claim for an adjustment in Contract Price or Contract Times will be valid if not submitted in accordance with this Paragraph 10.05.

ARTICLE 11 – COST OF THE WORK; ALLOWANCES; UNIT PRICE WORK

11.01 *Cost of the Work*

- A. *Costs Included:* The term Cost of the Work means the sum of all costs, except those excluded in Paragraph 11.01.B, necessarily incurred and paid by Contractor in the proper performance of the Work. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, the costs to be reimbursed to Contractor will be only those additional or incremental costs required because of the change in the Work or because of the event giving rise to the Claim. 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, shall not include any of the costs itemized in Paragraph 11.01.B, and shall include only the following items:
 - 1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include, without limitation, superintendents, foremen, and other personnel employed full time on the Work. Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits, which shall include social security contributions, unemployment, excise, and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work outside of regular working hours, on Saturday, Sunday, or legal holidays, shall be included in the above to the extent authorized by Owner.
 - 2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.
 - 3. Payments made by Contractor to Subcontractors for Work performed by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner, who will then determine, with the advice of Engineer, which bids, if any, will be acceptable. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in this Paragraph 11.01.

4. Costs of special consultants (including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants) employed for services specifically related to the Work.
5. Supplemental costs including the following:
 - a. The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.
 - b. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the Site, and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost, less market value, of such items used but not consumed which remain the property of Contractor.
 - c. Rentals of all construction equipment and machinery, and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Engineer, and the costs of transportation, loading, unloading, assembly, dismantling, and removal thereof. All such costs shall be in accordance with the terms of said rental agreements. The rental of any such equipment, machinery, or parts shall cease when the use thereof is no longer necessary for the Work.
 - d. Sales, consumer, use, and other similar taxes related to the Work, and for which Contractor is liable, as imposed by Laws and Regulations.
 - e. Deposits lost for causes other than 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, and royalty payments and fees for permits and licenses.
 - f. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance of the Work (except losses and damages within the deductible amounts of property insurance established in accordance with Paragraph 5.06.D), provided such losses and damages have resulted from causes other than 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. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages, and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee.
 - g. The cost of utilities, fuel, and sanitary facilities at the Site.
 - h. Minor expenses such as telegrams, long distance telephone calls, telephone service at the Site, express and courier services, and similar petty cash items in connection with the Work.
 - i. The costs of premiums for all bonds and insurance Contractor is required by the Contract Documents to purchase and maintain.

B. *Costs Excluded:* The term Cost of the Work shall not include any of the following items:

1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnerships and sole proprietorships), general managers, safety managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in Paragraph 11.01.A.1 or specifically covered by Paragraph 11.01.A.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. 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.
 5. Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in Paragraphs 11.01.A.
- C. *Contractor's Fee:* When all the Work is performed on the basis of cost-plus, Contractor's fee shall be determined as set forth in the Agreement. When the value of any Work covered by a Change Order or when a Claim for an adjustment in Contract Price is determined on the basis of Cost of the Work, Contractor's fee shall be determined as set forth in Paragraph 12.01.C.
- D. *Documentation:* Whenever the Cost of the Work for any purpose is to be determined pursuant to Paragraphs 11.01.A and 11.01.B, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in a form acceptable to Engineer an itemized cost breakdown together with supporting data.

11.02 Allowances

- A. It is understood that Contractor has included in the Contract Price all allowances so named in the Contract Documents and shall cause the Work so covered to be performed for such sums and by such persons or entities as may be acceptable to Owner and Engineer.
- B. *Cash Allowances:*
1. Contractor agrees that:
 - a. the cash allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the Site, and all applicable taxes; and
 - b. Contractor's costs for unloading and handling on the Site, labor, installation, overhead, profit, and other expenses contemplated for the cash allowances have been included in

the Contract Price and not in the allowances, and no demand for additional payment on account of any of the foregoing will be valid.

C. *Contingency Allowance:*

1. Contractor agrees that a contingency allowance, if any, is for the sole use of Owner to cover unanticipated costs.

D. Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be correspondingly adjusted.

11.03 *Unit Price Work*

A. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement.

B. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer subject to the provisions of Paragraph 9.07.

C. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

D. Owner or Contractor may make a Claim for an adjustment in the Contract Price in accordance with Paragraph 10.05 if:

1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and
2. there is no corresponding adjustment with respect to any other item of Work; and
3. Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

12.01 *Change of Contract Price*

A. The Contract Price may only be changed by a Change Order. Any Claim for an adjustment in the Contract Price shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.

- B. The value of any Work covered by a Change Order or of any Claim for an adjustment in the Contract Price will be determined as follows:
1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of Paragraph 11.03); or
 2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with Paragraph 12.01.C.2); or
 3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under Paragraph 12.01.B.2, on the basis of the Cost of the Work (determined as provided in Paragraph 11.01) plus a Contractor's fee for overhead and profit (determined as provided in Paragraph 12.01.C).
- C. *Contractor's Fee*: The Contractor's fee for overhead and profit shall be determined as follows:
1. a mutually acceptable fixed fee; or
 2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:
 - a. for costs incurred under Paragraphs 11.01.A.1 and 11.01.A.2, the Contractor's fee shall be 15 percent;
 - b. for costs incurred under Paragraph 11.01.A.3, the Contractor's fee shall be five percent;
 - c. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of Paragraphs 12.01.C.2.a and 12.01.C.2.b is that the Subcontractor who actually performs the Work, at whatever tier, will be paid a fee of 15 percent of the costs incurred by such Subcontractor under Paragraphs 11.01.A.1 and 11.01.A.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor;
 - d. no fee shall be payable on the basis of costs itemized under Paragraphs 11.01.A.4, 11.01.A.5, and 11.01.B;
 - e. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and
 - f. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with Paragraphs 12.01.C.2.a through 12.01.C.2.e, inclusive.

12.02 *Change of Contract Times*

- A. The Contract Times may only be changed by a Change Order. Any Claim for an adjustment in the Contract Times shall be based on written notice submitted by the party making the Claim to the Engineer and the other party to the Contract in accordance with the provisions of Paragraph 10.05.
- B. Any adjustment of the Contract Times covered by a Change Order or any Claim for an adjustment in the Contract Times will be determined in accordance with the provisions of this Article 12.

12.03 *Delays*

- A. Where Contractor is prevented from completing any part of the Work within the Contract Times due to delay beyond the control of Contractor, the Contract Times will be extended in an amount equal to the time lost due to such delay if a Claim is made therefor as provided in Paragraph 12.02.A. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions, or acts of God.
- B. If Owner, Engineer, or other contractors or utility owners performing other work for Owner as contemplated by Article 7, or anyone for whom Owner is responsible, delays, disrupts, or interferes with the performance or progress of the Work, then Contractor shall be entitled to an equitable adjustment in the Contract Price or the Contract Times, or both. Contractor's entitlement to an adjustment of the Contract Times is conditioned on such adjustment being essential to Contractor's ability to complete the Work within the Contract Times.
- C. If Contractor is delayed in the performance or progress of the Work by fire, flood, epidemic, abnormal weather conditions, acts of God, acts or failures to act of utility owners not under the control of Owner, or other causes not the fault of and beyond control of Owner and Contractor, then Contractor shall be entitled to an equitable adjustment in Contract Times, if such adjustment is essential to Contractor's ability to complete the Work within the Contract Times. Such an adjustment shall be Contractor's sole and exclusive remedy for the delays described in this Paragraph 12.03.C.
- D. Owner, Engineer, and their officers, directors, members, partners, employees, agents, consultants, or subcontractors shall not be liable to Contractor for any claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Contractor on or in connection with any other project or anticipated project.
- E. Contractor shall not be entitled to an adjustment in Contract Price or Contract Times for delays within the control of Contractor. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.01 Notice of Defects

- A. Prompt notice of all defective Work of which Owner or Engineer has actual knowledge will be given to Contractor. Defective Work may be rejected, corrected, or accepted as provided in this Article 13.

13.02 Access to Work

- A. Owner, Engineer, their consultants and other representatives and personnel of Owner, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Site and the Work at reasonable times for their observation, inspection, and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's safety procedures and programs so that they may comply therewith as applicable.

13.03 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 to facilitate required inspections or tests.
- 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 13.03.C and 13.03.D below;
 - 2. that costs incurred in connection with tests or inspections conducted pursuant to Paragraph 13.04.B shall be paid as provided in Paragraph 13.04.C; 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) specifically to be inspected, tested, or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval.
- D. Contractor shall be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests, or approvals required for Owner's and Engineer's acceptance of materials or equipment to be incorporated in the Work; or acceptance of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Such inspections, tests, or approvals shall be performed by organizations acceptable to Owner and Engineer.

- E. If any Work (or the work of others) that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, Contractor shall, if requested by Engineer, uncover such Work for observation.
- F. Uncovering Work as provided in Paragraph 13.03.E 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.

13.04 *Uncovering Work*

- A. If any Work is covered contrary to the written request of Engineer, it must, 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.
- C. If it is found that the uncovered Work is defective, Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such uncovering, exposure, observation, inspection, and testing, and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others); and Owner shall be entitled to an appropriate decrease in the Contract Price. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05.
- D. If the uncovered 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, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a Claim therefor as provided in Paragraph 10.05.

13.05 *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 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, any Subcontractor, any Supplier, any other individual or entity, or any surety for, or employee or agent of any of them.

13.06 *Correction or Removal of Defective Work*

- A. Promptly after receipt of written notice, Contractor shall correct all defective Work, whether or not fabricated, installed, or completed, or, if the Work has been rejected by Engineer, remove it from the Project and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers,

architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or removal (including but not limited to all costs of repair or replacement of work of others).

- B. When correcting defective Work under the terms of this Paragraph 13.06 or Paragraph 13.07, Contractor shall take no action that would void or otherwise impair Owner's special warranty and guarantee, if any, on said Work.

13.07 *Correction Period*

- A. If within one year after the date of Substantial Completion (or such longer period of time as may be prescribed 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, or if the repair of any damages to the land or areas made available for Contractor's use by Owner or permitted by Laws and Regulations as contemplated in Paragraph 6.11.A is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions:
 - 1. repair such defective land or areas; or
 - 2. correct such defective Work; or
 - 3. if the defective Work has been rejected by Owner, remove it from the Project and replace it with Work that is not defective, and
 - 4. satisfactorily correct or repair or remove and replace any damage to other Work, to the work of others or other land or areas resulting therefrom.
- B. If Contractor does not promptly comply with the terms of Owner's written instructions, or in an emergency where delay would cause serious risk of loss or damage, Owner may have the defective Work corrected or repaired or may have the rejected Work removed and replaced. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to such correction or repair or such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.
- C. 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.
- D. Where defective Work (and damage to other Work resulting therefrom) has been corrected or removed and replaced under this Paragraph 13.07, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.
- E. Contractor's obligations under this Paragraph 13.07 are in addition to any other obligation or warranty. The provisions of this Paragraph 13.07 shall not be construed as a substitute for, or a waiver of, the provisions of any applicable statute of limitation or repose.

13.08 *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, Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution 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 for the diminished value of the Work to the extent not otherwise paid by Contractor pursuant to this sentence. 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, reflecting the diminished value of Work so accepted. If the parties are unable to agree as to the amount thereof, Owner may make a Claim therefor as provided in Paragraph 10.05. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.09 *Owner May Correct Defective Work*

- A. If Contractor fails within a reasonable time after written notice from Engineer to correct defective Work, or to remove and replace rejected Work as required by Engineer in accordance with Paragraph 13.06.A, 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, or remedy any such deficiency.
- B. In exercising the rights and remedies under this Paragraph 13.09, Owner shall proceed expeditiously. In connection with such corrective or 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 materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representatives, agents and employees, Owner's other contractors, and Engineer and Engineer's consultants access to the Site to enable Owner to exercise the rights and remedies under this Paragraph.
- C. All claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred or sustained by Owner in exercising the rights and remedies under this Paragraph 13.09 will be charged against Contractor, 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. If the parties are unable to agree as to the amount of the adjustment, Owner may make a Claim therefor as provided in Paragraph 10.05. Such claims, costs, losses and damages will include but not be limited to all costs of repair, or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work.

- D. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies under this Paragraph 13.09.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

14.01 Schedule of Values

- A. The Schedule of Values established as provided in Paragraph 2.07.A 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.

14.02 Progress Payments

A. Applications for Payments:

1. At least 20 days before the date established in the Agreement for each progress payment (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. If payment is requested on the basis of materials and equipment 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 materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance or other arrangements to protect Owner's interest therein, all of which must be satisfactory to Owner.
2. 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.
3. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

B. Review of Applications:

1. Engineer will, within 10 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.
2. Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to Owner, based on Engineer's observations of the executed Work as an experienced and qualified design professional, and on Engineer's

review of the Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information and belief:

- a. the Work has progressed to the point indicated;
 - b. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, the results of any subsequent tests called for in the Contract Documents, a final determination of quantities and classifications for Unit Price Work under Paragraph 9.07, and any other qualifications stated in the recommendation); and
 - c. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Engineer's responsibility to observe the Work.
3. By recommending any such payment Engineer will not thereby be deemed to have represented that:
- a. inspections made to check the quality or the quantity of the Work as it has been performed have been exhaustive, extended to every aspect of the Work in progress, or involved detailed inspections of the Work beyond the responsibilities specifically assigned to Engineer in the Contract Documents; or
 - b. there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.
4. Neither Engineer's review of Contractor's Work for the purposes of recommending payments nor Engineer's recommendation of any payment, including final payment, will impose responsibility on Engineer:
- a. to supervise, direct, or control the Work, or
 - b. for the means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or
 - c. for Contractor's failure to comply with Laws and Regulations applicable to Contractor's performance of the Work, or
 - d. to make any examination to ascertain how or for what purposes Contractor has used the moneys paid on account of the Contract Price, or
 - e. to determine that title to any of the Work, materials, or equipment has passed to Owner free and clear of any Liens.
5. Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representations to Owner stated in Paragraph 14.02.B.2. Engineer may also refuse to recommend any such payment or, because of subsequently discovered evidence or the results of subsequent inspections or tests, revise or revoke any such payment recommendation previously made, to such extent as may be necessary in Engineer's opinion to protect Owner from loss because:

- a. the Work is defective, or completed Work has been damaged, requiring correction or replacement;
- b. the Contract Price has been reduced by Change Orders;
- c. Owner has been required to correct defective Work or complete Work in accordance with Paragraph 13.09; or
- d. Engineer has actual knowledge of the occurrence of any of the events enumerated in Paragraph 15.02.A.

C. *Payment Becomes Due:*

1. Ten days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

D. *Reduction in Payment:*

1. Owner may refuse to make payment of the full amount recommended by Engineer because:
 - a. claims have been made against Owner on account of Contractor's performance or furnishing of the Work;
 - b. Liens have been filed in connection with the Work, except where Contractor has delivered a specific bond satisfactory to Owner to secure the satisfaction and discharge of such Liens;
 - c. there are other items entitling Owner to a set-off against the amount recommended; or
 - d. Owner has actual knowledge of the occurrence of any of the events enumerated in Paragraphs 14.02.B.5.a through 14.02.B.5.c or Paragraph 15.02.A.
2. If Owner refuses to make payment of the full amount recommended by Engineer, Owner will give Contractor immediate written notice (with a copy to Engineer) stating the reasons for such action and promptly pay Contractor any amount remaining after deduction of the amount so withheld. Owner shall promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor remedies the reasons for such action.
3. Upon a subsequent determination that Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1 and subject to interest as provided in the Agreement.

14.03 *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.

14.04 *Substantial Completion*

- A. When Contractor considers the entire Work ready for its intended use Contractor shall 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. Promptly after Contractor's notification, 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 the reasons therefor.
- C. If Engineer considers the Work substantially complete, Engineer will deliver to Owner a tentative certificate of Substantial Completion which shall 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. 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 14 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 14 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, and protection of the Work, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Engineer in writing 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.
- E. Owner shall have the right to exclude Contractor from the Site after the date of Substantial Completion subject to allowing Contractor reasonable access to remove its property and complete or correct items on the tentative list.

14.05 *Partial Utilization*

- A. Prior to Substantial Completion of all the Work, Owner may use or occupy any substantially completed 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 usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, subject to the following conditions:

1. Owner at any time may request Contractor in writing to permit Owner to use or occupy any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If and when Contractor agrees that such part of the Work is substantially complete, Contractor, Owner, and Engineer will follow the procedures of Paragraph 14.04.A through D for that part of the Work.
2. 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.
3. 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 14.04 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.
4. No use or occupancy or separate operation of part of the Work may occur prior to compliance with the requirements of Paragraph 5.10 regarding property insurance.

14.06 *Final Inspection*

- A. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Engineer will promptly 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 complete such Work or remedy such deficiencies.

14.07 *Final Payment*

A. *Application for Payment:*

1. After Contractor has, in the opinion of Engineer, satisfactorily completed all corrections identified during the final inspection and has delivered, in accordance with the Contract Documents, all maintenance and operating instructions, schedules, guarantees, bonds, certificates or other evidence of insurance, certificates of inspection, marked-up record documents (as provided in Paragraph 6.12), and other documents, Contractor may make application for final payment following the procedure for progress payments.
2. The final Application for Payment shall be accompanied (except as previously delivered) by:
 - a. all documentation called for in the Contract Documents, including but not limited to the evidence of insurance required by Paragraph 5.04.B.6;
 - b. consent of the surety, if any, to final payment;
 - c. a list of all Claims against Owner that Contractor believes are unsettled; and

- d. complete and legally effective releases or waivers (satisfactory to Owner) of all Lien rights arising out of or Liens filed in connection with the Work.
3. In lieu of the releases or waivers of Liens specified in Paragraph 14.07.A.2 and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material, and equipment for which a Lien could be filed; and (ii) all payrolls, material and equipment bills, and other indebtedness connected with the Work for which Owner might in any way be responsible, or which might in any way result in liens or other burdens on Owner's property, have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

B. Engineer's Review of Application and Acceptance:

1. 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 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 for Payment to Owner for payment. At the same time Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of Paragraph 14.09. Otherwise, Engineer will return the Application for Payment 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 for Payment.

C. Payment Becomes Due:

1. Thirty days after the presentation to Owner of the Application for Payment and accompanying documentation, the amount recommended by Engineer, less any sum Owner is entitled to set off against Engineer's recommendation, including but not limited to liquidated damages, will become due and will be paid by Owner to Contractor.

14.08 *Final Completion Delayed*

- A. 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 (for Work fully completed and accepted) and recommendation of Engineer, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required in Paragraph 5.01, 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.

14.09 *Waiver of Claims*

- A. The making and acceptance of final payment will constitute:
1. 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 14.06, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and
 2. a waiver of all Claims by Contractor against Owner other than those previously made in accordance with the requirements herein and expressly acknowledged by Owner in writing as still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

15.01 *Owner May Suspend Work*

- A. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive 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 granted an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes a Claim therefor as provided in Paragraph 10.05.

15.02 *Owner May Terminate for Cause*

- A. The occurrence of any one or more of the following events will justify termination for cause:
1. Contractor's persistent failure to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the Progress Schedule established under Paragraph 2.07 as adjusted from time to time pursuant to Paragraph 6.04);
 2. Contractor's disregard of Laws or Regulations of any public body having jurisdiction;
 3. Contractor's repeated disregard of the authority of Engineer; or
 4. Contractor's violation in any substantial way of any provisions of the Contract Documents.
- B. If one or more of the events identified in Paragraph 15.02.A occur, Owner may, after giving Contractor (and surety) seven days written notice of its intent to terminate the services of Contractor:
1. 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);

2. incorporate in the Work all materials and equipment stored at the Site or for which Owner has paid Contractor but which are stored elsewhere; and
 3. complete the Work as Owner may deem expedient.
- C. If Owner proceeds as provided in Paragraph 15.02.B, Contractor shall not be entitled to receive any further payment until the Work is completed. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) sustained by Owner arising out of or relating to completing the Work, such excess will be paid to Contractor. If such claims, costs, losses, and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses, and damages incurred by Owner will be reviewed by Engineer as to their reasonableness and, when so approved by Engineer, incorporated in a Change Order. When exercising any rights or remedies under this Paragraph, Owner shall not be required to obtain the lowest price for the Work performed.
- D. Notwithstanding Paragraphs 15.02.B and 15.02.C, Contractor's services will not be terminated if Contractor begins within seven days of receipt of notice of intent to terminate to correct its failure to perform and proceeds diligently to cure such failure within no more than 30 days of receipt of said notice.
- E. 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 Contractor by Owner will not release Contractor from liability.
- F. If and to the extent that Contractor has provided a performance bond under the provisions of Paragraph 5.01.A, the termination procedures of that bond shall supersede the provisions of Paragraphs 15.02.B and 15.02.C.

15.03 *Owner May Terminate For Convenience*

- A. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for (without duplication of any items):
1. completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;
 2. expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;
 3. all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other

dispute resolution costs) incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others; and

4. reasonable expenses directly attributable to termination.

B. Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

15.04 *Contractor May Stop Work or Terminate*

A. If, through no act or fault of Contractor, (i) the Work is suspended for more than 90 consecutive days by Owner or under an order of court or other public authority, or (ii) Engineer fails to act on any Application for Payment within 30 days after it is submitted, or (iii) 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, and provided Owner or Engineer do not remedy such suspension or failure within that time, terminate the Contract and recover from Owner payment on the same terms as provided in Paragraph 15.03.

B. In lieu of terminating the Contract and without prejudice to any other right or remedy, if Engineer has failed to act on an Application for Payment within 30 days after it is submitted, or Owner has failed for 30 days to pay Contractor any sum finally determined to be due, Contractor may, seven days after written notice to Owner and Engineer, stop the Work until payment is made of all such amounts due Contractor, including interest thereon. The provisions of this Paragraph 15.04 are not intended to preclude Contractor from making a Claim under Paragraph 10.05 for an adjustment in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping the Work as permitted by this Paragraph.

ARTICLE 16 – DISPUTE RESOLUTION

16.01 *Methods and Procedures*

A. Either Owner or Contractor may request mediation of any Claim submitted to Engineer for a decision under Paragraph 10.05 before such decision becomes final and binding. The mediation will be governed by the Construction Industry Mediation Rules of the American Arbitration Association in effect as of the Effective Date of the Agreement. The request for mediation shall be submitted in writing to the American Arbitration Association and the other party to the Contract. Timely submission of the request shall stay the effect of Paragraph 10.05.E.

B. Owner and Contractor shall participate in the mediation process in good faith. The process shall be concluded within 60 days of filing of the request. The date of termination of the mediation shall be determined by application of the mediation rules referenced above.

C. If the Claim is not resolved by mediation, Engineer's action under Paragraph 10.05.C or a denial pursuant to Paragraphs 10.05.C.3 or 10.05.D shall become final and binding 30 days after termination of the mediation unless, within that time period, Owner or Contractor:

1. elects in writing to invoke any dispute resolution process provided for in the Supplementary Conditions; or

2. agrees with the other party to submit the Claim to another dispute resolution process; or
3. gives written notice to the other party of the intent to submit the Claim to a court of competent jurisdiction.

ARTICLE 17 – MISCELLANEOUS

17.01 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:
 1. 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
 2. delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.02 Computation of Times

- 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.

17.03 Cumulative Remedies

- A. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto 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. 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.

17.04 Survival of Obligations

- A. All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work or termination or completion of the Contract or termination of the services of Contractor.

17.05 Controlling Law

- A. This Contract is to be governed by the law of the state in which the Project is located.

17.06 Headings

- A. Article and paragraph headings are inserted for convenience only and do not constitute parts of these General Conditions.

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

TABLE OF CONTENTS

Article 1 – Definitions 2
 SC-1.01 Defined Terms 2

Article 2 – Preliminary Matters 2
 SC-2.02 Copies of Documents..... 2

Article 4 – Availability of Lands; Subsurface and Physical Conditions; Reference Points..... 2
 SC-4.02 Subsurface and Physical Conditions..... 2
 SC-4.06 Hazardous Environmental Condition at Site 3

Article 5 – Bonds and Insurance 3
 SC-5.01 Performance, Payment and Other Bonds 3
 SC-5.02 Licensed Sureties and Insurers 3
 SC-5.04 Contractor's Insurance 3
 SC-5.06 Property Insurance 4
 SC-5.07 Waiver of Rights..... 4
 SC-5.09 Acceptance of Bonds and Insurance; Option to Replace..... 4

Article 6 – Contractor's Responsibilities..... 5
 SC-6.06 Concerning Subcontractors, Suppliers, and Others 5
 SC-6.08 Permits 5
 SC-6.17 Shop Drawings and Samples 5
 SC-6.20 Indemnification..... 5

Article 9 – Engineer's Status During Construction 5
 SC-9.03 Project Representative 5

Article 10 – Changes In the Work; Claims 9
 SC-10.03 Execution of Change Orders..... 9
 SC-10.05 Claims 9

Article 12 – Change of Contract Price; Change of Contract Times 9
 SC-12.01 Change of Contract Price..... 9
 SC-12.03 Delays 10

Article 13 – Tests and Inspections; Correction, Removal or Acceptance of Defective Work..... 11
 SC-13.07 Correction Period..... 11

Article 14 – Payments to Contractor and Completion 12
 SC-14.02 Payment for Materials..... 12
 SC-14.07 Final Payment 12

Article 16 – Dispute Resolution..... 12
 SC-16.01 Methods and Procedures..... 12

Article 17 – Miscellaneous 13

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

TABLE OF CONTENTS

SC-17.07 Addresses of Owner, Engineer, Contractor 13
SC-17.08 Cross-Referencing 13
SC-17.09 Claims for Consequential Damages..... 13

SECTION 00 73 00

SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the Standard General Conditions of the Construction Contract, EJCDC C-700 (2007 Edition). All provisions which are not so amended or supplemented remain in full force and effect. These Supplemental Conditions supersede the General Conditions.

The terms used in these Supplementary conditions have the meanings stated in the General Conditions. Additional terms used in these Supplementary Conditions have the meanings stated below, which are applicable to both the singular and plural thereof.

The address system used in these Supplementary conditions is the same as the address system used in the General Conditions, with the prefix "SC" added thereto.

ARTICLE 1 – DEFINITIONS

SC-1.01A.19 Add the following sentence at the end of Paragraph 1.01.A.19:

The title of Architect as used in the Contract Documents refers to the Engineer.

SC-1.01A.34 Add the following sentence at the end of Paragraph 1.01.A.34:

The Project Manual also includes the bidding requirements, Contract Forms, General Conditions of the Contract, Supplemental Conditions and Specifications.

SC-1.01A.50 Add the following sentence at the end of Paragraph 1.01.A.50:

Work shall also include the materials and equipment provided by Contractor or equipment as provided by Owner for installation by Contractor.

ARTICLE 2 – PRELIMINARY MATTERS

SC-2.02A. Delete Paragraph 2.02A in its entirety and insert the following in its place:

Owner shall furnish to Contractor two (2) complete sets of the Contract Documents for use in the execution of the Work. Additional copies will be furnished, upon request, at the cost of the reproduction.

ARTICLE 4 – AVAILABILITY OF LANDS; SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

SC-4.06 Delete Paragraphs 4.06.A and 4.06.B in their entirety and insert the following:

A. No reports or drawings related to Hazardous Environmental Conditions at the Site are known to Owner.

B. Not Used.

ARTICLE 5 – BONDS AND INSURANCE

SC-5.01 Add the following new paragraph immediately after Paragraph 5.01.C:

D. In addition to the performance bond specified in the General Conditions, Contractor shall furnish Labor and Material Payment Bonds and Insurance Certificates. Owner and Engineer reserve the right to reject surety providing performance and payment bonds or other bonds as specified in the Contract Documents. Contract Agreement will not be executed until surety is acceptable to Owner and Engineer.

SC-5.02.A Delete Paragraph 5.02. A in its entirety and insert the following:

A. All bonds and insurance required by the Contact Documents to be purchased and maintained by the Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the State of Colorado and must be countersigned by an agent who is a resident of the State of Colorado and must be accompanied by a certified copy of the authority to act for the surety and authority to transact business in the State of Colorado.

SC-5.04 Add the following new paragraphs immediately after Paragraph 5.04.B:

C. The limits of liability for the insurance required by Paragraph 5.04 of the General Conditions shall provide coverage for not less than the following amounts or greater where required by Laws and Regulations:

1. Workers' Compensation and related coverages under Paragraphs 5.04.A.1 and A.2 of the General Conditions:

- a. State of Colorado Statutory
- b. Applicable Federal: Statutory
- c. Employer's Liability \$100,000 each accident
\$500,000 disease, policy limit
\$100,000 disease, each employee

2. Contractor's General Liability under Paragraphs 5.04.A.3 through A.6 of the General Conditions which shall include completed operations and product liability coverages and eliminate the exclusion with respect to property under the care, custody and control of Contractor:

- a. General Aggregate \$1,000,000

- b. Products Completed Operations Aggregate \$1,000,000
 - c. Personal and Advertising Injury \$500,000
 - d. Each Occurrence (Bodily Injury and Property Damage) \$500,000
 - e. Property Damage liability insurance will provide Explosion, Collapse, and Under-ground coverages where applicable.
 - f. Excess or Umbrella Liability Bodily Injury and Property Damage \$2,000,000 Retention \$10,000
3. Automobile Liability under Paragraph 5.04.A.6 of the General Conditions:
- a. Combined Single Limit of \$2,000,000

D. The Owner (Town of Johnstown), Engineer (J&T Consulting, Inc.), Owner's Material Testing Company (Cesare, Inc.), property owners (as listed in the drawings) shall be named as additional insureds.

SC-5.06.A Delete Paragraph 5.06.A in its entirety.

SC-5.06.B Delete Paragraph 5.06.B

SC-5.07.B.1 Delete subparagraph 5.07.B.1 in its entirety.

SC-5.09.A Delete Paragraph 5.09.A in its entirety and insert the following in its place:

A. If the Owner has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the Contractor in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the Owner shall so notify the Contractor in writing within 10 days after receipt of the certificates (or other evidence requested) required by paragraph 2.01.B. Contractor shall provide to the Owner such additional information in respect of insurance. If Contractor does not purchase or maintain all of the Bonds and insurance required of Contractor by the Contract Documents, Contractor shall notify the Owner in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the Owner may elect to obtain equivalent Bonds or insurance to protect the

Owner's interests at the expense of the Contractor and a Change Order shall be issued to adjust the Contract Price accordingly.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

SC-6.06 Add the following new paragraph immediately after Paragraph 6.06.G:

- H. Owner may furnish to any Subcontractor or Supplier, to the extent practicable, information about amounts paid to Contractor on account of Work performed for Contractor by a particular Subcontractor or Supplier.

SC-6.08 Add the following new paragraph immediately after Paragraph 6.08. A:

- B. Contractor shall coordinate with all agencies as required in the Special Conditions for any and all permits required to complete the work.

SC-6.17 Delete paragraphs 6.17.A, B, C, D, and E in their entirety and replace with the following:

- A. Contractor shall furnish required submittals with sufficient information and accuracy in order to obtain required approval of an item with no more than three submittals. Engineer will record Engineer's time for reviewing subsequent submittals of Shop Drawings, Samples, or other items requiring approval and Contractor shall reimburse Owner for Engineer's charges for such time.
- B. In the event that Contractor requests a change of a previously approved item, Contractor shall reimburse Owner for Engineer's charges for its review time unless the need for such change is beyond the control of Contractor.

SC-6.20 Add the following new paragraph immediately after Paragraph 6.20.C:

- D. Governmental Immunities Act. The Owner is relying on, and does not waive or intend to waive by any provision of this Agreement, the monetary limitations or any rights, immunities and protection provided by the Colorado Governmental Immunities Act (C.R.S. § 24-10-101 et seq.) as from time to time amended, or otherwise available to the Town, its officers, agents, employees, attorneys, engineers, planners, indemnifiers and insurers.

ARTICLE 9 – ENGINEER'S STATUS DURING CONSTRUCTION

SC-9.03 Add the following new paragraphs immediately after Paragraph 9.03.A:

- B. The Resident Project Representative (RPR) will be Owner's representative at the Site, will act as directed by and under the supervision of Owner, and Engineer regarding. Where the Contract Documents require the Engineer to perform any act or function, this act or function shall be carried out by the RPR except when an interpretation of the contract Documents, or a decision resolving claims is involved. RPR's dealings with Subcontractors shall be through or with the full knowledge and approval of Contractor. The RPR shall:

1. Schedules: Review the progress schedule, schedule of Shop Drawing and Sample submittals, and schedule of values prepared by Contractor and consult with Engineer concerning acceptability.
2. Conferences and Meetings: Attend meetings with Contractor, such as preconstruction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.
3. Liaison:
 - a. Serve as Engineer's liaison with Contractor, working principally through Contractor's authorized representative, assist in providing information regarding the intent of the Contract Documents.
 - b. Assist Engineer in serving as Owner's liaison with Contractor when Contractor's operations affect Owner's on-Site operations.
 - c. Assist in obtaining from Owner additional details or information, when required for proper execution of the Work.
4. Interpretation of Contract Documents: Report to Engineer when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Engineer.
5. Shop Drawings and Samples:
 - a. Record date of receipt of Samples and approved Shop Drawings.
 - b. Receive Samples which are furnished at the Site by Contractor, and notify Engineer of availability of Samples for examination.
6. Modifications: Consider and evaluate Contractor's suggestions and modifications in Drawings or Specifications and report such suggestions, together with RPR's recommendations, to Engineer. Transmit to Contractor in writing decisions as issued by Engineer.
7. Review of Work and Rejection of Defective Work:
 - a. Conduct on-Site observations of Contractor's work in progress to assist Engineer in determining if the Work is in general proceeding in accordance with the Contract Documents.
 - b. Report to Engineer whenever RPR believes that any part of Contractor's work in progress will not produce a completed Project that conforms generally to the Contract Documents or

will imperil the integrity of the design concept of the completed Project as a functioning whole as indicated in the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Engineer of that part of work in progress that RPR believes should be corrected or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

8. Inspections, Tests, and System Startups:
 - a. Verify that tests, equipment, and systems start-ups and operating and maintenance training are conducted in the presence of appropriate Owner's personnel, and that Contractor maintains adequate records thereof.
 - b. Observe, record, and report to Engineer appropriate details relative to the test procedures and systems start-ups.
9. Records:
 - a. Record names, addresses, fax numbers, e-mail addresses, web site locations, and telephone numbers of all Contractors, Subcontractors, and major Suppliers of materials and equipment.
 - b. Maintain records for use in preparing Project documentation.
10. Reports:
 - a. Furnish to Engineer periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawings and Sample submittals.
 - b. Draft and recommend to Engineer proposed Change Orders, Work Change Directives, and Field Orders. Obtain backup material from Contractor.
 - c. Immediately notify Engineer of the occurrence of any Site accidents, emergencies, acts of God endangering the Work, damage to property by fire or other causes, or the discovery of any Hazardous Environmental Condition.
11. Payment Requests: Review Applications for Payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed, and materials and equipment delivered at the Site but not incorporated in the Work.

12. Certificates, Operation and Maintenance Manuals: During the course of the Work, verify that materials and equipment certificates, operation and maintenance manuals and other data required by the Specifications to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have these documents delivered to Engineer for review and forwarding to Owner prior to payment for that part of the Work.
13. Completion:
 - a. Participate in a Substantial Completion inspection, assist in the determination of Substantial Completion and the preparation of lists of items to be completed or corrected.
 - b. Participate in a final inspection in the company of Engineer, Owner, and Contractor and prepare a final list of items to be completed and deficiencies to be remedied.
 - c. Observe whether all items on the final list have been completed or corrected and make recommendations to the Engineer concerning acceptance and issuance of the Notice of Acceptability of the Work.

C. The RPR shall not:

1. Authorize any deviation from the Contract Documents or substitution of materials or equipment (including "or-equal" items).
2. Exceed limitations of Engineer's authority as set forth in the Contract Documents.
3. Undertake any of the responsibilities of Contractor, Subcontractors, Suppliers, or Contractor's superintendent.
4. Advise on, issue directions relative to, or assume control over any aspect of the means, methods, techniques, sequences or procedures of Contractor's work unless such advice or directions are specifically required by the Contract Documents.
5. Advise on, issue directions regarding, or assume control over safety practices, precautions, and programs in connection with the activities or operations of Owner or Contractor.
6. Participate in specialized field or laboratory tests or inspections conducted off-site by others except as specifically authorized by Engineer.

7. Accept Shop Drawing or Sample submittals from anyone other than Contractor.
8. Authorize Owner to occupy the Project in whole or in part.

ARTICLE 10 - CHANGES IN THE WORK; CLAIMS

SC-10.03.A.4. Add the following new paragraph immediately after Paragraph 10.03.A.3:

4. At the time of execution of a Change Order or Written Agreement, Owner and Contractor expressly acknowledge that said Change Order or Written Agreement provides for a fair and equitable adjustment in Contract Price and/or Contract Time for the additions, deletions, or revisions in the Work as authorized by said Change Order or Written Agreement. Owner and Contractor further expressly acknowledge that later claims for adjustments to the Contract Price and/or Contract Time associated with said Change Order or Written Agreement are not valid.

SC-10.05.G Add the following new paragraphs immediately after Paragraph 10.05.F:

- G. Should Contractor cause damage to the Work or property of any separate contractor or subcontractor at the site, or should any claim arising out of Contractor's performance of the Work at the site be made by any separate contractor against the Contractor, Owner, or Engineer, the Contractor shall promptly attempt to settle with such other contractor by agreement, or to otherwise resolve the dispute by arbitration.

Contractor shall to the fullest extent permitted by Laws and Regulations, indemnify and hold Owner or 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 separate contractor against Owner or Engineer.

ARTICLE 12 - CHANGE OF CONTRACT PRICE; CHANGE OF CONTRACT TIMES

SC-12.01.A Add the following language at the end of the last sentence of Paragraph 12.01A:

Changes in the Contract Price or Contract Time, which are agreed to by the parties by an appropriate, duly executed Change Order or Written Amendment shall constitute a full and final change or amendment to the Contract for any and all changes of which the Contractor is, or should have been, aware as of the date of the executed Change Order.

Accordingly, execution of a Change Order or Written Amendment by the Contractor shall constitute a waiver on the part of the Contractor of any further claims for changes in the Contract Price or Contract Time, which occurred or

may have occurred up through the date of any executed Change Order, whether such changes were expressly set forth in the executed change Order or not.

SC-12.03 Add the following new paragraph immediately after Paragraph 12.03.E.

- F. Time is an essential condition of the Contract. Should Contractor fail to perform any of the individual Work tasks within the period of time stipulated by the milestone(s) in the Agreement, Contractor shall pay to Owner, as liquidated damages and not as a penalty, the amounts set forth in the Agreement unless extensions of time granted by Owner expressly, waive liquidated damages in writing.

In case of joint responsibility for delay in the final completion of the Work, where two or more separate contracts are in force at the same time and cover work at the same site, liquidated damages assessed against any one contractor will be based upon the individual responsibility of that contractor for the delay as determined by, and in the judgment of, Engineer.

Owner shall have the right to deduct the liquidated damages from any money in its hands, otherwise due, or to become due, to Contractor, or to sue for and recover compensation for damages for nonperformance of this Contract within the time stipulated.

SC-12.03 Add the following new paragraph immediately after Paragraph 12.03.F:

- G. The Owner and Contractor are both aware that a substantial portion of the construction may be conducted during winter weather conditions, and that extremely variable and severe weather conditions are typical for the site of the Work. The Contractor expressly agrees that the Contract Price is based on completion of the Work within the times specified in the Agreement and under weather conditions typically encountered during the contemplated construction period at the site of the Work. For purposes of evaluating requests for extensions of time due to unusually severe weather conditions, the following conditions, and no others, will be considered unusually severe:

1. Precipitation exceeding the historical mean for the months of the construction period by more than one standard deviation;
2. For winter construction, average temperature less than the historical mean for the months of the construction period by more than one standard deviation;
3. For winter construction, number of days below freezing exceeding the historical mean for the months of the construction period by more than one standard deviation;
4. Isolated abnormal weather occurrences of a severely destructive nature, which in fact, cause such destruction at the site of the Work.

5. For the purpose of determining mean conditions, all available data contained in the records of the National Weather Service for reporting from, as well as data available from the State Climatologist for the same areas. The Contractor further agrees that should a request for time extension due to unusually severe weather conditions be made, the Contractor shall submit all necessary historical and detailed daily data during the construction period to support the claim.

ARTICLE 13 – TESTS AND INSPECTIONS; CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

SC-13.07 Add the following new paragraph immediately after Paragraph 13.07.E:

- F. Nothing in the General Conditions concerning the correction period shall establish a period of limitation with respect to any other obligation, which Contractor has under the Contract Documents. The establishment of a time period relates only to the specific obligations of the Contractor to correct the Work, and has no relationship to the time within which his obligations under the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish his liability with respect to his obligations other than to specifically correct the Work.

ARTICLE 14 - PAYMENTS TO CONTRACTOR AND COMPLETION

SC-14.02.A.1 Add the following as the last sentence of subparagraph 14.02.A.1:

Payment for materials and equipment not incorporated in the Work, but delivered and suitably stored, shall be based only upon the actual cost of such materials to Contractor, and shall not include any overhead or profit to Contractor.

SC-14.02.C.1 Delete Paragraph 14.02.C.1 in its entirety and replaced with the following:

1. Thirty days after presentation of the Application for Payment to Owner with Engineer's recommendation, the amount recommended will (subject to the provisions of Paragraph 14.02.D) become due, and when due will be paid by Owner to Contractor.

SC-14.02.D.3 Delete subparagraph 14.02.D.3 in its entirety and replace with the following:

3. Upon a subsequent determination that the Owner's refusal of payment was not justified, the amount wrongfully withheld shall be treated as an amount due as determined by Paragraph 14.02.C.1, as amended, and subject to interest as provided in the Agreement from the date of said determination, to the date of payment.

SC-14.07.C.1 Delete subparagraph 14.07.C.1 in its entirety and replace with the following:

1. The Owner shall make final payment to the Contractor in accordance with Section 14.07 of the General Conditions, except final payment shall not be due until forty-five (45) days after Owner approval of the final Application for Payment, or unless final payment is subject to statutory retention for unresolved claims as provided by C.R.S. § 38-26-107.

ARTICLE 16 – DISPUTE RESOLUTION

- SC-16.01 Delete Paragraph 16.01 A, B and C in their entirety and insert the following:
- A. In the event of any dispute or claim arising under or related to this Agreement, the parties agree to use their best efforts to settle such dispute or claim through good faith negotiations with each other. If such dispute or claim is not settled through negotiations within 30 days after the earliest date on which one party notifies the other party in writing of its desire to attempt to resolve such dispute or claim then the parties shall proceed to mediation as a condition precedent to litigation. If mediation is unsuccessful, the parties shall proceed to Weld County District Court. The Surety and any other party may be joined in the lawsuit following either party’s written request therefore. If such dispute or claim is not settled through arbitration, then either party may institute a civil action in the Weld County District Court. In either event, the prevailing party shall be awarded attorney fees and costs.

ARTICLE 17 – MISCELLANEOUS

- SC-17.07 Add the following new paragraphs immediately after Paragraph 17.06:
- A. Owner is the Town of Johnstown. All notices, letters and communication directed to Owner shall be addressed and delivered to Claud Hanes, who is designated representative (below), with a copy to J&T Consulting, Inc., Engineer.

Town of Johnstown
130 South Parish Avenue
Johnstown, CO 80534

Attention: NAME, Town Administrator

J&T Consulting, Inc.
J.C. York, P.E.
305 Denver Avenue, Suite D
Fort Lupton, CO 80621
 - B. All duties and responsibilities assigned to Engineer in the Contract Documents, with the corresponding rights and authority will be assumed by J&T Consulting, Inc. and their duly authorized agents. All notices, letters and communication directed to Engineer shall be addressed and delivered to address noted above.

- C. Owner may furnish a Resident Project Representative and assistants to aid Engineer in carrying out responsibilities at the site. The duties, responsibilities, and limitations of authority of the Resident Project Representative are set forth in paragraph SC-9.03 of these Supplementary Conditions.
- D. The business addresses of Contractor given in contract for the work and Contractor's office at the site of the Work are hereby designated as the places to which all notices, letters, and other communication to Contractor will be delivered
- E. Either Owner, Contractor, or Engineer may change his address at any time by an instrument in writing delivered to the other parties.

SC-17.08 Add the following new paragraph immediately after Paragraph 17.07:

The cross-referencing or specification sections under the heading "Related Sections" and elsewhere within each specification section is intended as an aid to the Contractor and shall not relieve the Contractor from his responsibility to coordinate the Work under the Contract Documents. Listings of cross-references are not intended to be comprehensive. The omission of a cross-reference to an additional or related requirement shall not relieve the Contractor of his obligation to provide a complete Project.

SC-17.09 Claims for Consequential Damages. The Contractor waives Claims against the Owner for consequential damages arising out of or relating to this contract. This mutual waiver includes, but is not limited to:

- A. damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- B. damages incurred by the Contractor for principal and home office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work specifically performed.

END OF SECTION

SPECIAL CONDITIONS

PART 1--GENERAL

1.01 EXISTING CONDITIONS

The bidder represents that he has carefully examined the contract documents and the site where the work is to be performed in accordance with the provisions of the General Conditions and Supplementary Conditions, and that he has familiarized himself with all local conditions and federal, state, and local laws, ordinances, rules, and regulations that may affect the performance of the work. The bidder further represents that he has studied all documents pertaining to the job site, that he has performed such additional surveys and investigations as he deems necessary to assure himself of his ability to complete the work at this bid price, and that he has correlated the results of all such data with the requirements of the contract documents.

The submittal of a bid shall be conclusive evidence that the bidder has investigated and is satisfied as to the conditions to be encountered, including locality, uncertainty of weather and all other contingencies, and as to the character, quality quantities, and scope of work.

The plans and specifications for the work show subsurface conditions or otherwise hidden conditions as they might be expected to exist; but it is not intended nor is it to be inferred that showing said conditions constitute a representation that such conditions are accurate or complete.

Where the Town or the Engineer or their consultants have made investigations of subsurface conditions in areas where the work is to be performed, such investigations were made only for the purpose of study and design. The conditions indicated by such investigations apply only at the specific location of each boring or excavation at the time the borings or excavations were made.

Where such investigations have been made, bidders or Contractors may inspect the records as to such investigations subject to the above limitations. The record of such investigations is not a part of the contract and is provided solely for the convenience of the bidder or Contractor.

No information derived from such inspection of records of investigation or compilation thereof made by the Town, the Engineer, or their consultant will in any way relieve the bidder or Contractor from any risk or from properly fulfilling the terms of the contract nor entitle the Contractor to any additional compensation.

Excavated soils which are excessively wet as determined by soil sampling and testing should be dried prior to being used in the backfill operation, or at the Contractor's option, be replaced with suitable backfill material from other areas of the project at no additional cost to the Town. Also, excavated soils containing debris, rubble, organic, and deleterious substances are not acceptable for use as backfill and shall be disposed of properly by the Contractor at no cost to the Town.

1.02 MOBILIZATION

The Contractor shall limit storage equipment and supplies and remain on the project site.

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1.04 SOILS AND CONCRETE TESTING

The Town of Johnstown will provide testing services for backfill compaction and concrete and asphalt testing.

The Contractor shall be responsible for coordinating soils testing for backfill compaction and concrete and asphalt testing. The Contractor shall give the testing service 24-hours notice for testing. The testing service reserves the right to reject any request for soils testing with less than 24-hours notice. The Contractor agrees to pay for all retesting due to failed tests at no cost to the Owner.

1.05 SURVEYING

The Contractor shall obtain and pay for surveying services for the staking of the project. The surveyor employed will be a Colorado Registered Licensed Surveyor and have the expertise to perform such services. All costs associated with surveying shall be included in the price of the project.

1.06 CONTRACTOR'S WORK HOURS

CONTRACTOR (and Subcontractor) regular working hours consist of up to 12 working hours between 7:00 a.m. and 7:00 p.m. or daylight hours, on a regularly scheduled basis, excluding Saturdays, Sundays, and holidays; unless the Contractor requests permission from the Town prior to extended hours or prior to work on Saturdays and Sundays the week prior such that the Town can make arrangements.

1.07 NOT USED

1.08 MAINTENANCE OF ACCESS TO RESIDENCES AND BUSINESSES

Street access to residences and businesses in the vicinity of the construction shall be maintained by the Contractor during the work. At least one 12-foot wide lane shall be maintained at all times for local traffic and emergency vehicle access. Lane closures must be approved by the Town of Johnstown prior to closures. The Contractor shall submit a traffic control plan to the Town of Johnstown for approval prior to any lane closure or construction.

Driveway access will likely be impacted at times. The Contractor shall make every effort to limit the time driveways are inaccessible, and shall take care to notify Town staff at least 48 hours in advance of when the driveway or parking area will be blocked or otherwise unusable.

1.09 COORDINATION AND NOTIFICATION OF SERVICE DISRUPTION

The Contractor shall personally contact each impacted household and business 48 hours in advance of temporary service disruption, informing residents and businesses of the estimated times and durations. Residents and businesses shall also be notified when service has been restored.

Service disruptions must be coordinated with the Town via the Engineer to ensure that there are no additional considerations required with service shutdowns in a particular area at a particular time.

The maximum amount of time that any resident or business may be out of service is four hours.

The maximum amount of time that fire protection lines may be out of service is four hours.

1.10 COMMUNICATION WITH THE PUBLIC

The Town will assist with communication to the impacted residences, businesses regarding the construction. The Contractor should plan on continuous communication with residents regarding work schedule for the duration of the project. The Engineer will help facilitate the efforts, but his responsibilities are not a substitute for an adequate communication plan and implementation of that plan by the Contractor.

1.11 COORDINATION WITH TOWN STAFF

The Town's Public Works Department personnel are familiar with the project and the system, and are a valuable resource for information. However, they have many responsibilities, are not available at all times, and individuals may not have all the information available that is needed to make a field decision. The Contractor will only receive direction in the field from the Engineer and/or the Town.

1.12 CONSTRUCTION PHASING AND SCHEDULING

Substantial completion will require that all improvements are constructed.

Final completion will require that all punch list items are addressed and all remaining construction is completed (i.e. seeding and reclamation).

1.13 LOCATING AND MARKING EXISTING UTILITIES

The Contractor shall have all existing utilities marked prior to construction and verify their location. Existing utility information shown on the Drawings has been confirmed by only limited locate and potholing data, and may not reflect the exact position of existing utilities, and may not show all the utility lines present.

The Town will mark Town-owned utilities, but other utilities will need to be located. Coordinate utility locates through the Utility Notification Center of Colorado, 811.

Town-located utilities will be marked only one time. The Contractor shall be responsible for maintaining the locate marks. The Contractor must request the locates of town-owned utilities periodically as the work progresses rather than as a single event. Requests for locates shall not precede the construction activity in any given area by more than 2 weeks.

1.14 CONSTRUCTION MATERIAL STOCKPILE REQUIREMENTS

Construction stockpiles for earth, road base materials and pipe materials should be placed on-site. Contractor shall coordinate and review stockpiling with the Town prior to the work.

Measures to control migration of sediment from stockpiles should be put in place, especially if left overnight or over a weekend or other break in the work.

1.15 CONSTRUCTION EQUIPMENT

The Town has expressed the need to maintain the condition of the existing pavement and concrete infrastructure outside the project work areas, and along equipment and material haul routes. The use of appropriate construction equipment that is adequate to complete the required work for this project while

minimizing pavement and concrete damage outside the defined work areas shall be required. The Contractor shall be held responsible for damages outside the defined work areas created by his activities.

1.16 PROTECTION OF EXISTING UTILITIES

Existing utilities that are not scheduled for replacement, removal or relocation shall be protected to avoid disruption of service. Adequate shoring, bracing and blocking shall be put in place to avoid damage or shifting of the utility lines and trench materials. All repairs required due to the work of the Contractor shall be the responsibility of the Contractor.

1.17 OPERATING EXISTING VALVES AND HYDRANTS

Existing valves and hydrants are to be operated by Town Public Works Department personnel only. Coordinate with Town personnel and the Engineer when operating any new valve adjacent to an existing water line.

1.18 CONSTRUCTION WATER

Use of a fire hydrant to supply construction water will require the Contractor to pay a \$1,500 fee for renting each meter and backflow preventer from the Town, as well as a non-refundable \$25 administration fee for each meter. Water usage will not be charged for by the Town, and the balance of the fee shall be refunded when the meter and backflow preventer are returned if there are no damages to the meter and backflow preventer. Construction water from the Town may not be obtained from an unmetered source.

1.19 PROTECTION OF EXISTING LANDSCAPING

Existing landscaping in the vicinity of the work areas shall be protected from damage, including lawns, shrubs and trees. Landscaping that interferes with the work may be removed after discussions with the property owner and approval from the Town and must be replaced in a manner satisfactory to the property owner and the Engineer. Damaged landscaping shall be replaced in-kind at the expense of the Contractor.

1.20 END OF WORKDAY SITE CONDITIONS

Streets where there is active work shall be swept daily at the end of the work shift.

1.21 COORDINATION AND REQUIREMENTS FOR UTILITY COMPANIES

Contractor shall coordinate with Poudre Valley REA for shielding overhead power lines (if required) in order to complete the work. Contractor shall maintain safe distances from overhead power lines to complete the work.

Contractor shall coordinate with Poudre Valley REA for any construction activities near overhead power lines. Contractor shall pay for material labor and equipment to shield overhead power lines and provide invoicing from Poudre Valley REA to the Town with the Contractor's monthly application for payment.

Contractor shall coordinate with Poudre Valley REA for holding or supporting any overhead power line pole if required and pay any charges for holding or supporting any overhead power line pole.

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Poudre Valley REA will not leave a support truck over night. Contractor shall provide a support truck from an independent company with acceptable equipment to hold over night and Poudre Valley REA would assist in the proper setup. Contractor shall pay for material labor and equipment to re-install and provide invoicing from United Power Company to the Town with the Contractor's monthly application for payment.

Contractor shall coordinate with Xcel Energy company for requirements for crossing oil/gas lines with heavy equipment to ensure their lines are protected during the hauling of excess excavation materials. Contractor to ensure that Xcel has access to these lines and all equipment and operation areas at all times during construction.

END OF SECTION

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION

- A. All work to be performed under this Contract is located at the areas shown on the attached drawings.

1.02 DESCRIPTION OF WORK

- A. The work of this Contract consists of furnishing all labor, materials, equipment, and incidentals required and performing all construction, installation, and testing of all improvements, modifications, and additions, as shown on the Drawings and specified in these specifications. The work includes, but is not necessarily limited to: new water, and storm sewer piping; manholes, vaults, valves, fittings and appurtenances; reinforced cast-in-place concrete foundations and structures, sluice gates and actuators, hand rail, excavation, compacted fill, excess excavation hauling to off-site location, riprap and bedding placement, trenching and backfilling; dewatering, grading, fencing, connections to existing facilities, seeding; miscellaneous work and cleanup. Major items of the work include the following as shown on the Construction Drawings:

Mobilization: This work shall include all labor, equipment, materials, and incidentals required to mobilize the Contractor's work forces to complete the Project. This Base Bid Item shall have a maximum cost of 10 percent of the total Base Bid Amount as shown on the Bid Form.

Erosion Control: This work includes all labor, materials, equipment, and incidentals required for construction, support, for providing, installing and maintaining erosion control measures during the construction.

Construction Staking: This work includes all labor, materials, equipment, and incidentals required for construction.

Dewatering: This work includes all labor, materials, equipment, and incidentals required for dewatering the work areas, assuming that the reservoir has been initially drained by the Town prior to the start of construction.

Removals and Disposals: This work includes all labor, materials, equipment, and incidentals required for removing and disposing of the items.

Excavation and Fill: This work includes all labor, materials, equipment, and incidentals required for construction, support, connection, materials testing, including excavation, clearing and grubbing, grading, dewatering, subgrade preparation, fill placement, and seeding/restoration.

Concrete Mud Mat: This work includes all labor, materials, equipment, and incidentals required for providing and installing the mud mat

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Reinforced Concrete Structures: This work includes all labor, materials, equipment, and incidentals required for construction, support, connection, including excavation, backfilling, for providing and installing all cast-in-place concrete and appurtenances involved with the structures.

Concrete Bridge: This work includes all labor, materials, equipment, and incidentals required for construction, support, and connection, for providing and installing the concrete bridge

Handrails: This work includes all labor, materials, equipment, and incidentals required for construction.

Water Piping: This work includes all labor, materials, equipment, and incidentals required for construction, support, connection, testing of all pipelines, utilities, including excavation, backfilling, manholes, and fittings for all pipelines on this Project.

Sluice Gates and Operators: This work includes all labor, materials, equipment, and incidentals required for construction, support, connection, and testing of the gates and actuators.

Roadbase: This work includes all labor, materials, equipment, and incidentals required for construction.

Soil Riprap: This work includes all labor, materials, equipment, and incidentals required for construction.

1.03 CONTRACTOR'S USE OF PREMISES

- A. Contractor will not have complete and exclusive use of the premises for the performance of the work.
- B. Contractor shall limit the use of the premises for his/her work and for storage to allow for through traffic and operation of existing facilities during construction. The Contractor shall keep in mind that the Owner will continue to operate the existing facilities throughout construction.
- C. Contractor shall coordinate the use of the premises with the Owner. Areas requiring shutdown of the existing facilities shall be coordinated with the Owner 48 hours prior to taking those facilities out of service.
- D. Contractor shall assume full responsibility for security of all his/her, and his/her subcontractor's, materials and equipment stored on the site.
- E. Contractor, if directed by the Owner and/or Engineer, shall move any stored items that interfere with the operations of the Owner.
- F. Contractor shall obtain and pay for use of additional storage if needed to perform the work.

1.04 OWNER OCCUPANCY

- A. Owner will occupy premises during performance of the work for the conduct of his/her normal operations. Coordinate all construction operations with the Owner to minimize conflict and to facilitate Owner usage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01 20 00

MEASUREMENT AND PAYMENT PROCEDURES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Measurement and payment shall be as specified in this Section.
- B. Work to be performed under this contract will be paid for on a unit cost or lump sum basis under the appropriate unit cost or lump sum Bid Items shown on the Bid Schedule. No item of Work shown on the Drawings or in the Specifications will be considered for extra compensation due to a claim that it does not fall within the scope of one of the Bid items.
- C. Contractor shall, within 10 days of receipt of Notice to Proceed, submit a complete breakdown of lump sum and unit cost bid items (Schedule of Values) showing value assigned to each part of Work. Payment for materials delivered but not fully incorporated in Work will be made only if such materials are listed and assigned a value in Contractor's Schedule of Values.
- D. The work of this Contract consists of furnishing all labor, materials, equipment and incidentals required and performing all construction, installation and testing of all improvements, modifications and additions, all as shown on the Drawings and specified in these Specifications.

1.02 BID ITEMS

PHASE 1 ITEMS

General Items

- 1. Project Mobilization/Demobilization
Shall include all labor, materials, equipment, and incidentals required for the Contractor to mobilize. Shall include all costs for Contractor's insurance and bonds, construction permits and fees, job trailers and site administration expenses, utilities including power, telephone, etc. This item shall not exceed more than ten (10) percent of the Base Bid. This item will be paid 50 percent of the total at 25 percent project completion, an additional 30 percent of the total at 50 percent project completion, and the remaining 20 percent of the total at 100 percent project completion.
- 2. Erosion Control
Shall include all labor, materials, equipment, and incidentals required for construction.
- 3. Dewatering Required to Complete the Project
Shall include all labor, materials, equipment, and incidentals required for construction.
- 4. Construction Staking
Shall include all labor, materials, equipment, and incidentals required for construction.

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Reservoir Infrastructure

5. Clearing, Grubbing, Striping/Stockpiling/Replacing Topsoil
Shall include all labor, materials, equipment, and incidentals required for construction.
6. Site Restoration of all Disturbed Areas (final grading, seeding, mulching)
Shall include all labor, materials, equipment, and incidentals required for construction.
7. Embankment Excavation
Shall include all labor, materials, equipment, and incidentals required for construction.
8. Embankment Backfill
Shall include all labor, materials, equipment, and incidentals required for construction.
9. Remove and Dispose of Existing 16 in Clay Outlet Pipe and Concrete Vault
Shall include all labor, materials, equipment, and incidentals required for construction.
10. Concrete Outlet Tower Structure, Including Sluice Gate, Steel Grate, Trash Screens
Shall include all labor, materials, equipment, and incidentals required for construction.
11. 40ft Precast Concrete Bridge, Including Footer, Connections and Appurtenances
Shall include all labor, materials, equipment, and incidentals required for construction.
12. 1-1/2 in Diameter Galvanized Steel Handrail, Including all Appurtenances
Shall include all labor, materials, equipment, and incidentals required for construction.
13. Concrete Mud Mat
Shall include all labor, materials, equipment, and incidentals required for construction.
14. 24 in Restrained Joint, Concrete Encased, Ductile Iron Class 250 Outlet Pipe
Shall include all labor, materials, equipment, and incidentals required for construction.
15. 4ft Diameter Concrete Flat-Top Manhole, Including Connection to Perforated Toe Drain Pipe.
Shall include all labor, materials, equipment, and incidentals required for construction
16. 4 ft Diameter Concrete Flat-Top Manhole, Including Connection to Existing RCP Pipe
Shall include all labor, materials, equipment, and incidentals required for construction.
17. Fill Around Manhole
Shall include all labor, materials, equipment, and incidentals required for construction.
18. Remove and Replace Existing Toe Drain with 8" Contech A-2000 Perforated Toe Drain Pipe, Including No 8 or No 89 Aggregate Filter Gravel, and ASTM C-33 Concrete Sand Bedding
Shall include all labor, materials, equipment, and incidentals required for construction.

Project Allowances

19. Utility Conflicts/Contingency - Additional requirements for modifying utilities not identified in drawings and/or for utility repair. Contractor to provide schedule of values and breakdown of required materials and labor for installation for review and approval before this allowance will be used.

The use of this bid item shall be authorized by written order, and shall be binding on the Owner and the Contractor. The Engineer will authorize minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents and paid to the Contractor through use of this allowance bid item. Executed Authorization of Allowance Account must be agreed to by the Owner and Contractor in order to empower use of this bid item.

PHASE 2 ITEMS (Additive Alternate)

General Items

1. Project Mobilization/Demobilization
Shall include all labor, materials, equipment, and incidentals required for the Contractor to mobilize. Shall include all costs for Contractor's insurance and bonds, construction permits and fees, job trailers and site administration expenses, utilities including power, telephone, etc. This item shall not exceed more than ten (10) percent of the Base Bid. This item will be paid 50 percent of the total at 25 percent project completion, an additional 30 percent of the total at 50 percent project completion, and the remaining 20 percent of the total at 100 percent project completion.
2. Erosion Control
Shall include all labor, materials, equipment, and incidentals required for construction.
3. Construction Staking
Shall include all labor, materials, equipment, and incidentals required for construction.
4. Clearing, Grubbing, Striping/Stockpiling/Replacing Topsoil
Shall include all labor, materials, equipment, and incidentals required for construction.
5. Site Restoration of all Disturbed Areas (final grading, seeding, mulching)
Shall include all labor, materials, equipment, and incidentals required for construction.

Reservoir Infrastructure

6. Crest and Slope Fill, Bring Crest to Minimum 4986 Elevation All Around Reservoir
Shall include all labor, materials, equipment, and incidentals required for construction.
7. 6" Thick CDOT Class 6 Roadbase on Reservoir Crest
Shall include all labor, materials, equipment, and incidentals required for construction.

8. 18" Thick D50 = 9" Type L Soil Riprap on Emergency Spillway
Shall include all labor, materials, equipment, and incidentals required for construction.

Project Allowances

9. Utility Conflicts/Contingency - Additional requirements for modifying utilities not identified in drawings and/or for utility repair. Contractor to provide schedule of values and breakdown of required materials and labor for installation for review and approval before this allowance will be used.

The use of this bid item shall be authorized by written order, and shall be binding on the Owner and the Contractor. The Engineer will authorize minor changes in the Work not involving an adjustment in the Contract Sum or an extension of the Contract Time and not inconsistent with the intent of the Contract Documents and paid to the Contractor through use of this allowance bid item. Executed Authorization of Allowance Account must be agreed to by the Owner and Contractor in order to empower use of this bid item.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

01 20 00-4

SECTION 01 30 00

ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Progress meetings.

1.2 COORDINATION AND PROJECT CONDITIONS

- A. Coordinate scheduling, submittals, and Work of various sections to ensure efficient and orderly sequence of installation of interdependent construction elements.
- B. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

1.3 FIELD ENGINEERING

- A. Employ Land Surveyor registered in State of Colorado and acceptable to Owner.
- B. Locate and protect survey control and reference points. Promptly notify Engineer of discrepancies discovered.
- C. Control datum for survey is that shown on Drawings.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of liner drawings signed by Land Surveyor depicting elevations and locations of the as constructed Work.
- G. Maintain complete and accurate log of survey control work as Work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

01 30 00- 1

- I. Promptly report to Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

1.4 PRECONSTRUCTION MEETING

- A. Engineer will schedule meeting after notice has been given to Owner that construction will begin.
- B. Attendance Required: Owner, Owner's Representative, Engineer, Geotechnical Engineer, Surveyor, and Contractor.
- C. Agenda:
 - 1. Distribution of Contract Documents.
 - 2. Submission of list of Subcontractors, list of products, and progress schedule.
 - 3. Designation of personnel representing parties in Contract, and Engineer.
 - 4. Procedures and processing of field decisions, submittals, substitutions.
 - 5. Scheduling.
 - 6. Scheduling activities of Geotechnical Engineer.
- D. Record minutes and distribute copies within seven days after meeting to participants, with two copies to Engineer, Owner, and those affected by decisions made.

1.5 PROGRESS MEETINGS

- A. Engineer will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- B. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner and/or Owner's Representative, Engineer, as appropriate to agenda topics for each meeting.
- C. Agenda:
 - 1. Review minutes of previous meetings.
 - 2. Review of Work progress.
 - 3. Field observations, problems, and decisions.
 - 4. Identification of problems impeding planned progress.
 - 5. Review of submittals schedule and status of submittals.
 - 6. Maintenance of progress schedule.
 - 7. Corrective measures to regain projected schedules.
 - 8. Planned progress during succeeding work period.
 - 9. Coordination of projected progress.
 - 10. Maintenance of quality and work standards.
 - 11. Effect of proposed changes on progress schedule and coordination.
 - 12. Other business relating to Work.

- D. Record minutes and distribute copies within seven days after meeting to participants, with two copies to Engineer, Owner, and those affected by decisions made.

END OF SECTION

01 30 00- 3

SECTION 01 32 16

CONSTRUCTION PROGRESS SCHEDULES

PART 1 GENERAL

1.01 CONTRACTOR REQUIREMENTS INCLUDED

- A. The Contractor shall submit his/her proposed Schedule of Work in accordance with the provisions and time frames stated in this Section and in the Contract. Three copies of all Schedules and Schedule updates shall be submitted initially and monthly thereafter.
- B. Contractor shall submit updated Schedule of Work monthly or more frequently when required and acceptable to the Engineer. Progress payment shall not be made unless the Contractor submits the monthly schedule update.
- C. Contractor's Schedule is to be considered and used as a working tool, and will not become part of Contract or Contract Documents.

1.02 RELATED REQUIREMENTS

- A. Conditions of Contract
- B. Section 01 11 00: Summary of Work
- C. Section 01 33 00: Submittal Procedures

1.03 FORM OF SCHEDULES

- A. The Schedule of Work shall utilize a Critical Path Method (CPM). Contractor shall prepare, maintain, and furnish current detailed progress and schedule charts using the CPM schedule, which shall support the Contract performance dates. Schedule shall identify Work in Contract in sufficient detail to ensure compliance with Contract dates, schedules, and sequences of construction.
- B. CPM schedule shall be maintained throughout life of Contract. Contractor shall designate an authorized representative within its firm who will be responsible for preparation of the CPM network plan and schedule and for monitoring progress of Project.
 - 1. Schedule submittal: In accordance with the Contract. Contractor shall submit to the Engineer complete CPM. A schedule of estimated monthly progress payments shall be developed by Contractor and submitted with CPM network plan. Contractor shall also submit Schedule of Values and schedule of Shop Drawings and sample submittals.
 - 2. Acceptance of Contractor's Schedule by Engineer will not relieve Contractor from compliance with all conditions of the Contract. Errors and omissions in accepted

Contractor's Schedule will not be cause for future claims by Contractor for extra costs or increased Contract Time.

4. Schedule is Contractor's schedule, prepared by him and he remains solely responsible for adherence thereto.
5. Changes to Schedule: Contractor may at any time make changes to its current plan and schedule upon notification to Engineer. Contractor shall submit changes schedule for any of the following reasons:
 - a. When delay in completion of any activity or group of activities indicates an extension of scheduled Project completion including delays which may be involved with change orders, strikes, unusual weather, etc.
 - b. Delays in submittals or deliveries or work stoppage are encountered which make re-planning or rescheduling of Work necessary.
 - c. Schedule does not represent actual prosecution and progress of Project.
6. Engineer's acceptance of changes to Schedule and all relevant data is contingent upon compliance with all other paragraphs of this Section and any other previous agreements or requirements by Engineer.
7. Contractor's cost of revisions to Schedule due to any cause shall be responsibility of Contractor.
8. Adjustment of Contract Completion: Contract Time will be adjusted only by Change Order for causes specified in this Contract. In the event Contractor requests an extension of Contract Time, he shall furnish such justification, CPM data, and supporting evidence as follows for a determination as to whether or not Contractor is entitled to an extension of Time under provisions of Contract: all CPM logic revisions, duration changes, and cost changes for Work in question and its relationship to other activities on accepted, current network plan.
9. Contractor shall submit a brief narrative report as part of monthly update. Narrative report shall include a description of problem areas; current and anticipated delaying factors and their estimated impact on performance of other activities and completion dates; and an explanation of corrective action taken or proposed.

C. Contractor failure to comply with this Section shall be a material breach of this Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

01 32 16 - 2

SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Test reports.
- G. Certificates.
- H. Manufacturer's instructions.
- I. Construction photographs.

1.2 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Sequentially number transmittal forms. Mark revised submittals with original number and sequential alphabetic suffix.
- C. Identify Project, Contractor, subcontractor and supplier; pertinent drawing and detail number, and specification section number, appropriate to submittal.
- D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work.
- E. Schedule submittals to expedite Project, and deliver to Engineer. Coordinate submission of related items.
- F. For each submittal for review, allow 14 days excluding delivery time to and from Contractor.
- G. Allow space on submittals for Contractor and Engineer review stamps.

01 33 00- 1

- H. When revised for resubmission, identify changes made since previous submission.
- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report inability to comply with requirements.
- J. Submittals not requested will not be recognized or processed.
- K. Provide copies of approved submittals to Owner and Owner's Representative.

1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit preliminary outline Schedules within 14 days after date notice is given to Owner that work is scheduled to begin. After review, submit detailed schedules within 7 days modified to accommodate revisions recommended by Owner.
- B. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- C. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- D. Submit computer generated horizontal bar chart with separate line for each section of Work, identifying first work day of each week.
- E. Indicate estimated percentage of completion for each item of Work at each submission.
- F. Submit separate schedule of submittal dates for shop drawings, product data, and samples, and dates reviewed submittals will be required from Engineer.
- G. Indicate delivery dates for products.
- H. Revisions To Schedules:
 - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
 - 2. Identify activities modified since previous submittal.

1.4 PROPOSED PRODUCTS LIST

- A. Within 14 days after date notice is given to Owner that work is scheduled to begin, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.5 PRODUCT DATA

- A. Product Data: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Design Documents
- B. Submit number of copies Contractor requires, plus three copies Engineer will retain.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Design Documents.
- B. Submit number of opaque reproductions Contractor requires, plus three copies Engineer will retain.
- C. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

1.7 TEST REPORTS

- A. Submit for Engineer's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Design Documents.

1.8 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Engineer.

1.9 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, [start-up,] adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.10 CONSTRUCTION PHOTOGRAPHS

- A. Provide photographs of construction throughout progress of Work to Engineer.
- B. Photographs: to be delivered in electronic format, JPG files, or approved equal.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

01 33 00- 4

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Quality control and control of installation.
- B. Tolerances.
- C. References.
- D. Testing and inspection services.
- E. Testing Standards.
- F. Quality Control Testing.

1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Design Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.3 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

01 40 00- 1

- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes or these Specifications.
- B. Conform to reference standard by date of issue current on Design Documents, except where specific date is established by code.
- C. When specified reference standards conflict with Contract Documents, request clarification from Engineer before proceeding.

1.5 TESTING AND INSPECTION SERVICES

- A. Coordinate with Owner's testing agency or laboratory to perform specified testing.
- B. The testing firm will perform tests, inspections and other services specified in individual specification sections and as required by Engineer.
 - 1. Laboratory: Authorized to operate in State of Colorado.
 - 2. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
 - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an acceptable accuracy.
- C. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Engineer or Owner.
- D. Reports will be submitted by testing firm to Engineer, Contractor, and Owner, indicating observations and results of tests and indicating compliance or non-compliance with Design Documents.
 - 1. Submit final report indicating status of Work previously reported as non-compliant.
- E. Cooperate with testing firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Engineer and testing firm 48 hours prior to expected time for operations requiring services.
- F. Testing and employment of testing agency laboratory or any other form of quality control or quality assurance shall not relieve Contractor of obligation to perform Work in accordance with requirements of Construction Documents.

- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same testing firm on instructions by Engineer.
- H. Testing Agency Responsibilities:
 - 1. Test samples of mixes submitted by Contractor.
 - 2. Provide qualified personnel at site for on-site testing and/or observations.
 - 3. Perform specified sampling and testing of products in accordance with specified standards.
 - 4. Ascertain compliance of materials, mixes and methods with requirements of Design Documents.
 - 5. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
 - 6. Perform additional tests required by Engineer.
 - 7. Attend preconstruction meetings and progress meetings.
- I. Testing Agency Reports: After each test or site visit, promptly submit two copies of report to Engineer, Contractor, and Owner. When requested by Engineer, provide interpretation of test results. Include the following:
 - 1. Date issued.
 - 2. Project title and number.
 - 3. Name of inspector.
 - 4. Date and time of sampling or inspection.
 - 5. Identification of product and specifications section.
 - 6. Location in Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Design Documents.
- J. Limits On Testing Authority:
 - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of design Documents.
 - 2. Agency or laboratory may not approve or accept any portion of the Work.
 - 3. Agency or laboratory may not assume duties of Contractor.
 - 4. Agency or laboratory has no authority to stop the Work.
 - 5. Agency has no responsibility or authority regarding job site safety.

1.6 TESTING STANDARDS

- A. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
5. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
6. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
7. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

B. The percent compaction requirements for earthwork will be evaluated as follows:

The in-place density as compacted by the Contractor will be determined by the field density test using the sand-cone method or the nuclear method. The maximum dry density of the fill at the location of the in-place density test will be estimated using full-curve compaction test (family of curves) of representative fill materials. The full-curve compaction tests will be performed according to ASTM D698. The percent compaction in-place will be calculated as the ratio (in percent) of the in-place dry density to the estimated maximum dry density of the compacted fill at the location of the in-place density test.

1.7 QUALITY CONTROL TESTING

Schedule of quality control testing shall be as summarized in Table 1 below:

Material	Test	Test Schedule
All Fill	Sieve Analysis (ASTM C136), USCS Classification (ASTM D2487), Standard Proctor (ASTM D698)	Every 2,000 cubic yards or each individual source/material
All Fill	In-place density & water content (ASTM D2922 and ASTM D3017)	Every 500 cubic yards or each individual source/material, minimum 1 per day

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

01 40 00- 4

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Temporary Utilities:
 - 1. Temporary electricity.
 - 2. Telephone service.
 - 3. Facsimile service.
 - 4. Temporary water service.
 - 5. Temporary sanitary facilities.

- B. Construction Facilities:
 - 1. Field offices and sheds.
 - 2. Vehicular access.
 - 3. Parking.
 - 4. Progress cleaning and waste removal.
 - 5. Traffic regulation.

- C. Temporary Controls:
 - 1. Barriers.
 - 2. Enclosures and fencing.
 - 3. Security.
 - 4. Water control.
 - 5. Dust control.
 - 6. Erosion and sediment control.
 - 7. Noise control.
 - 8. Pollution control.

- D. Removal of utilities, facilities, and controls.

1.2 TEMPORARY ELECTRICITY

- A. Complement existing power service capacity and characteristics as required for construction operations.

1.3 TELEPHONE SERVICE

- A. Provide, and maintain telephone service to field office at time of project mobilization and throughout the project.

01 50 00- 1

- 1.4 FACSIMILE SERVICE
 - A. Provide and maintain to field office at time of project mobilization.
- 1.5 TEMPORARY WATER SERVICE
 - A. Provide suitable quality water service as needed to maintain specified conditions for construction operations
- 1.6 TEMPORARY SANITARY FACILITIES
 - A. Provide and maintain required facilities and enclosures.
- 1.7 FIELD OFFICES AND SHEDS
 - A. Contractor is to provide sufficient space for field offices to incorporate plan layout space, and a table for phone/fax services.
- 1.8 VEHICULAR ACCESS
 - A. Existing site access is to be used for construction access.
- 1.9 PARKING
 - A. Provide temporary parking areas to accommodate construction personnel.
 - B. Maintenance:
 - 1. Maintain traffic and parking areas in sound condition.
 - C. Mud From Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.
- 1.10 PROGRESS CLEANING AND WASTE REMOVAL
 - A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.
 - B. Collect and remove waste materials, debris, and rubbish from site as needed and dispose off-site.
- 1.11 TRAFFIC REGULATION
 - A. Signs, Signals, And Devices:
 - 1. Post Mounted Traffic Control and Informational Signs: As approved by Weld County.
 - B. Haul Routes:
 - 1. Confine construction traffic to designated haul routes.

1.12 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plants designated to remain. Replace damaged plants.

1.13 ENCLOSURES AND FENCING

- A. Construction: Contractor's option to install fencing as required to limit access to the site and provide safety barrier from construction activities.

1.14 SECURITY

- A. Security Program:
 - 1. Protect Work from theft, vandalism, and unauthorized entry.
- B. Entry Control:
 - 1. Restrict entrance of persons and vehicles into Project site.
 - 2. Allow entrance only to authorized persons with proper identification.
 - 3. Maintain log of visitors, make available to Owner on request.
 - 4. Coordinate access of Owner's personnel to site.

1.15 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water.

1.16 DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
- C. Comply with all Federal, State, and local regulations concerning dust control.

1.17 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.

- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Comply with all Federal, State, and local regulations concerning erosion and sediment control, and dewatering and stormwater discharges related to construction activity.

1.18 NOISE CONTROL

- A. Provide methods, means, and facilities to minimize noise produced by construction operations.
- B. Comply with all Federal, State, and local regulations concerning erosion and sediment control, and dewatering and stormwater discharges related to construction activity.

1.19 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of the Colorado Department of Health and Environment, and the Environmental Protection Agency.

1.20 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Final Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary work.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

01 50 00- 4

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.

1.2 PRODUCTS

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Furnish interchangeable components from same manufacturer for components being replaced.

1.3 PRODUCT DELIVERY REQUIREMENTS

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.

01 60 00- 1

- E. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- G. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.

1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Engineer will consider requests for Substitutions only within 14 days after date notification to Owner that work has been scheduled to begin.
- B. Substitutions may be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Contractor:
 - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for Substitution as for specified product.
 - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.
- F. Substitution Submittal Procedure:
 - 1. Submit two copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
 - 2. Submit Shop Drawings, Product Data, and certified test results attesting to proposed product equivalence. Burden of proof is on proposer.
 - 3. Engineer will notify Contractor in writing of decision to accept or reject request.

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

01 60 00- 3

SECTION 01 70 00

EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Closeout procedures.
- B. Final cleaning.
- C. Protecting installed construction.
- D. Project record documents.

1.2 CLOSEOUT PROCEDURES

- A. Submit written certification that Design Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Design Documents and ready for Engineer's review.
- B. Provide submittals to Engineer required by Owner.

1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean site; sweep paved areas, rake clean landscaped surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from site.

1.4 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Prohibit traffic from landscaped areas.

1.5 PROJECT RECORD DOCUMENTS

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

01 70 10- 1

2. Specifications.
 3. Addenda.
 4. Modifications to the Design Documents.
 5. Reviewed Shop Drawings, Product Data, and Samples.
 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly, including survey of excavated surfaces and liner embankment placement.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
1. Manufacturer's name and product model and number.
 2. Product substitutions or alternates utilized.
 3. Changes made by Addenda and modifications.
- F. Record Drawings: Legibly mark each item to record actual construction including:
1. Surveyed elevations of excavations and limits/locations of fill for each fill type.
 2. Surveyed horizontal locations of each fill type.
 3. Surveyed locations/elevations of and geologic anomalies encountered during construction.
 4. Field changes of dimension and detail.
 5. Details not on original Design drawings.
- G. Submit documents to Engineer.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

01 70 10- 2

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Formwork for cast-in place concrete.
 - 2. Shoring, bracing, and anchorage.
 - 3. Architectural form liners.
 - 4. Form accessories.
 - 5. Form stripping.

- B. Related Sections:
 - 1. Section 03 20 00 - Concrete Reinforcing.
 - 2. Section 03 30 00 - Cast-In-Place Concrete.
 - 3. Section 04 20 00 - Unit Masonry: Product requirements for masonry accessories for placement by this Section.
 - 4. Section 05 50 00 - Metal Fabrications: Product requirements for metal fabrications for placement by this Section.
 - 5. Section 32 13 13: Concrete Paving.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Formwork (Vertical Structures):
 - 1. Basis of Measurement: Incidental to all concrete work.
 - 2. Basis of Payment: Includes form materials, placement, placing accessories, stripping.

- B. Formwork (Horizontal Supported Structures):
 - 1. Basis of Measurement: Incidental to all concrete work.
 - 2. Basis of Payment: Includes form materials, placement, placing accessories, stripping.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 - Specifications for Structural Concrete.
 - 3. ACI 318 - Building Code Requirements for Structural Concrete.
 - 4. ACI 347 - Guide to Formwork for Concrete.

- B. American Forest and Paper Association:

03 10 00- 1

- 1. AF&PA - National Design Specifications for Wood Construction.
 - C. The Engineered Wood Association:
 - 1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.
 - D. ASTM International:
 - 1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
 - 2. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - E. West Coast Lumber Inspection Bureau:
 - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- 1.4 DESIGN REQUIREMENTS
- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and code requirements to achieve concrete shape, line and dimension as indicated on Drawings.
- 1.5 PERFORMANCE REQUIREMENTS
- A. Not applicable to this Project.
- 1.6 SUBMITTALS
- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- 1.7 SUSTAINABLE DESIGN SUBMITTALS
- A. Not applicable to this Project.
- 1.8 QUALITY ASSURANCE
- A. Perform Work in accordance with ACI 347, ACI 301, and ACI 318.
 - B. Perform Work in accordance with CDOT standards.
- 1.9 MOCK-UP
- A. Not applicable to this Project.
- 1.10 DELIVERY, STORAGE, AND HANDLING
- A. Section 01 60 00 - Product Requirements: Products storage and handling requirements.

1.11 COORDINATION

- A. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor. Contractor to provide submittal.

2.2 PREFABRICATED FORMS

- A. Manufacturers: At discretion of Contractor. Contractor to provide submittal.
- B. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.
- C. Form Liners: Smooth, durable, grainless and non-staining hardboard, unless otherwise indicated on Drawings.

2.3 ARCHITECTURAL FORM LINERS

- A. Not applicable to this Project.

2.4 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, metal, free of defects capable of leaving blemishes in concrete surface as determined by Engineer.
- B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.
- C. Form Anchors and Hangers:
 - 1. Do not use anchors and hangers exposed concrete leaving exposed metal at concrete surface.
 - 2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
 - 3. Penetration of structural steel members is not permitted.
- D. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
 - 1. Manufacturers:
 - a. Arcal Chemical Corporation Arcal-80.

- b. Industrial Synthetics Company Synthex.
 - c. Nox-Crete Company Nox-Crete Form Coating.
 - d. Or approved equivalent
- E. Corners: Chamfer, rigid plastic or wood strip type; size as applicable.
 - F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.
 - G. Water Stops: Rubber and Polyvinyl chloride, minimum 1,750 psi tensile strength, minimum 50 degrees F to plus 175 degrees F working temperature range, ribbed profile, preformed corner sections, heat welded jointing.

2.5 COATINGS

- A. Not applicable to this Project.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Engineer.

3.2 INSTALLATION

- A. Earth Forms:
 1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing widths indicated on Drawings.
 2. Trim sides and bottom of earth forms.
 3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
 4. Form sides of footings where earth sloughs.
 5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.
- B. Formwork - General:
 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.

03 10 00- 4

2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
 5. Complete wedging and bracing before placing concrete.
- C. Forms for Smooth Finish Concrete:
1. Use steel, plywood or lined board forms.
 2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
 3. Install form lining with close-fitting square joints between separate sheets without springing into place.
 4. Use full size sheets of form lines and plywood wherever possible.
 5. Tape joints to prevent protrusions in concrete.
 6. Use care in forming and stripping wood forms to protect corners and edges.
 7. Level and continue horizontal joints.
 8. Keep wood forms wet until stripped.
- D. Architectural Form Liners:
1. Erect architectural side of formwork first.
 2. Attach form liner to forms before installing form ties.
 3. Install form liners square, with joints and pattern aligned.
 4. Seal form liner joints to prevent grout leaks.
 5. Dress joints and edges to match form liner pattern and texture.
- E. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.
- F. Framing, Studding and Bracing:
1. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
 2. Construct beam soffits of material minimum of 2 inches thick.
 3. Distribute bracing loads over base area on which bracing is erected.
 4. When placed on ground, protect against undermining, settlement or accidental impact.
- G. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and ACI 318.
- H. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.

- I. Obtain Engineer's approval before framing openings in structural members not indicated on Drawings.
- J. Install chamfer strips on external corners of beams, joists, columns, and walls.
- K. Do not reuse damaged wood formwork. Do not patch formwork.

3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms for concrete indicated to receive "scored finish". Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.
- D. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Install water stops continuous without displacing reinforcement. Heat seal joints watertight.
- F. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- G. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.
- H. Form Ties:
 - 1. Use sufficient strength and sufficient quantity to prevent spreading of forms.

2. Place ties at least 1 inch away from finished surface of concrete.
 3. Leave inner rods in concrete when forms are stripped.
 4. Space form ties equidistant, symmetrical and aligned vertically and horizontally
- I. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- J. Construction Joints:
1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.
 2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.
 3. Show no overlapping of construction joints.
 4. Arrange joints in continuous line straight, true and sharp.
- K. Embedded Items:
1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
 2. Do not embed wood or uncoated aluminum in concrete.
 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- L. Openings for Items Passing Through Concrete:
1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
 2. Coordinate work to avoid cutting and patching of concrete after placement.
 3. Perform cutting and repairing of concrete required as result of failure to provide required openings.
- M. Screeds:
1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
 2. Slope slabs to drain where required or as shown on Drawings.
 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.
- N. Cleanouts and Access Panels:
1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
 2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301 and ACI 318.

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

03 10 00- 8

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Reinforcing bars.
 - 2. Welded wire fabric.
 - 3. Reinforcement accessories.
- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories.
 - 2. Section 03 30 00 - Cast-In-Place Concrete.
 - 3. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Grounding concrete reinforcement.
 - 4. Section 32 13 13: Concrete Paving.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Bar Reinforcement:
 - 1. Basis of Measurement: Incidental to all concrete work.
 - 2. Basis of Payment: Includes reinforcement, placement, and accessories.
- B. Welded Wire Fabric Reinforcement:
 - 1. Basis of Measurement: Incidental to all concrete work.
 - 2. Basis of Payment: Includes welded wire reinforcement, placement, and accessories.

1.3 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 318 - Building Code Requirements for Structural Concrete.
 - 3. ACI 530.1 - Specifications for Masonry Structures.
 - 4. ACI SP-66 - ACI Detailing Manual.
- B. ASTM International:
 - 1. ASTM A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
 - 2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
 - 3. ASTM A496 - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.

03 20 00- 1

4. ASTM A497 - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
5. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
6. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
7. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
8. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
9. ASTM A775/A775M - Standard Specification for Epoxy-Coated Reinforcing Steel Bars.
10. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.
11. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
12. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.
13. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Reinforcing Steel Bars.

C. American Welding Society:

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

D. Concrete Reinforcing Steel Institute:

1. CRSI - Manual of Standard Practice.
2. CRSI - Placing Reinforcing Bars.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Follow submittal procedures.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel bending and cutting schedules, and supporting and spacing devices.
- C. Certificates: Submit AWS qualification certificate for welders employed on the Work.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.
 1. Submit certified copies of mill test report of reinforcement materials analysis.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Not applicable to this Project.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI - Manual of Standard Practice ACI 301 & ACI 318.
- B. Perform Work in accordance with CDOT standards.

1.7 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Deformed and Plain Reinforcement: ASTM A615/A615M; 60 ksi yield strength, steel bars, unfinished and epoxy coated finish.
- B. Welded Plain Wire Fabric: ASTM A185; in coiled rolls; unfinished.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type. Manufacturers: At discretion of Contractor.
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Type; size and shape to meet Project conditions.
- D. Reinforcing Splicing Devices: Exothermic welding type; full tension and compression; sized to fit joined reinforcing.
 - 1. Manufacturers: At discretion of Contractor.
- E. Reinforcing Splicing Devices: Mechanical set screw, swaged or threaded type; full tension and compression; sized to fit joined reinforcing.
 - 1. Manufacturers: At discretion of Contractor.
- F. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

03 20 00- 3

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice & ACI 318.
- B. Form standard hooks for 180 degree bends, 90 degree bend, stirrup and tie hooks, and seismic hooks as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Form ties and stirrups from the following:
 - 1. For bars No. 10 and Smaller: No. 3 deformed bars.
 - 2. For bars No. 11 and Larger: No. 4 deformed bars.
- E. Weld reinforcement in accordance with AWS D1.4.
- F. Epoxy-Coated Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI Manual of Practice.
- G. Locate reinforcement splices, at point of minimum stress. Review location of splices with Engineer.

2.4 SHOP FINISHING

- A. Epoxy Coated Finish for Steel Bars: Per CDOT Standards.
- B. Epoxy Coated Finish for Steel Wire: Per CDOT Standards.

2.5 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Make completed reinforcement available for inspection at manufacturer's factory prior to packaging for shipment. Notify Engineer at least seven days before inspection is allowed.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
 - 1. Do not weld crossing reinforcement bars for assembly except as permitted by Engineer.
- B. Accommodate placement of formed openings.

- C. Space reinforcement bars with minimum clear spacing in accordance with ACI 318 of one bar diameter, but not less than 1 inch.
1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

- D. Maintain concrete cover around reinforcement in accordance with ACI 318 as follows:

Reinforcement Location		Minimum Concrete Cover
Footings and Concrete Formed Against Earth		3 inches
Concrete exposed to weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches
Supported Slabs, Walls, and Joists	No. 14 bars and larger	1-1/2 inches
	No. 11 bars and smaller	3/4 inches
Beams and Columns		1-1/2 inches
Shell and Folded Plate Members	No. 6 bars and larger	3/4 inches
	No. 5 bars and smaller	1/2 inches

- E. Bond and ground reinforcement in accordance with requirements of Section 26 05 26.

3.2 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8 inch	minus 3/8 inch
Less than 8 inches	plus or minus 1/2 inch	minus 1/2 inch

- C. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

03 20 00- 5

- B. Field testing will be performed by Owner's testing laboratory in accordance with ACI 318.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Reinforcement Inspection:
 - 1. Placement Acceptance: Specified and ACI 318 material requirements and specified placement tolerances.
 - 2. Welding: Inspect welds in accordance with AWS D1.1.
 - 3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.
 - 4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706/A706M.
 - 5. Continuous Weld Inspection: Inspect reinforcement as required by ACI 318.
 - 6. Periodic Weld Inspection: Other welded connections.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes cast-in-place concrete for the following:
 - 1. Shear walls.
 - 2. Foundation walls.
 - 3. Supported slabs.
 - 4. Slabs on grade.
 - 5. Control, expansion and contraction joint devices.
 - 6. Equipment pads.
 - 7. Light pole base.
 - 8. Sign base.
 - 9. Fence post base
 - 10. Thrust blocks.
 - 11. Manholes.
 - 12. Storm drains Inlets.

- B. Related Sections:
 - 1. Section 03 10 00 - Concrete Forming and Accessories.
 - 2. Section 03 20 00 - Concrete Reinforcing.
 - 3. Section 03 35 00 - Concrete Finishing.
 - 4. Section 03 39 00 - Concrete Curing.
 - 5. Section 07 90 00 - Joint Protection.
 - 6. Section 07 95 00 - Expansion Control.
 - 7. Section 31 23 23 - Fill.
 - 8. Section 32 13 13 - Concrete Paving.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Concrete - Slab-on-fill or grade:
 - 1. Basis of Measurement: Lump Sum by Structure.
 - 2. Basis of Payment: Includes concrete, placement accessories, consolidating and leveling, troweling, curing.

- B. Concrete - Vertical in Forms:
 - 1. Basis of Measurement: Lump Sum by Structure.
 - 2. Basis of Payment: Includes concrete, placement accessories, consolidating, curing.

- C. Concrete - Miscellaneous Locations:
 - 1. Basis of Measurement: Lump Sum by Structure.

03 30 00- 1

2. Basis of Payment: Includes concrete, placement accessories, consolidating and leveling, troweling, curing.
- D. Concrete - Grouting:
1. Basis of Measurement: Lump Sum by Structure.
 2. Basis of Payment: Includes preparation of substrate, grout, placement, consolidating, troweling, curing.
- E. Devices: Control, Expansion and Contraction.
1. Basis of Measurement: Incidental to all concrete work.
 2. Basis of Payment: Includes component, placement with accessories.

1.3 REFERENCES

- A. American Concrete Institute:
1. ACI 301 - Specifications for Structural Concrete.
 2. ACI 305 - Hot Weather Concreting.
 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
 4. ACI 308.1 - Standard Specification for Curing Concrete.
 5. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 3. ASTM C33 - Standard Specification for Concrete Aggregates.
 4. ASTM C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
 8. ASTM C150 - Standard Specification for Portland Cement.
 9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
 10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
 11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
 12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
 13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural Concrete.
 14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
 15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.

16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric Batching and Continuous Mixing.
18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.
22. ASTM C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218 - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.4 PERFORMANCE REQUIREMENTS

- A. Not applicable to this Project.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, attachment accessories, and admixtures.

03 30 00- 3

- C. Design Data:
 - 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
 - a. Hot and cold weather concrete work.
 - b. Air entrained concrete work.
 - 2. Identify mix ingredients and proportions, including admixtures.
 - 3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.
- D. Samples: Submit two samples of expansion/contraction joint and control joint.
- E. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- A. Not applicable to this Project.

1.7 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 & ACI 318.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.
- E. Perform Work in accordance with CDOT standards.

1.9 MOCKUP

- A. Not applicable to this Project.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

03 30 00- 4

- B. Maintain high early strength concrete temperature after installation at minimum 50 degrees F for minimum 3 days.

1.11 COORDINATION

- A. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Concrete Materials: Provide in accordance with CDOT standards.

2.2 ADMIXTURES

- A. Furnish materials in accordance with CDOT standards.

2.3 ACCESSORIES

- A. Bonding Agent: Two component modified epoxy resin.
 - 1. Manufacturers:
 - a. At the discretion of the Contractor. Contractor to provide submittal that is on approved CDOT products list.
- B. Non-Shrink Grout: ASTM C1107, Grade A; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
 - 1. Manufacturers:
 - a. At the discretion of the Contractor. Contractor to provide submittal that is on approved CDOT products list.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Furnish materials in accordance with CDOT standards.
- B. Construction Joint Devices: Integral galvanized steel or extruded plastic, formed to tongue and groove profile, with removable top strip exposing sealant trough, knockout holes spaced at 6 inches, ribbed steel spikes with tongue to fit top screed edge.
- C. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric, vinyl, or neoprene filler strip with Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; extruded aluminum or vinyl cover plate, of longest manufactured length at each location, recessed mounted; color as selected.

- D. Sealant and Primer: as specified in Section 07 90 00.

2.5 CONCRETE MIX

- A. Provide concrete to the following criteria:
 - 1. Class D:
 - a. Compressive Strength: 4,500 psi at 28 days.
 - b. Slump: Per approved mix design.
 - c. Minimum Cement Content: 615-660 pounds/cu yd.
 - d. Maximum Water/Cement Ratio: Per approved mix design.
 - e. Air Entrainment: 5 – 8 percent.
- B. Limit the following cementitious materials to maximum percentage by mass of all cementitious materials:
 - 1. Fly Ash: Per approved mix design and CDOT Standards.
 - 2. Blast Furnace Slag: Per approved mix design and CDOT Standards.
 - 3. Fly Ash and Blast Furnace Slag: Per approved mix design and CDOT Standards.
- C. Use accelerating admixtures in cold weather only when approved by the Engineer in writing. Use of admixtures will not relax cold weather placement requirements.
- D. Use calcium chloride only when approved by the Engineer in writing.
- E. Use set retarding admixtures during hot weather only when approved by the Engineer in writing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.
- C. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- D. Remove water from areas receiving concrete before concrete is placed.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 & ACI 318 and CDOT Standards.
- B. Notify testing laboratory and Engineer minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints, and forms are not disturbed during concrete placement.
- D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by adhesive applied between overlapping edges and ends through taping edges and ends.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.
- G. Place joint filler in slab following pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- H. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface. Conform to Section 07 90 00 for finish joint sealer requirements.
- I. Install construction joint devices in coordination with slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- J. Install joint device anchors. Maintain correct position to allow joint cover to be flush with slab finish.
- K. Install joint covers in longest practical length, when adjacent construction activity is complete.
- L. Apply sealants in joint devices in accordance with Section 07 90 00.
- M. Deposit concrete at final position. Prevent segregation of mix.
- N. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- O. Consolidate concrete.
- P. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

03 30 00- 7

- Q. Place concrete continuously between predetermined expansion, control, and construction joints.
- R. Do not interrupt successive placement; do not permit cold joints to occur.
- S. Place slabs in pattern indicated.
- T. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth of slab thickness.
- U. Screed slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft.

3.4 SEPARATE SLAB TOPPINGS

- A. Prior to placing floor topping, [roughen substrate concrete surface and] remove deleterious material. Broom and vacuum clean.
- B. Place required dividers, edge strips, reinforcing and other items to be cast in.
- C. Apply bonding agent to substrate.

3.5 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with sack rubbed finish as Scheduled in this section.
- B. Finish concrete slab surfaces to requirements of Section 03 35 00.

3.6 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 1. Protect concrete slabs from freezing for minimum 7 days.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete in accordance with ACI 308.1

3.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field testing in accordance with CDOT standards.
- C. Inspect reinforcing placement for size, spacing, location, support.

03 30 00- 8

- D. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.
- E. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
 - 3. Sample concrete and make one set of four cylinders for every 50 cu yds or less of Class B structure concrete placed each day.
 - 4. Make one additional cylinder during cold weather concreting, and field cure.
 - 5. Class P concrete shall include AASHTO T 97 (ASTM C 78) Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) performed with at least two specimens at seven days and four specimens at 28 days for a total of six specimens.
- F. Field Testing:
 - 1. Slump Test Method: ASTM C143/C143M.
 - 2. Air Content Test Method: ASTM C173/C173M and ASTM C231.
 - 3. Temperature Test Method: ASTM C1064/C1064M.
 - 4. Measure slump and temperature for each compressive strength concrete sample.
 - 5. Measure air content in air entrained concrete for each compressive strength concrete sample.
- G. Cylinder Compressive Strength Testing:
 - 1. Test Method: ASTM C39.
 - 2. Test Acceptance: In accordance with CDOT standards.
 - 3. Test one cylinder at 7days.
 - 4. Test two cylinders at 28 days.
 - 5. Retain one cylinder for testing when requested by Engineer.
 - 6. Dispose remaining cylinders when testing is not required.
- H. Beam Flexural Strength Testing for Class P and E Concrete:
 - 1. Test Method: AASHTO T 97 (ASTM C78).
 - 2. Test Acceptance: In accordance with CDOT standards.
 - 3. Test two specimens at 7days.
 - 4. Test four specimens at 28 days.
 - 5. Retain one cylinder for testing when requested by Engineer.
 - 6. Dispose remaining cylinders when testing is not required.
- I. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.8 PATCHING

- A. Allow Engineer to inspect concrete surfaces immediately upon removal of forms.

- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Engineer upon discovery.
- C. Patch imperfections as directed by Engineer in accordance with ACI 301 & ACI 318.

3.9 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by Architect/Engineer.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Architect/Engineer for each individual area.

3.10 SCHEDULE - CONCRETE TYPES AND FINISHES

- A. Foundations and Walls: 4,500 psi 28 day concrete, form finish with honeycomb filled surface.
- B. Underside of Supported Slabs and Structure Exposed to View: 4,500 psi 28 day concrete, sack rubbed finish.

3.11 SCHEDULE - JOINT FILLERS

- A. Slab Perimeter: Joint filler Type A set 1/8 inch below slab elevation.
- B. Exterior Retaining Wall: Joint filler Type F recessed 3/8 inch with sealant cover.

END OF SECTION

03 30 00- 10

SECTION 03 35 00

CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Finishing concrete slabs.
 - 2. Slab surface treatment.
 - 3. Handicap Ramp Truncated Domes.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 03 39 00 - Concrete Curing.
 - 3. Section 07 90 00 - Joint Protection.
 - 4. Section 07 95 00 - Expansion Control.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
- B. ASTM International:
 - 1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Follow submittal procedures.
- B. Product Data: Submit data on concrete hardener, sealer, curing compounds and slip resistant treatment, compatibilities, and limitations.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Not applicable to this Project.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit data on maintenance renewal of applied coatings.

03 35 00- 1

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 302.1.
- B. Perform Work in accordance with CDOT standards.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum 5 years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum 5 years documented experience.

1.8 MOCK-UP

- A. Not Required for this Project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver materials in manufacturer's packaging including application instructions.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

1.11 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with concrete floor placement and concrete floor curing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 - 1. Hanoveer
 - 2. Davis Colors
 - 3. Or Approved Equivalent.

03 35 00- 2

2.2 COMPOUNDS - SEALERS

- A. Sealer: Manufacturers: At the discretion of the Contractor. Contractor to provide submittal that is on CDOT approved products list.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify slab surfaces are acceptable to receive the Work of this section.

3.2 SLAB FINISHING

- A. Finish concrete slab surfaces in accordance with ACI 301 & ACI 302.1.
- B. Steel trowel surfaces which are to be exposed.

3.3 SLAB SURFACE TREATMENT

- A. Apply sealer on slab surfaces.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Surface Flatness For Exposed Concrete Slabs: 1/4 inch in 10 ft.
- C. Correct defects in defined slab floor by grinding or removal and replacement of defective Work. Areas requiring corrective Work will be identified by Engineer. Re-measure corrected areas by same process.

END OF SECTION

03 35 00- 3

SECTION 03 39 00
CONCRETE CURING

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes initial and final curing of horizontal and vertical concrete surfaces.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete.
 - 2. Section 03 35 00 - Concrete Finishing.

1.2 REFERENCES

- A. American Concrete Institute:
 - 1. ACI 301 - Specifications for Structural Concrete.
 - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
 - 3. ACI 308.1 - Standard Specification for Curing Concrete.
 - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
 - 1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
 - 2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
 - 3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
 - 4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on curing compounds, mats, film, compatibilities, and limitations.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Not applicable to this Project.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301, ACI 302.1, ACI 318.
- B. Perform Work in accordance with CDOT standard.

03 39 00- 1

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver curing materials in manufacturer's packaging including application instructions.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Membrane Curing Compound Type 1 clear or approved equivalent. Contractor to provide submittal on membrane curing compound.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces are ready to be cured.

3.2 INSTALLATION - HORIZONTAL SURFACES

- A. Cure concrete in accordance with ACI 308.1.
- B. Membrane Curing Compound: Apply curing compound in two coats with second coat applied at right angles to first.

3.3 INSTALLATION - VERTICAL SURFACES

- A. Cure concrete in accordance with ACI 308.1.
- B. Membrane Curing Compound: Apply compound in two coats with second coat applied at right angles to first.

3.4 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Do not permit traffic over unprotected floor surface.

3.5 SCHEDULES

- A. Concrete Slabs and Walls: Membrane curing compound, clear color.

END OF SECTION

03 39 00- 2

SECTION 05 52 00

METAL RAILINGS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes steel pipe railings, balusters, and fittings; and handrails.
- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete:

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 3. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 4. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
 - 5. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
- B. Green Seal:
 - 1. GC-3 - Environmental Criteria for Anti-Corrosive Paints.
- C. National Ornamental & Miscellaneous Metals Association:
 - 1. NOMMA Guideline 1 - Joint Finishes.
- D. SSPC: The Society for Protective Coatings:
 - 1. SSPC - Steel Structures Painting Manual.
 - 2. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
 - 3. SSPC Paint 20 - Zinc-Rich Coating, Type I - Inorganic and Type II - Organic.

1.3 DESIGN REQUIREMENTS

- A. Structural Performance of Handrails and Railings:Top Rail of Guards:
 - 1. Capable of withstanding the following structural loads without exceeding the allowable design working stress of materials involved:
 - a. Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and a uniform load of 50 lbf/ft. (730 N/m) applied horizontally and concurrently with uniform load of 100 lbf/ft. (1460 N/m) applied

vertically downward. Concentrated and uniform loads need not be assumed to act concurrently.

- b. Handrails Not Serving as Top Rails: Concentrated load of 200 lbf (890 N) applied at any point and in any direction, and a uniform load of 50 lbf/ft. (730 N/m) applied in any direction. Concentrated and uniform loads need not be assumed to act concurrently.
- c. Infill Area of Guards: Horizontal concentrated load of 200 lbf (890 N) applied to 1 sq. ft. (0.09 sq. m) at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area. Load on infill area need not be assumed to act concurrently with loads on top rails.

1.4 SUBMITTALS

- A. Product Data: For mechanically connected handrails and railings, grout, anchoring cement, and paint products.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.
 - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples: For each exposed finish required.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Not Used

1.6 QUALITY ASSURANCE

- A. Finish joints in accordance with NOMMA Guideline 1.

1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 STEEL RAILING SYSTEM COMPONENTS

- A. Rails and Posts: 1-1/2 inch diameter steel; welded joints.
- B. Fittings: Elbows, T-shapes, wall brackets, escutcheons; [cast] [machined] steel.

- C. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- D. Splice Connectors: Steel concealed spigots or welding collars.
- E. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.
- F. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I zinc rich
- G. Shop Primer: [SSPC Paint 15, Type 1, red oxide.] [_____.]
- H. Touch-Up Primer: Match shop primer.

2.2 FABRICATION

- A. Fit and shop assemble components in largest practical sizes for delivery to site.
- B. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Exterior Components: Continuously seal joined pieces by [intermittent welds and plastic filler.] [continuous welds.] Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.
- F. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify concealed blocking and reinforcement is installed and correctly located to receive wall mounted handrails.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be embedded in concrete with setting templates, to appropriate sections.

3.3 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Anchor railings to structure with anchors.
- C. Touch-up surfaces and finishes after erection.
- D. Conceal bolts and screws whenever possible.
- E. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

END OF SECTION

SECTION 31 05 13

SOILS FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Subsoil materials.
 - 2. Topsoil materials.
- B. Related Sections:
 - 1. Section 31 23 23 - Fill.
 - 2. Section 32 91 19 - Landscape Grading.
 - 3. Section 32 92 19 - Seeding.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - 5. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
 - 6. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 7. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Materials Source: Submit name of imported materials source.

PART 2 PRODUCTS

2.1 EMBANKMENT MATERIALS

- A. Embankment Fill: Compacted Embankment
 - 1. Fill material will be brought from off-site and is need to meet the following qualifications.
 - 2. The compacted embankment shall consist of inorganic clay soil material. The material may be random or homogenous fill. The moisture shall be within 2% of optimum moisture.
 - 3. The soils should be relatively well-graded and shall not consist of any material greater than two inches in diameter.
 - 4. The material shall conform to the following gradation:

<u>Screen Size</u>	<u>Percent Passing</u>
3 inch	100
No. 200	60-100

2.2 TOPSOIL MATERIALS

- A. Topsoil:
 - 1. Material used for topsoil will be obtained from on-site and off-site locations.
 - 2. Free of roots, rocks larger than 1 inch, subsoil, debris, large weeds and foreign matter.

2.3 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements
- B. When tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site if necessary.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Stockpile differing materials apart to prevent mixing.
- D. Prevent intermixing of soil types or contamination.

- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 05 16

AGGREGATES FOR EARTHWORK

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Coarse aggregate materials.
 - 2. Fine aggregate materials.

- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork: Fill and grading materials.
 - 2. Section 31 23 17 - Trenching.
 - 3. Section 31 23 23 - Fill.
 - 4. Section 32 91 19 - Landscape Grading.
 - 5. Section 33 11 13 – Public Water Distribution Systems.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Earthfill Material
 - 1. Basis of Measurement: By cubic yard.
 - 2. Basis of Payment: Includes supplying aggregate materials, stockpiling, placing where required, and compacting.

- B. Sand Bedding Material (ASTM C33 Concrete Sand):
 - 1. Basis of Measurement: Included in the cost of toe drain.
 - 2. Basis of Payment: Includes supplying aggregate materials, stockpiling, placing where required, and compacting.

- C. Filter Gravel Material (ASTM No. 8 or No. 89 gravel):
 - 1. Basis of Measurement: Included in the cost of toe drain.
 - 2. Basis of Payment: Includes supplying aggregate materials, stockpiling, placing where required, and compacting.
 - 3.

- D. Roadbase (CDOT class 6):
 - 1. Basis of Measurement: By ton.
 - 2. Basis of Payment: Includes supplying aggregate materials, stockpiling, placing where required, and compacting.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.

2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m<sup>3 - 3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m<sup>3 - 4. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 5. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 6. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - 7. ASTM D4253 - Test Methods for Maximum Index Density of Soils Using a Vibratory Table
 - 8. ASTM D4254 - Test Methods for Minimum Index Density of Soils and Calculation of Relative Density
 - 9. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.</sup></sup>

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit 50 lb sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Not applicable to this Project.

1.6 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work, if possible. If not possible, identify potential sources at the beginning of construction for time to evaluate the sources.
- B. Perform Work in accordance with Town of Johnstown standards.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

- A. Earthfill Material: Fine-grained, inorganic, clay material. Free of roots, debris, and gravel over 2 inches in diameter. Graded in accordance with ASTM C136,; within the following limits:

Sieve Size	Total Percent Passing by Weight
2 inch	100
No. 200	60-100

- B. Sand Filter Material (ASTM C33 Concrete Sand): Coarse Stone, or Crushed Gravel, washed stone; free of shale, clay, friable material and debris; graded in accordance with ASTM C33; within the following limits:

Sieve Size	Total Percent Passing by Weight
3/8 inches	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0-4

- C. Road Base (CDOT Class 6): Coarse Stone, or Crushed Gravel, washed stone; free of shale, clay, friable material and debris; graded in accordance with ASTM C136; within the following limits:

Sieve Size	Total Percent Passing by Weight
3/4 inches	100
No. 4	30-65
No. 8	25-55
No. 200	3-12

PART 3 EXECUTION

3.1 STOCKPILING

- A. Stockpile materials on site at locations indicated and designated by Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Do not allow segregation during stockpiling.
- D. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated trees, shrubs, and other plant life.
3. Removing abandoned utilities.
4. Excavating topsoil.

1.2 SUBMITTALS – Not used

1.3 QUALITY ASSURANCE

- A. Conform to applicable codes for disposal of debris.

PART 2 PRODUCTS - Not used.

2.1 MATERIALS – Not used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements.
- B. Verify existing plant life designated to remain is tagged or identified.
- C. Identify waste area for placing removed materials.

3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
1. Request underground utilities to be located and marked within and surrounding construction areas.

3.3 PROTECTION

- A. Locate, identify, and protect utilities indicated to remain, from damage.

31 10 00- 1

- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect bench marks, survey control points, and existing structures from damage or displacement.

3.4 CLEARING

- A. Clear areas required for access to site and execution of Work to minimum depth of 12 inches.
- B. Remove trees, including entire root ball, and shrubs in Work area.
- C. Clear undergrowth and deadwood, without disturbing subsoil.

3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site.
- B. Remove abandoned utilities. Indicate removal termination point for underground utilities on Record Documents.
- C. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- D. Do not burn or bury materials on site. Leave site in clean condition.

3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from Work area without mixing with foreign materials for use in finish grading.
- B. Stockpile in area designated on site and protect from erosion.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation from borrow.
 - 2. Water content and drainage.
 - 3. Excavation for embankment foundation
 - 4. Stripping for foundation of embankment
 - 5. Protection of foundation materials

- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 31 10 00 – Site Clearing.
 - 3. Section 31 23 23 - Fill.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

- B. Local utility standards when working within 24 inches of utility lines.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Submit a borrow area use plan which describes anticipated use, borrow area layouts, equipment, and operations.

PART 2 PRODUCTS - Not Used.

PART 3 EXECUTION

3.1 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Protect utilities indicated to remain from damage.
- D. Protect bench marks, survey control points, existing structures, fences, paving, from excavating equipment and vehicular traffic. Immediately replace any monuments damaged or removed by construction activities.

3.2 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing.
- B. Request visual inspection of bearing surfaces by Engineer and inspection agency before installing subsequent work. Contact Engineer 48 hours before exposing the foundation and coordinate activities so the area can be observed, mapped and covered within the time limitations presented in this section.

3.3 WATER CONTENT AND DRAINAGE

- A. The water content of the material prior to loading and hauling to the fill shall be in accordance with Section 31 23 23. The material shall be conditioned to within 3 percent of the proper moisture content prior to loading and hauling to the fill. If required, water shall be introduced into the borrow area for the wetting fill material by irrigation, at least two (2) days in advance of excavation operations. Moisture contents can be supplemented by water trucks and thorough disking. If borrow material is too wet it shall be processed as necessary prior to bringing it to the fill.
- B. When water is introduced for conditioning fill material prior to excavation, care shall be exercised to wet the material uniformly to produce the required water content for placement and compaction, avoiding both excessive runoff and accumulation of water in depressions. The Contractor is cautioned to control carefully the application of water and check on the depth and amount of water penetration during application so as to avoid overirrigation.
- C. If at any location in the fill material, before or during excavation operations, there is excessive water content, steps shall be taken to reduce the water content by selective

excavation to secure the drier materials; by excavating and placing in temporary stockpiles material containing excessive moisture; by excavating drainage ditches; by allowing adequate additional time for curing or drying; by disking and/or harrowing, or by any other approved means.

3.4 EXCAVATION FOR EMBANKMENT FOUNDATION

- A. Insofar as practicable, as determined by the Engineer, suitable material excavated under the provisions of this Section shall be used in the required construction work for embankment fill, or transported to stockpiles for later use in the required construction work as approved by the Engineer.
- B. Excavated materials that are unsuitable for use in the required construction work or are in excess of construction needs, as determined by the Engineer, shall be wasted on-site at an Engineer approved location, or removed from the site at the discretion of the Contractor.
- C. Excavated materials that may otherwise be suitable for use in the required construction work but for which it is not practicable, that they be used or stockpiled shall be wasted on-site at an Engineer approved location, or removed from the site at the discretion of the Contractor.
- D. The alignments and excavation lines shown on the Drawings are subject to such changes as may be found necessary by the Engineer to adapt the foundation excavation and other features to the conditions disclosed by the excavation.
- E. Accurate trimming of the slopes of the excavation will be required, and the excavation shall conform to the established lines and grades. Loose rock shall be removed from foundation contacts.
- F. Foundation irregularities shall be reduced as determined by the Engineer to provide satisfactory foundation contours. Any irregularities found in the foundation area, including carbonaceous materials, shall be overexcavated and removed to a minimum depth of 3 feet and beyond the limits of the irregularity a minimum of 10 feet. Suitable material shall be placed and compacted in the removal area on the foundation surface.

3.5 STRIPPING FOR FOUNDATION OF EMBANKMENT

As provided in Section 31 10 00, areas where embankment material is to be placed shall first be stripped in accordance with the Drawings, these Specifications, and to the satisfaction of the Engineer.

3.6 EXCAVATION TO BEDROCK SURFACE

The excavation shall be excavated in the embankment foundation to, at a minimum, the lines and grades shown on the Drawings. Excavation will extend to sound rock or to firm material to the satisfaction of Engineer. Sound rock or firm material shall be determined visually by the Engineer and shall be primarily claystone bedrock that appears uniform and excavates in a

relatively uniform manner. The material shall be non-yielding to rubber tire pressure from scrapers and shall require a rock hammer to break it apart. The initial excavations shall be observed by an engineer experienced with dam embankment construction or similar bedrock material. All loose, soft, or deleterious material shall be removed from the rock surface and pockets and depressions to the satisfaction of the Engineer. Special considerations are required for the last 2 feet of excavation to reduce the potential of damaging the bedrock surface. The last 2 feet of excavation shall be conducted with rubber tired equipment. Other areas of the embankment foundation where shown on the Drawings shall be excavated to sound rock or to an otherwise suitable foundation to the satisfaction of the Engineer. The last 2 feet of excavation shall be conducted with rubber tired equipment.

3.7 PROTECTION OF FOUNDATION MATERIALS

Embankment foundation materials exposed during excavation for the embankment foundation, shall be protected from freezing and surface drying in accordance with the requirements of Section 31 23 23.

END OF SECTION

SECTION 31 23 17

TRENCHING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavating trenches for utilities.
 - 2. Compacted fill from top of utility bedding to subgrade elevations.
 - 3. Backfilling and compaction.

- B. Related Sections:
 - 1. Section 03 30 00 - Cast-In-Place Concrete: Concrete materials.
 - 2. Section 31 05 13 - Soils for Earthwork: Soils for fill.
 - 3. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
 - 4. Section 31 23 16 - Excavation:
 - 5. Section 31 23 23 - Fill: General backfilling.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Trenching:
 - 1. Basis of Measurement: Included in cost of pipe items.
 - 2. Basis of Payment: Includes excavating to required elevations, protecting excavation, and stockpiling excavated materials removing excavated materials from site. Over Excavating: Payment is not made for over excavated work nor for replacement materials.

- B. Subsoil Fill:
 - 1. Basis of Measurement: Included in the cost of pipe items.
 - 2. Basis of Payment: Includes furnishing fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

- C. Structural Fill:
 - 1. Basis of Measurement: Included in the cost of pipe items.
 - 2. Basis of Payment: Includes furnishing fill material, stockpiling, shaping substrate surface, placing where required, and compacting.

- D. Granular Fill:
 - 1. Basis of Measurement: Included in the cost of pipe items.
 - 2. Basis of Payment: Includes furnishing fill material, stockpiling, scarifying substrate surface, placing where required, and compacting.

- E. Concrete Fill:
 - 1. Basis of Measurement: Included in the cost of pipe items.
 - 2. Basis of Payment: Includes furnishing materials, forming, mixing and placing where required, and curing.

1.3 REFERENCES

- A. American Association of State Highway and Transportation Officials:
 - 1. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
 - 2. AASHTO T99 - Standard Specification for Moisture-Density Relations of Soils Using a 2.27-kg (5-lb) Rammer and a 457-mm (18-in.) Drop.

- B. ASTM International:
 - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
 - 2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 3. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 4. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
 - 5. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
 - 6. ASTM D4253 - Test Methods for Maximum Index Density of Soils Using a Vibratory Table
 - 7. ASTM D4254 - Test Methods for Minimum Index Density of Soils and Calculation of Relative Density
 - 8. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 9. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - 10. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.4 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit, or cable.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Excavation Protection Plan: Describe sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property; include structural calculations to support plan.
- C. Product Data: Submit data for geotextile fabric indicating fabric and construction.
- D. Samples: Submit 50 lb sample of each type of fill to testing laboratory.
- E. Materials Source: Submit name of imported fill materials suppliers.
- F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.6 SUSTAINABLE DESIGN SUBMITTALS

- a. Not applicable to this Project.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Fort Lupton standards.

1.8 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify Work associated with lower elevation utilities is complete before placing higher elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Embankment Fill: as specified in Sections 31 05 13.
- B. Granular Fill: as specified in Section 31 05 16

2.2 ACCESSORIES

- A. Geotextile Fabric (if required): Non-biodegradable, non-woven.
 - 1. TC Mirafi; Model.
 - 2. Tensar Earth Technologies, Inc.; Model.
 - 3. Or approved equivalent.

PART 3 EXECUTION

3.1 LINES AND GRADES

- A. Lay pipes to lines and grades indicated on Drawings.
 - 1. Engineer reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.
- B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- D. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Maintain and protect above and below grade utilities indicated to remain.
- F. Establish temporary traffic control and detours when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 TRENCHING

- A. Excavate subsoil required for utilities to utility service.
- B. Remove lumped subsoil, cobbles larger than 6 inches and/or boulders, and rock up of 1/6 cubic yard, measured by volume. Remove larger material as specified in Section 31 23 18.
- C. Perform excavation within 24 inches of existing utility service in accordance with the utility's requirements.
- D. Do not advance open trench more than 200 feet ahead of installed pipe.
- E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.
- F. Excavate bottom of trenches maximum 2 feet wider than outside diameter of pipe.
- G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material, pipe, and utilities.
- H. Do not interfere with 45 degree bearing splay of foundations.
- I. When Project conditions permit, slope side walls of excavation starting 2 feet above top of pipe. When side walls can not be sloped, provide sheeting and shoring to protect excavation as specified in this section.
- J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth as directed by Engineer until suitable material is encountered. Notify Engineer, and request instructions.
- K. Cut out soft areas of subgrade not capable of compaction in place. Backfill with an Appropriate Fill Type and compact to density equal to or greater than requirements for subsequent backfill material.
- L. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

- M. Correct areas over excavated with compacted backfill as specified for authorized excavation or replace with fill concrete as directed by [Architect/Engineer].
- N. Remove excess subsoil not intended for reuse, from site.

3.4 SHEETING AND SHORING

- A. Sheet, shore, and brace excavations to prevent danger to persons, structures and adjacent properties and to prevent caving, erosion, and loss of surrounding subsoil.
- B. Support trenches more than 4 feet deep excavated through unstable, loose, or soft material. Provide sheeting, shoring, bracing, or other protection to maintain stability of excavation.
- C. Design sheeting and shoring to be removed at completion of excavation work.
- D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of filled excavations or adjacent soil.
- E. Repair damage to new and existing Work from settlement, water or earth pressure or other causes resulting from inadequate sheeting, shoring, or bracing.

3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Place material in continuous layers as follows:
 - 1. Compacted Fill: Maximum 8 inches compacted depth.
 - 2. Granular Fill: Maximum 8 inches compacted depth.
- D. Compaction shall be by mechanical means only. Water settling or jet shall not be used. Placement and compaction methods shall not disturb or damage existing or new utilities in trench or adjacent structures.
- E. Fill shall be placed at optimum moisture content plus or minus 2%.
- F. Do not leave more than 20 feet of trench open at end of working day.
- G. Protect open trench to prevent danger to the public. Open trenches shall be covered with a steel plate overnight to protect the public.

3.6 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of General Backfilling: Plus or minus 0.10 feet from required elevations.

3.7 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements and Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Maximum Density and Optimum Moisture Content shall be determined in accordance with ASTM D698 for Random and Select Fill.
- C. Maximum and Minimum Index Densities for Relative Density shall be determined in accordance with ASTM D4253 and D4254 for Free-draining Fill
- D. Perform in place compaction tests in accordance with the following:
 - 1. Density Tests: ASTM D2922.
- E. When tests indicate Work does not meet specified requirements, corrective action shall be taken until the Work meets specified requirements and retested for verification.]
- F. Frequency of Tests: 1 moisture density test for every 100 feet of pipe.

3.8 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.9 SCHEDULE

- A. Piping:
 - 1. Cover pipe and bedding with appropriate Fill to subgrade elevation.
 - 2. Compact uniformly to minimum 95 percent of maximum density as determined by ASTM D698 and plus or minus 2% of the optimum moisture.

END OF SECTION

SECTION 31 23 19

DEWATERING AND DRAINAGE

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. Furnish, install, operate, monitor, maintain, and remove temporary dewatering and drainage systems as required. Lower and control water levels below inverts to permit construction in the dry.
- B. Provide, maintain, and remove temporary surface water control measures to sufficiently drain and remove surface water before it enters any excavations, or grading. If surface water does enter excavation or grading, implement control measures so that it is adequately removed.
- C. Collect and properly dispose of all discharge water from dewatering and drainage systems.
- D. Repair damage caused by dewatering and drainage system operations.
- E. Remove temporary dewatering and drainage systems when no longer needed. Restore all disturbed areas.
- F. Obtain, pay for, and comply with any and all required permits.

1.2 SUBMITTALS (see Section 01 33 00)

- A. Quality Control Submittal
 - 1. Water Control Plan
 - a. At a minimum, the Water Control Plan shall include:
 - (1) Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment, methods, standby equipment and power supply, pollution control facilities, discharge locations to be utilized, provisions for immediate temporary water supply and other requirements, as specified in this Section.
 - b. If the system is modified during installation or operation, the Water Control Plan shall be revised or amended as appropriate and shall be resubmitted.
- B. Administrative Submittals
 - 1. Discharge permits.

1.3 DEFINITIONS

- A. Where the phrase "in the dry" is used in this Section, *in situ* soil moisture content shall be no more than 4 percentage points above the optimum moisture content for that soil.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

- A. All Excavations: Water shall be continuously controlled during the course of construction, including weekends, holidays, and during periods of work stoppages. Contractor shall provide adequate backup systems to maintain control of water.
- B. Properly control and dispose of any surface runoff, preventing it from entering excavations. Contractor shall comply with sedimentation and erosion.

3.2 DEWATERING SYSTEMS

- A. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction in the dry. Groundwater level shall be lowered and maintained to below the invert of the proposed structures. Contractor shall continuously maintain excavations to be free of water, regardless of source, until backfilled to final grade. No additional compensation shall be made for dewatering operations meeting the above requirements.
- B. Design and Operate Dewatering Systems:
 - 1. To prevent loss of ground as water is removed.
 - 2. To avoid inducing settlement or damage to existing facilities completed work, or adjacent property.
- C. Provide supplemental ditches and sumps only as necessary to collect water from local seeps. Ditches and sumps shall not be used as the primary means of dewatering.

3.3 DISPOSAL OF WATER

- A. Obtain discharge permit for water disposal from jurisdictional authorities.
- B. Treat water collected by dewatering or surface operations, as required by regulatory agencies, prior to discharge.
- C. Discharge water as required by discharge permit and in a manner that will not cause erosion, flooding, or otherwise damage existing facilities, completed work, or adjacent property.

- D. Remove solids from any treatment facilities required by discharge permit and perform maintenance of treatment facilities as necessary to maintain their efficiency.

3.4 PROTECTION OF PROPERTY

- A. Contractor shall make an assessment of potential for dewatering induced settlement and shall provide and operate devices or systems, including but not limited to: reinjection wells, infiltration trenches, and cutoff walls, necessary to prevent damage to existing facilities, completed work, and adjacent property.
- B. Securely support existing facilities, construction work, completed work, and adjacent property vulnerable to settlement due to dewatering operations. Support shall include, but not be limited to, bracing, underpinning, or compaction grouting.

3.5 REMEDIATION OF GROUNDWATER DEPLETION

- A. If dewatering reduces quantity or quality of water produced by existing wells, Contractor shall temporarily supply water to affected well owners from other sources. Contractor shall furnish water of a quality and quantity equal to or exceeding the quality and quantity available to the well owner prior to beginning work, or as satisfactory to each well owner.

END OF SECTION

SECTION 31 23 20

TEST PITS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Excavation of test pits in compacted earthfill during the progress of the Work. Location and times of excavating test pits shall be as necessary to examine or obtain samples of specific portions of the work in accordance with the applicable provisions of Section 01 40 00, and as determined by the Engineer.
- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 31 23 16 - Excavation.
 - 3. Section 31 23 23 - Fill

PART 2 PRODUCTS

2.1 BACKFILLING TEST PITS

After examination of test pits and collection of embankment samples, the test pits shall be backfilled with earthfill conforming to the adjacent embankment materials, which shall be placed in layers, moistened, and compacted in accordance with the applicable provisions of Section 31 23 23, as applicable.

PART 3 EXECUTION

3.1 EXCAVATION OF TEST PITS

- A. The surface dimensions and depth of each test pit will be determined by the Engineer, but in general, no test pit will involve the excavation and backfill of more than 10 cubic yards of earthfill.
- B. The sides of the test pits shall be excavated to as near vertical as practicable but in accordance with applicable safety requirements to allow inspection of the compacted earthfill by the Engineer.
- C. The Contractor shall adjust its operations so that test pits will remain open for a maximum of 4 hours to facilitate inspection and collection of embankment samples.
- D. Prior to backfilling the test pit wall shall be sloped to 1 vertical to 1 horizontal or flatter.

END OF SECTION

31 23 20- 1

SECTION 31 23 23

FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Embankment construction
 - 2. Placing earthfill.
 - 3. Specially compacted earthfill in embankment.

- B. Related Sections:
 - 1. Section 01 30 00 – Administration Requirements.
 - 2. Section 01 70 00 – Execution and Closeout Requirements.
 - 3. Section 31 05 13 – Soils for Earthwork.
 - 4. Section 31 23 16 – Excavation.
 - 5. Section 31 23 19 – Dewatering.
 - 6. Section 32 91 19 – Landscape Grading.

1.2 REFERENCES

- A. ASTM International:
 - 1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
 - 2. ASTM D1556 - Standard Test Method for Density of Soil in Place by the Sand-Cone Method.
 - 3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
 - 4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
 - 5. ASTM D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Materials Source: Submit name of imported fill materials suppliers.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Embankment Fill as specified in Section 31 05 13.

- B. Topsoil as specified in Section 31 05 13.

PART 3 EXECUTION

3.1 EMBANKMENT CONSTRUCTION

The completed liner embankment shall be to the lines and grades shown on the Drawings.

A. PLACING

1. The Contractor's operations, including handling and placing of the embankment materials, shall be such as to prevent segregation of the materials.

B. FOUNDATION PREPARATION

1. The embankment footprint, and excavation requirements are specified in this Section.
2. The Contractor shall allow sufficient time prior to final foundation preparations to allow for observations and geologic logging of the exposed foundation as outlined in Sections 01 30 00 and 01 70 00. The schedule for this work shall be coordinated with the Engineer to prevent delay in final foundation preparations and fill placement or rework of prepared surfaces or exposed bedrock.
3. No materials shall be placed in any portion of the embankment until the foundation for each section has been unwatered, cleared, grubbed, stripped, suitably prepared, and approved by the Engineer.
4. All portions of excavations made for test pits or other subsurface explorations found within the liner foundation areas which extend below or beyond the established lines of excavation for liner embankment foundation, shall be filled with compacted earthfill.
5. All joints, cracks, fractures, cavities, depressions, and irregularities, either existing or resulting from foundation excavation and preparation and exposed within the footprint of the liner shall be cleaned of all loose infilling materials and debris to expose firm native as specified herein for general foundation preparations. The final cleaning and condition of the exposed surfaces shall meet the intentions these foundation preparation specifications and observed by the Engineer for determination of acceptance for placement of backfill. The void space and openings resulting from the removal of the loose infillings and debris shall be filled with embankment fill material conditioned at two percent under to two percent over optimum moisture content (per ASTM D698) and compacted so to meet the minimum compaction sections presented herein for this material.
6. Embankment shall not be placed on a foundation which contains frozen material, or which has been subjected to freeze-thaw action, desiccation or damage by vehicular traffic, or exists at moisture conditions above specified limits. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrades, whether in an excavation or on an embankment, and all

layers of previously placed and compacted earthfill which become the foundations for successive layers of earthfill.

7. All material that freezes or has been subjected to freeze-thaw action, or has desiccated, or has been excessively wetted during the construction work, or during periods of temporary shutdowns, such as, but not limited to, nights, holidays, weekends, or winter shutdowns or earthwork operations, shall be removed to a depth that is acceptable to the Engineer and replaced with new material. Alternatively, the material shall be thawed, dried, moisture conditioned, reworked, and recompacted to the specified criteria before additional material is placed.
8. The Engineer will determine when placement of fill shall cease due to cold weather. The Engineer may elect to use average daily air temperatures, and/or physical observation of the soils for this determination.
9. Bedrock Foundation Surfaces:
 - a. Prior to the first layer of earthfill being placed in contact with bedrock, all bedrock surfaces within the area to receive fill shall be cleaned of all loose and objectionable materials in an approved manner by handwork, barring, picking, brooming, air jetting, or other effective means. In no case shall the selected method result in further loosening, deterioration or undermining of the surface being cleaned. This includes the foot traffic during cleaning and over prepared surfaces and methods of removing collected materials and debris during cleaning so not to adversely impact the prepared surface. The final 2 feet of excavation shall be conducted with rubber tired equipment. No steel tracked or wheeled equipment shall be allowed within 2 feet of the bedrock surface.
10. Vertical formation surfaces shall be not more than 3 feet in height, and benches of sufficient width shall be provided as necessary so that the average slope of any formation surface is not steeper than one horizontal to two vertical. Resloping of formation surfaces shall be accomplished by the method that results in the least damage to the formation left in place.
11. Formation protrusions that will prohibit the specified placement and compaction of earthfill materials shall be removed as provided in Section 31 23 16. The formation surface remaining after removal of protrusions shall be cleaned, and all loose and objectionable material removed prior to placement of the earthfill.
12. Foundation Surfaces:
 - a. The Foundation shall be excavated to exposed firm bedrock as outlined Section 31 23 16. Areas of soft or fractured material within the bedrock foundations shall be over excavated a minimum of 3 feet to expose firm and less permeable bedrock surface. The final depth and configuration of the overexcavation shall be approved by the Engineer. The last 2 feet of excavation shall be conducted with rubber tired equipment. No steel

tracked or wheeled equipment shall be allowed within the last 2 feet of excavation.

- b. Surface preparation in these areas shall be as outlined above with the exceptions or additions presented as follows. The prepared surfaces shall be cleaned in a manner outlined above or as necessary to produce a thoroughly clean surface for fill placement and free of all loose material or other contaminants such as wind blown soils or fall in from adjacent areas. The final surface shall exhibit a geometry, both overall and locally suitable to provide a complete and continuous contact between the fill and the bedrock rock surface.
 - c. Cleaning of all loose material and protection of the underlying material and exposed bedrock surface may require vacuuming with an industrial sized vacuum truck or broomed with a power broom.
 - d. The prepared surface shall be observed by the Engineer and approved prior to fill placement. The approved surface shall be backfilled as soon as possible following approval. The approved surface shall be backfilled or otherwise protected from degradation or contamination within a 6-hr period following approval unless otherwise approved by the Engineer.
 - e. Surfaces applicable to cleaning and surface preparations under this paragraph shall extend over the foundation floor and continuous up sidewalls for 18 inches from the floor in areas of earthfill placement.
 - f. Exposed foundation surfaces shall be cleaned and approved by the Engineer prior to fill placement. In no case shall the Contractor clean key trench areas for approval that cannot be covered with fill, as applicable, within the same shift. Exposure of the excavated formation surface upon which fill will be placed shall be limited to 6 hours, which time shall commence at the completion of each portion of the excavation, and which will include the time required for final cleanup and surface treatment.
13. The Contractor shall mobilize sufficient equipment, materials, and manpower prior to the start of final excavation in order to limit the exposure time so specified.

C. PLACING EMBANKMENT MATERIALS

1. The suitability of each part of the foundation for placing embankment materials thereon and of all materials for use in embankment construction will be determined by the Engineer.
2. No brush, roots, sod, or other perishable or unsuitable materials shall be placed in the embankment.
3. Each load of the material placed in the embankment, whether from excavation for other parts of the Work or from the borrow pit, shall be placed in accordance with the plans and specifications.

4. In any separate portion of liner embankment being constructed, each layer shall be constructed continuously and approximately horizontal for the width and length of such portion at the elevation of the layer, with the exception of the ends of the fill section which can be constructed at maximum 3:1 slopes or flatter. When the portions of the liner are extended laterally to connect to an existing portion of the liner the existing liner shall be overexcavated to firm, properly moisture conditioned embankment prior to placement of new fill adjacent to the existing fill.
5. The Contractor shall maintain the embankment in an approved manner, including maintaining surfaces free of weeds or other vegetation, until final completion and acceptance of all the work under the Contract.
6. During temporary shutdown periods, or winter shutdown periods, the embankment shall be protected by “dry lifting” a minimum of 1 foot depth over the fill to protect from frost.
7. Prior to resuming the placement of embankment material after temporary or winter shutdown periods, the Contractor shall remove the “dry lift” material, and overexcavate the existing surface down to firm, unfrozen, frost free, properly moisture conditioned fill prior to new fill placement. The depth of the overexcavation shall be approved by the Engineer. Prior to placement of new fill the area shall be scarified and moisture conditioned to specified moisture limits.

D. RATE OF PLACEMENT

Unless otherwise directed by the Engineer, the embankment shall be maintained at approximately the same level regardless of the number of types of materials being placed.

E. MAINTENANCE AND PROTECTION OF EMBANKMENT MATERIALS

1. The Contractor shall maintain and protect the embankment in a satisfactory condition at all times until final completion and acceptance of all work under the Contract. If in the opinion of the Engineer, the hauling equipment causes horizontal shears or slick sides, rutting, quaking, heaving, cracking or excessive deformation of the embankment, the Contractor shall limit the type, load or travel speed of the hauling equipment on the embankment.
2. Any approved embankment material which is lost in transit or rendered unsuitable after being placed in the embankment and before final acceptance of the Work, shall be replaced by the Contractor in a satisfactory manner.
3. The Contractor shall excavate and remove from the embankment any material that the Engineer considers objectionable and shall also dispose of such material and refill the excavated area as directed.

3.2 PLACING EARTHFILL

- A. The distribution and gradation of the earthfill materials shall be such that the earthfill will be free from lenses, pockets, streaks, voids, or layers of material differing

substantially in texture, gradation, or water content from surrounding material.

- B. The combined excavation and placing operations shall be such that the earthfill materials, when placed on the embankment, will be blended sufficiently in the opinion of the Engineer to secure the highest practicable degree of uniformity and strength.
- C. Placing of earthfill materials includes dumping, spreading, and mixing the earthfill materials and any other operations on the surface of the earthfill portion of the embankment necessary to blend earthfill materials to form as homogeneous a layer as practicable prior to compaction. Successive loads of material shall be dumped and spread on the earthfill so as to produce the best practicable distribution of the material, subject to the approval of the Engineer; and for this purpose, the Engineer may designate the locations in the earthfill where the individual loads shall be deposited.
- D. The earthfill materials shall be dumped and spread in a direction parallel to the crest of the embankment. When windrows of material are formed as a result of the dumping operations, such windrows shall be parallel to the crest of the embankment.
- E. The material placed in the earthfill shall be spread in level, continuous, horizontal layers such that the loose layers shall not exceed 8 inches in thickness prior to compaction.
- F. The first layer of fill placed over or against the prepared surface of the bedrock shall be placed wet of optimum. Material along the floor and side wall contact shall be wheel rolled for compaction with a rubber-tired piece of equipment. Such equipment shall be a Caterpillar 988 front-end loader with a loaded bucket, a scraper, or equivalent as approved by the Engineer. Material in subsequent lifts along the side wall of the key trench shall be compacted in the same manner.
- G. As soon as practicable after commencement of construction of any section of the embankment; the fill shall be raised or slightly sloped as determined by the Engineer so that the surface of the fill will drain freely to the rear of the fill so that it enters the dewatering trench or runs off laterally along the back wall of the excavation and shall be so maintained throughout construction.
- H. If, in the opinion of the Engineer, the surface of the prepared foundation or the surface of any previously compacted layer of earthfill is too dry or too smooth to bond properly with the layer of earthfill material to be placed thereon, it shall be moistened and disked or scarified in an approved manner to a sufficient depth to provide a satisfactory bonding surface before the earthfill material is placed.
- I. If, in the opinion of the Engineer, the surface of any previously compacted layer of the earthfill in place is too wet for proper compaction of the layer of earthfill material to be placed thereon, it shall be removed, allowed to dry, or be worked with a disk to reduce the water content to the required amount, and then it shall be recompacted before the next succeeding layer of earthfill material is placed.
- J. After a layer of earthfill has been dumped and spread, it shall be disked to break up and blend the earthfill materials. Smooth, hard surfaces and deep ruts in the surface of earthfill resulting from the passage of construction equipment during placing operations shall be removed by disking or scarifying. Disking to obtain a uniform distribution of water content throughout the uncompacted layer as detailed below, may be substituted

for disking required to break up and blend the earthfill materials. Disking shall be performed with a heavy disk plow to the full depth of the uncompacted layer. The diameter of the disk shall not be less than 24 inches at any time during the disking operations. If one pass of the disk does not accomplish the breaking up and blending of the earthfill, additional passes of the disk may be required.

- K. Prior to placement of earthfill on or against the surfaces of previously placed and compacted portions of the liner embankment, all previously placed and compacted materials which have become soft or loose due to exposure to weather, which contain erosion channels or cracks, or which are excessively dry, shall be reworked by removing and replacing, or by recompacting as directed by the Engineer. The replaced materials shall be compacted as required by these Specifications for the type of material being compacted. Damaged or loosened surfaces shall be recompacted as originally specified for the material being recompacted.
- L. At all times during the dumping and spreading processes, the Contractor shall maintain a personnel force adequate to remove all roots and debris from all embankment materials and all cobbles of greater than 3 inches in maximum dimension from embankment fill materials. Cobbles so removed and the roots and debris shall be removed from the embankment and disposed of in an approved manner. The entire surface of any section of the embankment under construction shall be maintained in such condition that construction equipment can travel on any part of any one section. Ruts in the surface of any layer shall be removed by scarifying before placing and compacting additional material.
- M. WATER CONTENT AND DENSITY CONTROL
 - 1. General:
 - a. Each layer of the earthfill material on the embankment shall be compacted by a sufficient number of passes, but no less than 2 complete passes, to achieve the specified percent compaction shown below, which shall be the minimum compaction effort to be performed by the Contractor. One pass is defined as the passing of both drums of a double drum tamping foot roller over the material to be compacted. During compaction, the water content of the earthfill materials shall be such that the water content and dry density of the compacted earthfill will be maintained within the control limits specified below. The results of testing specially compacted earthfill will not be combined with the results of testing earthfill compacted by tamping rollers.
 - 1. Embankment fill: 98% maximum dry density.
 - 2. Fill outside embankment: 95% maximum dry density.
 - 3. Topsoil: No requirement.
 - b. To determine that the water content and dry density requirements of the compacted earthfill are being met, field and laboratory tests will be made by the testing agency at frequent intervals on samples of compacted

material taken at embankment locations determined by the Engineer. Field and laboratory tests will be made by the testing agency in accordance with Section 01 40 00. The results of all completed earthwork tests shall be available to the Engineer and Owner as soon as is reasonable.

- c. Materials not meeting the specified water content or dry density requirements, or any other specified material property, as determined by the tests, shall be reworked until approved results are obtained. If freezing of previously compacted and accepted earthfill has resulted in a decrease in compacted density of the earthfill as determined by the Engineer, the Contractor shall rework or overexcavate and replace the earthfill as directed until approved densities are obtained. Reworking shall include removal, rehandling, reconditioning, rerolling, or combinations of these procedures.

2. Water Content Control:

- a. The optimum water content is defined as "the water content of a soil at which it can be compacted to its laboratory maximum dry density by a given compactive effort." The laboratory maximum dry density in pounds per cubic foot is the maximum dry density obtained from a curve of water content versus dry density for a given compactive effort.
- b. As far as practicable, the material shall be brought to the proper water content for compaction in the borrow pit or at the site of required excavation before excavation, and the Contractor shall make allowances for water loss during excavation, transportation, and placing operations.
- c. Supplementary water, if required, shall be added to the material by sprinkling on the earthfill, and each layer of earthfill shall be conditioned by disking or other approved methods so that the water is distributed uniformly throughout the layer. Water applied on a layer of fill shall be accurately controlled in amount so that free water will not appear on the surface during or subsequent to rolling. Should too much water be added to any part of the embankment, so that the material is too wet per specifications, the rolling on that section of the embankment shall be delayed until the moisture content of the material is reduced to an amount within the specified limits.
- d. The water contained in the earthfill material during compaction shall be distributed uniformly throughout the layer of material being compacted. The moisture content after compaction shall be as uniform as practicable throughout any one layer of the earthfill material. The allowable ranges of water content are based on design considerations.

- e. Material represented by the samples tested having a water content outside the limits shown below will be rejected and shall be removed or reworked until the water content is between these limits as specified below.
 - 1. Embankment Fill: Less than two (2) percent below optimum water content and more than two (2) percent above optimum water content.
 - 2. Fill outside embankment: Less than two (2) percent below optimum water content and more than two (2) percent above optimum water content.
 - 3. Topsoil: No requirement

3. Density Control:

- a. Density control of compacted embankment fill shall be such that the dry density of the portion of the compacted material passing a United States Standard No. 4 sieve as determined by tests performed by the Engineer shall conform to the following limits:
 - 1. Material represented by samples having a dry density less than 98% of its laboratory maximum dry density will be rejected as outlined below. Such rejected material shall be rerolled or reworked as necessary until its dry density is equal to or greater than 98% of its maximum dry density.
 - 2. For all embankment fill having a dry density greater than the above limit and based on a continuous record of tests made by the Engineer on previously compacted and accepted embankment fill, the uniformity of dry density shall be such that:
 - a. The average dry density of all accepted embankment fill and of material represented by any 10 consecutive tests within a work area of the embankment shall be not less than 85% of the laboratory maximum dry density with no single test sample being lower than 95% of the maximum dry density.
 - 3. The Engineer will inform the Contractor of single sample test results and the running average compacted density, The Contractor shall immediately make adjustments in procedures as necessary to maintain the dry density within the specified limits of uniformity.
- b. Density control of compacted fill outside the embankment shall be such that the dry density of the portion of the compacted material passing a United States Standard No. 4 sieve as determined by tests performed by the Engineer shall conform to the following limits:
 - 3. Material represented by samples having a dry density less than

95% of its laboratory maximum dry density will be rejected as outlined below. Such rejected material shall be rerolled or reworked as necessary until its dry density is equal to or greater than 95% of its maximum dry density.

4. For all fill outside of the embankment having a dry density greater than the above limit and based on a continuous record of tests made by the Engineer on previously compacted and accepted fill outside the embankment, the uniformity of dry density shall be such that:
 - b. The average dry density of all accepted fill outside the embankment and of material represented by any 10 consecutive tests within a work area of the fill shall be not less than 95% of the laboratory maximum dry density with no single test sample being lower than 92% of the maximum dry density.
3. The Engineer will inform the Contractor of single sample test results and the running average compacted density, The Contractor shall immediately make adjustments in procedures as necessary to maintain the dry density within the specified limits of uniformity.

N. ROLLERS

1. Tamping Foot type rollers shall be used for compacting the fill soils. The rollers shall be capable of effectively achieving the required density for the entire depth of the lifts being placed. The rollers shall be suitable for the material being placed, capable of rates of production, which will not cause any delays to the progress of the work. The length of each tamping foot shall sufficient to penetrate the thickness of each loose lift. Each compactor shall be equipped with cleaners on the drums so soil cannot building up and reduce the compactive effort of the machine.

O. COMPACTION

1. When each layer or a portion of a layer of earthfill has been blended, leveled, and conditioned to have the water contained therein distributed uniformly throughout the layer, as detailed above, it shall be compacted by passing the drum of a tamping roller over it a sufficient number passes (with a minimum of 2 complete passes) to achieve the specified minimum allowable compaction. On rough or irregular formation surfaces or formation surfaces which could be damaged by tamping rollers, as determined by the Engineer, the initial layer of earthfill shall be compacted with a rubber-tired roller having a minimum wheel load of 25,000 pounds and tire pressure of 80 to 100 pounds per square inch. When compacted, the dry density of the earthfill shall be uniform throughout the depth of the layer. Passes of the tamping roller or rubber-tired roller shall be carried out so that the

compactive effort is uniformly distributed in a systematic manner over the entire layer. When two- or four-drum, self-propelled rollers are used which have drums laterally separated by the operator's cab and differential, the uncompacted central portion of the roller path shall not be compacted until the outer portions of the path have been fully compacted.

2. Where steep abutments, construction activities, or other factors make it impractical or inefficient to complete the required number of drum passes while maintaining the same direction of roller travel, additional passes as needed to achieve compaction shall be performed by routing the tamping rollers parallel to the obstructions as approved by the Engineer. Portions of the earthfill which are not accessible to tamping rollers shall be specially compacted with power tampers or other approved methods in accordance with the provisions of this Section.
3. If, in the opinion of the Engineer, the compacted earthfill material has a water content greater than allowed above, the earthfill material shall be worked with a disk or other suitable equipment to reduce the water content to the amount specified, shall be allowed to dry until such time as its water content is within the limits specified above, or the material shall be removed from the embankment.
4. If, in the opinion of the Engineer, the compacted earthfill material has a water content less than allowed above, water shall be added to the uncompacted earthfill, and the earthfill shall be worked with a disk or other suitable equipment to distribute the water uniformly throughout the uncompacted layer.
5. Compacted earth material that has a water content or dry density which does not meet the limits specified above, shall be reworked and rerolled, as directed by the Engineer, to obtain the water content and dry density specified for compacted earthfill.
6. At locations and at such times as determined by the Engineer, the Contractor shall excavate test pits in previously compacted earthfill for the purpose of obtaining samples of previously compacted earthfill or for determining whether the earthfill contains unbonded layers of earthfill or unblended earthfill materials. Such test pits shall be in accordance with Section 31 23 20.

3.3 SPECIALLY COMPACTED EARTHFILL EMBANKMENT

A. LOCATIONS OF SPECIALLY COMPACTED EARTH FILL

Specially compacted earthfill will be required at the following locations:

1. Earthfill in embankment placed and compacted in depressions and irregularities in foundation surfaces where designated by the Engineer.
2. Earthfill material locations outside the limits of the embankment where designated by the Engineer.

B. PLACING

1. Material used in specially compacted earthfill shall conform to embankment fill material required for earthfill in liner embankment in Section 31 05 13: Provided, all roots, debris, and cobbles of greater than 3 inch in maximum dimension are removed from the material and are not placed in specially compacted earthfill.
2. Specially compacted earthfill material shall be placed in accordance with the applicable provisions this specification: Provided: That earthfill material to be specially compacted may require placement in layers thinner than those specified for roller compaction of earthfill material to obtain the desired compaction with the equipment used.
3. Where the foundation or compacted surface of any layer is too smooth to bond properly with the succeeding layer, it shall be scarified or otherwise roughened to provide a satisfactory bonding surface before the next layer of earthfill material is placed.

C. COMPACTING

1. When each layer of material has been conditioned to have the required water content, it shall be compacted by special rollers, mechanical tampers, or by other approved methods. All equipment and methods used shall be subject to approval by the Engineer.
2. Adjacent to restrictive areas as approved by the Engineer, compaction by rubber-tired equipment of a layer of earthfill not to exceed 2 feet in horizontal width may be substituted for compaction by mechanical tampers: Provided, That smooth surface left by the use of rubber-tired equipment shall be treated as prescribed above, prior to placement of the subsequent layer of earthfill.
3. The water content control and density control shall be equivalent to that obtained in the earthfill placed in the liner embankment in accordance with this specification.

3.4 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements.

a. PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements

END OF SECTION

31 23 23- 12

SECTION 31 25 13
EROSION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Site Stabilization

- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 31 05 16 - Aggregates for Earthwork.
 - 3. Section 31 10 00 - Site Clearing.
 - 4. Section 31 23 16 - Excavation.
 - 5. Section 31 23 23 - Fill.
 - 6. Section 32 91 19 - Landscape Grading.
 - 7. Section 32 92 19 - Seeding.

1.2 REFERENCES

- A. Urban Drainage & Flood Control District (UDFCD) Criteria Manual Volume 3
- B. Colorado Department of Health and Environment (CDPHE) regulations.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Stormwater Management Plan (SWMP)
- C. CDPHE Temporary Construction Dewatering Permit (if required).
- D. CDPHE Stormwater Discharge Permit (if required).

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 SITE STABILIZATION

- A. Incorporate erosion control devices indicated in the SWMP into the Project at the earliest practicable time.
- B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.

3.3 FIELD QUALITY CONTROL

- A. Inspect erosion control devices per the SWMP and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. When sediment accumulation in sedimentation structures has reached a point one-half depth of sediment structure or device, remove and dispose of sediment.
- C. Do not damage structure or device during cleaning operations.
- D. Do not permit sediment to erode into construction or site areas or natural waterways.
- E. Clean channels when depth of sediment reaches approximately one half channel depth.

3.5 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

END OF SECTION

SECTION 31 37 00

RIPRAP

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Riprap placed loose.
- B. Related Sections:
 - 1. Section 31 23 16 - Excavation
 - 2. Section 31 23 23 - Fill.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Riprap:
 - 1. Basis of Measurement: By cubic yard.
 - 2. Basis of Payment: Includes supply and placing riprap.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for riprap.
- C. Manufacturer's Certificate: Certify product meets or exceeds specified requirements.

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Not applicable to this project.

1.5 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Furnish materials in accordance with Urban Drainage and Flood Control District.
- B. Riprap: Type L; 9-inch median size.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 40 00 – Quality Requirements.

3.2 PLACEMENT

A. Place riprap as indicated on Drawings.

B. Installed Thickness: As indicated on Drawings.

END OF SECTION

31 37 00- 2

SECTION 31 63 29

DRILLED CONCRETE PIERS (CAISSONS)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.
- B. Information concerning a sub-surface soil investigation by the Owner's Geotechnical Engineer is available and will be furnished by the Owner upon request. The contractor may use the data included therein for his general information only. The Architect/Engineer is not responsible for the accuracy or applicability of the data therein.

1.2 DEFINITIONS

- A. Casing: Steel cylinder used to resist earth and water pressures, to serve as concrete form, and to protect personnel.
- B. Dry Method: A method of pier installation in which concrete is placed in the dry. Casing may or may not be used to maintain sidewall stability.
- C. Owner's Representative: The Architect, Structural Engineer, or Geotechnical Engineer authorized to act on behalf of the Owner.
- D. Owner's Representative - Geotechnical Engineer: The Geotechnical Engineer specifically authorized to carry out the responsibilities defined in this specification.
- E. Tremie method: Procedure for placing concrete under water or slurry using a watertight steel pipe or tube to place concrete without washing out cement fines.

1.3 STANDARDS

- A. The following Standards are listed in this specification:

ASTM A36 Standard Specification for Carbon Structural Steel

ASTM A283 Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates

ASTM A929 Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe

ASTM C33 Standard Specification for Concrete Aggregates

ASTM C94 Specification for Ready Mixed Concrete

ASTM C150 Specification for Portland Cement

ASTM D1143 Standard Test Method for Piles Under Static Axial Compressive Load

ASTM D4380 Standard Test Method for Density of Bentonitic Slurries

ASTM D4381 Standard Test Method for Sand Content by Volume of Bentonitic Slurries

ASTM D4972 Standard Test Method for pH of Soils

1.4 SCOPE OF WORK

- A. The Drilling Contractor shall furnish all labor, materials, services, equipment (including temporary casings and/or dewatering where required), and shall install all piers at the locations and depths shown on the drawings or as otherwise directed by the Owner's Geotechnical Engineer. Installation methods compatible with the design may be used if acceptable to the Owner's Geotechnical Engineer. Methods that are not compatible with the design shall be excluded from consideration.
- B. The Drilling Contractor shall furnish and place all reinforcing steel, dowels, and anchor bolts that are shown on the drawings to be embedded in the pier.
- C. The General Contractor shall provide all necessary excavation, sheeting and bracing or other adequate maintenance of excavation banks, suitable runways and ramps as necessary for access of pier drilling, control of ground and surface water as necessary to keep the work area sufficiently dry, suitable access roads for movement of equipment and materials to and from pier locations, field layout required for pier work including setting and maintaining a location stake for each pier and giving cut-off grades on all piers, removal and replacement of all overhead and underground obstructions as required, and coordination of all concrete ordering and delivery.

1.5 QUALIFICATIONS

- A. Drilled piers shall be installed by a specialty Drilling Contractor with suitable equipment, competent personnel, and a reputation of satisfactorily performing the work. The Contractor shall have a minimum of 5 years successful experience and a minimum of 5 successful installations on projects of a similar size and scope to this project and of using similar installation methods as may be anticipated for this project. Evidence of compliance with this section shall be submitted to the Architect/Engineer prior to entering into a contract for the work.

1.6 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

- A. Codes and Standards: The Drilling Contractor shall comply with the provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:

1. ACI 301 - "Specifications for Structural Concrete for Buildings".
2. ACI 117 - "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 318 - "Building Code Requirements for Reinforced Concrete".
4. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice".
5. ANSI/AWS D1.1 "Structural Welding Code - Steel".
6. ANSI/AWS D1.4 "Structural Welding Code – Reinforcing Steel".

In addition, all applicable building code and local regulations shall be followed. In case of conflict, the strictest interpretation shall govern.

B. Survey Work:

1. The General Contractor shall employ a qualified surveyor to perform all surveys, layouts and measurements for drilled pier work including the layout of anchor rods and/or reinforcing steel dowels embedded in drilled piers. The surveyor shall conduct the layout work for each drilled pier to the lines and levels required prior to beginning excavation and shall make actual in-place measurements of each drilled pier plan location, shaft diameter, bottom and top elevations and deviations from specified tolerances.
2. The surveyor shall record and submit all information pertinent to each drilled pier and cooperate with other testing and inspection personnel to provide data for all required reports.

C. Testing Laboratory Requirements: The Drilling Contractor shall cooperate with all testing and inspection personnel employed to perform field quality control tests and inspections. See Testing Laboratory section of the specifications for required tests and inspections to be performed by the Testing Laboratory and Geotechnical Engineer.

Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.

1.7 JOB CONDITIONS

A. Site Information:

1. Data on indicated subsurface conditions are not intended as representations or warranties of continuity of such conditions. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. The data are made available for convenience of the Contractor.
2. The Contractor may make additional test borings and other exploratory operations at no additional cost to the Owner.
3. The Contractor shall inspect the site prior to drilling operations and shall determine any constraints to the work presented by the existing surface conditions and report them to the Owner's Representative.

B. Protection of Existing Structures: Locate all existing underground structures and utilities that are to remain in service during construction. Protect above-ground structures, underground utilities and other construction from damage caused by drilling operations.

Report any conflicts between drilling work and underground utilities and structures to the Owner's Representative and do not proceed with the work until the conflict is resolved.

1.8 PREINSTALLATION CONFERENCE

- A. At least 7 days prior to beginning pier installation, the Contractor shall conduct a meeting to review the proposed excavation, inspection, and concrete and reinforcement placement methods and procedures to produce pier construction of the required quality. Also review requirements for submittals, status of coordinating work and availability of materials. Establish work progress schedule and procedures for bearing surface inspection, materials testing, and certifications. The Contractor shall send a pre-installation conference agenda to all attendees 7 days prior to the scheduled date of the conference.
- B. The Contractor shall require responsible representatives of every party who is concerned with the concrete work to attend the conference, including but not limited to the following:
 - Contractor's Superintendent
 - Laboratory responsible for field material testing
 - Drilling Subcontractor
 - Ready-Mix Concrete Producer
 - Geotechnical Engineer
 - Owner's and Architect's/Engineer's Representative
- C. Minutes of the meeting shall be recorded, typed and printed by the Contractor and distributed by him to all parties concerned within 5 days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes:
 - Owner's Representative
 - Architect
 - Engineer-of-Record
- D. The Engineer shall be present at the conference. The Contractor shall notify the Engineer at least 7 days prior to the scheduled date of the conference.

1.9 SUBMITTALS

- A. Concrete Mix Design: Submit concrete mix designs suitable for method of concrete placement for Engineer and Owner's Testing Laboratory approval prior to pier installation.
- B. Drilling Records: The Contractor and the Owner's Geotechnical Engineer or other authorized inspector shall each submit copies of the drilling record for each pier to the Architect/Engineer immediately after drilling. The reports shall indicate the name of the job, name of Contractor, and name of drilling superintendent. For each pier installed, the report shall indicate the following information:
 - 1. Pier number and location
 - 2. Pier shaft diameter
 - 3. Bottom elevation
 - 4. Top elevation

5. Pier length
6. Theoretical volume of concrete in pier
7. Actual volume of concrete placed
8. Reinforcing steel size and depth actually placed
9. Drilling start and finish time
10. Concreting start and finish time
11. Variation from specified tolerances including surveyed location and plumbness
12. Construction method (dry method, casing method, or slurry displacement method)
13. Groundwater conditions (rate of water infiltration and depth of water in hole prior to concreting for dry piers; water elevation in hole for wet piers)
14. Elevation of top and bottom of any casing left in place
15. Description of temporary or permanent casing (including purpose, diameter, wall thickness and length)
16. Description and elevation of any obstructions encountered and whether removal was obtained
17. Description of pier bottom including amount and extent of loose material
18. Method of concrete placement
19. Any difficulties encountered in drilling or concreting operations
20. Any deviations from specifications.

For piers founded in rock, also record elevation at which rock was encountered, depth of socket, and record of any rock core samples made.

Reports prepared by the Owner's Geotechnical Engineer or authorized inspector shall be compiled and signed by a licensed professional engineer in the state where the project is located. Reports prepared by the Contractor shall be compiled and signed by the drilling superintendent.

C. Shop Drawings:

1. Reinforcing Steel: Submit shop drawings for all drilled pier and pier cap reinforcing steel.
2. Installation Method: Submit detailed procedures of the installation method, including (where applicable) type and number of drilling rigs and equipment, casing size and length, casing removal method, drilling fluid type, dewatering method, concrete placement, and reinforcing steel securing and placement.

D. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items.

E. Qualification Data:

1. Submit qualification data for firms and persons specified in the article entitled "Qualifications" to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

2. Submit Welding Procedure Specifications (WPS) in accordance with ANSI/AWS D1.1 for all welded joints in steel casing. Submit test reports showing successful passage of qualification tests for all non-prequalified WPSs.
 3. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests as specified in section 1.05-B. If recertification of welders is required, retesting will be at Contractor's responsibility.
- F. Alternates: The Drilling Contractor shall submit his bid based on the specifications as written without exceptions. He may submit bids for alternates to the specifications or modifications to the design, load test program, or installation specifications for consideration by the Owner's Representative and the Owner.
- G. Post Construction Survey: After completion of pier placement, the Contractor shall provide the Owner's Representative with an as-built survey showing the actual locations of the piers at the top elevations. This survey shall show the plumbness of vertical piers, and all abandoned piers and their replacements. No construction of superstructures shall commence until this survey has been reviewed and accepted by the Owner's Representative. In order to facilitate the progress of the Work, the Contractor shall submit partial pier surveys for approval as the Work proceeds.

PART 2 PRODUCTS

2.1 CONCRETE

Concrete shall be as specified in the "Cast-in-Place Concrete" section of the specifications, in the general notes, and on the drawings, with the additional requirements specified below:

- A. Maximum Aggregate Size: Provide maximum aggregate size of three quarters of minimum clear spacing between individual reinforcing bars or bundles of bars, with 1 1/2" maximum.
- B. Water Reducing Admixtures: Where required by mix design, use water-reducing admixtures in strict compliance with manufacturers directions. Admixtures to increase cement dispersion, or provide increased workability for low-slump concrete may be used at contractor's option. Use admixtures in the amounts as recommended by manufacturer for climatic conditions prevailing at time of placing concrete. Adjust quantities of admixtures as required to maintain quality control.
- C. Slump Limits: Proportion concrete to have a slump that is suitable for the placement process used. The mix must remain fluid throughout the concrete placement time and during extraction of any temporary casing. The design shall be in accordance to ACI and ADSC procedures.

2.2 REINFORCING STEEL

- A. See "Concrete Reinforcing Steel" section of the specifications.

- B. Reinforcing Support and Positioning Devices: Devices made of non-corrosive material that support and align reinforcing steel within the shaft and that provide the appropriate side and bottom cover to the reinforcing steel. Acceptable manufacturers include:

“Pieresearch”

“Aztec, a Dayton-Superior Company”

“Foundation Technologies, Inc.”

2.3 STEEL CASING

- A. Steel casing shall conform to ASTM A 283, Grade C or ASTM A 36.
- B. Corrugated steel casing shall conform to ASTM A 929.

2.4 CONCRETE MIXING

- A. Ready Mix Concrete: Comply with the requirements of ASTM C94.
- B. Hot Weather Concreting: The maximum acceptable concrete temperature at the truck discharge point shall be 95°F. Refer to Hot Weather Concreting Practices specified in "Cast-in-Place Concrete" section of the specifications for required hot weather concreting practices.
- C. Cold Weather Concreting Practices: Refer to the "Cast-in-Place Concrete" section of the specifications for cold weather concreting practices and the conditions under which they are to be followed.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Requirements:
 - 1. Excavate holes for drilled piers to dimensions and required bearing strata or elevations as shown on the drawings unless directed otherwise in the field by the Owner's Geotechnical Engineer.
 - 2. Maintain sidewall stability during drilling. If sidewall instability is encountered that the Owner's Representative considers excessive, the Contractor shall use alternate drilling methods such as temporary casing or slurry displacement method.
 - 3. Excavate holes for closely spaced piers and those occurring in fragile or sand stratas only after adjacent holes are filled with concrete and allowed to set a minimum of 6 hours or longer as required for concrete to harden unless temporary casing to maintain sidewall stability is used.
 - 4. Drilled pier design dimensions and depths shown on the drawings are based on bearing and/or friction in assumed strata. If bearing stratum is not capable of maintaining the assumed capacity, the foundation system shall be revised as directed by the Owner's Geotechnical Engineer and Owner's Representative. The Owner's Geotechnical Engineer may require drilling deeper than planned depths.

Revisions will be paid for in accordance with contract conditions relative to changes in the work. Refer to drawings for design bearing pressures and skin friction values.

5. The shaft shall be cleaned such that not more than 3 inches of loose material remains at the bottom of the shaft.

B. Equipment:

1. Provide adequate equipment so work is expedited to the fullest extent possible. Use equipment fully capable of excavating shafts to depths, diameters, and sizes indicated, and within the specified tolerances. Maintain equipment in satisfactory operating condition and provide sufficient quantity of equipment to maintain the projected schedule of the Work.
2. Using bits or augers with a power-driven rotary-type rig, a shaft of a diameter specified on the drawings shall be excavated from the ground surface to a depth as specified on the drawings or as ordered by the Owner's Geotechnical Engineer.

C. Obstructions:

1. If rocks, boulders, or other unforeseen obstructions are encountered which cannot be removed by standard drilled pier excavation methods, and if such obstructions are not indicated by available sub-surface data, removal of such obstructions will be paid for in accordance with the terms of the Contract relative to changes in the Work.
 2. Remove such obstructions by hand labor using air-powered tools or by other safe methods recognized in the construction industry. Standard drilled pier excavation methods include the use of core barrels with pier drilling equipment.
 3. The work of this Section includes demolition and removal of rock, boulders, concrete, masonry, and other subsurface obstructions that are indicated by the Contract Documents, or by the available subsurface exploration data, and such work will not be considered a change in the Work.
- D. Overexcavation: No payment will be made for extra length or greater diameter of drilled piers when they are installed to a greater depth or are larger than required unless authorized by the Owner's Geotechnical Engineer. Overexcavated drilled piers will be measured and paid for in accordance with the original design or authorized design depth and diameter.
- E. Excavated Material: Remove excavated material and dispose of it off site.

3.2 DEWATERING

- A. Dewatering shall be at the Contractor's discretion.
- B. Provide and maintain pumping equipment to keep excavations free of water before placing concrete. An excavation is considered dry if the water rises at a rate of less than 1/4 inch per minute and the height of water at the bottom of the pier does not exceed two inches at the time of concrete placement.
- C. Dewater in a manner that will not create subsidence or ground loss that might adversely affect the Work or existing adjacent structures. Should the dewatering system employed

involve pumping inside the pier, extreme caution shall be used to prevent an unbalanced water head from causing a "blowout", bottom heave, or "quick" condition that could disturb the proposed bearing stratum or surrounding soil strata.

- D. The dewatering method shall be submitted for review and approval of the Owner's Geotechnical Engineer.
- E. Conduct water to general site run-off ditches and disposal areas with discharge lines. Provide ditching as required to conduct water to site drainage facilities.
- F. If excessive water and/or sidewall instability is encountered and drilling operations must be halted, consult with Geotechnical Engineer and Owner's Representative before using alternate methods of construction.

3.3 TEMPORARY STEEL CASINGS

A. Requirements:

1. Provide temporary casing at locations as directed by the Geotechnical Engineer where the soil will not stand without support or where sloughing of the sides of shafts may seriously delay or endanger the satisfactory completion of excavation and placement of concrete. Also provide temporary casing at locations as directed by the Geotechnical Engineer to stabilize the shaft due to the inflow of water into the excavation.
2. The Contractor shall have immediately available for use on the job an ample supply of casing for each size that will be required for use in the shafts and shall provide additional amounts, as required, to ensure the orderly progress of the job.
3. Such casing may be in short pieces but with jointing devices of sufficient strength that assembled sections of casing may be pulled complete as concrete is placed, or immediately thereafter. Provide casing of sufficient strength to withstand handling stresses, concrete pressure, and surrounding earth and/or fluid pressures. Make diameter of excavation in relation to diameter of casing such as to create a minimum of void space outside of casing. Provide casing with a minimum inside diameter minimally larger than the outside diameter of drill bits.

B. Delivery, Handling, and Storage of Casing

1. Deliver casing to site in undamaged condition.
2. Handle and protect casing to maintain diameter within plus or minus two percent.

- #### C. Casing Withdrawal: Unless otherwise approved by the Owner's Representative, all temporary casing shall be removed from shafts as concrete is placed or immediately thereafter, and in such a manner as to prevent sloughing material from dropping to the bottoms of shafts or falling on top of freshly placed concrete. Casings shall be pulled in a single continuous smooth operation without sudden jerks or impact. Maintain head of concrete above the bottom of the casing that exceeds the soil and water pressure at all times during casing withdrawal. Water within the casing shall be positively displaced by the concrete. Do not vibrate concrete internally before the casing is withdrawn. A vibratory casing extractor may be used. Do not withdraw casing after the concrete has

attained initial set. The casing withdrawal and concreting operations shall be observed by the Geotechnical Engineer.

3.4 DRILLED PIERS IN ROCK

- A. Requirement: Provide drilled piers socketed into rock as shown on the drawings or as directed by the Owner's Geotechnical Engineer.
- B. Classification of Rock: Rock is defined as material which cannot be drilled with a conventional earth auger or underreaming tool, and requires use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation. Earth seams, rock fragments, and voids included in rock excavation area will be considered rock for full volume of shaft from initial contact with rock for pay purposes. The work of this section includes demolition and removal of rock, boulders, concrete, masonry, and other subsurface obstructions that are clearly indicated by contract documents, or by available subsurface exploration data, and such work will not be considered a change in work.

3.5 REINFORCING STEEL PLACEMENT

- A. Before placing, clean reinforcing steel and dowels of loose rust, scale, dirt, grease and other material that could reduce or destroy bond.
- B. Fabricate and erect reinforcing cages in shafts as one continuous unit using inner ring reinforcing guide. Place reinforcement accurately and symmetrically about axis of hole and hold securely in position during concrete placement. The Contractor shall verify depths of drilled piers prior to cutting and tying reinforcing steel cages. Reinforcing steel shall be delivered to the site in standard 60-foot lengths and cut as required. Splice no more than 33% of the bars at any one location, alternating spliced and unspliced bars in a symmetrical pattern. Splices shall be 30 bar diameter compression splices for bars #11 and smaller and mechanical end bearing compression splices for #14 and #18 bars unless noted otherwise on the drawings. See drawings for additional splice information. The Contractor shall be responsible for adding additional reinforcing steel ties or spirals as required to ensure stability of cage and maintenance of shape and configuration as required for proper lifting, handling, and placement.
- C. Provide cover to reinforcing steel of not less than 3 inches of concrete. Provide spacer devices to maintain side and bottom cover. Devices shall be installed in accordance with manufacturer's instructions.
- D. Permissible reinforcing steel upward vertical movement during casing withdrawal shall be no greater than 6 inches. Downward movement should not exceed 6 inches for every 20 feet of shaft length.
- E. Use templates to set anchor bolts, leveling plates and other accessories furnished under work of other sections. A qualified and licensed Engineer/Land Surveyor shall determine the plan location and elevation of such devices. Provide spacers (capable of sliding on any temporary casings required), blocking and holding devices to maintain required position during concrete placement.

- F. The General Contractor shall protect exposed ends of dowels and anchor bolts from mechanical damage and exposure to weather by wrapping and taping with polyethylene or other suitable material.

3.6 CONCRETE PLACEMENT

A. General:

1. Fill drilled piers with concrete immediately after inspection and approval by the Geotechnical Engineer or other authorized inspector. All shafts drilled shall be filled with concrete the same day. No shaft shall be allowed to remain open longer than 4 hours.
2. Place concrete continuously and in a smooth flow without segregating the mixed materials.
3. Place concrete by means of bottom discharge bucket, flexible drop chute, elephant trunk hopper, concrete pump, or tremie. Free fall of concrete may be used if provided for in concrete mix design and provided it is directed through a hopper or chute such that fall is down center of shaft without hitting sides or reinforcing steel. Free fall of concrete is not permitted for depths greater than 10 feet.
4. Place concrete in-the-dry if at all possible. If water occurs, and it is impracticable to dewater drilled pier excavation, and reasonable attempts to seal off water flow have failed, allow water level to attain its normal level and place concrete by tremie method or by concrete pumping. Other methods of depositing concrete underwater may only be used if approved by Architect/Engineer.
5. Stop concrete placement at cut-off elevation shown, screed level, and apply a scoured, rough finish. Where cut-off elevation is above ground elevation, form top section above grade and extend shaft to required elevation.
6. Provide mechanical vibration for consolidation of at least top 5' of each shaft but only after any temporary casing is pulled or when casing is permanent.
7. Interrupted placing operations of over one hour duration will require a cold joint installation as follows. Leave resulting shaft surface approximately level. At resumption of concrete placing, clean off surface laitance, roughen as required, and slush with a 1-to-1 cement grout or commercial bonding agent before remainder of concrete is placed. Intentional cold joints will not be permitted.
8. Concrete shall not be placed in adjacent drilled piers located within three center-to-center shaft diameters of each other until concrete has cured a minimum of 6 hours.
9. Aluminum pipe or equipment shall not be used for placing concrete.

B. Tremie Method:

1. The drilled shafts shall be filled with concrete by the use of a tremie or concrete pump extending from above the ground surface to the bottom of the drilled shaft. Inspection of the empty tremie on the bottom may be requested of the Contractor by the Owner's authorized inspector. The tube shall be filled to the top extending above the ground. The filled tremie shall be picked up off the bottom of the shaft to allow the weight of the concrete to displace any water greater than 3 inches deep at the shaft bottom. At no time is the tremie to be pulled to such a height as

to clear the surface of the concrete already placed in the shaft or water being displaced. All concrete shall be poured through the now open tremie with care taken to maintain a sufficient head of concrete to completely displace all water and suspended cuttings of material and to provide sufficient pressure so as to prevent reduction in pile diameter by earth pressure on the fresh concrete. The concrete in each pile shall be carried above cut-off elevation and then dipped out while fresh to cut-off elevation.

2. All concrete shall be deposited through the tremie or pumpline so as to provide a continuous flow, without aggregate segregation, from bottom to top of pile. The production and delivery of the ready-mixed concrete shall be such that not more than 45 minutes shall elapse between the depositing of successive batches of concrete to ensure a monolithic unit of concrete. No deviation from this method will be acceptable.
3. Should the surface of the concrete in the shaft be breached by the tremie or pumpline, the tube shall immediately be withdrawn from the hole, re-sealed and re-lowered below the surface of the concrete, and pouring operations re-started. Should the Owner's authorized inspector deem it necessary, the Contractor shall instead retrieve the reinforcing steel cage, redrill the shaft to reopen the hole, and begin the concreting operations from the bottom of the pier shaft.
4. If the Owner's authorized inspector has reason to suspect that the concrete was breached by the tremie or pumpline or that the pier, for any other reason, may contain extraneous material or otherwise fail the specifications, he may order the pier cored for inspection and/or testing. If the core recovery and/or test results indicate noncompliance with the specifications, the Contractor shall bear the expense of the investigation and/or testing and shall also, at no cost to the Owner, install proper additional construction as required by the Architect/Engineer. Should the investigation and/or testing indicate compliance with the specifications the Owner shall bear the cost of such investigation and/or testing.

C. Hot and Cold Weather Placement: Refer to Part II.

3.7 CONSTRUCTION TOLERANCES

- A. Plan Location: The tolerance on plan location for the top of the drilled pier shall not be more than 1/24 of the pier diameter or 3" in any direction, whichever is less. If the as-installed shaft is larger than required, the center of the shaft may be taken as the center of a shaft having the required area that lies wholly within the as-installed shaft.
- B. Plumbness: Permissible tolerance for plumbness shall be 1.5% of the length. The centers of the top and bottom may be taken as the center of the required area that lies wholly within the as installed area.
- C. Bottom Area: The bottom of the pier shall be essentially horizontal within a tolerance of 1 vertical to 12 horizontal with the area of the bottom bearing not less than 98% of that specified on the drawings.
- D. Top Area: The Contractor shall remove excess concrete at the top of the pier beyond the limits of the pier diameter. The pier top diameter shall be the same diameter as the shaft below. Piers extending above the ground surface shall be formed.

- E. Concrete Cut-Off Elevation: Concrete cut-off elevation at the pier top shall be plus one inch to minus three inches.
- F. Anchorage Embedment Tolerance: Vertical and horizontal deviation from design location for individual anchorage components embedded in the pier shall not exceed ± 0.5 inches.
- G. If any of the above tolerances are exceeded, the Architect/Engineer shall immediately be notified to evaluate the eccentricity in the pier and recommend corrective measures. The cost of reengineering and corrective construction shall be borne by the Contractor.

3.8 INSPECTIONS AND TESTS FOR DRILLED PIER EXCAVATIONS

- A. Verification of Design: Bottom elevations, bearing and/or skin friction capacities and lengths of drilled piers as shown on the drawings are estimated from available subsurface data.
- B. Notification of Architect/Engineer: If field conditions differ from the data and design recommendations outlined in the Geotechnical Report, the Geotechnical Engineer shall notify the Architect/Engineer immediately.
- C. Additional Tests: Additional tests may be required by the Geotechnical Engineer to determine new design criteria. Such tests shall be made as quickly as possible so as not to delay the concreting operations any longer than absolutely required.
- D. Observation Requirements: Each drilled pier shall be inspected by the authorized inspector and approved prior to placement of concrete.
- E. Cooperation with Testing and Inspection Personnel: The Contractor shall provide facilities as required to assist in the inspection and testing of the excavations, and cooperate with the inspecting and testing personnel to expedite the work.
- F. Notification of Observer: The Contractor shall notify the authorized observer at least twelve hours prior to the time the excavation will be ready for inspection. Drilled shaft installation shall not proceed without the authorized observer on site.
- G. Personnel Safety: The Contractor shall provide gas testing equipment, protective cage, or temporary casing or shoring of proper diameter, length, and thickness, and all other safety equipment required by law for inspection and testing of drilled piers and to protect workmen and inspectors during hand belling or other operations necessitating entry into shaft.

3.9 APPROVAL BY THE GEOTECHNICAL ENGINEER

- A. Approval by the Owner's Geotechnical Engineer is required on all pier installation criteria and his/her decision and judgment on pier length, rejection of piers, additional piers required, and all other pier installation and capacity questions shall be final.

3.10 CONTRACT BASIS

- A. Basis of Bids: Bids shall be based on number of drilled piers, design length from top elevation to bottom of shaft and diameter of shaft, as shown on drawings. The bid price shall include cost for temporary casing of excavation that may be required.

- B. Basis for Payment: Payment for drilled piers will be made on actual net volume of drilled piers in place and accepted. The actual length and shaft diameter may vary to coincide with elevation where satisfactory bearing or friction strata is encountered, and with actual bearing value of bearing strata determined by testing services, and with stability and characteristics of soil strata. Adjustments will be made on net variation of total quantities, based on design dimensions for shafts.
 - 1. There will be no additional compensation for excavation, concrete fill, reinforcing, casings, or other costs due to unauthorized overexcavating shafts. Overexcavated piers will be measured and paid for in accordance with required design or authorized depth. No payment will be made for rejected drilled piers.
 - 2. Prices quoted shall include full compensation for labor, temporary casing, materials, tools, equipment, and incidentals required for excavation, trimming, shoring, casings, dewatering, reinforcement, concrete, and other items for complete installation.

- C. Unit Prices (NOT USED)

END OF SECTION

SECTION 32 91 13

SOIL PREPARATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Preparation of subsoil.
 - 2. Placing topsoil.

- B. Related Sections:
 - 1. Section 32 05 13 - Soils for Earthwork.
 - 2. Section 32 91 19 - Landscape Grading.
 - 3. Section 32 92 19 – Seeding.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures

PART 2 PRODUCTS

2.1 SOIL MATERIALS

- A. Topsoil: As specified in Section 31 05 13

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 PREPARATION OF SUBSOIL

- A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

- B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated sub-soil.

- C. Scarify subsoil to depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

3.3 PLACING TOPSOIL

- A. Spread topsoil to minimum depth of 6 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low or soft areas, and to ensure positive drainage.

END OF SECTION

SECTION 32 91 19
LANDSCAPE GRADING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Final grade topsoil for finish grade.
- B. Related Sections:
 - 1. Section 31 23 23 - Fill.
 - 2. Section 3105 13 - Soils for Earthwork.
 - 3. Section 32 92 19 - Seeding.

1.2 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures

PART 2 PRODUCTS

2.1 MATERIAL

- A. Topsoil as specified in Section 31 05 13.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify substrate base has been contoured and compacted.

3.2 PREPARATION

- A. Protect landscaping and other features remaining as final Work.

3.3 SUBSTRATE PREPARATION

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of 1 inch in size. Remove contaminated subsoil.

32 91 19- 1

- C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.4 PLACING TOPSOIL

- A. Place topsoil in all disturbed areas outside of liner limits and on liner in all areas above normal operating water surface elevation. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Lightly compact placed topsoil.
- E. Leave stockpile area and site clean and raked, ready to receive seeding.

3.5 TOLERANCES

- A. Top of Topsoil: Plus or minus 1 inch.

3.6 PROTECTION OF INSTALLED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Prohibit construction traffic over topsoil.

3.7 SCHEDULES

- A. Compacted topsoil thicknesses:
 - 1. Seeded Grass: 6 inches.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Fertilizing.
 - 2. Seeding.
 - 3. Mulching.
 - 4. Maintenance.

- B. Related Sections:
 - 1. Section 31 05 13 - Soils for Earthwork.
 - 2. Section 32 91 13 - Soil Preparation
 - 3. Section 32 91 19 - Landscape Grading.

1.2 DEFINITIONS

- A. Weeds: Vegetative species other than specified species to be established in given area.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

1.4 QUALITY ASSURANCE

- A. Provide seed mixture in containers showing percentage of seed mix, germination percentage, purity of seed mix, and vendor's name.
- B. The quantity of pure live seed shall be determined using the following formula:
 - 1. Pounds of Seed (Bulk) X Purity X Germination = Pounds of Pure Live Seed (PLS)

1.5 QUALIFICATIONS

- A. Seed Supplier: Company specializing in manufacturing Products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 PRODUCTS

2.1 SEED MIXTURE

- A. Seed Mixture:

Scientific Name	Common Name	Variety	Pounds PLS/Ac	Percent
GRASSES				
Agropyron riparium	Streambank Wheatgrass	Sodar	1.0	7.1
Agropyron smithii	Western Wheatgrass	Arriba	2.0	14.3
Agropyron smithii	Western Wheatgrass	Rosanna	2.0	14.3
Andropogon gerardi	Big Bluestem		2.0	14.3
Boutelona gracillis	Blue Grama	Lovington	1.0	7.1
Buchloe dactyloides	Buffalograss	Sharps Improved	0.5	3.6
Festuca prantensis	Meadow Fescue		1.0	7.1
Panicum virgatum	Switchgrass	Tralblazer	1.5	10.7
Poa compressa	Canad Bluegrass	Rubens	0.5	3.6
Schizachyrium scoparium	Little Bluestem	Cimarron	1.5	10.7
Sporobolus cryptandrus	Sand Drop Seed		0.5	3.6
FORBS				
Achillea millefolium	Yarrow		0.1	.7
Gailiardia aristata	Blanketflower		0.2	1.4
Linum lewisii	Blue Flax		0.2	1.4
		Totals	14.0	100

2.2 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are acceptable.
- B. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil.

- C. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify prepared soil base is ready to receive the Work of this section.

3.2 FERTILIZING

- A. Apply fertilizer at application rate recommended by manufacturer
- B. Apply after smooth raking of topsoil.
- C. Do not apply fertilizer at same time or with same machine used to apply seed.
- D. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- E. Lightly water soil to aid dissipation of fertilizer. Manually irrigate top level of soil uniformly.

3.3 SEEDING

- A. Apply seed evenly in two intersecting directions. Rake in lightly.
- B. Apply seed at the vendor's recommended bulk seed rate/acre according to the quantity of PLS contained in their bulk seed to achieve the specified PLS/acre rate.
- C. Where access is limited and seed is applied by hand broadcasting, apply the seed mix at twice the PLS rate per acre.
- D. Do not seed areas in excess of that which can be mulched on same day.
- E. Do not sow immediately following rain, when ground is too dry, or when winds are over 10 mph.
- F. Immediately following seeding, apply mulch to thickness of 1/4 inch. Maintain clear of shrubs and trees.
- G. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

3.4 MAINTENANCE

- A. Water to prevent grass and soil from drying out.
- B. Control growth of weeds. Apply herbicides. Remedy damage resulting from improper use of herbicides.
- C. Immediately reseed areas showing bare spots.
- D. Repair washouts or gullies.
- E. Protect seeded areas with warning signs during maintenance period.

3.5 SCHEDULE

- A. Seed all areas where topsoil is placed, including all disturbed areas outside of embankment construction, and portions of the embankment above the normal operating water surface elevation.

END OF SECTION

SECTION 33 11 13 A

DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required to fabricate, supply, and deliver all Goods (ductile iron pipe, fittings, and appurtenances) and Services for work under this Section. This shall include, but not be limited to: shop welding, joints, harnessing attachments, linings inside, and coating system for outside of all items complete as shown on the Drawings and as specified herein.
- B. Unless otherwise noted, "pipe" shall mean pipe work of any type including pipe, fittings, joints, or appurtenances.

1.03 SUBMITTALS

- A. Shop drawings, including piping layouts, design calculations warranty information, test reports, and schedules shall be submitted to the Engineer.
- B. Submit shop drawings. Shop drawings shall include, but not be limited to:
 - 1. The grade of material; size, wall thickness of the pipe and fittings and appurtenances, type and location of fittings, specials, and valves; and the type and limits of the lining, lining reinforcing, and coating systems of the pipe and fittings. Methods and procedures recommended by the coating manufacturer will be documented.
 - 2. Joint details; methods and locations of supports; and complete information concerning type, size, and location of all welds. Shop and field welds will be clearly differentiated, and welds will be clearly detailed with preparation procedures for all pipe and parent metal comprising each weld. Critical welding procedures will be identified along with methods for controlling welding stresses and distortions. Locations and proposed joint details will also be clearly identified.
 - 3. All other pertinent technical information for all items to be furnished; product data to show compliance of all couplings, supports, fittings, coatings, and related items.
- C. Prior to shipment, submit a statement of compliance that the pipe, fittings, gaskets, linings and exterior coatings for this project have been manufactured and tested in accordance with AWWA and ASTM standards and requirements specified herein.

1.04 REFERENCE STANDARDS

- A. Unless otherwise noted in these Contract Documents, the standards referenced below shall apply to this Section and shall take precedence. Additional references may be noted in text and/or on the Drawings.

B. Where reference is made to standards, the revision in effect at the time of bid opening shall apply.

C. American Water Works Association (AWWA)

1. AWWA C104* - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
2. AWWA C105* - Polyethylene Encasement for Ductile-Iron Pipe Systems
3. AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3 In. through 48 In. (75 mm through 1200 mm) for Water and Other Liquids
4. AWWA C111 - Rubber-Gasket Joints for Ductile Iron Pressure Pipe and Fittings
5. AWWA C115 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges
6. AWWA C150 - Thickness Design of Ductile-Iron Pipe
7. AWWA C151 - Ductile Iron Pipe, Centrifugally Cast, for Water
8. AWWA C153 - Ductile-Iron Compact Fittings for Water Service for Water Service
9. AWWA C600 - Standard for Installation of Ductile Iron Water Mains and Their Appurtenances. (Installation by Others)
10. AWWA M45 - Handbook for Ductile Iron Pipe and Fittings

(*) - See Section 09950 for applicability

D. American Society for Testing and Materials (ASTM) (see Section 15120)

1. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
2. ASTM A194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service
3. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs 60,000 psi Tensile Strength
4. ASTM C150 - Standard Specification for Portland Cement (see Section 09950)

E. American National Standards Institute (ANSI)

1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings

1.05 QUALITY ASSURANCE

- A. It is a requirement of these Contract Documents to have all of the ductile iron pipe and fittings under this Section designed and supplied by a single manufacturer rather than have selection and supply of these items by a number of different manufacturers.
- B. All ductile-iron pipe and fittings to be installed under this project shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured.
- C. Inspection of the pipe will be made by Engineer or Owner after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the specification requirements even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery (including for defects from manufacturing or deliver/transport) shall be marked for identification and shall immediately be removed from the job at the Contractor's expense.

1.06 DESCRIPTION OF SYSTEMS

- A. Pipe shall be made in America as manufactured by Griffin Pipe, American Cast Iron Pipe Co., U.S. Pipe or an approved equal who is a member of the Ductile Iron Pipe Association (DIPRA). All ductile iron pipe shall be by a single manufacturer and all ductile iron fittings shall be by a single supplier. The fittings supplier shall certify in writing that their fittings are compatible with the supplied brand of pipe.
- B. Piping is to be installed in those locations as shown on the Drawings, and only where specifically indicated.

1.07 MARKINGS, HANDLING, AND STORAGE

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe or linings coatings. See also AWWA C600 and the referenced AWWA standards for shipping, handling, and storage procedures. Pipe or fittings shall not be dropped. All pipe or fittings shall also be examined as noted in Division 1. Any damage to linings or coatings discovered during examination shall be repaired to the satisfaction of the Engineer at the cost of the Contractor, before proceeding with the Work. Pipe shall be transported from the coating plant to the jobsite on padded bunks with nylon tie-down straps or padded banding to adequately protect the pipe and coating.
- B. All pipe and fittings shall be thoroughly cleaned, and shall be kept clean until they are used in the Work.
- C. Lined and/or coated pipe shall be suitably protected from exposure and heating of the sun at all times following procedures recommended by the coating system manufacturer. Exposure will not be allowed (except for short periods such as installation, assembly, and coating repairs).
- D. In handling the pipe, a double 2-ft wide cushioned sling shall be used or other devices and methods acceptable to the Engineer. No uncushioned ropes, chairs, wedges, cables, or levers shall be used in handling the finished pipe, fittings, or couplings. Care should be taken not to mar the pipe's outer coating. Padded wooden pipe cradles or chocks suitable for protection of tape or polyurethane coatings shall be used between fabricated pipes and beneath them on rough

surfaces when pipes are stacked. Pipe shall not be stored on bare ground unless soft sand berms are used to support the pipe.

- E. No metal tools or heavy objects shall be permitted to come into contact unnecessarily with the finished coating.
- F. It shall be the responsibility of the Contractor to prevent damage to the linings or coating that might be caused by handling and/or storage of the completed pipe at low temperature (due to embrittlement) or high temperatures or direct sunlight.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ductile iron pipe shall conform to AWWA C151. Pipe shall be supplied in standard lengths as much as possible, with shorter pipe segments where required.
- B. All pipe shall have a pressure class rating of 250 psi.
- C. All flanges shall be rated for the same pressure as the adjacent pipe in all cases. Compatibility of the flanges with 250-lb class and higher special class AWWA valves will be the responsibility of the Contractor.
- D. Ductile iron pipe shall have locking restrained joint ends with rubber gaskets as noted on the drawings and in compliance with the requirements of this Section. Gaskets shall be manufactured of vulcanized styrene butadiene rubber (SBR) meeting all the requirements of AWWA C111 for push on and mechanical joints.

2.02 DUCTILE IRON PIPE DESIGN

- A. Ductile iron pipe shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Design shall be done for external and internal pressures separately using the larger of the two for the net design thickness. Additional allowances shall be made for service allowance and casting tolerance per AWWA C150. The pipe classes determined for various sizes and conditions shall provide the total calculated thickness at a minimum or conform to minimum pipe class specified in Paragraph 2.01 above or as shown on the Drawings, whichever is greater.

2.03 END TREATMENT/JOINTS

- A. Unless otherwise noted ends shall be:
 - 1. Where noted on the Drawings
 - 2. All ductile iron pipe/fitting joints shall be push-on, rubber gasket type per AWWA C111 in unrestrained areas. In restrained areas, both pipe and fitting joints shall be push-on, rubber gasket, restrained joint per the manufacturer's standard.

- B. Flanges shall be faced and drilled after being screwed on the pipe, with flanges true to 90 degrees with the pipe axis and shall be flush with end of pipe.
 - 1. Gaskets shall be full-face rubber, 1/8-in thick SBR material such as American Toruseal Gasket, or approved equal. Refer to paragraph 2.01 for drilling patterns associated with main pipe isolation valves and blind or dish head flanges. Special material, ring gaskets may be required for pressures exceeding 250 psi for ANSI rated and custom flanges branching off the main pipe.
 - 2. Flanged joints shall be supplied with bolts, bolt studs with a nut on each end, or studs with nuts where the flange is tapped. The number and size of bolts shall comply with the same standard as the flange. Bolts and nuts shall, except as otherwise specified or noted on the Drawings, comply with the ASTM A193 grade B7.
 - 3. Blind flanges shall be similar to regular flanges.
- C. Restrained joints shall be "Locked-type" joints manufactured by the pipe and fitting manufacturer that utilize restraint independent of the joint gasket. Restrained joints shall be suitable for the specified test pressure. Restrained joints shall be restrained push-on joints, "Megalug" by EBAA Iron, Snap-Ring by Griffin Pipe, TR Flex by US Pipe and Foundry; Lok-Ring by American Cast Iron Pipe Company or equal. Joints shall be fabricated of heavy section ductile iron casting. Bolts and nuts shall be low carbon steel conforming to ASTM A193, Grade B7.
 - 1. The required lengths of restrained joints shall be as shown on the Drawings.
- D. Couplings/Adaptors
 - 1. Closures shall be made with mechanical joint ductile iron solid sleeves and shall be located in straight runs of pipe at minimum cover outside the limits of restrained joint sections. Location of closures shall be subject to approval of the Engineer. Where required, proper restraint must be developed across the coupling.

2.04 FITTINGS

- A. Pipe fittings shall be ductile iron with pressure rating of 250 psi for all piping. Fittings shall meet the requirements of AWWA C110 or AWWA C153 as applicable.

PART 3 EXECUTION

3.01 DELIVERY, STORAGE, AND HANDLING

- A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, or pipe tongs shall be used in pipe handling. All pipe and fittings shall be examined before laying and no piece shall be installed that is found to be defective. Damage to the pipe coatings shall be repaired per manufacturer's recommendations.

- B. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work and when installed or laid, shall conform to the lines and grades required.
- C. Materials, if stored, shall be kept safe from damage. The interior of all pipe, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.
- D. Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Stacking shall conform to manufacturer's recommendations.
- E. Gaskets for mechanical, restrained, and push-on joints to be stored shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

3.02 LAYING DUCTILE IRON PIPE AND FITTINGS

- A. Ductile iron pipe and fittings shall be installed in accordance with requirements of the laying Schedule and AWWA C600, except as otherwise specified herein. A firm, even bearing throughout the length of the pipe shall be provided by digging bell holes at each joint and by tamping backfill materials at the side of the pipe to the springline per details shown on the Drawings. Blocking will not be permitted.
- B. All pipe shall be sound and clean before laying. When laying is not in progress, including lunchtime, the open ends of the pipe shall be closed by watertight plugs or other approved means. Good alignment shall be preserved in laying. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those shown on the Drawings, shall be provided, if required, for crossing utilities, which may be encountered upon opening the trench. Solid sleeves shall be used only where approved by the Engineer.
- C. All ductile iron pipe laid underground shall have a minimum of 5-ft of cover unless otherwise shown on the Drawings or as specified herein. Pipe shall be laid such that the invert elevations shown on the Drawings are not exceeded.
- D. Fittings, in addition to those shown on the Drawings shall be provided, where required, in crossing utilities, which may be encountered upon opening the trench. Solid sleeve closures shall be installed at locations approved by the Engineer.
- E. The pipe interior shall be maintained dry clean throughout the construction period.
- F. When field cutting is required, the cutting shall be accomplished with an abrasive wheel saw, torch cutter, or self-powered machine cutter in order to provide a smooth, 90-degree angle cut to the axis of the pipe. The cut end shall be beveled and coated according to the manufacturer's recommendations. Cutting of restrained joint pipe will not be allowed unless it is necessary to align a closure at a fitting, valve, casing, or other location-sensitive appurtenance. In these cases, the plain end shall be restrained with a manufacturer's field restraint system compatible with the system already being used or the appropriate weld rings may be field welded in accordance with the pipe and ring manufacturer's instructions.

G. Jointing Ductile-Iron Pipe:

1. Push-on joints shall be made in strict accordance with manufacturer's instructions, AWWA C600, and Appendix B of AWWA C111. If there is conflict, the manufacturer's instructions shall take precedence. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe. The joint surfaces shall be cleaned and lubricated and the plain end of the pipe shall be aligned with the bell of the pipe to which it is to be joined and pushed home. After joining the pipe, a metal feeler shall be used to make certain that the rubber gasket is correctly located.
2. Mechanical joints (where used) shall be assembled in strict accordance with the manufacturer's instructions, AWWA C600, and Appendix A of AWWA C111. If there is conflict, the manufacturer's instructions shall take precedence. Pipe shall be laid with bell ends looking ahead. To assemble the joints in the field, thoroughly clean and lubricate the joint surfaces and rubber gasket. Bolts shall be tightened to the specified torques. Under no condition shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage. After installation, apply a bitumastic coating to bolts and nuts and install polyethylene encasement as specified within this section.
3. Bolts in mechanical or restrained joints shall be tightened alternately and evenly.
4. Restrained joints shall be installed according to pipe manufacturer's instructions.

H. All blow-offs, outlets, valves, fittings, and other appurtenances required shall be set and jointed as indicated on the Drawings in accordance with the manufacturer's instructions.

I. Sleeve couplings shall be installed only where required for closure or shown on the Drawings. Couplings shall not be assembled until adjoining joints have been assembled. After installation apply a heavy bitumastic coating to bolts and nuts and install protective wrap recommended by the coupling manufacturer. Care shall be exercised to insure that insulating properties of insulating and dielectric couplings are maintained.

J. All joints shall be electrically bonded using bonding wire and brazing cartridges, as acceptable to the Engineer

3.04 TESTING

A. See Section 33 11 13 – Public Water Distribution Systems

3.05 CLEANING

A. At the conclusion of the work, thoroughly clean all of the pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material, which may have entered during the construction period. All debris shall be removed from the pipeline. The lowest segment outlet shall be flushed last to assure debris removal.

B. After the pipelines are cleaned and if the groundwater level is above the pipe or water surface in trench is above the pipe following a heavy rain, the Engineer will examine the pipe for leaks. If

defective pipes or joints are discovered at this time, they shall be repaired or replaced by the Contractor.

3.06 DISINFECTION

A. Not Applicable

END SECTION

SECTION 35 20 16.26

SLUICE GATES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required and install complete sluice gates, operators, and appurtenances complete and ready for operation and field tests as shown on the Drawings and as specified herein.

1.02 SUBMITTALS

- A. Submit to the Engineer shop drawings and product data showing materials of construction and details of installation.
 - 1. Complete description of all materials
 - 2. Certified shop and installation Drawings showing all details of construction, dimensions, and anchor bolt locations
 - 3. Descriptive literature, bulletins, and/or catalogs of the equipment
 - 4. A complete bill of materials
 - 5. The weight of each component
 - 6. A list of manufacturer's recommended spare parts
 - 7. Stem sizing calculations and forces
- B. In the event it is not possible to conform with certain details of this Section, describe completely all non-conforming aspects.
- C. Operation and Maintenance Data
 - 1. Operating and maintenance instructions for each type of equipment shall be furnished to the Engineer. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc. that are required to instruct operating and maintenance personnel unfamiliar with such equipment.
 - 2. A factory representative who has complete knowledge of proper operation and maintenance shall be provided for a minimum of the days noted below for each type item to instruct representatives of the Owner on the proper operation and maintenance of the equipment. Provide 1 day for sluice gates.
- D. The Contractor shall provide all final approved shop drawings, installation instructions, certified test reports, electrical and other schematics, drawings, data sheets, operations and maintenance manuals, and warranties and guaranties in hard copy and digital format.

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
 - 2. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes
 - 3. ASTM B98 - Standard Specification for Copper-Silicon Alloy Rod, Bar and Shapes
- B. American Water Works Association (AWWA)
 - 1. AWWA C501 - Cast-Iron Gates
- C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.04 QUALITY ASSURANCE

- A. All of the items and appurtenances specified under this Section of the same type shall be furnished by a single manufacturer who has at least 10 years experience, in the manufacture of the equipment furnished. All sluice gates and operators shall be by one Manufacturer.
- B. The sluice gates shall be manufactured by Rodney Hunt, Hydrogate, Waterman, or approved equal.

1.05 SYSTEM DESCRIPTION

- A. All of the gates are intended to be specifically designed for use with controlling and/or isolating the flow of raw water.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. All items under this Section shall be delivered, stored, and handled in compliance with the manufacturer's requirements and as herein specified:
 - 1. Care shall be taken in loading, transporting, and unloading to prevent injury to items and their operators, and to their respective coatings, they shall not be dropped. All items shall be examined before installation and no component shall be installed that is found to be defective. All coating damage shall be repaired to the satisfaction of the Owner's representative.
- B. Storage and Protection: Special care shall be taken to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extreme temperatures. Reference manufacturer's storage and protection information for further requirements.

PART 2 PRODUCTS

2.01 MATERIALS – GENERAL

- A. All units shall be of the type, size and location as shown on the Drawings, with the operators factory mounted.
- B. All fasteners, hardware, bolts, washers and trim shall be Type 316 stainless steel, unless specifically noted otherwise.

2.02 SLUICE GATES

- A. The gate shall be conventional frame, rising stem, fabricated of cast iron and shall have adequate strength to prevent distortion in handling and placing and under any condition of service outlined herein. All mating and sliding surfaces shall be fully machined.
- B. Unseating head for the gate shall be rated for the head each gate will be encounter during operation.
 - 1. Gate bottom elevation = 4971: 15 feet of head
- C. Frames shall be of cast iron, ASTM A126, Class B, one-piece flat or flange type construction, rectangular or circular opening, as required.
 - 1. Machined to be surface mounted directly to concrete and grouted in place per manufacturer's requirements.
 - 2. Sides shall extend upward so as to support and retain at least half the disc when in the full open position.
 - 3. Shall have machined dove-tailed grooves on the front face into which the type 316 stainless steel or bronze seat facings shall be driven and machined to a 63 micro-in finish. The back of the frame shall be machined to be surface mounted directly to concrete and grouted in place per manufacturer's requirements.
 - 4. Shall have integrally cast pads machined with keyways to receive top wedge seats.
 - 5. Anchor bolts shall be stainless steel and shall be epoxy set into concrete.
- D. The gate guide and disc shall be of cast iron, ASTM A126, Class B, one-piece construction, rectangular with integrally cast vertical and horizontal ribs. A reinforcing rib along each side shall be provided to ensure rigidity between the side wedges. The disc shall be manufactured so that deflection of the top and bottom ribs with full head on the gate will be less than 0.025-in.
 - 1. The gate slide shall have machined dove-tailed grooves on the seating face into which type 316 stainless steel or bronze seat facings shall be driven and machined to a 63-micro-inch finish.

2. A tongue on each side, extending the full length of the gate, shall be machined on all sides with a 1/16-in clearance maintained between the gate tongue and gate guide groove. The sluice gates shall have stainless steel or bronze lined disc tongues.
 3. Wedge pads for side and top wedges shall be cast integrally on the gate and machined to receive the adjustable, Type 316 stainless steel or bronze wedges. The side wedge pads shall be located at the ends of horizontal ribs.
 4. A heavily reinforced nut pocket shall be cast integrally on the vertical centerline and above the horizontal center and be of such shape to receive the square-backed manganese bronze stem block. Operating or lift nuts for the gates shall be bronze.
 5. The guides shall withstand the total thrust due to the water pressure and the wedging action. The guides shall be machined on all contact surfaces and a groove shall be machined the entire length of the guide to allow 1/16-in clearance between the gate tongue and the guide groove. The sluice gates shall have stainless steel or bronze lined guide grooves. The guides shall be of such length as to retain and support at least 1/2 the gate in the full open position. The guides shall be integrally cast or attached to the frame with silicon bronze or stainless steel studs and nuts and shall be doweled to prevent any relative motion between the guides and the frame. Stainless steel or bronze wedge seats shall be securely attached to machined pads on the guides.
 6. The wedges shall be type 316 stainless steel or bronze machined on all contact surfaces. They shall be attached to the gate with type 316 stainless steel or silicone bronze studs and nuts and shall have type 316 stainless steel or silicone bronze adjusting screws with lock nuts or other approved method.
 7. All seat facings shall be type 316 stainless steel or bronze. The extruded seat facings shall be of special shape to fill and permanently lock in the machined dove-tail grooves when pneumatically impacted into place. Attaching pins and screws will not be allowed. The installed seat facings shall be machined to a 63 micro-in finish.
- E. All fasteners for the gate and seal components shall be of stainless steel, ASTM A276, Type 316, or bronze ASTM B98, CA-655.
- F. The stem shall be of Type 316 stainless steel for the entire length, the metal having a tensile strength of not less than 60,000 psi. The stem shall:
1. Have sufficient diameter at the base of the thread to lift the weight of the gate, offset the resistance of the gate to the maximum unbalanced head and fully allow for starting impact.
 2. Transmit in compression at least two times the rated output of the crank operated floor stand with a 40 lb effort on the crank.

3. The threaded portion of the stem shall have machine cut threads of the Acme type.
 4. Stems of more than one section shall be joined by stainless steel couplings pinned and bolted to the stems. All threaded and keyed couplings of the same size shall be interchangeable.
 5. The gates shall be provided with adjustable bronze stop collars on the stem to prevent overclosing of the gate.
- G. Stem guides shall be provided as recommended by the manufacturer. Stem guide shall be cast iron, bronze bushed, mounted in a cast iron bracket. It shall be adjustable in two directions and spaced at sufficient intervals to adequately support the stem. This spacing shall not exceed 10-ft.
- H. Flush-Bottom Closure Seals
1. Compressible Resilient Seal
 - a. Attached to bottom of disc with a bronze or stainless steel bar and bronze or stainless steel fasteners.
 - b. Specially molded shape designed to fit a lip machined on bottom rib of disc.
 - c. Shaped to produce a wide sealing area on a machined cast iron stop bar, bolted and keyed to gate frame to form a flush invert.
 - d. Differential sealing pressure of resilient seal on stop bar shall be variable by adjustment of side wedges on gate.
 2. Alternative Closures
 - a. Solid, square-cornered, resilient rubber seal in place of bottom dovetail facing and wedging devices.
 - b. Securely fastened to bottom cross member of frame on a stop plate, with a retainer bar and stainless steel fasteners.
 - c. Make top surface of seal flush with invert of gate opening.
 - d. Machine full length of bottom edge of disc accurately to make contact with seal when disc is closed.

2.03 OPERATORS

- A. Gates shall be manually operated using a handwheel.

- B. The gate will have a maximum necessary operating force of 40 lbs.
- C. Cast iron housing will completely enclose the lift mechanism.
- D. Handwheel shall be positioned 36" above the operating floor.
- E. Gate Operators shall be equipped with fracture-resistant clear butyrate plastic stem covers, which shall not discolor or become opaque for a minimum of 5 years after installation. The top of the stem cover shall be closed. The bottom end of the stem cover shall be mounted in a housing or adapter plate for easy field mounting. Stem covers shall be complete with indicator markings to indicate gate position.

PART 3 EXECUTIONS

3.01 INSTALLATION

- A. Installation of all gates and appurtenances shall be in strict accordance with the manufacturer's drawings and recommendations. Frames and guides shall be installed in a true vertical plane and shall be installed with 90-degree corners.
- B. Gates with embedded guides and inverts shall be installed in accordance with the recommendations of the manufacturer subject to the Engineer's approval.

3.02 INSPECTION AND TESTING

- A. In addition to requirements in Part 1 of this Section, furnish the services of a factory representative for 1 day for the sluice gates who has complete knowledge of proper installation, startup and operation of the gates, and to inspect the final installation and supervise a test of the equipment. If there are difficulties in operation of the equipment due to the manufacturer's fabrication or Contractor's installation, additional services shall be provided at no additional cost to the Owner. The factory representative shall also provide training to Town staff on the gate operation(s).
- B. After installation, all gates shall be field tested at maximum differential head to ensure that all items of equipment are in compliance with this Section, including the leakage requirements.
 - 1. Maximum allowable leakage for sluice gates shall be: 0.1 gpm/ft of perimeter under the design seating head, and 0.2 gpm/ft perimeter for unseating heads of 20-ft or less.
- C. In the event that any unit fails to meet the above requirements, the necessary changes shall be made and the unit retested. If the unit remains unable to meet the test requirements to the satisfaction of the Engineer, it shall be removed and replaced with a satisfactory unit at no additional cost to the Owner.

END OF SECTION

35 20 16.26- 6

GEOTECHNICAL EVALUATION

Johnstown Reservoir Outlet Structure
Weld County, Colorado



Report Prepared for:

**J.C. York, P.E.
J&T Consulting, Inc.
305 Denver Avenue, Suite D
Fort Lupton, CO 80621**

**Project No. 20.3062
February 19, 2021**



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Report Prepared for:

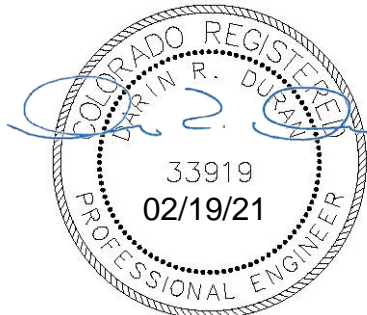
J.C. York, P.E.
J&T Consulting, Inc.
305 Denver, Avenue, Suite D
Fort Lupton, CO 80621

Project No. 20.3062
February 19, 2021

Report Prepared by:

A handwritten signature in blue ink that reads 'Jonathan A. Crystal'.

Jonathan A. Crystal, P.E.
Project Engineer



Darin R. Duran, P.E.
Principal, Manager - Salida and Crested Butte

TABLE OF CONTENTS

1. PURPOSE..... 1

 1.1 GENERAL..... 1

 1.2 SCOPE OF SERVICES 1

2. SUMMARY OF FINDINGS AND CONCLUSIONS..... 1

3. RESERVOIR HISTORY 1

4. PROJECT DESCRIPTION..... 1

5. GEOLOGIC CONDITIONS..... 2

6. SITE CONDITIONS 2

7. FIELD EXPLORATION 2

8. LABORATORY TESTING 2

9. SUBSURFACE CONDITIONS 3

10. EMBANKMENT ANALYSIS..... 3

 10.1 EMBANKMENT CONFIGURATIONS..... 3

 10.1.1 EXISTING CONFIGURATION..... 3

 10.1.2 REPAIR CONFIGURATION 3

 10.2 MATERIAL PARAMETERS 4

 10.2.1 SEEPAGE ANALYSIS 4

 10.2.2 STRENGTH PARAMETERS 4

 10.3 SEISMIC DESIGN 5

 10.4 STABILITY AND SEEPAGE RESULTS 5

 10.5 SETTLEMENT 6

11. CONSTRUCTION CONSIDERATIONS..... 6

 11.1 GROUNDWATER CONTROL..... 6

 11.2 EXCAVATIONS..... 7

 11.2.1 GENERAL CONSIDERATIONS..... 7

 11.2.2 EMBANKMENT FOUNDATIONS 7

 11.2.3 FILL MATERIAL 7

 11.2.4 MOISTURE CONDITIONING 7

 11.2.5 TEMPORARY CUTS 7

 11.3 FOUNDATION PREPARATION..... 8

 11.4 OUTLET PIPE 8

12. SOLUBLE SULFATE CONTENT 8

13. GEOTECHNICAL RISK..... 9

14. LIMITATIONS..... 9

TABLES

TABLE 8.1. Laboratory Testing Performed..... 2
TABLE 10.1. Design Hydraulic Conductivities 4
TABLE 10.2. Stability Analysis Strength Parameters 5
TABLE 10.3. Stability Analyses Results..... 6
TABLE 12.1. Information from ACI 318-08 - Table 4.3.1 9

FIGURE

VICINITY MAP..... FIGURE 1

APPENDICES

FIELD EXPLORATION APPENDIX A
LABORATORY TESTING..... APPENDIX B
SLOPE STABILITY RESULTS..... APPENDIX C

COMMON ABBREVIATIONS

AASHTO American Association of State Highway and Transportation Officials
ABC..... aggregate base course
ACI American Concrete Institute
ADA Americans with Disabilities Act
ADSC Association of Drilled Contractors
AI Asphalt Institute
APM asphalt paving material
ASCE..... American Society of Civil Engineers
ASTM American Society for Testing and Materials
AWWA American Water Works Association
bgs..... below ground surface
CDOT Colorado Department of Transportation
CBR..... California Bearing Ratio
CFR..... Code of Federal Regulations
CGS..... Colorado Geological Survey
CKD cement of kiln dust stabilized subgrade
CMU..... concrete masonry unit
CSEO..... Colorado State Engineer’s Office
CTB..... cement treated base course
deg degree
EDLA..... equivalent daily load application
 e_m edge moisture variation distance
EPS expanded polystyrene
ESAL equivalent single axle loads
 $f'c$ specified compressive strength of concrete at the age of 28 days
 F_a seismic site coefficient
FHWA Federal Highway Administration
FS factor of safety
 F_v seismic site coefficient
GSA..... global stability analysis
GVW gross vehicle weight
IBC International Building Code
ICC-ES..... International Code Council Evaluation Services, Inc.
IRC International Residential Code
kip 1,000 pounds-force
km kilometer
LTS lime treated subgrade
MDD maximum dry density
mg/L milligrams per liter
MGPEC..... Metropolitan Government Pavement Engineers Council
mm millimeter
 M_r resilient modulus
MSE mechanically stabilized earth
mV millivolts
NAPA National Asphalt Pavement Association
 N_{DESIGN} design gyrations

OSHA **Occupational Safety and Health Administration**
OMC..... **optimum moisture content**
OWTS **onsite wastewater treatment system**
PCA..... **Portland Cement Association**
PCC..... **portland cement concrete**
pcf **pounds per cubic foot**
pci..... **pounds per cubic inch**
pH..... **power of hydrogen**
psf **pounds per square foot**
psi..... **pounds per square inch**
PT **post-tension**
RAP..... **recycled asphalt pavement**
S_s..... **mapped spectral accelerations for short periods**
UBC **Uniform Building Code**
USGS **United States Geological Survey**

1. PURPOSE

1.1 GENERAL

Cesare, Inc. (Cesare) completed a geotechnical evaluation of the outlet structure replacement location of the existing Johnstown Reservoir in Weld County, Colorado. The purpose of the project is to replace the existing outlet structure due to leakage in the fall of 2020.

1.2 SCOPE OF SERVICES

Cesare's proposed scope of services is detailed in Cesare's Proposal Agreement No. F201001.

2. SUMMARY OF FINDINGS AND CONCLUSIONS

This section is intended as a summary only and does not include design details. The report should be read in its entirety and utilized for design.

- Cesare encountered a surface layer of granular material about 1 foot thick, which was likely base course used for a travel surface on the dam. Below the base course, the borings encountered about 8 to 16 feet of fill overlying weathered claystone in Borings B-1, B-2, and B-4 or native clays in Boring B-3. Claystone bedrock was encountered below the weathered claystone and clays at a depth of about 23 feet in B-1, B-2, and B-3 and 13 feet in B-4, extending to the remaining depths explored. A zone of about 1 foot of granular material was encountered in B-4 at a depth of about 9 feet, directly overlying the weathered claystone. The granular material may be pipe or structure bedding.
- The embankment is over 100 years old and little is known of its design or construction.
- The new outlet is anticipated to be a cast iron pipe (CIP) encased in concrete bearing on undisturbed competent claystone bedrock.

3. RESERVOIR HISTORY

Cesare understands the reservoir is on the order of 100 years old. Little is known of its design or construction. A new outlet was constructed in about 1952 for emergency discharge. Design documents for the new outlet were available; however, as-built documents were not available. The outlet began leaking in the fall of 2020, requiring emergency repair of the outlet.

4. PROJECT DESCRIPTION

The project consists of open cut excavating through the existing embankment, removing the existing outlet works, and constructing a more vigorous outlet structure. In addition, the repair will include localized grading to direct ponded water to the outlet structure intake. The grading will require excavating the existing soil up to an estimated 3 feet at the upstream dam toe. Some regrading of the existing embankment is planned, with a planned crest elevation of 4,984 feet and the maximum storage elevation of 4,981 feet. An outlet tower inside the reservoir will allow discharge from the reservoir.

Cesare understands normal operation is providing water for the treatment plant, which is understood to be low discharge rates CSEO requires a minimum design rapid drawdown of 1 foot, per day, for 5 days.

5. GEOLOGIC CONDITIONS

The soil onsite is described as eolian sediment, windblown deposits comprised of loess, clay, and silt mixtures. These sediments are Quaternary Middle Holocene and Upper Pleistocene in age, and generally 3 to 15 feet thick¹.

6. SITE CONDITIONS

Johnstown Reservoir is about 38 acres in area, roughly rectangular, and located in the southwest quarter of Section 1 and extends into the southeast quarter of Section 2, Township 4 North, and Range 68 West in Weld County. More specifically, the reservoir is north of State Highway 60 (SH60) and about 1 mile east of the Interstate Highway 25 (I25) intersection with SH60 and about 2-1/2 miles west of Johnstown, Colorado. The site location is shown in the vicinity map presented in Figure 1. The reservoir is bounded by an open space setback, with residential properties and a church bordering the outer open space perimeter on all sides.

The reservoir is positioned on an east sloping, low topographic ridge with the ground surface to the north and south sloping downwards to the northeast and southeast. Vegetation consists of a sparse to heavy growth of native and landscaping grasses. Cesare noted no bodies of water outside the reservoir in the vicinity of the site at the time of its field exploration. The reservoir water surface level was low, only a few feet deep, due to the leakage and subsequent CSEO decree.

7. FIELD EXPLORATION

Subsurface conditions were explored on December 2, 2020 by drilling four borings at the locations indicated in the boring location plan presented in Appendix A. Three borings were drilled to about 40 feet in depth along the existing dam centerline. One boring at the embankment downstream toe near the existing outlet was drilled to about 25 feet in depth. Graphical logs of the subsurface conditions observed, locations of sampling, and further explanation of the exploration performed are presented in the boring logs and accompanying key to symbols contained in Appendix A.

8. LABORATORY TESTING

Cesare personnel returned samples obtained during field exploration to its laboratory where professional staff visually classified them and assigned testing to selected samples to evaluate pertinent engineering properties. Laboratory tests performed are listed in Table 8.1. Further discussion of laboratory testing and laboratory test results are presented in Appendix B.

TABLE 8.1. Laboratory Testing Performed

Laboratory Test	To Evaluate
Grain size analysis	Grain size distribution for classification purposes.
Atterberg limits	Soil plasticity for classification purposes.
Moisture density relationships	Evaluate the relationship of moisture content, compactive effort, and compacted density.
In situ moisture and density	Evaluate in situ moisture content and density
Water soluble sulfate content	Potential reaction of the soil with cementitious material.

¹ Palkovic, M.J., Morgan, M.L., 2017, Geologic Map of the Johnstown Quadrangle, Larimer and Weld Counties, Colorado, Colorado Geologic Survey.

9. SUBSURFACE CONDITIONS

Cesare's borings encountered:

- Existing embankment fill to depths of about 8 to 16 feet in Borings B-1 through B-3.
- Existing fill, likely pipe backfill for the outlet installed in 1953, to 9 feet in B-4. Granular material found at the bottom of the fill and directly overlying weathered bedrock is likely pipe bedding for the outlet.
- Native clay below the fill in B-3 that extended to a depth of 23 feet.
- Weathered claystone bedrock in B-1, B-2, and B-4 below the fill.
- Claystone bedrock at depths of about 23 feet in B-1 through B-3 and about 13 feet in B-4.
- Groundwater at depths of 15, 18, 14 and 8 feet in Borings B-1 through B-4, respectively, at the time of drilling.
- Groundwater at depths of 15, 14-1/2, 13, and 4-1/2 feet in Borings B-1 through B-4, respectively, 1 day after drilling,.
- Borings B-1 through B-4 caved to depths of 38, 37, 27, and 16-1/2 feet immediately after drilling.

These observations represent conditions at the time of field exploration and may not be indicative of other times or other locations. Groundwater in the embankment can be expected to fluctuate and will be primarily influenced by height of water in the reservoir. Regional groundwater can be influenced by variations in seasons, weather, precipitation, drainage, vegetation, landscaping, and irrigation. Discontinuous zones of perched water may exist or develop within the overburden material and/or upper zones of the bedrock. Cesare's field explorations were performed during the fall when regional groundwater levels are usually lowest. Regional groundwater levels may be higher in the spring and early summer.

10. EMBANKMENT ANALYSIS

The CSEO considers the embankment as stable in its present configuration. Cesare's evaluation is intended to verify the embankment's stability at the repair location, considering the existing conditions and post repair conditions.

10.1 EMBANKMENT CONFIGURATIONS

10.1.1 Existing Configuration

The existing embankment at the outlet repair location has a crest width of about 12 feet wide at an elevation of about 4,986 feet. The upstream and downstream embankment slopes are about 3:1, horizontal to vertical. The upstream slope is about 11 feet high from its present toe and the downstream slope is about 13 feet high. The present downstream slope has a localized steepened slope of about 1-1/2:1 at its toe.

10.1.2 Repair Configuration

The final embankment will have a 12 foot wide crest width at an elevation of 4,986 feet. The upstream and downstream slopes are planned for 3:1. Excavation planned for the pond bottom at the embankment toe at the outlet is expected to extend to about elevation 4,971 feet, about 15 feet from the crest at that location.

10.2 MATERIAL PARAMETERS

Cesare based the stability analysis and seepage parameters on its field and laboratory test results, and experience with similar projects.

10.2.1 Seepage Analysis

Cesare used permeability values based on its experience and the laboratory classification, moisture density relationship, and in situ physical characteristics results. Due to the dam's age, the seepage parameters for the various materials will remain consistent, with the only modification being the fill placed in the repair section. The fill is expected to be of lower permeability than the existing material considering its compaction by modern earthwork equipment, as opposed to the equipment likely used when the embankment was first constructed.

No in situ permeability testing was performed. The upper portion of claystone in the Front Range typically exhibits permeabilities somewhat higher than expected for this material. This higher permeability is likely relating to fracture flow, at least in the unweathered claystone. Packer tests in unweathered claystone typically exhibit nonuniform permeability, indicating fracture flow in the fresher claystone is unlikely to be uniform below the embankment. Work by Zhang² (2013) and others indicates claystone fractures tend to close under increased loading and when wetted. Although the upper bedrock has likely gained the maximum moisture it is capable of under the existing conditions, Cesare believes a conservative approach considering fracture flow during the reservoir life is appropriate.

The material requiring seepage parameters for analysis includes the existing and new fill soil, native soil, weathered bedrock, and unweathered bedrock; the values for which are presented in Table 10.1. The values presented for embankment material and weathered bedrock are based on laboratory test results previously described. The permeability of the unweathered bedrock considers Packer test results from similar projects and research into published rates for the local claystone bedrock.

TABLE 10.1. Design Hydraulic Conductivities

Material	Saturated Hydraulic Conductivity (cm/sec)	Saturated Hydraulic Conductivity (ft/sec)
Existing embankment fill	1.70 x E-6	5.54 x E-8
New embankment fill	4.97 x E -7	1.64 x E-8
Native clay soils	7.07 x E-7	2.32 x E-8
Weathered claystone	1.0 x E-8	3.3 x E-10
Unweathered claystone	1.0 x E-5*	3.3 x E-7*

* Horizontal conductivity. Vertical is one order of magnitude less.

10.2.2 Strength Parameters

Based on Cesare's testing and judgement, strength parameters assigned to embankment material are presented in Table 10.2.

² Zhang, C.L., Experimental evidence for self-sealing of fractures in claystone. J. Phys. Chem. Earth (2011), doi:10.1016/j.pce.2011.07.030.

TABLE 10.2. Stability Analysis Strength Parameters

Material	Friction Angle (degrees)	Cohesion (psf)
Existing embankment fill	30	100
New embankment fill	30	200
Native clay soil	25	50
Weathered claystone	25	100
Unweathered claystone	0	3000
Residual claystone	15	0

10.3 SEISMIC DESIGN

The "Rules and Regulations for Dam Safety and Dam Construction" (2007) indicate a pseudostatic analysis for embankment dams is acceptable, for the following cases:

5.9.2.3.1 The embankment is to be mechanically compacted to at least 95% of the maximum standard Proctor density, ASTM D698, or at least 90% of the maximum modified Proctor density, ASTM D1557 or at least 70% relative density per ASTM D4253 and ASTM D4254, if Proctor testing is not appropriate; no materials prone to liquefaction are present in the foundation and the design peak bedrock acceleration is 0.20g or less; or

5.9.2.3.2 The embankment is to be mechanically compacted to at least 95% of the maximum standard Proctor density, ASTM D698, or at least 90% of the maximum modified Proctor density, ASTM D1557; potentially submerged portions of the embankment except for internal drain elements are constructed of clayey material; the dam is constructed on clayey soil or bedrock foundation and peak bedrock acceleration is 0.35g or less; and

5.9.2.3.3 All static stability safety factor requirements of these Rules are met; minimum freeboard requirements of these Rules are met; and the pseudostatic coefficient selected for analysis must be at least 50% of the design peak bedrock acceleration, but not less than 0.05g and the factor of safety under pseudostatic analysis shall be 1.0 or greater. In determining the factor of safety for pseudostatic analysis, a search for the critical failure surface shall be made."

The analysis requirement includes using at least 50% of the peak acceleration, but not less than 0.05g. Cesare used 0.1g in that this value is customarily used and is suitably conservative.

10.4 STABILITY AND SEEPAGE RESULTS

Cesare analyzed the repair zone for seepage and stability, considering both existing and repaired conditions. Analysis included steady state seepage at full pool surface elevation for both upstream and downstream slopes and rapid drawdown on the upstream face by means of a transient analysis. The rapid drawdown discharge rate was 17 cfs, which has a relative equivalence of 1 foot of drawdown, per day. Cesare also analyzed the downstream slope at full pool, considering a pseudo seismic force and considering residual bedrock strength. These scenarios meet the CSEO

requirements (2020). Results of Cesare’s stability analyses are presented in Table 10.3 and include the CEO’s requirements.

TABLE 10.3. Stability Analyses Results

Section	Analysis	Factor of Safety		Required Factor of Safety
		Block	Circular	
Existing	Full, steady state upstream	2.54	2.47	1.5
	Full, steady state upstream, pseudo seismic	1.71	1.67	1.0
	Full, steady state downstream	1.81	1.73	1.5
	Full, steady state downstream, pseudo seismic	1.34	1.27	1.0
	Transient upstream	1.82	1.74	1.2*
Repaired	Full, steady state upstream	3.94	3.78	1.5
	Full, steady state upstream, pseudo seismic	2.68	2.56	1.0
	Full, steady state downstream	3.50	3.29	1.5
	Full, steady state downstream, pseudo seismic	2.56	2.41	1.0
	Full, steady state downstream, residual bedrock strength	2.84	3.07	1.1**
	Transient upstream	2.84	2.67	1.2*

* Lowest factor of safety.

**Case by case determination.

10.5 SETTLEMENT

Cesare did not perform a settlement analysis on the embankment. The embankment at the repair section is estimated to be about 33 feet from the embankment crest to its contact with competent bedrock. Considering this and Cesare’s experience with timed consolidation results, Cesare estimates less than about 1/2 foot of embankment consolidation during construction. This consolidation typically occurs rapidly in clays with sand contents similar to the clays encountered at this site in both existing embankment and native soil. Settlement may be complete by the end of embankment construction, however, Cesare recommends a minimum of 1/2 foot of camber to account for unforeseen conditions. The bedrock supporting the embankment is unlikely to consolidate or deflect.

11. CONSTRUCTION CONSIDERATIONS

11.1 GROUNDWATER CONTROL

Groundwater was measured within the lower portion of existing fill in Boring B-1, in the weathered bedrock in Boring B-2, and in the native clay soil in B-3. Boring B-2 was located within the anticipated repair zone; thus, will likely represent the groundwater conditions during construction. All water levels appear within the anticipated vertical extent of the repair zone. The nature of the subsurface material may result in variable rates of inflow into the open excavation; however, the difference between the existing embankment, native clays, and weathered bedrock is not expected to be large. The contractor should implement groundwater control that will minimize disturbance to foundation material, all excavation activities, and fill placement. The groundwater appeared to be within the lower portion of the area to receive fill, such that groundwater control will be required for at least a

portion of the fill placement. Saturated borrow material may require wasting. The contractor should be responsible for designing and maintaining dewatering systems. Localized sumps may be adequate.

Surface drainage should be prevented from entering or flooding excavations and from causing uncontrolled erosion on excavated slopes. The contractor should be responsible for controlling surface drainage and meeting applicable local, state, and federal regulations.

11.2 EXCAVATIONS

11.2.1 General Considerations

The relative ease or difficulty of the excavation of the material onsite is not anticipated to vary greatly, both horizontally and with depth. Material ranged from existing embankment fill, unconsolidated native deposits, and weathered bedrock exhibiting single digit blow counts that should be readily excavated. Excavation should stop at competent bedrock contact. Excavation using rippers or tracked vehicles should stop before reaching final foundation surface as discussed in Section **11.3 FOUNDATION PREPARATION**. Blasting of foundation material will not be allowed.

11.2.2 Embankment Foundations

Soil and weathered bedrock should be excavated to remove soft and compressible material to contact of competent bedrock to provide proper support for the new outlet pipe and its encasement. The excavated soil and weathered bedrock may be used as fill for these areas, provided it is free of organics or other deleterious material. The side slopes excavated into the existing embankment should be benched at minimum vertical intervals of 1 foot and horizontal intervals of 2 feet, as fill is placed. At least the upper 6 inches of exposed embankment soil on the excavation slope benches should be moistened and compacted similar to the repair fill soil.

11.2.3 Fill Material

The soil excavated from the repair area is intended for use as repair embankment construction. The weathered claystone bedrock can also be used for embankment.

11.2.4 Moisture Conditioning

The embankment material should be conditioned in the required excavation area to within $\pm 2\%$ of optimum moisture content according to ASTM D698. Based on laboratory results, Cesare estimates most of the soil to be excavated is well over its optimum moisture content. Moistening material may be required and can be accomplished through mixing on grade; however, drying of the excavated material will likely be required. Variable moisture contents exist naturally and the contractor should design a program to moisten or dry the material to produce uniform moisture contents in the embankment material. Application of water should be carefully controlled to avoid overwatering or drying of the borrow material.

11.2.5 Temporary Cuts

Temporary cuts in the existing embankment, native soil, and weathered bedrock material should not exceed slopes of 2 horizontal to 1 vertical (2:1). Construction materials should not be stored adjacent to the slope crest, which would result in surcharging the slope and reducing its stability. Temporary cuts in competent bedrock material should not exceed slopes of 1:1. Steeper slopes may require

bracing or other stabilization methods to provide safe working conditions. The contractor should be responsible for designing and maintaining construction slopes. All slopes should be protected from runoff due to precipitation events. Methods of slope stabilization should comply with applicable state, local, and federal regulations.

11.3 FOUNDATION PREPARATION

Where claystone bedrock will be used for embankment and outlet pipe foundation, precautions should be considered for construction. Claystone bedrock tends to air slake upon exposure and drying. The foundation in the outlet line alignment and outlet structure should be protected from losing moisture, freezing, and effects of weathering. To accomplish this, Cesare recommends that a temporary cover of a few feet of unexcavated material be left in place until construction is ready to proceed. Final excavation, preparation, and backfilling must be done in small sections so that work can be completed before the foundation is damaged from drying. Within 10 hours of exposing the final foundation surface, surveying, inspection, foundation preparation, and placement of protective coatings or fill should take place. Experience gained during construction may allow for variations in this. Use of concrete mud mats should be considered for bedrock protection in outlet structure and other structure areas that must be left open for extended periods of time.

Exposed finished surfaces should be kept from drying or slaking. Temporary plastic may be effective in limited areas. If exposed surfaces dry out, become desiccated, slake, or are loosened or disturbed, the affected material should be removed just prior to fill or structure placement. Cesare's experience has shown that metal tracked equipment should be kept off the final excavated surface. Rubber tired equipment should be used for the final excavation to foundation grade.

11.4 OUTLET PIPE

The outlet pipe should bear on competent bedrock encased in reinforced concrete. The depth to bedrock in the outlet location will require on the order of 2 to 6 feet of excavation below the pipe invert to contact competent bedrock. The bedrock will likely be exposed for sufficient time to allow desiccation and cracking. Thus, a mud mat should be placed on it and below the encasement. The encasement's longitudinal sides should have slopes of 1 to 10, horizontal to vertical, from the bearing surface. A collar should surround the encasement on all four sides by at least 12 inches of filter material meeting the project requirements. The filter material should extend along the encasement at least 5 feet.

12. SOLUBLE SULFATE CONTENT

Water soluble sulfate contents of 0.01% and 0.0% were measured on samples of native and fill clays. Results are summarized in Appendix B. The PCA publication titled, *Design and Control of Concrete Mixtures* 2002 and the ACI publication titled *Building Code Requirements for Structural Concrete and Commentary* consider this range negligible for water soluble sulfate exposure. Recommendations for all concrete which will be in contact with or within 6 inches of these soils are shown in Table 12.1.

TABLE 12.1. Information from ACI 318-08 - Table 4.3.1

Water Soluble Sulfates (%)	Exposure Class	Maximum (w/cm)*	Minimum f_c , (psi)	Cementitious materials† (types)			Calcium Chloride Admixture
				ASTM C150	ASTM C595	ASTM C1157	
<0.10	S0	N/A	2,500	No type restriction	No type restriction	No type restriction	No restriction
0.10 ≤ to <0.20	S1 Moderate	0.50	4,000	II [‡]	IP (MS) IS (<70) (MS)	MS	No restriction
≤0.20 to ≤2.00	S2 Severe	0.45	4,500	V [§]	IP (HS) IS (<70) (HS)	HS	Not permitted
>2.00	S3 Very Severe	0.45	4,500	V + pozzolan or slag	IP (HS)+pozzolan or slag or IS (<70) (HS)+pozzolan or slag	HS+pozzolan or slag	Not permitted

*For lightweight concrete, see ACI 318-08 4.1.2.

†Alternative combinations of cementitious materials of those listed in Table 4.3.1 shall be permitted when tested for sulfate resistance and meeting the criteria in ACI 318-08 4.5.1.

‡For seawater exposure, other types of Portland cements with tricalcium aluminate (C₃A) contents up to 10 percent are permitted if the w/cm does not exceed 0.40.

§Other available types of cement such as Type III or Type I are permitted in Exposure Classes S1 or S2 if the C₃A contents are less than 8 or 5 percent, respectively.

|| The amount of the specific source of the pozzolan or slag to be used shall not be less than the amount that has been determined by service record to improve sulfate resistance when used in concrete containing Type V cement. Alternatively, the amount of the specific source of the pozzolan or slag to be used shall not be less than the amount tested in accordance with ASTM C1012 and meeting the criteria in ACI 318-08 4.5.1.

Refer to ACI 318-08 R4.3.1 for further interpretation of this table.

13. GEOTECHNICAL RISK

The concept of risk is an important aspect of any geotechnical evaluation. The primary reason for this is that the analytical methods used by geotechnical engineers are generally empirical and must be tempered by engineering judgment and experience, therefore, the solutions or recommendations presented in any geotechnical evaluation should not be considered risk free, and more importantly, are not a guarantee that the interaction between the soil and the proposed construction will perform as predicted, desired, or intended. The engineering recommendations presented in the preceding sections constitute Cesare’s best estimate of those measures that are necessary to help the structure perform in a satisfactory manner based on the information generated during this evaluation, training, and experience in working with these conditions.

14. LIMITATIONS

This document has been prepared as an instrument of service for the exclusive use of J&T Consulting, Inc. for the specific application to the project as discussed herein and has been prepared in accordance with geotechnical engineering practices generally accepted in the state of Colorado at the date of its preparation. No warranties, either expressed or implied, are intended or made. This document should not be assumed to contain information for other parties or other purposes.

The findings of this evaluation are valid as of the date its preparation. Changes in the conditions of

a property can occur with the passage of time, whether due to natural processes or the works of people on this or adjacent properties. Standards of practice evolve in engineering and changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this evaluation may be invalidated wholly or partially by changes outside of Cesare's control, therefore, this evaluation is subject to review and should not be relied upon without such review after a period of 3 years.

In the event that changes, including but not limited to, the nature, type, design, size, elevation, or location of the project or project elements as outlined in this report are made, the conclusions and recommendations contained in this report shall not be considered valid unless Cesare reviews the changes and either confirms or modifies the conclusions of this report in writing.

Cesare should be retained to review final plans and specifications that are developed for proposed construction to judge whether the recommendations presented in this report and any addenda have been appropriately interpreted and incorporated in the project plans and specifications as intended.

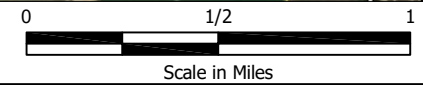
The exploration locations for this evaluation were selected to obtain a reasonably accurate depiction of underground conditions for design purposes and these locations are often modified based on accessibility and the presence of underground or overhead utility conflicts. Variations from the soil conditions encountered are possible. These variations may necessitate modifications to Cesare's design recommendations, therefore, Cesare should be retained to observe subsurface conditions, once exposed, to evaluate whether they are consistent with the conditions encountered during Cesare's exploration and that the recommendations of this evaluation remain valid. If parties other than Cesare perform these observations and judgements, they must accept responsibility to judge whether the recommendations in this report remain appropriate.

Cesare's scope of services for this report did not include either specifically, or by implication, any environmental assessment of the site or identification of contaminated or hazardous material or conditions.

Cesare should be retained during construction to observe and/or test the following:

- completed excavations.
- placement and compaction of fill.
- proposed import or onsite fill material.

Cesare offers many other construction observations, materials engineering, and testing services and can be contacted to discuss further.



BASEMAP FROM GOOGLE EARTH PRO©.

PROJECT NO:	20.3062		
PROJECT NAME:	Johnstown Reservoir Outlet Structure		
DRAWN BY:	RCK	CHECKED BY:	JAC2
DWG DATE:	12.15.2020	REV. DATE:	--

FIGURE 1
Vicinity Map



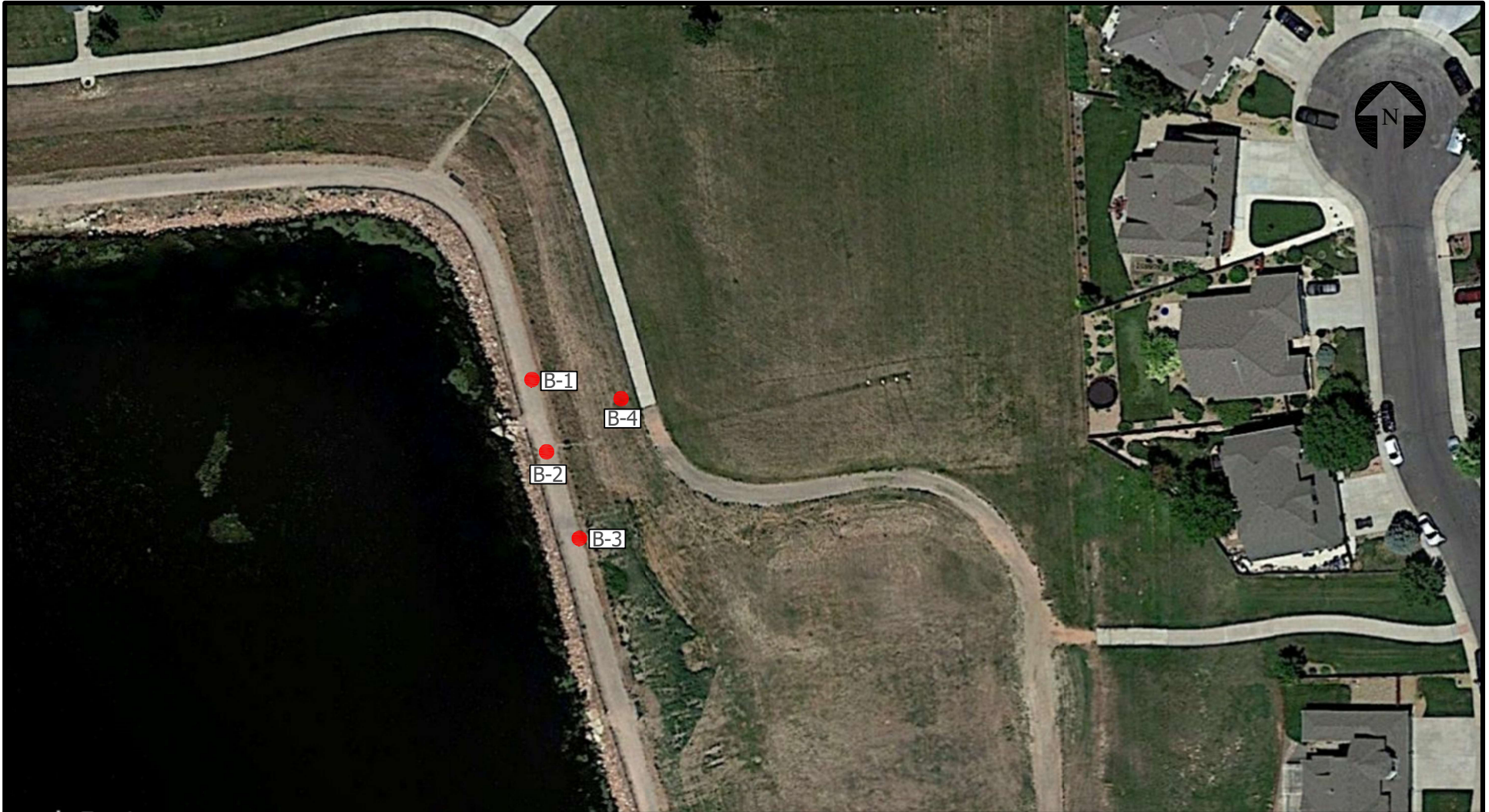


APPENDIX A

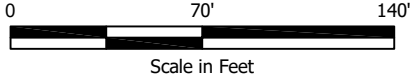
Field Exploration

FIELD EXPLORATION

Samples of the subsoil were obtained at this site using a modified California sampler which was driven into the soil by dropping a 140 pound hammer through a free fall of 30 inches. The modified California sampler is a 2-1/2 inch outside diameter by 2 inch inside diameter device lined with brass tubes. The procedure to drive the modified California sampler into the soil and to record the number of blows required to do so is known as a penetration test. The number of blows required for the sampler to penetrate 12 inches gives an indication of the relative stiffness of cohesive soil, relative density of non-cohesive soil, and relative hardness of sedimentary bedrock material encountered. Bulk samples were collected from cuttings generated during drilling. Locations of sampling and penetration test results are presented on the boring logs and key to symbols/legend contained in this appendix.



LEGEND: B-1 BORING LOCATIONS

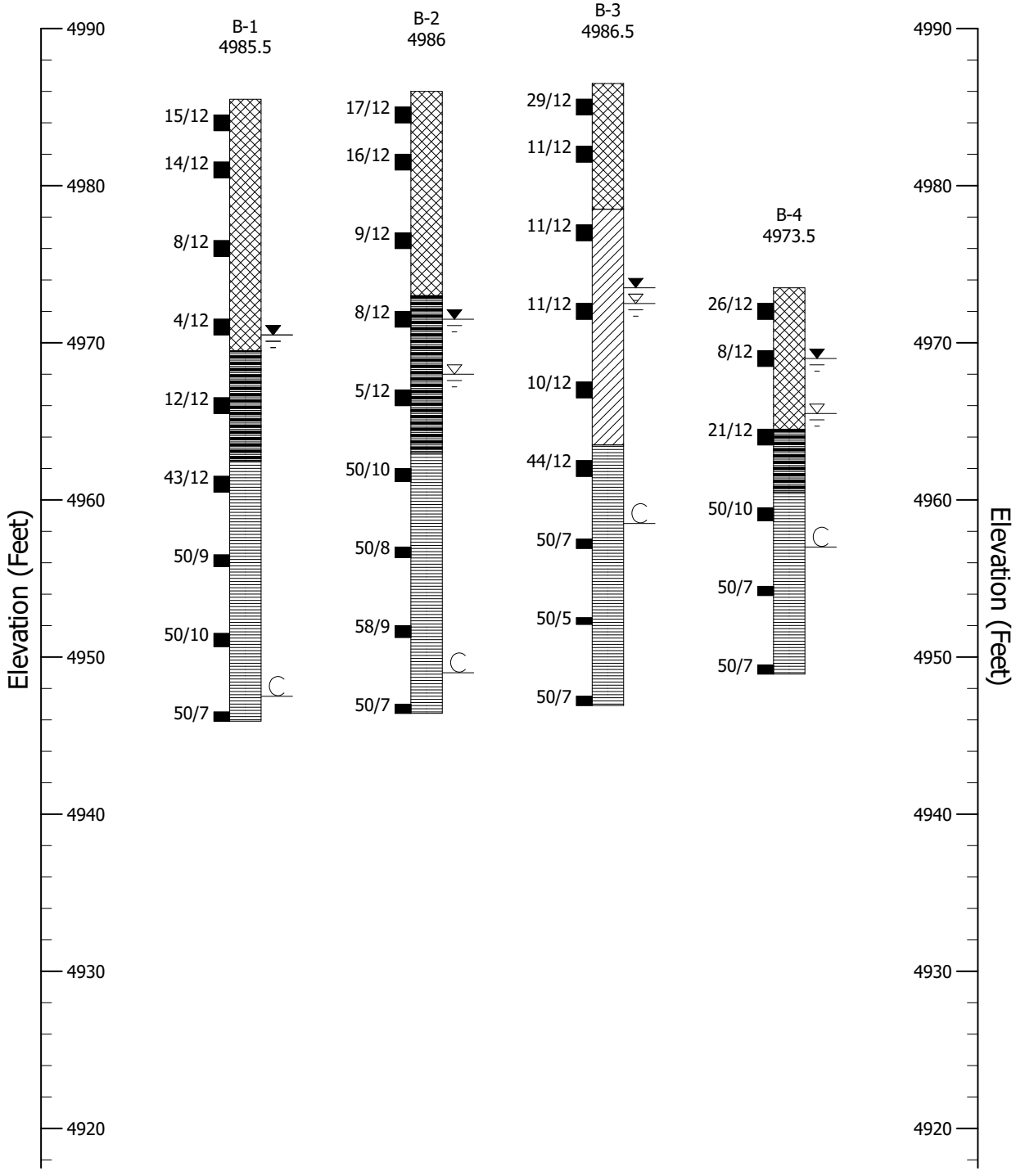


BASEMAP FROM GOOGLE EARTH PRO©.

PROJECT NO:	20.3062		
PROJECT NAME:	Johnstown Reservoir Outlet Structure		
DRAWN BY:	RCK	CHECKED BY:	JAC2
DWG DATE:	12.16.2020	REV. DATE:	--

BORING LOCATION PLAN





BORING LOGS

PROJECT NO:	20.3062
PROJECT NAME:	Johnstown Reservoir Outlet Structure
DWG DATE:	2/10/2021



KEY TO SYMBOLS

Symbol Description

Strata symbols



FILL: CLAY, lean, to with sand, stiff to very stiff, moist, brown, olive (CL, A-7-6, A-6); POSSIBLE PIPE BEDDING: SAND, open graded medium sand size, wet, medium dense, dark gray (SP, A-1-b); SURFACE TRAVEL COURSE: SAND, clayey, with gravel, slightly moist, dense, (SC, A-6).



CLAY, moist, stiff, brown (CL, A-6, A-7-6).



WEATHERED CLAYSTONE, moist to very moist, soft to very stiff, light to dark olive.



CLAYSTONE, moist, hard to very hard, light to dark olive, olive tan, olive brown, olive gray.

Misc. Symbols



Water level during drilling



Water level 1 day after drilling.

Soil Samplers



Modified California sample

Notes:

1. 15/12 indicates 15 blows with a 140-pound hammer falling 30 inches were required to drive a modified California barrel sampler 12 inches.
 2. Exploratory borings B-1 through B-4 were drilled on December 2, 2020 using a CME-55 drill rig equipped with 4-inch diameter continuous flight solid stem auger.
 3. Relative elevations of borings B-1 through B-4 were provided by J&T Consulting from project survey.
 4. Groundwater was encountered at depths of 15, 18, 14, and 8 feet below ground surface in borings B-1 through B-4, respectively, during drilling. Groundwater was measured at depths of 15, 14-1/2, 13, and 4-1/2 feet below ground surface in borings B-1 through B-4, respectively, 1 day after drilling. Borings were grouted solid at the completion of the latter groundwater measurement.
 5. Contacts between soil units are approximate and may be gradational.
 6. These logs are subject to the limitations, conclusions, and recommendations in this report.
- Project No. 20.3062.



APPENDIX B

Laboratory Testing

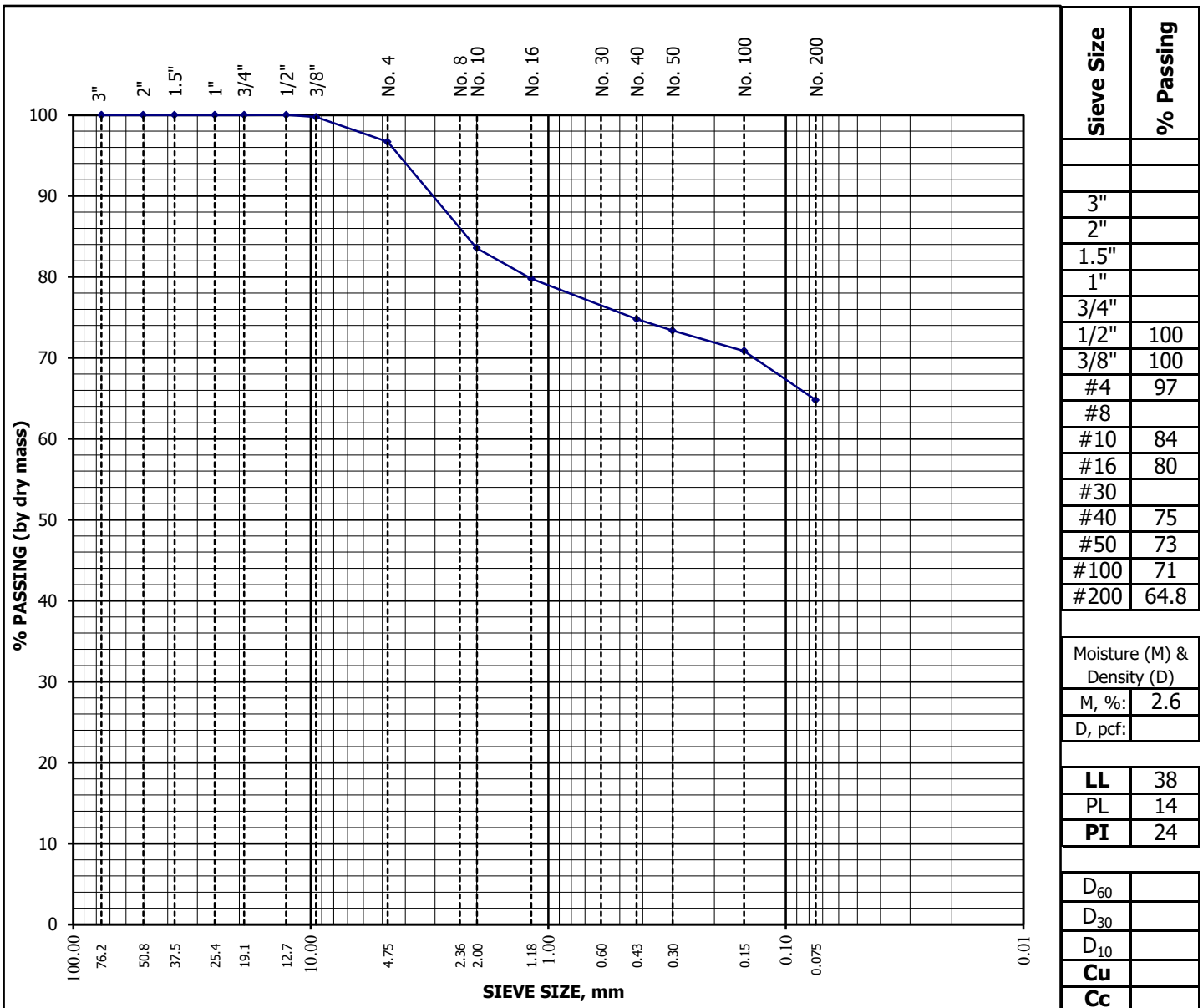
SUMMARY OF LABORATORY TEST RESULTS
Johnstown Reservoir Outlet Structure
Project No. 20.3062

Sample Location		Natural Dry Density (pcf)	Natural Moisture Content (%)	Standard Proctor		Water Soluble Sulfates (%)	Gradation			Atterberg Limits		Material Type
Boring	Depth (feet)			Maximum Dry Density (pcf)	Optimum Moisture Content (%)		Gravel (%)	Sand (%)	Silt/Clay (%)	Liquid Limit (%)	Plasticity Index (%)	
B-1	0 to 5		2.6	114.4	15.2		3	30	64.8	38	24	FILL: CLAY, sandy, lean (A-6(13))
B-1	1	109.0	17.7				2	8	90.3	47	32	FILL: CLAY, lean (A-7-6(30))
B-1	4	109.2	19.1					12	88.0	37	24	FILL: CLAY, lean (A-6(20))
B-1	9	94.8	27.5					8	91.9	43	28	FILL: CLAY, lean (A-7-6(26))
B-2	0 to 5		2.0	120.2	11.9		9	39	47.3	30	16	FILL: SAND, clayey (A-6(4))
B-2	1	106.2	20.0				2	8	89.6	47	33	FILL: CLAY, lean (A-7-6(30))
B-2	4	109.6	19.5					12	87.8	43	29	FILL: CLAY, lean (A-7-6(25))
B-2	9	99.6	25.5					8	91.7	44	29	FILL: CLAY, lean (A-7-6(27))
B-2	14	96.6	27.3			0.01						WEATHERED CLAYSTONE: CLAY, lean (A-7-6)
B-3	1	116.5	15.4				6	12	82	44	29	FILL: CLAY, lean, with sand (CL, A-7-6(23))
B-3	4	103.7	18.4				2	19	79	46	30	FILL: CLAY, lean, with sand (CL, A-7-6(23))
B-3	9	96.4	27.5					10	90	42	27	CLAY, lean (A-7-6(24))
B-3	14	101.9	24.9									WEATHERED CLAYSTONE: CLAY, lean (A-7-6)
B-4	4					0.00						FILL: CLAY, lean (CL, A-7-6)

GRADATION PLOT - SOIL & AGGREGATE

Project Number: 20.3062, J&T Consulting, Inc. Date: 16-Dec-20
 Project Name: Johnstown Reservoir Outlet Structure Technician: J. De Los Santos
 Lab ID Number: 2021425 Reviewer: J. Crystal
 Sample Location: B-1 at 0' to 5'
 Visual Description: CLAY, sandy, brown

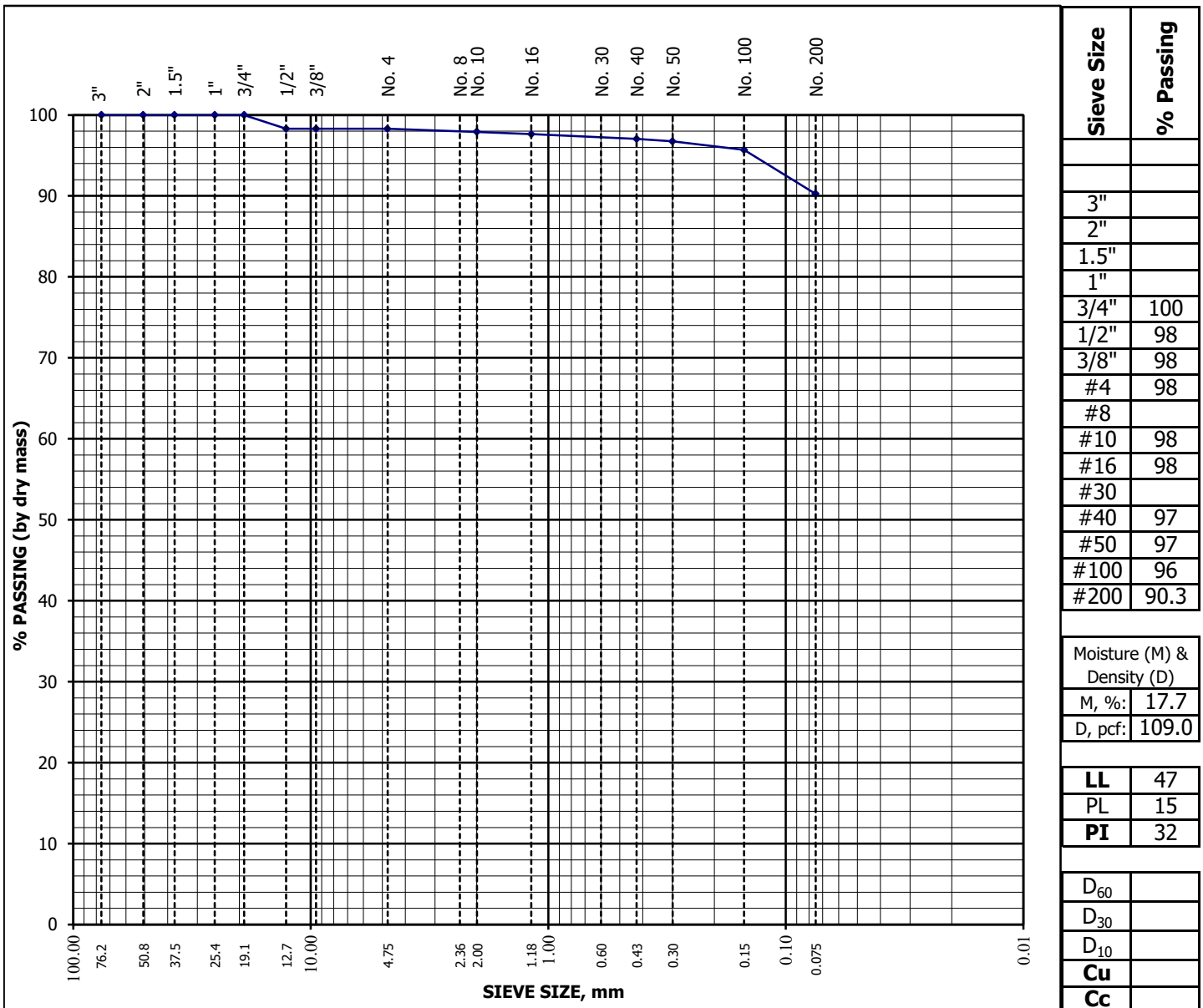
AASHTO M 145 Classification: A-6 **Group Index:** 13
Unified Soil Classification System
(ASTM D 2487): (CL) **Sandy lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number: 20.3062, J&T Consulting, Inc. Date: 9-Dec-20
 Project Name: Johnstown Reservoir Outlet Structure Technician: J. Holiman
 Lab ID Number: 2021426 Reviewer: J. Crystal
 Sample Location: B-1 at 1'
 Visual Description: CLAY, brown

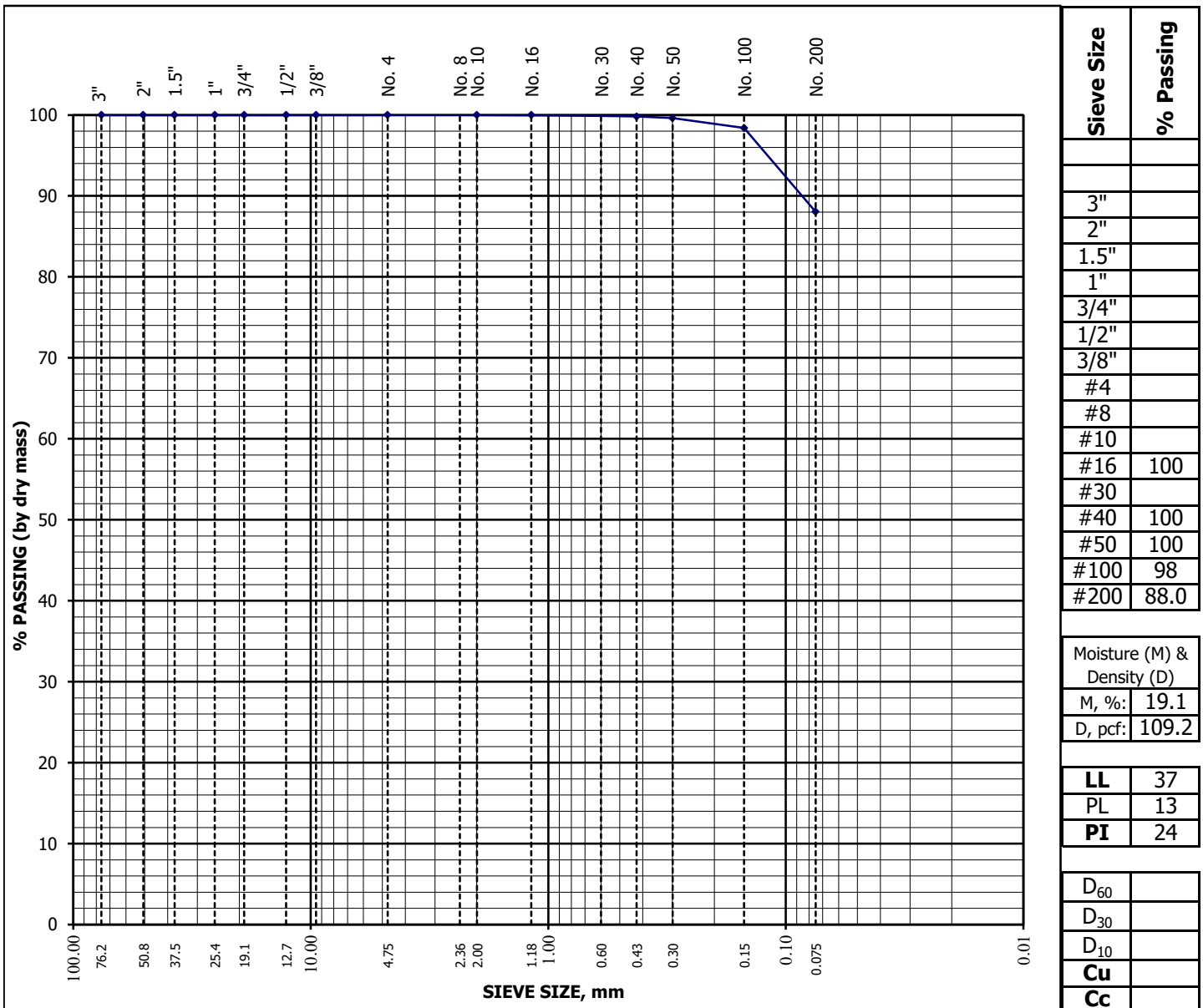
AASHTO M 145 Classification: A-7-6 **Group Index:** 30
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021427	Reviewer:	J. Crystal
Sample Location:	B-1 at 4'		
Visual Description:	CLAY, brown		

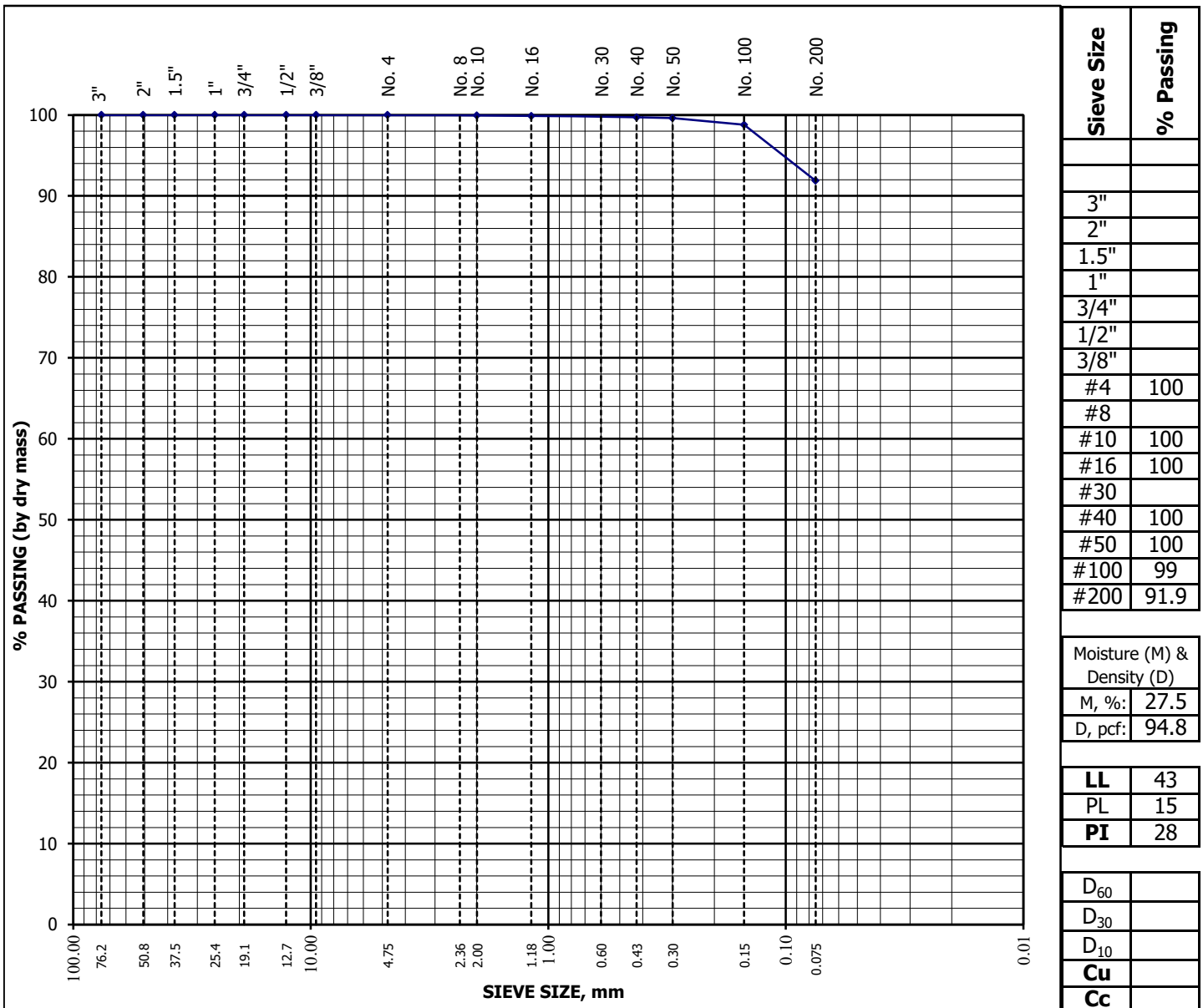
AASHTO M 145 Classification: A-6 **Group Index:** 20
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021428	Reviewer:	J.Crystal
Sample Location:	B-1 at 9'		
Visual Description:	CLAY, brown		

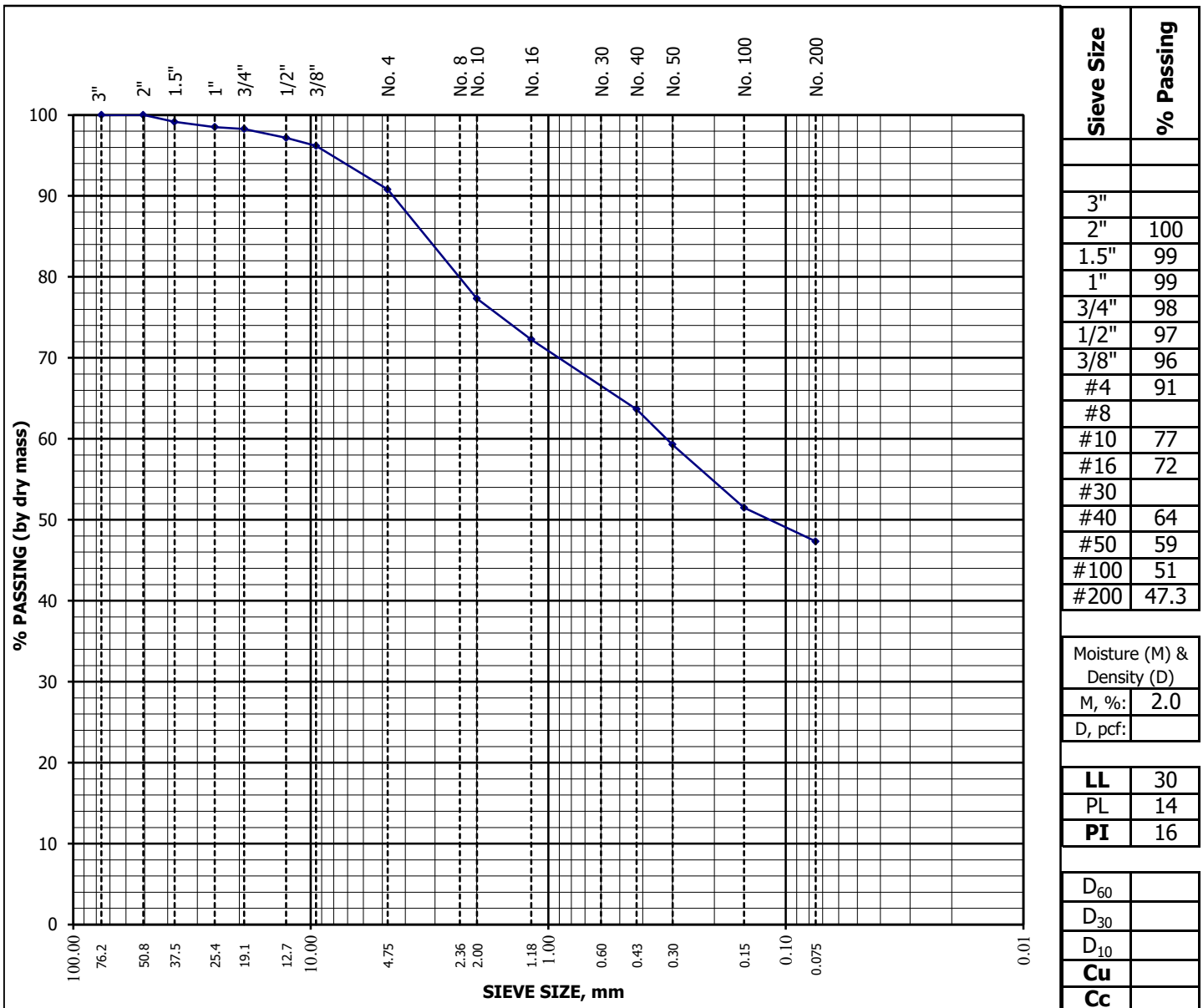
AASHTO M 145 Classification: A-7-6 **Group Index:** 26
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number: 20.3062, J&T Consulting, Inc. Date: 16-Dec-20
 Project Name: Johnstown Reservoir Outlet Structure Technician: J. De Los Santos
 Lab ID Number: 2021429 Reviewer: J. Crystal
 Sample Location: B-2 at 0' to 5'
 Visual Description: SAND, clayey, brown

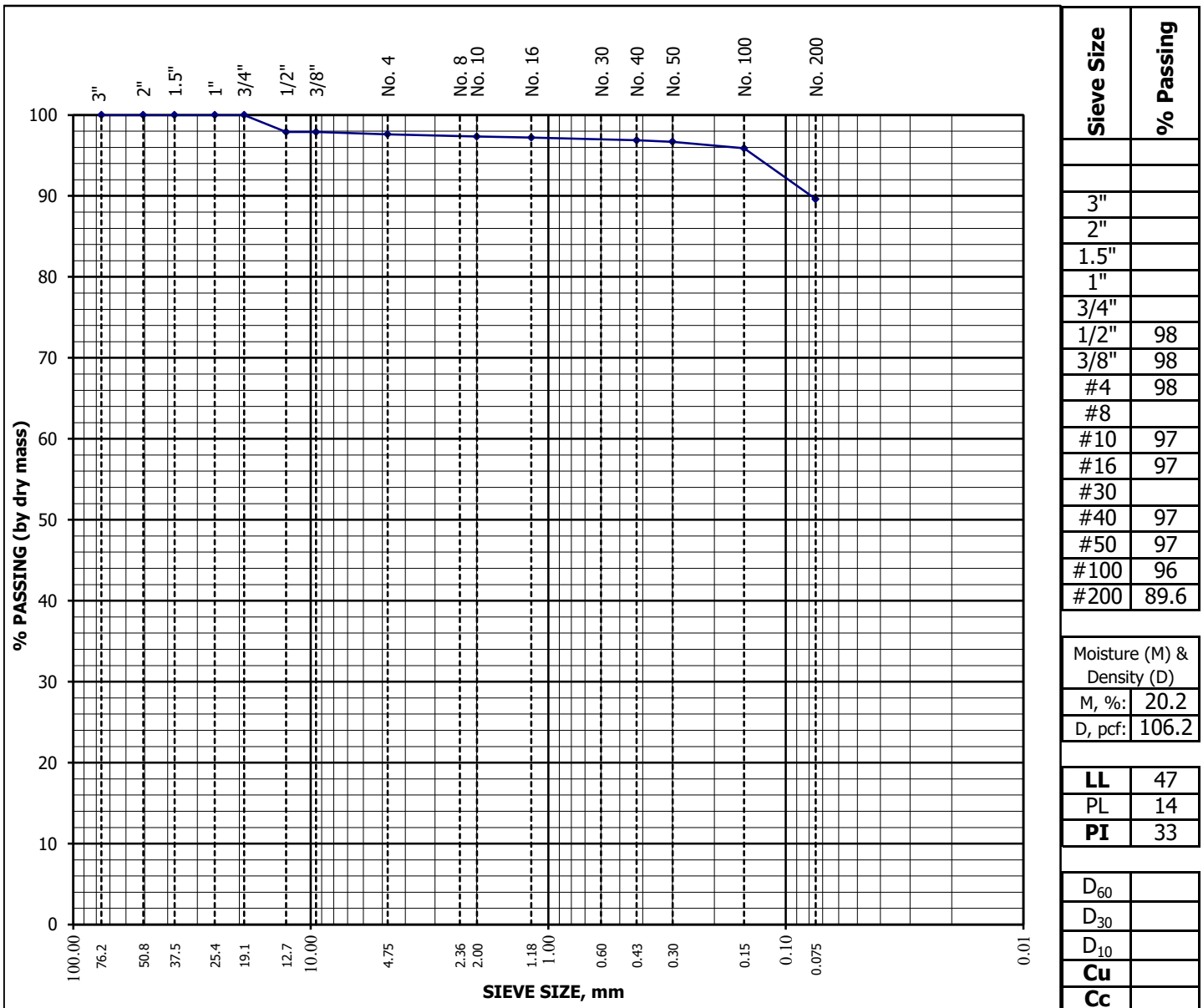
AASHTO M 145 Classification: A-6 **Group Index:** 4
Unified Soil Classification System
(ASTM D 2487): (SC) Clayey Sand



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021430	Reviewer:	J. Crystal
Sample Location:	B-2 at 1'		
Visual Description:	CLAY, brown		

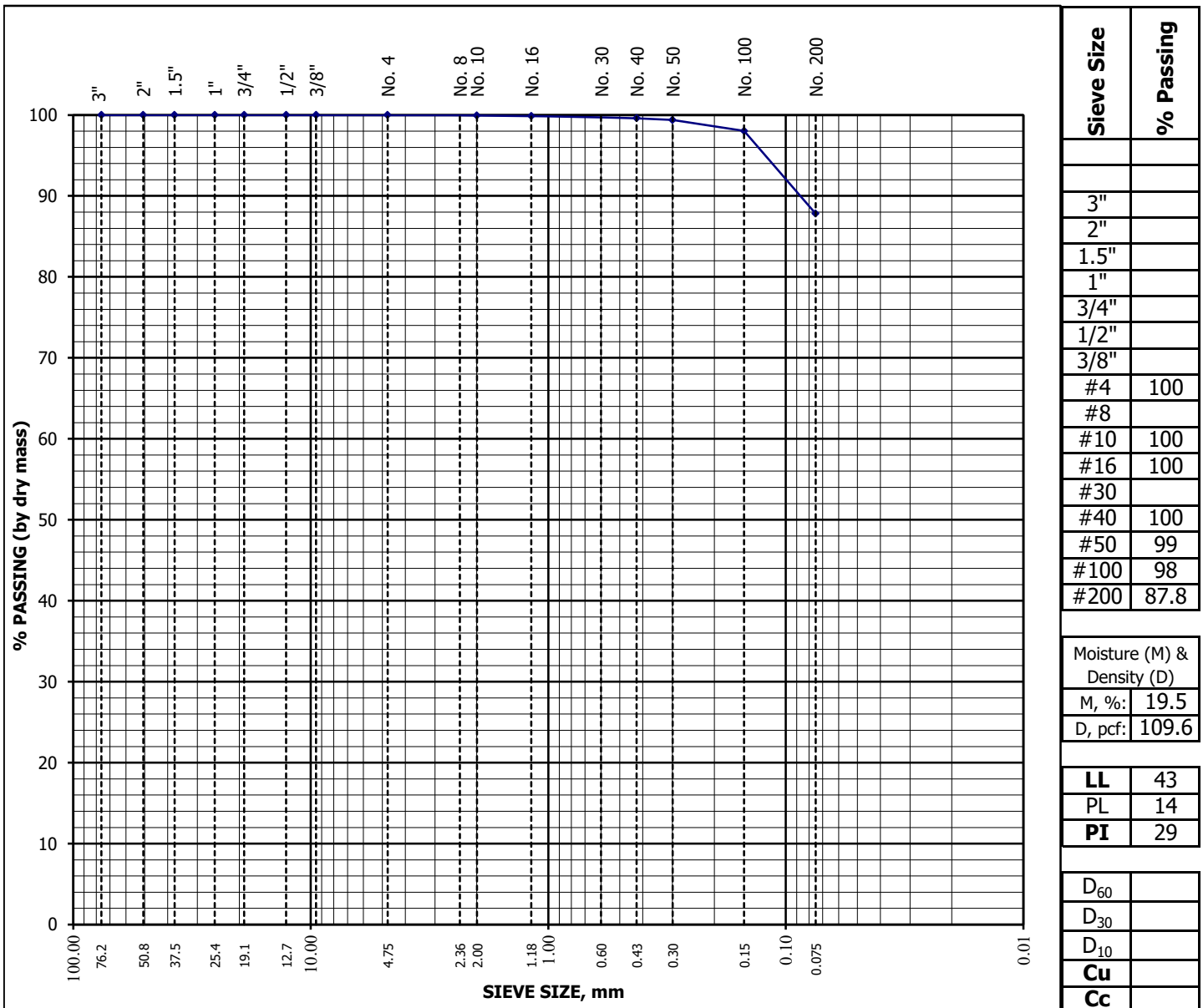
AASHTO M 145 Classification: A-7-6 **Group Index:** 30
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021431	Reviewer:	J. Crystal
Sample Location:	B-2 at 4'		
Visual Description:	CLAY, brown		

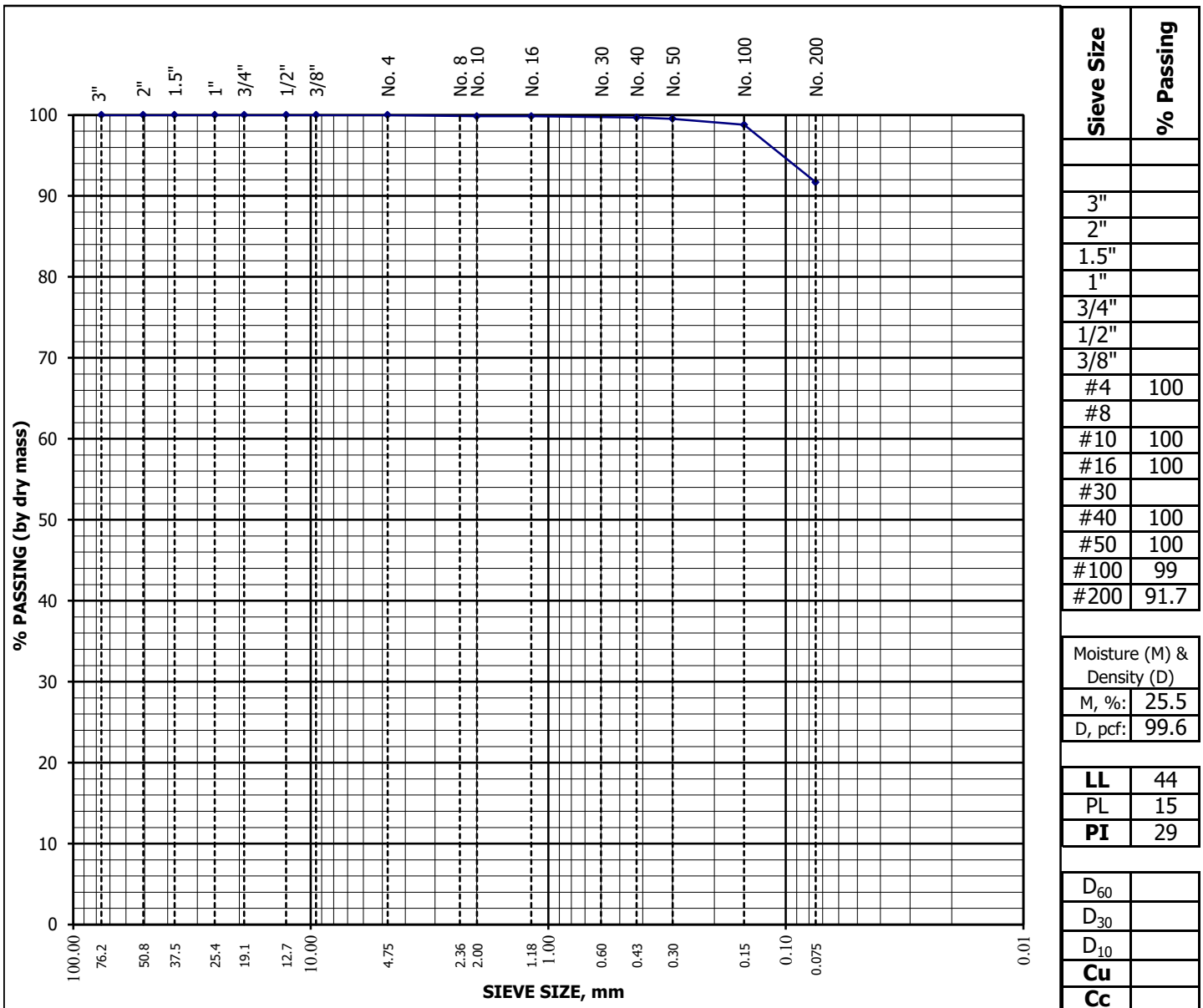
AASHTO M 145 Classification: A-7-6 **Group Index:** 25
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021432	Reviewer:	J. Crystal
Sample Location:	B-2 at 9'		
Visual Description:	CLAY, brown		

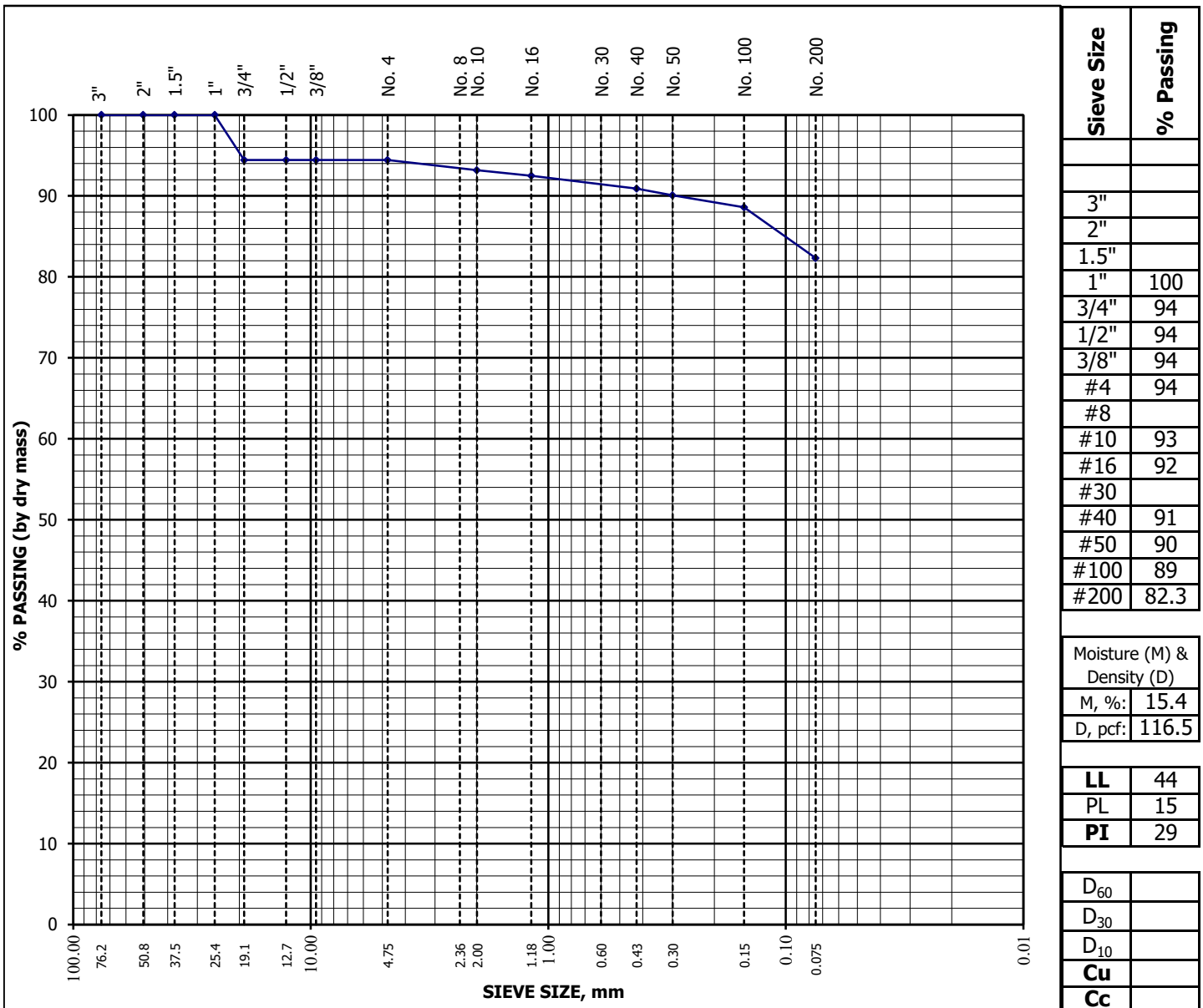
AASHTO M 145 Classification: A-7-6 **Group Index:** 27
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021435	Reviewer:	J. Crystal
Sample Location:	B-3 at 1'		
Visual Description:	CLAY, with sand, brown		

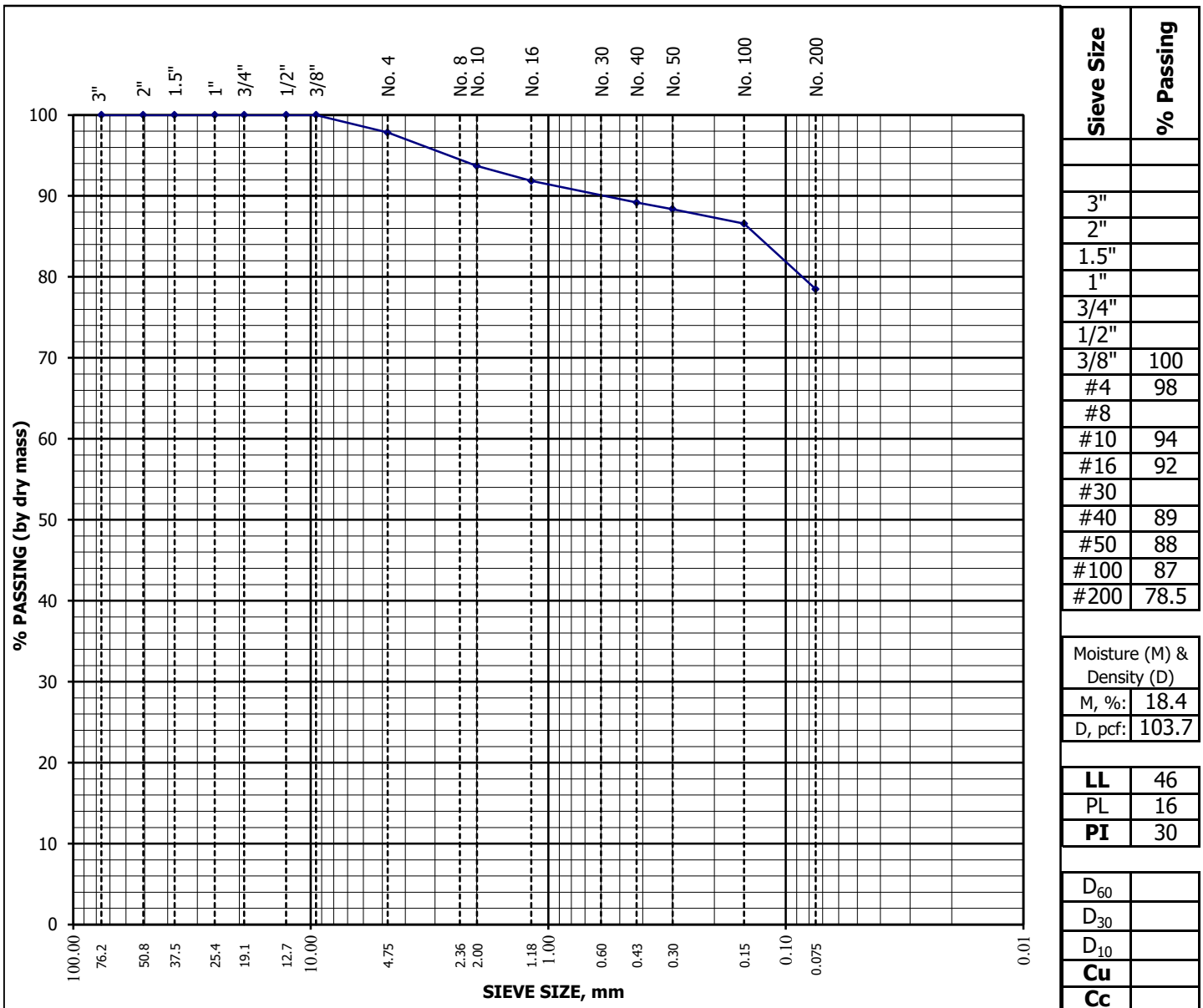
AASHTO M 145 Classification: A-7-6 **Group Index:** 23
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay with sand**



GRADATION PLOT - SOIL & AGGREGATE

Project Number:	20.3062, J&T Consulting, Inc.	Date:	9-Dec-20
Project Name:	Johnstown Reservoir Outlet Structure	Technician:	J. Holiman
Lab ID Number:	2021435	Reviewer:	J. Crystal
Sample Location:	B-3 at 4'		
Visual Description:	CLAY, with sand, brown		

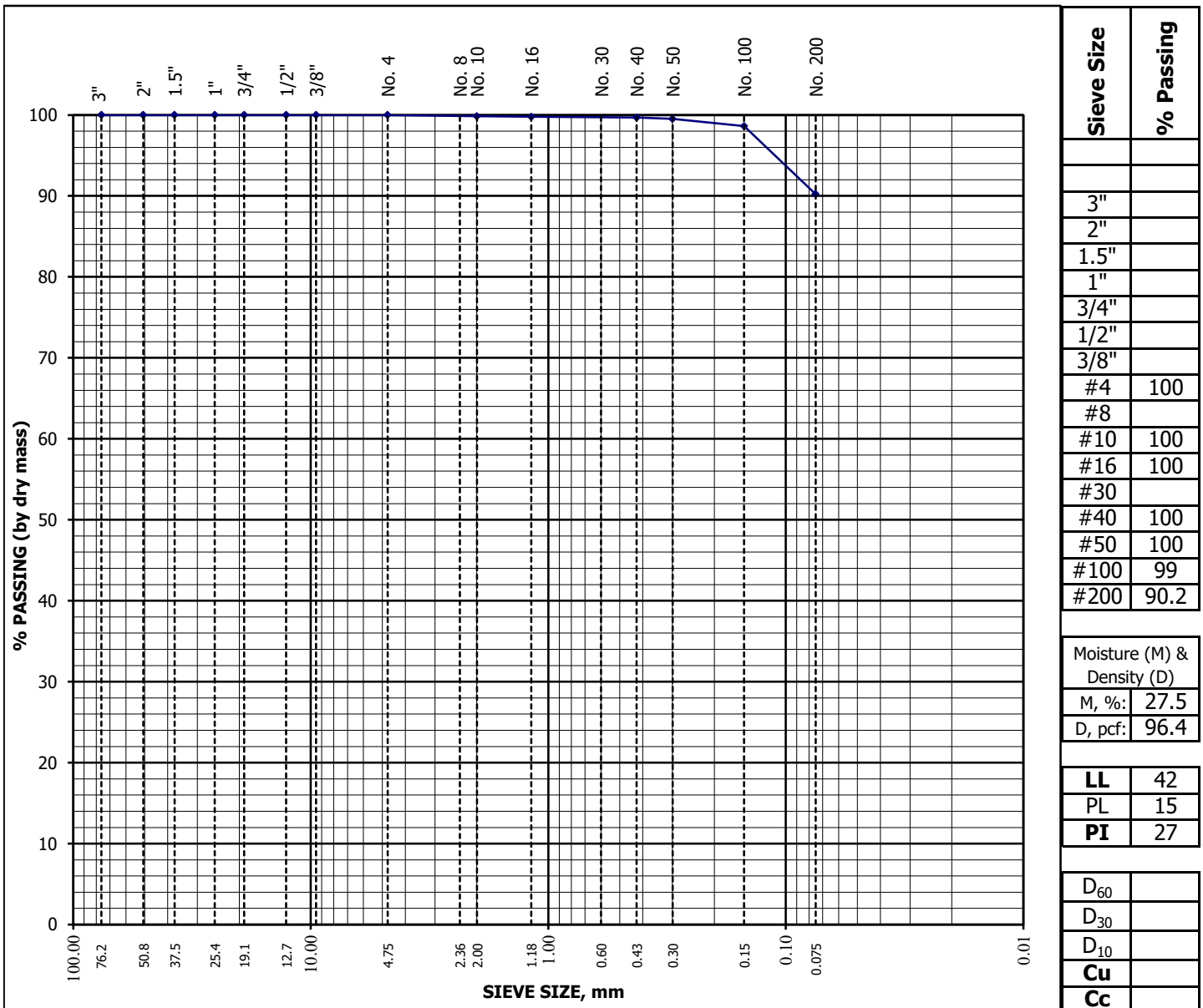
AASHTO M 145 Classification: A-7-6 **Group Index:** 23
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay with sand**



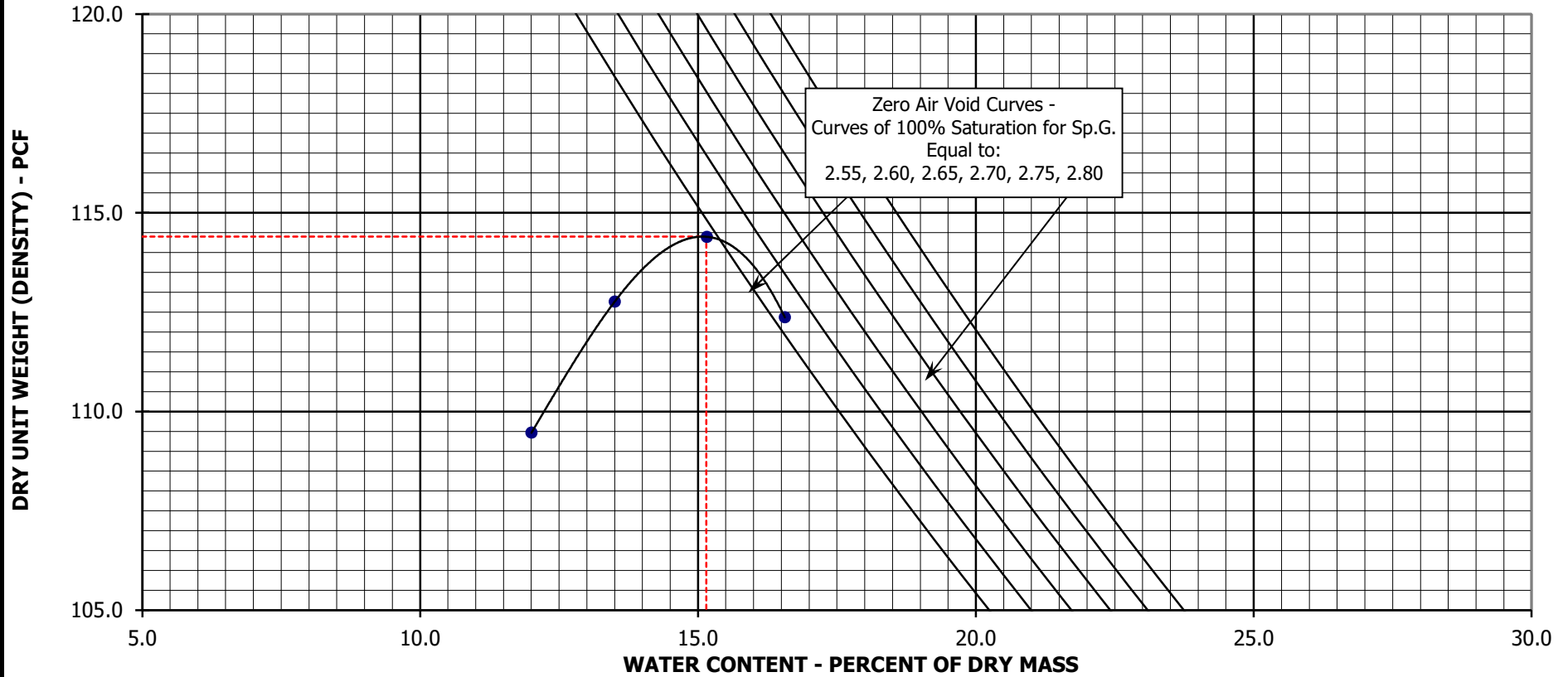
GRADATION PLOT - SOIL & AGGREGATE

Project Number: 20.3062, J&T Consulting, Inc. Date: 9-Dec-20
 Project Name: Johnstown Reservoir Outlet Structure Technician: J. Holiman
 Lab ID Number: 2021436 Reviewer: J. Crystal
 Sample Location: B-3 at 9'
 Visual Description: CLAY, brown

AASHTO M 145 Classification: A-7-6 **Group Index:** 24
Unified Soil Classification System
(ASTM D 2487): (CL) **Lean clay**

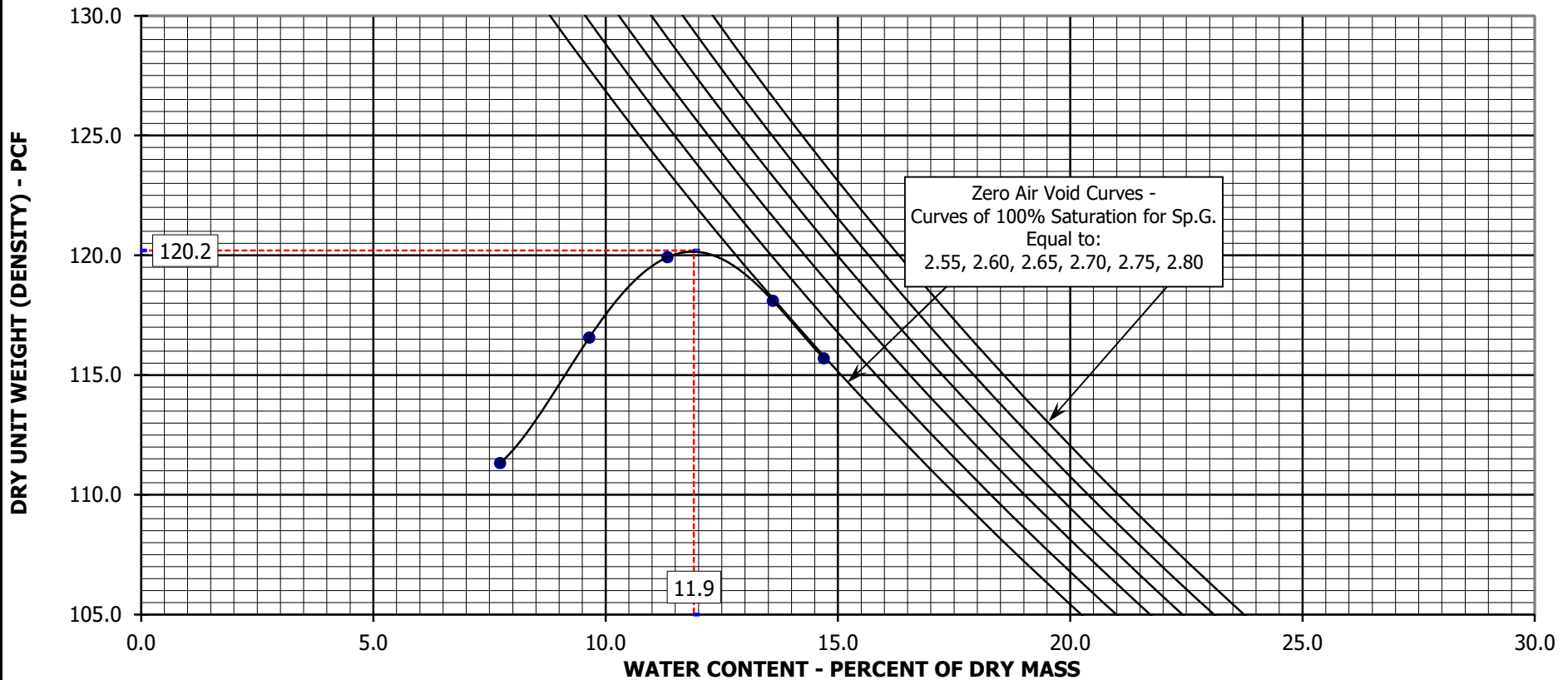


Laboratory Maximum Dry Unit Weight (Density): 114.4 pcf
 Laboratory Optimum Moisture Content (OMC): 15.2 %



Sample Location	Depth (ft)	LL	PL	PI	-#200 (%)	Soil Description & Classification	Moisture/Density Relationship (Proctor) Test
B-1	0 to 5	38	14	24	64.8	Visual: CLAY, sandy, brown AASHTO: A-6(13) USCS: CLAY, sandy, lean	Project Number: 20.3062, J&T Consulting, Inc. Project Name: Johnstown Reservoir Outlet Structure Drawn By: K. Lang Tested by: J. De Los Santos Checked By: J. Crystal Date: 18-Dec-20 Date: 21-Dec-20 Lab ID Number: 2021425

Laboratory Maximum Dry Unit Weight (Density): 120.2 pcf
 Laboratory Optimum Moisture Content (OMC): 11.9 %



Sample Location	Depth (ft)	LL	PL	PI	-#200 (%)	Soil Description & Classification	Moisture/Density Relationship (Proctor) Test
B-2	0 to 5	30	14	16	47.3	Visual: SAND, clayey, brown AASHTO: A-6(4) USCS: (SC) Sandy clay	Project Number: 20.3062, J&T Consulting, Inc. Project Name: Johnstown Reservoir Outlet Structure Drawn By: K. Lang Tested by: J. De Los Santos Checked By: J. Crystal Date: 18-Dec-20 Date: 21-Dec-20 Lab ID Number: 2021429

SOIL CHEMICAL TESTS

Project Number: 20.3062, J&T Consulting, Inc. Date: 11-Feb-21
 Project Name: Johnstown Reservoir Outlet Structure Technician: G. Hoyos
 Lab ID Number: 212211 Reviewer: J. Crystal
 Sample Location: B-2 at 14'
 Visual Description: CLAY, sandy, brown

Dish+Wet Soil (g): _____
 Dish+Dry Soil (g): _____
 Dish Wt. (g): _____
 Air Dried Moisture
 Content (%): _____

Water Soluble Sulfate (Colorado Procedure CP-L-2103)

Dilution	Reading, mg/L	Concentration, ppm	Concentration, %
100:1	1.0	100	0.01

pH (ASTM D 4972, 20g of -#10)

pH Meter Reading: _____

Water Soluble Chloride (HACH Method 8113, 100g of -#10)

Dilution	Reading (mg/L)	Result (mg/L)

Resistivity (AASHTO T 288, -#10)

Readings (ohm*cm)

Lowest Resistivity

SOIL CHEMICAL TESTS

Project Number: 20.3062, J&T Consulting, Inc. Date: 11-Feb-21
 Project Name: Johnstown Reservoir Outlet Structure Technician: G. Hoyos
 Lab ID Number: 212212 Reviewer: J. Crystal
 Sample Location: B-4 at 4'
 Visual Description: CLAYSTONE, sandy, brown

Dish+Wet Soil (g): _____
 Dish+Dry Soil (g): _____
 Dish Wt. (g): _____
 Air Dried Moisture
 Content (%): _____

Water Soluble Sulfate (Colorado Procedure CP-L-2103)

Dilution	Reading, mg/L	Concentration, ppm	Concentration, %
100:1	0.0	0	0.00

pH (ASTM D 4972, 20g of -#10)

pH Meter Reading: _____

Water Soluble Chloride (HACH Method 8113, 100g of -#10)

Dilution	Reading (mg/L)	Result (mg/L)

Resistivity (AASHTO T 288, -#10)

Readings (ohm*cm)

Lowest Resistivity



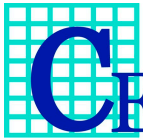
APPENDIX C

Slope Stability Results



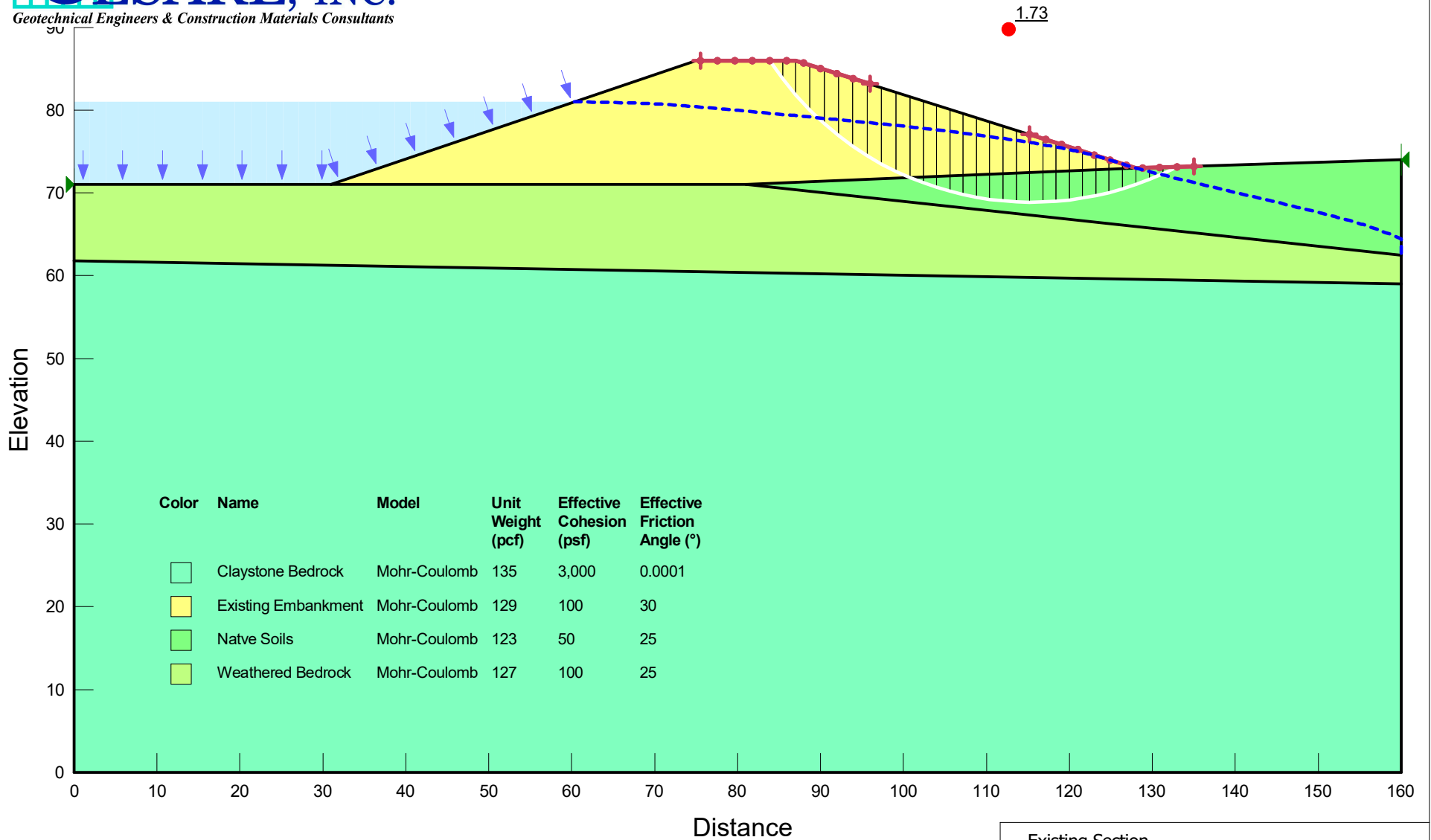
APPENDIX C

Slope Stability Results
Existing



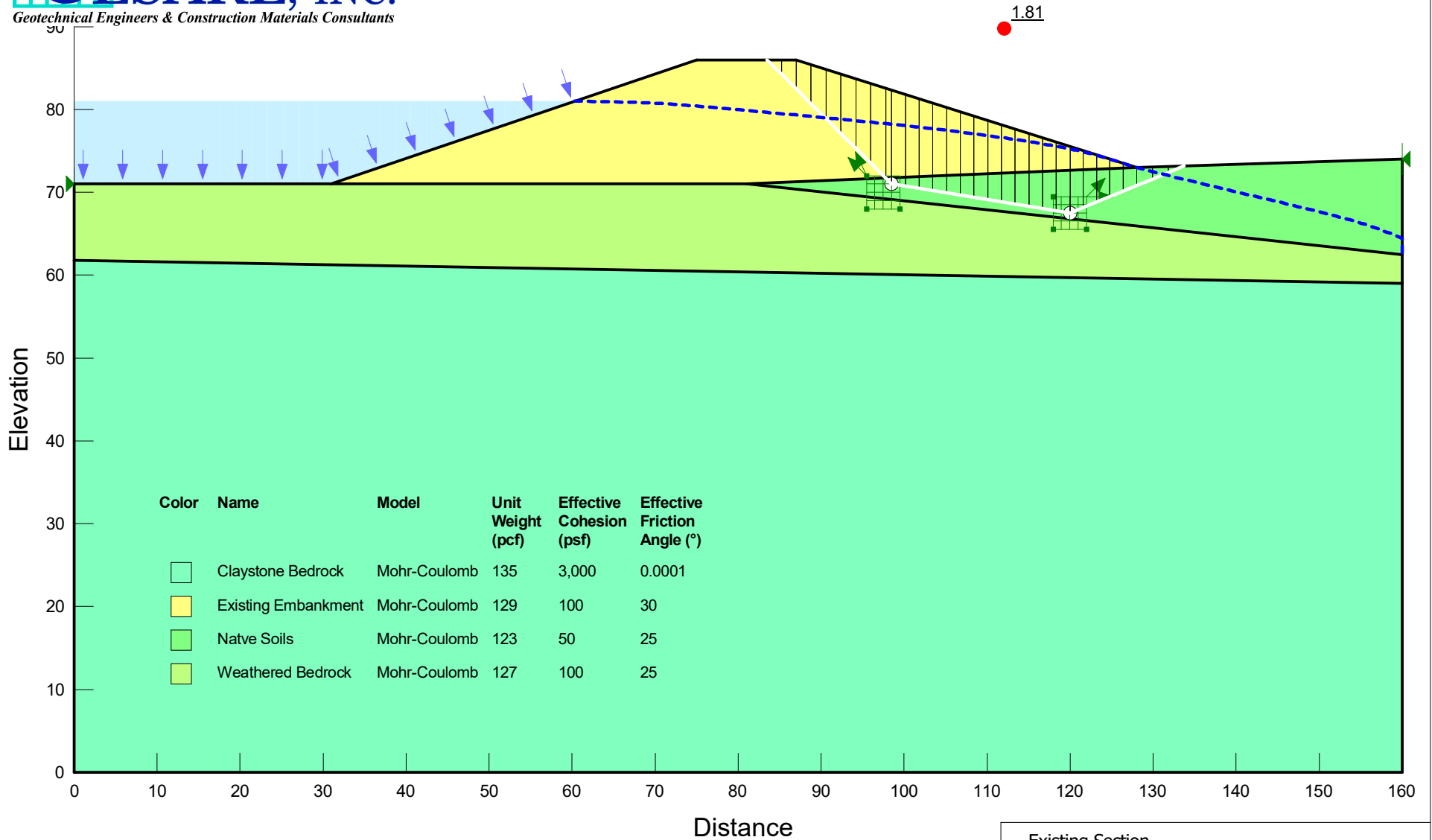
Geotechnical Engineers & Construction Materials Consultants





Johnstown Reservoir Outlet Structure Project No. 20.3062



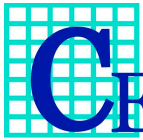
Existing Section
Full Reservoir Steady State Seepage
Downstream Circular Failure
Critical Failure Surface

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



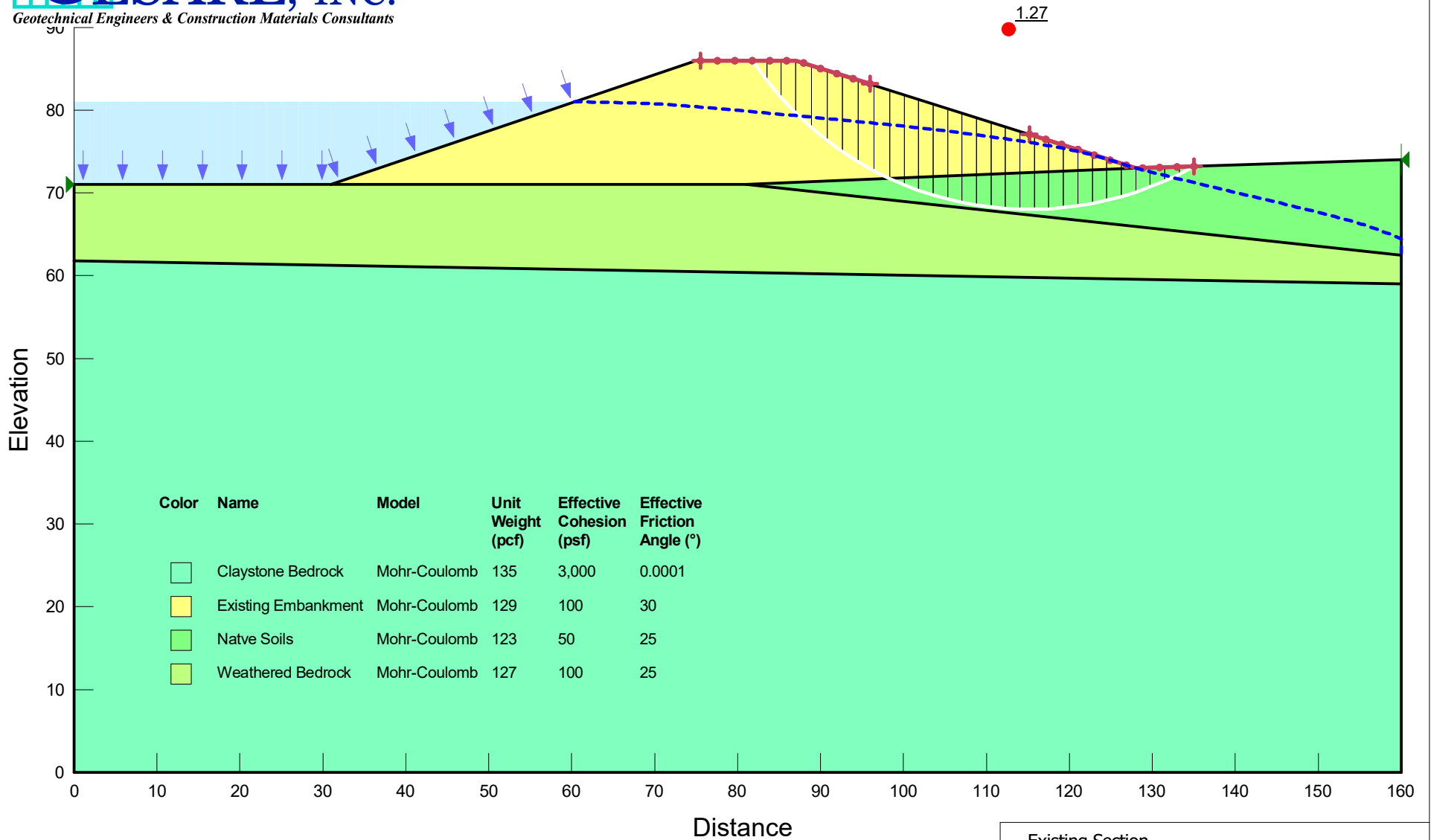
Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
	Existing Embankment	Mohr-Coulomb	129	100	30
	Native Soils	Mohr-Coulomb	123	50	25
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Full Reservoir Steady State Seepage
Downstream Block Failure
Critical Failure Surface



Geotechnical Engineers & Construction Materials Consultants

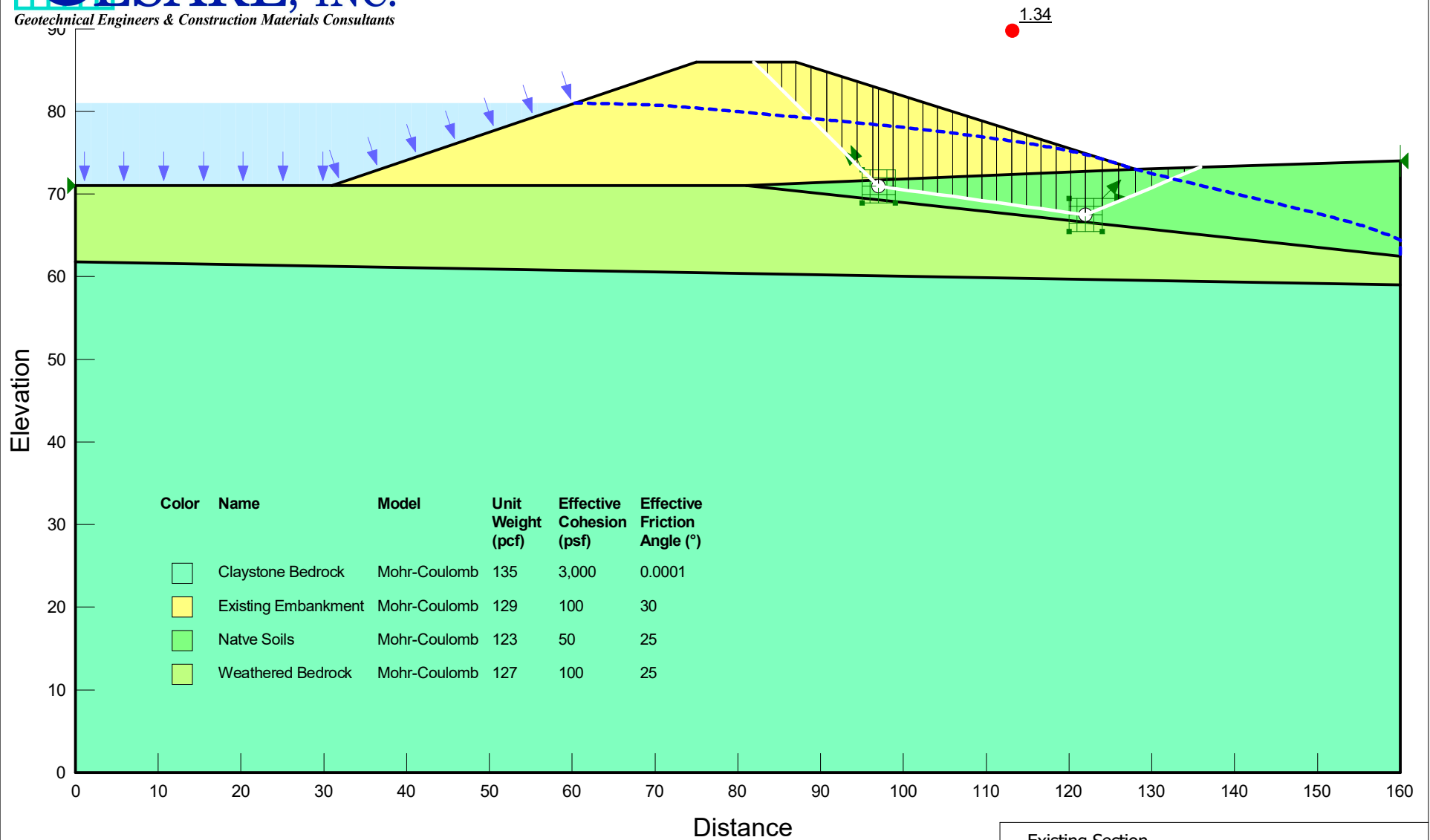
Johnstown Reservoir Outlet Structure Project No. 20.3062



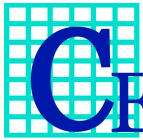
Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Light Blue	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
Yellow	Existing Embankment	Mohr-Coulomb	129	100	30
Light Green	Native Soils	Mohr-Coulomb	123	50	25
Yellow-Green	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Full Reservoir Steady State Seepage
Downstream Circular Failure - Pseudo Seismic
Critical Failure Surface

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**

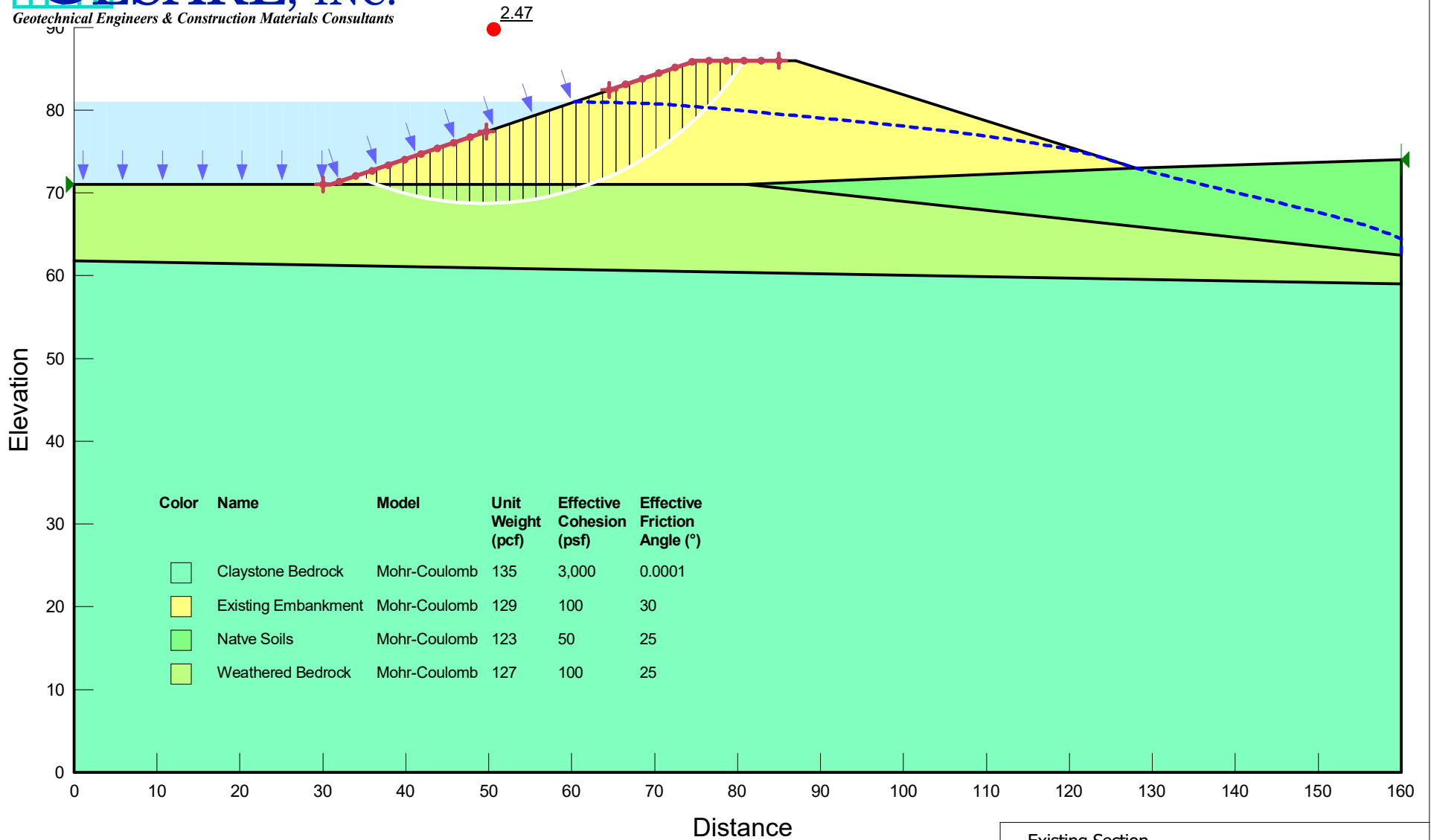


Existing Section
Full Reservoir Steady State Seepage
Downstream Block Failure - Pseudo Seismic
Critical Failure Surface



Geotechnical Engineers & Construction Materials Consultants

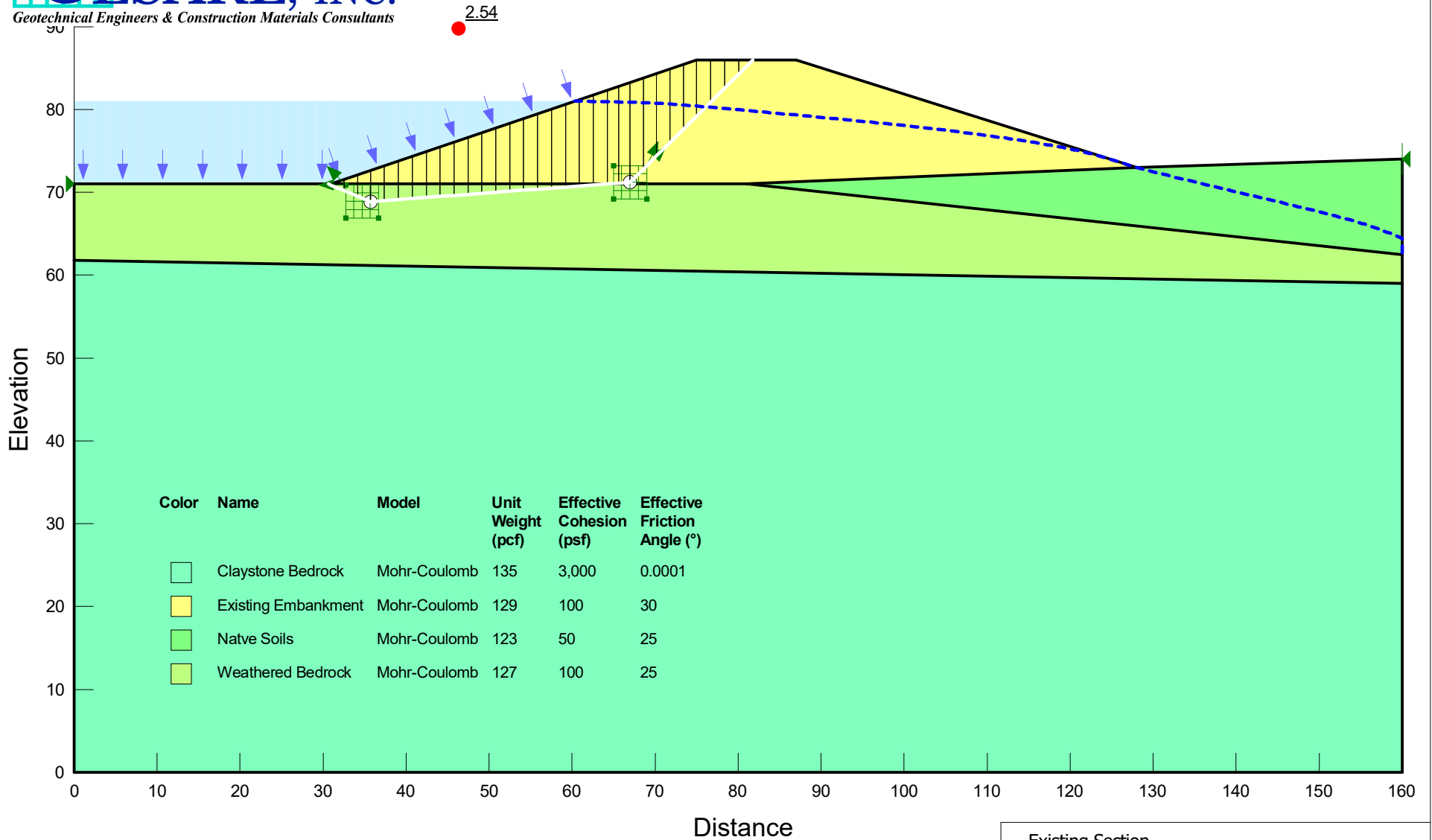
Johnstown Reservoir Outlet Structure Project No. 20.3062







Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Light Blue	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
Yellow	Existing Embankment	Mohr-Coulomb	129	100	30
Green	Native Soils	Mohr-Coulomb	123	50	25
Light Green	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Full Reservoir Steady State Seepage
Upstream Circular Failure
Critical Failure Surface

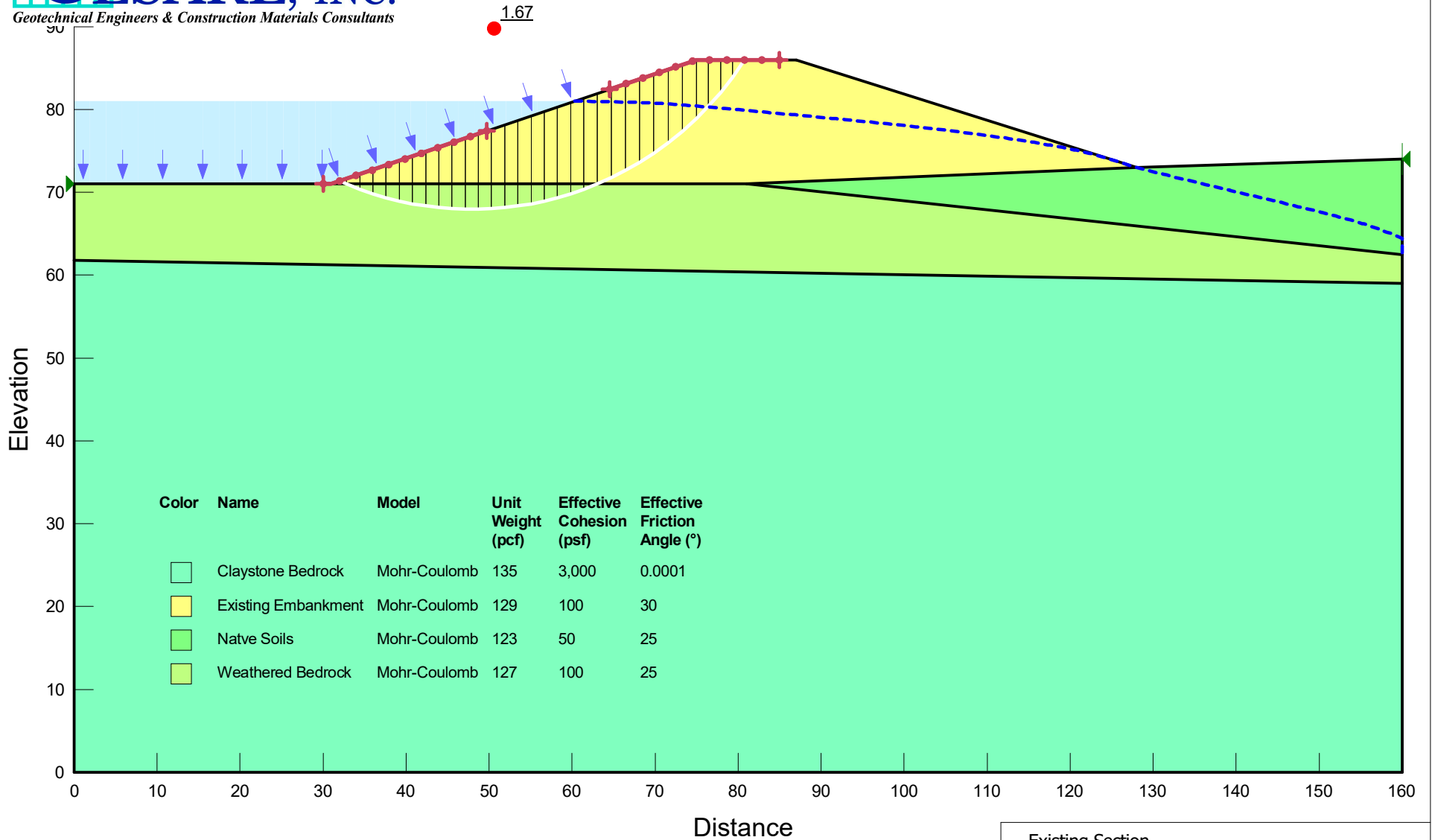
**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
	Existing Embankment	Mohr-Coulomb	129	100	30
	Native Soils	Mohr-Coulomb	123	50	25
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Full Reservoir Steady State Seepage
Upstream Block Failure
Critical Failure Surface

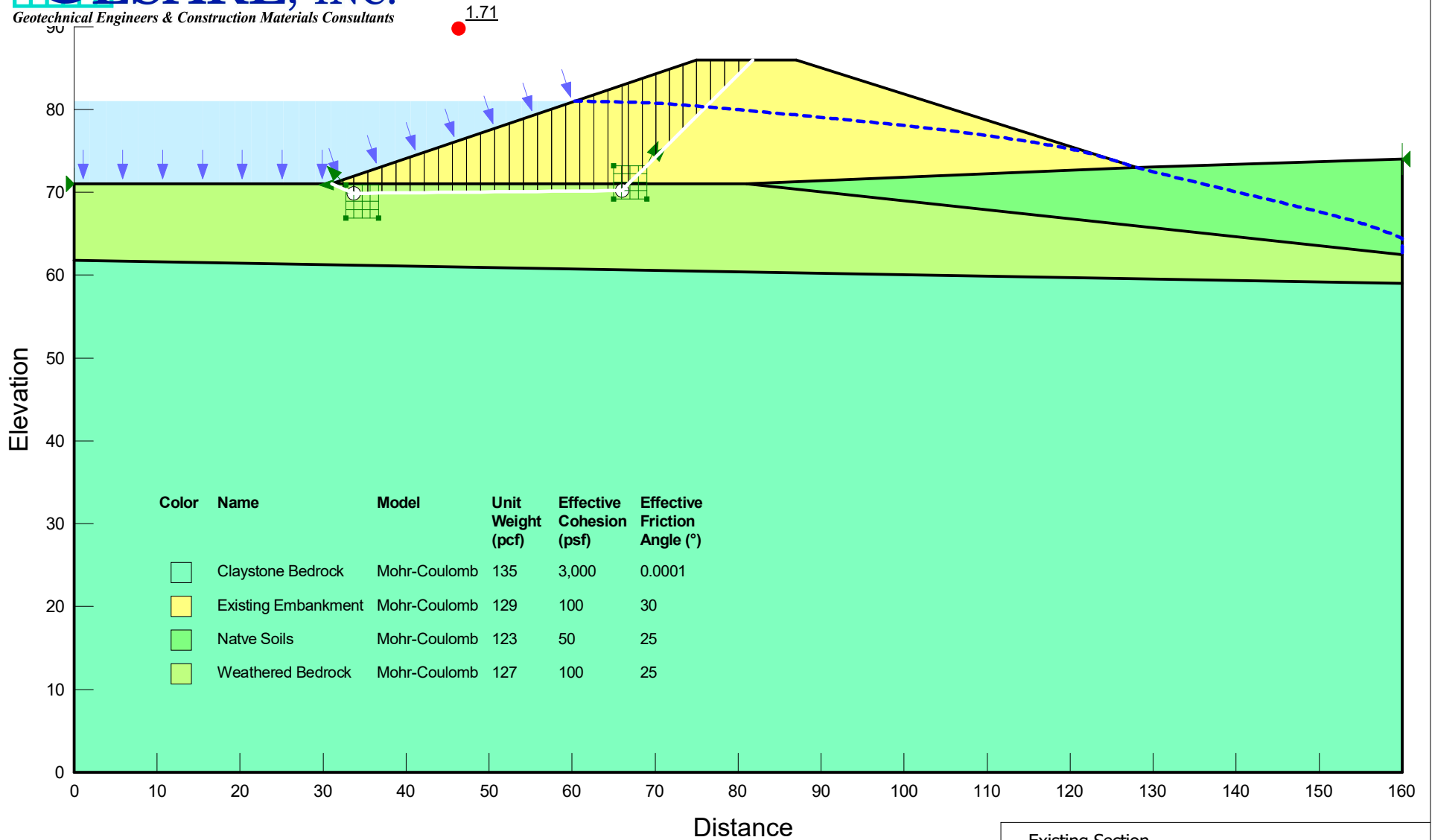
**Johnstown Reservoir Outlet Structure
Project No. 20.3062**







Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
Light Blue	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
Yellow	Existing Embankment	Mohr-Coulomb	129	100	30
Green	Native Soils	Mohr-Coulomb	123	50	25
Light Green	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Steady State Seepage
Upstream Circular Failure - Pseudo Seismic
Critical Failure Surface

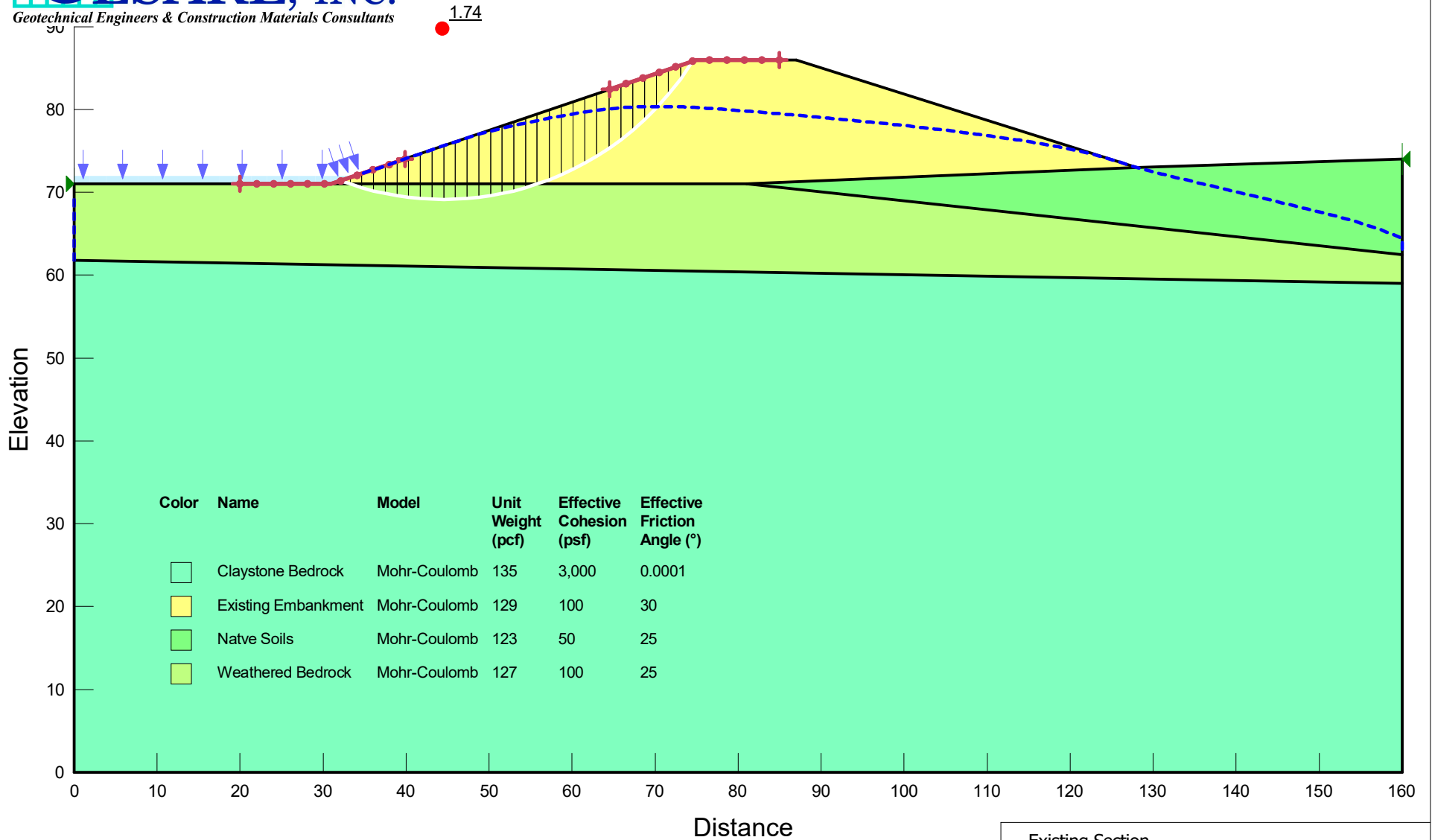
**Johnstown Reservoir Outlet Structure
Project No. 20.3062**







Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
	Existing Embankment	Mohr-Coulomb	129	100	30
	Native Soils	Mohr-Coulomb	123	50	25
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Steady State Seepage
Upstream Block Failure - Pseudo Seismic
Critical Failure Surface

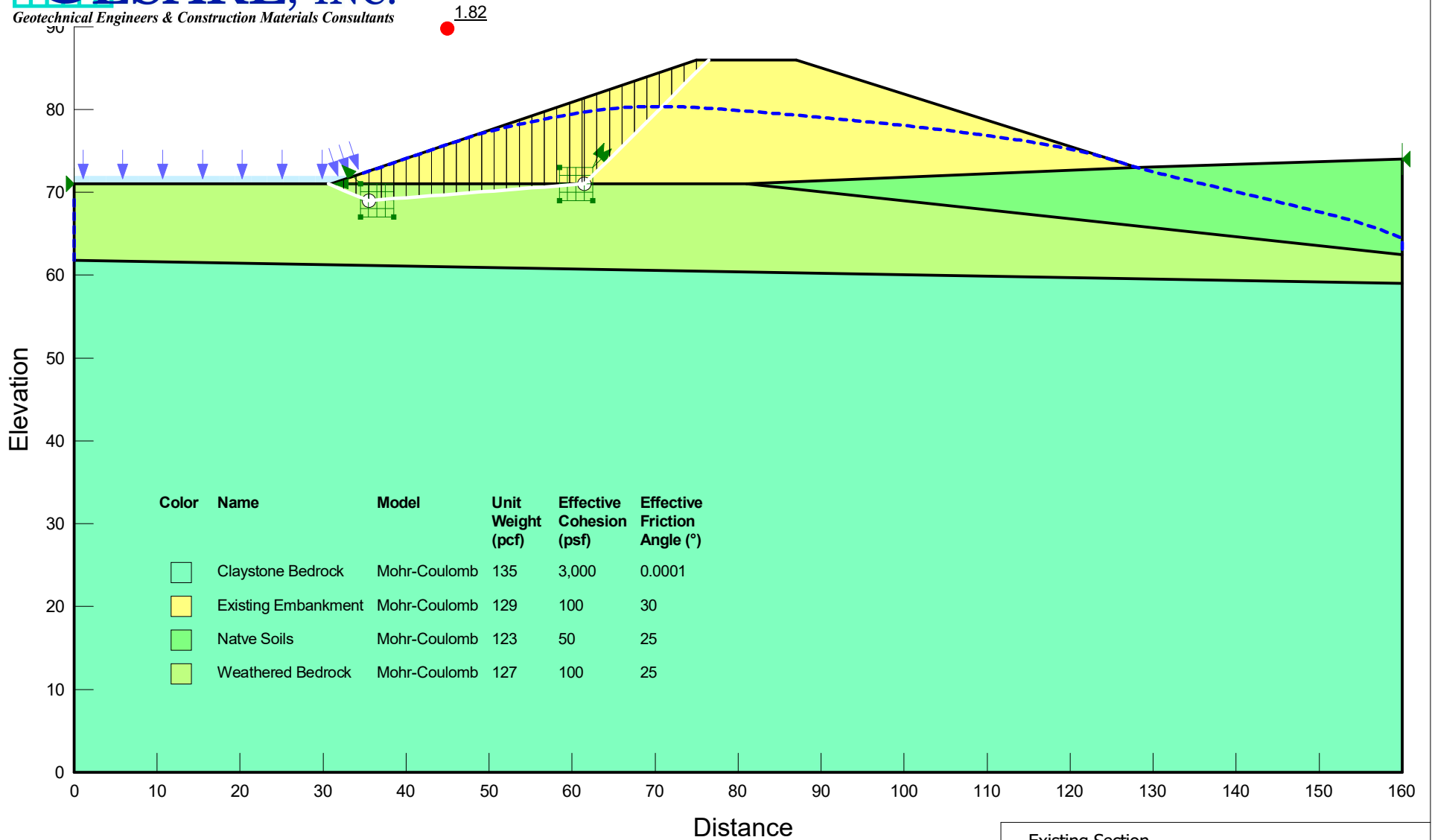
**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
	Existing Embankment	Mohr-Coulomb	129	100	30
	Native Soils	Mohr-Coulomb	123	50	25
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Existing Section
Rapid Drawdown Transient Seepage
Upstream Circular Failure
Lowest Critical Failure Surface of All Time Steps

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



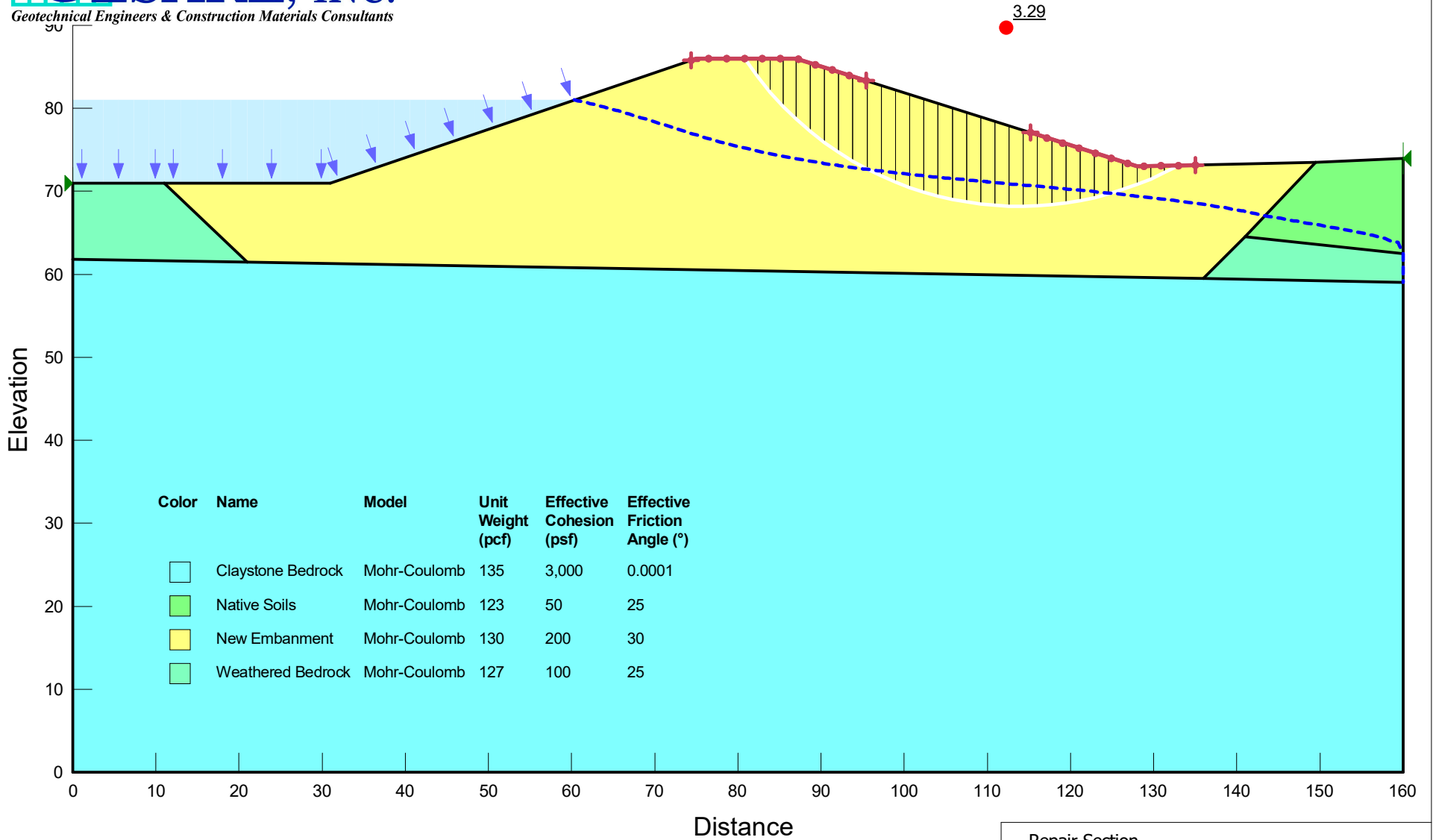
Existing Section
Rapid Drawdown Transient Seepage
Upstream Block Failure
Lowest Critical Failure Surface of All Time Steps







APPENDIX C

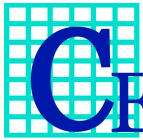
Slope Stability Results
Repaired

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



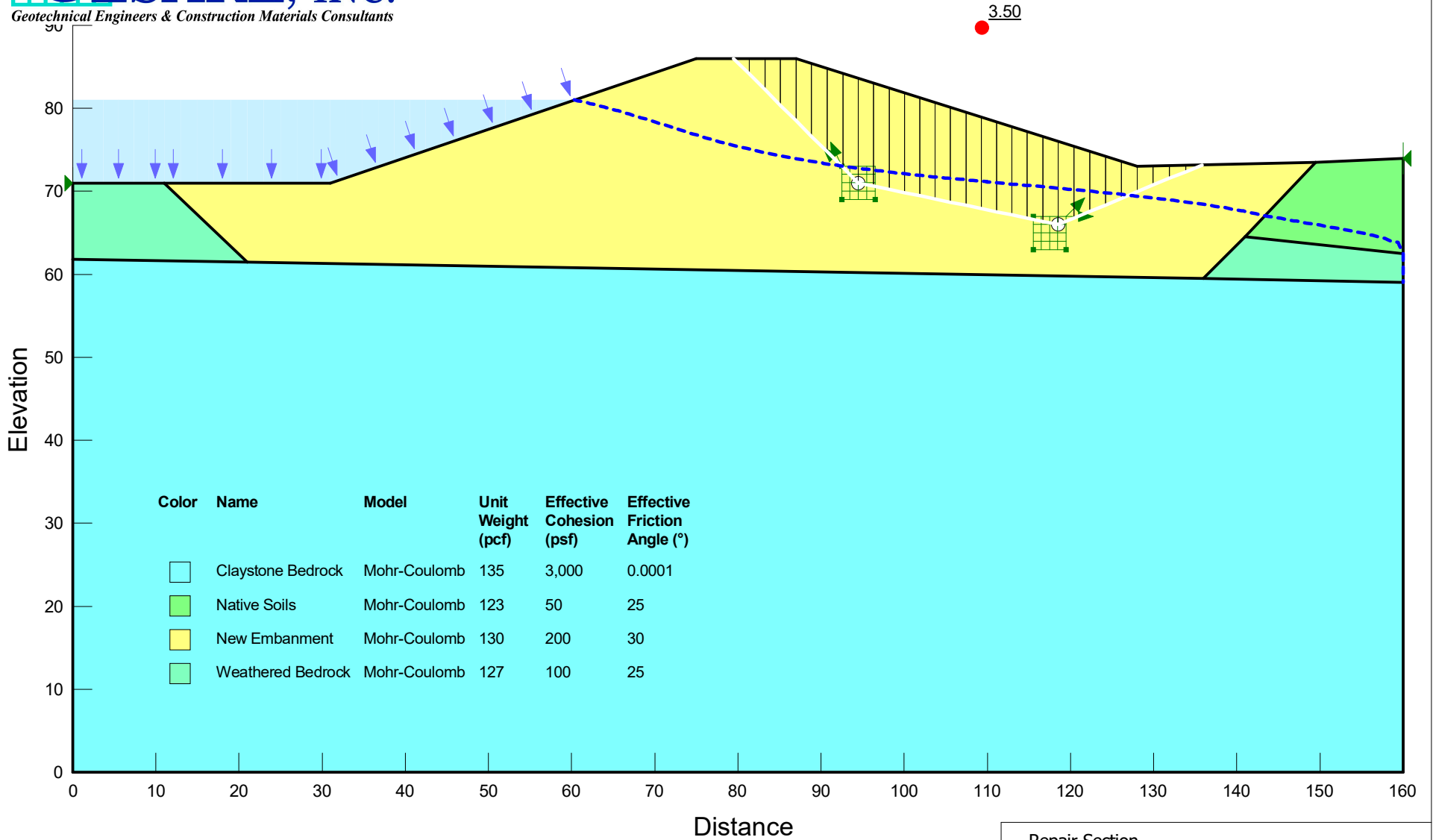
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	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
	Native Soils	Mohr-Coulomb	123	50	25
	New Embankment	Mohr-Coulomb	130	200	30
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Repair Section
Full Steady State Seepage
Downstream Circular Failure
Critical Failure Surface



Geotechnical Engineers & Construction Materials Consultants

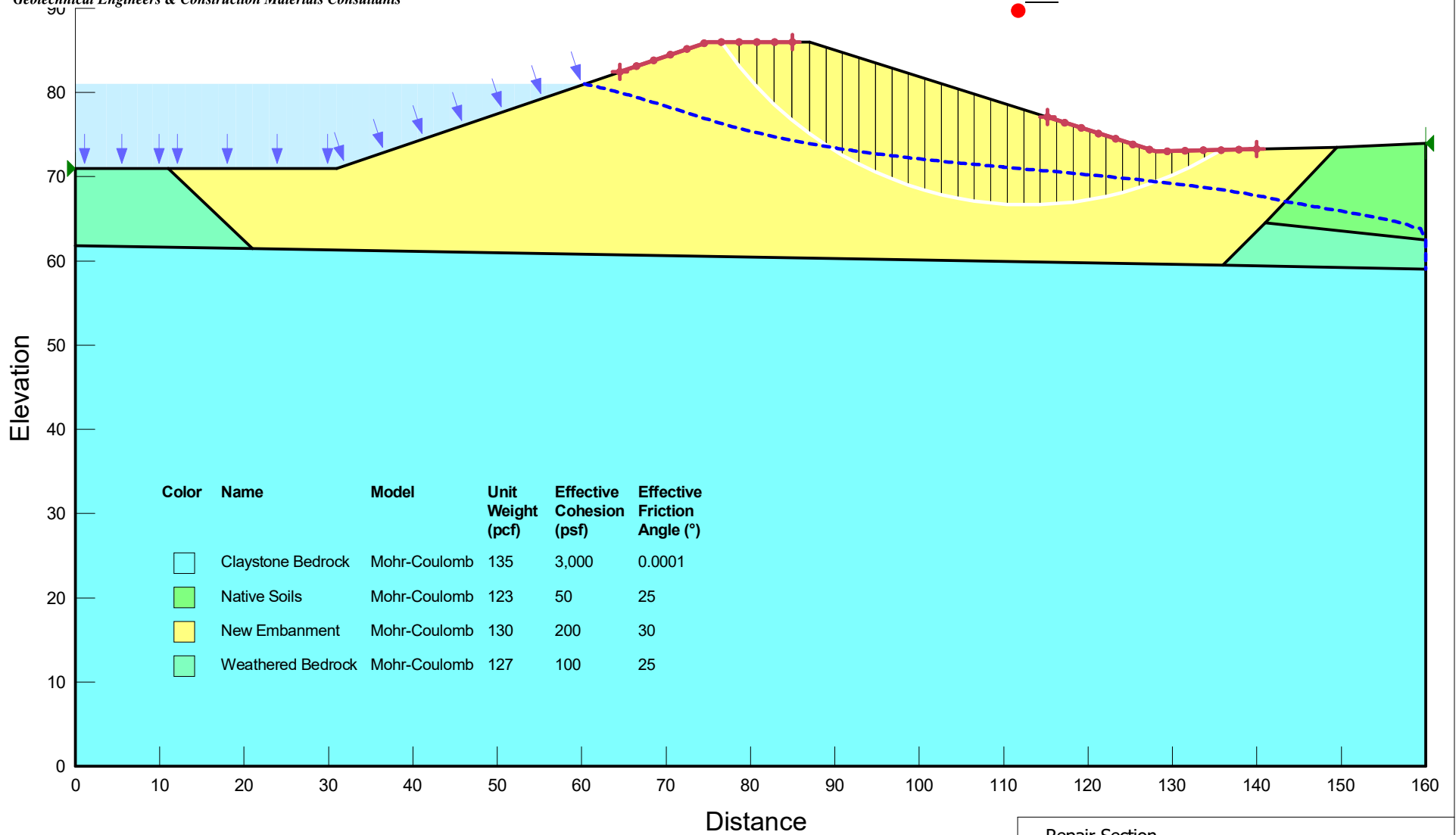
Johnstown Reservoir Outlet Structure Project No. 20.3062







Repair Section
Full Steady State Seepage
Downstream Block Failure
Critical Failure Surface

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**

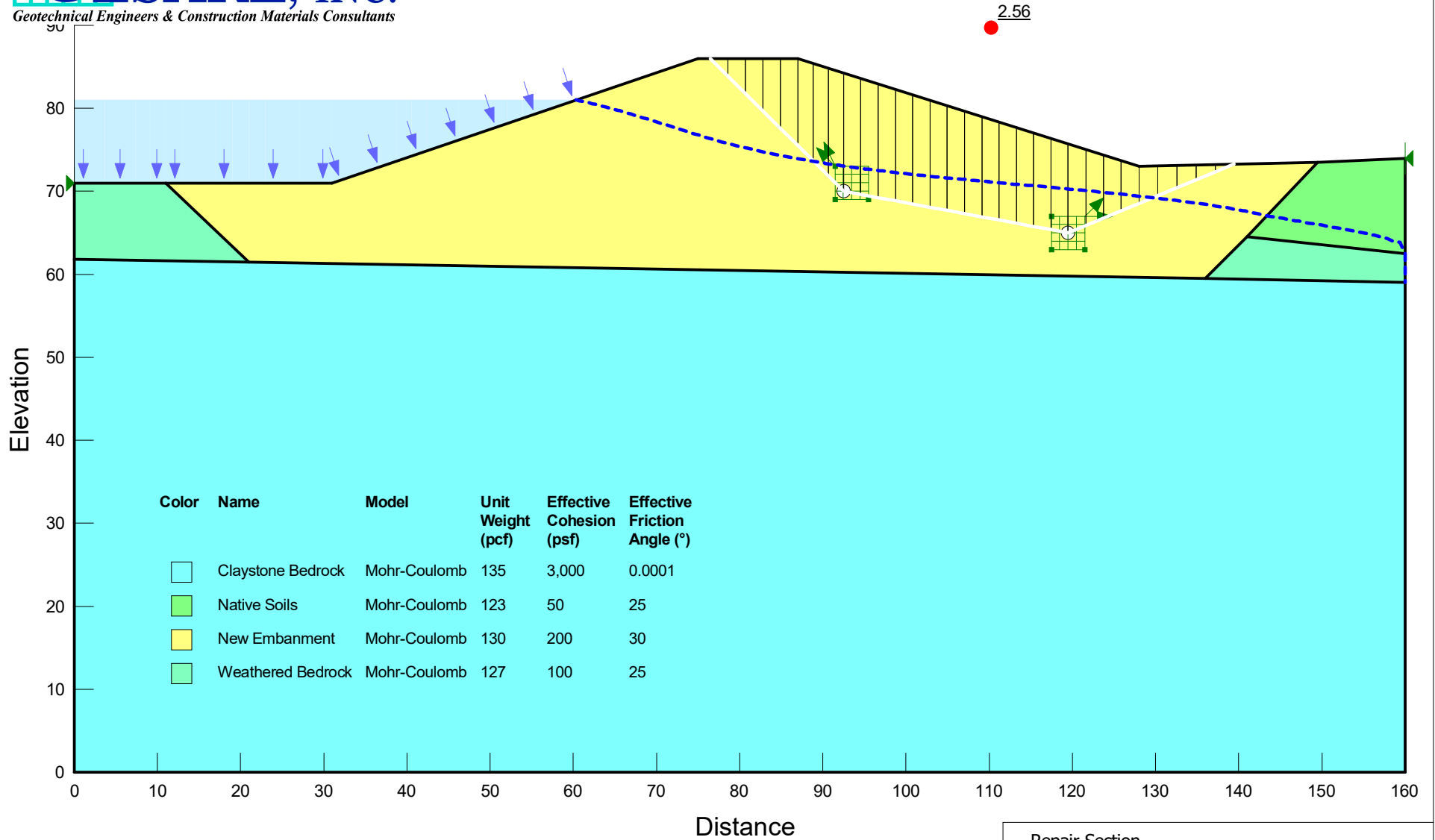
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Color	Name	Model	Unit Weight (pcf)	Effective Cohesion (psf)	Effective Friction Angle (°)
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	Native Soils	Mohr-Coulomb	123	50	25
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	Weathered Bedrock	Mohr-Coulomb	127	100	25

Repair Section
Full Steady State Seepage
Downstream Circular Failure Pseudo Seismic
Critical Failure Surface

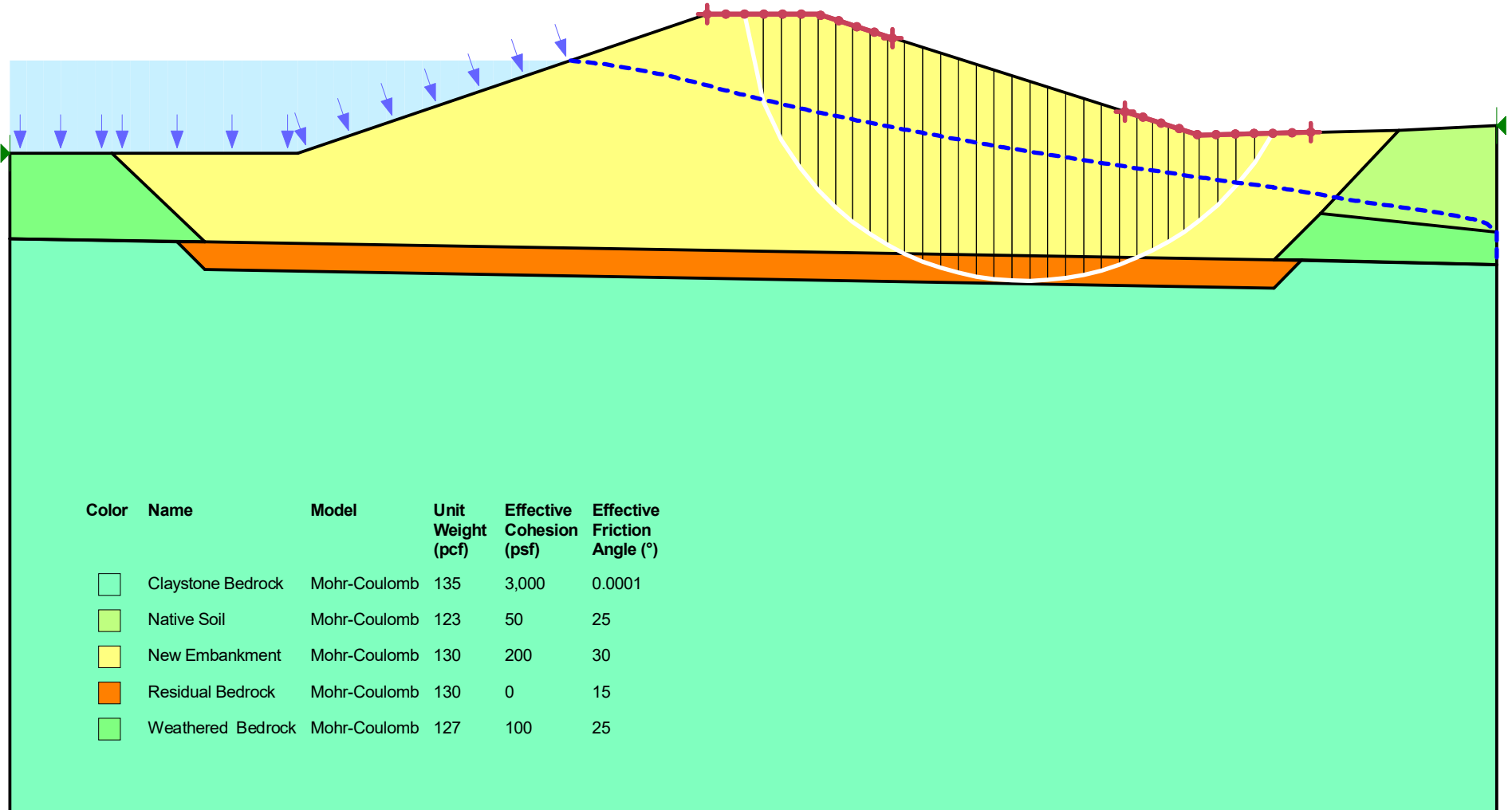
**Johnstown Reservoir Outlet Structure
Project No. 20.3062**








Repair Section
Full Steady State Seepage
Downstream Block Failure Pseudo Seismic
Critical Failure Surface

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**

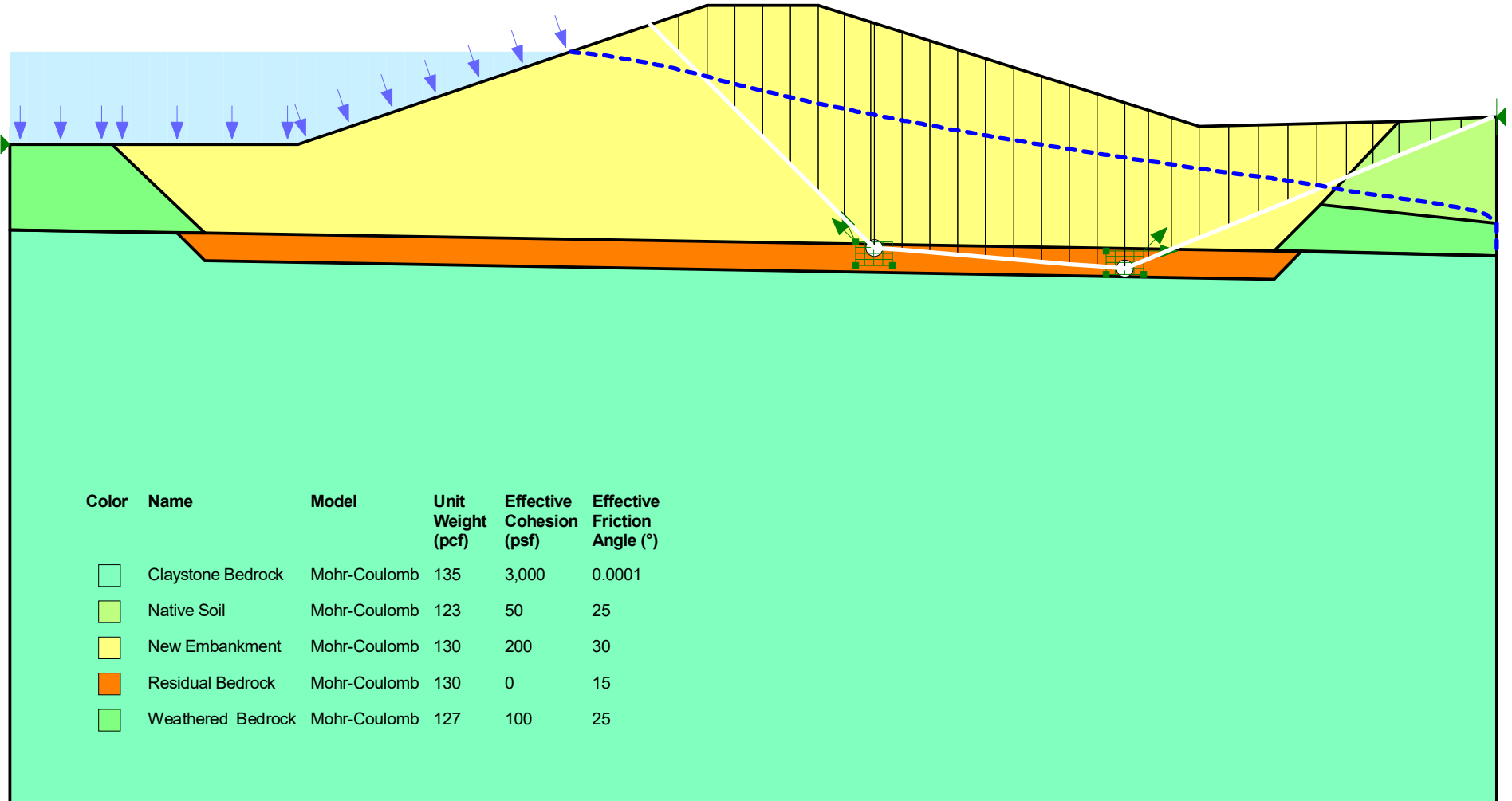
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	Native Soil	Mohr-Coulomb	123	50	25
	New Embankment	Mohr-Coulomb	130	200	30
	Residual Bedrock	Mohr-Coulomb	130	0	15
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Repair Section
Full Steady State Seepage
Downstream Circular Failure - Residual Bedrock
Critical Failure Surface

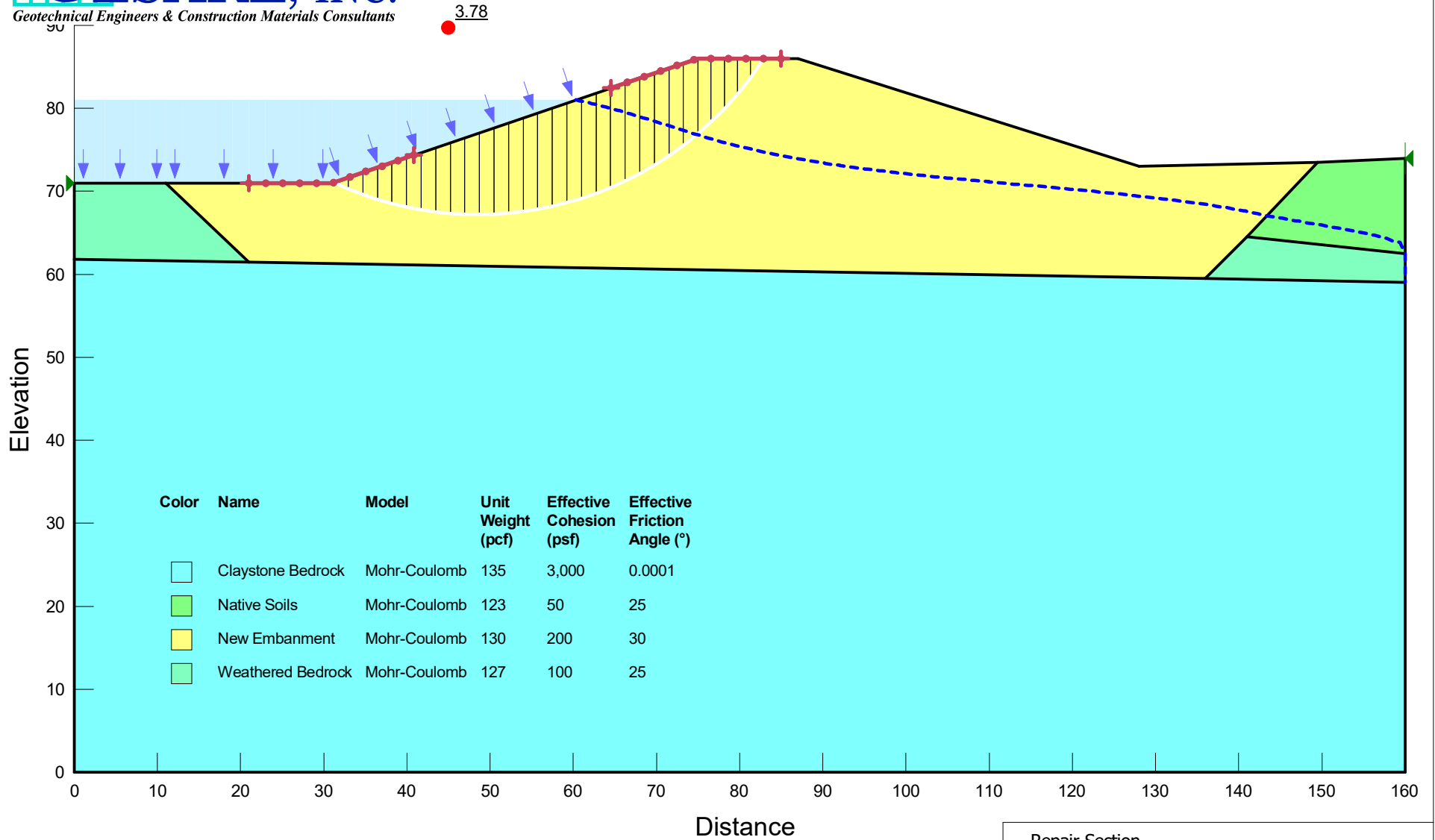
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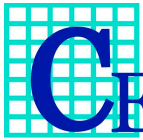
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	Claystone Bedrock	Mohr-Coulomb	135	3,000	0.0001
	Native Soil	Mohr-Coulomb	123	50	25
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	Residual Bedrock	Mohr-Coulomb	130	0	15
	Weathered Bedrock	Mohr-Coulomb	127	100	25

Repair Section
Full Steady State Seepage
Downstream Block Failure - Residual Bedrock
Critical Failure Surface

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**

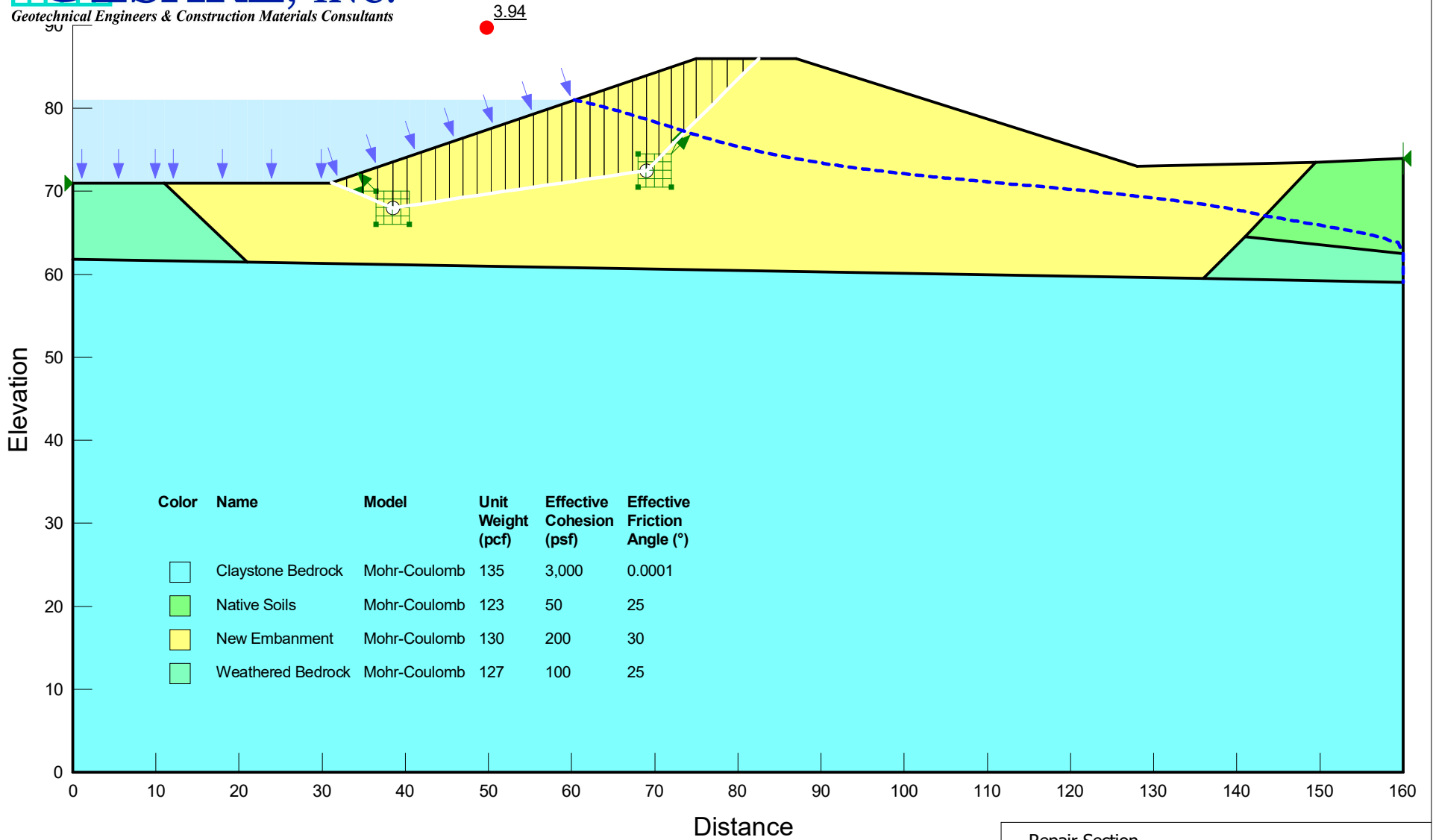


Repair Section
Full Steady State Seepage
Upstream Circular Failure
Critical Failure Surface

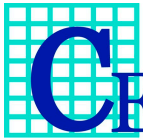


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Johnstown Reservoir Outlet Structure Project No. 20.3062

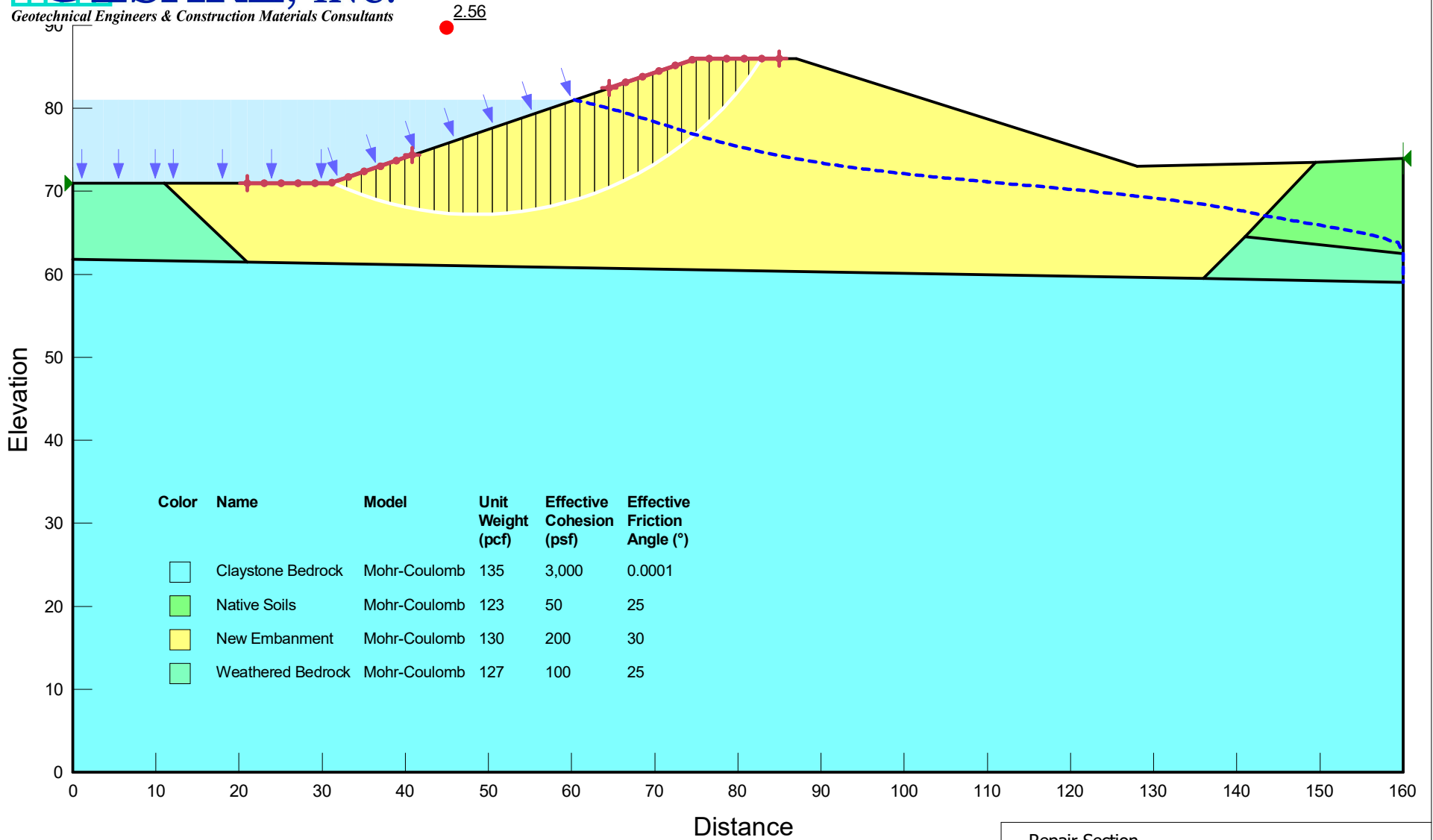


Repair Section
Full Steady State Seepage
Upstream Block Failure
Critical Failure Surface

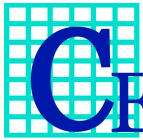


CESARE, INC.
 Geotechnical Engineers & Construction Materials Consultants

**Johnstown Reservoir Outlet Structure
 Project No. 20.3062**

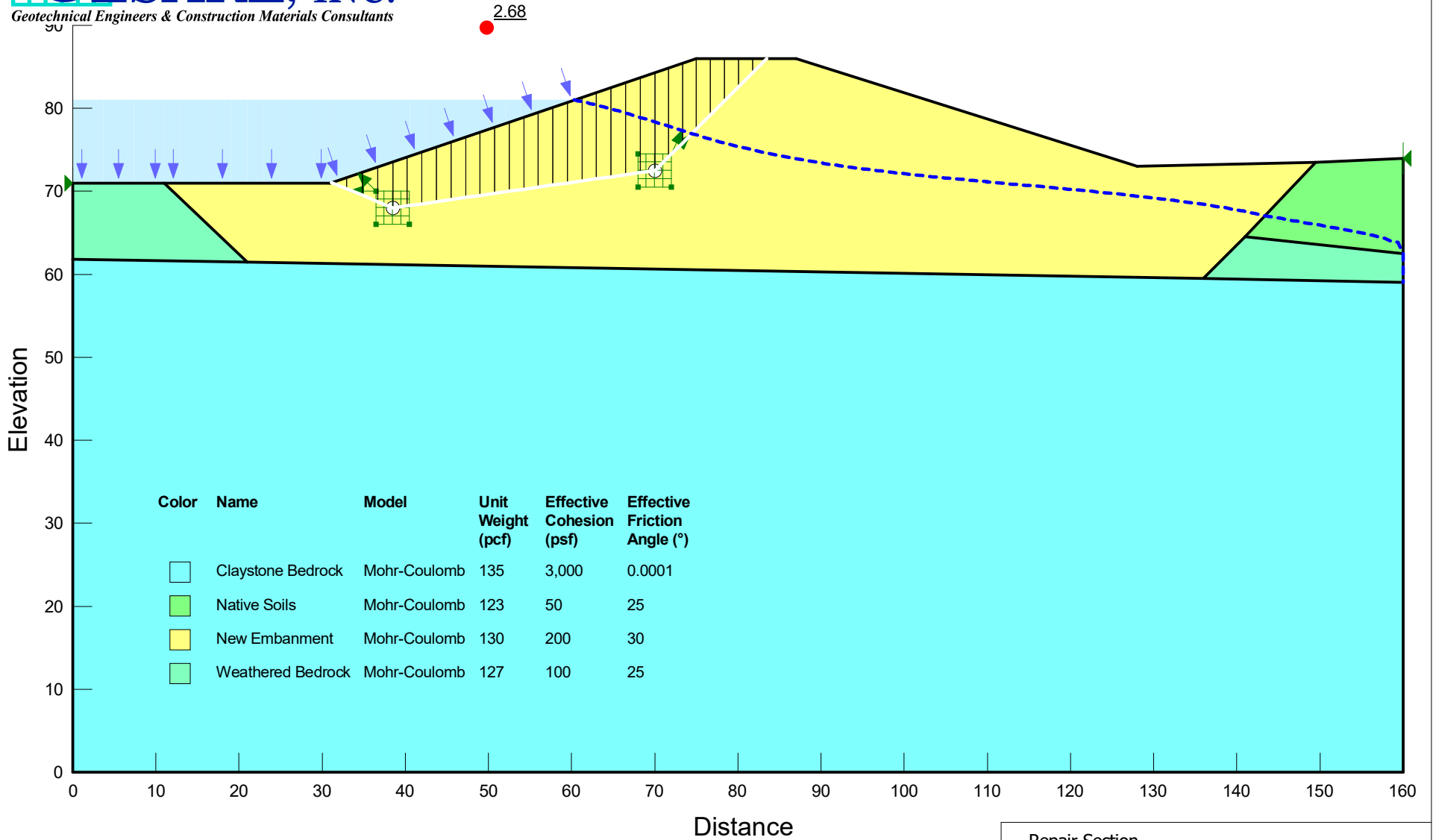


Repair Section
Full Steady State Seepage
Upstream Circular Failure - Pseudo Seismic
Critical Failure Surface



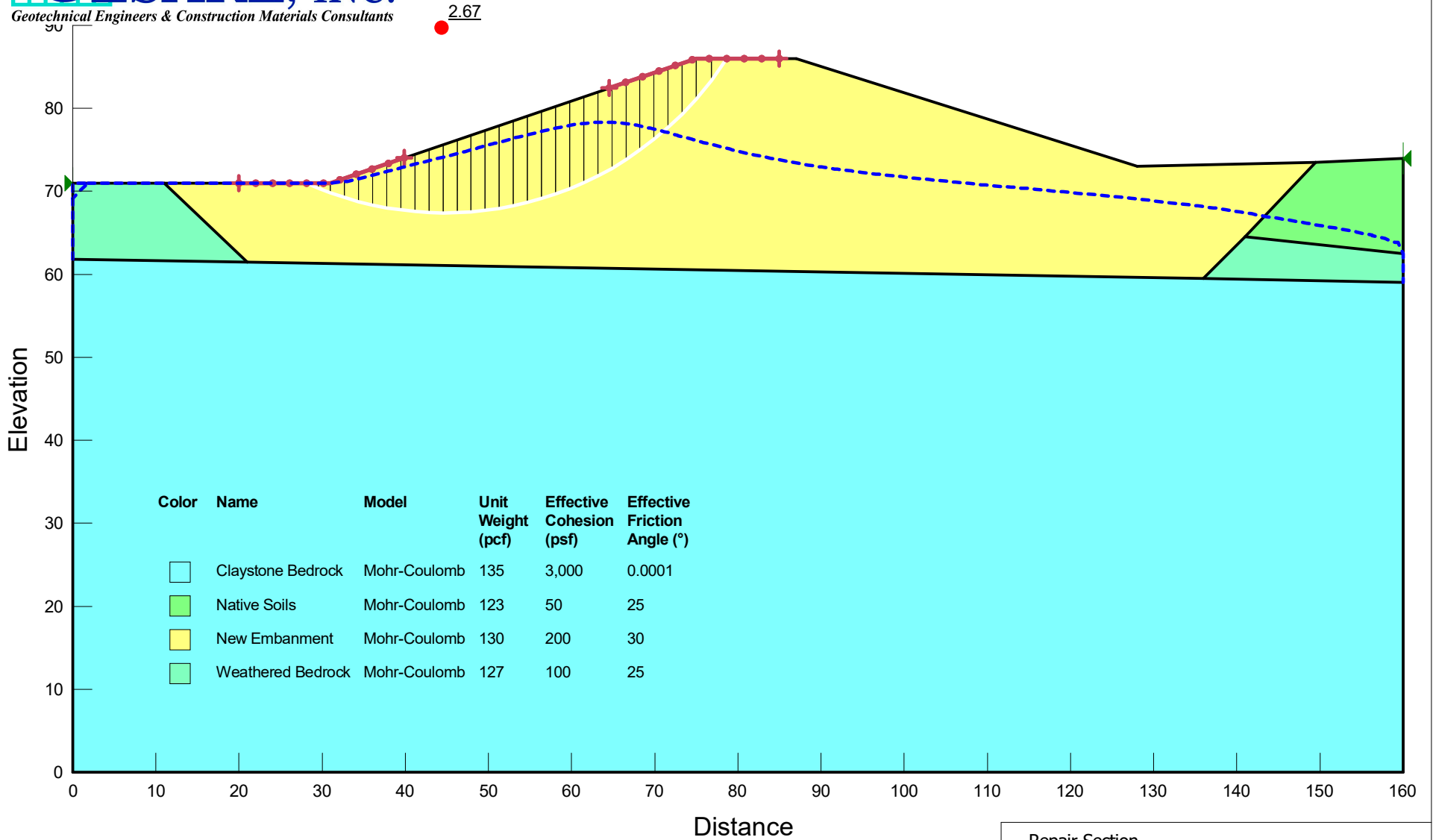
CESARE, INC.
Geotechnical Engineers & Construction Materials Consultants





**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



Repair Section
Full Steady State Seepage
Upstream Block Failure - Pseudo Seismic
Critical Failure Surface

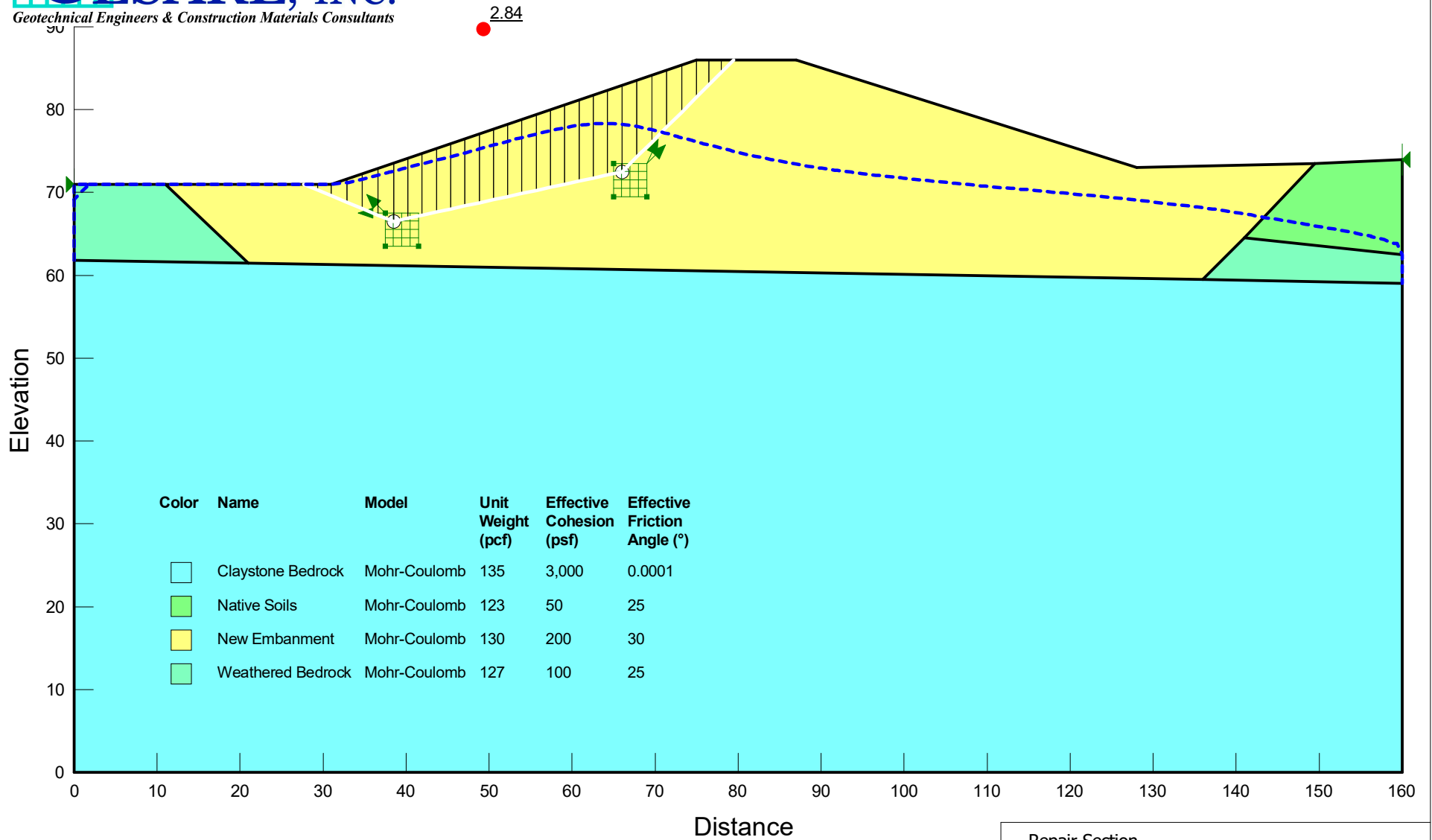
**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



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Repair Section
Rapid Drawdown Transient Seepage
Upstream Circular Failure
Lowest Critical Failure Surface of All Time Steps

**Johnstown Reservoir Outlet Structure
Project No. 20.3062**



Repair Section
Rapid Drawdown Transient Seepage
Upstream Block Failure
Lowest Critical Failure Surface of All Time Steps

May 6, 2021

J.C. York, P.E.
J&T Consulting, Inc.
305 Denver Avenue, Suite D
Fort Lupton, CO 80261

Subject: Johnstown Reservoir Outlet Structure
 Outlet Structure and Access Ramp Foundations
 Weld County, Colorado
 Addendum No. 1
 Project No. 20.3062

Dear Mr. York:

Mr. Todd Yee with J&T Consulting, Inc. (J&T) requested recommendations for a foundation design for a proposed outlet tower and access ramp for the subject project. Cesare, Inc. (Cesare) reviewed its original geotechnical engineering evaluation for the project to provide recommendation appropriate to the structures.

The outlet tower will be constructed of cast-in-place concrete located within the embankment near its upstream toe and will have a single discharge elevation within the reservoir. It will bear on straight shaft drill pier foundations embedded in competent bedrock. Cesare understands the top of piers will be at or near the contact of the competent bedrock.

A discharge pipe will extend from the outlet tower below the embankment to a water treatment plant intake pipe downstream of the embankment. The discharge pipe will be encased in concrete bearing on competent bedrock its entire length below the embankment. The existing embankment and its supporting soil will be excavated to competent bedrock contact for the discharge pipe structure.

The proposed access ramp configuration will be two parallel cast-in-place concrete cantilever retaining walls with a space of 11 feet between them. The walls will be cast in lifts and the space between will be backfilled with soil prior to the next lift being cast. The walls are planned to bear on spread footings stepping up from an elevation near the tower pier cap to the embankment crest. Since the embankment will be reconstructed from the competent bedrock contact, wall footings will bear on reconstructed embankment fill.

FOUNDATIONS

OUTLET TOWER

The proposed structure can be supported by straight shaft drilled piers designed in accordance with the following recommendations:

- a) The tower floor should be designed as a pier cap.
- b) Piers shall have a minimum diameter of 12 inches.

- c) Piers shall have a minimum penetration of 26 feet into competent bedrock, which is considered as having blow counts of 50/12 or harder.
- d) The minimum pier shaft length is based on measuring from the bottom of the pier cap.
- e) Dead load plus full live load of the structure should be used for pier length sizing.
- f) Piers shall be designed so that dead loads are as high as reasonably practicable.
- g) Maximum allowable end bearing pressure of 25,000 pounds per square foot (psf).
- h) Allowable side shear of 2,500 psf for the portion of pier in competent bedrock.
- i) No side shear shall be used to resist downward axial load for any portion of the pier in natural soil or manmade fill.
- j) No side shear shall be used to resist upward forces within the top 3 feet of the pier shaft.
- k) Minimum dead load pressure is assumed to be zero.
- l) Piers should be reinforced their full length to resist tension forces.
- m) Piers should have a center-to-center spacing of at least 3 pier diameters when designing for vertical loading conditions or be designed as a group.
- n) Piers aligned in the direction of lateral forces should have center-to-center spacing of at least 6 pier diameters.
- o) Piers should have a maximum length to diameter ratio of about 30 for constructability and observation purposes.
- p) It is anticipated that casing will not be needed for most of the drilled shafts. Concrete should be placed as soon as possible after drilling to reduce the potential for caving soil and/or water accumulation. Drilled shafts shall not be allowed to remain open overnight.
- q) Concrete should not be placed by freefall through more than 3 inches of water, unless proper tremie techniques are utilized to place concrete from the bottom of the shaft displacing the water or the water is removed.
- r) Difficult drilling may be encountered in the hard bedrock. Rock teeth may be required for the bit. Pier penetration may not be decreased unless acceptable by the geotechnical engineer.
- s) Concrete for each pier should be formed at the top of the pier, if necessary, to achieve a uniform diameter at the top of the pier. Excess concrete or overpour resulting in enlargement of the pier shall be removed.
- t) Proper concrete mixture design for drilled shafts varies with the design stress intensity, anticipated concrete placement procedures, and spacing of the reinforcement. It is recommended that current design and construction procedures outlined by the American Concrete Institute (ACI) and the International Association of Drilled Contractors (ADSC) be followed. Per these guidelines, current practice is to use a concrete mixture design slump in the range of 5 to 7 inches if casing is to be utilized or the shaft is heavily reinforced. A design slump in the range of 7 to 9 inches with 3/4 inch maximum size aggregate is recommended if concrete is to be placed by tremie or pumping methods. Additional recommendations as outlined by ACI and ADCS should also be followed.
- u) A Cesare representative should observe pier drilling to confirm that actual subsurface conditions are consistent with those presented in this evaluation. If conditions deviate significantly, drilled pier recommendations may require modification.

C ACCESS RAMP WALL FOOTINGS

The proposed structure can be supported by continuous spread footings bearing on controlled, structural fill below frost depth in accordance with the following design recommendations:

- a) Weld County Building Code requires a design frost depth of 30 inches, as adopted at the time of this evaluation.
- b) Footings should be designed for a maximum allowable soil bearing pressure of 3,000 psf based on dead load plus full live load.
- c) Continuous footings should have a minimum width of 18 inches. Using the soil pressure recommended above, Cesare estimates the maximum settlement for the walls will be on the order of 1 inch, with differential settlement potentially on the order of 0.5 inches. Footings should be proportioned as much as practicable to reduce differential settlement.
- d) The previously presented estimated settlement will likely be differential to the outlet tower. The retaining walls should be structurally independent from the outlet tower.
- e) Steel reinforcement for continuous concrete foundation walls should be designed to span localized settlements over a 10 foot length.
- f) All soft or loose soil beneath footing areas should be densified in place, or removed and replaced with properly compacted structural fill, suitable flow fill, or concrete prior to placement of footing concrete.
- g) A Cesare representative should observe all footing excavations prior to concrete placement to evaluate if bearing conditions are consistent with those assumed to develop its recommendations.

C LATERAL EARTH PRESSURES

Lateral pressures on walls depend on the type of wall, hydrostatic pressure behind the wall, type of backfill material, and allowable wall movements. Cesare understands the location and configuration of the access ramp will necessitate design considering backfill with hydrostatic pressures. Where anticipated wall movements are greater than 0.5% of the wall height, lateral earth pressures can be estimated for an "active" condition. Where anticipated wall movement is less than approximately 0.5% of the wall height or wall movement is constrained, lateral earth pressures should be estimated for an "at rest" condition. Recommended lateral earth pressures for onsite material are provided in the following table.

The recommended values for lateral earth pressures provided in the following table are given in terms of equivalent unit weight. The equivalent unit weight multiplied by the depth below the top of the ground surface is the horizontal pressure against the wall at that depth. The resulting pressure distribution is a triangular shape. These soil pressures are for horizontal backfill with no surcharge loading and with hydrostatic pressure. If these criteria cannot be met, Cesare should be contacted for additional criteria.

Lateral Earth Pressures and Coefficients of Sliding Resistance for Onsite Material

Backfill Material Type	Location	Equivalent Unit Weight (pcf)			Coefficient of Sliding Resistance
		Active	At Rest	Passive	
Saturated sandy clay	Between access ramp walls	90	100	285	0.35

This addendum should be attached to the original report¹ and made a part thereof. Please contact Cesare with any questions or comments regarding this information.

Sincerely,
CESARE, INC.



Jonathan A. Crystal, P.E.
Project Engineer

JAC2/ksm

cc: Mr. Todd Yee, J&T Consulting, Inc., toddyee@j-tconsulting.com

¹ Geotechnical Evaluation, Johnstown Reservoir Outlet Structure, Weld County, Colorado, Project No. 20.3062, dated February 19, 2021.