

**CITY of DULUTH
Spirit Mountain Recreation Authority
Contract Documents**

**Contract A – Reversible Water Supply and Runoff
Collection Pipeline**

Duluth, Minnesota

Bid No.: SM 4501A

Opening Date: November 20, 2014

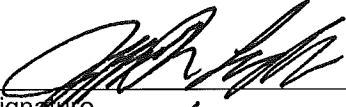
Time: 2:00 pm

**Place: RM 100, Duluth City Hall
411 West 1st St.
Duluth, MN 55802**

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SPECIFICATIONS SIGNATURE PAGE

I HEREBY CERTIFY THAT THIS PLAN, specification or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.



Signature

Jeffrey R. Ledin

Typed or Printed Name

Oct / 17 / 2014

Date

25222

License No.

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PROJECT DIRECTORY

Project Name: Contract A - Reversible Water Supply and
Runoff Collection Pipeline

Location: Duluth, Minnesota

Owner

Name: Spirit Mountain Recreation Area
Address: 9500 Spirit Mountain Place
Duluth, MN 55810
Contact: Brandy Ream, Executive Dir.
Phone: 218-624-8501
E-mail: bream@spiritmt.com

Owner

Name: Spirit Mountain Recreation Area
Address: 9500 Spirit Mountain Place
Duluth, MN 55810
Contact: Jody Ream, General Manager
Phone:
E-mail: jream@spiritmt.com

Owner

Name: Spirit Mountain Recreation Area
Address: 9500 Spirit Mountain Place
Duluth, MN 55810
Contact: Ryan Abel, Trail Maintenance Mgr.
Phone:
E-mail: ryanabel@spiritmt.com

Project Manager

Name: Foster Jacobs Johnson
Address: 345 Canal Park Drive Suite 200
Duluth, MN 55802
Contact: Randy Anderson
Phone: 218.213.1825
E-mail: randya@fjj.com

Engineer

Name: SEH
Address: 416 South 6th Street, Suite 200
Brainerd, MN 56401-3540
Contact: Jeff Ledin
Phone: 218.855.1711
Fax: 888.908.8166
E-mail: jledin@sehinc.com

Other

Name:
Address:
Contact:
Phone:
Fax:
E-mail:

Snow Making Consultant

Name: Torrent Engineering & Equipment
Address: P.O. Box 270
10693 N. Orn Rd.
Milford, IN 46542
Contact: Mark Meadows
Phone: 574.658.3200
E-mail: mark@torrentee.com

Other

Name:
Address:
Contact:
Phone:
E-mail:

END OF DOCUMENT

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TABLE OF CONTENTS

Number	Document
	Introductory Information
	Title Page
	Specifications Signature Page
	Project Directory
	Bidding Requirements
	Invitation to Bid
	Additional Forms
	Bid Form
	Non-Collusion Affidavit
	Contract Forms
	Performance Bond
	Payment Bond
	Conditions of the Contract
	Duluth General Conditions Supplement
	Insurance and Indemnity Requirements
DIVISION 1 – GENERAL REQUIREMENTS	
	Summary
01 11 00	Summary of Work
	Price and Payment Procedures
01 25 13	Product Substitution Procedures
01 29 10	Applications for Payment
	Administrative Requirements
01 31 13	Coordination
01 31 19	Project Meetings
01 32 16	Progress Schedules
01 33 00	Submittal Procedures
	Quality Requirements
01 45 29	Testing Laboratory Services
	Temporary Facilities and Controls
01 51 00	Temporary Utilities
01 51 36	Temporary Water
01 52 13	Field Office
01 52 19	Temporary Sanitary Facilities
01 55 25	Maintenance of Traffic
01 57 12	Stormwater Management and Erosion Control
01 57 19	Air, Land, and Water Pollution
01 58 13	Project Signs
	Execution and Closeout Requirements
01 71 13	Mobilization
01 77 00	Closeout Procedures

DIVISION 3 - CONCRETE

03 11 00 **Maintenance of Concrete**
Concrete Forming
03 20 00 Concrete Reinforcing

03 30 00 **Cast-in-Place Concrete**
Cast-in-Place Concrete

DIVISION 5 - METALS

05 50 00 Metal Fabrications

DIVISION 31 - EARTHWORK

31 11 00 **Site Clearing**
Clearing and Grubbing

31 23 16 **Earth Moving**
Structure Excavations and Backfills
31 23 19 Dewatering
31 23 33 Trench Excavation and Backfill

31 71 30 **Tunneling and Mining**
Jack Bore Crossings

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 34 20 **Bases, Ballasts, and Paving**
Fabricated Bridges
Fabricated Steel Pedestrian Bridge

32 91 00 **Planting**
Topsoil Placement
32 92 30 Turf Restoration

DIVISION 33 – UTILITIES

33 05 13 **Common Work Results for Utilities**
Grit Chamber
33 05 20 Horizontal Directional Drilling (HDD) Pipe Installation

33 11 01 **Water Utilities**
Water Supply Piping (At Pump Stations)
33 11 02 Water Supply Piping (Between Pump Stations)
33 11 03 Water Transfer Piping (Grit Chamber to Sta 104)
33 11 04 Marine Constructed Water Supply Piping (River Station to Inlet-Outlet)
33 11 05 Intake-Outlet Piping and Fittings

33 32 15 **Storm Drainage Utilities**
Pump Station Wet Well
33 41 00 Run Off Collection System
33 44 20 Manholes and Catch Basins

Attachments:

AET Amendment to Geotechnical Exploration and Review 09/17/2014
AET Geotechnical Exporation and Review 01/09/2013

CITY OF DULUTH INVITATION TO BID (ENG)

PROJECT NAME/DESCRIPTION: City of Duluth, Spirit Mountain Recreation Area, Water System Improvements
Contract A - Reversible Water Supply and Runoff Collection Pipeline

SEH PROJECT NUMBER: FOSJJ 129137

BID NUMBER: SM 4501A

Sealed bids will be received by the City Purchasing Agent in and for the Corporation of the City of Duluth, Minnesota, at his office, Room 100 - City Hall, Duluth, Minnesota, 55802, (218) 730-5340 until 2:00pm local time on Thursday, November 20, 2014 for the above named project. Immediately thereafter, bids will be taken to Room 106A - City Hall, where they will be publicly opened and read aloud.

NOTICE TO BIDDERS:

- 1. A Project Labor Agreement (PLA) will be required for any bid that is over or could virtually go over \$150,000.**
- 2. Unless a Certificate of Exemption is provided, any out-of-state bidder receiving a bid award will have 8% retained from invoice payments on any contracts over \$50,000. Submit a signed copy from the State of Minnesota when submitting Payment and Performance Bonds. This form may be found at the following web address: http://taxes.state.mn.us/Forms_and_Instructions/sde.pdf.**

Scope of project: Reversible Water Supply and Runoff Collection Pipeline: Includes a runoff collection system, a grit chamber, transfer pipeline, yard piping at the Main pump station, low pressure supply pipe, a wet well and yard piping for the River pump station, an intake pipe (in St Louis River) and an intake structure.

Questions pertaining to this project should be directed to the issuing office: SEH, 418 W. Superior St., Ste. 200, Duluth, MN 55802, 218.279.3000.

A pre-Bid conference will be held at 10:00 a.m. on Thursday November 6, 2014 at Spirit Mountain Recreation Area, 9500 Spirit Mountain Place, Duluth, MN 55810. Representatives of Owner and Engineer will be present to discuss the Project. Bidders are encouraged to attend and participate in the conference.

Plans and specifications are on file for inspection at the City Engineering office, Duluth Builders Exchange, F.W. Dodge Plan Room, Minneapolis Builders Exchange and St. Paul Builders Exchange.

Digital image copies of the Bidding Documents are available at <http://www.sehinc.com> for a fee of \$30. These documents may be downloaded by selecting this project from the BIDDING DOCUMENTS link and by entering eBidDocTM Number 3568638 on the SEARCH PROJECTS page. For assistance and free membership registration, contact QuestCDN at 952.233.1632 or info@questcdn.com.

Paper copies of the Bidding Documents may be obtained from Docunet Corp. located at 2435 Xenium Lane North, Plymouth, MN 55441 (763.475.9600) for a fee of \$70.

A certified check or bank draft, payable to the order of the City of Duluth, negotiable U.S. Government Bonds (at par value), or a satisfactory bid bond executed by the bidder and acceptable surety, in an amount equal to five per cent (5%) of the total bid, shall be submitted with each bid.

Attention is called to the fact that not less than the minimum salaries and prevailing wages as set forth in the contract documents must be paid on this project. The contractor must take affirmative action to ensure that the employees and applicants for employment are not discriminated against because of their race, color, creed, sex or national origin, and must meet the affirmative action goals. Contractors are encouraged to subcontract with Disadvantaged Business Enterprises when possible.

Contractor will comply with all applicable Equal Employment Opportunity laws and regulations.

The City of Duluth is an Equal Opportunity employer.

CITY OF DULUTH
Dennis Sears
Purchasing Agent

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Additional Forms

The following forms and regulations/rules/statutes and interpretations, which are incorporated by reference in this contract, are available on the World Wide Web at the sites listed below. The City of Duluth will use its best efforts to ensure that the most recent, applicable forms and regulations/rules/statutes and interpretations are included on the web sites provided; however, if you are the successful bidder, prior to signing the contract, you are responsible for comparing the versions of the forms and regulations/rules/statutes and interpretations attached to the contract which you are signing with the versions on the web to ensure conformity.

THE VERSIONS OF THE FORMS AND REGULATIONS/RULES/STATUTES and INTERPRETATION ATTACHED TO THE CONTRACT WILL BE CONTROLLING. HARD COPIES OF ALL FORMS ARE AVAILABLE AT THE ENGINEERING DIVISION, EXCEPT THE NON-COLLUSION AND AFFIRMATIVE ACTION POLICY STATEMENT, WHICH ARE AVAILABLE AT THE CITY OF DULUTH PURCHASING DEPARTMENT.

Item listing from web:

FORM	WEB SITE
Affidavit of Non-Collusion (required by awarded contractor only)	www.duluthmn.gov/engineering/construction_documents.cfm
Affirmative Action Policy Statement/Certificate - EEO (required by awarded contractor only)	www.duluthmn.gov/engineering/construction_documents.cfm
Bidder's Label for submitting project bids	www.duluthmn.gov/engineering/construction_documents.cfm
Certified Payroll Report form WH347 (front side only)	www.dol.gov/whd/forms/WH347.pdf
Contractor's Haul Route	www.duluthmn.gov/engineering/construction_documents.cfm
Debarment/Suspension Notice (most current version)	www.dot.state.mn.us/pre-letting/prov/order/suspension.pdf
HUD 4010	www.hud.gov/offices/adm/hudclips/forms/files/4010.pdf
IC-134 form	www.taxes.state.mn.us/Forms_and_Instructions/ic134.pdf
IC-134 on-line submittal (click: Submit Contractor Affidavit; r-side of screen)	www.mndor.state.mn.us/
MN Rules 5200.1105 & .1106	www.duluthmn.gov/engineering/construction_documents.cfm
MN Statutes 177.41 to 177.44	www.revisor.mn.gov/statutes/?id=177
Notice to Bidders Prompt Payment to Subs	www.duluthmn.gov/engineering/construction_documents.cfm
One-Call Instructions	www.duluthmn.gov/engineering/construction_documents.cfm
Purchasing Division General Specifications	www.duluthmn.gov/engineering/construction_documents.cfm
Request to Sublet TP-21834 (5-12-09)	www.duluthmn.gov/engineering/construction_documents.cfm
Statement of Compliance Form (12-10)	www.dot.state.mn.us/const/labor/forms.html
Statement of Compliance Form - 2 nd page WH347	www.dol.gov/whd/wh347.pdf
Supplemental General Conditions Part II 4/15/11	www.duluthmn.gov/engineering/construction_documents.cfm

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OFFICIAL SEALED BID

REQUEST FOR BID
Issue Date:10/21/2014
Bid # SM4501A

RETURN BY OPENING TIME TO:
Purchasing Division
RM 100 City Hall
411 West 1st Street
Duluth, MN 55802

Buyer: Dennis Sears
Phone: 218-730-5003
Fax: 218-730-5922

Contract D - Water Pumping Improvements; Pump Station Packages

BID OPENING, AT 2:00 PM ON Thursday, November 20, 2014

Note: All bids must be written, signed, and transmitted in a sealed envelope, plainly marked with the bid number, subject matter, and opening date. The City of Duluth reserves the right to split award where there is substantial savings to the city, waive informalities and to reject any and all bids. Bidder should state in proposal if bid is based on acceptance of total order. Sales tax is not to be included in the unit price. Bidder to state freight charges if, proposal is F.O.B. shipping point, freight not allowed. Low bid will not be the only consideration for award of bid. All pages must be signed or initialed by authorized bidder's representative as indicated at the bottom of the page(s) of the request for bid.

BID DEPOSIT REQUIREMENTS: 5% OF BID AMOUNT
Deposit shall mean cash, cashier's check or corporate surety bond payable to or in favor of the City of Duluth.

A PERFORMANCE BOND AND A PAYMENT BOND shall be required of the successful bidder, BOTH in the full amount of the bid.

INSUREANCE CERTIFICATE required per attached requirements.

*****SCHEDULE OF PRICES*****

UNIT PRICE SCHEDULE

Table with 6 columns: Item No., Description, Unit, Est. Quantity, Bid Unit Price, Bid Price. Rows include Mobilization, Clear, Grub, Remove Existing Storm Sewer, Rock Excavation, Relocate Utilities, Traffic Control, Materials Testing (Section 01 45 29), and Dewatering.

OFFICIAL SEALED BID

Item No.	Description	Unit	Est. Quantity	Bid Unit Price	Bid Price
10	Common Borrow	CY	200	\$_____	\$_____
11	Common Excavation	CY	1190	\$_____	\$_____
Run-off Collection System					
12	Trench Dam	EA	2	\$_____	\$_____
13	12" HDPE STORM PIPE	LF	78	\$_____	\$_____
14	12" HDPE FES	EA	2	\$_____	\$_____
15	15" HDPE STORM PIPE	LF	146	\$_____	\$_____
16	15" HDPE FES	EA	4	\$_____	\$_____
17	24" HDPE STORM PIPE	LF	322	\$_____	\$_____
18	24" HDPE FES	EA	5	\$_____	\$_____
19	36" HDPE STORM PIPE	LF	373	\$_____	\$_____
20	36" HDPE FES	EA	1	\$_____	\$_____
21	42" HDPE STORM PIPE	LF	344	\$_____	\$_____
22	Storm Manhole Type B (48")	EA	1	\$_____	\$_____
23	Storm Manhole Type D (72")	EA	3	\$_____	\$_____
24	Storm Manhole Type E (84")	EA	2	\$_____	\$_____
25	Storm Manhole Type F (96")	EA	1	\$_____	\$_____
26	Storm Drainage Casting R1733	EA	10	\$_____	\$_____
27	Connect Existing Storm Sewer to Manhole	EA	1	\$_____	\$_____
28	Grit Chamber (Inc. Box sections, end sections and 48" MH)	LS	1	\$_____	\$_____
TRANSFER PIPE AREA					
29	24" HDPE DR 21 (Transfer Pipe)	LF	1476	\$_____	\$_____
30	Storm Manhole Type special (48") Tee vert	EA	2	\$_____	\$_____

Pressure Pipe (At pump stations and between)

OFFICIAL SEALED BID

Item No.	Description	Unit	Est. Quantity	Bid Unit Price	Bid Price
31	24" HDPE DR 17 (Main to River, except HDD)	LF	1559	\$ _____	\$ _____
32	HDD Installed 24" HDPE DR 17	LF	150	\$ _____	\$ _____
33	24" DUCTILE IRON PIPE	LF	82	\$ _____	\$ _____
34	36" DUCTILE IRON PIPE	LF	77	\$ _____	\$ _____
35	24" DI WYE	EA	3	\$ _____	\$ _____
36	24" DI 45D BEND	EA	10	\$ _____	\$ _____
37	24" DI 22D BEND	EA	5	\$ _____	\$ _____
38	24" x 36" DI REDUCER	EA	1	\$ _____	\$ _____
39	36" DI WYE	EA	1	\$ _____	\$ _____
40	24" BUTTERFLY VALVE	EA	5	\$ _____	\$ _____
41	Jack and Bore 30" Steel Casing	LF	60	\$ _____	\$ _____
42	30" Steel Casing (open cut)	LF	70	\$ _____	\$ _____
43	HDD Installed 30" HDPE CASING PIPE	LF	100	\$ _____	\$ _____
River Pipe					
44	36" HDPE DR 17	LF	1175	\$ _____	\$ _____
45	Pump Station Wetwell (Inc. slide gate)	EA	1	\$ _____	\$ _____
46	4" DIPS HDPE Air Line (DR 11) Laid in trench w/Supply Line	LF	1200	\$ _____	\$ _____
Intake/Outlet Structure Area					
47	Intake Screen	EA	1	\$ _____	\$ _____
48	Tideflex check valve	EA	1	\$ _____	\$ _____
49	48" check valve	EA	1	\$ _____	\$ _____
50	Intake/Outlet Structure Pipes and Fittings	LS	1	\$ _____	\$ _____
51	Intake/Outlet Structural Platform	LS	1	\$ _____	\$ _____
Intake/Outlet Structure Pileing					
52	Topsoil Borrow	CY	1115	\$ _____	\$ _____

OFFICIAL SEALED BID

Item No.	Description	Unit	Est. Quantity	Bid Unit Price	Bid Price
53	Seeding (inc. seed, fertilizer and mulch)	AC	3.7	\$_____	\$_____
54	Silt Fence Heavy Duty	LF	7950	\$_____	\$_____
55	Silt Fence Floating curtain	LF	1660	\$_____	\$_____
56	Erosion Control Blanket Category 4	SY	780	\$_____	\$_____
57	Rock Construction Entrance	EA	3	\$_____	\$_____
58	Inlet Protection	EA	12	\$_____	\$_____
Creek Restoration (Drawing Sheets C24-C25)					
59	Remove Existing Silt Fence	LF	300	\$_____	\$_____
60	Remove Existing RC Culvert	LF	160	\$_____	\$_____
61	Clear and Grub Tree	EA	4	\$_____	\$_____
62	Common Excavation	CY	875	\$_____	\$_____
63	Random Riprap Cl. III	CY	35	\$_____	\$_____
64	1 1/2" washed rock	CY	45	\$_____	\$_____
65	Topsoil Borrow	CY	394	\$_____	\$_____
66	Erosion Control Blanket Category 4	SY	2362	\$_____	\$_____
67	Hydro Seeding (inc. seed, fertilizer and mulch)	AC	0.49	\$_____	\$_____
68	Silt Fence Heavy Duty	LF	400	\$_____	\$_____
69	Install New Bridge (Drawing B1-B2)	LS	1	\$_____	\$_____
TOTAL BID PRICE				\$_____	

Bidder acknowledges that estimated quantities are not guaranteed, and are solely for the purpose of comparison of Bids, and final payment for all Unit Price Bid items will be based on actual quantities, determined as provided in the Contract Documents.

OFFICIAL SEALED BID

ADDENDUM RECEIPT ACKNOWLEDGEMENTS :

ADDENDUM NO. _____ , DATED _____

ADDENDUM NO. _____ , DATED _____

ADDENDUM NO. _____ , DATED _____

TOTAL BID IN WORDS:

CONTRACTOR NAME :

THE CONTRACTOR AGREES TO ALL OF THE PROVISIONS CONTAINED IN THE CONTRACT DOCUMENTS. ENCLOSED HERewith FIND A CERTIFIED CHECK OR BID BOND IN THE AMOUNT OF AT LEAST 5% OF THE AMOUNT OF PROPOSAL MADE PAYABLE TO THE CITY OF DULUTH AS A PROPOSAL GUARANTEE WHICH IT IS AGREED BY THE UNDERSIGNED WILL BE FORFEITED IN THE EVENT THE FORM OF CONTRACT AND BOND IS NOT EXECUTED, IF AWARDED TO THE UNDERSIGNED.

SIGNED: _____ FOR

A PARTNERSHIP (OR)

A CORPORATION INCORPORATED UNDER THE LAWS OF THE STATE OF:

PRESIDENT _____

VICE-PRES. _____

SECRETARY _____

TREASURER _____

ADDRESS(ES) _____

OFFICIAL SEALED BID

BEING DULY SWORN, DEPOSES AND SAYS THAT
THERE ARE NO OTHER PERSONS COMPRISING
ABOVE COMPANY OR FIRM THAN THE ABOVE
NAMES, AND THAT THERE ARE NO PERSONS
OR CORPORATIONS INTERESTED IN THE
FORGOING PROPOSALS, EITHER AS PRINCIPAL
OR SUBCONTRACTOR, OTHER THAN THE ABOVE
NAMES; ALSO THAT THE PROPOSALS ARE MADE
WITHOUT ANY CONNECTION WITH ANY PERSON
OR PERSONS MAKING ANY PROPOSAL FOR THE
ABOVE WORK; THAT THEY ARE IN ALL
RESPECTS FAIR AND WITHOUT COLLUSION OR
FRAUD; AND THAT NO PERSON ACTING IN ANY
OFFICIAL CAPACITY FOR THE CITY OF DULUTH
IS DIRECTLY OR INDIRECTLY INTERESTED
THEREIN, OR IN ANY PORTION OF THE PROFIT
THEREOF.

SUBSCRIBED AND SWORN TO BEFORE ME THIS

DAY OF

A.D.,

NOTARY
PUBLIC

IMPORTANT NOTE BIDDERS:

PLEASE DISREGARD THE NOTE ON PAGE 1
REGARDING SALES TAX FOR THIS BID. ALL
APPLICABLE SALES AND/OR USE TAXES ARE
TO BE INCLUDED IN BID PRICING. ALSO,
ALL BIDS ARE TO BE F.O.B. JOBSITE.
THE BLANK ON PAGE ONE FOR FREIGHT IS TO
TO BE LEFT BLANK.

****Note: Please self-identify as an MBE _____ or WBE _____ by checking if applicable.**

AFFIDAVIT AND INFORMATION REQUIRED OF BIDDERS

Affidavit of Non-Collusion:

I hereby swear (or affirm) under penalty of perjury:

- 1) That I am the bidder (if the bidder is an individual), a partner in the bidder (if the bidder is a partnership), or an officer or employee of the bidding corporation having authority to sign on its behalf (if the bidder is a corporation);
- 2) That the attached bid or bids have been arrived at by the bidder independently and have been submitted without collusion with and without agreement, understanding, or planned common course of action with any other vendor or materials, supplied, equipment or services described in the invitation to bid, designed to limit independent bidding or competition;
- 3) That the contents of the bid or bids have not been communicated by the bidder or its employees or agents to any person not an employee or agent of the bidder or its surety on any bond furnished with the bid or bids and will not be communicated to any such person prior to the official opening of the bid or bids; and
- 4) That I have fully informed myself regarding the accuracy of the statements made in this affidavit.

Signed: _____

Firm Name: _____

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

NOTARY PUBLIC _____

My commission expires: _____

Bidder=s E.I. Number _____

(Number used on employer=s quarterly Federal Tax return)

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CITY OF DULUTH
PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That we:

_____ (contractor's name)
(hereinafter called the "Contractor") located at: _____

_____ (contractor's address)

and _____ (surety's name)

(a corporation holding a certificate of the Insurance Commissioner of the State of Minnesota showing that it is authorized to contract as a surety, hereinafter called the "Surety") located at:

_____ (surety's address)

are held and firmly bound unto the City of Duluth (hereinafter called the "Owner"), in the penal sum of _____

Dollars (\$ _____) for the payment of which we bind ourselves, our heirs, executors and administrators, successors and assigns, for the faithful performance of a written contract for the purpose of:

according to plans, profiles, and specifications thereto annexed. A copy of that contract is incorporated herein by reference and is made a part hereof as if fully copied herein.

- NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH That,
- A) If the Contractor shall in all respects comply with the terms and conditions of the Contract (which includes the contract documents) and such alterations as may be made in said contract as documents therein provide for, and shall complete the contract in accordance with its terms,
 - B) If the Contractor shall indemnify, defend and save harmless the owner from all costs, expenses, damages, injury or conduct, want or care or skill, negligence or default, including patent infringement on the part of the Contractor, agents or employees, in the execution or performance of the contract,

C) If the Contractor shall indemnify the owner for all costs that may accrue on account of the enforcing of the terms of the bond, if action is brought on the bond, including reasonable attorney's fees, in any case where such action is successfully maintained,

D) If the Contractor shall comply with all laws pertaining to doing the work under the contract, Then, this obligation shall be void; the Contractor and Surety jointly and severally agree to pay to the Owner any difference between the sum to which the Contractor will be entitled on the completion of the contract and that which the Owner may be obliged to pay for the completion of the work by contract or otherwise, and any damages, direct or indirect, or consequential, which the Owner may sustain on account of the work, or on account of the failure of the Contractor to properly and in all things, keep and execute all of the provisions of the Contract, provided however that Surety's liability to pay damages is limited to the amount of the Performance Bond as set forth above.

And, the said Contractor and Surety hereby further bind themselves, their successors, executors, administrators and assigns, jointly and severally, that they will employ and fully protect the said Owner against and will pay any and all amounts, damages, costs and judgements which may be recovered against or which the Owner may be called upon to pay to any person or corporation by reason of any damage arising from the performance of said work, repair or maintenance thereof, or the manner of doing the same, or the neglect of the said Contractor or his agents or servants, or the improper performance of the said work by the Contractor or his agents or servants, or the infringements of any patent rights by reason of the use of any material furnished or work done, as aforesaid, or otherwise. For the purpose of this paragraph, a subcontractor shall be deemed to be the agent or employee of the Contractor to the extent of his subcontract.

The Contractor and the Sureties do hereby expressly waive any objection that might be interposed as to the right of the Owner to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either and any of them might interpose to an action brought hereon by any person, firm, or corporation, including subcontractors, materialmen and third persons, for work, labor, services, supplies or material performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the Owner to require the foregoing provisions to be placed in this bond.

And the Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this bond shall in no way be impaired or affected by any extension of time, modification, omission, addition or change in or to the contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provision thereof, or by any assignment, subletting or other transfer thereof, or of any part

thereof, or of any work to be performed, or of any moneys due or to become due thereunder; and the said Surety does hereby waive notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors and other transferees, shall have the same effect as to said Surety as though done or omitted to be done by and in relation to the Contractor.

Signed this _____ day of _____, 20____.

Name of Principal

By

Name of Surety

By
Attorney-in-Fact

ACKNOWLEDGEMENTS

State of Minnesota)
) ss. Principal – Individual
County of St. Louis)

This instrument was acknowledged before me on _____
by _____.

Notary Seal

Notary Public

State of Minnesota)
) ss. Principal – Corporate or Partnership
County of St. Louis)

This instrument was acknowledged before me on _____
by _____ as _____
of _____.

Notary Seal

Notary Public

State of Minnesota)
) ss. Surety
County of St. Louis)

Be It Known, That on this _____ day of _____ A. D., 20____, came before me personally
_____, to me personally known, who being
by me duly sworn, did say that he/she is the _____ (title) of

the above named corporation which executed the foregoing bond as surety; that the seal affixed to the foregoing
instrument is the corporate seal of said corporation; that said instrument was executed in behalf of said corporation, by
authority of its Board of Directors; that said corporation hold a certificate of the Insurance Commissioner of the State
of Minnesota showing that it is authorized to contract as a surety; and said

acknowledged said instrument to be the free act and deed of said corporation.

Notary Seal

Notary Public

APPROVED AS TO FORM, CORRECTNESS AND VALIDTY HEREOF

Dated this _____ day of _____, 20 ____

Assistant City Attorney Duluth MN

Dated this _____ day of _____, 20 ____

Finance Director Duluth MN



**CITY OF DULUTH
PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS: That we:

_____ (contractor's name)
(hereinafter called the "Contractor") located at: _____

_____ (contractor's address)

and _____ (surety's name)

(a corporation holding a certificate of the Insurance Commissioner of the State of Minnesota showing that it is authorized to contract as a surety, hereinafter called the "Surety") located at:

_____ (surety's address)

are held and firmly bound unto the City of Duluth (hereinafter called the "Owner"), for the benefit of persons furnishing labor and materials for the contract set forth below, in the penal sum of

_____ Dollars (\$ _____) for the payment of which we bind ourselves, our heirs, executors and administrators, successors and assigns, for the payment of all labor and materials supplied by any person in the performance of a written contract for the purpose of:

_____ according to plans, profiles, and specifications thereto annexed. A copy of that contract is incorporated herein by reference and is made a part hereof as if fully copied herein.

NOW, THEREFORE, THE CONDITIONS OF THIS OBLIGATION ARE SUCH That,

- A) If the Contractor shall make payments, as they may become due, to all persons supplying "labor and materials," as defined in Minnesota Statutes Section 574.26, used directly or indirectly by the Contractor, or his Subcontractor, in the prosecution of the work provided for in the contract,
- B) If the Contractor shall indemnify the owner or other claimant for all costs that may accrue on account of the enforcing of the terms of the bond, if action is brought on the bond, including reasonable attorney's fees, in any case where such action is successfully maintained,

Then, this obligation shall be void; otherwise it shall remain in full force and effect.

And, the said Contractor and Surety agree that in accordance with Minnesota Statutes Section 574.26 not only said City, but any person furnishing "labor and materials," as defined in Minnesota Statutes 574.26, may sue on this bond for their use on account of any sums due them for anything so furnished.

The Contractor and the Sureties do hereby expressly waive any objection that might be interposed as to the right of the Owner to require a bond containing the foregoing provisions, and they do hereby further expressly waive any defense which they or either and any of them might interpose to an action brought hereon by any person, firm, or corporation, including subcontractors, materialmen and third persons, for work, labor, services, supplies or material performed, rendered or furnished as aforesaid, upon the ground that there is no law authorizing the Owner to require the foregoing provisions to be placed in this bond.

And the Surety, for value received, hereby stipulates and agrees that the obligations of the Surety and this bond shall in no way be impaired or affected by any extension of time, modification, omission, addition or change in or to the contract or the work to be performed thereunder, or by any payment thereunder before the time required therein, or by any waiver of any provision thereof, or by any assignment, subletting or other transfer thereof, or of any part thereof, or of any work to be performed, or of any moneys due or to become due thereunder; and the said Surety does hereby waive notice of any and all such extensions, modifications, omissions, additions, changes, payments, waivers, assignments, subcontracts and transfers, and hereby stipulates and agrees that any and all things done and omitted to be done by and in relation to executors, administrators, successors, assignees, subcontractors and other transferees, shall have the same effect as to said Surety as though done or omitted to be done by and in relation to the Contractor.

Signed this _____ day of _____, 20____.

Name of Principal

By

Name of Surety

By _____
Attorney-in-Fact

ACKNOWLEDGEMENTS

State of Minnesota)) ss. Principal – Individual
County of St. Louis)

This instrument was acknowledged before me on _____
by _____.

Notary Seal

Notary Public

State of Minnesota)) ss. Principal – Corporate or Partnership
County of St. Louis)

This instrument was acknowledged before me on _____
by _____ as _____
of _____.

Notary Seal

Notary Public

State of Minnesota)) ss. Surety
County of St. Louis)

Be It Known, That on this _____ day of _____ A. D., 20____, came before me personally
_____, to me personally known, who being
by me duly sworn, did say that he/she is the _____ (title)
of _____

_____ the above named corporation which executed the foregoing bond as surety; that the seal affixed to the foregoing instrument is the corporate seal of said corporation; that said instrument was executed in behalf of said corporation, by authority of its Board of Directors; that said corporation hold a certificate of the Insurance Commissioner of the State of Minnesota showing that it is authorized to contract as a surety; and said _____ acknowledged said instrument to be the free act and deed of said corporation.

Notary Seal

Notary Public

APPROVED AS TO FORM, CORRECTNESS AND VALIDTY HEREOF

Dated this _____ day of _____, 20 ____

Assistant City Attorney Duluth MN

Dated this _____ day of _____, 20 ____

Finance Director Duluth MN

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CITY OF DULUTH - PART II -
SUPPLEMENTARY GENERAL CONDITIONS FOR FEDERALLY, STATE OF MINNESOTA, AND/OR CITY ASSISTED ACTIVITIES
(revised 4/15/11)

The following conditions take precedence over any conflicting conditions in this Contract.

<u>Section</u>	<u>Title</u>
1	Restrictions on Disbursements, Subcontractors Federal Agency Requirements, Separability, Property
2	Miscellaneous Provisions
3	Definitions
4	Environmental Provisions
5	Contract Compliance
6	Records, Reports and Information, Audits and Inspections
7	Conflict of Interest and Lobbying
8	Labor Standards - Physical Improvement Projects
9	Minnesota Department of Transportation Specification 1960 Partial Payments
10	Housing and Urban Development (HUD) Section 4010
11	Equal Opportunity and Affirmative Action
12	Employment Opportunities - "HUD Section 3"
13	Federal Requirements for Minority/Women Business Enterprises Contract Guidance - MPFA
14	Forms

E-Mail Addresses

For ease in communication, the e-mail address of the person(s) responsible for preparing certified payroll reports (CPRs) is required from the prime contractor and all subcontractors (regardless of tier). This information will be provided to the project engineer prior to the pre-construction meeting OR with materials required in the Letter of Intent.

Section I

Restrictions on Disbursements

No money under this Contract shall be disbursed by the City to any Contractor except pursuant to a written contract which incorporates the applicable PART II, Supplementary General Conditions for Federally, State of Minnesota, and/or City Assisted Activities, and unless the Contractor is in compliance with the Federal Agency requirements with regard to accounting and fiscal matters to the extent they are applicable.

Subcontractors

(A) The Contractor shall include in any subcontract the clauses set forth in the PART II, Supplementary General Conditions for Federally, State of Minnesota and/or City Assisted Activities in their entirety and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

(B) The Contractor shall not subcontract any part of the work covered by this Contract or permit subcontracted work to be further subcontracted without the City's prior written approval of the subcontractors. The City will not approve any subcontractor for work covered by this Contract who is at the time ineligible under the provisions of any applicable regulations issued by a Federal Agency or the Secretary of Labor, United States Department of Labor, to receive an award of such subcontract.

Federal Agency Requirements

Unearned payments under this Contract may be suspended or terminated upon refusal to accept any additional conditions that may be imposed by the Federal Agency at any time; or if the grant, if applicable, to the City under which this Contract is made is suspended or terminated.

Separability

If any provisions of this Contract is held invalid, the remainder of this Contract shall not be affected thereby if such remainder would then continue to conform to the terms and requirements of applicable law.

Property

Acquisition, use, and disposal of all property, materials and goods acquired as a result of activities made possible by this Contract shall be accomplished in accordance with the applicable provisions of Federal Management Circular (FMC)-74-7, as amended.

Section 2

Miscellaneous Provisions

(A) **Copyrights.** In the event this Contract results in a book or other copyrightable material, the author is free to copyright the work, but Federal Agency and the City reserve a royalty-free, nonexclusive, and irrevocable license to reproduce, publish or otherwise use, all copyrighted material and all material which can be copyrighted.

(B) **Patents.** Any discovery or invention arising out of or developed in the course of work aided by this Contract shall be promptly and fully reported to the Federal Agency and the City for determination by the Federal Agency as to whether patent protection on such invention or discovery shall be sought and how the rights in the invention or discovery, including rights under any patent issued thereon, shall be disposed of and administered in order to protect the public interests.

(C) **Political Activity Prohibited.** None of the funds, materials, property or services provided directly or indirectly under this Contract shall be used in the performance of this Contract on any partisan political activity, or to further the election or defeat of any candidate for public office.

(D) **Lobbying Prohibited.** None of the funds under this Contract shall be used for publicity or propaganda purposes designed to support or defeat legislation pending before the Congress or the City.

(E) **Prohibition of and Elimination of Lead-Based Paint Hazard.** Notwithstanding any other provision, the Agency and Contractor agree to comply with the regulation issued by the Secretary of Housing and Urban Development set forth in 37 F. R. 22732-3 and all applicable rules and orders issued thereunder which prohibit the use of lead-based paint in residential structures undergoing Federally assisted construction or rehabilitation and require the elimination of lead-based paint hazards. Every contract or subcontract, including paint, pursuant to which such Federally assisted construction or rehabilitation is performed shall include appropriate provisions prohibiting the use of lead-based paint.

(F) **Architectural Barriers Act.** The design for and construction of any facility funded in whole or in part by this Contract shall be in conformance with the American Standard Specification for Making Buildings and Facilities Accessible and Usable by the Physically Handicapped, Number A-117.1-1971, as modified.

(G) **Relocation and Acquisition.** Any relocation or acquisition resulting from activities funded in whole or in part by this Contract shall be in conformance with the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (40 U.S.C. 4601) and the implementing regulations 24CFR Part 42.

(H) **Prohibition Against Payments of Bonus or Commission.** The assistance provided under this Contract shall not be used in the payment of any bonus or commission for the purpose of obtaining Federal Agency approval for such assistance, or Federal Agency approval of applications for additional assistance, or any other approval or concurrence of a Federal Agency required under this Contract, Federal Law or Federal Regulations thereto; provided, however, that reasonable fees or bonafide technical, consultant, managerial or other such services, other than actual solicitation, are not hereby prohibited if otherwise eligible as project costs.

(I) **Hatch Act.** Where applicable, the Contractor will comply with the provisions of the Hatch Act which limits the political activity of the Contractor's employees.

Section 3

Definitions

(A) City means the City of Duluth, Contracting Officer, or other persons authorized to act on behalf of the City of Duluth.

(B) Contracting Officer is the delegated representative of the City who has the responsibility for administering the Project.

(C) Contractor means an entity, whether public or private, which furnishes (other than standard commercial supplies, office space or printing services) to the City, products, services or supplies as described in this project Contract.

(D) Federal Agency means the United States, the District of Columbia, and any executive department, independent establishment, administrative agency, or instrumentality of the United States or of the District of Columbia, including any corporation, all or substantially all of the stock of which is beneficially owned by the United States, by the District of Columbia, or by any of the foregoing departments, establishments, agencies, and instrumentalities. The term Federal Agency shall also include the person or persons authorized to act on behalf of said Federal Agency.

(E) Project means the activities to be undertaken by the Contractor as described in this Contract, which from time to time may be amended by mutual consent of the City and Contractor.

(F) Subcontractor means an entity, regardless of tier, which has entered into an agreement with the Contractor or another Subcontractor, to undertake certain Project activities as described in that agreement.

(G) The term labor standards, as used in the Contract, means the requirements of the Davis-Bacon Act, the Contract Work Hours and Safety Standards Act (other than those relating to safety and health), the Copeland Act, and the prevailing wage provisions of the other statutes listed in 20 CFR 5.1.

(H) Work means all labor necessary to produce the construction required by the Contract Documents, all materials and equipment incorporated or to be incorporated in such construction, products, services, or supplies required by the Contract Documents, or any other requirements set forth in the Contract.

(I) Additional Definitions, that are applicable to the Labor Standards provisions - Section 8 - of this Contract can be found in 29CFR5.2 as published by the U.S. Department of Labor and said definitions are hereby incorporated by reference into the provisions of this Contract.

Section 4

Environmental Provisions

(A) The Contractor agrees to follow the regulations, requirements, policies, goals and procedures set forth by the Council on Environmental Quality (CEQ) under provisions of the National Environmental Policy Act (NEPA) (Pub. L 91-190, 42 U.S.C. 4321 et seq.), Executive Order 11514, and 40 CFR Part 1500.

(B) **Historic Properties.** The Contractor agrees to follow the regulations, requirements, policies, goals, and procedures set forth under provisions of the National Historic Preservation Act of 1966 (Pub. L. 89-665); Preservation of Historic and Archeological Data Act of 1974 (Pub. L. 93-291); Executive Order 11593; 36 CFR , Part 800 and applicable State legislation or regulations.

(C) **Coastal Zones and Wetlands.** The Contractor agrees to follow the regulations, requirements, policies, goals and procedures set forth under provisions of the Coastal Zone Management Act of 1972 (Pub. L. 92-583) and applicable State legislation or regulations.

(D) **Noise.** The Contractor agrees to comply with provisions set forth in the U.S. Department of Housing and Urban Development Handbook 1390.2, Noise Abatement and Control, Department Policy, Responsibility and Standards, 1971.

(E) **Flood Plain.** The Contractor agrees to comply with the provisions set forth in the Flood Disaster Protection Act of 1973 (Pub. L. 93-234) and implementing regulations; Title 24, Chapter X, Subchapter B, National Flood Insurance Program, Executive Order 11296, and Executive Order 11988 relating to the evaluation of flood hazards.

(F) **Air Quality.** The Contractor agrees to comply with provisions set forth in the Clean Air Act (Pub. L. 90-148) and Clean Air Act Amendments of 1970 (Pub. L. 91-604); and applicable U.S. Environmental Protection Agency implementing regulations.

(G) **Water Quality.** The Contractor agrees to comply with the provisions set forth in the Federal Water Pollution Control Act (Pub. L. 92-500) and applicable U.S. Environmental Protection Agency implementing regulations, and Executive Order 11288 relating to the prevention, control, and abatement of water pollution.

(H) **Wildlife.** The Contractor agrees to comply with the provisions of the Fish and Wildlife Coordination Act (Pub. L. 85-264).

Section 5

Contract Compliance

(A) In the event of the Contractor's noncompliance with the provisions of this Contract or with any of the said regulations, the City may withhold payment(s) until evidence of compliance by the Contractor has been demonstrated, or the Contract may be canceled, terminated or suspended in whole or in part and the Contractor may be declared ineligible for further City contracts.

(B) In the event the Contract is terminated or canceled as a result of noncompliance with any of the provisions of this Contract, the City may subject to bids the remainder of the Project for which this Contract was made. The City shall have the right upon termination or suspension to withhold all further payments under this

Contract to the Contractor. Upon the award of a new contract for the remainder of the Project, the City shall pay to the Contractor an amount no more than the balance remaining due to the Contractor less the sum of the costs incurred by the City which are necessary in preparing the new bid specifications. In the event the amount paid the Contractor prior to the date of termination or cancellation exceeds the full amount of this Contract less the cost of the new contract and the additional costs mentioned above, the Contractor agrees to reimburse the City for such excess amount within ninety days after the new contract is awarded by the above procedures.

(C) Provisions contained in subparagraph (A) and (B) above shall not be interpreted as precluding any authorized Federal, State, or County governmental unit from exercising their legal administrative or other responsibilities in respect to the enforcement by said governmental units of laws or regulations concerning activities of the Contractor.

Section 6

Records

(A) **Establishment and Maintenance of Records.** Records shall be maintained in accordance with requirements prescribed by the Federal Agency or the City with respect to all matters covered by this Contract. Except as otherwise authorized by the Federal Agency, such records shall be maintained for a period of three years after receipt of final payment under this Contract.

(B) **Documentation of Costs.** All costs shall be supported by properly executed payrolls, time records, invoices, contracts, or vouchers, or other official documentation evidencing in proper detail the nature and propriety of the charges. All checks, payrolls, invoices, contracts, vouchers, orders, or other accounting documents pertaining in whole or in part to this Contract shall be clearly identified and readily accessible.

Reports and Information

At such times and in such forms as the Federal Agency or the City may require, there shall be furnished to the Federal Agency or the City such statements, records, data and information as the Federal Agency or the City may request pertaining to matters covered by this Contract.

Audits and Inspection

At any time during normal business hours and as often as the City, the Federal Agency and/or the Comptroller General of the United States may deem necessary, there shall be made available to the City, the Federal Agency and/or representatives of the Comptroller General for examination of all its records with respect to all matters covered by this Contract and will permit the City, the Federal Agency and/or representative of the Comptroller General to audit, examine and make excerpts or transcripts from such records, and to make audits of all contracts, invoices, materials, payrolls, records of personnel, conditions of employment, and other data relating to all matters covered by this Contract.

Section 7

Conflict of Interest and Lobbying

(A) **Interest of Members, Officers, or Employees of the City, Members of Local Governing Body, or Other Public Officials.** No member, officer, or employee of the City, or its designees or agents, or member of the governing body of the City, during his/her tenure of for one year thereafter, shall have any interest, direct or indirect in any contract or subcontract, or the proceeds thereof, for work to be performed in connection with the Project assisted under this Contract. Any contract in which any of the above indicated individuals becomes directly or indirectly, interested, personally or as a member of a firm, or as an officer, director, or stockholder of a corporation, shall be and become absolutely void; and any money which shall have been paid on such contract by the City may be recovered back from any or all persons interested therein, by a joint action or several actions.

(B) The Contractor agrees that he will incorporate into every contract required to be in writing the following provisions: **Interest of Contractors and Employees** - The Contractor covenants that he presently has no interest and shall not acquire any interest, direct or indirect, in the Project which would conflict in any manner or degree with the performance of this Contract, and no person having any conflicting interest shall be employed. Any interest on the part of the Contractor or his employees must be disclosed to the Federal Agency and the City. Provided, however, that this paragraph shall be interpreted in such a manner so as not to unreasonably impede any statutory requirements that opportunity be provided for employment of and participation by certain residents of a designated geographical are, if applicable.

(C) **Interest of Member or of Delegate to Congress.** No member of or Delegate to Congress, or Resident Commissioner, shall be admitted to any share or part of this Contract or to any benefit that may arise therefrom, but this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

(D) The Contractor by signing this document certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the Contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the Contractor shall complete and submit Standard Form -LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

The above certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1332, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

(E) The parties to this Contract certify and agree that they are under no contractual or other disability which would prevent them from complying with the terms of this Contract.

Section 8

Labor Standards - Physical Improvement Projects

Where applicable, there shall be included in all construction, rehabilitation, alteration or repair contracts with private entities made possible by or resulting from this Contract, the following Labor Standards provisions;

(A) **General Requirements.**

(1) **Subcontracts.** The Contractor shall include in any subcontract the clauses set forth in Section 8, **Labor Standards**, in their entirety and also a clause requiring the subcontractors to include these clauses in any Tower tier subcontract which they may enter into, together with a clause requiring this insertion in any further subcontracts that may in turn be made.

(2) The transporting of materials and supplies to or from the site of the Project or Program to which this Contract pertains by the Employees of the Contractor or of any subcontractor, and the manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the Project or Program to which this Contract pertains by persons employed by the Contractor or by any subcontractor, shall for the purpose of this Contract, and without limiting the generality of the foregoing provisions of this Contract, be deemed to be work to which these **Labor Standards** provisions are applicable.

(3) No person under the age of eighteen years shall be employed on work covered by this Contract.

(4) In connection with the performance of work under this Contract, the Contractor agrees not to employ any person undergoing sentence of imprisonment except as provided by Public Law 89-176, September 10, 1955 (18 U.S.C. 4082 (c) (2)) and Executive Order 11755, December 29, 1973.

(5) The Contractor will permit authorized representatives of the Federal Agency and the City to interview employees during working hours on the job.

(6) No employee to whom the wage, salary, or other **Labor Standards** provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the Labor Standards applicable under this Contract to his employer.

(B) **Safety Standards.** No Contractor or subcontractor contracting for any part of a construction contract shall require any laborer or mechanic, including apprentices and trainees, employed in the performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous to his health or safety, as determined under construction safety and health standards promulgated by the Secretary of Labor. The Contractor or subcontractor comply with all the rules, regulations, and relevant orders, promulgated by the Secretary of Labor pursuant to Public Law 91-54.

(C) **Davis-Bacon Act - 29 CFR 5.5**

web site: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title29/29cfr5_main_02.tpl

Refer to Section 10, Page 10 Housing and Urban Development (HUD) form-4010 (06/2009) Ref Handbook 1344.1

City of Duluth "Mini Davis-Bacon"

(D) **City of Duluth - Minimum Wage Ordinance 8940, as Amended.**

(1) On a project (as defined below) funded in whole or in part by federal and/or state funds and/or city of Duluth funds, these local provisions shall prevail in those instances where the requirements of the local provisions are equal to or greater than similar minimum labor standards provisions as set forth in applicable federal and/or state laws and regulations.

(2) In all contracts in excess of \$2,000 for projects (as defined below), the Contractor's particular attention is called to Ordinance 8940, effective June 8, 1989, respectively coded as Article IV of Chapter 2 of the Duluth City Code, and entitled "An Ordinance Pertaining to Wages and Working Hours of Persons on Public Works in the City of Duluth", as set forth below:

(3) **Definitions.**

For the purposes of this section the following words and phrases shall have the meanings respectively ascribed to them in this section:

(a) **Basic hourly rate** - The hourly wage paid to any employee.

(b) **Prevailing wage rate** - The basic hourly rate plus fringe benefits prevailing in the city of Duluth as determined by the United States secretary of labor pursuant to the Davis-Bacon act, as amended; provided that whenever employer and employee organizations employing and representing a majority of a class of workers in a particular industry within the city jointly certify that the prevailing basic hourly rate plus fringe benefits of such workers differs from the amount determined by the secretary of labor, the certified rate shall be considered to be the prevailing wage rate for such class of workers in that industry.

(c) **Fringe benefits** - Employer contribution for health and welfare benefits, vacation benefits, pension benefits, and all other economic benefits other than the basic hourly rate.

(d) **Apprentice** - An employee who is working under a training program which is approved either by the U.S. Department of Labor Bureau of Apprenticeship & Training or the Minnesota Director of Voluntary Apprenticeship; see apprentice ratios on pages 6-7 and HUD 4010 in Section 10.

(e) **Trainee** - An employee registered with the U. S. Department of Labor Employment & Training Administration; see HUD 4010 in Section 10.

(f) **Project** - Erection, construction, demolition, painting, remodeling or repairing of any public building, highway, sidewalk, bridge, water or gas line, sewer and sewage treatment facility or other public work performed under contract with the city.

(g) **Labor, mechanic** - All persons utilized, employed or working on a project who are doing work usually done by mechanics and laborers, including proprietors, partners, and members of cooperatives.

(4) **Wage Rates and Hours for City of Duluth Projects.**

(a) Any contract which provides for a project of estimated total cost of over \$2,000.00 shall contain a stipulation that no laborer, mechanic or apprentice-trainee employed directly upon the project work site by the contractor or any subcontractor shall be permitted or required to work at a rate of pay less than the prevailing wage rate; nor shall any such employee be permitted or required to work more than 8 hours in any work day **OR** 40 hours in any work week unless he is paid at a rate of at least 1½ times the basic hourly rate for all hours in excess of 8 per day **OR** 40 per week [in other words: all hours in excess of eight per day and all hours after 40 per week] and unless he receives fringe benefits that are at least equal to those in the prevailing wage rate; provided that whenever employer and employee organizations employing and representing a majority of a class of workers in a particular industry within the city jointly certify that the maximum number of hours that such persons may work under existing labor agreements before overtime wages must be paid differs from the hours specified in this paragraph, the maximum number of hours specified in such labor agreements shall be substituted for those specified above in applying the provisions of this paragraph to such workers.

(b) The word "or" in the state statute and the city of Duluth Code refers to the number of hours worked in any one week or, in the alternative, the number of hours worked in any one day in the week (the days in one week being totaled for reporting purposes); the law requires use of the alternative which results in the higher number of overtime hours for each employee whose time is being reported.

EXCEPTIONS: Federal government funding only and HUD (Housing and Urban Development) funding - see point "e"

In summary, if a project is solely funded with city of Duluth monies, city ordinance 8940 as amended allows the employees to work four ten-hour days and be paid at the regular hourly rate for those ten hours; exceeding hours must be paid at the overtime rate. An employer may not withhold overtime payment exclusively until 40 hours per week have been worked. Daily overtime must be paid as it is earned.

- **The base workweek hours must be clearly indicated on each payroll. Employees may be assigned a different workweek; however, that must be clearly marked beside the employees' names.**

The following are examples of how these rules apply to different situations.

- TT refers to the total time worked on the day or in the week
- RT refers to the hours worked at the regular rate of pay (straight time)
- OT refers to the hours worked for which overtime must be paid

	State Funded with or without federal funding Projects								City-only Funded Projects (4 ten-hour days)						
	Mon	Tues	Wed	Thurs	Fri	Sat	Total		Mon	Tues	Wed	Thurs	Fri	Sat	Total
TT	10	10	10	10	0	6	46		10	10	10	10	0	6	46
RT	8	8	8	8	0	6	38		10	10	10	10	0	0	40
OT	2	2	2	2	0	0	8		0	0	0	0	0	6	6

	State Funded with or without federal funding Projects								City-only Funded Projects (4 ten-hour days)						
	Mon	Tues	Wed	Thurs	Fri	Sat	Total		Mon	Tues	Wed	Thurs	Fri	Sat	Total
TT	0	10	10	0	7	0	27		10	0	12	0	0	0	32
RT	0	8	8	0	7	0	23		10	0	10	10	0	0	30
OT	0	2	2	0	0	0	4		0	0	2	0	0	0	2

c) Overtime Calculations

Minnesota Statutes Chapter 177.42, subd 4 specifies that the prevailing hours of labor may not be more than eight hours per day or more than 40 hours per week (as stated above in (b)), the City of Duluth does allow for ten hours per day/40 hours per week with City funding *only*. **Example: hours exceeding eight per day are paid at 1.5 times the rate in the contract's wage decision OR the base rate the employee is being paid if it is higher than the required base rate; once 40-hours in any one week are attained, all hours exceeding that 40 are paid at 1.5 times the rate in the project contract's wage decision.** See example (1) and (2) below.

Minnesota Statutes Chapter 177.42, subd 5 defines the hourly basic rate as the hourly wage paid to any employee. (subd 6): The prevailing wage rate means the hourly basic rate of pay plus the contribution for health and welfare benefits, vacation benefits, pension benefits, and any other economic benefit paid to the largest number of workers engaged in the same class of labor within the area...

Minnesota Statutes Chapter 177.43, subd 1 (1) ...employees are permitted to work more hours than the prevailing hours of labor [being] paid for all hours in excess of the prevailing hours at a rate of at least 1-½ times the hourly basic rate of pay. (2) A laborer or mechanic may not be paid a lesser rate of wages than the prevailing wage rate in the same or most similar trade or occupation in the area.

An employer may pay a lower **regular time/straight time** hourly rate and higher fringe benefit rate--to a bona fide plan--than stated in the contract's wage decision providing the total of the two rates is equal to or greater than the total in the wage decision; however, the **OVERTIME rate** must be paid on the higher rate in the contract's wage decision.

(1) Overtime Calculation with Fringe Benefits Paid to Bona Fide Plans

For overtime purposes, an employer paying higher fringe benefits to a bona fide plan and paying a lower hourly rate **MUST** calculate the overtime on the higher hourly rate as stated in the project contract's wage decision. The fringe benefit amount may be reduced to reflect any increase in the total prevailing wage package IF the plan administrator permits such a reduction. This acceptance must be verified in writing by the plan administrator and attached to the appropriate certified payroll report.

(2) Overtime Calculation with Cash Payment of Fringe Benefits

When the fringe benefit is paid directly to an employee, the prevailing base rate and the fringe benefit rate as established in the project contract's wage decision for a specific classification are totaled to arrive at the hourly rate. *Overtime is calculated at 1.5 x the base rate of the wage decision with the fringe benefit amount added to that rate: base rate of the wage decision x 1.5 + fringe benefit rate = overtime rate.*

Contract Work Hours and Safety Standards Act

[Refer to page two of this document.] All projects valued at \$100,000 or greater are subject to this Act. As with Minnesota Statutes Chapter 177.43, the overtime rate is calculated as in items one and two above OR (e) below.

- (d) A contractor shall not reduce a worker's private, regular rate of pay when the wage rate certified by the U. S. Department of Labor or the Minnesota Department of Labor & Industry is less than the worker's normal hourly wage [Minnesota Statute 181.03 subdivision 1(2)].

(e) **Regular Time & Overtime Definitions**

- **State of Minnesota** funded projects with or without federal funding *only allow for five eight-hour days per week at regular time*. Overtime is calculated at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount. (see (1) above for example when a lower base rate and higher fringe are paid)
- **City of Duluth** funded projects do permit four ten-hour work days at regular time--see point 4-a, b for stipulations. Overtime is calculated at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision--OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount. (see (1) above for example when a lower base rate and higher fringe are paid)
- **Federal** funded only projects allow overtime pay for hours worked in excess of 40 in a workweek at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount.
- **HUD** funded projects allow overtime pay for hours worked in excess of 40 in a workweek at a rate not less than time and one-half (1.5) of the prevailing base rate as stated in the wage decision OR the base rate the employee is being paid if it is higher than the required base rate--plus the straight time fringe benefit amount.

** When a combination of funding sources are included in any one project, the most strict requirements will apply.

- (f) The minimum hourly prevailing wages are contained in each project specification. When both federal (general decision rates from the U. S. Department of Labor) and State of Minnesota prevailing wages for state funded construction projects from the Minnesota Department of Labor and Industry are used, the prime contractor and all subcontractors including trucking operations, are required to pay the higher of the two wages for all laborers and mechanics [MnDOT Contract Administration Manual, Section 5-591.320].
- (g) The prime contractor and any lower-tier subcontractor shall review all wage decisions and compensate a worker according to the type of work performed and at the rate that is the greatest.
- (h) State of Minnesota prevailing wages typically list two rates for each classification with two effective dates. Should any City of Duluth contract continue to and past the second effective date, that rate and fringe benefit will be in effect through the remainder of the project.
- (i) **Mn/DOT Statement of Compliance is required on all city of Duluth construction projects (regardless of the project funding source) with each weekly certified payroll report.** web site: <http://dot.state.mn.us/const/labor/forms.html>
- (j) All contracts for city projects shall have applicable schedules of prevailing wage rates set forth in the contract. Schedules of applicable prevailing wage rates shall be posted on all project job sites for public review and shall be protected from the weather.
- (k) Employees on projects shall be paid at least **weekly**. Fringe benefits shall be paid either in cash or to an employee benefit plan that has been approved by the U.S. Department of Labor. ■ **The fringe benefit package is an integral portion of the prevailing wage. Should the prime contractor or any subcontractor (regardless of tier) become delinquent with any fringe benefit plan administrator's requirements for monthly payment, the monthly estimate(s) may be withheld until the plan payments are made current.** (city ordinance 8940 6-18-89 plus amendments)
See MnDOT Specification 1906 on page nine and Section 5 of this document: Contract Compliance.
See Statement of Compliance and Certified Payroll Report requirements in Section 10, HUD 4010 and web sites in Section 14, Forms.
- (l) Any contractor or subcontractor working on a project shall furnish the City with **original** certified payroll reports with **original signatures** relating to the project. Such certified payroll reports shall be **submitted weekly** on U.S. Department of Labor standard forms (WH-347) or their equivalent--using the same format--to the City of Duluth Labor Standards representative. All City of Duluth funded projects must have the base workweek hours indicated on the certified payroll form and/or beside each employee's name (should some employees be working different base workweeks).
- (m) No contractor or subcontractor working on a project shall evade or attempt to evade the provisions of this section through the use of non-recognized training programs. The only employees involved in training programs that shall be allowed to work on projects covered by this section shall be apprentice-trainees as defined by this article.
- (n) Any person violating the provisions of this section shall be guilty of a misdemeanor with each day of violation constituting a separate offense. In addition, if the prevailing wage rate and accompanying fringe benefit rate is not paid to employees working on a project, the City of Duluth may withhold contract payments to the prime contractor until such deficiencies are corrected. Should fringe benefits be paid to authorized Plans, the payments must be made within the demands of those Plans. Delinquencies may result in withholding of project funds to the prime contractor.
- (o) This section shall not apply to contracts for projects where the total cost of the project is less than \$2,000.00; nor to materialmen who do no more than deliver materials to the work site, **except** that this section shall apply to employees who deliver asphalt, concrete or mineral aggregate such as sand, gravel or stone where such material is incorporated into the project by depositing the material substantially in place, either directly or through spreaders, from the transporting vehicle.

(5) **Helpers**

A helper may perform work *only* if the helper classification is specified and defined in the federal wage decision and/or State of Minnesota wage decision incorporated into the project contract. Without such a helper classification, the contractor must assign a job classification that is the "same or most similar" [Minnesota Statute 177.44, subdivision 1] and compensate the helper for the actual work performed regardless of the helper's skill level.

(6) **Apprentice Ratios**

Journeyworkers must be on site with the apprentices and their hours must match.

FUNDING SOURCE:

City of Duluth and State of Minnesota with or without Federal funding

- Apprentices are not permitted to work alone under any circumstances.
- Working foremen are acceptable as a journeyworker PROVIDING he/she is in the same classification.
 - » Example: carpenter foreman and carpenter apprentice
- Ratios are determined by the trade's labor agreement.
- In the absence of ratio language, the following State of Minnesota apprenticeship ratios will be applied:
(apprentice : journeyworker) 1:1 2:4 3:7 4:10, etc.

- Employees working in excess of the allowable ratio must be paid the full journeyworker compensation.
- Out-of-ratio apprentices will be calculated beginning with the **apprentice at the highest level of training** and, then, to less senior apprentices in their rank order.
- Should two or more out-of-ratio apprentices have the same level of training, whomever was on the work site first will receive journeyworker pay; if the apprentices at the same level of training began work on the project site at the same time, hours worked out-of-ratio for which restitution is due will be divided among those apprentices.

Examples:

Four apprentices working unsupervised are on site. [4:0]
 Ratio calls for four apprentices and ten journeyworkers [4:10]

Correction: all apprentices will receive the full journeyworker compensation as apprentices are not permitted to work alone.

Three apprentices and two journeyworkers are on site. [3:2]
 Ratio calls for three apprentices and seven journeyworkers [3:7]

Two journeyworkers may accompany only one apprentice; therefore, the two highest level apprentices are paid the full journeyworker compensation.

Even though this particular job has three apprentices—the second journeyworker is a mute point; a third journeyworker would also be a mute point in this example.

Correction: the two highest level apprentices are paid the full journeyworker compensation and the third lower level apprentice is considered in ratio.

H U D (CDBG) and Federal funding only

- Apprentices are not permitted to work alone unless the U. S. Department of Labor-approved agreement allows that practice.
- Working foremen are acceptable as a journeyworker PROVIDING he/she is in the same classification.
 - » Example: electrician foreman and electrician apprentice
- Ratios are determined by the trade's U. S. Department of Labor-approved agreement.
- In the event of the absence of ratio language in the applicable agreement, the Minnesota Department of Labor ratio of one apprentice for the first journeyworker and one apprentice for each three journeyworkers thereafter will be applied, (i.e., 1:1, 2:4, 3:7, 4:10, etc.).
- The **legal apprentices are those who first came to work on the job site**; in the event that all apprentices begin work on the project site at the same time, hours worked out-of-ratio for which restitution is due will be divided among the apprentices.
- Time cards will be required to substantiate the start times.
- Employees working in excess of the allowable ratio—or for which U. S. Department of Labor-apprentice agreement/certificate is not provided—must be paid the full journeyworker compensation.

Examples:

Four apprentices and one journeyworker are on site. [4:1]
 Ratio calls for four apprentices and ten journeyworkers. [4:10]

The first apprentice on site is considered in ratio as one journeyworker may only accompany one apprentice [1:1]; this particular job has four apprentices.

Correction: the second through the fourth apprentices coming on site are paid the full journeyworker compensation.

Six apprentices and two journeyworkers are on site [6:2]
 Ratio calls for six apprentices and sixteen journeyworkers [6:16]

The first apprentice on site is considered in ratio as two journeyworkers may only accompany one apprentice; this particular job has six apprentices—the second journeyworker is a mute point.

Correction: the second through sixth apprentices coming on site are paid the full journeyworker compensation.

(7) Poster Boards

The prime contractor must construct and display a poster board, which contains all required posters, is legible and is accessible to all workers from the first day of work until the project is 100% complete. Posters must be protected from the weather. Prime contractors are not allowed to place a poster board at an off-site facility location.

(8) Trucking Issues

a) For the purpose of sections seven and eight, the term “owner” includes all persons having an ownership interest in the trucking entity or a partnership interest in the trucking entity and has a legal and rightful title to the vehicle(s) or has an approved lease on the vehicle(s). “Operate” means the owner either physically drives the vehicle or hires another to physically drive the vehicle; yet, maintains the right to direct the day-to-day operations of the vehicle.

b) Trucking Operations Definitions: See MN Rule 5200.1106 web site: <https://www.revisor.mn.gov/rules/?id=5200.1106>

Independent Trucking Operator: an individual or partnership who owns or holds a vehicle under lease and who contracts that vehicle and the owner's services to an entity which provides construction services to a public works project. The individual owns or leases and drives the equipment, is responsible for the maintenance of the equipment, bears all operating costs, determines the details and means of performing the services, and enters into a legally binding agreement that specifies the relationship to be that of an independent contractor and not that of an employee.

Multiple Truck Operations: any legal business entity that owns more than one vehicle and hires the vehicles out for services to brokers or contractors on public works projects. The owners of a trucking firm may either drive the vehicles or hire employees to drive the vehicles. Employee drivers are subject to the appropriate prevailing wage rate. The owner driving a vehicle is obligated to account for the value of his/her services as a driver at the appropriate prevailing wage.

Partnerships: a legal business entity where two or more individuals hold vehicles under lease and contract those vehicles and their services to an entity which provides construction services to a public works project. The partners own or lease the equipment, are responsible for maintenance and all operating costs, drive the equipment, determine the details and means of performing the services, and enter a legally binding agreement that specifies the

relationship to be that of a partner and not that of an employee. All partners are subject to the appropriate prevailing wage per city of Duluth ordinance 8940 as amended.

Corporation: any legal business entity that owns or leases vehicles to provide construction services to public works projects. All individuals are employees of the corporation and subject to the appropriate prevailing wage regardless of title or position.

Broker: an individual or firm who (activities include, but are not limited to):

- contracts to provide trucking services [equipment and driver] in the construction industry to users of such services, such as prime contractors and various subcontractors of the prime;
- contracts to obtain services from other trucking operations and dispatches them to various assignments;
- receives payment from the users (such as prime contractors and various subcontractors) in consideration for the trucking services provided; and
- makes payment to the providers (trucking operations so contracted with) for their services.

(9) **Specific documentation from trucking operations.**

Independent Trucking Operators

The owner/operator of a truck must submit a copy of his/her commercial driver's license (CDL), cab card, and insurance certificate for each truck the owner/operator drives on each construction project *before commencing work on that project*. These documents must be sent to the prime contractor who will then forward the material to Labor Standards, Engineering Division at the City of Duluth.

Multiple Truck Operators

Weekly certified payrolls and payment of corresponding prevailing wages plus the fringe benefit package will be required for each project where trucks are operating. This covers the owner plus all employees performing work on the project.

Partnerships

Weekly certified payrolls and payment of corresponding prevailing wages plus fringe benefit packages will be required for each project where trucks are operating. This covers all partners of the organization who perform work on the project.

Each partner performing work on a project must submit a copy of his/her commercial driver's license (CDL), cab card, and insurance certificate for the truck being operated with that weekly certified payroll. It is not necessary to repeat such supporting documentation until a different truck is used and/or certificates or licenses have expired.

Employees of the partnership are always reported on a weekly certified payroll and paid the appropriate prevailing wage plus fringe benefit package for the work being performed.

Corporations

All persons employed by the corporation are subject to receive payment of the prevailing wage plus the fringe benefit package for the work performed on a project regardless of title or position. Weekly certified payrolls must be submitted for all work performed on the project.

Brokers

Truck ownership and a **bonafide contract** between the broker and another trucking operation, a prime contractor, or a subcontractor must be identified. Paperwork must be submitted with the month end trucking report to the city of Duluth Labor Standards representative - Engineering. Certified payrolls are not required when the above documentation is provided and approved.

(10) **Month End Trucking Report - ONLY REQUIRED WITH STATE OF MINNESOTA FUNDING**

The Minnesota Department of Transportation Month End Trucking Report Form A and Form B plus Minnesota Department of Transportation Month End Trucking Report Statement of Compliance are *only required on state funded projects*.

A guide for completing the forms including definitions and the reports, themselves, may be downloaded from:

www.dot.state.mn.us/const/labor/forms.html

Payment to the prime contractor may be withheld until documentation is received and approved.

(11) **Truck Rental Rates - ONLY REQUIRED WITH STATE OF MINNESOTA FUNDING**

Truck rental rates are listed in the prevailing wage section of the project specifications.

(12) **Minnesota Rules 5200.1105 and 5200.1106**

These rules are incorporated into this supplementary general conditions part II by reference and are found on these web sites:

www.revisor.mn.gov/rules/?id=5200

(13) **Truck Axles** web site: <https://www.revisor.mn.gov/rules/?id=5200.1100>

Per Minnesota Rules 5200.1100 Master Job Classifications, a truck "unit" refers to all axles including the steering axle. A tag axle is also counted as one of the axles. Examples: four rear axles plus one steering axle = five axles total one rear axle plus one steering axle = two axles total

(14) **Non-Compliance and Enforcement**

- a) The prime contractor shall be liable for any unpaid wages to its workers or those of its lower-tier subcontractors, trucking companies/Multiple Truck Owners (MTO's) and/or Independent Truck Owner/Operator (ITOs) [MnDOT Standard Specifications for Construction, Section 1801].
- b) See Section 9, MnDOT Specification 1906 Partial Payments and Section 5, page two of this document.
- c) City of Duluth ordinance 8940 as amended.

(15) **IC-134 form - Withholding Affidavit for Contractors**

The IC-134 form will be required from all Multiple Truck Operators, Partnerships, and Corporations performing trucking services on a project before the retainage or all remaining funds can be released. Web site for completing form online: www.mndor.state.mn.us

The form, itself, is found at: and www.taxes.state.mn.us/Forms_and_Instructions/ic134.pdf

(16) **Owners, Supervisors, Foremen listed on certified payrolls.**

All persons working on a City of Duluth project including owners, partners, supervisors, salaried persons, and working foremen who perform laborer and/or mechanic work shall be reported on the weekly certified payroll reports including all data required of any laborer or mechanic. (ordinance 8731, 6/24/85 and 8940 as amended).

(17) **Supporting documentation.**

At his/her discretion, the City of Duluth employee responsible for prevailing wage labor standards may demand proof of payment of the prevailing wage which may include copies of a payroll register, itemized time sheet and matching cancelled check, or any other supporting documents as stipulated. Payment to the prime contractor may be withheld until documentation is received and approved.

(18) **Kickbacks from Public Works employees prohibited.**

No contractor working on a project or other person shall, by force intimidation, or threat of termination of employment, cause any employee working on a project to give up any part of the compensation to which he is entitled under his contract of employment.

Section 9
Minnesota Department of Transportation Specification 1906 Partial Payments
Process For “Withholding Contract Monies” and “Default and Termination of a Contract” 11/5/04

Mn/DOT Specification 1906 Partial Payments describes the Commissioner’s authority to withhold funds to protect the Department’s interests. In addition, Specification 1808 Default and Termination of a Contract describes the Commissioner’s authority to take the prosecution of the work out of the hands of the Contractor.

Additionally, on projects funded in whole or part with federal funds and in accordance with the Required Contract Provisions Federal-Aid Construction Contracts Form – 1273, Section IV, Subpart 6, “Withholding”, incorporated into federal aid contracts, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance or guarantee of funds until such violations have ceased.

However, the Department must give the Contractor, and its Sureties due notice prior to exercising these authorities. The withholding of contract funds, in accordance with Specification 1906 or the Required Contract Provisions Federal-Aid Construction Contracts Form – 1273, Section IV, Subpart 6, “Withholding”, should be implemented as soon as a possible prevailing wage violation is recognized. However, Default and Termination of a Contract, in accordance with Specification 1808, should only be exercised as a “last resort” if the Contractor is not willing to comply.

Definitions

(Mn/DOT Standard Specifications for Construction 2000 Edition, Section 1103)

Commissioner: The Commissioner of the Minnesota Department of Transportation, or the chief executive of the department or agency constituted for administration of Contract work with its jurisdiction.

Contractor: The individual, firm or corporation Contracting for and undertaking prosecution of the prescribed work; the party of the second part to the Contract, acting directly or through a duly authorized representative.

Department: The Department of Transportation or the State of Minnesota, or the political subdivision, governmental body, board, commission, office, department, division, or agency constituted for administration of the Contract work within its jurisdiction.

(Form 1273 - 29 CFR, Part 5.1, Definitions)

Contracting Officer: The individual, a duly appointed successor or authorized representative who is designated and authorized to enter into Contracts on behalf of the Federal Agency and/or the City of Duluth.

Important Considerations

1. Upon completion of the work under a contract, the department should consider issuing the final voucher as soon as possible. Failure to finalize a contract expeditiously could result in subsequent claims that would prevent the department from finalizing the contract. However, before the issuance of the final voucher, the department must be able to ensure that the terms of the contract have been satisfied. Failure on the part of the department to ensure compliance could result in the Mn/DOT state aid division retaining funds from the department in accordance with *Minnesota Rules 8820.3000, subpart 5*.
2. On every contract, the department should withhold the final retainage in accordance with the following guidelines: (1) if the total amount of the contract is \$1,000,000 or more, the department should retain funds not more than \$50,000, (2) if the total amount of the contract is less than \$1,000,000, the department should retain 5% of the total contract, (3) retainage should be withheld until the department can ensure that the contractor has met the terms of the contract or until the finalization of the contract.
3. This guide specifies that the department verbally notify the bonding company early in the process. Generally, as a “rule of thumb”, notifying the bonding company is usually the “last resort”. However, the justification for the early notification is related to the language found in *Minnesota statute 574.31, subdivision 2*, which summarizes that if an individual or the department does not submit a claim on the payment bond within 120 days after the completion of work under the contract, the claim can be denied.

The following are general guidelines that should be followed prior to placing a Contractor in default:

- Step 1: Upon verbal or written notification that a possible prevailing wage violation exists, the Department should give written notice to the Contractor regarding the nature of the claim, along with the Department’s intent to withhold monies until the claim is investigated and determined to be in compliance. Additionally, the Department should inform the Contractor that the bonding company has been verbally notified of the claim. Please be aware, the Department should ensure employee confidentiality at all times.
- Step 2: Upon a preliminary determination surrounding the financial extent of the claim, the Department should consider retaining a “reasonable” portion of one or more partial estimates in accordance with Mn/DOT’s 2000 Standard Specifications for Construction, Section 1906; or on federal aid contracts, in accordance with the Required Contract Provisions Federal-Aid Construction Contracts Form – 1273, Section IV, Subpart 6, “Withholding”.
- Step 3: If it is determined that the claim is valid, the Department should schedule a meeting with the Contractor and attempt to resolve the matter. If the claim is determined to be invalid, the Department should release any partial estimates that may have been held as a result of the claim. However, the Department should continue to withhold the final retainage in accordance with the above-mentioned: *Important Considerations, 2*.
- Step 4: If resolution cannot be obtained through a meeting, the Department should order the Contractor, in writing, to complete their obligations under the contract. The letter should clearly state the circumstances under which the Department has deemed that the Contractor has not met the terms of the contract. Additionally, the Department should include a reasonable deadline for this obligation to be completed. A copy of this letter should be forwarded to the Surety, District State Aid Engineer (DSAE), Labor Compliance Unit and the Department’s Attorney.
- Step 5: In the event that the Contractor does not respond to the Department’s written order, the Department should send a similar letter, requesting that the Contractor respond immediately, in writing, regarding the Contractor’s intention to comply or not comply with the order. A copy of this letter should be forwarded to the Surety, District State Aid Engineer (DSAE), Labor Compliance Unit and the Department’s Attorney.
- Step 6: If the Department still does not get a proper response from the Contractor, the Department should write another letter, addressed to both the Contractor and the Surety, specifying all the facts of the alleged breach, demanding that the Contractor, or its Surety, respond satisfactorily within 10 days or the Department may exercise its authority to Default and Terminate the Contract in accordance within/DOT’s 2000 Specifications for Construction, Section

1808. It's important to provide sufficient detail so that the Surety understands the situation. This notification should be sent by certified mail. A copy of this letter should be forwarded to the Surety, District State Aid Engineer (DSAE), Labor Compliance Unit and the Department's Attorney.

Step 7: If the Contractor or Surety is unresponsive after 10 days, the Department should consult with their attorney to consider proceeding with Default and Termination of the Contract.

Step 8: Upon termination of the contract, the Department provides a written order to the Surety, requiring the Surety to bring resolution to the prevailing wage violation.

Step 9: The Department places the Contractor on a Non-Responsible Bidder's List and rejects any future awards.

Section 10

Federal Labor Standards Provisions U.S. Department of Housing and Urban Development Office of Labor Relations
Previous editions are obsolete Page 1 of 5 form HUD-4010 (06/2009) ref. Handbook 1344.1

Applicability

The Project or Program to which the construction work covered by this contract pertains is being assisted by the United States of America and the following Federal Labor Standards Provisions are included in this Contract pursuant to the provisions applicable to such Federal assistance.

A. 1. (i) Minimum Wages. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under Section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of 29 CFR 5.5(a)(1)(iv); also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs, which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period.

Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under 29 CFR 5.5(a)(1)(ii) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible, place where it can be easily seen by the workers.

(ii) (a) Any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. HUD shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(b) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and HUD or its designee agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by HUD or its designee to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, D.C. 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB control number 1215-0140.)

(c) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and HUD or its designee do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), HUD or its designee shall refer the questions, including the views of all interested parties and the recommendation of HUD or its designee, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise HUD or its designee or will notify HUD or its designee within the 30-day period that additional time is necessary. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

(d) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii)(b) or (c) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part Previous editions are obsolete Page 2 of 5 form HUD-4010 (06/2009) ref. Handbook 1344.1 of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (Approved by the Office of Management and Budget under OMB Control Number 1215-0140.)

2. Withholding. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other Federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract In the event of failure to pay any laborer or mechanic, including any apprentice, trainee or helper, employed or working on the site of the work, all or part of the wages required by the contract, HUD or its designee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased. HUD or its designee may, after written notice to the contractor, disburse such amounts withheld for and on account of the contractor or subcontractor to the respective employees to whom they are due. The Comptroller General shall make such disbursements in the case of direct Davis-Bacon Act contracts.

3. (i) Payrolls and basic records. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in Section I(b)(2)(B) of the Davis-bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in Section I(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs. (Approved by the Office of Management and Budget under OMB Control Numbers 1215-0140 and 1215-0017.)

(ii) (a) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i) except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/whd/wh347.pdf> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to HUD or its designee if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant sponsor, or owner, as the case may be, for transmission to HUD or its designee, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this subparagraph for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to HUD or its designee. (Approved by the Office of Management and Budget under OMB Control Number 1215-0149.)

(b) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under 29 CFR 5.5 (a)(3)(ii), the appropriate information is being maintained under 29 CFR 5.5(a)(3)(i), and that such information is correct and complete;

Previous editions are obsolete; Page 3 of 5 form **HUD-4010** (06/2009) ref. Handbook 1344.1

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR Part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(c) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph A.3.(ii)(b).

(d) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under subparagraph A.3.(i) available for inspection, copying, or transcription by authorized representatives of HUD or its designee or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, HUD or its designee may, after written notice to the contractor, sponsor, applicant or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding

journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by Previous editions are obsolete; Page 4 of 5 form HUD-4010 (06/2009) ref. Handbook 1344.1

the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under 29 CFR Part 5 shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR Part 3 which are incorporated by reference in this contract

6. Subcontracts. The contractor or subcontractor will insert in any subcontracts the clauses contained in subparagraphs 1 through 11 in this paragraph A and such other clauses as HUD or its designee may by appropriate instructions require, and a copy of the applicable prevailing wage decision, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this paragraph.

7. Contract termination; debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and HUD or its designee, the U.S. Department of Labor, or the employees or their representatives.

10. (i) Certification of Eligibility. By entering into this contract the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of Section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1) or to be awarded HUD contracts or participate in HUD programs pursuant to 24 CFR Part 24.

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001. Additionally, U.S. Criminal Code, Section 1 01 0, Title 18, U.S.C., "Federal Housing Administration transactions", provides in part: "Whoever, for the purpose of . . . influencing in any way the action of such Administration.... makes, utters or publishes any statement knowing the same to be false..... shall be fined not more than \$5,000 or imprisoned not more than two years, or both."

11. Complaints, Proceedings, or Testimony by Employees. No laborer or mechanic to whom the wage, salary, or other labor standards provisions of this Contract are applicable shall be discharged or in any other manner discriminated against by the Contractor or any subcontractor because such employee has filed any complaint or instituted or caused to be instituted any proceeding or has testified or is about to testify in any proceeding under or relating to the labor standards applicable under this Contract to his employer.

B. Contract Work Hours and Safety Standards Act. The provisions of this paragraph B are applicable where the amount of the prime contract exceeds \$100,000. As used in this paragraph, the terms "laborers" and "mechanics" include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which the individual is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in subparagraph (1) of this paragraph, the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in subparagraph (1) of this paragraph, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in sub paragraph (1) of this paragraph.

Previous editions are obsolete Page 5 of 5 form HUD-4010 (06/2009) ref. Handbook 1344.1

(3) Withholding for unpaid wages and liquidated damages. HUD or its designee shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contract, or any other Federally-assisted contract subject to the Contract Work Hours and Safety Standards Act which is held by the same prime contractor such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in subparagraph (2) of this paragraph.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in subparagraph (1) through (4) of this paragraph and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in subparagraphs (1) through (4) of this paragraph.

C. Health and Safety. The provisions of this paragraph C are applicable where the amount of the prime contract exceeds \$100,000.

(1) No laborer or mechanic shall be required to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his health and safety as determined under construction safety and health standards promulgated by the Secretary of Labor by regulation.

(2) The Contractor shall comply with all regulations issued by the Secretary of Labor pursuant to Title 29 Part 1926 and failure to comply may result in imposition of sanctions pursuant to the Contract Work Hours and Safety Standards Act, (Public Law 91-54, 83 Stat 96). 40 USC 3701 et seq.

(3) The contractor shall include the provisions of this paragraph in every subcontract so that such provisions will be binding on each subcontractor. The contractor shall take such action with respect to any subcontractor as the Secretary of Housing and Urban Development or the Secretary of Labor shall direct as a means of enforcing such provisions.

Section 11

Equal Opportunity Laws and Regulations

(A) In addition to Contract specifications set forth below, the Contractor shall conduct and administer this Contract in compliance with:

- (1) Title VI of the Civil Rights Act of 1964 (Pub. L. 88-352) and implementing regulations issued at 24 CFR Part 1;
- (2) Title VIII of the Civil Rights Act of 1968 (Pub. L. 90-284), as amended, and implementing regulations;
- (3) Section 109 of the Housing and Community Development Act of 1974, as amended; and the regulations issued pursuant thereto (24 CFR Section 570.601);
- (4) Section 3 of the Housing and Urban Development Act of 1968, as amended, and implementing regulations of 24 CFR Part 135;
- (5) Executive Order 11246, as amended by Executive Order 11375 and 12086 and implementing regulations at 41 CFR Chapter 60;
- (6) Executive Order 11063, as amended by Executive Order 12259 and implementing regulations at 24 CFR Part 107;
- (7) Section 504 of the Rehabilitation Act of 1973 (Pub. L. 93-112), as amended, and implementing regulations when published for effect;
- (8) The Age Discrimination Act of 1975, as amended, (Pub. L. 94-135) and implementing regulations when published for effect;
- (9) The Minnesota Human Rights Act of 1974, as amended (Chapter 363).

Equal Opportunity and Affirmative Action

(A) Contractors and Subcontractors that have a work force in excess of fifty (50) employees and a contract in excess of \$50,000.00 shall prepare and maintain an appropriate affirmative action plan in accordance with the provisions of 41 CFR 60 "Compliance Responsibility for Equal Opportunity".

(B) Non-segregated Facilities. The Contractor shall certify that he does not maintain or provide for his employees any segregated facilities at any of his establishments, and that he does not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. The Contractor covenants that he will not maintain or provide for his employees any segregated facilities at any of his establishments, and he will not permit his employees to perform their services at any location, under his control, where segregated facilities are maintained. As used in this paragraph the term "segregated facilities" means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or facilities provided for employees which are segregated by explicit directive or are in fact segregated on the basis of race, color, creed, religion, national origin, ancestry, age, marital status, status with respect to public assistance, and/or disability because of habit, local custom, or otherwise.

General Provisions Against Discrimination

(A) In all hiring or employment made possible by or resulting from this Contract, there:

- (1) will not be any discrimination against any employee or applicant for employment because of race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability.
- (2) affirmative action will be taken to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability. This requirement shall apply to, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; lay-off or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. There shall be posted in conspicuous places available to employees and applicants for employment, notices setting forth the provisions of this clause. All solicitations or advertisements for employees shall state that all qualified applicants will receive consideration for employment without regard to race, color, creed, religion, national origin, ancestry, age, sex, marital status, status with respect to public assistance, and/or disability.

(B) No person in the United States shall, on the grounds of race, color, creed, religion, national origin, age, sex, marital status, status with respect to public assistance, and/or disability, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity made possible by or resulting from this Contract. The Contractor and each employer will comply with all requirements imposed by or pursuant to the regulations of the Federal Agency effectuating Title VI of the Civil Rights Act of 1966. The Contractor will note this requirement in all solicitations or advertisements for employees. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(C) The Contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representative of the Contractor's commitments under these provisions, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(D) The Contractor hereby agrees that he will incorporate into any contract for construction work, or modification thereof, as defined in the regulations of the Secretary of Labor at 41 CFR Chapter 60, which is paid for in whole or in part with funds obtained pursuant to this Contract, the equal opportunity clause which is a part of these Contract Documents.

(E) The Contractor further agrees that he will be bound by the equal opportunity clause and other provisions of 41 CFR Chapter 60, with respect to his own employment practices when he participates in federally assisted construction work: **Provided:** That of the Contractor so participating is a State or Local Government, the above equal opportunity clause is not applicable to any agency, instrumentality, or subdivision of such government which does not participate in work on or under the Contract. Also, the Contractor will make his files available to inspection by appropriate government agencies and shall furnish those reports as may be required by said agencies.

(F) The Contractor agrees that he will assist and cooperate actively with the Federal Agency and the Secretary of Labor in obtaining the compliance of subcontractors with the equal opportunity clause and the rules, regulations, and relevant orders of the Secretary of Labor, that he will furnish the Federal Agency and the Secretary of Labor such information as they may require for the supervision of such compliance, and that he will otherwise assist the Federal Agency in the discharge of its primary responsibility for securing compliance.

(G) The Contractor further agrees that he will refrain from entering into any contract or any contract modification subject to Executive Order 11246 of September 24, 1965, with a subcontractor debarred from, or who has not demonstrated eligibility for, Government contracts and federally assisted construction contracts pursuant to the Executive Order. In addition, the Contractor agrees that if he fails or refuses to comply with these undertakings, the City or the Federal Agency may take any or all of the following actions: Terminate or suspend in whole or in part this Contract; refrain from extending any further assistance to the Contractor under the Project with respect to which the failure or refusal occurred until satisfactory assurance of future compliance has been received from such Contractor and refer the case to the Department of Justice for appropriate legal proceedings.

Affirmative Action - "Construction Contracts" over \$10,000

Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity
(Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

<u>Timetables</u>	<u>Goals for minority participation (percent)</u>	<u>Goals for female participation (percent)</u>
From April 1, 1980 until revised	3.0	6.9

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area.

The Contractor's compliance with the Executive Order and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3 (a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Contractor shall provide written notification to the City and to the Director of the Office of Federal Contract Compliance Programs; U.S. Department of Labor, ESA/OFCCP, 16th Floor, 230 South Dearborn Street, Chicago, Illinois, 60604, within 10 working days of award of any construction subcontract and/or subcontract in excess of \$10,000 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the contractor and/or subcontractor; employer identification number; estimated dollar amount of the prime contract; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the contract is to be performed.

4. As used in this Notice, and in the Contract, the "covered area" is all work under a contract currently held with the City of Duluth, Minnesota.

Standard Federal Equal Employment Opportunity
Construction Contract Specifications (Executive Order 11246)

1. As used in these specifications:

- a) "Director" means Director, Office of Federal Contract Compliance Programs, United States Department of Labor; or any person to whom the Director delegates authority;
- b) "Employer identification number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.
- c) "Minority" includes:
 - (i) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);
 - (ii) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American or other Spanish Culture or origin, regardless of race);
 - (iii) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and
 - (iv) American Indian or Alaskan Native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any Subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of \$10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors must be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each Contractor or Subcontractor participating in an approved Plan is individually required to comply with its obligations under the EEO clause, and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other Contractors or Subcontractors toward a goal in approved Plan does not excuse any covered Contractor's or Subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. The Contractor is expected to make substantially uniform progress toward its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement, nor the failure by a union with whom the Contractor has a collective bargaining agreement, to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees must be employed by the Contractor during the training period, and the Contractor must have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees must be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative action to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully, and shall implement affirmative action steps at least as extensive as the following:
- a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other on-site supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.
 - b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.
 - c. Maintain a current file of the names, addresses and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore, along with whatever additional actions the Contractor may have taken.
 - d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or woman sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.
 - e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notices of these programs to the sources compiled under 7b above.
 - f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.
 - g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination or other employment decisions including specific review of these items with onsite supervisory personnel such as Superintendents, General Foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.
 - h. Disseminate the Contractor's EEO policy externally by including it any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other Contractors and Subcontractors with whom the Contractor does or anticipates doing business.
 - i. Direct its recruitment efforts, both oral and written, to minority, female and community organizations, to schools with minority and female students and to minority and female recruitments and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations such as the above, describing the openings, screening procedures, and tests to be used in the selection process.
 - j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer and vacation employment to minority and female youth both on the site and in other areas of a Contractor's work force.
 - k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR Part 60-3.
 - l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.
 - m. Ensure that seniority practices, job classifications, work assignments and other personnel practices, do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.
 - n. Ensure that all facilities and company activities are nonsegregated except that separate or single-user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.
 - o. Document and maintain a record of all solicitations of officers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.
 - p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.
8. Contractors are encouraged to participate in voluntary associations which assist in fulfilling one or more of their affirmative action obligations (7a through p). The efforts of a contractor association, joint contractor-union, contractor-community, or other similar group of which the contractor is a member and participant, may be asserted as fulfilling any one or more of its obligations under 7a through p of these Specifications provided that the contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.
9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, the Contractor may be in violation of the Executive Order if a particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally, the Contractor may be violation of the Executive Order if a specific minority group of women is underutilized).
10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, creed, religion, national origin, sex, ancestry, age, marital status, status with respect to public assistance and/or disability.
11. The Contractor shall not enter into any Subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.
12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any Contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.
13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails

to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government and to keep records. Records shall at least include for each employee the name, address, telephone numbers, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g., those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Affirmative Action for Handicapped Workers

(applies to contracts in excess of \$2,500)

(A) The Contractor will not discriminate against any employee or applicant for employment because of physical or mental handicap in regard to any position for which the employee or applicant is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified handicapped individuals without discrimination based upon their physical or mental handicap in all employment practices such as the following: Employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(B) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(C) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(D) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified handicapped employees and applicants for employment, and the rights of applicants and employees.

(E) The Contractor will notify each labor union or representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of Section 503 of the Rehabilitation Act of 1973, and is committed to take affirmative action to employ and advance in employment physically and mentally handicapped individuals.

(F) The Contractor will include the provisions of this clause in every subcontract or purchase order of \$2,500 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to Section 503 of the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

Affirmative Action for Disabled Veterans and Veterans of the Vietnam Era

(applies to contracts in excess of \$10,000)

(A) The Contractor will not discriminate against any employee or applicant for employment because he or she is a disabled veteran or veteran of the Vietnam era in regard to any position for which the employee or applicant for employment is qualified. The Contractor agrees to take affirmative action to employ, advance in employment and otherwise treat qualified disabled veterans and veterans of the Vietnam era without discrimination based upon their disability or veterans status in all employment practices such as the following: Employment, upgrading, demotion or transfer, recruitment, advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

(B) The Contractor agrees that all suitable employment openings of the Contractor which exist at the time of the execution of this contract and those which occur during the performance of this contract, including those not generated by this contract and including those occurring at an establishment of the Contractor other than the one wherein the contract is being performed but excluding those of independently operated corporate affiliates, shall be listed at an appropriate local office of the State employment service system wherein the opening occurs. The Contractor further agrees to provide such reports to such local office regarding employment openings and hires as may be required.

State and local government agencies holding Federal contracts of \$10,000 or more shall also list all their suitable openings with the appropriate office of the State employment service, but are not required to provide those reports set forth in paragraphs (D) and (E).

(C) Listing of employment openings with the employment service system pursuant to this clause shall be made at least concurrently with the use of any other recruitment source or effort and shall involve the normal obligations which attach to the placing of a bona fide job order, including the acceptance of referrals of veterans and non-veterans. The listing of employment openings does not require the hiring of any particular job applicant or from any particular group of job applicants, and nothing herein is intended to relieve the Contractor from any requirements in Executive Orders or regulations regarding nondiscrimination in employment.

(D) The reports required by paragraph (B) of this clause shall include, but not be limited to, periodic reports which shall be filed at least quarterly with the appropriate local office or, where the Contractor has more than hiring location in a State, with the central office of that State employment service. Such reports shall indicate for each hiring location (1) the number of individuals hired during the reporting period, (2) the number of non-disabled veterans of the Vietnam era hired, (3) the number of disabled veterans of the Vietnam era hired, and (4) the total number of disabled veterans hired. The reports should include covered veterans hired for on-the-job training under 38 U.S.C. 1787. The Contractor shall maintain at each hiring location copies of the reports submitted until the expiration of one year after final payment under the contract, during which time these reports and related documentation shall be made available, upon request, for examination by any authorized representatives of the contracting officer of the Secretary of Labor. Documentation would include personnel records respecting job openings, recruitment and placement.

(E) Whenever the Contractor becomes contractually bound to the listing provisions of this clause, it shall advise the employment service system in each State where it has establishments of the name and location of each hiring location in the State. As long as the Contractor is contractually bound to these provisions, and has so

advised the State system, there is no need to advise the State system of subsequent contracts. The Contractor may advise the State system when it is no longer bound by this contract clause.

(F) This clause does not apply to the listing of employment openings which occur and are filled outside of the 50 States, the District of Columbia, Puerto Rico, Guam, and the Virgin Islands.

(G) The provisions of paragraphs (B), (C), (D), and (E) of this clause do not apply to openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement for that opening.

(H) As used in this clause:

(1) "All suitable employment openings" includes, but is not limited to, openings which occur in the following job categories: Production and non-production; plant and office; laborers and mechanics; supervisory and non-supervisory; technical; and executive, administrative, and professional openings as are compensated on a salary basis of less than \$25,000 per year. This term includes full-time employment, temporary employment of more than 3 days' duration, and part-time employment. It does not include openings which the Contractor proposes to fill from within his own organization or to fill pursuant to a customary and traditional employer-union hiring arrangement nor openings in an educational institution which are restricted to students of that institution. Under the most compelling circumstances an employment opening may not be suitable for listing, including such situations where the needs of the Government cannot reasonably be otherwise supplied, where listing would be contrary to national security, or where the requirement of listing would otherwise not be for the best interest of the Government.

(2) "Appropriate office of the State employment service system" means the local office of the Federal-State national system of public employment offices with assigned responsibility for serving the area where the employment opening is to be filled, including the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

(3) "Openings which the Contractor proposes to fill from within his own organization" means employment openings for which no consideration will be given to persons outside the Contractor's organization (including any affiliates, subsidiaries, and the parent companies) and includes any openings which the Contractor proposes to fill from regularly established "recall" lists.

(4) "Openings which the Contractor proposes to fill pursuant to a customary and traditional employer-union hiring arrangement" means employment openings which the Contractor proposes to fill from union halls, which is part of the customary and traditional hiring relationship which exists between the Contractor and representatives of his employees.

(I) The Contractor agrees to comply with the rules, regulations, and relevant orders of the Secretary of Labor issued pursuant to the Act.

(J) In the event of the Contractor's noncompliance with the requirements of this clause, actions for noncompliance may be taken in accordance with the rules, regulations and relevant orders of the Secretary of Labor issued pursuant to the Act.

(K) The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices in a form to be prescribed by the Director, provided by or through the contracting officer. Such notices shall state the Contractor's obligation under the law to take affirmative action to employ and advance in employment qualified disabled veterans and veterans of the Vietnam era for employment, and the rights of applicants and employees.

(L) The Contractor will notify each labor union representative of workers with which it has a collective bargaining agreement or other contract understanding, that the Contractor is bound by the terms of the Vietnam Era Veterans Readjustment Assistance Act, and is committed to take affirmative action to employ and advance qualified disabled veterans and veterans of the Vietnam era..

(M) The Contractor will include the provisions of this clause in every subcontract or purchase order of \$10,000 or more unless exempted by rules, regulations, or orders of the Secretary issued pursuant to the Act, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the Director of the Office of Federal Contract Compliance Programs may direct to enforce such provisions, including action for noncompliance.

Section 12
Employment Opportunities - "HUD Section 3"

General

These requirements apply to the City of Duluth contracts receiving assistance under the U.S. Department of Housing and Urban Development (HUD) Community Development Block Grant (CDBG) Program.

Type of Covered Projects

24CFR570.607 (b) of the HUD CDBG Program Regulations state in part "... that employment and other economic opportunities arising in connection with housing rehabilitation, housing construction, or other public construction projects shall to the greatest extent feasible, and consistent with existing Federal, State, and local laws and regulations be given to low- and very low-income persons.

Thresholds

In accordance with the provisions of 24CFR135.3(a) (3) (ii) (A), the requirements of this Section apply to those recipients as defined at 24CFR135.5 when the amount of this contract exceeds \$200,000.

In addition, in accordance with the provisions of 24CFR135.3 (a) (3) (ii) (B), the requirements of this Section apply to any contractor or subcontractor whose contract exceeds \$100,000 as a result of assistance provided under this contract.

Requirements (Section 3 Clause)

(A) The work to be performed under this contract is subject to the requirements of Section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of Section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

(B) The parties to this contract agree to comply with HUD's regulations in 24 CFR part 135, which implement section 3. As evidenced by their execution of this contract, the parties to this contract certify that they are under no contractual or other impediment that would prevent them from complying with the part 135 regulations.

(C) The contractor agrees to send to each labor organization or representative of workers with which the contractor has a collective bargaining agreement, or other understanding, if any, a notice advising the labor organization or workers' representative of the contractor's commitments under this section 3 clause, and will post copies of the notice in conspicuous places at the work site where both employees and applicants for training and employment positions can see the notice. The

notice shall describe the section 3 preference, shall set forth minimum number and job titles subject to hire, availability of apprenticeship and training positions, the qualifications for each; and the name and location of the person(s) taking applications for each of the positions; and the anticipated date the work shall begin.

(D) The Contractor agrees to include this section 3 clause in every subcontract subject to compliance with regulations in 24 CFR part 135, and agrees to take appropriate action, as provided in an applicable provision of the subcontract or in this section 3 clause, upon a finding that the subcontractor is in violation of the regulations in 24 CFR part 135. The contractor will not subcontract with any subcontractor where the contractor has notice or knowledge that the subcontractor has been found in violation of the regulations in 24 CFR part 135.

(E) The contractor will certify that any vacant employment positions, including training positions, that are filled (1) after the contractor is selected but before the contract is executed, and (2) with persons other than those to whom the regulations of 24 CFR part 135 require employment opportunities to be directed, were not filled to circumvent the contractor's obligation under 24 CFR part 135.

(F) Noncompliance with HUD's regulations in 24 CFR part 135 may result in sanctions, termination of this contract for default, and debarment or suspension from future HUD-assisted contracts.

Section 13

Federal Requirements for Minority/Women Business Enterprises Contract Guidance - MPFA

General

Municipalities that receive loan funding must comply with Federal requirements concerning utilization of Minority Business Enterprises (MBE) and Women's Business Enterprises (WBE). These requirements are designed to encourage the prime contractors to utilize MBEs and WBEs whenever procurement opportunities occur.

Regulation

40 C.F.R. Section 35.3145(d) Application of other Federal Authorities, M/WBE Requirements

Executive Orders No. 11625, 12138 and 12432 - Promoting the use of M/WBEs

Section 129 of Public Law 100-590 - Small Business Administration Reauthorization and Amendment Act of 1988

Regulations detailed in the EPA's *Cross-Cutting Federal Authorities - Clean Water Act State Revolving Fund Program and Safe Drinking Water Act State Revolving Fund Program*

Implementation

The "fair share" target percentage participation proposed for this project is 3.5 percent (3.5%) for MBE and 11.5 percent (11.5%) for WBE.

If the Contractor intends to let any subcontractors for a portion of the work, the Contractor shall take affirmative steps to assure that minority and women businesses are utilized when possible as sources of supplies, equipment, construction and services. Affirmative steps shall include the following:

- a) Include qualified minority businesses on solicitation lists.
- b) Assure that minority businesses are solicited whenever they are potential sources.
- c) When economically feasible, divide total requirements into smaller tasks or quantities so as to permit maximum small and minority business participation.
- d) Where the requirement permits, establish delivery schedules, which will encourage participation by minority businesses.
- e) Use the services and assistance of the Office of Minority Business Enterprise of the Department of Commerce.

The low bidder will be required to submit to the City of Duluth documentation of his good faith efforts to meet the targeted goals of utilizing MBEs and WBEs.

Section 14 - Forms

Minnesota Department of Transportation and City of Duluth, Minnesota funded certified payroll forms

- MnDOT Prime Contractor's-Subcontractor's Statement of Compliance form (12/2010)
www.dot.state.mn.us/const/labor/forms.html
- Certified Payroll Forms
<http://www.dol.gov/forms/whd/wh347.pdf>
use front side only

U. S. Department of Housing and Urban Development and federal government funded certified payroll forms

- Statement of Compliance Form & Certified Payroll Forms
<http://www.dol.gov/forms/whd/wh347.pdf>
(use reverse side for Statement of Compliance form)
- MnDOT Prime Contractor's-Subcontractor's Statement of Compliance form (12/2010)
www.dot.state.mn.us/const/labor/forms.html

Minnesota Department of Transportation Trucking Requirements

- Month End Trucking Report Form A and Form B
- Month End Trucking Report Statement of Compliance
- Definitions, instructions, forms:
www.dot.state.mn.us/const/labor/forms.html

City of Duluth

Indemnification & Insurance Requirements

(Updated February 16, 2011)

(Please Be Sure These Requirements Can Be Met Before Submitting Your Response)

INDEMNIFICATION CLAUSE

The Contractor will defend, indemnify and save the City harmless from all costs, charges, damages, and loss of any kind that may grow out of the matter covered by this contract. Said obligation does not include indemnification of the City for claims of liability arising out of the sole negligent or intentional acts or omissions of City but shall include but not be limited to the obligation to defend, indemnify and same harmless the City in all cases where claims of liability against the City arise out of acts or omissions of City which are derivative of the negligence or intentional acts or omissions of Contractor such as, and including but not limited to, the failure to supervise, the failure to warn, the failure to prevent such act or omission by Contractor and any other such source of liability. In addition, Contractor will comply with all local, state and federal laws, rules and regulations applicable to this contract and to the work to be done and things to be supplied hereunder.

INSURANCE

- a. Contractor shall provide the following minimum amounts of insurance from insurance companies authorized to do business in the state of Minnesota, which insurance shall indemnify Contractor and City from all liability described in the paragraph above, subject to provisions of subparagraph below.
 - (1) Worker's compensation in accordance with the laws of the state of Minnesota.
 - (2) Public Liability and Automobile Liability Insurance with limits not less than **\$1,500,000** Single Limit, and twice the limits provided when a claim arises out of the release or threatened release of a hazardous substance; shall be in a company approved by the city of Duluth; and shall provide for the following: Liability for Premises, Operations, Completed Operations, Independent Contractors, and Contractual Liability.
 - (3) City of Duluth shall be named as **Additional Insured** under the Public Liability, Excess/Umbrella Liability* and Automobile Liability, or as an alternate, Contractor may provide Owners-Contractors Protective policy, naming itself and the City of Duluth. Contractor shall also provide evidence of Statutory Minnesota Worker's Compensation Insurance. Contractor to provide Certificate of Insurance evidencing such coverage with 30-days notice of cancellation, non-renewal or material change provisions included. The City of Duluth does not represent or guarantee that these types or limits of coverage are adequate to protect the Contractor's interests and liabilities.

**An umbrella policy with a "following form" provision is acceptable if written verification is provided that the underlying policy names the City of Duluth as an additional insured.*

- (4) If a certificate of insurance is provided, the form of the certificate shall contain an unconditional requirement that the insurer notify the City without fail not less than 30 days prior to any cancellation, non-renewal or modification of the policy or coverages evidenced by said certificate and shall further provide that failure to give such notice to City will render any such change or changes in said policy or coverages ineffective as against the City.
- (5) **The use of an “Acord” form as a certificate of insurance shall be accompanied by two forms – 1) ISO Additional Insured Endorsement (CG-2010 pre-2004) and 2) Notice of Cancellation Endorsement (IL 7002) or equivalent, as approved by the Duluth City Attorney’s Office.**
- b. The insurance required herein shall be maintained in full force and effect during the life of this Agreement and shall protect Contractor, its employees, agents and representatives from claims and damages including but not limited to personal injury and death and any act or failure to act by Contractor, its employees, agents and representatives in the negligent performance of work covered by this Agreement.
- c. Certificates showing that Contractor is carrying the above described insurance in the specified amounts shall be furnished to the City prior to the execution of this Contract and a certificate showing continued maintenance of such insurance shall be on file with the City during the term of this Contract.
- d. The City shall be named as an additional insured on each liability policy other than the workers’ compensation policies of the Contractor.
- e. The certificates shall provide that the policies shall not be changed or canceled during the life of this Contract without at least 30 days advanced notice being given to the City.
- f. Contractor shall be required to provide insurance meeting the requirements of this Paragraph unless Contractor successfully demonstrates to the satisfaction of the City Attorney, in the exercise of his or her discretion, that such insurance is not reasonably available in the market. If Contractor demonstrates to the satisfaction of the City Attorney that such insurance is not reasonably available, the City attorney may approve an alternative form of insurance which is reasonably available in the market which he or she deems to provide the highest level of insurance protection to the City which is reasonably available.

Procedure verified by:

Don Douglas, Claims Adjuster
Duluth City Attorney’s Office

Date _____

PRE-2004 CG 2010

A. **Section II - Who Is an Insured** is amended to include as an insured the person or organization shown in the Schedule, but only with respect to liability arising out of your ongoing operations performed for that insured.

NOTICE OF CANCELLATIONS ENDORSEMENT IL-7002 (10-90)

All Coverage Parts included in this policy are subject to the following condition: If we cancel this policy for any reason other than non-payment of premium, we will mail advance notice to the person(s) or organization(s) as shown in the Schedule.

Schedule	
Person or Organization (Name and Address)	Advance Notice (Days)
City of Duluth Purchasing Division Room 100 City Hall 411 West First Street Duluth, MN 55802	30

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Work Included in Contract Documents
 - 2. Contract Information
 - 3. Contract Information
 - 4. Contract Information
 - 5. Work Under Other Contracts
 - 6. Future Work
 - 7. Work Sequence
 - 8. Contractor Use of Premises
 - 9. Occupancy Requirements
 - 10. Products Ordered in Advance
 - 11. Owner Furnished Products
 - 12. Work Restrictions

1.02 WORK INCLUDED IN CONTRACT DOCUMENTS

- A. Description of the Project:
 - 1. Construction of water system improvements for the Spirit Mountain Recreational Area. This contract manual for Contract A is part of a larger project for which three additional separate contracts will be awarded. A general description of the four project contracts is included below.
 - a. Contract A
Reversible Water Supply and Runoff Collection Pipeline: Includes a runoff collection system, a grit chamber, transfer pipeline, yard piping at the Main pump station, low pressure supply pipe, a wet well and yard piping for the River pump station, an intake pipe (in St Louis River) and an intake structure.
 - b. Contract B
Water Supply Pump Stations. Main pump station and River pump station; including foundations, floors and complete building enclosures, plus mechanical and electrical equipment for these water pump stations.
 - c. Contract C
Hillside Water Improvements. Includes high pressure steel lines for increased distribution of water, upgrades to valve stations and electrical improvements
 - d. Contract D
Water Pumping Improvements: Off-site manufactured complete packages for water pumping equipment skids (with electrical equipment and controls) for Main and River pump stations.

1.03 CONTRACT INFORMATION

- A. Type of Contract: Owner will award Multiple Prime Contracts.
- B. Scope of Contract:
 - 1. Each contract is complete unto itself, including all labor and material required to complete each contract to the point of receiving the next section of Work to be installed.
 - 2. All Contracts will include:
 - a. Contract Forms:
 - 1) Agreement
 - 2) Performance Bond
 - 3) Payment Bond
 - 4) Certificates

- b. Conditions of the Contract:
 - 1) General Conditions
 - 2) Supplementary Conditions
- c. Specifications:
 - 1) Division 1 - General Requirements
 - 2) Applicable Technical Sections
- d. Addenda
- e. Contract Modifications
- 3. Separate contracts will be issued for:
 - a. The other 3 Contract packages as listed above

1.04 WORK UNDER OTHER CONTRACTS

- A. Other Work at Site:
 - 1. Owner reserves the right to let other separate contracts for Work of the Project, or to pursue other Work at the Site with its own personnel.
 - 2. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.
 - 3. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Work Not Included:
 - 1. Work not included is either marked "NIC," or "by others," on Drawings or is noted in each section of Specifications.
 - 2. Provide all labor and materials required unless so specifically noted or marked.
 - 3. Install Work indicated to be furnished by others or Owner unless specifically stipulated to be furnished and installed by others or Owner.

1.05 CONTRACT TIMES

- A. Time of the Essence:
 - 1. All time limits for Milestones, if any, Substantial Completion, and completion and readiness for final payment as stated in the Contract Documents are of the essence of the Contract.
- B. Contract Times:
 - 1. Construction operations are expected to start May 1, 2015 however, the Notice to Proceed letter will be the official authorization to commence construction operations.
 - 2. Substantial and Final Completion:
 - a. The Work will be substantially completed on or before October 1, 2015, and completed and ready for final on or before October 31, 2015.
 - b. Parts of the Work shall be substantially completed on or before the following Milestone(s):
 - 1) Milestone 1: Installation of River Pump station concrete wet well, associated piping, grading and backfill on or before July 1, 2015.
- C. Liquidated Damages
 - 1. Contractor and Owner recognize that time is of the essence and that Owner will suffer financial loss if the Work is not completed and milestones not achieved within the times specified, plus any extensions thereof allowed in accordance with the Contract. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty):
 - 2. Substantial Completion: Contractor shall pay Owner \$10,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified for Substantial Completion until the Work is substantially complete.
 - 3. Final Completion of Remaining Work: After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time (as duly adjusted pursuant to the Contract) for completion and readiness for final payment, Contractor shall pay Owner \$4,000 for each day that expires after such time until the Work is completed and ready for final payment.
 - 4. Liquidated damages for failing to timely attain Substantial Completion and final completion are not additive and will not be imposed concurrently.

- D. Milestones: Contractor shall pay Owner \$6,000 for each day that expires after the time (as duly adjusted pursuant to the Contract) specified above for achievement of Milestone 1, until Milestone 1 is achieved.

1.06 CONTRACTOR USE OF PREMISES

- A. Confine operations at Site to areas permitted under contract or as directed by Engineer
- B. Conform to site rules and regulations affecting Work while engaged in Project construction.
- C. Existing Structures:
 - 1. Keep existing driveways, and adjacent streets clear and available to public in accordance with Owner's or local authority's requirements.
 - 2. Repair damages caused to existing public and private property and structures due to operations of Contractor to the satisfaction of, and at no additional cost to Owner.
 - 3. Take complete field measurements affecting all existing construction, wiring, piping, and equipment in this Contract, and assume responsibility for proper fit between Work and existing structures and other equipment.
- D. Construction personnel may park only in areas designated by the Owner.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.
- F. Damaged Property:
 - 1. Patch and/or clean existing improvements and restore damage of property on, or adjacent to Site occasioned by this Work, including, but not limited to, lawns, walks, curbs, pavements, roadways, structures, and utilities which are cut or damaged by operations and are not designated for removal, relocation, or replacement in the course of construction.
 - 2. Public Property or Utilities: Comply with laws, ordinances, rules, regulations, standards, orders of utility owner or any public authority having jurisdiction.
 - 3. Provide written acceptance of restoration work by authority or Owner.

1.07 PRODUCTS ORDERED IN ADVANCE

- A. Storage:
 - 1. Products will be allowed to be stored at the Site prior to commencement of construction activities.
 - 2. Contractor shall store such items as directed by Owner.

1.08 OWNER FURNISHED PRODUCTS

- A. Items furnished by Owner will be identified in the Specification sections.
- B. Owner's Responsibilities:
 - 1. Arrange for, and deliver Owner reviewed Shop Drawings, Product Data and samples to Contractor.
 - 2. Arrange and pay for product delivery to Site.
 - 3. At time of delivery, inspect products jointly with Contractor.
 - 4. Submit claims for transportation damage and replace damaged, defective or deficient items.
 - 5. Arrange for manufacturer's warranties, inspections and service.
- C. Contractor's Responsibilities:
 - 1. Review Owner reviewed Shop Drawings, Product Data and samples.
 - 2. Receive and unload products at Site; inspect for completeness or damage, jointly with Owner.
 - 3. Provide support systems to receive Owner's equipment.
 - 4. Protect Owner-furnished items from damage during storage and handling, including damage from exposure to the elements.
 - 5. Install and otherwise incorporate Owner-furnished items into the Work.

6. Repair or replace items damaged after receipt, except that damage caused by Owner's employees or agents.

1.09 WORK RESTRICTIONS

A. On-Site Work Hours:

1. Normal business working hours of 7:00 a.m. to 5:00 p.m. Monday through Friday.
2. Weekend Hours: 7:00 a.m. to 5:00 p.m. with 48 hours' notice to Project Manager and Engineer.

B. Existing Utility Interruption:

1. Do not interrupt utilities serving facilities occupied by Owner or others without written permission by Engineer
2. Notify Engineer not less than 2 days in advance of proposed utility interruptions.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 SCHEDULE OF CONTRACTS

Not Used

END OF SECTION

PRODUCT SUBSTITUTION PROCEDURES**PART 1 GENERAL****1.01 SUMMARY**

- A. Administrative and procedural requirements for handling requests for substitutions.

1.02 DEFINITIONS

- A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment and methods of construction required by Contract Documents proposed by Contractor.
- C. The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by Owner or Engineer.
 - 2. Specified options of products and construction methods included in Contract Documents.
 - 3. Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.03 SUBMITTALS

- A. Substitution Request Prior to Bid: For a Product Substitution to be considered, the following conditions must be met:
 - 1. All requests must be submitted in writing no later than 10 calendar days prior to the date for receipt of the bids.
 - 2. Faxed submittals will not be considered.
 - 3. Submit each request for substitution (one material or product per form) on the attached "Substitution Request Form" attached at the end of this section (either duplicated from the Project Manual or available from Engineer's office) together with a self-addressed, stamped envelope. Submittals not accompanied by this form properly filled in and endorsed will be discarded without review. NO EXCEPTIONS.
 - 4. Identify any impact of the substituted product on related items.
 - 5. Approved items will be listed in addenda. Requests for substitution will be returned in the self-addressed, stamped envelope provided by bidder at Engineer's earliest convenience.
- B. All substitutions permitted on addenda must meet or exceed requirements of the specifications including, but not limited to:
 - 1. Warranty.
- C. Substitution Request After Bid: Requests for substitution will be considered if received within 60 days after commencement of the work. Requests received more than 60 days after commencement of the work may be considered or rejected at the discretion of Engineer.
 - 1. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for change order proposals.
 - 2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related specification section and Drawing numbers.
 - 3. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Product data, including drawings and descriptions of products, fabrication and installation procedures.
 - b. Samples, where applicable or requested.

- c. A detailed comparison of significant qualities of the proposed substitution with those of the work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
 - d. Coordination information, including a list of changes or modifications needed to other parts of the work and to construction performed by Owner and separate contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the substitution's effect on Contractor's construction schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall contract time.
 - f. Cost information, including a proposal of the net change, if any in the contract sum.
 - g. Certification by Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated.
 - h. Include Contractor's waiver of rights to additional payment or time, which may subsequently become necessary because of the failure of the substitution to perform adequately.
- D. Substitution Conditions:
- 1. Contractor's substitution request will be received and considered by Engineer when one or more of the following conditions are satisfied, as determined by Engineer, otherwise requests will be returned without action except to record noncompliance with these requirements:
 - a. Extensive revisions to Contract Documents are not required.
 - b. Proposed changes are in keeping with the general intent of Contract Documents.
 - c. The request is timely, fully documented and properly submitted.
 - d. Contractors and suppliers will be expected to provide the specified product unless prior approval is received from Engineer's office in sufficient time so that all bidders can be notified through an addendum.
 - e. The specified product or method of construction cannot be provided within the contract time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.
 - f. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - g. A substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other considerations of merit, after deducting offsetting responsibilities Owner may be required to bear. Additional responsibilities for Owner may include additional compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, or separate contractors, and similar considerations.
 - h. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where Contractor certifies that the substitution will overcome the incompatibility.
 - i. The specified product or method of construction cannot be coordinated with other materials, and where Contractor certifies that the proposed substitution can be coordinated.
 - j. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where Contractor certifies that the proposed substitution provides the required warranty.
 - k. Where a proposed substitution involves more than one prime contractor, each contractor shall cooperate with the other contractors involved to coordinate the work, provide uniformity and consistency, and to assure compatibility of products.
- E. Limitations: Contractor's submittal and Engineer's acceptance of Shop Drawings, Product Data, or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.
- F. Substitution Causing Redesign: Engineer time for redesign as a result of substitution, will be charged to Owner, then deducted by Construction Change Directive from Contract Amount.
- G. Engineer's Action:
- 1. Request Prior to Bid: If approved, substitution will be included in an addendum.

2. Request After Bid:
 - a. If necessary, within one week of receipt of the request for substitution, Engineer will request additional information or documentation necessary for evaluation of the request.
 - b. Within two weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, Engineer will notify Contractor of acceptance or rejection of the proposed substitution.
 - c. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name.
 - d. Acceptance will be in the form of a change order.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SUBSTITUTION REQUEST FORM

TO: Attn: Jeff Ledin
 Short Elliott Hendrickson Inc.
 416 South 6th Street, Suite 200
 Brainerd, MN 56401-3540
 218.855.1700

PROJECT: Construction of water system improvements for the Spirit Mountain Recreational Area

SECTION NO.	ARTICLE NO.	SPECIFIED PRODUCT	PROPOSED SUBSTITUTION
-------------	-------------	-------------------	-----------------------

- A. Does the substitution affect dimensions shown on Drawings? Yes No
- B. Does the substitution affect other trades? Yes No
- C. Does the manufacturer's guarantee differ from that specified? Yes No
- D. If you indicated "Yes" to Items A, B, or C above, attach a thorough explanation on your company letterhead.
- E. If there are other differences between proposed substitution and specified product, attach a thorough explanation on your company letterhead. If differences are not noted and acknowledged in writing by Engineer, product must comply with specification requirements.
- F. The proposed substitution was used within the last 24 months on the following project:
 Project Name _____
 Location _____
 Engineer _____
 Telephone No. _____
- G. Has the proposed substitution been used on an SEH project within the last 12 months? Yes No
 If yes, which project? _____

**All questions must be answered. Incomplete forms will not be reviewed.
 Include a self-addressed, stamped envelope for reply.**

Submitted By: _____

 Signature _____
 Firm _____
 Address _____
 Date _____
 Phone _____
 E-mail _____

For Use by Design Consultant	
<input type="checkbox"/>	Not Accepted, Not Enough Information
<input type="checkbox"/>	Not Accepted, Does Not Appear to be Equal
<input type="checkbox"/>	Accepted <input type="checkbox"/> Accepted as Noted
<input type="checkbox"/>	Received Too Late
By _____	
Date _____	
Remarks _____	

SECTION 01 29 10

APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Procedures for Administration of Applications for Payment:
 - 1. Schedule of Values:
 - a. Coordination.
 - b. Format and Content.
 - c. Breakdown Detail.
 - d. Schedule Updating.
 - 2. Application for Payment:
 - a. Coordination.
 - b. Format.
 - c. Typical Application.
 - 3. Additional Requirements:
 - a. Initial Application.
 - b. Substantial Completion.
 - c. Final Payment.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures
 - 2. Section 01 74 20 - Construction Waste Management
 - 3. Section 01 77 00 - Closeout Procedures

1.02 SCHEDULE OF VALUES

- A. Coordinate preparation of Schedule of Values with preparation of Construction Schedule.
- B. Format and Content:
 - 1. Include following Project identification on Schedule of Values:
 - a. Project name and location.
 - b. Name of Engineer.
 - c. Engineer's Project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Use Project Bid Form
- C. Breakdown Detail:
 - 1. Provide breakdown of Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports.
 - 2. Break principal subcontract amounts down into several line items.
- D. Schedule Updating: Update and resubmit Schedule of Values when Change Orders or Construction Change Directives result in change in Contract Sum.

1.03 APPLICATIONS FOR PAYMENT

- A. Coordination: Each application for payment shall be consistent with previous applications and payments as certified by Engineer and paid by Owner.
- B. Application for Payment Forms: AIA Document G702 and Continuation Sheets G703.

- C. Typical Application:
 - 1. Payment Application Times: Each progress payment date is indicated in either the Supplementary Conditions, the Agreement, or as set at the Preconstruction Meeting.
 - 2. Period of Work Covered: Length of time for construction Work covered by each Application for Payment is indicated in the Agreement or as set at the Preconstruction Meeting.
 - 3. Preparation:
 - a. Complete every entry on form, including notarization and execution by person authorized to sign legal documents on behalf of Contractor.
 - b. Incomplete applications will be returned without action.
 - c. Entries must include data on Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
 - d. Include amounts of Change Orders and Construction Change Directives issued prior to last day of construction period covered by application.
 - 4. Transmittal: Submit 4 executed copies of each Application for Payment to Engineer/Construction Manager by means ensuring timely receipt.

1.04 ADDITIONAL REQUIREMENTS

- A. Initial Application for Payment:
 - 1. Applications for Payment will not be considered if copies of required submittals have not been received by Engineer.
- B. Substantial Completion:
 - 1. Administrative actions which must precede or coincide with submittal of Substantial Completion Application for Payment include:
 - a. On-site review with Owner/Engineer/Construction Manager.
 - 2. Following issuance of Certificate of Substantial Completion, submit Application for Payment.
 - 3. Applications for Payment will not be considered if copies of required submittals have not been received by Engineer.
- C. Final Payment Application:
 - 1. Administrative actions which must precede or coincide with submittal of final Application for Payment include:
 - a. Completion of Project requirements.
 - b. Completion of items specified for completion after Substantial Completion.
 - c. Assurance that unsettled claims will be settled.
 - d. Assurance that Work not complete and accepted will be completed without undue delay.
 - e. Removal of temporary facilities and services.
 - f. Removal of surplus materials, rubbish, similar elements.
 - g. Final cleaning.
 - 2. Applications for Payment will not be considered if copies of required submittals have not been received by Engineer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 31 13

COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Project Coordination
 - 2. Job Site Administration

1.02 COORDINATION BY CONTRACT A PRIME CONTRACTOR

- A. Coordinate use of premises under direction of Owner/Construction Manager.
- B. Coordinate scheduling, submittals, and Work to ensure efficient and orderly sequence of installation.
 - 1. Coordinate activities for mutual benefit and cooperate to facilitate the general progress of the Work.
 - 2. Each subcontractor shall be thoroughly familiar with all provisions governing the Work of other contractors, and shall obtain from such contractors all information as may be required to coordinate Work with theirs.
 - 3. Each trade shall perform its Work in proper sequence and arrangement in relation to other activities and shall join his Work to that of others in accordance with the intent of the Drawings and specifications.
 - 4. Each trade shall give due notice and proper information for any special provisions necessary in the placing or setting of Work that may come in contact with Work of other contractors.
- C. Inspect the Contract Documents for Work of others that is inter-related, and afford other trades every reasonable opportunity for the installation of their Work. Coordinate Work of various specification sections having interdependent responsibilities.
- D. Prepare coordination drawings where off-site fabricated products and materials are by separate entities and must accurately interface. Coordination drawings shall indicate how Work, shown by separate Shop Drawings, will interface and shall indicate sequence for installation.
- E. Coordinate space requirements and installation of mechanical and electrical Work.
 - 1. Follow routing shown for pipes, ducts, and conduit as closely as practicable; place runs parallel with line of building.
 - 2. Utilize space efficiently to maximize accessibility for other installations, maintenance, and repairs.
 - 3. Conceal pipes, ducts, and wiring within the construction in finished areas, except as otherwise indicated.
 - 4. Coordinate locations of fixtures and outlets with finish elements.
 - 5. All final decisions as to the right-of-way and run of interfering pipes, ducts, etc., shall be made by Engineer at Project meetings.

1.03 JOB SITE ADMINISTRATION

- A. Supervise and direct the Work. Employ and maintain a full time, qualified supervisor or superintendent to act as Contractor's representative at the Site.
- B. Enforce good order and conduct among contractors, installers, and construction employees.
- C. Require installers to inspect conditions under which Work is to be performed. Installer shall report all unsatisfactory conditions in writing to Contractor. Do not proceed with Work until unsatisfactory conditions have been corrected.

- D. Where installations include manufactured products, comply with manufacturer's applicable instructions and recommendations for installation to the extent that these instructions and recommendations are more explicit or more stringent than requirements indicated in the Contract Documents. Where manufacturer provides contradictory instructions, notify Engineer immediately and request clarifications.
- E. Recheck measurements and dimensions of the Work, as an integral step of starting each installation.
- F. Coordinate enclosure of Work with required inspections and tests, so as to minimize necessity of uncovering Work for that purpose.
- G. Where mounting heights are not indicated, mount individual units of work at industry recognized standard mounting heights for the particular application indicated. Refer questionable mounting height choices to Engineer.
- H. Supervise performance of the Work to ensure that none of the Work, whether completed or in progress, will be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- I. Clean and perform maintenance as frequently as necessary throughout construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Coordinate completion and cleanup of Work.

1.04 SUBMITTALS

- A. Provide listing of Contractor's principal staff assignments and consultants, including name, home and work addresses, and telephone numbers.
- B. Provide supervisor's or superintendent's name, home and work address, and telephone numbers.
- C. Provide names, work address, telephone numbers, samples of signature, and limits of authority of each individual authorized to sign change orders, field modifications, and monthly pay requests for Contractor.

1.05 FIELD CONDITIONS

- A. Before ordering material or commencing Work, check and verify all dimensions and conditions. Notify Engineer of any omissions or discrepancies immediately.
- B. Field measurements shall be furnished in a timely manner to suppliers and fabricators who require them to complete their Work. Ascertain the requirement for such measurements at the earliest practical date and make every reasonable effort to expedite the affected Work.
- C. Conflicts: Engineer has exercised reasonable professional care to ensure there are no conflicts between the Work of the various trades. Such conflicts, however, may exist and no warranty to the contrary is made or implied.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 31 19

PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Procedures for Administration of Project Meetings:
 - 1. Preconstruction Conference
 - 2. Progress Meetings
 - 3. Preinstallation Conferences

- B. Related Sections:
 - 1. Section 01 31 13 - Coordination
 - 2. Section 01 33 00 - Submittal Procedures

1.02 PRECONSTRUCTION/SITE MOBILIZATION CONFERENCE

- A. Scheduled by Owner/Construction Manager at Site after Notice of Award, prior to commencement of construction for:
 - 1. Execution of Owner-Contractor Agreement and exchange of preliminary submittals if not previously completed.
 - 2. Clarification of Owner and Contractor responsibilities in use of the Site and review of administrative procedures.

- B. Attendees: Owner, Engineer, Consultants, Contractors, major subcontractors, other concerned parties represented by persons familiar with and authorized to conclude matters relating to Work.

- C. Agenda:
 - 1. Items of significance that could affect progress including, but not limited to:
 - a. Submittal of executed bonds and insurance certificates.
 - b. Execution of Owner-Contractor Agreement if not previously completed.
 - c. Distribution of Contract Documents.
 - d. Use of premises by Owner and Contractor:
 - 1) Owner's requirements and occupancy.
 - 2) Construction facilities provided by Owner (if any).
 - 3) Temporary utilities provided by Owner (if any).
 - 4) Use of premises office, work, and storage areas.
 - e. Security and housekeeping procedures.
 - f. Submittals:
 - 1) Final list of subcontractors, suppliers, products.
 - 2) Schedule of Values.
 - 3) Progress Schedule.
 - 4) Designation of responsible personnel:
 - a) Contractor's principal staff and consultants.
 - b) Contractor's superintendent or job foreman acting as Contractor's Site representative.
 - c) Owner's and Contractor's designated individuals authorized to sign Change Orders, field modifications, and monthly pay requests.
 - g. Procedures for processing:
 - 1) Field decisions.
 - 2) Submittals:
 - a) Shop Drawings.
 - b) Product Data.
 - c) Samples.
 - 3) Substitutions.

- 4) Applications for Payments.
- 5) Proposal requests.
- 6) Change Orders.
- 7) Contract Closeout.
- h. Schedules:
 - 1) Tentative construction schedule.
 - 2) Critical Work sequencing.
 - 3) Progress meetings.
- i. Procedures for testing.
- j. Procedures for maintaining Record Documents.
- k. Requirements for startup of equipment: Inspection and acceptance of equipment put into service during construction period.
- l. Equipment deliveries and priorities.
- m. Contractor responsibilities:
 - 1) Safety procedures.
 - 2) First aid.

1.03 PROGRESS MEETINGS

- A. Contract A Prime Contractor with Construction Manager:
 - 1. Schedule and administer weekly construction progress meetings throughout progress of Work.
 - 2. Make physical arrangements, prepare agenda and distribute with notice of each meeting to participants and to Engineer, 4 days in advance of meeting date.
 - 3. Preside at meetings, record meetings and distribute copies (2 to Engineer) within 2 days to participants, and entities affected by decisions at the meetings.
 - 4. If Contractor does not preside, record, and distribute meeting notes, Engineer will do so at Engineer's standard hourly rate submitted to Owner. An equivalent amount will be deleted from Contract by Construction Change Directive.
- B. Attendees:
 - 1. Contractor, job superintendent/Construction Manager, subcontractors and suppliers, other entity concerned with current progress or involved in planning, coordination or performance of future activities; Owner, Engineer, professional consultants as appropriate to agenda.
 - 2. Attendees shall be familiar with Project and authorized to conclude matters relating to progress.
- C. Agenda:
 - 1. Items of significance that could affect progress, including topics for discussion as appropriate to current status of Project, minimally:
 - a. Approval of minutes of last meeting.
 - b. Review of Work progress.
 - c. Field observations, problems and decisions.
 - d. Identifications of problems which impede planned progress.
 - e. Review of submittal schedule and status of submittals.
 - f. Review of off-site fabrication and delivery schedules.
 - g. Maintenance of progress schedule.
 - h. Corrective measures to regain projected schedules.
 - i. Planned progress during succeeding Work period.
 - j. Coordination of projected progress.
 - k. Maintenance of quality and work standards.
 - l. Effect of proposed changes on progress schedule and coordination.
 - m. Other business relating to Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 32 16
PROGRESS SCHEDULES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Format
 - 2. Content
 - 3. Revisions to Schedules
 - 4. Submittals

- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 29 10 - Applications for Payment
 - 3. Section 01 33 00 - Submittal Procedures

1.02 FORMAT

- A. Prepare schedules as a horizontal bar chart with separate bar for each major portion of Work or Operation, identifying first workday of each week.

- B. Sequence of Listings: The Table of Contents of this Project Manual. The chronological order of the start of each item of work.

- C. Scale and Spacing: To provide space for notations and revisions.

- D. Sheet Size: Minimum 11 by 17 inches. Multiples of 8-1/2 by 11 inches.

1.03 CONTENT

- A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

- B. Identify each item by specification section number.

- C. Identify Work of separate stages, separate floors, and other logically grouped activities.

- D. Provide sub-schedules to define critical portions of the entire schedule.

- E. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

- F. Provide separate schedule of submittal dates for Shop Drawings, Product Data, and Samples, including Owner furnished products and products identified under Allowances, and dates reviewed. Submittals will be required from Engineer. Indicate decision date for selection of finishes.

- G. Indicate delivery dates for Owner furnished products and products identified under Allowances.

1.04 REVISIONS TO SCHEDULES

- A. Indicate progress of each activity to date of submittal, and projected completion date of each activity.

- B. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.

- C. Provide narrative report to define problem areas, anticipated delays, and impact on schedule. Report corrective action taken, or proposed, and its effect including the effect of changes on schedules of separate contractors.

1.05 SUBMITTALS

- A. Submit initial schedules within 10 days after date of Owner-Contractor Agreement. After review, resubmit required revised data within 10 days.
- B. Submit revised Progress Schedule with each Application for Payment.
- C. Submit 4 copies which will be retained by Engineer.
- D. Distribute copies of reviewed schedules to Site file, subcontractors, suppliers, and other concerned parties.
- E. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements Included:
 - 1. Procedures
 - 2. Shop Drawings
 - 3. Product Data
 - 4. List of Proposed Subcontractors
 - 5. List of Proposed Suppliers
 - 6. Material Safety Data Sheets

1.02 PROCEDURES

- A. Deliver submittals to Engineer at address listed in Project Manual with a Transmittal.
- B. Transmit each item under Engineer-accepted form.
 - 1. Identify Project, Contractor, subcontractor, major supplier.
 - 2. Identify pertinent Drawing sheet and detail number, and specification Section number.
 - 3. Identify deviations from Contract Documents.
 - 4. Provide space for Engineer and consultant review stamps.
- C. Submit initial progress schedules and schedule of values in duplicate within 10 days after date of Owner-Contractor Agreement. After review by Engineer, revise and resubmit as required.
- D. Submit revised schedules with each Application for Payment, reflecting changes since previous submittal.
- E. Comply with progress schedule for submittals related to Work progress. Coordinate submittal of related items.
- F. After Engineer review of submittal, revise and resubmit as required, identifying changes made since previous submittal.
- G. Distribute copies of reviewed submittals to concerned persons. Instruct recipients to promptly report any inability to comply with provisions.

1.03 SHOP DRAWINGS

- A. Shop Drawings will not be accepted for review by Engineer until after they have been checked and approved by the Contractor as evidenced by his approval stamp and signature.
- B. Submit the number of opaque reproductions Contractor requires, plus 4 copies that will be retained by Engineer, plus copies to be included by Contractor in O&M Manuals.

1.04 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, testing compliance, warranty, and other data; supplement manufacturers' standard data to provide information unique to the Work.
- B. Submit the number of copies which Contractor requires plus 4 copies that will be retained by Engineer, plus copies to be included by Contractor in O&M Manuals.

1.05 LIST OF PROPOSED SUBCONTRACTORS

- A. Submit a list of subcontractors who will provide Work on the Project.
- B. The submitted list shall include:
 - 1. Name of Subcontractor
 - 2. Address
 - 3. Type of work to be provided
 - 4. Contact list for administrative and supervisory personnel.

1.06 LIST OF PROPOSED SUPPLIERS

- A. Submit a list of suppliers who will provide materials, equipment or components principle to the Work.
- B. The submitted list should include:
 - 1. Name of supplier.
 - 2. Address.
 - 3. Equipment, material or component to be provided.
 - 4. Contact list for administrative and supervisory personnel.

1.07 MATERIAL SAFETY DATA SHEETS

- A. Submit MSDS to the Site on all products with chemical emissions and as called for in individual technical sections.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Selection and Payment
 - 2. Quality Assurance
 - 3. Contractor Submittals
 - 4. Laboratory Responsibilities
 - 5. Laboratory Reports
 - 6. Limits on Testing Laboratory Authority
 - 7. Contractor Responsibilities
 - 8. Schedule of Inspections and Tests
 - 9. Retesting

- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures: Manufacturer's certificates
 - 2. Section 01 77 00 - Closeout Procedures: Project Record Documents

- C. Individual Specification Sections: Inspections and tests required, and standards for testing.

1.02 REFERENCES

- A. ANSI/ASTM:
 - 1. D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
 - 2. E329 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction

1.03 SELECTION AND PAYMENT

- A. Contractor shall employ and pay for services of an independent testing laboratory to perform specified inspection and testing.

- B. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

1.04 QUALITY ASSURANCE

- A. Comply with requirements of ANSI/ASTM D3740 and ANSI/ ASTM E329.

- B. Laboratory: Authorized to operate in state in which Project is located.

- C. Laboratory Staff: Maintain a full time registered Engineer specialist on staff to review services.

- D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Institute of Standards and Technology (NIST) Standards or accepted values of natural physical constants.

1.05 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer specialist and responsible officer.

- B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Institute of Standards and Technology (NIST) during most recent tour of inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.06 LABORATORY RESPONSIBILITIES

- A. Test samples of mixes submitted by Contractor.
- B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
- C. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or Products.
- F. Perform additional inspections and tests required by Engineer.
- G. Attend preconstruction conferences and progress meetings.

1.07 LABORATORY REPORTS

- A. After each inspection and test, promptly submit two copies of laboratory report to Engineer, and to Contractor.
- B. Include:
 - 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 the Project.
 - 7. Type of inspection or test.
 - 8. Date of test.
 - 9. Results of tests.
 - 10. Conformance with Contract Documents.
- C. When requested by Engineer, provide interpretation of test results.

1.08 LIMITS ON TESTING LABORATORY AUTHORITY

- A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Laboratory may not approve or accept any portion of the Work.
- C. Laboratory may not assume any duties of Contractor.
- D. Laboratory has no authority to stop the Work.

1.09 CONTRACTOR RESPONSIBILITIES

- A. Deliver to laboratory at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
- B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.

- C. Provide incidental labor and facilities to provide access to Work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.
- D. Notify Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.
- E. Pay costs of testing laboratory
- F. Employ services of a qualified testing laboratory. Arrange with laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.10 SCHEDULE OF INSPECTIONS AND TESTS

- A. Provide laboratory testing in accordance with the attached schedule.

1.11 RETESTING

- A. Where results of quality control services prove unsatisfactory and do not indicate compliance of related work with requirements of the contract documents, retests are responsibility of Contractor, regardless of whether the original test was Contractor's responsibility. Retesting will be at the rate of 2 retests for each failed test. Retest of work revised or replaced by Contractor is Contractor's responsibility. Retesting costs invoiced to the Owner will be deducted from Contract amount by Supplemental Agreement.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

Quality Control Testing Schedule

Material Type	Specification	Test Method	Location	Responsibility	Frequency
Fine Filter Aggregate (1)	Mn/DOT 3149.2J	ASTM: C117/C136 D698	source	Contractor	One per source and every 1,000 cy
Coarse Filter Aggregate(2)	Mn/DOT 3149.2H	ASTM: C117/C136 D698	source	Contractor	One per source and every 1,000 cy
Granular Bedding (3)	Mn/DOT 3149.2F	ASTM: C117/C136 D698	source	Contractor	One per source and every 1,000 cy
Select Granular Material (4)	Mn/DOT 3149.2B2	ASTM: C117/C136 D698	source	Contractor	One per source and every 1,000 cy
Grading Material (5)	Liquid Limit <50% Organic content < 2% free of debris, cobbles and boulders	ASTM: C117/C136 D4318 D698	Material from Project Site	Testing Agency	Test per change in material composition
Excavation Backfill					
Type 1, 2, 3, and 4	Backfill for Bedding/Structure support	ASTM: D6938-08	Compaction 95% Standard Proctor adjacent to structures; 100% beneath footings.	Testing Agency	One test per 200 lf of pipe or One test per 50 lf of wall/structure per 2 foot depth
Backfill Above Pipe Zone	Areas beneath grass/ditches	ASTM: D6938-08	Minimum Compaction 90% of Standard Proctor D698	Testing Agency	One test per 200 lf of pipe per 2 foot lift
Backfill above Pipe Zone	Areas beneath or near pavements	ASTM: D6938-08	Compaction 100% Standard Proctor in the upper 3-foot of subgrade; 95% below this.	Testing Agency	One test per 100 lf per one foot lift

END OF SECTION

SECTION 01 51 36
TEMPORARY WATER

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Availability of Water for Construction.

1.02 DESCRIPTION

- A. Water is available from the City of Duluth.
- B. City will establish rates and conditions.
- C. Piping shall be the responsibility of the Contractor.
- D. Keep water use to minimum and consistent with needs.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 52 13

FIELD OFFICE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes furnishing and maintaining field office for use by Contractor, subcontractors, and Engineer during construction operations.
- B. Related Sections:
 - 1. Section 01 11 00 - Summary of Work
 - 2. Section 01 51 00 - Temporary Utilities
 - 3. Section 01 71 13 - Mobilization
- C. Basis of Payment: Incidental to Mobilization.

1.02 DESCRIPTION

- A. Basic Requirements:
 - 1. Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations, with steps and landings at entrance doors.
 - 2. Minimum 8-foot wide and 7-foot ceiling height.
 - 3. Minimum 120 square feet of usable space.
 - 4. Weatherproof and insulated.
 - 5. Finished interior walls.
 - 6. Heating and air conditioning system.
 - 7. Electrical service.
 - 8. Lighting: 50-foot C at desktop height and exterior lighting at entrance doors.
- B. Furnishings:
 - 1. Desk and chair.
 - 2. Flat surface large enough to examine Construction Documents.
 - 3. Drawing rack.
 - 4. Conference table and chairs to seat at least 6 persons.
 - 5. Telephone.
 - 6. Answering machine.
 - 7. Wastebasket.
 - 8. Potable water supply.
 - 9. Fire extinguisher.
 - 10. Six adjustable-band protective helmets for visitors.
 - 11. One 10-inch outdoor weather thermometer.

1.03 LOCATION

- A. Locate to provide convenient access to construction Site and as provided on Drawings or determined in field by Engineer.
- B. Subject to Owner's approval.
- C. Existing facilities shall not be used for field offices.

1.04 SCHEDULE

- A. Provide facility and services upon commencement of construction or within 10 days after date fixed in Notice to Proceed.

B. Remove building, utilities, and foundation upon completion and acceptance of Work. Restore area.

1.05 MAINTENANCE

A. Maintain, clean, and repair field office and services to ensure proper working order throughout the duration of construction operations.

B. Maintain approach walks free of mud, water, and snow.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 52 19

TEMPORARY SANITARY FACILITIES

PART 1 GENERAL

1.01 SUMMARY

- A. Provide temporary closet or privy.
- B. Maintain throughout Project duration.
- C. Type and location subject to Engineer's approval.
- D. Remove upon completion of Project.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

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SECTION 01 55 25

MAINTENANCE OF TRAFFIC

PART 1 GENERAL

1.01 SUMMARY

- A. Temporary procedures and equipment for safely maintaining and controlling traffic within and near Site during construction.
- B. Method of Measurement:
 - 1. Measure all required procedures and equipment on a Lump Sum basis, except as otherwise noted.
 - 2. Procedural and equipment revisions resulting from minor changes or field adjustments will be considered incidental.
- C. Basis of Payment:
 - 1. Payment for temporary maintenance of traffic shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.
 - 2. Progress payment amounts will be determined by percentage of total Work completed based on the following schedule:

<u>Percent of Contract Completed</u>	<u>Percent of Item Paid</u>
5	15
25	40
50	70
75	90
100	(Final) 100

1.02 SUBMITTALS

- A. Preconstruction:
 - 1. Traffic Control Plan.
 - 2. Names, addresses, and phone numbers of 2 local persons who will respond to requests for maintenance.
- B. At least 24 hours prior to construction and upon request, present all traffic control devices intended for use on the Project to Engineer to ensure conformance with MN MUTCD and MnDOT Standard Signs Manual.

1.03 QUALITY ASSURANCE

- A. Permits: All work shall be in accordance with **MnDOT Permit 1A-UL-2014-64029. (See Appendix)**
- B. Operations: Conduct all operations in accordance with the MN MUTCD and Field Manual for Temporary Traffic Control Zone Layouts.

1.04 SEQUENCING AND SCHEDULING

- A. Restrictions:
 - 1. Work which interferes with traffic operations shall not be performed during the following times:
 - a. From 12:00 noon on day before to 9:00 a.m. on day following any consecutive combinations of Saturday, Sunday, and legal holiday.
 - 2. Inclement Weather: Lane closures will not be permitted during inclement weather or when Engineer determines such closure will be a hazard to traffic.

3. Nighttime Work, approved in advance by Engineer:
 - a. Provide adequate lighting as necessary to supplement or replace existing street lighting so Work, personnel, equipment, traffic control devices, and flaggers are visible to motorists.
 - b. Workers shall wear reflectorized jumpsuits during nighttime construction.
4. Railroads: No Work shall be done on railroad property without the proper railroad agency approval, permit, and notification.
5. The previous restrictions may be modified as necessary to ensure safe traffic operations.

1.05 TRAFFIC CONTROL PLAN

- A. Submit an overall Traffic Control Plan for approval within 10 days after award of Contract and 5 days prior to initiating any construction.

1.06 INSPECTION AND MAINTENANCE

- A. Maintain traffic control devices on a 24-hour basis throughout term of the Contract, including Work suspensions.
 1. Repair or replace as necessary:
 - a. Devices that are damaged or moved.
 - b. Lights that cease to function properly.
 - c. Barricade weights that are damaged or fail to stabilize barricade.
- B. Inspection:
 1. Check devices twice daily, including end of workday.
 2. Conduct 1 night (after work hours) inspection of devices each week.
 3. Immediately correct deficiencies in alignment visibility and reflectivity.
- C. Notice:
 1. Furnish names, addresses, and phone numbers of 2 local persons who will respond to requests for maintenance to the following:
 - a. Engineer.
 - b. City Police Department.
 - c. City Public Works Department.
 - d. MnDOT Dispatcher at Duluth.
- D. Provide a means of receiving maintenance requests on a 24-hour basis.
- E. Respond to maintenance requests within 2 hours. Failure to respond to maintenance requests will result in Work being completed by Owner with twice the cost thereof being deducted from any monies due Contractor.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Signs:
 1. Provide required signs in accordance with MN MUTCD, MnDOT Standard Signs Manual, Minnesota Traffic Engineering Manual, Field Manual, Drawings, and as approved by Engineer.
 2. Retroreflective Sheeting:
 - a. Fabricate all temporary rigid orange warning and rigid orange guide signs with either Type HP FLO (High Performance Fluorescent Sign Sheeting for Rigid Temporary or Permanent Signs) or Sign Sheeting for Rigid Temporary Fluorescent Orange Signs, and Markers (Type IX FLOW).
 - b. Fabricate all rigid signs installed, other than those with orange backgrounds, on a temporary basis with Type HP (High Performance Sheeting for Rigid Permanent Signs) or Sign Sheeting for Rigid Permanent Signs, Delineators, and Markers (Type IX).
 - c. Inplace signs that still apply during temporary operations may remain in place with no change in sign sheeting required.

3. Advance Signing Notice: Provide 10 calendar days advance signing notice, as follows:
 - a. Closure notice (G20-X1) signs on road to be closed to traffic.
 - b. Work Zone Advance notice (G2-X2) signs where noted in Paragraph 3.01 of this Section.
 - c. Alternatives to sign G20-X2 will be allowed if approved by Engineer.
 4. Size, legend, and layout of signs shall be approved by Engineer prior to sign manufacture.
- B. Barricades:
1. Provide 8-foot, Type III barricades in accordance with current MnDOT Standard Plate 8000I.
 2. Provide at least 1 Type III barricade in a closed lane for every 1,000 feet of lane closure.
- C. Barriers: Provide temporary portable precast concrete barriers in accordance with current MnDOT Standard Plate 8337C.
- D. Channelizing Devices: Provide channelizing devices in accordance with MN MUTCD Section 6F.63, and Minnesota Traffic Engineering Manual 8-5.04.
- E. Ballast:
1. Sandbags will be the only acceptable weight to stabilize traffic control devices.
 2. During freezing conditions, mix sand for bags and impact barrels with a deicer to prevent sand from freezing.
 3. Place sandbags on each foot of traffic control device as needed to be stabilized.
- F. Extra Materials:
1. In addition to traffic control devices approved by Engineer prior to each stage of construction, or as shown in Traffic Control Drawings, Engineer may require more traffic control as traffic conditions warrant.
- G. Flashing Arrow Panels: Provide in accordance with MN MUTCD, and Minnesota Traffic Engineering Manual 8-5.09.
- H. Portable Changeable Message Sign: Provide in accordance with Minnesota Traffic Engineering Manual 8-5.08.
- I. Pavement Markings: Provide pavement markings in accordance with MN MUTCD and Minnesota Traffic Engineering Manual.

PART 3 EXECUTION

3.01 SCHEDULE OF WORK

- A. Comply with traffic control requirements of MnDOT permit.

3.02 PREPARATION

- A. Conduct operations to allow continual fire and police access to all areas within Project.
- B. Inplace Facilities:
1. Signs:
 - a. Do not remove signs unless authorized by Engineer.
 - b. Carefully remove and store designated signs and posts for reinstallation.
 - c. Replace signs and posts damaged or lost during removal or construction.
 - d. Relocate or temporarily mount and maintain required regulatory, warning, guide, and street name signs along streets that remain open to traffic.
 - e. Reinstall all signs not being replaced in accordance with MN MUTCD and Minnesota Traffic Engineering Manual.

2. Mailboxes:
 - a. Prior to proceeding with any Work, relocate any mail and other delivery boxes within construction area and as designated by Engineer, to a location that will allow delivery during construction.
 - b. Remove and place on homeowner's property mailboxes designated by Engineer. Homeowner is responsible for postal service during construction.
 - c. Postal service and other affected delivery services shall approve all locations and installations.
 - d. Temporary mailbox banks may be utilized in accordance with the following:
 - 1) Accessible to postal service and postal recipient at all times.
 - 2) Numerous mailbox banks may be utilized to minimize distances from postal recipients.
 - 3) Provide materials to construct temporary mailbox banks.
 - e. Property owner's posts, cross members, and mailboxes not used during temporary relocation shall be properly stored by Contractor.
 - f. If postal delivery is not achieved, Work shall stop immediately and remain stopped until the situation is corrected.
3. Pavement Markings:
 - a. For long-term lane closures and traffic shifts, remove all pavement markings that conflict with temporary traffic control operations in accordance with MnDOT 2102.
 - b. Removal and replacement of these pavement markings shall be considered incidental to Traffic Control.

3.03 INSTALLATION

- A. For signs that will be in-place for longer than 30 days, mount signs on posts driven into ground at proper height and lateral offset as detailed in MN MUTCD. For signs in-place for less than 30 days, or if this is not possible, maintain signs on portable supports or barricades.
- B. Signs shall not be mounted on metal drums.
- C. Placement of signs and barricades shall proceed in direction of traffic flow.
- D. Cover traffic control devices inconsistent with traffic patterns.

3.04 TRAFFIC PROTECTION

- A. Do not deposit, store materials, or park equipment on or adjacent to any roadway open to traffic that will interfere with safe flow of traffic.
- B. Keep roadways that are open to traffic free from earth materials and debris.
- C. During construction, provide devices to protect traffic and pedestrians from drop-offs, openings, falling objects, splatter or other hazards.
 1. Open excavations/drop-offs adjacent to traveled roadway:
 - a. Schedule operations so as to minimize traffic exposure to uneven lanes, milled edges, and edge drop-offs.
 - b. Close a traffic lane, auxiliary lane, or shoulder on any road open to traffic when construction operations cause a drop-off greater than 4 inches adjacent to that lane or shoulder, unless adequately protected by traffic barrier.
 - c. Sign and delineate any drop-off less than 4 inches caused by construction operations, as shown in the Field Manual.
 - d. When excavations on roadways open to traffic exceed 1 foot in depth:
 - 1) Provide continuous portable concrete barriers for entire length of excavation.
 - 2) Include suitable end treatment consisting of tapered barrier sections, impact attenuators, or combination thereof.
 - 3) Place warning lights at 50-foot intervals.
 - e. Place portable concrete barriers with end treatments according to Part 6 of the MN MUTCD and AASHTO's "Roadside Design Guide."

2. In lieu of precast concrete barrier, barrels and barricades may be used during construction, as approved by Engineer, provided that:
 - a. Construction work is actively done in or directly adjacent to excavation.
 - b. Workers are present.
 - c. It is daylight hours; or, if nighttime hours, there is additional lighting of the open excavation.
 - d. Traffic is in a single lane (alternating) or a single lane in each direction with parking removed.
 - e. Barrels or barricades can be set outside the minimum widths required for traffic and at intervals as directed by Engineer.

D. Pedestrian Access and Traffic:

1. Provide continuous access to all adjacent residences and businesses.
2. Provide temporary boardwalk where in-place sidewalk is removed.
3. When access to business entrances is prohibited, coordinate with business owners to provide protection and direction for alternate entrances.
4. Provide signs, barricades, flasher, snow fence or other devices as required to protect pedestrians adjacent to Work.
5. Cover newly poured concrete sidewalk with plywood after curing compound is applied to provide access at business entrances.

3.05 REMOVAL OF DEVICES

- A. After signs are removed, remove sign posts as soon as possible.
- B. Removal of signs and barricades shall start at the end of construction areas and proceed toward oncoming traffic, unless otherwise directed by Engineer.

3.06 RESTORATION AND ADJUSTMENT

- A. Replace any device found to be defective.
- B. Replace reflective material on both new and used traffic control devices whose effectiveness, in Engineer's opinion, has been substantially reduced from traffic or other causes.
- C. Keep traffic control signs and devices furnished in legible condition, including removing any grime deposited on devices by traffic, natural causes, or by nature of Work being performed.
- D. Relocate any traffic control device that is misplaced due to Contractor or subcontractor operations.
- E. Following construction, reinstall mail and other delivery boxes in convenient locations and in compliance with United States Postal Service (USPS) regulations.
 1. Replace any box or supporting member that is damaged during construction.
 2. Permanent installation shall be acceptable to postal service, delivery service, and property owner.

END OF SECTION

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SECTION 01 57 12

STORMWATER MANAGEMENT AND EROSION CONTROL (MnDOT 1717.2)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes temporary and permanent prevention and control of soil erosion.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 32 92 30 - Turf Restoration
- C. Basis of Payment:
 - 1. All expenses shall be borne by Contractor with no direct compensation.
 - 2. Failure to comply with established erosion control measures will result in withholding of progress payments by Owner.

1.02 REFERENCES

- A. MnDOT 1717.2 - Stormwater Management and Erosion Control
- B. MPCA:
 - 1. Protecting Water Quality in Urban Areas, 2000
 - 2. Minnesota Stormwater Manual

1.03 SUBMITTALS

- A. Site plan and schedule for accomplishment of Work within, adjacent to, or affecting surface water.
- B. Submit erosion control schedule weekly to Engineer.
 - 1. Proposed installations and timing of installation.
 - 2. Grading operations and incorporation of erosion control.
 - 3. Repair or maintenance required on erosion control installations.
 - 4. Proposed measures during periods of suspension of Work.
- C. State of Minnesota, Form MN R100001 - NPDES Permit.

1.04 QUALITY ASSURANCE

- A. Refer to "Protecting Water Quality in Urban Areas - Best Management Practices for Minnesota.
- B. For operations that disturb 1 acre or more of land area, submit Form MN R100001 at least 7 days prior to start of construction.
 - 1. Conduct inspections required in NPDES permit.
 - 2. Maintain NPDES inspection log.
 - 3. Complete and attach SWPPP to NPDES permit. Keep copy on Site. See MPCA website for more information: www.pca.state.mn.us.
- C. Obtain all necessary permits from the responsible regulatory agencies.
 - 1. For erosion control measures not shown on Drawings.
 - 2. Before working in surface waters.

1.05 SEQUENCING AND SCHEDULING

- A. Construct drainage facilities and turf establishment concurrently with earthwork operation.
- B. Complete construction and finishing operation on a drainage area basis to minimize erosion.
- C. Incorporate erosion control measures at the earliest practical time during construction.
- D. Install erosion control measures as directed prior to disturbance of in-place ground cover in critical areas that are tributary to public waters.

1.06 EMERGENCY EROSION CONTROL

- A. Emergency Basis:
 - 1. Sudden occurrence of a serious and urgent nature that is beyond normal maintenance of erosion control items and which requires immediate mobilization and movement of necessary personnel, equipment, and materials to emergency site.
 - 2. Emergency will require immediate corrective Work followed by installation of erosion control measures.
- B. Mobilization: Within 24 hours of notice by Engineer.

1.07 MAINTENANCE

- A. Maintain all erosion control facilities to provide proper function throughout Project.
- B. Should Contractor fail to maintain erosion control measured specified, Owner may hire another firm to maintain the erosion control measures. Costs associated with hiring another firm will be deducted from Contract amount.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Ensure minimum interference with roads, streets, walks, adjacent occupied or used facilities. Do not close or obstruct without permission from authorities having jurisdiction.
- B. Shape exposed soil areas to permit runoff with minimal erosion.
- C. Install safeguards to prevent water pollution from haul roads, work platforms or other temporary construction facilities.
- D. Restore all plant, equipment, or other supplementary operation sites to prevent siltation and erosion.
- E. Repair any off-site damage resulting from failure to install or maintain erosion control measures.

3.02 PROTECTION

- A. Contractor is advised to refer to "Protecting Water Quality in Urban Areas."

END OF SECTION

SECTION 01 57 19

AIR, LAND, AND WATER POLLUTION (MnDOT 1717)

PART 1 GENERAL

1.01 SUMMARY

- A. Provide control of pollution from construction sites and related activities.
- B. Related Sections:
 - 1. Section 01 57 12 - Stormwater Management and Erosion Control
- C. Basis of Payment:
 - 1. No direct payment will be made. All activities required by or relating to this section will be considered incidental.
 - 2. No additional compensation or time extension will be granted due to actions brought against the Contractor for failure to comply with pollution control requirements.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conduct all operations to prevent, control and abate the pollution of air, land and water in accordance with the rules, regulations and standards adopted and established by the following agencies:
 - a. Minnesota Department of Natural Resources
 - b. Minnesota Pollution Control Agency
 - c. Minnesota Department of Transportation
 - d. U.S. Army Corps of Engineers

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PROTECTION OF WATERS

- A. Schedule and conduct all operations to minimize soil erosion and prevent siltation and the resultant turbidity of public waters.
- B. Prevent pollution of flowing or impounded waters from particulate or liquid matter that may be harmful to fish and wildlife or detrimental to public use.
- C. Remove sediment from aggregate wash operations by filtration or settlement prior to discharge into public waters.
- D. Do not discharge wash water or waste from concrete mixing operations into streams or public waters.

3.02 SPECIAL REQUIREMENTS

- A. Minimize crossing of streams and rivers with hauling equipment.
- B. Provide temporary bridging where stream crossings are necessary.

C. Remove temporary bridging as soon as crossings are no longer necessary.

END OF SECTION

SECTION 01 58 13

PROJECT SIGNS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Provide 2 Project identification signs.
- B. Related Sections:
 - 1. Section 01 33 00 - Submittal Procedures

1.02 DESIGN REQUIREMENTS

- A. Professionally designed and lettered sign including the following information:
 - 1. Name of Project, 3-inch high letters.
 - 2. Name of Owner, 1-3/4-inch letters.
 - 3. Name of Financier, 1-3/4-inch letters.
 - 4. SEH, Duluth 1-3/4-inch letters.
 - 5. FJJ, Duluth 1-3/4-inch letters.
 - 6. Name of Contractor, 1-3/4-inch letters:
 - a. Address.
 - b. Phone Number.

1.03 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Submit Shop Drawings showing content, layout, lettering, colors, sizes, and grades of members.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Structure and Framing: New wood, structurally adequate.
- B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4-inch thick standard large sizes to minimize joints.
- C. 8-foot by 4-foot.
- D. Rough Hardware: Galvanized.
- E. Paint and Primers: Exterior quality, 2 coats; sign background of color as selected.
- F. Lettering:
 - 1. Exterior quality paint, contrasting colors as selected.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install at Project entrance locations as shown on Drawings or designated by Engineer.

- B. Install signs within 30 days after date fixed by Notice to Proceed.
- C. Erect supports and framing on secure foundation, free standing, rigidly braced and framed to resist wind loadings of 50 mph.
- D. Install sign surface plumb and level, with butt joints. Anchor securely.
- E. Paint exposed surfaces of sign, supports, and framing.

3.02 MAINTENANCE

- A. Maintain signs and supports clean. Repair deterioration and damage.

3.03 REMOVAL

- A. Remove signs, framing, supports, and foundations at completion of Project and restore area.

END OF SECTION

SECTION 01 71 13

**MOBILIZATION
(MnDOT 2021)**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes preparatory Work for construction operations.
- B. Related Sections:
 - 1. Section 01 52 13 - Field Office
 - 2. Section 01 52 19 - Temporary Sanitary Facilities
 - 3. Section 01 58 13 - Project Signs
- C. Basis of Payment:
 - 1. Payment for mobilization shall be at the contract unit price as listed on the Bid Form. Additional mobilizations that may be required for specific work items or to conform to the provisions of the Contract Times shall be included in this item.
 - 2. Payment will be made as follows:

Cost Percent of Contract Completed	Percent of Mobilization Item Paid
10	50
30	75
50	95
100	(Final) 100

1.02 REFERENCES

- A. MnDOT 2021 - Mobilization

1.03 PERFORMANCE REQUIREMENTS

- A. Movement of personnel, equipment, supplies, and incidentals to the Site.
- B. Establishment of Contractor offices and facilities.
- C. Installation of temporary sanitary facilities.
- D. Installation of Project signs.
- E. Erection of a field office.
- F. Commencement of Work.

1.04 SUBMITTALS

- A. Required Submittals Prior to Mobilization:
 - 1. Approved Project Schedule.
 - 2. Shop Drawing Schedule.
 - 3. List of Proposed Subcontractors.
 - 4. List of Proposed Suppliers.
 - 5. Material and Procedural Submittals as Required.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

- A. Administrative and procedural requirements for contract closeout, including:
 - 1. Submittals.
 - 2. Inspection procedures.
 - 3. Warranties.
 - 4. Record document submittals.
 - 5. Final cleaning.
 - 6. Pest control.
- B. Related Sections:
 - 1. Section 01 78 23 - Operation and Maintenance Data
 - 2. Specific requirements for individual units of work are included in appropriate technical sections

1.02 SUBSTANTIAL COMPLETION

- A. Complete the following before requesting Engineer's inspection for certification of Substantial Completion for each phase of work. List items that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Obtain, submit releases enabling Owner unrestricted use of the Work and access to services and utilities.
 - 3. Regulatory requirements:
 - a. Where required, obtain occupancy permits, operating certificates, similar releases.
 - b. Obtain elevator inspection from State Inspector.
 - 4. Bonding and insurance:
 - a. Consent of Surety to Reduction In or Partial Release of Retainage.
- B. Inspection Procedures:
 - 1. When prerequisites are complete, submit request in writing to Engineer stating that all requirements are satisfied, and requesting inspection.
 - 2. Upon receipt of Contractor's request for inspection, Engineer/Project Manager will either proceed with inspection or advise Contractor of unfilled prerequisites.
 - 3. Following initial inspection, Engineer will either prepare Certificate of Substantial Completion, or advise Contractor of work which must be performed before certificate will be issued. Engineer will repeat inspection when requested and when assured that work has been substantially completed.
 - 4. Results of completed inspection will form the basis of requirements for Final Acceptance.

1.03 FINAL ACCEPTANCE

- A. Before requesting final inspection for determining date of Final Completion, complete the following:
 - 1. Submittals:
 - a. Certificate of Substantial Completion.
 - b. Contractor's Affidavit of Payment of Debts and Claims.
 - c. Contractor's Affidavit of Release of Liens.
 - d. Consent of Surety (if Performance Bond provided).
 - 1) To Partial Release of Retainage.
 - 2) To Final Payment.
 - e. Assurance that unsettled claims will be settled.
 - f. Proof that fees and similar obligations have been paid.
 - g. Evidence of final, continuing insurance coverage complying with insurance requirements.

- h. Form IC-134, Affidavit for Obtaining Final Settlement of Contract with State of Minnesota and any of its Political or Governmental Subdivisions.
 - i. Certified copy of Engineer's final punch list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance and has been endorsed and dated by Engineer.
- B. Record Drawings: Submit to Engineer a set of record prints marked to show "as-built" conditions for work of contract.
- C. Adjusting:
 - 1. Repair and restore marred exposed finishes.
 - 2. Touch up of painting of marred surfaces.
 - 3. Complete final cleaning requirements.
- D. Final Payment Request:
 - 1. Include certificates of insurance for products and completed operations where required.
 - 2. Updated final statement, accounting for final additional changes to Contract Sum.
 - 3. Final liquidated damages settlement statement, acceptable to Owner.
- E. Re-inspection Procedure:
 - 1. Engineer will re-inspect work upon receipt of notice that work, including punch list items resulting from earlier inspections, has been completed, except for items whose completion has been delayed because of circumstances that are acceptable to Engineer.
 - 2. Engineer will either prepare a certificate of final acceptance, or will advise Contractor of work that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
 - 3. If necessary, re-inspection procedure will be repeated.

1.04 TRANSFER OF SITE TO OWNER

- A. Deliver tools, spare parts, extra materials and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
- B. Change door locks to Owner's access. Advise Owner's personnel of changeover in security provisions.
- C. Advise Owner of changeover in heat and other utilities.
- D. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

PART 2 PRODUCTS

2.01 CLEANING AGENTS

- A. Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned.
- B. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 EXECUTION

3.01 FINAL CLEANING

- A. Conduct cleaning and waste-removal operations to comply with local laws and ordinances, and federal and local environmental and antipollution regulations.

- B. Comply with safety standards for cleaning.
 - 1. Do not burn waste materials.
 - 2. Do not bury debris or excess materials on Owner's property.
 - 3. Do not discharge volatile, harmful, or dangerous materials into drainage systems.
 - 4. Remove waste materials from Site and dispose of lawfully.

- C. Clean Site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- D. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program.
 - 1. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - 2. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - 3. Remove tools, construction equipment, machinery, and surplus material from Site.
 - 4. Remove snow and ice to provide safe access to building.
 - 5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

END OF SECTION

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SECTION 03 11 00
CONCRETE FORMING

PART 1 GENERAL

1.01 SUMMARY

- A. Section covers Structural Platform drawing sheets S1-S3.
- B. Design and installation of formwork with shoring, bracing and anchorage for cast-in-place concrete.

1.02 REFERENCES

- A. ACI 347 - Recommended Practice for Concrete Formwork

1.03 QUALITY ASSURANCE

- A. The design, engineering, and proper construction of all formwork shall be the responsibility of the Contractor.
- B. Design formwork in accordance with ACI 347.

1.04 PRODUCT HANDLING

- A. Do not store forms or equipment on finished slabs.

PART 2 PRODUCTS

2.01 FORM MATERIAL

- A. Form Facing Material: Smooth faced, undamaged plywood or other panel type material approved by Engineer.
- B. The form facing material shall produce a smooth, hard, uniform texture on the concrete.
- C. The arrangement of the facing material shall be orderly and symmetrical with the number of seams kept to a minimum.
- D. Do not use facing material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface.
- E. Fiber Tube Forms: Continuous laminated fiber tube with exterior moisture protection and non-adhering interior surface similar to "A-Coated Sonotube" as manufactured by Sonoco Products, or approved equal.
- F. Void Forms:
 - 1. Corrugated fiberboard forms impregnated with paraffin, as manufactured by firm regularly engaged in production of corrugated fiberboard forms.
 - 2. Design to safely support dead load of concrete and construction live loads for period of 2 weeks.
 - 3. Design to prevent leakage of concrete or backfill materials and treat to prevent loss of strength and softening of form material due to moisture absorption.
 - 4. Size as shown on Drawings.

2.02 FORM TIES

- A. Form Ties: Factory fabricated, adjustable length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.

- B. The portion of the tie remaining in the concrete after removal of the tie shall be at least 1 inch from the surface of the concrete.
- C. Provide waterseals on all wall ties used in water containment structures and exterior walls.

2.03 FORM COATINGS

- A. Form Coatings or Release Agents: Commercially formulated chemical release agents containing no lubrication oil, conventional form oil, fuel oil, or kerosene. Containers shall have manufacturer's instructions for use printed thereon.
- B. The form coating shall not penetrate, stain, or leave a residual film on the concrete surface and shall not attract dirt or other deleterious material.

2.04 ACCESSORIES

- A. Chamfer Strips: 3/4-inch by 3/4-inch wood or plastic strips.
- B. Provide all anchorages, braces, and special forms required to construct cast-in-place concrete components shown on the Drawings.

PART 3 EXECUTION

3.01 GENERAL

- A. Establish a benchmark in an accessible location and use as a reference point for various construction levels.
- B. Verify lines, levels, and centers before proceeding with formwork.
- C. Insure that dimensions agree with the Drawings. Report any discrepancies to Engineer before proceeding with Work.

3.02 FORMWORK DESIGN

- A. The design and construction of the formwork shall be the responsibility of the Contractor.
- B. Design formwork in accordance with ACI 347.
- C. Formwork shall be designed, erected, supported, braced, and maintained to safely support all vertical and lateral loads that might be applied until such loads can be supported by the concrete structure.
- D. Camber formwork to compensate for anticipated deflections in the formwork prior to hardening of the concrete.
- E. Provide positive means of adjustment of shores and struts.
 - 1. Take up all settlement during concrete placing operations.
 - 2. Securely brace forms against lateral deflections.

3.03 FORMWORK CONSTRUCTION

- A. Provide forms for all concrete work. Do not use earth cuts as forms for vertical surfaces.
- B. Construct forms to conform to slopes, lines, and dimensions shown on the Drawings.
- C. Forms shall be sufficiently tight to prevent loss of mortar from the concrete.
- D. Place chamfer strips at all exposed corners.

- E. Install all required openings, frames, pipe sleeves, cavities, slots, and other embedded items.
- F. Cut all holes in forms required for installation or embedment of concrete reinforcement bars and ties.
- G. Provide sharp clean corners at intersecting planes without visible edges or offsets. Back joints with extra studs or girts to maintain true, square corners.
- H. Provide temporary openings at the base of column forms and wall forms to facilitate cleaning and observation immediately before concrete is placed.
 - 1. Construct closures to ensure a tight fit flush with the adjoining surfaces.
- I. Provide runways for moving equipment.
 - 1. Provide runways with struts or legs and support directly on the formwork.
 - 2. Runways shall not rest on the reinforcing steel.
- J. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris before concrete is placed.
- K. Install Void Forms:
 - 1. Protect from moisture before concrete placement. Store above ground level in dry location.
 - 2. Do not use forms subjected to water, moist soils, or damp storage unless test loaded.
 - 3. Install on surface providing uniform support. Conform to recommendations of manufacturer.
 - 4. Protect from crushing and penetration of form at reinforcing steel supports and at other supports.

3.04 TOLERANCES

- A. Construct formwork so that concrete surfaces will conform with the following tolerances:
 - 1. Variation from Plumb:
 - a. In any 10 feet of length: 1/4 inch.
 - b. Maximum for entire length: 1/2-inch.
 - 2. Variation from the Level or Specified Grade:
 - a. In any 10 feet of length: 1/4 inch.
 - b. Maximum for entire length: 1/2-inch.
 - 3. Variation of the Linear Building Lines from Established Position in Plan and Related Position of Columns, Walls, Grade Beams and Partitions:
 - a. In any 20 feet of length: 1/2-inch.
 - b. Maximum for entire length: 1 inch.
 - 4. Variation in the Sizes and Locations of Sleeves, Floor Openings, and Wall Openings: 1/4-inch plus or minus.
 - 5. Variation in Cross-sectional Dimensions of Columns and Beams and in the Thickness of Slabs and Walls:
 - a. Minus: 1/4-inch.
 - b. Plus: 1/2-inch.
 - 6. Footings (tolerances apply to concrete dimensions only, not to positioning of reinforcing steel):
 - a. Variations in dimensions in plan:
 - 1) Minus: 1/2-inch.
 - 2) Plus: 1 inch.
 - b. Misplacement: 1 inch.
 - c. Thickness:
 - 1) Decrease in thickness: 1/2-inch.
 - 2) Increase in thickness: No limit
 - 7. Variations in Steps:
 - a. In flight of stairs:
 - 1) Rise: 1/8 inch plus or minus.
 - 2) Tread: 1/4 inch plus or minus.
 - b. In consecutive steps:
 - 1) Rise: 1/16 inch plus or minus.
 - 2) Tread: 1/8 inch plus or minus.

3.05 FORM SURFACE PREPARATION

- A. Clean surfaces of forms and embedded material of all accumulated mortar or grout from previous concreting and of all other foreign material before concrete is placed.
- B. Before placing the reinforcing steel or the concrete, cover the surfaces of the forms with an acceptable coating material that will effectively prevent absorption of moisture, prevent bond with the concrete, and not stain the concrete surfaces.
- C. Do not allow form coating material to stand in puddles in the forms.
- D. Form coating material shall not come in contact with hardened concrete against which fresh concrete is to be placed.
- E. Spray form coating on all concrete form surfaces, including wood forms for wall openings, keyway strips, and chamfer strips. Apply coatings in accordance with manufacturer's instructions.

3.06 RE-USE OF FORMS

- A. Clean and repair surfaces of forms to be re-used.
- B. Do not use split, frayed, delaminated, or otherwise damaged form facing material.

3.07 FORM REMOVAL

- A. Time specified below in this Article represents cumulative time during which temperature of concrete is maintained above 50 degree F (10 degree C) and for concrete without set-controlling admixtures. For concrete containing fly ash, increase these times by 10 percent for each 10 percent of fly ash substituted for Portland cement.
- B. Formwork for columns, walls, sides of beams, and other parts not supporting the weight of the concrete may be removed as soon as the concrete has hardened sufficiently to resist damage from removal operations, but not less than 24 hours after completing concrete placement and finishing.
- C. Forms and shoring used to support the weight of concrete in beams, slabs, and other structural members shall not be removed in less than 10 days and not until the concrete has attained 3,500 psi minimum compressive strength. Determine compressive strength by field-cured specimens.
- D. Once forms and shoring supporting beams, slabs, and other structural members have been removed, reshore concrete structural members at each level the same day such that all superimposed loads are uniformly distributed and transferred directly to the foundation through temporary supports.
 - 1. No construction or other live loads shall be permitted on the members, unless sufficient support is in place or concrete has attained full design strength and loads do not exceed the design maximum, as approved by Engineer.
- E. Contractor shall be responsible for all damage resulting from removal of forms or premature overloading of structural members.
- F. Loosen wood forms for wall openings as soon as possible without damage to the concrete.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section applies to Structural Platform drawing sheets S1-S-3.
- B. Furnish and install concrete reinforcement.

1.02 REFERENCES

- A. ACI:
 - 1. 117 - Standard Specifications for Tolerances for Concrete Construction and Materials
 - 2. 301 - Specifications for Structural Concrete for Buildings
 - 3. 315 - Details and Detailing of Concrete Reinforcement
- B. CRSI Manual of Standard Practice

1.03 SUBMITTALS

- A. Submit complete Shop Drawings and bar lists of all material to be furnished and installed under this Section.
 - 1. Show bar sizes, spacings, locations, and quantities of reinforcing and bending details.
- B. Provide Shop Drawings in accordance with ACI 315 and the CRSI Manual of Standard Practice.
 - 1. Show in detail the location, size, spacing, bends, and quantities of each and all reinforcing bars to be placed in the structure.
 - 2. Bars shall have unique identifying labels or marks for each size, length, bend configuration, etc.
- C. Submit Product Data on threaded dowel inserts.
- D. Submit mill certifications for concrete reinforcement at time of delivery.
- E. Submit certification for the epoxy coating at the time of delivery.
 - 1. Documentation of certification data shall come directly from the manufacturing plant's quality control office.
 - 2. Certification data shall contain test data and measurements taken at times and locations approved by Engineer.
 - 3. Monitoring shall be done by personnel not directly involved in production and be sufficient for compliance with approved procedures.

1.04 QUALITY COMPLIANCE

- A. Comply with ACI 117, ACI 301, and ACI 315, except as modified in this Section.

1.05 PRODUCT HANDLING

- A. Deliver reinforcement to the Site bundled, tagged, and marked.
 - 1. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement Drawings.
- B. Store reinforcement at the Site in a manner to prevent damage from drainage and accumulation of dirt and excessive rust.
- C. Do not store reinforcement, supports, or equipment on finished slabs.

- D. Store metal bar supports in a weather-proof shelter.
- E. Repair coating damage due to shipping, handling, and placing with an epoxy paint or equivalent coating material approved by Engineer.
 - 1. Damaged areas shall not exceed 2 percent of the surface area per linear foot of each bar.
 - 2. Coating color fading will not be considered coating damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Reinforcing Bars: Deformed billet steel bars conforming to ASTM A615, Grade 60.
- B. Welded Wire Fabric: Steel wire spot welded at intersections conforming to ASTM A185. Use flat sheets only.
- C. Epoxy-Coated Reinforcing Steel: Conform to ASTM A775.

2.02 ACCESSORIES

- A. Bar Supports for Elevated Slabs, Walls, Columns, and Beams: All bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be plastic protected, conforming to CRSI Class 1 protection for bar supports.
- B. Ground Supported Reinforcing:
 - 1. All supports for ground supported reinforcement shall conform to CRSI Class 1 protection for bar supports.
 - 2. All supports shall be supplied with precast concrete blocks with a minimum bearing surface of 100 sq. inches to prevent the support from sinking.
- C. Tie Wire for Reinforcing Bars: Black annealed wire, 16 gage or heavier.
- D. Tie Wire for Epoxy-Coated Reinforcing Bars: 16 gage or heavier annealed wire epoxy-coated or other polymer approved by Engineer.
- E. Threaded Dowel Inserts: Manufactured of minimum Grade 60 steel and shall be capable of achieving 125 percent of specified yield strength of reinforcement steel for the bar size indicated.
- F. Mechanical Bar Splices:
 - 1. Manufactured of minimum Grade 60 steel.
 - 2. Shall achieve 125 percent of specified yield strength of reinforcement steel for the bar size indicated.
- G. Wire Supports for Epoxy-Coated Reinforcement: Supports shall be coated with dielectric material including epoxy or other polymer for a minimum of 2 inches from the point of contact with epoxy-coated reinforcement.

2.03 FABRICATION

- A. Shop fabricate reinforcing steel to required shapes and dimensions.
- B. Do not rebend or straighten reinforcing steel.
- C. Fabricate bars in accordance with the fabricating tolerances given in ACI 315.

2.04 FINISHES

- A. Epoxy coating shall be applied in a fusion bonded coating plant that has been granted "Certification" by CRSI (Concrete Reinforcing Steel Institute).

PART 3 EXECUTION

3.01 PLACING

- A. Place reinforcing steel in accordance with the Structural Drawings, approved Shop Drawings, and as specified herein.
- B. Reinforcing steel shall have the following concrete cover, unless specifically noted differently on the Drawings:
 - 1. Concrete cast against earth 3 inches.
 - 2. All other concrete 2 inches.
- C. Properly position reinforcing steel and wire it together at intersections and supports to ensure against displacement during concrete placing. Tie all reinforcing steel to wall forms.
- D. Support reinforcing steel for slabs on grade by placing the top of precast concrete blocks, flush with grade, at all locations where chairs are to be located. Place chairs or standees over concrete blocks.
- E. Wire dowels in place before placing concrete.
- F. Place and tie all reinforcing steel before concrete is placed.
- G. Do not bend reinforcing steel embedded in hardened or partially hardened concrete after placing.
- H. Place wall chairs at the top and bottom of all walls and not greater than 6 feet on center horizontally.
- I. All reinforcement at the time concrete is placed shall be free of mud, oil, or other materials that may adversely affect or reduce the bond.
- J. Support the reinforcing steel closest to the formed surface with chairs and bolsters. Support beam stirrups and column ties by chairs.
- K. After completing welds on epoxy-coated reinforcement, repair damaged coating in accordance with the requirements stated in Part 1 of this Section.
- L. Reinforcement used as supports with epoxy-coated reinforcement shall be epoxy coated.
- M. After field bending or straightening epoxy-coated reinforcing bars, repair coating damage in accordance with Part 1 of this Section.
- N. When epoxy-coated reinforcing bars are cut in the field, coat the ends of the bars with the same material used for repair of coating damage, and repair any coating damage in accordance with Part 1 of this Section.

3.02 SPLICES

- A. Provide reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying. Provide lap splice lengths as shown on the Drawings.
- B. Provide splices only as shown on the Drawings or as authorized by Engineer.
- C. Provide threaded or other approved mechanical bar splices:
 - 1. Where shown on the Drawings.

2. Elsewhere for the convenience of the Contractor at no additional cost to Owner if specifically requested of and approved by Engineer.

3.03 TOLERANCES

- A. Place bars to the tolerances specified in ACI 117.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

- A. Section applies to Structural Platform drawing sheets S1-S3.
- B. Furnish and install all cast-in-place concrete and accessories.
- C. Related Sections:
 - 1. Section 03 11 00 - Concrete Forming
 - 2. Section 03 20 00 - Concrete Reinforcing

1.02 REFERENCES

- A. ACI:
 - 1. 301 - Specifications for Structural Concrete for Buildings
 - 2. 305 - Hot Weather Concreting
 - 3. 306 - Cold Weather Concreting
 - 4. 309 - Recommended Practice for Consolidation of Concrete
 - 5. 350 - Environmental Engineering Concrete Structures
- B. ASTM:
 - 1. A36 - Carbon Structural Steel
 - 2. A307 - Carbon Steel Bolts and Studs
 - 3. A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
 - 4. C33 - Standard Specification for Concrete Aggregates
 - 5. C94 - Standard Specification for Ready-Mixed Concrete
 - 6. C171 - Standard Specification for Sheet Materials for Curing Concrete
 - 7. C260 - Standard Specification for Air-Entraining Admixtures for Concrete
 - 8. C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
 - 9. C494 - Standard Specification for Chemical Admixtures for Concrete
 - 10. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
 - 11. C989 - Standard Specification for Slag Cement for Use in Concrete and Mortars
 - 12. C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures
 - 13. D1741 - Test Method for Functional Life of Ball Bearing Greases (Withdrawn 1991)

1.03 SUBMITTALS

- A. Submit manufacturer's data for concrete admixtures, liquid curing material, floor joint filler, finishing compounds, bonding agents, and adhesive anchoring material.
- B. Submit concrete aggregate test reports and concrete mix designs at least 14 days prior to placement of concrete.
- C. Submit results of project field and laboratory concrete tests (slump, air content, and compressive strength).

1.04 QUALITY ASSURANCE

- A. Comply with ACI 301, except as modified in this Section.

- B. For concrete mix designs and aggregate testing associated with the concrete mix designs retain an independent testing laboratory/agency, approved by Engineer, to perform the work listed below. All costs for this testing shall be paid by Owner:
 - 1. Test proposed aggregate.
 - 2. Design concrete mixes for each type of concrete specified.
 - 3. Test each type of concrete mixes proposed for slump, air content, temperature, & compressive strength.
 - 4. Cast concrete cylinders for strength tests.
 - 5. Test concrete cylinders.
- C. Aggregate Tests: Test aggregates for compliance with ASTM C33.
- D. Concrete Mix Design:
 - 1. Prepare mix designs for each type of concrete specified.
 - 2. Design concrete mixes in accordance with ACI 301.
- E. Concrete Strength Tests:
 - 1. Mold and cure 4 specimens from each sample in accordance with ASTM C31. Any deviations from the requirements of ASTM C31 shall be recorded in the test report.
 - 2. Test specimens in accordance with ASTM C39. 2 specimens shall be tested at 28 days from acceptance and 1 shall be tested at 7 days for information. 1 specimen shall be tested at 56 days if desired by Engineer.
 - 3. Make at least 1 strength test for each 50 cu.yds. or fraction thereof of each mixture design of concrete placed in any 1 day.
 - 4. A copy of the test results shall be furnished to the Engineer as soon as available.
 - 5. Costs of concrete cylinder testing will be paid by Owner.
 - 6. Mold and field cure specimens as required in ASTM C31.
 - 7. The acceptance test results shall be the average strengths of the 2 specimens tested at 28 days.
 - 8. Failure on the concrete tested to meet the specified strength, in accordance with ASTM C42, will require a load test of test cores at Contractor's expense.
 - 9. Failure to meet strength requirements of the cores, shall constitute consideration for rejection by Engineer.
 - 10. The cost of all measures to make the work satisfactory shall be paid for by the Owner.
- F. Adjustment to Concrete Mixes: May be requested when characteristics of materials, job conditions, weather, test results, other circumstances warrant, at no additional cost to Owner, it meets the requirements of 3.01.A, and as accepted by Engineer.
- G. Concrete Slump Tests:
 - 1. The testing agency shall determine slump of concrete from each truck in accordance with ASTM C143.
 - 2. If slump significantly exceeds maximum allowed, remove batch from work and dispose of off Project Site.
 - 3. Slump shall be tested at end of conveying system.
 - 4. All costs of slump testing will be paid by Owner.
- H. Concrete Air Content Tests:
 - 1. The testing agency shall determine air content of concrete from each truck in accordance with ASTM C231.
 - 2. If air content adjustments are allowed provided the maximum unloading time is not exceeded as specified in 3.01A. Otherwise remove batch from work and dispose of off Project Site.
 - 3. Air content shall be tested at end of conveying system.
 - 4. All costs of air content testing will be paid by Owner.
- I. Concrete Temperature:
 - 1. The testing agency shall determine temperature of concrete from each truck in accordance with ASTM C31.
 - 2. The temperature shall be tested at end of conveying system.
 - 3. All costs of temperature testing will be paid by Owner.

- J. Special Structural Testing and Inspection Program:
 - 1. The Testing Agency will conduct concrete slump tests, concrete air content tests, concrete temperature tests, and concrete strength test periodically as required per the Special Structural Testing and Inspection Program Summary Schedule.
 - 2. Concrete floor slabs on grade less than 6 inches thick are exempt from Special Inspections requirements.

1.05 PRODUCT HANDLING

- A. Do not store forms, shores, reinforcing, equipment, or other material on finished slab surfaces.

PART 2 PRODUCTS

2.01 CONCRETE MATERIAL

- A. Cement: Conform to ASTM C150, Type I.
 - 1. Alkali content less than or equal to 0.6 percent (expressed as Na₂O).
 - 2. Provide cement from one source of supply.
- B. Aggregate:
 - 1. Coarse Aggregate: ASTM C33-5S
 - a. Provide from 1 source of supply.
 - b. For exterior exposed surfaces.
 - 2. Fine Aggregate: ASTM C33.
 - a. Provide from 1 source of supply.
 - b. For exterior exposed surfaces.
 - 3. Do not use fine or coarse aggregates containing spalling-causing deleterious substances.
 - 4. Local aggregates not complying with ASTM C33 but which have been shown by special test or actual service to produce concrete of adequate strength and durability may be used when approved by Engineer.
 - 5. Maximum Size:
 - a. 1/5 the narrowest dimension of concrete member; nor
 - b. 1/3 the depth of slab; nor
 - c. 3/4 the clear spacing between reinforcement bars; nor
 - d. 1-1/2 inches
 - 6. Gradation sizes 467, 57 or 67: ASTM C33, Table 2.
- C. Water: Clean potable and free from deleterious amounts of oil, acid, alkali, or other foreign matter.

2.02 ADMIXTURES

- A. Air Entraining Admixture: ASTM C260.
- B. Water Reducing Admixture: ASTM C494, Type A.
- C. High Range Water-Reducing Admixtures (Superplasticizer): ASTM C494, Type F and contain no chlorides.
- D. Retarding Admixtures: ASTM C494, Types B and D.
- E. Set-Accelerating Admixtures: ASTM C494, Type C. No chloride containing admixtures will be allowed.
- F. Cortec MCI. Use in all concrete subject to de-icing salts. Base on manufacturer's suggested dosing rates.
- G. Viscosity Modifying Admixture: Demonstrate compatibility with other admixtures.
- H. Pozzolans:
 - 1. Fly Ash: ASTM C618, Class C or F. Loss on ignition shall be limited to 3 percent maximum.
 - 2. Ground Granulated Blast-Furnace Slag: ASTM C989, Grade 100 or 120.

3. Silica Fume: ASTM C1240, 6 percent maximum.

2.03 MISCELLANEOUS MATERIAL

- A. Burlap-Polyethylene Sheet: Burlap weighing not less than 10 ounces per linear yard, 40 inches wide impregnated on 1 side with white opaque polyethylene 0.006 inch thick. Sheeting shall conform to ASTM C171.
- B. Liquid Curing Compound: ASTM C309, Type 1-D, Class B clear or translucent with fugitive dye. Do not apply to floor slabs or concrete surfaces against which other concrete is to be placed (such as tops of footings). Spray-on curing compound may be used only as a temporary protection until the burlap-poly moist cure can be placed.
- C. Expansion Joint Material: Bituminous fiber type conforming to ASTM D1751 with bituminous or paraffin binder.
- D. Interior Joint Filler: 1 part, self leveling, polymer reinforced joint filler.
 1. Everjoint manufactured by L&M Construction Chemicals, Inc., or approved equal.
- E. Exterior Joint Sealant: 2 parts, self leveling, polyurethane sealant.
 1. Sonolastic SL2 manufactured by Sonneborn, or approved equal.
- F. Bonding Agent: Acryl 60 manufactured by Thoro System Products, or approved equal.
- G. Drilled-In Anchors:
 1. Cartridge Injection Adhesive Anchors: Threaded steel rod, inserts, or reinforcing dowels, complete with nuts, washers, polymer or hybrid mortar adhesive two component injected epoxy system, and manufacturer's preparation and installation instructions. Type and size indicated on Drawings.
 - a. Where indicated on the Drawings, provide stainless steel anchors. Stainless steel anchors shall be AISI Type 316 stainless steel provided with stainless steel nuts & washers or matching alloy group and minimum proof stress equal or greater than specified minimum full-size tensile strength of externally threaded fastener. All nuts shall conform to ASTM F594 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.
 - b. Reinforcing dowels shall be ASTM A615, Grade 60.
 - c. Acceptable adhesive anchor manufacturers are:
 - 1) Hilti HAS threaded rods, HIT-TZ rods, or reinforcing dowels with HIT HY-200/ HIT ICE Adhesive Anchorage System for anchorage to concrete or grouted masonry, ICC ER-5193, ICC ESR-1562.
 - 2) Hilti HAS threaded rods or reinforcing dowels with RE 500 SD Injection Adhesive Anchoring System for anchorage to concrete, ICC ESR-1682.
 - 3) Red Head threaded rods or reinforcing dowels with Red Head Adhesive Anchoring System C6 or G5 Adhesive.
 - 4) Threaded rods or reinforcing dowels with Simpson Strong-Tie Epoxy Tie Adhesive.
 - 5) Threaded rods or reinforcing dowels with Powers/Rawl Adhesive.
 - d. Or approved equal.
- H. Epoxy Injection: Sika 35, Hi-Mod, LV or equal with Sikadur 31 Paste Epoxy or equal to be installed according to manufacturer's recommendations.
- I. Plastic Coated Manhole Rungs: Copolymer Polypropylene Plastic in accordance with ASTM C478 and ASTM A615 as manufactured by M.A Industries, Inc., or approved equal.

2.04 CONCRETE MIX PROPORTIONS

- A. See Table 2.1 at the end of the Section.

PART 3 EXECUTION

3.01 CONCRETE PRODUCTION

- A. Ready-mixed concrete: Comply with ASTM C94. From time that water and cement are combined, concrete shall be placed within 90 minutes.
 - 1. Concrete Temperature shall be taken at time of placement. For every degree that concrete temperature is above 75 degrees Fahrenheit, reduce mixing and delivery time by two minutes.
 - 2. Batch Ticket: Provide for each batch discharged and used in work, indicating project identification name and number date, mix type, mix time, quantity and amount of water introduced and available.
- B. Mix concrete only in quantities for immediate use. Concrete which has set shall be discarded and shall not be retempered.
- C. Do not add water at the Site without the approval of Engineer.
- D. Add superplasticizer and mix concrete in accordance with manufacturer's specification.

3.02 ENGINEEREMBEDDED ITEMS

- A. Place all sleeves, inserts, anchors, and embedded items required for adjoining work or for its support prior to placing concrete.
- B. Position all embedded items accurately and supported against displacement.
- C. Temporarily fill voids in sleeves, inserts, and anchor slots with readily removable material to prevent the entry of concrete into the voids.
- D. General - Construction Joints:
 - 1. Locate joints as indicated on Contract Drawings or as shown on approved shop drawings.
 - 2. Make joints perpendicular to main reinforcement.
 - 3. Continue all reinforcement across joints.
 - 4. Allow a minimum of 48 hours before placement of adjoining concrete construction.
- E. Construction Joints - Spacing:
 - 1. General - Structures not intended to contain liquid:
 - a. Wall vertical construction joints:
 - 1) 60 feet maximum centers.
 - 2) At wall intersections, 30 feet maximum from corner.
 - b. Wall horizontal construction joints: 20 - 25 foot centers.
 - c. Base slab, floor, and roof slab construction joints:
 - 1) Placements to be approximately square and not to exceed 3500 square feet.
 - 2) Maximum side dimension of a slab pour to be 80 feet.
- F. Bonding at Construction Joints:
 - 1. Obtain bond between concrete pours at construction joints by thoroughly cleaning and removing all laitance from construction joints. Before new concrete is placed, all construction joints shall be coated with bonding agent, cement grout, or dampened.
 - a. General - Use cement grout or dampening for all construction joints except as noted in Article 3.03 - F.1.b. below, or at Contractor's option use bonding agent for all construction joints.
 - 1) Treatment of joint surfaces:
 - a) Roughen the surface of the concrete to expose the aggregate uniformly.
 - b) Remove laitance, loosened particles of aggregate or damaged concrete at the surface.
 - c) Dampen the hardened concrete (but do not saturate) immediately prior to placing of fresh concrete or grout.
 - 2) Cover the hardened concrete of horizontal joints with a coat of cement grout of similar proportions to the concrete, except substitute fine aggregate for coarse aggregate.
 - a) Place grout as thick as possible on vertical surfaces.

- b) Place 3 inch layer of grout in bottoms of wall or column lifts immediately before placing concrete and at least 1/2 inch thick on other horizontal surfaces. Vibrate grout and first layer of concrete simultaneously.
 - c) Place fresh concrete before grout has attained its initial set.
 - b. Use bonding agent for walls and slabs of tanks and structures designed to contain liquids and at all joints in beams, girders, and slabs.
 - 1) Joints receiving an adhesive shall be prepared, and the adhesive applied in accordance with the manufacturer's recommendations.
- G. Joints in Slabs on Grade:
 - 1. Locate joints in slabs on grade as indicated on Contract Drawings or as shown on approved shop drawings.
 - 2. Maximum spacing of joints shall be at 24 to 36 times the slab thickness in both directions. As a general rule, ratios of the long to short side should not exceed 1.5.
 - 3. Time cutting properly with set of concrete, if saw cut joints are required or permitted.
 - a. Start cutting as soon as concrete has hardened sufficiently to prevent aggregates being dislodged by saw.
 - b. Complete before shrinkage stresses become sufficient to produce cracking.

3.03 PREPARATION BEFORE PLACING

- A. Complete formwork and secure all reinforcement and embedded items in place.
- B. Formwork Erection (floor slab on grade):
 - 1. Verify lines, levels, and measurement before proceeding with formwork.
 - 2. Hand trim sides and bottom of earth forms; remove loose dirt.
 - 3. Align form joints.
 - 4. Slope floor as required per Drawings.
- C. Remove all snow, ice, and mud prior to placing concrete.
- D. Do not place concrete on frozen ground.
- E. Do not place concrete on ground with standing water or when upper 2 inches of ground is saturated.
- F. Do not place concrete during rain, sleet, or snow, or allow same to fall on uninsulated concrete within 48 hours.

3.04 CONCRETE CONVEYING

- A. Deliver concrete from the mixer to the place of final deposit as rapidly as practical by methods, which will prevent segregation or loss of ingredients.

3.05 CONCRETE DEPOSITING

- A. Deposit concrete continuously or in layers of such thickness that no concrete will be deposited on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section.
- B. Place concrete at such a rate that the concrete which is being integrated with fresh concrete is still plastic.
- C. Do not deposit concrete which has partially hardened or has been contaminated by hardened materials.
- D. Remove rejected concrete from the Site.
- E. Deposit concrete as nearly as practicable in its final position to avoid segregation due to handling or flowing.

- F. Free fall of concrete shall not exceed 4 feet. Use chutes equipped with hopper heads for placing where a drop of more than 4 feet is required.

3.06 PLACING CONCRETE SLABS

- A. Deposit and consolidate concrete slabs in a continuous operation.
- B. Consolidate concrete placed in slabs by vibrating bridge screeds, roller pipe screeds, or other methods acceptable to Engineer.
 - 1. Bring slab surfaces to the correct level with a straight edge and then strike off.
 - 2. Use bullfloats or darbies to smooth the surface, leaving it free from bumps and hollows.
- C. Do not leave screed stakes in concrete.
- D. Do not sprinkle water on the plastic surface. Do not disturb the slab surfaces prior to start of finishing operations.

3.07 PLACING GROUT

- A. Blast with water and clean all concrete surfaces to be in contact with grout overlay.
- B. Apply proprietary bonding agent immediately before placement of grout.
- C. Max. grout design f'g = 3000 psi. Max. cementitious content 500 lb/cy. Max. w/c ratio of 0.5.

3.08 COLD WEATHER PLACING

- A. Do not place concrete when the air temperature is less than 40 degrees F. without the specific approval of Engineer.
- B. Cold Weather Concrete Work: ACI 306.1, except as modified by the requirements of these Contract Documents.
- C. Do not place concrete against any frozen substrate, including subgrade soils and surfaces of formwork.
- D. Do not place concrete around any embedment, including reinforcing steel that is at a temperature below freezing.
- E. The temperature of the concrete delivered at the site shall conform to the following limitations:

Air Temperature	Minimum Concrete Temperature	
	< 12 Inches Thick	12-36 Inches Thick
Above 30° F	60° F	55° F
0° to 30° F	65° F	60° F
Below 0° F	70° F	65° F

- F. If water or aggregate is heated above 100 degrees F., combine water with the aggregate in the mixer before cement is added. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 100 degrees F.
- G. When the mean daily temperature is less than 40 degrees F., maintain the temperature of the concrete between 50 and 70 degrees F. for the required curing period.
- H. Arrangements for Heating, Covering, Insulation, Or housing the Concrete Work:
 - 1. Made in advance of placement.
 - 2. Adequate to maintain the required temperature without injury due to concentration of cold or heat.
 - 3. Keep protection in place for a minimum of 3 days.

- I. Do not use combustion heaters during the first 24 hours, unless precautions are taken to prevent exposure of the concrete to exhaust gases.
- J. Once the cold weather concrete protection is removed, maintain insulation for a minimum of 24 hours to provide for gradual cool down, and continue concrete curing for the remainder of the 10 day curing period.

3.09 HOT WEATHER PLACING

- A. Comply with ACI 305 when hot weather conditions exist.
- B. Maintain concrete temperature at time of placement below 90 degrees F.
- C. When the temperature of the steel is greater than 120 degrees F., spray steel forms and reinforcement with water prior to placing concrete.
- D. Keep all surfaces protected from rapid drying. Provide windbreaks, shading, fog spraying, sprinkling, ponding, or wet covering in advance of placement.

3.10 CONSOLIDATION

- A. Consolidate all concrete in accordance with provisions of ACI 309.
- B. Consolidate each layer of concrete immediately after placing by use of internal concrete vibrators. Maintain a frequency of not less than 8,000 vibrations per minute for each internal vibrator.
- C. Provide adequate number of units and power source at all times. Use a minimum of 2 vibrators for all work and maintain spare units to ensure adequacy.
- D. Insert the vibrator so as to penetrate the lift immediately below the one being placed. Do not insert the vibrator into lower courses which have begun to set.
- E. Limit spacing between insertions of the vibrator to 12-18 inches and do not exceed twice the radius of action as shown in ACI 309 or 18 inches.
- F. Do not use vibrators to transport concrete inside the forms.
- G. Vibrate concrete to minimize entrapped air and surface voids on formed surfaces.

3.11 CONCRETE SLAB FINISHING

- A. Float Finish:
 - 1. Apply float finish to all slab surfaces.
 - 2. After placing and screeding concrete slabs, do not work the surface until ready for floating. Begin floating when the surface water has disappeared and when the concrete has stiffened sufficiently to permit operation of a power-driven float.
 - 3. Consolidate the surface with power-driven float or by handfloating if the area is small or inaccessible to power units.
 - 4. Check and level the surface plane to a tolerance not exceeding 1/4 inch in 10 feet when tested with a 10 foot straight-edge placed on the surface at not less than 2 different angles.
 - 5. Immediately after leveling, refloat the surfaces to a smooth, uniform, granular texture.
- B. Trowel Finish:
 - 1. Do not apply steel trowel finish to any concrete with more than 2 percent air entrainment.
 - 2. Apply float finish to slabs as described above in Part 3.11.A.
 - 3. After floating, begin the first trowel finish operation using a power-driven trowel. Begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.

4. Consolidate the concrete surface by the final hand troweling operation, free from trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8 inch in 10 feet when tested with a 10 foot straight-edge.
- C. Broom Finish:
1. Apply non-slip broom finish to all exterior sidewalks and aprons.
 2. Apply float finish to slabs as described above in Part 3.11.A.
 3. Immediately after floating, slightly roughen the concrete surface by brooming in the direction perpendicular to the main traffic route. Use a fiber-bristle broom.

3.12 FINISHING FORMED SURFACES

- A. Provide a smooth formed surface to all formed surfaces not exposed to view, unless otherwise noted in Paragraph B. Smooth formed finish shall consist of the following:
1. Construct formwork in accordance with Section 03 11 00.
 2. Patch all tie holes and defects larger than 1/8-inch in diameter and/or 1/8-inch deep.
 3. Remove all fins, seams and concrete "buttons" protruding more than 1/16-inch.
- B. Provide a special form finish to all formed surfaces exposed to view:
1. Prepare 3 test samples of various textures for approval by Engineer. Each sample shall be approximately 6 feet by 6 feet in size and located on an unexposed wall surface as directed by Engineer.
 2. Perform all Concrete Crack Repairs in accordance with Article 3.14.B.
 3. Remove all form release agents, curing compounds, hardeners, salts, efflorescence, laitance, loose material, unsound concrete, and other foreign materials by sandblasting, shot blasting, mechanical scarification, or other suitable methods.
 4. Surface Preparation:
 - a. Expose, but not undercut or loosen, aggregate.
 - b. Expose all bugholes, cracks and subsurface voids.
 - c. Provide a clean, sound substrate with sufficient surface profile.
 5. Filling of deep voids, bugholes, etc., exceeding 1/8-inch depth:
 - a. Dampen surface with clean water to obtain saturated surface-dry (SSD) with no standing water.
 - b. Brush-apply a small quantity of mixed patching material as a scrub coat to prepare substrate. Thoroughly key-in and work material throughout cavity to promote bond.
 - 1) If scrub coat dries out before wet mortar can be placed, remove scrub coat similar to laitance removal.
 - c. Place repair mortar onto wet scrub coat using brush with firm trowel pressure.
 - 1) Completely fill voids.
 - 2) Key in and compact thoroughly to secure bond.
 - 3) Apply patching material in lifts of 1/4-inch (8mm) to 2-inches (51mm) and trowel to desired finish promptly after placing material.
 - d. For successive lifts, thoroughly score each lift and allow reaching initial set before next layer is applied.
 - e. Perform wet curing of patched areas for the following conditions:
 - 1) If temperature exceed 85 degrees F (29 degrees C).
 - 2) If relative humidity is below 30 percent.
 - 3) If wind speed exceeds 15 mph
 - 4) If patches are exposed to direct sunlight for 72 hours after placement.
 - f. Special curing compounds are allowed with approval of Owner and Engineer. Do not use solvent-based curing compound.
 6. Dampen surface with clean water just prior to application of finishing compound.
 7. Mix 1 part bonding agent to 3 parts clean water for mixing liquid.
 8. Mix concrete finishing compound with mixing liquid as specified by the manufacturer.
 9. Apply 2 coats using a stiff fiber brush or textured spray equipment. Spray application of the first coat requires back brushing to properly fill voids, bugholes and nonmoving cracks.
 - a. First coat: Apply at 2 pounds per sq. yd. and allow to cure a minimum 24 hours.
 - b. Second coat: Apply at 2 pounds per sq. yd., allow to set and then float to a uniform finish.
 10. Perform damp curing to applied product.

3.13 CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
- B. Immediately after placement, damp cure all concrete for a minimum of 7 days.
- C. Cover all slabs and topping with approved burlap-polyethylene film and keep in place throughout the curing period.
- D. Immediately after forms are removed, cover walls, beams, columns and other formed surfaces with burlap-polyethylene film.
- E. Anchor all burlap-polyethylene film at the edges to prevent moisture loss.
- F. Rewet all surfaces at least once a day during the curing period.

3.14 PATCHING

- A. Repair honeycomb and other defective areas, fill surface voids, and fill form tie holes and similar defects in accordance with ACI 301.
- B. Inject concrete cracks as observed during construction and leak testing operations with epoxy to manufacturer's recommendations. Confirm procedures with Owner and Engineer prior to installation.
- C. Reinforce or replace deficient work as directed by Engineer and at no additional cost to Owner.
- D. The Contractor shall repair defects in existing concrete elements affected by the new construction in as directed by the Engineer.

3.15 CLEAN UP AND DISPOSAL

- A. Upon completion of the walls and prior to any painting, thoroughly clean all exposed or painted concrete surfaces of all concrete spatters, form oil, or other foreign material detrimental to appearance or painting.
- B. Remove all excess concrete debris remaining after completion of placement and form removal from the Site and dispose of in a proper and legal manner.

3.16 ANCHORING DOWELS

- A. Drill hole in concrete to the size and depth recommended by the adhesive supplier and as approved by Engineer.
- B. Clean hole with a nylon brush and use oil-free compressed air to blow out hole.
- C. Fill hole with anchoring adhesive in accordance with manufacturer's recommendations.

3.17 FIELD QUALITY CONTROL

- A. Concrete Strength Tests:
 - 1. Mold and cure 4 specimens from each sample in accordance with ASTM C31. Record any deviations from the requirements of ASTM C31 in the test report.
 - 2. Test specimens in accordance with ASTM C39. Test 2 specimens at 28 days for acceptance and 1 at 7 days for information. Test 1 specimen at 56 days if desired by Engineer.
 - 3. Conduct at least 1 strength test for each 50 cu.yds. or fraction thereof for each mixture design placed in any 1 day.
 - 4. Furnish a copy of the test results to Engineer as soon as available.
 - 5. Costs of concrete cylinder testing will be paid by Owner.

6. Mold and field cure specimens as required in ASTM C31.
 7. Acceptance test results shall be the average strengths of the 2 specimens tested at 28 days.
 8. Conduct load test on test cores of concrete that fail to meet the specified strength, in accordance with ASTM C42.
 9. Failure to meet strength requirements of the cores, shall be a cause for rejection by Engineer.
 10. The cost of remedial measures required due to test failures shall be paid for by Contractor.
- B. Engineer may request adjustment to concrete mixes when characteristics of materials, job conditions, weather, test results, other circumstances warrant.
- C. Concrete Slump Tests, Air Content Tests, and Temperature: See paragraph 1.04. All costs of initial testing will be paid for by owner.

Table 2-1

	f'c @ 28 days	Maximum Water/Cement + Pozzolan Ratio	Maximum Pozzolan Content (percent of cement content)	Aggregate	Entrained Air Content (Refer to ACI 350, Moderate Exp.)	Slump (inches) before and after superplasticizer
A. Concrete for walls, slabs, beams, base slabs, pads and all other concrete unless noted below.	4,000 psi	0.45	25% Fly Ash 40% Slag 50% combined	Section 2.01.B	6 percent plus/minus 1%	3 ± 1 before 6 ± 1 after

END OF SECTION

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SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section applies to Structural Platform drawing sheets S1-S3 – Detail H on S2.
- B. Provide:
 - 1. Pile Hangers
- C. Related Sections:
 - 1. Section 03 30 00 - Cast-in-Place Concrete

1.02 REFERENCES

- A. Building Codes:
 - 1. International Building Code
 - 2. Minnesota State Building Code
- B. AASHTO H20 - Loading Conditions for Gratings
- C. ASTM:
 - 1. A27 - Steel Carbon Castings, General Applications
 - 2. A36 - Carbon Structural Steel
 - 3. A47 - Ferritive Malleable Iron Castings
 - 4. A48 - Gray Iron Castings
 - 5. A53 - Pipe, Steel, Black, Hot Dipped, Zinc Coated, Welded, Seamless
 - 6. A123 - Zinc Coatings on Iron and Steel Products
 - 7. A153 - Zinc Coatings on Iron and Steel Hardware
 - 8. A167 - Stainless and Heat Resisting Chromium Nickel Steel Plate, Sheet, and Strips
 - 9. A500 - Cold-Formed, Welded and Seamless Carbon Steel Structural Tubing
 - 10. A501 - Hot-Formed, Welded and Seamless Carbon Steel Structural Tubing
 - 11. A510 - Wire Rods and Coarse Round Wire, Carbon Steel
 - 12. A513 - Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
 - 13. A536 - Ductile Iron Castings
 - 14. A569 - Tables, Mess, Marine, Steel
 - 15. A653 - Steel Sheet, Galvanized or Galvannealed by Hot Dip Process
 - 16. A780 - Repair of Damaged Galvanized Coatings
 - 17. A786 - Hot Rolled Carbon, Low Alloy, High Strength Low Alloy, and Alloy Steel Floor
 - 18. A992 - Structural Steel Shapes
 - 19. A1008 - Steel Sheet, Cold Rolled, Carbon, Structural High Strength, Low Alloy
 - 20. B632 - Aluminum Alloy Rolled Tread Plates
 - 21. E119 - Test Method for Fire Tests of Building Construction and Methods
 - 22. E894 - Test for Anchorage of Permanent Metal Railing Systems and Rails for Buildings
 - 23. E935 - Performance of Permanent Metal Railing Systems and Rails for Buildings
 - 24. E985 - Permanent Metal Railing Systems and Rails for Buildings
 - 25. E936 - Roof Systems Assemblies Employing Steel Deck, Preformed Insulation, and Bituminous Built-up Roofing
 - 26. G90 - Standard for Performing Outdoor Weathering of Nonmetallic Materials Using Sun
- D. AWS:
 - 1. D1.1 - Structural Welding Code - Steel
 - 2. D1.2 - Structural Welding Code - Aluminum
 - 3. D1.3 - Structural Welding Code - Sheet Metal

- E. NAAMM:
 - 1. Metal Finishes Manual
 - 2. MBG 532 - Heavy-Duty Metal Bar Grating Manual
- F. SSPC:
 - 1. PA1 - Paint Application Specification No. 1
 - 2. SP3 - Power Tool Cleaning
 - 3. SP6 - Commercial Blast Cleaning

1.03 DEFINITIONS

- A. Metal Fabrications: Items made from iron and steel shapes, plates, bars, strips, tubes, pipes, castings not part of structural steel or other metal systems specified elsewhere.

1.04 SUBMITTALS

- A. Product Data: Data for products used, including paint products and grout.
- B. Shop Drawings:
 - 1. Detail fabrication, erection of each metal fabrication indicated. Include plans, elevations, sections, details of metal fabrications, their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors, bolts specified for installation under other sections.
- C. Calculations:
 - 1. Where indicated to comply with certain design loadings, include structural computations, material properties, other information needed for structural analysis, signed and sealed by qualified professional engineer, registered in the state where project located, responsible for their preparation.
 - 2. Provide structural calculations for bridge crane.
- D. Welder Certificates: Signed by Contractor certifying that welders comply with specified requirements.
- E. Qualification Data: For firms and persons specified, to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.

1.05 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Fabricator: Firm experienced in successfully producing metal fabrications similar to that indicated for this project, with sufficient production capacity to produce required units without causing delay in the work.
 - 2. Installer: Arrange for installation of metal fabrications specified in this section by same firm that fabricated them.
 - 3. Welding Processes and Welding Operators:
 - a. Qualify in accordance with AWS D1.1 "Structural Welding Code - Steel," D1.3 "Structural Welding Code - Sheet Steel," and D1.2 "Structural Welding Code - Aluminum."
 - b. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.06 SITE CONDITIONS

- A. Field Measurements:
 - 1. Check actual locations of walls, other construction to which metal fabrications must fit, by accurate field measurements before fabrication.
 - 2. Show recorded measurements on final Shop Drawings.
 - 3. Coordinate fabrication schedule with construction progress to avoid delay of Work.
 - 4. Where field measurements cannot be made without delaying Work, guarantee dimensions, proceed with fabrication without field measurements.

5. Coordinate construction to ensure that actual opening dimensions correspond to guaranteed dimensions. Allow for trimming and fitting.

PART 2 PRODUCTS

2.01 FERROUS METALS

- A. Metal Fabrications Exposed to View:
 1. Provide materials selected for surface flatness, smoothness, and freedom from surface blemishes.
 2. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.
- B. Wide flange shapes and structural tees cut from: ASTM A992.
- C. Steel Shapes, Plates, and Bars: ASTM A36.
- D. Rolled Steel Floor Plates: ASTM A786.
- E. Wire Rod for Grating Cross Bars: ASTM A510.
- F. Gray Iron Castings: ASTM A48, Class 30.
- G. Malleable Iron Castings: ASTM A47, grade as recommended by fabricator for type of use indicated.
- H. Ductile Cast Iron Castings: ASTM A536, grade 65-45-12.
- I. Steel Tubing: Cold-formed, ASTM A500; or hot-rolled, ASTM A501. For exterior installations and where indicated, provide tubing with hot-dip galvanized coating per ASTM A53.
- J. Steel Bar Grating: ASTM A569 or ASTM A36 of size, design required for span indicated on Drawings.
- K. Structural Steel Sheet: Hot-rolled, ASTM E936; or cold-rolled ASTM 1008, Class 1; grade required for design loading.
- L. Galvanized Structural Steel Sheet: ASTM A653, grade required for design loading. Coating designation indicated; if not indicated, G90.
- M. Steel Pipe:
 1. ASTM A53; Type, Grade B, as required for design loading.
 2. Black finish unless galvanizing is indicated.
 3. Galvanized finish for exterior installations and where indicated.
 4. Standard weight (Schedule 40) unless otherwise indicated.
- N. All other steel shapes, plates and bars: ASTM A36.
- O. Brackets, Flanges, and Anchors: Cast or formed metal of same type material, finish as supported rails, unless otherwise indicated.
- P. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM 153.
- Q. Stainless Steel: ASTM A167 W/No. 2B Mill Finish.

2.02 FINISHES

- A. Steel and Iron Finishes:
 - 1. Galvanizing: Apply zinc-coating by the hot-dip process, complying with:
 - a. ASTM A153 for galvanizing iron and steel hardware.
 - b. ASTM A123 for galvanizing fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, forged shapes, plates, bars, and strips 0.0299 inch thick and heavier.
 - c. ASTM A386 for assembled steel products.
- B. Preparation for Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated.

2.03 FABRICATION, GENERAL

- A. Forming:
 - 1. Form from materials of size, thickness, shapes indicated, complying with performance requirements indicated.
 - 2. Work to dimensions indicated or noted on Shop Drawings.
 - 3. Form exposed work true to line, level, with accurate angles and surfaces and straight sharp edges.
- B. Cutting and Shaping:
 - 1. Shear, punch metals cleanly, accurately. Remove burrs.
 - 2. Ease exposed edges to radius of approximately 1/32 inch unless otherwise indicated.
 - 3. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - 4. Remove sharp or rough areas on exposed traffic surfaces.
- C. Welding:
 - 1. Comply with AWS recommendations.
 - 2. Use materials, methods to minimize distortion, develop strength and corrosion resistance of base metals.
 - 3. Fuse without undercut or overlap.
 - 4. Remove welding flux immediately.
 - 5. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Joints:
 - 1. Form exposed connections with hairline joints flush, smooth, using concealed fasteners wherever possible.
 - 2. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (countersunk) screws or bolts.
 - 3. Locate joints where least conspicuous.
- E. Anchorage:
 - 1. Provide for type indicated; coordinate with supporting structure.
 - 2. Fabricate, space anchoring devices to provide adequate support for intended use.
- F. Joints: Fabricate joints exposed to weather in manner to exclude water, or provide weep holes where water may accumulate.
- G. Shop Assembly:
 - 1. Preassemble in shop to greatest extent possible.
 - 2. Disassemble only as necessary for shipping, handling limitations.
 - 3. Use connections that maintain structural value of joined pieces.
 - 4. Clearly mark for reassembly and coordinated installation.
 - 5. Cut, reinforce, drill, tap miscellaneous metal work as indicated to receive finish hardware, screws, and similar items.

- H. Finishes:
 - 1. Comply with referenced NAAMM manual.
 - 2. Finish metal fabrications after assembly.

2.04 MISCELLANEOUS FRAMING

- A. Overhead Door Track Supports: Fabricate rigid support of steel shapes of size required to rigidly brace overhead door track during all phases of operation.

2.05 GROUT AND ANCHORING CEMENT

- A. Rough Hardware:
 - 1. Bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels, other miscellaneous steel and iron shapes required for framing and supporting woodwork, anchoring or securing woodwork to concrete or other structures.
 - 2. Fabricate to sizes, shapes, dimensions required.
 - 3. Malleable-iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.
- B. Non-shrink Nonmetallic Grout: Premixed, factory-packaged, (non-staining, noncorrosive, nongaseous grout complying stain) with CE CRD-C 621. Provide grout specifically recommended by manufacturer for interior and exterior applications of type specified in this section.
- C. Erosion-Resistant Anchoring Cement:
 - 1. Factory-prepackaged, non-shrink, non-staining, hydraulic expansion cement formulation for mixing with potable water at Site to create pourable anchoring, patching, and grouting compound.
 - 2. Provide formulation that is resistant to erosion from water exposure without need for protection by a sealer or waterproof coating and is recommended for exterior use by manufacturer.

2.06 FINISHES

- A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish metal fabrications after assembly.
- C. Steel and Iron Finishes:
 - 1. Galvanizing: For those items indicated for galvanizing, apply zinc-coating by the hot-dip process in compliance with the following requirements:
 - a. ASTM A153 for galvanizing iron and steel hardware.
 - b. ASTM A123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299-inch thick and heavier.
 - c. Use process for galvanizing that will prepare item for painting
 - 2. Primer Application:
 - a. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finish or to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated.
 - b. Comply with requirements of SSPC-PA1 "Paint Application Specification No. 1" for shop painting.
- D. Galvanizing Repair Paint: High zinc dust content; dry film containing at least 94 percent zinc dust by weight; comply with DOD-P-21035 or SSPC-Paint-20.
- E. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint-12 except containing no asbestos fibers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Work of Other Trades: Prior to commencing work, carefully inspect and verify that work is complete to point where this installation may properly commence.
- B. Verification of Conditions: Verify that Metal Fabrications may be installed in accordance with original design, pertinent codes and regulations, and pertinent portions of referenced standards.
- C. Discrepancies: Immediately notify Engineer. Do not proceed with installation in areas of discrepancy until fully resolved. Commencement of installation signifies acceptance of surface conditions.

3.02 PREPARATION

- A. Coordination:
 - 1. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction.
 - 2. Coordinate delivery of such items to Site.
- B. Utilize templates and other systems required to ensure accurate placement of items that will be embedded in concrete and masonry.
- C. Sleeves: Set sleeves in concrete with tops flush with finish surface elevations; protect sleeves from water and concrete entry.

3.03 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installation of miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- C. Temporary Bracing: Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.
- D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- E. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, methods used in correcting welding work, and the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

3.04 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Anchor supports securely to, and rigidly brace from, building structure.

3.05 INSTALLATION OF METAL BAR GRATINGS

- A. General: Install gratings to comply with recommendations of NAAMM grating standard referenced under Part 2 that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
- B. Removable Units: Secure removable units to supporting members with type and size of clips and fasteners indicated, or if not indicated as recommended by grating manufacturer for type of installation conditions shown.
- C. Non-removable Units: Secure non-removable units to supporting members by welding where both materials are the same; otherwise, fasten by bolting as indicated above.

3.06 INSTALLATION OF STEEL PIPE RAILINGS, HANDRAILS

- A. Preparation: Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loadings. Plumb posts in each direction.
- B. Securing Posts and Railing Ends: Secure posts to building construction as follows:
 - 1. Anchor posts in concrete as indicated on Drawings.
 - 2. Anchor posts to steel with steel oval flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.
 - 3. Anchor rail ends into concrete and masonry with steel round flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
 - 4. Anchor rail ends to steel with steel oval or round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.
 - 5. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.
- C. Securing Handrails: Secure to wall with wall brackets and end fittings. Provide bracket with at least 1-1/2 inches clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure wall brackets and wall return fittings to building construction as follows:
 - 1. Bracket with flange tapped for concealed anchorage to threaded hanger bolt.
 - 2. Bracket with pre-drilled hole for exposed bolt anchorage.
 - 3. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
 - 4. For hollow masonry anchorage, use toggle bolts having square heads.
 - 5. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with stud installations for accurate location of backing members.
 - 6. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors using self-tapping screws of size and type required to support structural loads.
- D. Expansion Joints: Provide expansion joints at locations indicated, or if not indicated, at intervals not exceeding 40 feet. Provide slip joint with internal sleeve extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; locate joint within 6 inches of posts.

3.07 INSTALLATION OF CAST TREADS AND THRESHOLDS

- A. Installation: Install cast treads and thresholds with anchorage system indicated to comply with manufacturer's recommendations.
- B. Sealant: Seal thresholds exposed to exterior with elastomeric sealant complying with Section 07 92 00 to provide a watertight installation.

3.08 INSTALLATION OF BOLLARDS

- A. Anchor bollards in concrete by means of pipe sleeves preset and anchored into concrete.
 - 1. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solid with non-shrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's directions.
 - 2. Wrap bollard with bond breaker prior to installation of paving or slabs.

3.09 TOLERANCES

- A. Install in required position and within following tolerances:
 - 1. Maximum variation from plumb: 1/4-inch.
 - 2. Maximum offset from true alignment: 1/4-inch.

3.10 ADJUSTING AND CLEANING

- A. Touch-Up Painting: Cleaning touch-up painting of field welds, bolted connections, and abraded areas of the shop paint on miscellaneous metal is specified in Section 09 91 00 of these specifications.
- B. Galvanizing: For galvanized surfaces clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.
- C. Collect offcuts and scrap and place in designated areas for recycling.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes removal and disposal of trees, shrubs, brush, stumps, roots, windfalls, unsound branches, and other plant life.
- B. Method of Measurement:
 - 1. Area Basis:
 - a. Determine quantity by measuring staked areas to nearest 1/20 of an acre.
 - b. All measurements will be made horizontally.
 - 2. Individual Unit Basis:
 - a. Determine quantity by field count of trees cleared or stumps grubbed.
 - 1) To be counted, trees must be at least 4 inches in diameter at a point 2 feet above the ground.
 - 2) Diameter is measured circumference divided by 3.14.
 - 3) To be counted, stumps must be at least 4 inches in diameter at the point of cut off.
- C. Basis of Payment:
 - 1. Pruning of branches on plantings being preserved shall be considered incidental.
 - 2. Payment for acceptable quantities of clearing and grubbing shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT 2101 - Clearing and Grubbing

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 PROTECTION

- A. Do not commence operations until erosion and sedimentation control measures are in place.
- B. Confine operations to areas staked or trees marked for removal.
- C. Protect all trees and plant materials which are not designated for removal.
 - 1. Do not store materials within Tree Protection Zone.
 - 2. Keep Tree Protection Zone free of debris and construction waste.
 - 3. Do not excavate in the Tree Protection Zone unless indicated on Drawings.
- D. Conduct all operations in a manner that will not damage or injure surrounding plant life and property.
- E. Salvage topsoil where feasible.

3.02 CLEARING OPERATIONS

- A. Cut and remove all designated trees, shrubs, bushes, windfalls, and other vegetation.

- B. Prune and remove any low hanging or unsound branches.

3.03 GRUBBING OPERATIONS

- A. Remove and dispose of designated stumps, roots and other remains.
- B. Remove stumps completely.
- C. Backfill depressions with native soils and compact.

3.04 DISPOSAL OPERATIONS

- A. Submit written request to Engineer for disposal within right-of-way embankments.
- B. Submit written request to Engineer for burning operations.
- C. Dispose of debris from Elm and Red Oak in accordance with MnDOT 2101.

3.05 RESTORATION

- A. Repair or replace trees damaged by construction activities but not selected for removal as directed by Engineer.

END OF SECTION

SECTION 31 23 16

STRUCTURE EXCAVATIONS AND BACKFILLS (MnDOT 2451)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes the following for the River Pump Station Wetwell and Foundation plus the Grit Chamber:
 - 1. Structure excavation.
 - 2. Foundation preparation.
 - 3. Backfill placement.
 - 4. Surplus excavated material disposal.
- B. Related Sections:
 - 1. Section 01 45 29 Testing Laboratory Services
 - 2. Section 31 25 10 - Stormwater Management
- C. Method of Measurement:
 - 1. Structure excavation:
 - a. Measure as a lump sum based on the dimensions indicated in the Plans.
 - b. Payment will be made for planned quantity unless dimensional changes are authorized.
 - 2. Granular materials:
 - a. Measure as planned quantity, based on the dimensions indicated in the Plans.
- D. Basis of Payment:
 - 1. Payment for structure excavation will also include:
 - a. Removing and disposing of surplus excavated materials as required.
 - b. Sheet piling, shoring and all necessary safeguards.
 - c. Installing and maintaining facilities to provide for proper drainage of excavation.
 - 2. Payment for structure excavation and backfills and all associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2451 - Structure Excavations and Backfills
 - 2. 3149 - Granular Material

1.03 SEQUENCING AND SCHEDULING

- A. Do not commence construction of structure foundation until soil test results are confirmed.

PART 2 PRODUCTS

2.01 MATERIALS

- A. As shown on Plans

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that foundation soils are in suitable condition to begin construction.
- B. Advise Engineer of soil types or conditions not in accordance with soil borings.

3.02 PREPARATION

- A. Temporary Construction:
 - 1. Provide sheeting, shoring, or other temporary facilities as required to prosecute Work.
 - 2. Provide warning signs, fencing or other temporary facilities as required to prevent unnecessary hazards to public.
 - 3. Provide pumping or other temporary means as required to establish and maintain dry conditions in excavation.

3.03 CONSTRUCTION REQUIREMENTS

- A. Excavation:
 - 1. Excavate, shape, and prepare foundation soils to elevations and dimensions designated on Drawings.
 - 2. Perform additional excavation as required to permit erection of forms and other temporary construction and to provide for proper compaction of backfill materials.
- B. Foundation Preparation:
 - 1. Compact foundation soils as necessary to achieve required stability.
 - 2. Replace unsuitable foundation soils with acceptable materials.
 - 3. Place and compact replacement materials in minimum 6-inch layers.
- C. Backfilling:
 - 1. Uniformly distribute backfill materials and compact as indicated on Plans.
 - 2. Do not place backfill material on frozen foundations.
 - 3. Do not place material that will freeze during backfill or compaction.
 - 4. Dispose of suitable surplus materials as embankment for Site grading.
 - 5. Remove surplus materials from Site.

3.04 FIELD QUALITY CONTROL

- A. Soil Tests:
 - 1. Soil bearing test on foundation soils and soil density tests on backfill material will be as indicated in the Schedule of Materials Testing Section 01 45 29.

3.05 PROTECTION

- A. Protect prepared foundation soils from freezing.
- B. Protect and maintain prepared foundation soils during dewatering operations.

END OF SECTION

DEWATERING

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. System description.
 - 2. Installation and maintenance.

- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 31 25 10 - Stormwater Management

- C. Measurement and Payment:
 - 1. Measurement: Dewatering shall be measured by the lump sum and include all subsurface investigations, submittals, designs, labor, supplies, materials, tools, and power to install and operate the dewatering systems necessary to construct the project to the lines and grades shown on the Drawings.
 - 2. Payment:
 - a. Payment for the Dewatering shall be at the Contract Unit Price as listed on the Bid form. All associated work items shall be considered incidental.
 - b. Progress payments for Dewatering will be determined by the percentage of the total contract completed based on the following schedule:

Percent of Contract Completed	Percent of Item Paid
5	10
25	35
50	60
75	85
95	95
100	100

1.02 SYSTEM DESCRIPTION

- A. Design Requirements: Design, furnish, install, test, operate, monitor, and maintain dewatering system of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

- B. Performance Requirements:
 - 1. Continuously monitor and maintain dewatering operations to ensure:
 - a. Erosion does not occur.
 - b. Stability of excavations and constructed slopes.
 - c. The excavation does not flood.
 - d. That damage to subgrades and permanent structures is prevented.
 - e. That the excavation does not uplift, heave, or develop seepage boils.

1.03 SUBMITTALS

- A. Dewatering Plan:
 - 1. Describe dewatering system and associated system features.
 - 2. Show arrangement, locations, and details of the dewatering system; locations of risers, headers, filters, pumps, power units, discharge lines or other system components; and means of discharge, control of sediment, and disposal of water.

3. Provide a schedule that shows the proposed timing and sequencing of operations.

1.04 REGULATORY REQUIREMENTS

- A. Comply with local and State installation requirements and sediment control regulations.
- B. Obtain permits from the following agencies:
 1. MN DNR Water Appropriations

1.05 SITE CONDITIONS

- A. Conduct additional subsurface investigations as required to determine the specific dewatering needs for the proposed construction at this site.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. New or used materials, adequate in capacity for required usage, must not create unsafe conditions and must not violate requirements of applicable codes and standards.

PART 3 EXECUTION

3.01 PROTECTION

- A. Protect trees, shrubs, lawns, and construction area from damage due to installation and operation of dewatering devices.
- B. Prevent sediment and turbid or silty water from entering surface waters.
- C. Control sediment by one or more of the following methods and as required by permitting agencies and local, State, and Federal regulations:
 1. Construction of a detention basin.
 2. Use of a portable detention basin or upland sumps.
 3. Pump turbid water away from surface waters.
- D. Do not allow water discharge to run over roads, parking areas, or work areas where water or ice could cause a hazardous condition.
- E. Do not allow water to pond in the construction area.
- F. Protect existing or completed work from water or sedimentation damage.
- G. Protect workers and public from temporary structures or basins.
- H. Do not allow water to run over work in progress.

3.02 INSTALLATION

- A. Install dewatering devices adequate to keep the work dry and free of ground water to an elevation at least 3 feet below elevation work is being done.
- B. Do not install French drains, sumps, ditches, or trenches within 5 feet of a structure foundation or slab.
- C. Install, operate, and ensure dewatering system is functional prior to excavating below the groundwater level.

- D. Do not use crushed rock or granular soils beneath structure foundations unless shown on the Drawings.
- E. Install dikes, riprap, culverts, and piping as necessary to prevent erosion of site or siltation of surface waters.
- F. Maintain dewatering operations until excavations are backfilled.
- G. Remove unneeded equipment and pipe upon completion. Abandon wells as required by controlling agency.

END OF SECTION

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SECTION 31 23 33

TRENCH EXCAVATION AND BACKFILL

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Trench excavation.
 - 2. Special pipe foundation.
 - 3. Trench backfill.
 - 4. Compaction.
 - 5. Pipe grade and alignment conflicts.

- B. Related Sections:
 - 1. Section 33 11 01 Water Supply Piping (At Pump Stations)
 - 2. Section 33 11 02 Water Supply Piping (Between Pump Stations)
 - 3. Section 33 11 03 Water Transfer Piping (Grit Chamber to Sta 104)
 - 4. Section 33 11 04 Marine Constructed Water Supply Piping (River Station to Intake/Outlet)
 - 5. Section 33 41 00 – Run Off Collection Systems

- C. Method of Measurement:
 - 1. Trench Excavation and Backfill: Incidental to associated pipe installation.
 - 2. Rock Excavation:
 - a. Measure by volume in cubic yards.
 - b. Measure vertically from top of rock to 6 inches below pipe exterior.
 - c. Measure horizontally to 12 inches on each side of pipe exterior.
 - d. Consider boulders less than 1 cubic yard incidental to excavation.
 - 3. Special Pipe Foundation Materials:
 - a. Incidental to pipe installation.
 - 4. Replacement Backfill:
 - a. Incidental to pipe installation.
 - 5. Compaction: Incidental to associated pipe installation.
 - 6. Dewatering:
 - a. As a Lump Sum according to Section 31 23 16

- D. Basis of Payment:
 - 1. Payment for quantities measured in this Section shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 SUBMITTALS

- A. Provide for each granular material:
 - 1. Name and location of source.
 - 2. Sample gradation.

1.03 SITE CONDITIONS

- A. Groundwater: Provide trench dewatering if groundwater surface is above or within 3 feet of pipe zone.

1.04 WARRANTY

- A. Repair all trench settlements and resulting damage or displacement of surface facilities that occur within the Contract correction period.

PART 2 PRODUCTS

2.01 MATERIALS

- A. As shown on Plans

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Trench Excavation:
 - 1. Alignment and Grade:
 - a. Excavate trench to alignment and grade as staked.
 - b. Excavate no more than 100 feet in advance of pipe laying operation.
 - 2. Trench Width at Pipe Zone:
 - a. Center trench on pipe alignment.
 - b. Minimum width: Pipe outside dimension plus 12 inches.
 - c. Maximum width: Pipe outside dimension plus 24 inches (except rock excavation).
 - 3. Excavated Materials:
 - a. Use stable material for backfill.
 - b. Waste unstable material as directed.
 - c. Do not place materials on sidewalk, driveways, or drainageways.
 - 4. Drainage:
 - a. Provide dewatering trenches when required.
 - b. Drain trench water into natural channels or storm sewer.
 - c. Do not drain trench water into sanitary sewer.
 - 5. Rock Excavation:
 - a. Blasting shall conform to all local and state ordinances.
 - b. Submit blasting schedule for approval.
 - c. Minimum trench width: 36-inch.
 - d. Provide minimum 6-inch vertical clearance between pipe and rock trench bottom.
 - e. Provide minimum 12-inch horizontal clearance between pipe and rock trench walls.
 - f. Provide pipe foundation material for pipe in rock trenches.
- B. Pipe Foundations:
 - 1. Engineer to determine condition of trench bottom.
 - 2. Stable Trench Bottom Condition:
 - a. Shape trench bottom to conform to bottom half of pipe.
 - b. Excavate bell holes to permit proper jointing.
 - 3. Unstable Trench Bottom Condition:
 - a. Excavate below pipe grade to specified depth.
 - b. Refill with specified foundation material in accordance with Drawings details and compact.
- C. Trench Backfill:
 - 1. Pipe Zone:
 - a. Use foundation material free of rocks and other unsuitable debris.
 - b. Deposit material uniformly on both sides of pipe throughout entire trench width.
 - c. Place material in 6-inch lifts and mechanically compact.
 - 2. Above Pipe Zone:
 - a. Use native materials free of debris and rock, concrete or clay lumps with a volume greater than 1/3 cubic foot.
 - b. Place in uniform lifts no more than 1 foot thick.
 - c. Mechanically compact each lift of the upper 3 feet of trench to a standard Proctor density of 100 percent.
 - d. Mechanically compact each lift under the upper 3 feet of trench to a standard Proctor density of 95 percent.
 - e. Do not backfill unless approved compaction equipment is operating.
 - f. Fine grade street subgrade to staked elevation and cross section.

3. Replacement Backfill:
 - a. Engineer to determine suitability of native material for backfill.
 - b. Use replacement backfill in lieu of native materials as directed.
4. Excess or Deficiency of Backfill Material:
 - a. Dispose of excess backfill material as directed after all trenches are backfilled.
 - b. Provide replacement backfill as required to establish required surface elevation.

3.02 FIELD QUALITY CONTROL

- A. Density tests on backfill materials will be as directed by Engineer.
- B. Recompact all areas represented by failed density tests.

3.03 PIPE CLEARANCES AND CONFLICTS

- A. Provide clearance between sewers and water main as follows:
 1. Maintain 10-foot horizontal between pipes.
 2. Maintain 18-inch vertical separation between pipes.
- B. When 18-inch vertical separation between sewer and water main cannot be maintained, provide special pipe crossing as follows:
 1. Advise Engineer of pipe conflict.
 2. Lower water main in accordance with Drawing or as directed.
 3. Provide 18-inch vertical separation between pipes.
 4. Construct sewer using pipe material and joints equal to water main at crossing point.
 5. Center pipe lengths at crossing point.
 6. Provide special foundation material for both pipes.
 7. Place insulation as directed.

END OF SECTION

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SECTION 31 71 30

JACK BORE CROSSINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Casing pipe materials and installation.
 - 2. Carrier pipe installation.
 - 3. Tunneling requirements.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 33 11 02 Water Supply Piping (Between Pump Stations)
- C. Method of Measurement:
 - 1. Casing Pipe: Measure by length in linear feet for each material type and diameter installed including excavation.
 - 2. Carrier Pipe: Measure by length in linear feet from the ends of the casing for each material type and diameter.
 - 3. Liner Pipe: Measure by length in linear feet for complete assembly and installation including excavation.
- D. Basis of Payment:
 - 1. Contract prices shall include all costs relating to the presence of rocks, cobbles, or boulders within or adjacent to the crossing alignment. No extra compensation will be made for their removal, or procedures or delays caused by their presence.
 - 2. Payment for acceptable quantities of subsurface crossing items shall be at the Contract Unit Price as listed on the Bid Form. All associated work items shall be considered incidental to that item.

1.02 REFERENCES

- A. ASTM:
 - 1. A53 - Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless

1.03 PERFORMANCE REQUIREMENTS

- A. Boring:
 - 1. Maximum Departure from Established Line and Grade: 6 inches/100 feet.

1.04 SUBMITTALS

- A. Boring: Submit Certificate of Compliance for Casing Pipe.

1.05 SITE CONDITIONS

- A. Refer to Soil Boring Logs for subsurface conditions.
- B. Provide additional borings as required to verify subsurface conditions at the crossing site.

1.06 WARRANTY

- A. Repair all in-place surface or underground facilities that are damaged or displaced due to the crossing installation within 1 year after final Project completion.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Casing Pipe:
 - 1. Provide new materials.
 - 2. Steel:
 - a. ASTM A53, Grade B.
 - b. Welded joint.
 - c. Wall thickness: 0.469 inches.
 - 3. Casing Dimensions:
 - a. Casing diameters and lengths shown on Drawings are minimum.
 - b. Provide permit revisions if larger or longer casing is provided.
 - c. No additional compensation will be provided for larger or longer casing.
- B. Carrier Pipe: See Section 33 11 02.

2.02 EQUIPMENT

- A. Boring:
 - 1. Shall remove earth concurrently as the casing progresses.
 - 2. Shall not introduce water into the excavation.
 - 3. Shall not disrupt traffic.
 - 4. Shall not damage or displace the surrounding earth or surface.
- B. Jacking: Shall progressively push the designated carrier pipe through the in-place casing.

PART 3 EXECUTION

3.01 PREPARATION

- A. Excavation and backfill jacking and receiving pits in accordance with Section 31 23 33.

3.02 INSTALLATION

- A. Boring:
 - 1. Extend casing through entire distance bored.
 - 2. Check grade and alignment after each casing section is installed.
 - 3. Coordinate operations to provide continuous support to surrounding earth materials.
- B. Jacking:
 - 1. Progressively push carrier pipe through completed casing.
 - 2. Strap 2 wooden saddle blocks to each pipe length to provide support at regular intervals.
 - 3. Center carrier pipe in casing at all times.
 - 4. Fill annular space between casing and carrier pipe with dry blown in sand.
 - 5. Seal each end of the casing after the sand has been deposited.

END OF SECTION

SECTION 32 34 20

FABRICATED STEEL PEDESTRIAN BRIDGE

PART 1 GENERAL

1.01 SUMMARY

- A. Install pre-purchased, pre-engineered steel bridge.
 - 1. Salvage existing temporary bridge
 - 2. Set abutments and grade slopes
 - 3. Install new bridge

1.02 REFERENCES

- A. AASHTO:
 - 1. M168 - Wood Products
 - 2. LRFD Guide Specifications for Design of Pedestrian Bridges - Revision 2
- B. ASTM:
 - 1. A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - 2. C1028 - Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
 - 3. C1107 - Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
 - 4. G101 - Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels
- C. AWS:
 - 1. D1.1 - Structural Welding Code - Steel
 - 2. D1.2 - Structural Welding Code - Aluminum
 - 3. D1.3 - Structural Welding Code - Sheet Steel
- D. MnDOT:
 - 1. 2401 - Concrete Bridge Construction
 - 2. 2402 - Steel Bridge Construction
 - 3. 2403 - Timber Bridge Construction
 - 4. 2451 - Structure Excavations and Backfills
 - 5. 2471 - Structural Metals

1.03 SUBMITTALS

- A. Refer to Section 01 33 00.
- B. Shop Drawings: Submit Shop Drawings showing installation drawings including plans, elevations, sections, details of components, joint locations and configurations. Comply with requirements of MnDOT 2471.3B.

1.04 QUALITY ASSURANCE

- A. Preinstallation Meetings: If requested by Engineer, conduct conference at Site to comply with requirements of Section 01 31 19.
- B. A representative of manufacturer/fabricator shall be present to instruct and ensure proper lifting procedure.

1.05 PROJECT CONDITIONS

- A. Drawings do not purport to show actual dimensions, but are intended only to establish location and scope of work. Field verify dimensions and assume full responsibility for their accuracy.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bridge:
 - 1. As purchased under separate contract.
- B. Substructure:
 - 1. Reinforced concrete supported on spread footings.
 - 2. Include abutments and temporary shoring supports as required.
 - 3. Provide on trail alignment and profile grade.
 - 4. Set with no skew.
- C. Accessories:
 - 1. Cementitious non-shrink grout, if used, to meet ASTM C1107, 7000 psi minimum.
 - 2. Other Materials: Materials not specifically described but required for complete, proper installation of bridge, subject to acceptance of Engineer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Work of Other Trades: Prior to commencing work, carefully inspect and verify that work is complete to point where this installation may properly commence.
- B. Verification of Conditions: Verify that bridge may be installed in accordance with original design, pertinent codes and regulations, and pertinent portions of referenced standards.
- C. Soil found incapable of supporting the required bearing pressure:
 - 1. Remove unsuitable material as directed by Engineer.
 - 2. Install select granular borrow (modified) backfill in 8-inch lifts to 100 percent of standard Proctor maximum density to the bottom of footing elevation.
 - 3. Do not allow granular borrow to daylight on slope face of abutment excavation.
 - 4. Verify engineered fill is capable of supporting required bearing pressure by geotechnical engineer.
- D. Discrepancies: Immediately notify Engineer in writing. Do not proceed with installation in areas of discrepancy until fully resolved. Commencement of installation signifies acceptance of surface conditions.

3.02 ERECTION

- A. Erect per MnDOT Specifications 2401, 2402, 2403, 2451, and 2471 and manufacturer's instructions.
- B. Temporarily anchor and brace primary members to prevent movement or creep in any direction, tipping, and buckling.

3.03 REPAIR/RESTORATION

- A. Touch up marred finishes. Use materials, procedures recommended or furnished by manufacturer.

3.04 CLEANING

A. Site:

1. Do not allow accumulation of scraps, debris arising from work of this section.
2. Maintain premises in neat, orderly condition.

END OF SECTION

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SECTION 32 91 00

TOPSOIL PLACEMENT

PART 1 GENERAL

1.01 SUMMARY

- A. Provide the following:
 - 1. Subsoil preparation.
 - 2. Soil composition.
 - 3. Placement of topsoil.
 - 4. Soils Report:
 - a. Existing topsoil.
 - b. Amended topsoil.

- B. Related Sections:
 - 1. Section 31 22 10 - Site Grading
 - 2. Section 31 22 20 - Earthwork for Building Sites
 - 3. Section 32 92 00 - Lawns and Grasses
 - 4. Section 32 93 00 - Exterior Plants

- C. Basis of Payment:
 - 1. Payment for acceptable quantities of select topsoil borrow shall be at the contract unit price as listed on the Bid Form.
 - 2. Associated work items shall be incidental to unit price.
 - 3. Importation of materials required for provision of topsoil is incidental to Work.

1.02 SUBMITTALS

- A. Refer to Section 01 33 00.

- B. Quality Assurance/Control Submittals:
 - 1. Test Reports:
 - a. Provide following qualification tests and information for topsoil either imported or prepared from on-site material.
 - b. Submittal to be prepared by independent testing lab, state university soils science department, or other recognized soil physics testing laboratory to indicate that proposed material complies with specified requirements.
 - 1) Mechanical gradation analysis, ASTM D422.
 - 2) Materials qualification test.
 - 3) Recommendation for type and application rate of amendments needed to adjust topsoil to required nutrient levels for each proposed landscape operation, including, seeding, sodding, planting.

- C. Delay resulting from rejected submittals is Contractor's responsibility and will not be considered as basis for subsequent delay claim.

PART 2 PRODUCTS

2.01 SOILS MATERIALS

- A. Topsoil for Non-Irrigated Areas:
 - 1. Material consisting of fertile, friable, loam, uniform in composition.
 - 2. Capable of sustaining vigorous plant growth.

3. Free of subsoil, stones, lumps, clods of hard earth, plants, plant roots, sticks, noxious weeds, slag, cinders, demolition debris or other extraneous matter over 1 inch in largest dimension.
4. Conforming to following chemical and physical attributes:
 - a. Allowable limits of topsoil mechanical analysis based on percent of dry weight of samples:

	Minimum Percent	Maximum Percent
No. 4 Sieve	100	---
No. 10 Sieve	80	90
No. 200 Sieve	40	60
Silt (particles 0.005-0.05 mm) ⁽¹⁾	10	40
Clay (particles < 0.005 mm) ⁽¹⁾	5	20

⁽¹⁾ Silt-Clay ratio: 2:1 or less

- b. Allowable maximum limits of mechanical analysis of sand and gravel fraction based on dry weight of total fraction sample:

	Minimum Percent	Maximum Percent
Very Fine Sand (< 0.15 mm)	0	5
Fine Sand (0.15-0.25 mm)	0	20
Coarse Sand (0.25-1.00 mm)	60	100
Very Coarse Sand (1.00-2.00 mm)	0	10
Gravel (> 2.00 mm)	0	5

⁽¹⁾ Silt-Clay ratio: 2:1 or less

- B. Final Topsoil Nutrient Values After Amendment (if required):
 1. Organic Matter: 4.0 percent minimum, 10.0 percent maximum.
 2. Extractable Phosphorus: 25 parts per million by weight minimum.
 3. Exchangeable Potassium: 125 parts per million by weight minimum.
 4. pH: 5.5 minimum, 7.0 maximum, 6-6.5 preferred.
 5. Soluble Salts: 3 mmhos/cm maximum.
 6. Lead Content: Less than 400 parts per million.
- C. On-site Base Mixture: To extent available, and if modified to meet requirements, select on-site material may be used as base mixture for preparation of topsoil.
- D. Import supplemental materials as necessary to satisfy specified topsoil requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions under which topsoil preparation and placement are to be performed.
 1. Verify final subgrade has been established.
 2. Verify topsoil meets requirements of this Section and soils testing lab report identifying required amendments is completed.
- B. Discrepancies:
 1. Immediately notify Engineer.
 2. Do not proceed in areas of discrepancy until fully resolved.
 3. Commencement of topsoil placement signifies acceptance of surface conditions. Do not proceed until unsatisfactory conditions have been corrected.

3.02 STORAGE/STOCKPILE

- A. Stockpile location: As directed by Engineer.

- B. Stockpile topsoil/planter soil component materials in such a manner that natural drainage is not obstructed and that no off-site sediment transmission will result.
- C. Place stockpiles with maximum 2:1 sideslopes.
- D. Construct a temporary perimeter dike with gravel outlet, or fabric sediment barrier around topsoil component stockpiles.
- E. Provide temporary seeding of stockpiles within 2 days of formation of stockpile.

3.03 PREPARATION AND PLACEMENT

- A. Topsoil Placement Preparation:
 - 1. Provide erosion and sediment control items such as diversions, berms, dikes, waterways, sediment basins, as specified or as needed.
 - 2. Remove debris from areas to be topsoiled, including excess concrete and concrete spoils adjacent to back of curb locations, and excavation spoils.
 - 3. Eliminate uneven areas and low spots; maintain indicated grades and make changes in grade gradual by blending slopes into more level areas.
 - 4. After the areas to be topsoiled have been brought to inferred subgrade elevations, and immediately prior to dumping and spreading approved topsoil, loosen and condition the subgrade by power rototilling to a minimum depth of 8 inches to ensure removal of gross subgrade debris and bonding of the topsoil and subsoil; no substitute operations acceptable.
 - 5. After rototilling and prior to placement of the topsoil, scalp or otherwise remove all visible stones, clods of hard earth, roots, plant parts, stumps, sticks, weeds, demolition or construction debris, or any other extraneous non-earth material in excess of 1 inch in size.
- B. Topsoil Placement:
 - 1. Do not place topsoil more than 2 weeks prior to planned commencement of Project planting operations.
 - 2. Do not place wet or muddy topsoil, when subgrade is excessively wet, or in condition that may otherwise be detrimental to subsequent Work.
 - 3. Uniformly place approved topsoil material where indicated to minimum compacted depth of 4 inches on 3:1 on steeper slopes, minimum of 6 inches on flatter slopes, and at greater depths as indicated on Drawings.
 - 4. Correct irregularities in surface resulting from placement or other operations to prevent formation of depressions or water pockets.
 - 5. Protect topsoiled areas from weather based erosion until planting operations commence.

END OF SECTION

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SECTION 32 92 30

TURF RESTORATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes re-establishment of original surface grade and turf in areas damaged by construction activities.
- B. Related Sections:
 - 1. Section 32 91 00 Topsoil Placement
- C. Method of Measurement:
 - 1. Seeding: Measure by the area seeded in acres regardless of the seed mixture used.
 - 2. Seed: Incidental to seeding item. No direct measurement made. Apply specified mixture at specified rate.
 - 3. Fertilizer: Incidental to seeding item. No direct measurement made. Apply specified product at specified rate.
 - 4. Mulch: Incidental to seeding item. No direct measurement made. Apply specified product at specified rate.
 - 5. Water: Water for turf establishment will be considered incidental.
 - 6. Rolled Erosion Control Products: Measure by area covered in square yards.
- D. Basis of Payment
 - 1. Payment for acceptable quantities of Turf Restoration shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. MnDOT:
 - 1. 2105 - Excavation and Embankment
 - 2. 2572 - Protection and Restoration of Vegetation
 - 3. 2574 - Soil Preparation
 - 4. 2575 - Establishing Turf and Controlling Erosion
 - 5. 3876 - Seed
 - 6. 3877 - Topsoil Material
 - 7. 3881 - Fertilizer
 - 8. 3882 - Mulch Material
 - 9. 3885 - Rolled Erosion Control Products

1.03 SEQUENCE AND SCHEDULING

- A. Coordinate seeding to minimize lag time after topsoil placement.
- B. Cover seeding with erosion control blanket in areas identified by Engineer immediately after application

1.04 SUBMITTALS

- A. Seed:
 - 1. Certified test report for each seed mixture.
- B. Soil Amendments and Additives:
 - 1. Manufacturer's product data sheet and certificate of compliance.
 - 2. Certified test reports.
 - 3. List of sources.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect seed from moisture prior to use.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Seed: Minnesota mix 36-311 (Woodland Edge NE)
- B. Fertilizer:
 - 1. MnDOT 3881
 - 2. Slow: Release Nitrogen type.
 - 3. NPK: 20-0-10 (phosphorus free)
- C. Mulch: MnDOT 3882.
- D. Erosion Control Blankets: MnDOT 3885.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. Regrade damaged or rutted areas in order to re-establish original ground topography.
- B. Scarify damaged areas prior to placement of borrow material thereon.
- C. Place borrow materials in maximum 6-inch layers and compact each layer.
- D. Maintain proper moisture content during placement and compaction of borrow materials.
- E. Compact all embankments with approved compaction equipment until there is no further evidence of consolidation.
- F. Topsoil Placement:
 - 1. Place 4" inches of topsoil borrow over all disturbed areas.
 - 2. Drag topsoiled areas to remove wheel tracks and provide a uniform texture and appearance.
 - 3. Finish topsoiled areas to within 0.1 foot of the original ground elevations.

3.02 SOIL PREPARATION

- A. Prepare restored surface for permanent turf establishment in accordance with MnDOT 2574.3.

3.03 TURF ESTABLISHMENT

- A. Applying Fertilizer and Conditioners:
 - 1. Apply fertilizer uniformly over the designated area using mechanical spreading devices.
 - 2. Apply fertilizer at a rate of 0.5 pounds Nitrogen per 1,000 square feet.
 - 3. Apply fertilizer no more than 48 hours prior to seeding.
- B. Sowing Seed:
 - 1. Apply seed mixture over designated areas at a rate of 33.5 pounds per acre.
 - 2. Apply seed uniformly by mechanical or hydrospreading method.
 - 3. Firm all seeded areas with a drag or cultipacker immediately after seeding and prior to mulching.

- C. Applying Mulch:
 - 1. Spread mulch uniformly by mechanical means at a rate of 2.0 Tons per acre.
 - 2. Apply mulch in accordance with MnDOT 2575.3.C.
- D. Placing Erosion Mats:
 - 1. Wood Fiber Blankets:
 - a. Place blankets within 24 hours after seeding.
 - b. Overlap strip ends 10-inch minimum with upgrade strip on top.
 - c. Bury upgrade end of each strip minimum 6 inches into soil.
 - d. Secure with wire staples placed at maximum 3-foot spacing.

3.04 ACCEPTANCE OF WORK

- A. Turf establishment will be accepted in accordance with MnDOT 2575.3.L.
- B. Once accepted, maintain or repair in accordance with MnDOT 2575.3.O.

3.05 CLEANUP AND PROTECTION

- A. Sweep up spilled fertilizer.
- B. Do not apply water to spilled fertilizer.

3.06 MAINTENANCE

- A. Maintain and repair all areas until acceptance.
- B. Maintain and restore accepted areas in accordance with MnDOT 2575.3.O.
- C. Re-water if soaking rain does not occur after 3 days.
- D. Maintain adequate soil moisture in the upper 1-foot for 3 weeks after seeding.
- E. Allow soil moisture to drop after 3 weeks.

END OF SECTION

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SECTION 33 05 13

GRIT CHAMBER

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Precast concrete structure.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
- C. Method of Measurement:
 - 1. Measure as a complete unit.
 - 2. Unit Includes:
 - a. Precast concrete valve, cover, base, and appurtenances.
 - b. Internal walls
 - c. 48" Manhole Barrel and Cone section
 - d. Casting cover, frame, and adjusting rings.
- D. Basis of Payment:
 - 1. Payment for the Grit Chamber shall be at the Lump Sum Contract Price as listed on the Bid Form. All associated Work items will be considered incidental.

1.02 REFERENCES

- A. ANSI:
 - 1. A21.4 - Standard for Cement - Mortar Lining for Ductile Iron Pipe and Fittings
- B. ASTM:
 - 1. A48 - Specification for Gray Iron Castings
 - 2. C478 - Specification for Precast Reinforced Concrete Manhole

1.03 DESIGN REQUIREMENTS

- A. Design in accordance with MNDOT 2412
- B. Design to support the following live loads:
 - 1. 32,000 lbs.

1.04 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for the precast vault components.

PART 2 PRODUCTS

2.01 PIPE CONNECTIONS

- A. Outlet Pipe Connection use Pipe Seal Gasket Detail (Drawing Sheet C4)
- B. Inlet Pipes use Catch Basin/Manhole opening detail (Drawing Sheet C4)

PART 3 EXECUTION

3.01 INSTALLATION

- A. Construct vault in accordance with Drawing details and elevations.

- B. Provide trench excavation, foundation, and backfill in accordance with Section 31 23 33.
- C. Place on compacted granular subgrade.
- D. Provide adjusting rings in accordance with Drawing details to establish casting elevation.
- E. Adjust casting to final surface elevation.

3.02 CLEANING

- A. Remove dirt and foreign materials from the completed structure.

END OF SECTION

SECTION 33 05 20

HORIZONTAL DIRECTIONAL DRILLING (HDD) PIPE INSTALLATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes installation of underground pipe using Horizontal Directional Drilling (Guided Boring) method.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section
- C. Method of Measurement:
 - 1. HDD Pipe Installation:
 - a. Measure by distance in linear feet for each size and type of pipe successfully installed and accepted for use.
 - b. Measure in the horizontal plane along the axis of the installed pipe.
 - c. Any deviations from the proposed distances shown on the Drawings shall be approved by Engineer.
- D. Basis of Payment:
 - 1. Bid Price includes:
 - a. Pipe. (either as carrier pipe or casing pipe)
 - b. Drilling.
 - c. Boring, receiving, and verification pits.
 - d. Wasted pipe at entry and exit points.
 - 2. Payment for acceptable quantities of HDD shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. D2667 - Standard Practice for Heat Joining Polyolefin Pipe and Fitting
 - 2. D3261 - Standard Specification for Butt Fusion Polyethylene (PE) Plastic Fittings for PE Plastic Pipe and Tubing
 - 3. F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR - PR) Based on Outside Diameter
 - 4. F905 - Standard Practice for Qualification of Saddle Fusion Joints
- B. AWWA:
 - 1. C906 - AWWA Standard for HDPE Pipe

1.03 DEFINITIONS

- A. Horizontal Directional Drilling (HDD) Pipe Installation (also known as Guided Boring): Method of trenchless construction producing continuous bores using a surface launched, remotely steerable, electronically monitored drilling tool controlled from a mobile drilling frame, and including a field power unit, mud mixing, storage and recycling system, and mobile spoils extraction system.
- B. DIPS: Ductile Iron Pipe Size.
- C. HDPE: High Density Polyethylene.

1.04 SYSTEM DESCRIPTION

- A. HDD Process:
 - 1. Excavate drilling and receiving pits.
 - 2. Install drilling frame in drilling pit.
 - 3. Drill pilot hole to receiving pit in conformance with proposed alignment and grade of proposed pipe.
 - 4. Control toolhead by means of real time guidance system that measures inclination, roll, and azimuth.
 - 5. Remove toolhead and install drill string and pipe in receiving pit.
 - 6. Pull drill string and pipe back to drilling pit along pilot hole alignment.
 - 7. Pilot hole is enlarged as required to accommodate pipe during pullback.
 - 8. Remove excess spoils generated during pipe installation by vacuum extraction.

1.05 SUBMITTALS

- A. Product Data:
 - 1. Drilling Fluid:
 - a. Manufacturer.
 - b. Components.
 - c. Special precautions.
 - d. Manufacturer's recommended method of mixing and application.
 - e. Manufacturer's recommendation for storage and handling.
 - f. Material Safety Data Sheet (MSDS).
 - 2. Equipment:
 - a. Detailed description of equipment and tools.
 - b. Size and capacity.
 - c. Piping materials.
 - d. Setup requirements.
 - e. Type and size of cutting toolhead and backreaming tool.
 - f. Type of pipe joining equipment.
 - 3. Written Procedures for:
 - a. Proposed pipe staging and installation.
 - b. Dewatering.
 - c. Monitoring and control of line and grade.
 - d. Time requirement for joint fusion.
 - e. Line and grade correction.
 - 4. Construction schedule for installations.
- B. Shop Drawings:
 - 1. Location and Dimensions for:
 - a. Drilling and receiving pits.
 - b. Product joining and staging areas.
- C. Quality Assurance:
 - 1. Qualifications and experience of field supervisors and boring machine operators.
 - 2. Previous HDD boring project references.
- D. Certificates: Provide Certificates of Compliance from the manufacturer certifying that the HDPE pipe and fittings meet the requirements listed in this section.

1.06 QUALITY ASSURANCE

- A. Minimum Qualifications for Field Supervisors and Boring Machine Operators:
 - 1. 3 previous installation projects.
- B. Provide qualified field supervisor on Site at all times when boring operations are in progress.

- C. Demonstrate pipe-joining process, using intended personnel and equipment, to Owner and Engineer prior to initial boring.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Check materials upon delivery to assure that proper material has been received.
- B. Store drilling fluid components in accordance with manufacturer's recommendations.

1.08 SITE CONDITIONS

- A. Geotechnical data is included in Attachment 1.

PART 2 PRODUCTS

2.01 MATERIALS

- A. HDPE Pipe:
 - a. As Specified in 33 11 02
- B. Pipe Adaptors:
 - 1. Join Pipe ends by fusion method for pipe material in Section 33 11 02

2.02 BORING EQUIPMENT

- A. High pressure, low volume fluid cutting process capable of dispensing drilling fluid to the surrounding materials as it proceeds.
- B. Remotely steerable.
- C. Provide for electronic monitoring of depth and location.
- D. Capable of placing pipe to a depth of 16.5 feet with a 1-foot tolerance.
- E. Capable of a 90-degree turn within a 300-foot radius.
- F. Provide for mobile spoils removal from entry and exit pits and return areas caused by fracturing.
- G. Include alarm system capable of detecting electrical current.
- H. Guidance System:
 - 1. Capable of measuring inclination, roll, and azimuth.
 - 2. Independent means to insure accuracy of installation.
 - 3. Capable of accurately producing installation alignment and profile records.
 - 4. Steering Equipment:
 - a. House in a non-magnetic bottom-hole of the lead drill pipe section.
 - b. Provide for in-hole deviation at the front during pilot hole drilling.
 - c. Position lead section along same alignment as the proposed crossing from entry to exit.
 - 5. Separate magnetized pilot work-string from steering guidance probe by means of 2 non-magnetic drill collars behind the bottom-hole assembly.
 - 6. Include remote tool locating device capable of detecting the position of the cutting head within the following tolerances:
 - a. Elevation: 1 inch per 5 feet of depth.
 - b. Alignment: 2 inches per 5 feet of depth.

2.03 BENTONITE CLAY COMPONENT

- A. Appearance: Off-white to tan powder.
- B. Chemical Definition:
 - 1. Untreated Wyoming bentonite.
 - 2. Hydrous silicate of alumina composed of sodium montmorillonite clay.
- C. Specific Gravity: 2.6 to 2.7.
- D. Bulk Density:
 - 1. Uncompacted: 71 pounds per foot, plus or minus 3.
 - 2. Compacted: 74 pounds per foot, plus or minus 3.
- E. Unit Weight: 2.4 pounds per quart.
- F. pH: 8.8 (6 percent in water suspension).
- G. Mineralogical Analysis (x-ray diffraction):
 - 1. Montmorillonite: 85 percent, plus or minus 5.
 - 2. Quartz: 5 percent, plus or minus 1.
 - 3. Feldspars: 5 percent, plus or minus 1.
 - 4. Cristobalite: 2 percent, plus or minus 0.2.
 - 5. Illite: 2 percent, plus or minus 0.2.
 - 6. Calcium and Gypsum: 1 percent, plus or minus 0.05.
- H. Chemical Analysis:
 - 1. S_1O_2 : 55.44 percent, plus or minus 5.
 - 2. $A1_2O_3$: 20.14 percent, plus or minus 2.
 - 3. Fe_2O_3 : 3.67 percent, plus or minus 0.2.
 - 4. CaO : 0.49 percent, plus or minus 0.05.
 - 5. MgO : 2.49 percent, plus or minus 0.2.
 - 6. Na_2O : 2.76 percent, plus or minus 0.2.
 - 7. K_2O : 0.6 percent, plus or minus 0.05.
 - 8. Bound Water: 5.5 percent, plus or minus 0.05.
 - 9. Moisture at 220 degrees F: 8 percent, plus or minus 0.5.

2.04 DRILLING FLUID MIXTURE

- A. Inert mixture of water and bentonite clay.
- B. Add cement or polymer extenders as required.
- C. Coordinate with Owner to obtain water supply for on-site mixture.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Field verify the location and depth of all utilities and other facilities that are within or adjacent to the proposed boring alignment.

3.02 PREPARATION

- A. Excavate access pits in accordance with 31 23 33.
- B. Locate pits to minimize the number required and to facilitate pipe installation in continuous runs.

- C. Control ground water as required to maintain pits in a dry and stable condition.

3.03 CONSTRUCTION

- A. Initial Boring:
 - 1. The entry angle of the pilot hole and the boring process shall maintain a curvature that does not exceed the allowable bending radius of the pipe.
 - 2. Notify Engineer prior to making any adjustments in alignment or grade.
- B. Pipe Installation:
 - 1. After initial boring is complete, install a swivel, circulating sub and reamer at the termination pit and pull pipe back to starting pit.
 - 2. Apply drilling fluid as required to maintain borehole stability and reduce frictional drag.
 - 3. Maximum reaming diameter: 1.4 times the pipe diameter.
 - 4. Protect and support pipe above ground to provide free movement and prevent damage from ground debris.
 - 5. Pullback forces shall not exceed the allowable pulling forces of the pipe.
 - 6. Provide sufficient pipe length to extend past termination point for connections to adjacent pipe sections or manholes.
 - 7. Allow installed pipe to stabilize for 24 hours prior to making tie-ins or connections.
 - 8. Install connections and tie-ins as shown on Drawings.
- C. Pipe Joining:
 - 1. Heat fusion method.
 - 2. Perform in accordance with manufacturer's instructions.

3.04 RESTORATION

- A. Backfill pits in accordance with Section 31 23 33.
- B. Restore Work areas to original condition.

3.05 FIELD QUALITY CONTROL

- A. Pressure test all material and joints in accordance with Section 33 11 02 after installation.
- B. Installation Tolerances:
 - 1. Inclination:
 - a. Accuracy: Plus/minus 0.05 degrees.
 - b. Range: Plus/minus 90 degrees.
 - c. Repeatability: Plus/minus 0.02 degrees.
 - 2. Roll:
 - a. Accuracy: Plus/minus 0.1 degree.
 - b. Range: Plus/minus 0 to 360 degrees.
 - 3. Azimuth:
 - a. Repeatability: Plus/minus 0.1 degree.
 - b. Range: Plus/minus 0 to 360 degrees.

3.06 MATERIAL DISPOSAL

- A. Excess drilling fluid and spoil will become property of the Contractor for transport and disposal.
- B. Do not discharge excess fluid and spoils into sewer systems or natural waterways.
- C. Remove and dispose of drilling fluid surfacing through fracturing.

END OF SECTION

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SECTION 33 11 01

WATER SUPPLY PIPING SYSTEM AT PUMP STATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water piping, fittings and appurtenances adjacent to pumping stations.
 - 2. Mainline Stations 104+00 to 104+30 (plus laterals), and Stations 121+39 to 121+96 (plus laterals).
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 33 11 02 – River Intake Piping
 - 3. Section 33 11 03 – Water Supply Piping
 - 4. Section 33 11 04 – Transfer Piping
- C. Method of Measurement:
 - 1. Water Supply Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure along pipe axis with no deduction for fittings or valves.
 - c. Measure in the horizontal plane unless pipe grade exceeds 15 percent.
 - 2. Fittings:
 - a. Measure by Each as shown on Drawings and Listed in on Bid Form.
 - 1) Includes restraint glands, gaskets, rods, bolts, and other accessories.
 - 3. Valves and Boxes: Measure valve and box of each size and type as a unit.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of water main and appurtenances shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - 2. A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - 3. A536 - Ductile Iron Castings
 - 4. A563 - Carbon and Alloy Steel Nuts
- B. AWWA:
 - 1. C105 - Polyethylene Encasement for Ductile -Iron Pipe Systems
 - 2. C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
 - 3. C150 - Thickness Design of Ductile Iron Pipe
 - 4. C151 - Ductile-Iron Pipe, Centrifugally Cast for Water or other Liquids
 - 5. C502 - C504 - Rubber-Seated Butterfly Valves
 - 6. C600 - Installation of Ductile Iron Water Mains and their Appurtenances

1.03 SUBMITTALS

- A. Submit Certificate of Compliance for products listed under Article 1.04.

1.04 QUALITY ASSURANCE

- A. Provide Certificates of Compliance from the manufacturer certifying that the products provided meet the respective requirements listed in Article 1.02:

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inspection:
 - 1. Inspect all pipe and products during the unloading process.
 - 2. Notify E/A of any cracked, flawed or otherwise defective products.
 - 3. Remove all products found to be defective by the E/A from the Site.
- B. Handling and Storage: Handling and storage of products shall be in accordance with Section 2.2 of AWWA C600.

PART 2 PRODUCTS

2.01 WATER MAIN PIPE

- A. Ductile Iron: AWWA C151.
- B. Cement-Mortar Lining: AWWA C104.
- C. Thickness Class: __52__.
- D. Joints: Push-On.

2.02 FITTINGS

- A. Ductile Iron: AWWA C153.
- B. Cement-Mortar Lining: AWWA C104.
- C. Joints: Mechanical with ASTM A307 and A563 Carbon Steel bolts and nuts.

2.03 VALVES AND BOXES

- A. Butterfly Valves:
 - 1. Rubber Seated: AWWA C504.
 - 2. Class: 150B.
 - 3. Body Type: Mechanical - Joint-End with ASTM A307 and A563 Carbon Steel bolts and nuts.
 - 4. Disc:
 - a. 316 stainless steel edge
 - b. 3-inch thru 24-inch: ASTM A126 Class B Cast Iron
 - c. 30-inch and larger: ASTM A536 Ductile Iron
 - 5. Seat:
 - a. 3-inch through 20-inch: Bond to body per ASTM D429, Method B.
 - b. 24-inch and larger: Retain in body without use of metal retainers.
 - 6. Operator:
 - a. Traveling nut actuator
 - b. Open left.
 - 7. Markings to be cast on the body:
 - a. Open indicating arrow.
 - b. Manufacturer's name.
 - c. Class.
 - d. Year of manufacture.
 - e. Size.

- B. Boxes:
 - 1. Cast Iron, 5-1/4-inch shaft.
 - 2. Vertical, 3 piece, Buffalo type.
 - 3. Box length to be provided as needed.
 - 4. Adjustable to 6 inches up or down from standard box length.

2.04 ENCASEMENT

- A. Polyethylene Sheet: AWWA C105 Low Density
- B. Thickness: 8 mil

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 - 1. Install pipe at the alignment and grade shown on the Drawings.
 - 2. Provide a minimum of 3 feet of cover over the pipe.
 - 3. Install appurtenances in the locations shown on the Drawings.
 - 4. Remove all dirt and foreign material from the pipe interior prior to installation.
 - 5. See Section 31 23 33 for pipe foundation and backfill procedures.
 - 6. See Section 31 23 33 in case of conflicts with existing pipes.
- B. Valve and Box Installation:
 - 1. Verify that subgrade material is adequate to support valve assembly.
 - 2. Install valves with stems vertical and plumb.
 - 3. Install boxes plumb and centered over the valve nut.
 - 4. Verify that box remains plumb and centered during backfill.
 - 5. Adjust box cover to required grade.
- C. Thrust Restraint:
 - 1. Install thrust restraints at all bends, tees and valves.
 - 2. Restraint devices for mechanical joint fittings and appurtenances conforming to either ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53, as applicable.
 - 3. Mechanical joint restraint shall be Megalug Series 1100 produced by EBAA Iron Inc. or pre-approved equal.
- D. Encasement:
 - 1. Comply with AWWA C105.
 - 2. Wrap all pipe and fittings in the location shown on the Drawings.
 - 3. Clean all surfaces of pipe and appurtenances prior to wrapping.
 - 4. Provide sufficient slack to prevent damage during backfill.
 - 5. Provide minimum 6-inch overlap at joints.
 - 6. Secure overlap and joints with compatible adhesive tape.
 - 7. Repair damaged wrap with tape or polyethylene patch.

3.02 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of the system and prior to being placed into service:
 - 1. Pressure and Leakage Test:
 - a. Perform pressure and leakage test in accordance with AWWA C600.
 - b. Test Pressure: 150 psi.
 - c. Test Duration: 2 hours.
 - d. Gage Requirements:
 - 1) Size: 4-1/2-inch dial.
 - 2) Range: 0 to 200 psi.
 - 3) Gradation: 2 psi.

- 4) Accuracy: 1/2 percent.
- e. Do not allow pressure to vary more than 5 psi during the test.
- f. Do not allow pressure to vary more than 2 psi during the last hour of the test.
- g. Allowable Leakage: One-half of the volume allowed by AWWA C600 in accordance with the following:

$$L = \frac{SD\sqrt{P}}{266,400}$$

L = Allowable Leakage in Gallons Per Hour

S = Length of Pipe Tested in Feet

D = Nominal Diameter of Pipe in Inches

P = Average Test Pressure During Test in Pounds/Square Inch (Gage)

END OF SECTION

SECTION 33 11 02

WATER SUPPLY PIPING SYSTEM BETWEEN PUMP STATIONS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water piping, fittings and appurtenances between pumping stations and within the Inlet/Outlet Structure. Mainline Stations 104+30 to 121+39.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 33 05 20 - Horizontal Directional Drilling (HDD) Pipe Installation
 - 3. Section 31 71 30 - Subsurface Crossings (Jack/Bore)
- C. Method of Measurement:
 - 1. Water Supply Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure along pipe axis with no deduction for fittings or valves.
 - c. Measure in the horizontal plane unless pipe grade exceeds 15 percent.
 - 2. Fittings: Fittings needed to allow pipe to follow planned alignment are to be included with the piping. Payment is considered incidental and no direct payment will be made.
 - 3. Piping will be measured in separate categories based on the installation method (i.e. Open Trench, Horizontal Directional Drilling or Subsurface Crossings (Jack/Bore)).
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of water piping shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. D2667 - Standard Practice for Heat Joining Polyolefin Pipe and Fitting
 - 2. D3261 - Standard Specification for Butt Fusion Polyethylene (PE) Plastic Fittings for PE Plastic Pipe and Tubing
 - 3. F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR - PR) Based on Outside Diameter
 - 4. F905 - Standard Practice for Qualification of Saddle Fusion Joints
- B. AWWA C906 - AWWA Standard for HDPE Pipe

1.03 QUALIFICATION OF MANUFACTURERS.

- 1. The Manufacturer shall have manufacturing and quality control facilities that are capable of producing and assuring the quality of the pipe and fittings required by these Specifications.
 - 2. The Manufacturer's production facilities shall be ISO Certified in accordance with the current edition of ISO 9001 and a documented quality management system that defines product specifications and manufacturing and quality assurance procedures that assure conformance with applicable regulatory requirements.
 - 3. Upon request, the manufacturer shall provide a current Certificate of Compliance form and independent ISO 9000 Registrar.
- B. Approved Manufacturers.

1. The Pipe and Resin manufacturing sites shall have the same ownership, and/or be of the same company. The Pipe and Resin manufacturers shall have at least 15 years of experience producing a similar size pipe and similar resin types.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inspection:
 1. Inspect all pipe and products during the unloading process.
 2. Notify Engineer of any cracked, flawed or otherwise defective products.
 3. Remove all products found to be defective by the Engineer from the Site.
- B. Handling and Storage: Handling and storage of products shall be in accordance with Section 2.2 of AWWA C600.

PART 2 PRODUCTS

2.01 WATER SUPPLY PIPE

- A. Materials.
 1. Black PE materials used for the manufacture of polyethylene pipe, tube and fittings shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. The material shall be listed and approved for potable water in accordance with NSF/ANSI 61.
 2. Gray PE material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E. When requested on the order, the Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.
- B. Pipe
Polyethylene pipe shall be manufactured in accordance with AWWA C901-96 for sizes. 4"IPS and DIPS sizes 4" and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99.
 - a. Service Identification Stripes for DIPS Sized Pipe. DIPS sized pipes shall have three equally spaced pairs of longitudinal blue color stripes co-extruded into the pipe outside surface.
 - b. Marking. Pipe shall be marked in accordance with ASTM F714 and/or AWWA C906. Marking shall indicate the pipe's Pressure Rating (PR) and/or Pressure Class (PC).
2. Pipe material shall be PE 4710, 24" (nominal) DIPS Size (actual OD = 25.800"), DR17.0, 125 psi rated.

2.02 FITTINGS

- A. Polyethylene Fittings & Custom Fabrications.
 1. Polyethylene fittings and custom fabrications shall be molded or fabricated by an Approved Manufacturer. All fittings and custom fabrications shall be pressure rated for the same internal pressure rating as the mating pipe.
 2. Molded fittings shall be manufactured and tested in accordance with ASTM D 3261 and shall be so marked. Molded fittings shall be tested in accordance with AWWA C906.
 3. The Manufacturer shall submit samples from each molded fittings production lot to x-ray inspection.
 4. Fabricated fittings shall;
 - a. be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings.
 - b. be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.
 - c. be tested in accordance with AWWA C906.
- B. Polyethylene Flange Adapters.
 1. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder.

2. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serrations).
3. Flange adapters shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe.
4. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius.
5. Flange bolts and nuts shall be Grade 3 or higher.
6. All MJ Adapters shall be provided with Heavy Duty Back-up Ring Kits and Stainless Steel stiffeners

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 1. Install pipe at the alignment and grade shown on the Drawings.
 2. Provide a minimum of 3 feet of cover over the pipe.
 3. Install appurtenances in the locations shown on the Drawings.
 4. Remove all dirt and foreign material from the pipe interior prior to installation.
 5. See Section 31 23 33 for pipe foundation and backfill procedures.
 6. See Section 31 23 33 in case of conflicts with existing pipes.

3.02 JOINING

- A. Heat Fusion Joining.
 1. Joints between plain end pipes and fittings shall be made by butt fusion.
 2. The butt fusion procedures used shall be as recommended by the pipe and fitting Manufacturer.
 3. The Contractor shall ensure that persons making heat fusion joints have received training in the Manufacturer's recommended procedure.
 4. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction.
- B. Joining by Other Means.
 1. Pipe and fittings may be joined together or to other materials by other means when shown on the plans
 - a. flanged connections (flange adapters and back-up rings),
 - b. mechanical couplings designed for joining polyethylene pipe
 - c. MJ Adapters with stiffener rings
 2. When joining by other means, the installation instructions of the joining device manufacturer shall be followed.

3.03 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of the system and prior to being placed into service:
 1. Pressure and Leakage Test:
 - a. Perform pressure and leakage test in accordance with AWWA C600.
 - b. Test Pressure: 150 psi.
 - c. Test Duration: 2 hours.
 - d. Gage Requirements:
 - 1) Size: 4-1/2-inch dial.
 - 2) Range: 0 to 200 psi.
 - 3) Gradation: 2 psi.
 - 4) Accuracy: 1/2 percent.
 - e. Do not allow pressure to vary more than 5 psi during the test.
 - f. Do not allow pressure to vary more than 2 psi during the last hour of the test.

- g. Allowable Leakage: One-half of the volume allowed by AWWA C600 in accordance with the following:

$$L = \frac{SD\sqrt{P}}{266,400}$$

L = Allowable Leakage in Gallons Per Hour

S = Length of Pipe Tested in Feet

D = Nominal Diameter of Pipe in Inches

P = Average Test Pressure During Test in Pounds/Square Inch (Gage)

END OF SECTION

SECTION 33 11 03

WATER TRANSFER PIPING GRIT CHAMBER TO STA. 104+00

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water piping, fittings and appurtenances between the Grit Chamber and mainline station 104+00.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 33 44 20 -Manholes And Catch Basins
 - 3. Restoration
- C. Method of Measurement:
 - 1. Water Supply Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure along pipe axis with no deduction for fittings or valves.
 - c. Measure in the horizontal plane unless pipe grade exceeds 15 percent.
 - 2. Fittings: Fittings needed to allow pipe to follow planned alignment are to be included with the piping. Payment is considered incidental and no direct payment will be made.
 - 3. Piping will be measured in separate categories based on the installation method (i.e. Open Trench, Horizontal Directional Drilling or Subsurface Crossings (Jack/Bore)).
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of water piping shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. D2667 - Standard Practice for Heat Joining Polyolefin Pipe and Fitting
 - 2. D3261 - Standard Specification for Butt Fusion Polyethylene (PE) Plastic Fittings for PE Plastic Pipe and Tubing
 - 3. F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR - PR) Based on Outside Diameter
 - 4. F905 - Standard Practice for Qualification of Saddle Fusion Joints
- B. AWWA C906 - AWWA Standard for HDPE Pipe

1.03 QUALIFICATION OF MANUFACTURERS.

- 1. The Manufacturer shall have manufacturing and quality control facilities that are capable of producing and assuring the quality of the pipe and fittings required by these Specifications.
- 2. The Manufacturer's production facilities shall be ISO Certified in accordance with the current edition of ISO 9001 and a documented quality management system that defines product specifications and manufacturing and quality assurance procedures that assure conformance with applicable regulatory requirements.
- 3. Upon request, the manufacturer shall provide a current Certificate of Compliance form and independent ISO 9000 Registrar.
- B. Approved Manufacturers.
 - 1. The Pipe and Resin manufacturing sites shall have the same ownership, and/or be of the same company. The Pipe and Resin manufacturers shall have at least 15 years of experience producing a similar size pipe and similar resin types.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inspection:
 - 1. Inspect all pipe and products during the unloading process.
 - 2. Notify Engineer of any cracked, flawed or otherwise defective products.
 - 3. Remove all products found to be defective by the Engineer from the Site.
- B. Handling and Storage: Handling and storage of products shall be in accordance with Section 2.2 of AWWA C600.

PART 2 PRODUCTS

2.01 WATER SUPPLY PIPE

- A. Materials.
 - 1. Black PE materials used for the manufacture of polyethylene pipe, tube and fittings shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. The material shall be listed and approved for potable water in accordance with NSF/ANSI 61.
 - 2. Gray PE material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E. When requested on the order, the Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.
- B. Pipe
 - Polyethylene pipe shall be manufactured in accordance with AWWA C901-96 for sizes. 4"IPS and DIPS sizes 4" and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99.
 - a. Service Identification Stripes for DIPS Sized Pipe. DIPS sized pipes shall have three equally spaced pairs of longitudinal blue color stripes co-extruded into the pipe outside surface.
 - b. Marking. Pipe shall be marked in accordance with ASTM F714 and/or AWWA C906. Marking shall indicate the pipe's Pressure Rating (PR) and/or Pressure Class (PC).
 - 2. Pipe material shall be PE 4710, 24" (nominal) DIPS Size (actual OD = 25.800"), DR 21.0, 100 psi rated.

2.02 FITTINGS

- A. Polyethylene Fittings & Custom Fabrications.
 - 1. Polyethylene fittings and custom fabrications shall be molded or fabricated by an Approved Manufacturer. All fittings and custom fabrications shall be pressure rated for the same internal pressure rating as the mating pipe.
 - 2. Molded fittings shall be manufactured and tested in accordance with ASTM D 3261 and shall be so marked. Molded fittings shall be tested in accordance with AWWA C906.
 - 3. The Manufacturer shall submit samples from each molded fittings production lot to x-ray inspection.
 - 4. Fabricated fittings shall;
 - a. be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock or molded fittings.
 - b. be rated for internal pressure service at least equal to the full service pressure rating of the mating pipe.
 - c. be tested in accordance with AWWA C906.
- B. Polyethylene Flange Adapters.
 - 1. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder.
 - 2. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serrations).

3. Flange adapters shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe.
4. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius.
5. Flange bolts and nuts shall be Grade 3 or higher.
6. All MJ Adapters shall be provided with Heavy Duty Back-up Ring Kits and Stainless Steel stiffeners

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 1. Install pipe at the alignment and grade shown on the Drawings.
 2. Provide a minimum of 3 feet of cover over the pipe.
 3. Install appurtenances in the locations shown on the Drawings.
 4. Remove all dirt and foreign material from the pipe interior prior to installation.
 5. See Section 31 23 33 for pipe foundation and backfill procedures.
 6. See Section 31 23 33 in case of conflicts with existing pipes.

3.02 JOINING

- A. Heat Fusion Joining.
 1. Joints between plain end pipes and fittings shall be made by butt fusion.
 2. The butt fusion procedures used shall be as recommended by the pipe and fitting Manufacturer.
 3. The Contractor shall ensure that persons making heat fusion joints have received training in the Manufacturer's recommended procedure.
 4. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction.
- B. Joining by Other Means.
 1. Pipe and fittings may be joined together or to other materials by other means when shown on the plans
 - a. flanged connections (flange adapters and back-up rings),
 - b. mechanical couplings designed for joining polyethylene pipe
 - c. MJ Adapters with stiffener rings
 2. When joining by other means, the installation instructions of the joining device manufacturer shall be followed.

3.03 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of the system and prior to being placed into service:
 1. Pressure and Leakage Test:
 - a. Perform pressure and leakage test in accordance with AWWA C600.
 - b. Test Pressure: 150 psi.
 - c. Test Duration: 2 hours.
 - d. Gage Requirements:
 - 1) Size: 4-1/2-inch dial.
 - 2) Range: 0 to 200 psi.
 - 3) Gradation: 2 psi.
 - 4) Accuracy: 1/2 percent.
 - e. Do not allow pressure to vary more than 5 psi during the test.
 - f. Do not allow pressure to vary more than 2 psi during the last hour of the test.

- g. Allowable Leakage: One-half of the volume allowed by AWWA C600 in accordance with the following:

$$L = \frac{SD\sqrt{P}}{266,400}$$

L = Allowable Leakage in Gallons Per Hour

S = Length of Pipe Tested in Feet

D = Nominal Diameter of Pipe in Inches

P = Average Test Pressure During Test in Pounds/Square Inch (Gage)

END OF SECTION

SECTION 33 11 04

MARINE CONSTRUCTED WATER SUPPLY PIPING SYSTEM RIVER STATION TO INTAKE-OUTLET

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water piping, fittings and appurtenances between ductile iron connection near River Station (Sta.121+96) to the Inlet/Outlet connection.
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
- C. Method of Measurement:
 - 1. Water Supply Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure along pipe axis with no deduction for fittings or valves.
 - c. Measure in the horizontal plane unless pipe grade exceeds 15 percent.
 - 2. Fittings: Adaptor fittings to connect to MJ or Flanged ductile iron considered incidental and no direct payment will be made.
 - 3. Weights: Precast concrete ballast weights are to be installed as shown on Plans. Weights and associated hardware are considered incidental and no direct payment will be made.
- D. Basis of Payment:
 - 1. Payment for acceptable quantities of water piping shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. D2667 - Standard Practice for Heat Joining Polyolefin Pipe and Fitting
 - 2. D3261 - Standard Specification for Butt Fusion Polyethylene (PE) Plastic Fittings for PE Plastic Pipe and Tubing
 - 3. F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR - PR) Based on Outside Diameter
- B. AWWA C906 - AWWA Standard for HDPE Pipe

1.03 QUALIFICATION OF MANUFACTURERS.

- 1. The Manufacturer shall have manufacturing and quality control facilities that are capable of producing and assuring the quality of the pipe and fittings required by these Specifications.
- 2. The Manufacturer's production facilities shall be ISO Certified in accordance with the current edition of ISO 9001 and a documented quality management system that defines product specifications and manufacturing and quality assurance procedures that assure conformance with applicable regulatory requirements.
- 3. Upon request, the manufacturer shall provide a current Certificate of Compliance form and independent ISO 9000 Registrar.
- B. Approved Manufacturers.
 - 1. The Pipe and Resin manufacturing sites shall have the same ownership, and/or be of the same company. The Pipe and Resin manufacturers shall have at least 15 years of experience producing a similar size pipe and similar resin types.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Inspection:
 - 1. Inspect all pipe and products during the unloading process.
 - 2. Notify Engineer of any cracked, flawed or otherwise defective products.
 - 3. Remove all products found to be defective by the Engineer from the Site.
- B. Handling and Storage: Handling and storage of products shall be in accordance with Section 2.2 of AWWA C600.

PART 2 PRODUCTS

2.01 WATER SUPPLY PIPE

- A. Materials.
 - 1. Black PE materials used for the manufacture of polyethylene pipe, tube and fittings shall be PE 4710 high density polyethylene meeting ASTM D3350 cell classification 445574C (formerly PE 3408 meeting 345464C per ASTM D3350-02) and shall be listed in the name of the pipe and fitting Manufacturer in PPI (Plastics Pipe Institute) TR-4 with a standard grade HDB rating of 1600 psi at 73°F. The material shall be listed and approved for potable water in accordance with NSF/ANSI 61.
 - 2. Gray PE material, when used, shall be the same except for meeting ASTM D 3350 cell classification 445574E. When requested on the order, the Manufacturer shall certify that the materials used to manufacture pipe and fittings meet these requirements.
- B. Pipe
 - Polyethylene pipe shall be manufactured in accordance with AWWA C901-96 for sizes. 4"IPS and DIPS sizes 4" and above shall be manufactured to the requirements of ASTM F714 and AWWA C906-99.
 - a. Service Identification Stripes for DIPS Sized Pipe. DIPS sized pipes shall have three equally spaced pairs of longitudinal blue color stripes co-extruded into the pipe outside surface.
 - b. Marking. Pipe shall be marked in accordance with ASTM F714 and/or AWWA C906. Marking shall indicate the pipe's Pressure Rating (PR) and/or Pressure Class (PC).
 - 2. Pipe material shall be PE 4710, 36" (nominal) DIPS Size (actual OD = 38.300"), DR17.0, 125 psi rated.

2.02 FITTINGS

- A. Polyethylene Flange Adapters.
 - 1. Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion-joining machine without the use of a stub-end holder.
 - 2. The sealing surface of the flange adapter shall be machined with a series of small v-shaped grooves (serrations).
 - 3. Flange adapters shall be fitted with back-up rings that are pressure rated equal to or greater than the mating pipe.
 - 4. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius.
 - 5. Flange bolts and nuts shall be Grade 3 or higher.
 - 6. All MJ Adapters shall be provided with Heavy Duty Back-up Ring Kits and Stainless Steel stiffeners

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 - 1. Install pipe at the alignment and grade shown on the Drawings.
 - 2. Install appurtenances in the locations shown on the Drawings.

3. Remove all dirt and foreign material from the pipe interior prior to installation.

3.02 JOINING

- A. Heat Fusion Joining.
 1. Joints between plain end pipes and fittings shall be made by butt fusion.
 2. The butt fusion procedures used shall be as recommended by the pipe and fitting Manufacturer.
 3. The Contractor shall ensure that persons making heat fusion joints have received training in the Manufacturer's recommended procedure.
 4. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction.
- B. Joining by Other Means.
 1. Pipe and fittings may be joined together or to other materials by other means when shown on the plans
 - a. flanged connections (flange adapters and back-up rings),
 - b. mechanical couplings designed for joining polyethylene pipe
 - c. MJ Adapters with stiffener rings
 2. When joining by other means, the installation instructions of the joining device manufacturer shall be followed.

3.03 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of the system and prior to being placed into service:
 1. Pressure and Leakage Test:
 - a. Perform pressure and leakage test in accordance with AWWA C600.
 - b. Test Pressure: 150 psi.
 - c. Test Duration: 2 hours.
 - d. Gage Requirements:
 - 1) Size: 4-1/2-inch dial.
 - 2) Range: 0 to 200 psi.
 - 3) Gradation: 2 psi.
 - 4) Accuracy: 1/2 percent.
 - e. Do not allow pressure to vary more than 5 psi during the test.
 - f. Do not allow pressure to vary more than 2 psi during the last hour of the test.
 - g. Allowable Leakage: One-half of the volume allowed by AWWA C600 in accordance with the following:

$$L = \frac{SD\sqrt{P}}{266,400}$$

L = Allowable Leakage in Gallons Per Hour

S = Length of Pipe Tested in Feet

D = Nominal Diameter of Pipe in Inches

P = Average Test Pressure During Test in Pounds/Square Inch (Gage)

END OF SECTION

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SECTION 33 11 05

INTAKE-OUTLET PIPING AND FITTINGS

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Water piping, fittings and appurtenances within the Inlet/Outlet Structure.
 - 2. Water Pipe
 - 3. Fittings
 - 4. "Duckbill Check Valve"
 - 5. Wafer Check Valve
 - 6. Intake Screen
- B. Method of Measurement:
 - 1. Pipe and Fittings:
 - a. Measure by a lump sum.
 - b. Includes pipe spool pieces, elbow, reducers, gaskets, bolts, and other accessories
 - 2. "Duckbill" Check Valve: Measure by each including gaskets bolts and accessories.
 - 3. Wafer Check Valve: Measure by each including gaskets bolts and accessories.
 - 4. Intake Screen: Measure as complete assembly including gaskets, bolts and accessories.
- C. Basis of Payment:
 - 1. Payment for acceptable quantities of pipe, fittings and appurtenances shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. A126 - Gray Iron Castings for Valves, Flanges, and Pipe Fittings
 - 2. A307 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
 - 3. A536 - Ductile Iron Castings
 - 4. A563 - Carbon and Alloy Steel Nuts
- B. AWWA:
 - 1. C150 - Thickness Design of Ductile Iron Pipe
 - 2. C151 - Ductile-Iron Pipe, Centrifugally Cast for Water or other Liquids
 - 3. C600 - Installation of Ductile Iron Water Mains and their Appurtenances

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Inspection:
 - 1. Inspect all pipe and products during the unloading process.
 - 2. Notify E/A of any cracked, flawed or otherwise defective products.
 - 3. Remove all products found to be defective by the E/A from the Site.
- B. Handling and Storage: Handling and storage of products shall be in accordance with Section 2.2 of AWWA C600.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

- A. Pipe:

- B. Ductile Iron: AWWA C151.
 - a. Cement-Mortar Lining: AWWA C104.
 - b. Thickness Class: 50.
 - c. Joints:
 - 1) Piping:
 - a) Flanged: AWWA C115.
- C. Fittings
 - 1. Ductile Iron: AWWA C153.
 - a. Cement-Mortar Lining: AWWA C104.
 - b. Joints: Flanged: AWWA C110.
- D. Bolts and Nuts
 - 1. Submerged and Buried Fittings: 304 stainless steel.
- E. Coatings
 - 1. Pipe and Fittings:
 - a. Asphaltic coating per AWWA C151.
 - b. Minimum Thickness: 1 mil.
- F. Manufacturers:
 - 1. DI Pipe and Fittings:
 - a. American Cast Iron Pipe Co.
 - b. U.S. Pipe

2.02 "DUCKBILL" ELASTOMERIC CHECK VALVES

- A. Features:
 - 1. The bill slit of the duckbill valve must be at least 1.57 times the nominal pipe diameter.
 - 2. Check Valves are to be all rubber and the flow operated check type with an integral flanged end connection.
 - 3. The port area shall contour down to a duckbill which shall allow passage of flow in one direction while preventing reverse flow.
 - 4. The flange and flexible duckbill sleeve shall be one-piece rubber construction with nylon reinforcement.
 - 5. The duckbill shall be offset so that the bottom line of the valve is flat, keeping the invert of the pipe parallel with the invert of the valve.
 - 6. The top of the valve shall rise to form the duckbill shape.
 - 7. The bill portion shall be thinner and more flexible than the valve body and formed into a curve of 180°.
- B. The flange drilling shall conform to ANSI B16.1 Class 125/ANSI B16.5, Class 150 standards. The valve shall be furnished with stainless steel back-up rings for installation.
- C. FUNCTION: When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the bill of the valve open, allowing flow to pass. When backpressure exceeds the line pressure, the bill of the valve is forced closed preventing backflow.
- D. MANUFACTURER:
 - 1. Shall have at least fifteen (15) years of experience in the manufacture of "duckbill" style elastomeric valves.
 - 2. Must have available flow test data from an accredited hydraulics laboratory to confirm pressure drop data. Company name, plant location, valve size and serial number shall be bonded to the check valve.
 - 3. All valves shall be of the Series 35-1 as manufactured by Tideflex Technologies, Carnegie, PA 15106. All valves shall be manufactured in the U.S.A.

2.03 PERFORATED DISK, ELASTOMERIC MEMBRANE TYPE CHECK VALVE

- A. Disk Features:
 - 1. The perforated disc shall be fabricated of stainless steel plate with welded support gussets.
 - 2. The disc shall be flanged and drilled to mate with ANSI B16.1, Class 125/ANSI B16.5 Class 150 flanges.
 - 3. The disc shall have three (3) tapped holes used for fastening the closure membrane and support rod to the disc with stainless steel bolts, nuts, and lock washers.
 - 4. The top of the disc shall be tapped and supplied with lifting eyebolt for installation.

- B. Membrane Features:
 1. The Waterflex® membrane shall be circular, one piece rubber construction with fabric reinforcement.
 2. The diameter of the membrane shall allow adequate clearance between the membrane O.D. and the pipe I.D.
 3. The membrane shall be vulcanized with a specified convex radius to produce a compression set to allow the membrane to seal against the perforated disc at low reverse differential pressure.
- C. The support rod shall be stainless steel and drilled with three (3) longitudinal holes to allow fastening of rod to membrane and perforated disc.
- D. FUNCTION: When line pressure inside the valve exceeds the backpressure outside the valve, the line pressure forces the membrane to open, allowing flow to pass through the perforations in the disc. When backpressure exceeds the line pressure, the membrane seats on the perforated disc preventing backflow.
- E. MANUFACTURER:
 1. Shall have at least fifteen (15) years experience in the manufacture of "duckbill" style elastomeric valves.
 2. Must have available flow test data from an accredited hydraulics laboratory to confirm pressure drop data. Company name, plant location, valve size and serial number shall be bonded to the check valve.
 3. All valves shall be of the Series WF-3 as manufactured by the Tideflex Technologies, Carnegie, PA 15106. Valves are to be manufactured in the USA.

2.04 INTAKE SCREEN

- A. GENERAL:
 1. All system components and equipment utilized in the intake screen system, including the system described in this shall be furnished as a complete integrated system by one manufacturer.
- B. CAPACITY:
 1. The intake assembly capacity shall be 6,000 GPM at a maximum through-slot velocity, as a result of water withdrawal, of 0.5 feet per second.
 2. The corresponding average through-slot velocity shall be 80% - 90% of the maximum velocity.
 3. Pressure drop through the entire intake assembly shall be approximately 0.4311 psi at the rated flow.
 4. The total intake assembly capacity of 6,000 GPM shall be handled by one (1) intake tee screen assembly.
- C. STRENGTH:
 1. The intake assembly shall be designed to a maximum 5 psi (3 bar) negative pump pressure or differential headloss.
 2. Design stress used for determining strength of the assembly shall be no more than 90% of the published yield strength of the material used. Strength calculations verifying compliance with these criteria shall be provided upon request.
- D. CONSTRUCTION
 1. The intake screen surface wire shall be Johnson Screens Vee-Wire® number 69.
 2. The surface wire, support beam and stiffener structure shall be an all-welded matrix designed to provide the specific strength with minimal interference with the through screen flow pattern.
 3. End plates and tee body shall be a minimum of 0.105 inches thick. All structural butt welds shall be full penetration fillet welds and shall be the thickness of the thinner component.
- E. SLOT OPENING SIZE
 1. The screen slot size shall be .125". The open area for this slot opening shall be 63.78%.
 2. Slot size shall be controlled and continuously monitored during manufacture.
 3. For slot openings of 0.040" through 0.100" the mean slot size shall be within +/- 0.002" with a standard deviation no greater than 0.002" throughout the assembly.
 4. For slot openings greater than 0.100" the mean slot size shall be within +/- 0.003" with a standard deviation no greater than 0.003" throughout the entire assembly.
- F. MATERIALS
 1. The main outlet flange shall mate with a 36" flange with a flange pattern equal to AWWA C-207, Table 2, Class D.
 2. The air connection shall be 4".
 3. The intake screen material shall be manufactured of Z-Alloy material.

- G. Manufacturer
 - 1. Evidence of the intake assembly capacity and flow distribution shall be able to be provided by a Computational Fluid Dynamic (CFD) analysis, supplied by the manufacturer. The CFD Analysis Method must be verified by actual physical testing.
 - 2. The intake screen assembly shall be as **manufactured by Johnson Screen, New Brighton, MN.**

PART 3 EXECUTION

3.01 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 - 1. Install pipe and fittings as shown on the Drawings.
 - 2. Provide anchorage to concrete structural slab

3.02 FIELD QUALITY CONTROL

- A. Perform the following tests upon completion of the system and prior to being placed into service:

END OF SECTION

SECTION 33 32 15

PUMP STATION WET WELL

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Precast concrete structure.
 - 2. Slide Gate and Operator
- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
- C. Method of Measurement:
 - 1. Measure as a complete unit.
 - 2. Unit Includes:
 - a. Precast concrete structure.
 - b. Slide Gate
 - c. All excavation and backfill.
- D. Basis of Payment:
 - 1. Payment for the Pump Station Wet Well shall be at the Lump Sum Contract Price as listed on the Bid Form. All associated Work items will be considered incidental.

1.02 DESIGN REQUIREMENTS

- A. Design in accordance with MNDOT 2412

1.03 SUBMITTALS

- A. Shop Drawings: Submit Shop Drawings for the precast structure and slide gate.

PART 2 PRODUCTS

2.01 PRECAST CONCRETE VAULT:

- A. ASTM C478.

2.02 PIPE CONNECTIONS

- A. Pipe Connection use Pipe Seal Gasket Detail (Drawing Sheet C4)

2.03 SLIDE GATE ASSEMBLY

- A. Description
 - 1. A slide gate assembly shall be upwards opening, of the 4 sides sealing type designed for submergence in water. The gate shall be self-contained-frame design and non-rising stem configuration.
 - 2. References:
 - a. AWWA C561
 - 3. Slide Gate Schedule:
 - a. Slide, Frame, Yoke, Stem and Accessories Material: Stainless Steel
 - b. Seals: Ultra high molecular weight polyethylene
 - c. Size: 36" x 36"

- d. Design Head: 20' seating, 20' unseating
 - e. Frame Type: Self Contained
 - f. Stem Type: Non Rising
 - g. Actuator: Gear box and crank
 - h. Actuator Mounting: Pedestal mounted
 - i. Accessories: Wall sealing gasket kit, all anchors and mounting instructions.
- B. Manufacturers:
- 1. AQUANOX Series S Slide Gates, as manufactured by ISE Metal Inc
 - 2. Waterman SS-250 Series Fabricated Slide Gate as manufactured by Waterman Industries of Exeter, California
 - 3. Approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Construct structure in accordance with Drawing details and elevations.
- B. Provide trench excavation, foundation, and backfill in accordance with Section 31 23 33.
- C. Place on compacted granular subgrade.

END OF SECTION

SECTION 33 41 00

STORM SEWER SYSTEMS (RUNOFF COLLECTION SYSTEM)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Storm sewer pipe.
 - 2. Manholes and appurtenances.
 - 3. Catch basins and appurtenances.
 - 4. Aprons.

- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill

- C. Method of Measurement:
 - 1. Pipe:
 - a. Measure by distance in linear feet.
 - b. Measure from structure centers and pipe ends not including end sections.
 - c. Measure each pipe size and class separately.
 - 2. Manholes:
 - a. Measure by height in linear feet to the nearest 0.1 foot.
 - b. Measure from the lowest invert to the top of the casting.
 - c. Measure each size and type separately.
 - 3. Catch Basins:
 - a. Measure by height in linear feet to the nearest 0.1 foot.
 - b. Measure from the lowest invert to the top of the casting.
 - c. Measure each size and type separately.
 - 4. Castings: Measure each type installed as a unit.
 - 5. Aprons: Measure each size and type installed as a unit.

- D. Basis of Payment:
 - 1. Payment for acceptable quantities of storm sewer items shall be at the Contract Unit Price as listed on the Bid Form. All associated Work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. A48 - Specification for Gray Iron Castings
 - 2. C478 - Specification for Precast Reinforced Concrete Manhole
 - 3. D2321 - Recommended Practice for Installation of Flexible Thermo-Plastic Sewer Pipe
 - 4. F477 - Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
 - 5. F667 - Standard Specifications for Large Diameter Corrugated Polyethylene Pipe and Fittings

1.03 SUBMITTALS

- A. Submit Certification of Compliance as required under Article 1.04.

- B. Provide Shop Drawings for each structure.

1.04 QUALITY ASSURANCE

- A. Provide certificate from manufacturer certifying that the pipe materials meet the respective requirements listed in Article 1.02.

1.05 DELIVERY OF MATERIALS

- A. Inspect all pipe and materials during the unloading process.
- B. Notify Engineer of any cracked, flawed or otherwise defective material.
- C. Remove all materials found to be unsatisfactory by Engineer from the Site.

PART 2 PRODUCTS

2.01 PIPE

- A. Corrugated High Density Polyethylene
- B. Provide all pipe from the same manufacturer.

2.02 MANHOLES AND CATCH BASINS

- A. See Drawings for diameter.
- B. Provide gasket joint.
- C. Provide base, cone section or cover slab as shown on Drawing details.
- D. Manhole Steps:
 - 1. Provide 16-inch wide step in accordance with the following:
 - a. Cast aluminum by Modern Metals Foundry (A-12).
 - b. Polypropylene coated steel by M.A. Industries, Inc.
 - c. Cast iron or aluminum alloy by Neenah Foundries (R-1980-I).
- E. Covers and Frames:
 - 1. ASTM A48:

2.03 APRONS

- A. Provide the same strength class as the pipe.
- B. Provide galvanized trash guards on all aprons.

PART 3 EXECUTION

3.01 PREPARATION

- A. Line and Grade:
 - 1. Conform to lines, elevations, and grades shown on the Drawings.
 - 2. Provide means for accurately transferring line and grade from ground surface stakes to the working point in the trench.

3.02 CONSTRUCTION REQUIREMENTS

- A. Pipe Installation:
 - 1. Inspect pipe for defects while suspended before lowering into the trench.
 - 2. Comply with ASTM D2321 for HDPE installation.
 - a. See Drawings for bedding details.
 - 3. Place pipe bell at upstream end of pipe length.
 - 4. Install pipe from lower to higher invert elevation.
 - 5. See Section 31 23 33 for pipe foundation and backfill procedures.

- B. Manhole and Catch Basin Installation:
 - 1. Place precast base on compacted granular subgrade.
 - 2. Install in accordance with drawing details.
 - 3. Locate steps within 1 inch of vertical alignment and within 1 inch of required vertical spacing.
 - 4. Install concrete adjusting rings to provide final horizontal and vertical adjustment within tolerances.
 - 5. Maximum horizontal tolerance: 3 inches in any direction.
 - 6. Construct watertight to prevent groundwater infiltration.

- C. Apron Installation: Tie aprons to next three pipe sections using galvanized "U" bolt fasteners.

3.03 FIELD QUALITY CONTROL

- A. Deflection Test:
 - 1. Perform on HDPE pipe at least 30 days after trench backfill has been placed.
 - 2. Perform test by pulling a mandrel through each line between manholes without aid of mechanical pulling devices.
 - 3. Mandrel Diameter: 95 percent of nominal pipe size.
 - 4. The line will be considered acceptable if mandrel can progress through line without binding.
 - 5. Provide corrective measures for lines not meeting these requirements.

3.04 CLEANING

- A. Remove all dirt and foreign material from the pipe and structure interiors.

END OF SECTION

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SECTION 33 44 20

MANHOLES AND CATCH BASINS (MnDOT 2506)

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Construction or reconstruction of precast sectional concrete sewer access structures.
 - 2. Adjustment of frame and ring castings to the final elevation.

- B. Related Sections:
 - 1. Section 31 23 33 - Trench Excavation and Backfill
 - 2. Section 33 41 00 Run Off Collection System
 - 3. Section 33 11 03 Water Transfer Piping (Grit Chamber to Sta 104)

- C. Method of Measurement:
 - 1. Manholes and Catch Basins:
 - a. Measure by height in linear feet to the nearest 0.1 foot.
 - b. Measure from the lowest invert to the top of the casting.
 - c. Measure each size and type separately.
 - 2. Castings:
 - a. Measure as individual unit.
 - b. Measure each type separately.
 - 3. Casting Adjustments: Measure as an individual unit regardless of type.

- D. Basis of Payment:
 - 1. Manhole and catch basin price includes base, precast sections, cone section or cover slab as required, steps and rings.
 - 2. Adjust or reconstruct price includes adjusting rings as required.
 - 3. Casting adjustments on in-place structures will be considered as reconstruction when:
 - a. The casting cannot be sufficiently lowered by removal of all in-place rings.
 - b. The total adjustment height exceeds 1 foot.
 - 4. Payment for acceptable quantities of manhole and catch basin items shall be at the contract unit price as listed on the Bid Form. All associated work items shall be considered incidental.

1.02 REFERENCES

- A. ASTM:
 - 1. C270 - Mortar for Unit Masonry

- B. MnDOT:
 - 1. 2461 - Structural Concrete
 - 2. 2506 - Manholes and Catch Basins
 - 3. 3149 - Granular Material
 - 4. 3321 - Gray Iron Castings
 - 5. 3622 - Sectional Concrete Manhole and Catch Basin Units

1.03 SUBMITTALS

- A. Submit certification as required under 1.04.

- B. Provide Shop Drawing for each structure.

1.04 QUALITY ASSURANCE

- A. Provide certificate from manufacturer certifying that the following materials meet the respective requirements listed in 1.02:
 - 1. Sectional Concrete Manhole/Catch Basin Units.
 - 2. Metal Castings.
 - 3. Concrete Drainage Castings.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All materials shall be in accordance with the respective MnDOT Specifications as follows:
 - 1. Concrete: 2461.
 - 2. Sectional Concrete Manhole/Catch Basin Units: 3622.
 - 3. Gray Iron Castings: 3321.
 - 4. Concrete Drainage Castings: 3622.
 - 5. Granular Materials: 3149.
- B. Manhole Steps:
 - 1. Provide 16-inch wide step in accordance with the following:
 - a. Cast aluminum by Modern Metals Foundry (A-12).
 - b. Polypropylene coated steel by M.A. Industries, Inc.
 - c. Cast iron or aluminum alloy by Neenah Foundries (R-1980-I).
- C. Mortar:
 - 1. 1 Part Masonry Cement (Type S): ASTM C270.
 - 2. 3 Parts Mortar Sand.
 - 3. Sufficient water for proper consistency.
 - 4. Entrained Air Content - 7 - 10 percent.

PART 3 EXECUTION

3.01 MANHOLES AND CATCH BASIN CONSTRUCTION

- A. Construct manholes and catch basins in accordance with plan details and elevations.
- B. Provide trench excavation, foundations and backfill in accordance with Section 31 23 33.
- C. Place precast base on compacted granular subgrade.
- D. Set bottom precast section in a full mortar bed on the base.
- E. Locate steps within 1 inch of vertical alignment and within 1 inch of required vertical spacing.
- F. Fill the joints between sections and around pipes with mortar or an approved joint compound.

3.02 CASTING ADJUSTMENT

- A. Adjust castings within the roadway surface prior to placement of final bituminous course.
- B. Keep excavation for adjustments to a minimum.
- C. Replace excavated areas in kind.
- D. Provide adjusting rings in accordance with plan details to establish required casting elevation.

- E. Set casting on a full mortar bed.
- F. Set top of casting to 1/2 inch below and parallel to proposed roadway surface.

3.03 STRUCTURE RECONSTRUCTION

- A. Remove connections to abandoned pipe and plug wall opening with concrete or masonry.
- B. Remove precast cone section or cover slab.
- C. Add, remove, or replace precast barrel sections as required to provide required structure height.
- D. Replace cone section or slab and set rings and castings per 3.02.

3.04 CLEANING

- A. Remove all dirt and foreign material from the structure interiors.

END OF SECTION

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- CONSULTANTS
- ENVIRONMENTAL
- GEOTECHNICAL
- MATERIALS
- FORENSICS

September 17, 2014

SEH, Inc.
416 South 6th Street, Suite 200
Brainerd, MN 56401

Attn: Jeff Ledin, PE

RE: Geotechnical Exploration and Review
Pump Stations, Runoff Collection Systems/Snowmaking Supply
Spirit Mountain Infrastructure Improvements
Duluth, Minnesota
AET No. 01-06238

Dear Mr. Ledin:

This letter report presents the results of the additional geotechnical exploration performed for the referenced project and presents our geotechnical recommendations pertaining to foundation support of the two pump station structures. This letter is a supplement to our previous geotechnical report for the project dated December 31, 2012 under AET No. 01-05655. This work is being performed per our August 12, 2014 proposal, subsequently authorized by you. The work scope consisted of two standard penetration test borings and preparation of this supplemental report.

1.0 Project Information

Two new pump stations are planned as a part of the improvement project. Details of each pump station are attached as Exhibits A and B. The locations on-site appear on Exhibit C. The pump stations are only anticipated to receive heat during snow-making season (November, December) and will likely be unheated during the majority of the winter season.

The higher elevation westerly station (Main Pump Station) is an addition to the project since our original geotechnical report. The above grade structure will house equipment and will not include a below grade space or wet well, although below grade piping and pump cans will be installed below the foundation and slabs. The structure will be supported on perimeter frost-depth strip footings, with maximum loads of up to 3.5 kips per linear foot.

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BY:



The lower elevation easterly station (River Pump Station) is at a revised location from that stated in our original report. With the revised location, the associated wet well will now be 15 feet below grade rather than 35.3 feet deep. The structure will still include frost depth perimeter strip footings, constructed away from the wet well. The wet well will likely be constructed with open cut methods, although the option of a "caisson" installation may still be available to the contractor. The loads to be exerted by the strip footings are anticipated to be relatively light.

2.0 Site Exploration and Testing

2.1 Soil Boring

Two standard penetration test borings were drilled and sampled at the site on August 28, 2014. The logs of the test borings are attached. The boring locations were obtained using GPS (not surveyor accuracy). The St. Louis County coordinates appear on the boring logs and the general locations on the site are shown on attached Exhibit C. Boring surface elevations were not measured.

The boring logs contain information concerning soil layering, soil classification, geologic description, and moisture condition. Relative density or consistency is also noted for natural soils, which is based on the standard penetration resistance (N-value). We refer you to the standard sheet entitled "Exploration/Classification Methods" for details on the drilling and sampling methods, the classification methods, and the water level measurement methods. Data sheets concerning the Unified Soil Classification System, the descriptive terminology, and the symbols used on the boring logs are also attached.

2.2 Laboratory Testing

The laboratory test program included water content and pocket penetrometer testing on cohesive soils retrieved. One organic content test and one Atterberg Limits test were also conducted on selected samples. The test results appear on the individual boring logs adjacent to the samples upon which they were performed.

3.0 Conditions Encountered

Boring HPS was conducted in the vicinity of the Main Pump Station. The boring indicates the presence of 9½ feet of mostly silty sand fill over highly plastic organic silt having an organic content of 31.4%. This is then underlain by lacustrine fat clay, which is stiff to firm at the top of the deposit, but likely becomes softer at depth.

Boring LPS was conducted in the vicinity of the River Pump Station. This boring shows organic clay is present to 7 feet deep, which may be either alluvium or fill. This is then underlain by lacustrine fat clay which is firm in the vicinity of the foundations and wet well, and softer at depth.

No ground water entered the boreholes at the time of drilling. The profile is slow draining, and it would take extended time, likely with the need for piezometers to reliably establish the hydrostatic ground-water level.

4.0 Recommendations

4.1 Main Pump Station

The organic silt should not be relied upon for support of the new structure. To allow support of spread foundations and the interior contents, we recommend excavation of the fill and organic silt from beneath the building footprint and lateral oversize zone. Boring HPS indicates that an excavation depth of 12½ feet will be needed to accomplish this. Because conditions will change away from the boring location, we recommend on-site observation by AET geotechnical field personnel during construction to evaluate these potential changes from that shown at the boring location.

Where the excavation needs to extend below foundation grade, the excavation bottom and resultant engineered fill system must be oversized laterally beyond the planned outside edges of the foundations to properly support the lateral loads exerted by that foundation. This excavation/engineered fill lateral extension should at least be equal to the vertical depth of fill needed to attain foundation grade at that location (i.e., 1:1 lateral oversize).

The on-site silty sand could be re-used as engineered fill in the non-frost zone, provided any organics, wood, and fat clay are properly separated and the soil can be compacted to specified levels. With the unheated condition for much of the winter, we recommend the silty sand not be used below the slab within 6 feet of final grade. In this zone, the fill should be limited to sands with less than 8% passing the #200 sieve by weight. Also, it may be necessary to use sands as the initial lifts of fill to allow proper compaction of the fill without disturbing the underlying clayey soils.

Engineered fill placed to attain foundation and floor slab grades should be compacted in thin lifts, such that the entire lift achieves a minimum compaction level of 95% of the *standard maximum dry unit weight* per ASTM:D698 (Standard Proctor test). The fill lift thicknesses should be no greater than 12 inches for granular soils and no greater than 8 inches for clayey/silty soils. The lifts should be thinner than the above if needed to achieve the minimum specified compaction level with the type of compaction equipment being used.

After the recommended excavation and filling procedures, the new structure can be supported on conventional spread foundations. For the unheated building case, we recommend the minimum soil cover depth from ground line to bottom of footing be 7 feet.

The foundation design can be based on a maximum allowable soil bearing capacity of 2,000 psf. It is our judgment the 2,000 psf design pressure will have a factor of safety of greater than 3 against localized shear or base failure. We judge that total and differential settlements under these loadings will be less than 1 inch and ½ inch, respectively.

4.2 River Pump Station

The wet well is anticipated to penetrate into the firm lacustrine clays, which should provide reasonable support for the wet well if undisturbed. The same comments and recommendations presented in our original report (01-05655) still apply, although the likelihood of bottom blow-up appears significantly reduced with the lesser depth and confirmation that sand layers are not present in close proximity to the wet well bottom. We do still recommend placement of a Coarse Filter Aggregate foundation layer wrapped in geotextile fabric as the foundation base for the open cut approach. The “allowable bearing pressure” value should be reduced to 1500 psf for the concrete base design.

For the unheated building case, we recommend the minimum soil cover depth from ground line to bottom of footing be 7 feet. We recommend all organic lean clay be excavated from beneath the building footprint and a 1:1 lateral oversize (if applicable) thereby exposing undisturbed inorganic clay, which is on the order of 7 feet deep at the boring location. This may vary away from the boring locations, and final supporting soils should be verified by AET geotechnical personnel.

The replacement fill should be non-frost susceptible fill (sand with less than 8% by weight passing the #200 sieve) in this zone. This upper fill should be compacted in thin lifts, such that the entire lift achieves a minimum compaction level of 95% of the *standard maximum dry unit weight* per ASTM:D698 (Standard Proctor test). Any engineered fill placed below the upper 7 foot zone can be Select Granular Borrow (MnDOT Specification 3149.2B2), and should be compacted to a minimum of 98% of the *standard maximum dry unit weight* to control differential settlement

The foundation design can be based on a maximum allowable soil bearing capacity of 2,000 psf. It is our judgment the 2,000 psf design pressure will have a factor of safety of greater than 3 against localized shear or base failure. We judge that total and differential settlements under these loadings will be less than 1 inch and ½ inch, respectively.

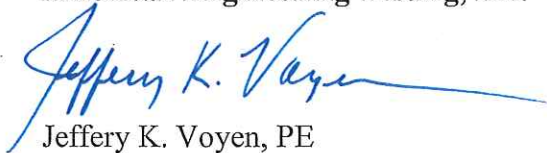
We refer you to our previous report for additional design details and potential construction difficulties.

We also refer you to the attached sheet entitled “Freezing Weather Effects on Building Construction” for other design considerations.

5.0 Limitations

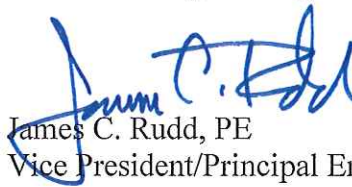
Within the limitations of scope, budget, and schedule, our services have been conducted according to generally accepted geotechnical engineering practices at this time and location.

Authored By,
American Engineering Testing, Inc.



Jeffery K. Voyer, PE
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Reviewed By,
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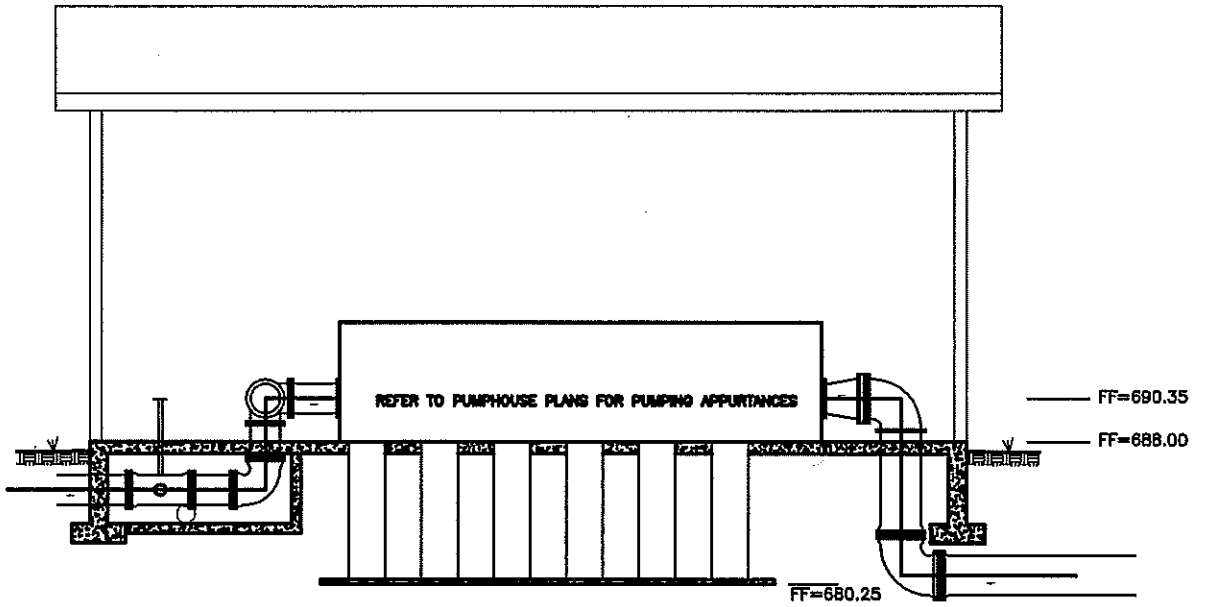


James C. Rudd, PE
Vice President/Principal Engineer

Attachments:

- Exhibit A – Detail of Main Pump Station
- Exhibit B – Detail of River Pump Station
- Exhibit C – General Boring Locations
- Subsurface Boring Logs
- Exploration/Classification Methods
- Boring Log Notes
- Unified Soil Classification System
- Freezing Weather Effects on Building Construction

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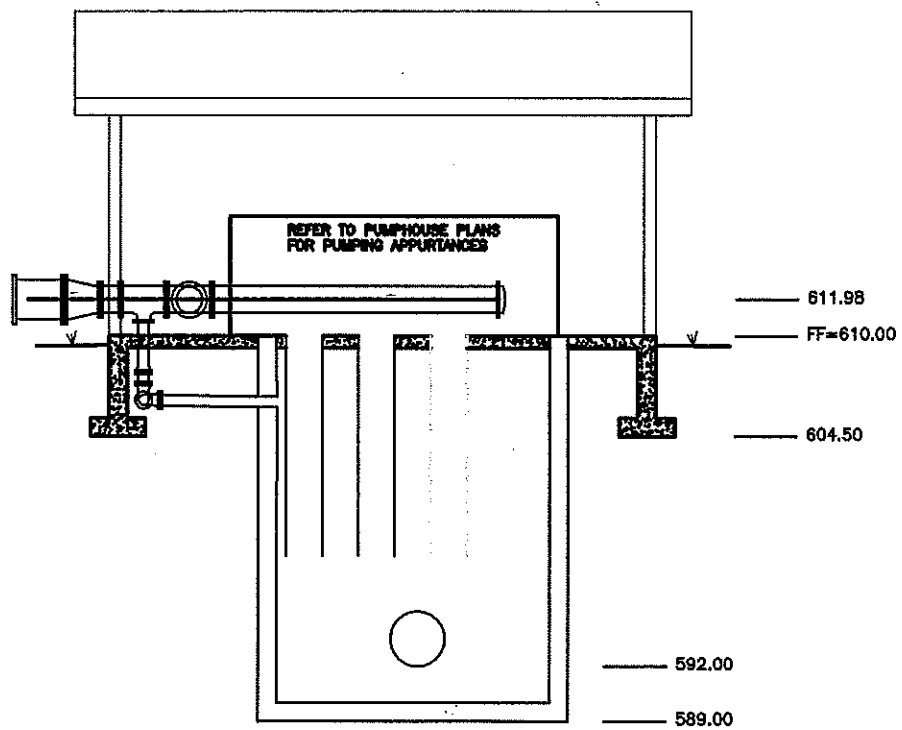
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 FOSJJ129137

DATE:
 09/08/14

MAIN PUMP STATION
 SPIRIT MOUNTAIN SNOWMAKING SUPPLY
 DULUTH, MINNESOTA

EXHIBIT
 A

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FILE NO.
FOSJJ129137

DATE:
09/08/14

RIVER PUMP STATION
SPIRIT MOUNTAIN SNOWMAKING SUPPLY
DULUTH, MINNESOTA

EXHIBIT
B



AMERICAN
ENGINEERING
TESTING, INC.

SUBSURFACE BORING LOG

N3317004.76, E4819022.23

AET JOB NO: **01-06238**

LOG OF BORING NO. **HPS (p. 1 of 1)**

PROJECT: **Spirit Mountain Pump Houses; Duluth, MN**

DEPTH IN FEET	SURFACE ELEVATION: _____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DD	LL	PL	q _p	
1	FILL, organic silty sand, trace roots, dark brown / FILL, silty sand, a little gravel, trace roots, brown	FILL	14	M	SS	12						
2			15	M	SS	4						
3												
4												
5			22	M	SS	4						
6												
7	FILL, a mixture of silty sand, fat clay, a little wood and gravel, reddish brown and brown		6	M	SS	4	26					
8												
9												
10	ORGANIC SILT, with roots, black to very dark gray (OH) Organic Content 9.5-11' = 31.4%	FINE ALLUVIUM	7	M	SS	6	99		129	60		
11												
12												
13	FAT CLAY, reddish brown, stiff to firm, laminations of fine grained brown sand and gray silt (CH)	LACUSTRINE	10	M	SS	8	35				1	
14												
15												
16			7	M	SS	6	36				1	
16	END OF BORING AT 16.0 FEET <i>Boring backfilled with auger cuttings</i>											

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
0-14½'	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
		8/28/14		16.0	14.5	--	--	None	
BORING COMPLETED: 8/28/14									
DR: LA LG: KH Rig: 51									



AMERICAN
ENGINEERING
TESTING, INC.

SUBSURFACE BORING LOG

N3316199.55, E4820143.13

AET JOB NO: **01-06238**

LOG OF BORING NO. **LPS (p. 1 of 1)**

PROJECT: **Spirit Mountain Pump Houses; Duluth, MN**

DEPTH IN FEET	SURFACE ELEVATION: _____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DD	LL	PL	q _p	
1	FILL, fat clay with sand and roots, reddish brown and brown	FILL	9	M	SS	8	27					
2	ORGANIC CLAY, with roots, black to very dark brown, may be fill (OH)	FINE ALLUVIUM OR FILL	5	M	SS	6	63					
3												
4												
5	FAT CLAY, reddish brown, firm (CH)	LACUSTRINE	12	M	SS	6	53					
6												
7												
8				8	M	SS	10	43				1.5
9												
10												
11												1.25
12												
13												1
14												
15												
16										1		
17												
18										1.75		
19												
20	FAT CLAY, dark grayish brown, soft (CH)		5	M	SS	18					0.75	
21												
22												
23												0.75
24												
25												
26										0.5		
27												
28	FAT CLAY, reddish brown, firm (CH)											
29												
30												
31												0.75
32												
33												
34												
35												
36			7	M	SS	20	52				0.75	
END OF BORING AT 36.0 FEET <i>Boring backfilled with bentonite grout</i>												

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
0-34½'	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
		8/28/14		36.0	34.5	--	--	None	
BORING COMPLETED: 8/28/14									
DR: LA LG: KH Rig: 51									

EXPLORATION/CLASSIFICATION METHODS

SAMPLING METHODS

Split-Spoon Samples (SS) - Calibrated to N_{60} Values

Standard penetration (split-spoon) samples were collected in general accordance with ASTM: D1586 with one primary modification. The ASTM test method consists of driving a 2" O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30". The sampler is driven a total of 18" into the soil. After an initial set of 6", the number of hammer blows to drive the sampler the final 12" is known as the standard penetration resistance or N-value. Our method uses a modified hammer weight, which is determined by measuring the system energy using a Pile Driving Analyzer (PDA) and an instrumented rod.

In the past, standard penetration N-value tests were performed using a rope and cathead for the lift and drop system. The energy transferred to the split-spoon sampler was typically limited to about 60% of its potential energy due to the friction inherent in this system. This converted energy then provides what is known as an N_{60} blow count.

Most of today's drill rigs incorporate an automatic hammer lift and drop system, which has higher energy efficiency and subsequently results in lower N-values than the traditional N_{60} values. By using the PDA energy measurement equipment, we are able to determine actual energy generated by the drop hammer. With the various hammer systems available, we have found highly variable energies ranging from 55% to over 100%. Therefore, the intent of AET's hammer calibrations is to vary the hammer weight such that hammer energies lie within about 60% to 65% of the theoretical energy of a 140-pound weight falling 30". The current ASTM procedure acknowledges the wide variation in N-values, stating that N-values of 100% or more have been observed. Although we have not yet determined the statistical measurement uncertainty of our calibrated method to date, we can state that the accuracy deviations of the N-values using this method are significantly better than the standard ASTM Method.

Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as "DS" or "SU" on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

CLASSIFICATION METHODS

Soil classifications shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil classifications shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
AR:	Sample of material obtained from cuttings blown out the top of the borehole during air rotary procedure.
B, H, N:	Size of flush-joint casing
CAS:	Pipe casing, number indicates nominal diameter in inches
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
DP:	Direct push drilling; a 2.125 inch OD outer casing with an inner 1½ inch ID plastic tube is driven continuously into the ground.
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RDA:	Rotary drilling with compressed air and roller or drag bit.
RDF:	Rotary drilling with drilling fluid and roller or drag bit
REC:	In split-spoon (see notes), direct push and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
SS:	Standard split-spoon sampler (steel; 1.5" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring
▽:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q _p :	Pocket Penetrometer strength, tsf (approximate)
q _c :	Static cone bearing pressure, tsf
q _u :	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designation of Rock Core, in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remolded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES (Calibrated Hammer Weight)

The standard penetration test consists of driving a split-spoon sampler with a drop hammer (calibrated weight varies to provide N₆₀ values) and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM: D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM: D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

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Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A			Soil Classification		
			Group Symbol	Group Name ^B	
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^C	$Cu \geq 4$ and $1 < Cc \leq 3^E$	GW	Well graded gravel ^F
			$Cu < 4$ and/or $1 > Cc > 3^E$	GP	Poorly graded gravel ^F
	Gravels with Fines more than 12% fines ^C		Fines classify as ML or MH	GM	Silty gravel ^{F,G,H}
			Fines classify as CL or CH	GC	Clayey gravel ^{F,G,H}
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^D	$Cu \geq 6$ and $1 < Cc \leq 3^E$	SW	Well-graded sand ^I
			$Cu < 6$ and/or $1 > Cc > 3^E$	SP	Poorly-graded sand ^I
Sands with Fines more than 12% fines ^D		Fines classify as ML or MH	SM	Silty sand ^{G,H,I}	
		Fines classify as CL or CH	SC	Clayey sand ^{G,H,I}	
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silt and Clays Liquid limit less than 50	inorganic	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}
		organic	Liquid limit—oven dried < 0.75	OL	Organic clay ^{K,L,M,N}
			Liquid limit— not dried		Organic silt ^{K,L,M,O}
	Silt and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}
			PI plots below "A" line	MH	Elastic silt ^{K,L,M}
		organic	Liquid limit—oven dried < 0.75	OH	Organic clay ^{K,L,M,P}
			Liquid limit— not dried		Organic silt ^{K,L,M,Q}
Highly organic soil		Primarily organic matter, dark in color, and organic in odor	PT	Peat ^R	

Notes

^ABased on the material passing the 3-in (75-mm) sieve.

^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^CGravels with 5 to 12% fines require dual symbols:
 GW-GM well-graded gravel with silt
 GW-GC well-graded gravel with clay
 GP-GM poorly graded gravel with silt
 GP-GC poorly graded gravel with clay

^DSands with 5 to 12% fines require dual symbols:
 SW-SM well-graded sand with silt
 SW-SC well-graded sand with clay
 SP-SM poorly graded sand with silt
 SP-SC poorly graded sand with clay

^E $Cu = D_{60} / D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.

^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^HIf fines are organic, add "with organic fines" to group name.

^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^JIf Atterberg limits plot is hatched area, soils is a CL-ML silty clay.

^KIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.

^LIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.

^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

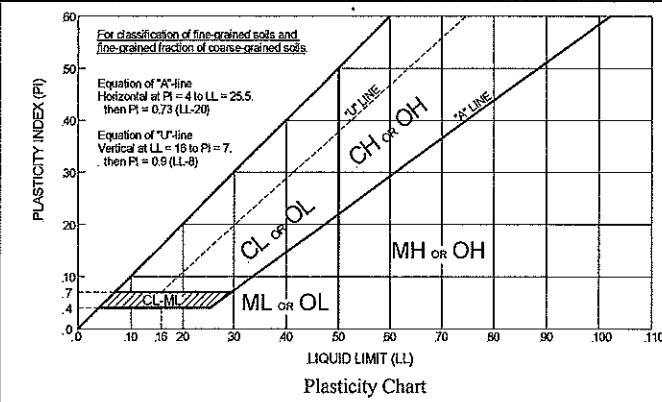
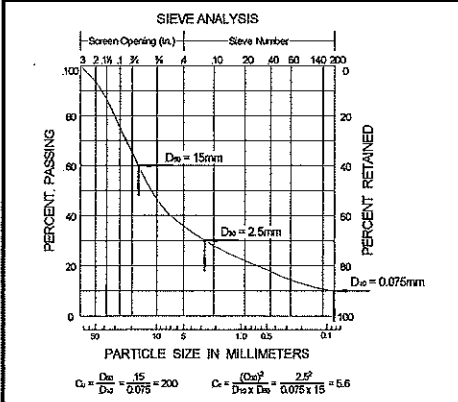
^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

^RFiber Content description shown below.



ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Grain Size		Gravel Percentages		Consistency of Plastic Soils		Relative Density of Non-Plastic Soils	
Term	Particle Size	Term	Percent	Term	N-Value, BPF	Term	N-Value, BPF
Boulders	Over 12"	A Little Gravel	3% - 14%	Very Soft	less than 2	Very Loose	0 - 4
Cobbles	3" to 12"	With Gravel	15% - 29%	Soft	2 - 4	Loose	5 - 10
Gravel	#4 sieve to 3"	Gravelly	30% - 50%	Firm	5 - 8	Medium Dense	11 - 30
Sand	#200 to #4 sieve			Stiff	9 - 15	Dense	31 - 50
Fines (silt & clay)	Pass #200 sieve			Very Stiff	16 - 30	Very Dense	Greater than 50
				Hard	Greater than 30		
Moisture/Frost Condition (MC Column)		Layering Notes		Peat Description		Organic Description (if no lab tests)	
D (Dry):	Absence of moisture, dusty, dry to touch.	Laminations:	Layers less than 1/2" thick of differing material or color.	Term	Fiber Content (Visual Estimate)	Soils are described as <u>organic</u> , if soil is not peat and is judged to have sufficient organic fines content to influence the Liquid Limit properties. <u>Slightly organic</u> used for borderline cases.	
M (Moist):	Damp, although free water not visible. Soil may still have a high water content (over "optimum").	Lenses:	Pockets or layers greater than 1/2" thick of differing material or color.	Fibric Peat:	Greater than 67%	<u>Root Inclusions</u>	
W (Wet/ Waterbearing):	Free water visible intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.			Hemic Peat:	33 - 67%	With roots: Judged to have sufficient quantity of roots to influence the soil properties.	
F (Frozen):	Soil frozen			Sapric Peat:	Less than 33%	Trace roots: Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.	

FREEZING WEATHER EFFECTS ON BUILDING CONSTRUCTION

GENERAL

Because water expands upon freezing and soils contain water, soils which are allowed to freeze will heave and lose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density/strength loss depends on the soil type and moisture condition. Heave is greater in soils with higher percentages of fines (silts/clays). High silt content soils are most susceptible, due to their high capillary rise potential which can create ice lenses. Fine grained soils generally heave about 1/4" to 3/8" for each foot of frost penetration. This can translate to 1" to 2" of total frost heave. This total amount can be significantly greater if ice lensing occurs.

DESIGN CONSIDERATIONS

Clayey and silty soils can be used as perimeter backfill, although the effect of their poor drainage and frost properties should be considered. Basement areas will have special drainage and lateral load requirements which are not discussed here. Frost heave may be critical in doorway areas. Stoops or sidewalks adjacent to doorways could be designed as structural slabs supported on frost footings with void spaces below. With this design, movements may then occur between the structural slab and the adjacent on-grade slabs. Non-frost susceptible sands (with less than 8% passing a #200 sieve) can be used below such areas. Depending on the function of surrounding areas, the sand layer may need a thickness transition taper away from the area where movement is critical. With sand placement over slower draining soils, subsurface drainage would be needed for the sand layer. High density extruded insulation could be used within the sand to reduce frost penetration, thereby reducing the sand thickness needed. We caution that insulation placed near the surface can increase the potential for ice glazing of the surface.

The possible effects of adfreezing should be considered if clayey or silty soils are used as backfill. Adfreezing occurs when backfill adheres to rough surfaced foundation walls and lifts the wall as it freezes and heaves. This occurrence is most common with masonry block walls, unheated or poorly heated building situations and clay backfill. The potential is also increased where backfill soils are poorly compacted and become saturated. The risk of adfreezing can be decreased by placing a low friction separating layer between the wall and backfill.

Adfreezing can occur on exterior piers (such as deck, fence or other similar pier footings), even if a smooth surface is provided. This is more likely in poor drainage situations where soils become saturated. Additional footing embedment and/or widened footings below the frost zones (which include tensile reinforcement) can be used to resist uplift forces. Specific designs would require individual analysis.

CONSTRUCTION CONSIDERATIONS

Foundations, slabs and other improvements which may be affected by frost movements should be insulated from frost penetration during freezing weather. If filling takes place during freezing weather, all frozen soils, snow and ice should be stripped from areas to be filled prior to new fill placement. The new fill should not be allowed to freeze during transit, placement or compaction. This should be considered in the project scheduling, budgeting and quantity estimating. It is usually beneficial to perform cold weather earthwork operations in small areas where grade can be attained quickly rather than working larger areas where a greater amount of frost stripping may be needed. If slab subgrade areas freeze, we recommend the subgrade be thawed prior to floor slab placement. The frost action may also require reworking and recompaction of the thawed subgrade.

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REPORT OF GEOTECHNICAL EXPLORATION AND REVIEW

Spirit Mountain Infrastructure Improvements
Runoff Collection System
Duluth, Minnesota

Report No. 01-05655

Date:

December 31, 2012

Prepared for:

SEH, Inc.
416 South 6th Street, Suite 200
Brainerd, MN 56401

www.amengtest.com





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December 31, 2012

SEH, Inc.
416 South 6th Street, Suite 200
Brainerd, MN 56401

Attn: Greg Kimman, PE

RE: Geotechnical Exploration and Review
Spirit Mountain Runoff Collection System
Duluth, Minnesota
Report No. 01-05655

Dear Mr. Kimman:

American Engineering Testing, Inc. (AET) is pleased to present the results of the subsurface exploration and testing, and our associated geotechnical engineering review, conducted for the referenced project. These services were performed according to our proposal to you, dated October 30, 2012.

In addition to the pdf electronic version, we are submitting four hard copies of the report to you.

Please contact me if you have any questions about the report.

Sincerely,
American Engineering Testing, Inc.

Jeffery K. Voyer, PE
Vice President/Principal Engineer
Phone: (651) 659-1305
Cell: (612) 961-9186
jvoyer@amengtest.com

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Signature Page

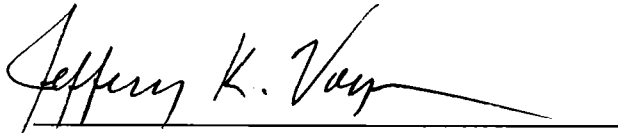
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416 South 6th Street, Suite 200
Brainerd, MN 56401
Attn: Greg Kimman, PE

Prepared by:

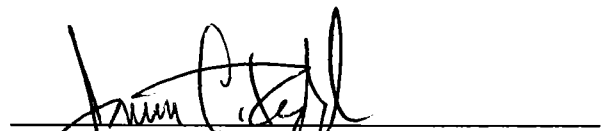
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Authored By:



Jeffery K. Voyer, PE
Vice President/Principal Engineer

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James C. Rudd, PE
Vice President/Principal Engineer

I hereby certify that this report was prepared by
me or under my direct supervision and that I am
a duly Licensed Professional Engineer under
Minnesota Statute Section 326.02 to 326.15

Name: Jeffery K. Voyer

Date: 12/31/12 License #: 15928

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 SCOPE OF SERVICES	1
3.0 PROJECT INFORMATION	2
4.0 SUBSURFACE EXPLORATION AND TESTING	3
4.1 Field Exploration Program	3
4.2 Laboratory Testing	4
5.0 SITE CONDITIONS	4
5.1 Subsurface Soils/Geology	4
5.2 Ground Water	5
6.0 RECOMMENDATIONS.....	5
6.1 Definitions	5
6.2 Pipe and Associated Structure Support/Bedding.....	7
6.3 Excavation Backfilling	8
6.4 Pump House Support.....	10
7.0 CONSTRUCTION CONSIDERATIONS	12
7.1 Potential Difficulties.....	12
7.2 Excavation Backsloping	13
7.3 Construction Impacts on Surrounding Property	13
7.4 Observation and Testing.....	14
7.0 LIMITATIONS.....	14

APPENDIX A – Geotechnical Field Exploration and Testing

- Boring Log Notes
- Unified Soil Classification System
- Figure 1 – Boring Locations
- Subsurface Boring Logs (10 to 15)
- Sieve Analysis Test Results

APPENDIX B – Geotechnical Report Limitations and Guidelines for Use

1.0 INTRODUCTION

A new storm water runoff collection system is proposed to be constructed on the east side of the Spirit Mountain Recreation Area in Duluth, Minnesota. To assist planning and design, you have authorized American Engineering Testing, Inc. (AET) to conduct a subsurface exploration at the site, to conduct soil laboratory testing, and to perform a geotechnical engineering review for the project. This report presents the results of the above services, and provides our engineering recommendations based on this data.

2.0 SCOPE OF SERVICES

AET's scope was outlined in our proposal to you dated October 30, 2012. Authorization to proceed with the work was verbally received following your client's board meeting of November 15. The authorized scope included the following:

- Drill and sample five standard penetration test (SPT) borings along the proposed alignment to depths of 11 feet to 36 feet.
- Drill and sample one hand auger boring on Tallis Island to a depth of 10 feet.
- Conduct laboratory classification of soils retrieved and perform index testing (water content, Atterberg Limits, and sieve analysis testing was performed).
- Perform geotechnical engineering analysis based on the available data and prepare this report.

These services were intended for geotechnical purposes. The scope was not intended to explore for the presence or extent of environmental contamination.

The project site is situated on sloping terrain with 90 feet or more of vertical relief. Evaluation of the stability of existing slopes is not a part of our authorized work scope.

3.0 PROJECT INFORMATION

The project involves installing a new 12-inch to 36-inch diameter RCP and/or HDPE pipe and associated catch basin/manhole structures to carry storm water from high elevation portions of Spirit Mountain to channel to the east/southeast. The explored portion of the project (the subject of this report) is from the planned 8,000 gallon below-grade storage tank at about Station 100+75 (area of Boring 15) to Tallis Island (area of Boring 10).

Based on provided profile data, the planned approximate pipe invert elevation and depth at each boring location is shown on Table 3.0.

Table 3.0 – Pipe Invert Elevations/Depths

Boring No.	Approximate Station	Boring Surface Elevation (ft)	Approximate Invert Elevation (ft)	Approximate Invert Depth* (ft)
15	100+60	693.8	687	7
14	107+50	652.1	645	7
13	108+60	649.7	641	8½
12	114+00	639.8	636	4
11	117+00	630.4	620	10½
10	125+50	603.4	590	13½

*Below boring surface elevation

A pump house is planned in the vicinity of Boring 11. The pump house is planned to be an above grade structure with a finish floor elevation of 628 feet, which is founded on frost depth perimeter footings. A 35.3-foot deep concrete wet well is proposed within the center of the building. The wet well installation method is not known by us, but it is presumed that the perimeter spread foundations will be supported upon pipe and/or wet well backfill.

The stated information represents our understanding of the proposed construction. This information is the basis of our engineering comments and recommendations. If there are changes from that described, modifications to the recommendations presented herein may be appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING

4.1 Field Exploration Program

The subsurface exploration program consisted of five standard penetration test (SPT) borings and one hand auger boring. The logs of the borings and details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, geologic description, and moisture condition. Relative density or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The boring locations are graphically shown on Figure 1 in Appendix A. The boring locations were generally pre-selected by SEH prior to the drilling activities and latitude-longitude data was provided as shown in Table 4.0.

Table 4.0 – Boring Latitude-Longitude Data

Boring No.	Latitude (°)	Longitude (°)
15	46.71610	-92.2045
14	46.71598	-92.2019
13	46.71586	-92.2016
12	46.71479	-92.2002
11	46.71406	-92.2001
10	46.71271	-92.1975

AET then field located the borings using GPS (however, not using surveyor quality equipment). SEH surveyed the final locations (the data in this report does not accurately reflect these surveyed locations), and provided the surface elevations shown on the logs.

4.2 Laboratory Testing

Water content testing was conducted on cohesive soil samples during laboratory classification logging. The laboratory test program also included two sieve analysis tests and four Atterberg Limits tests. The test results appear on the individual boring logs adjacent to the samples upon which they were performed and/or on the data sheet following the boring logs.

5.0 SITE CONDITIONS

5.1 Subsurface Soils/Geology

Higher elevation areas (based on Borings 14 and 15) terminated in apparent glacial till (silty sand with varying amounts of gravel), and it appears the new pipe system should mainly rest within these tills in the higher elevation area of the project. The till is overlain by fill and very stiff fat clay alluvium (Boring 14).

Alluvium (water-deposited soil) dominates the profile in the lower elevation area to the east. Most of the alluvium is fat clay, with some sand to silty sand and gravel layer interlayering. Eight feet of sand with silt appears over lean clay alluvium at hand auger Boring 10 on drilled on Tallis Island.

Based on the N-values, the fat clay alluvium appears to be over-consolidated in the upper zone of the deposit. At deep Boring 11 (near the planned pump house), the clay is soft to firm in the elevation range from about 595 to 615 feet, through which the wet well will penetrate. However, the planned bottom of the wet well should extend into stiff clay (N = 14 to 15) below this softer zone.

5.2 Ground Water

Ground water appeared in the Boring 10 and 11 boreholes during drilling at depths of 2.5 feet and 37.5 feet, respectively. The measurement at Boring 10 should reasonably represent the steady-state condition for that time and location, as it was measured in free-draining granular soils. It is expected that the level at Boring 11 would have risen higher if given more time. Many of the soils at this site are slow draining (clays) and moderately slow draining (silty sands); and it would take extended monitoring in piezometers to reliably establish accurate hydrostatic conditions (which is beyond the scope of our work).

Ground water should be expected to perch over the slow draining clays. Water will migrate through the more permeable layers, and water seepage will likely occur from these layers when excavations penetrate them.

Ground-water levels will fluctuate due to varying seasonal and annual rainfall and snow melt amounts, as well as other factors.

6.0 RECOMMENDATIONS

6.1 Definitions

Italicized words used in this report have a specific definition which is defined as follows or is defined in a publication or an ASTM Standard.

Boulders- Particles of rock that cannot be made to pass a 12-inch square opening when rotated in any orientation (modified from ASTM:D2487).

Cobbles- Particles of rock that will pass a 12-inch square opening and be retained on a 3-inch U.S. standard sieve per ASTM:D2487.

Coarse Filter Aggregate- Soils which uniformly meet the requirements of Mn/DOT Specification 3149.2H.

Fine Filter Aggregate- Soils which uniformly meet the requirements of Mn/DOT Specification 3149.2J.

Granular Bedding- Soils which uniformly meet the requirements of Mn/DOT Specification 3149.2F.

Select Granular Material- Sandy soils which uniformly meet the requirements of Mn/DOT Specification 3149.2B2. Sands (SP) and sands with silt (SP-SM) meet this criterion, with this classification based on the component passing the 1-inch sieve.

Suitable Grading Material- Soil materials from the project site, excluding the following: 1) cohesive soils having a Liquid Limit exceeding 50%, 2) soils which have an organic content exceeding 2%, and 3) soils which include debris, cobbles, and/or boulders. The soil must also be capable of attaining the specified compaction level at its current water content or at a water content that can be reasonably scarified, blended, and moisture conditioned to a proper and uniform water content in order to uniformly meet compaction requirements.

Bedding- Granular soil placed in the bottom of the trench on top of the foundation soil for the purpose of providing uniform support for the pipe (shaped to conform to the bottom of the pipe to minimize point or imbalanced loads on the pipe). For this project, a bedding thickness of 6 inches is used.

Pipe Zone- Area around the pipe defined by the bottom of the bedding layer, the trench walls, and 6-inches above the top of pipe, which includes the bedding, haunch area, embedment material, and 6 inches of cover material.

Foundation soil/foundation zone- Soils beneath the pipe zone which must be stable and free of open void space (caused by debris, cobble, and/or boulders) in order to allow bedding, pipe, and backfill to be accurately placed without ground movements. Where in-place soils in the "foundation zone" are unstable (or has open voids), it is necessary to excavate the unstable soils (defined below) and replace them with granular or rock foundation materials. The depth of the "foundation zone" depends on the degree and depth of instability, however, can be assumed to be 12 inches thick for baseline purposes.

Unstable soils- Soils present in the foundation zone which can change shape (shift, deflect, compress, etc.) as a result of actual or anticipated loading, whether induced naturally or by the construction activity. Unstable soils include:

- Organic soils.
- Very soft to soft clays and clayey silts.
- Very loose to loose silts to fine silty sands.
- Waterbearing/wet soils which are not properly dewatered.
- Soils which become disturbed as a result of the construction activity (recognize that avoiding disturbance through proper construction techniques and dewatering is the responsibility of the contractor).

Geotextile separation fabric- A geotextile intended for use in separating materials which do not have a proper gradation transition to prevent erosion of finer materials into the void space of open-graded materials (such as clear rock). The geotextile should meet the requirements of Mn/DOT Specification 3733, Type V.

6.2 Pipe and Associated Structure Support/Bedding

The glacial till soils, alluvial sands/gravels, or fine alluvial clays are expected to be present in the trench excavation bottoms for pipe, catch basin/manholes, and below-grade tank structures. In these soils, we recommend providing a 6-inch minimum *Granular Bedding* layer directly beneath the pipe/structures which is shaped to conform to the bottom (hard point or line surfaces should be avoided, including at oversized bells/joints, where applicable).

Granular Bedding (or coarser) should be placed and compacted around the pipe (in the *pipe zone*). The fill within the haunch zone should be sufficiently compacted to maintain uniform pipe support. Bedding should also be placed below pre-cast manhole/tank foundations. All *cobbles* and *boulders* should be removed and avoided within the *pipe zone*.

There may be cases where the exposed soils are unstable, whether due to organic or soft soil conditions, or created by ground water disturbance. The segment below the ground-water level on the east end is a likely area of potential instability. The excavation in this lower area will need

to be properly dewatered. If not, the soils will become unstable when unconfined. In *unstable soil* cases, additional foundation improvement should be provided beneath the bedding zone. The foundation improvement should consist of excavating the *unstable soils* to a depth of 1-foot (or more, if excessively unstable or if organic soils are present) below the bedding layer and replacing this with sand to gravel fill. The appropriate type of replacement fill would depend on the ground-water situation and the sensitivity of underlying soils. Possible material types (listed from coarse to fine) include *Coarse Filter Aggregate*, *Fine Filter Aggregate*, *Granular Bedding*, and *Select Granular Material*. *Coarse Filter Aggregate* is preferred as foundation fill in highly sensitive trench bottom conditions (which is usually associated with standing ground water). If the subcut exposes stable soils with no standing ground water, *Granular Bedding* or *Select Granular Material* could be used. *Coarse Filter Aggregate* is an open-graded material which requires complete separation from surrounding finer grained materials with a *geotextile separation fabric*.

Excavation for pipe foundation improvement should be laterally oversized at the bottom a horizontal distance (from the outermost plan view point of the pipe) at least equal to the vertical distance between the lowest bottom elevation of the pipe and the lowest excavation bottom elevation (i.e., 1:1 lateral oversize). All new fill placed within the excavation below springline should be well compacted sand and/or gravel material.

6.3 Excavation Backfilling

The degree of compaction and the soil type used for backfill above the *pipe zone* within open cut trenches depends on the function of the overlying land surface. Backfilling in the pump house area is discussed in Section 6.4.

Where trenches are located below or near pavements, we recommend using *Suitable Grading*

Material. These backfill soils should be compacted per Mn/DOT Specification 2105.3F1 (Specified Density Method). This specification requires 100% of the Standard Proctor density in the upper 3-foot subgrade zone, and 95% below this. Note that this specification includes water content range requirements which are important for proper subgrade stability. Soil types used in the upper frost zone should match the in-place soil types up to which the fill will abut for frost uniformity purposes.

In grass/ditch areas, backfill soils should be placed in reasonable lift thicknesses and compacted to a minimum of 90% of the Standard Proctor density (ASTM:D698) and/or per the Mn/DOT "Quality Compaction Method." If lower compaction levels are attained, more noticeable subsidence at the surface can occur.

Clayey soils are often difficult to compact, as they may be naturally wet or may become wet due to ground water or surface/rain water during construction. Soils will need to be placed within a certain range of water (moisture) content to attain desired compaction levels. Moisture conditioning to within this range can be time consuming, labor intensive, and requires favorable weather.

Special considerations are needed for structural retention systems which may be used to reduce impacts on adjacent roadways or other improvements. Where localized excavations/pits or annular spaces are created which need to be backfilled, it may not be possible to place and compact soils by the conventional means of backfilling. Retraction of structural systems can also leave soils loosened. Significant settlement can occur in areas where backfill cannot be compacted. If these situations are located in non-structural or non-paved areas, it may be reasonable to accept the settlements and associated follow-up maintenance in order to avoid the high cost of trying to compact the soil or placing flowable lean concrete fill. However, there

may be areas where fill settlement needs to be avoided, especially as the settlement will be differential from the surrounding surface. Where settlement needs to be avoided, the specification should require that the contractor submit a backfill compaction plan along with the retention plan. Improper sequencing of retention system removal and backfilling of the pits could result in excessive settlement and/or lateral movement of nearby improvements.

6.4 Pump House Support

6.4.1 Wet Well

Based on Boring 11, the bottom of the wet well will penetrate into stiffer alluvial clays which should provide proper support for the wet well if not disturbed.

If a “caisson” installation method is used, it may be important to maintain sufficient hydrostatic head within the interior of the structure to prevent potential blow-up or disturbance of the bottom due to the hydrostatic forces if permeable layers happen to be present near the bottom. The scope of our work did not allow for evaluation of this hydrostatic head, but it will likely be higher than the channel water level elevation. The buoyancy forces can ultimately be resisted with the thick concrete base at the bottom which should be placed through a tremie. Removal of the interior fluids should then be delayed until after the concrete base has had sufficient time to cure and gain strength.

If the wet well is placed using an open-cut excavation method (whether back-sloped or structurally retained), the excavation will likely need to be dewatered. Even with dewatering, the soils in the excavation bottom may be wet and potentially sensitive. In this case, undercutting the soils and placing a *Coarse Filter Aggregate* foundation layer is recommended to create a working platform and reduce the potential for soil disturbance. The *Coarse Filter Aggregate* layer should be wrapped in a *geotextile separation fabric*.

If an “allowable soil bearing pressure” value is used in design of the concrete base slab thickness, we recommend assuming a localized “allowable bearing pressure” of 2,500 psf (based on the burial depth, the actual capacity against overall foundation failure is much higher).

6.4.2 Above Grade Structure

Based on the provided data, the perimeter foundation for the above grade structure will lie outside of the footprint of the wet well. This portion of the structure is proposed to be supported on spread footings placed at frost depth, assumed to be 5 feet below grade.

If the wet well is installed with a “caisson” method, upper portions of the alluvial profile depicted by Boring 11 will likely be in-place below portions of the building. We recommend all existing fill be excavated from below the building area to expose the stiff clays and replaced with controlled engineered fill. Excavation bottoms should maintain minimum 1:1 lateral oversizing beyond proposed footing edges, if applicable.

If the wet well is installed in an open excavation, then the upper structure will be supported by the wet well backfill. Even with the “caisson” method there will likely be excavations for piping connected to the building which will result in backfill being placed below the structure.

The engineered fill placed below footings should be *Select Granular Material* compacted in thin lifts, such that the entire lift achieves a minimum compaction level of 100% of the *standard maximum dry unit weight* per ASTM:D698 (Standard Proctor test). The lift thickness should be thin enough such that the entire lift meets the specified compaction, and should be no greater than 12 inches thick.

The minimum specified compaction level for engineered fill supporting the floor slab only can be reduced to 95% of the *standard maximum dry unit weight* (Standard Proctor test).

In our opinion, the spread footings for the above grade structure can be designed based on a net maximum allowable soil bearing capacity of 2,500 psf. It is our judgment that this design pressure will have a factor of safety of at least 3 against localized shear failure. We judge that total and differential settlements under this unit loading should not exceed 1-inch and ½ inch, respectively.

6.4.3 Design Pressure Estimates

The structure should be designed for potential buoyancy and for the lateral pressures which may be applied. Lateral pressures may approach the “at-rest” situation. With sands (SP) to sands with silt (SP-SM) used as backfill, we estimate the lateral pressures would act similar to an equivalent fluid weight of up to 55 pcf above the potential zone of saturation and of up to 90 pcf below the potential zone of saturation.

If silty sands, clayey sands, or clays are allowed for backfill above pipes (or if they pre-exist), the potential lateral pressures would then be higher. In this case, we estimate the lateral pressures would act similar to an equivalent fluid weight of up to 65 above the potential zone of saturation and of up to 100 pcf below the potential zone of saturation.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Potential Difficulties

7.1.1 Water in Excavation

Water should be expected to enter excavations from ground seepage or from runoff water during and following times of inclement weather or snow melt. We recommend the contractor dewater

excavations as needed to reduce the potential for soil disturbance, to allow observation of competent soil exposure, and to facilitate installation and filling operations.

7.1.2 Disturbance of Soils

The on-site soils can become disturbed, especially if the soils are wet or the excavation is not properly dewatered. If soils become disturbed, they should be subcut to the underlying undisturbed soils and replaced with granular materials as previously discussed.

7.1.3 Cobbles, Boulders, and Debris

The soils at this site, particularly the tills and alluvial sands, can potentially include cobbles and/or boulders. In addition, fill soils can include debris. The contractor should recognize that oversized particles may exist within the ground, even if not noted on the boring logs, and the installation approach used should have contingencies for this possibility.

7.2 Excavation Backsloping

Non-retained excavations must maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards-29 CFR), Part 1926, Subpart P, "Excavations"* (see www.osha.gov). Providing safe trench back-slopes should be the responsibility of the contractor, and the project documents should be written as such. Evaluation of actual OSHA Soil Types exposed during construction should also be the responsibility of the contractor.

7.3 Construction Impacts on Surrounding Property

7.3.1 Vibrations

The limited space may restrict certain methods of installation. Protection of surrounding property will be an important consideration. When construction is expected to generate vibrations, it is

advisable to conduct pre-construction and post-construction condition surveys of the surrounding structures. Vibration monitoring may also be a prudent activity during construction, depending on methods used.

7.3.2 Dewatering

Dewatering in areas where compressible soils exist within and below the drawdown zone can cause ground subsidence. The impacts should be properly analyzed where dewatering is performed.

7.4 Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate these potential changes. Sieve analysis tests should be performed on engineered fill in order to document that materials used meet the intended gradation specifications. Soil density and Proctor testing should be performed on new fill placed in order to document that project specifications for compaction have been satisfied.

7.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, our services have been conducted according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, either express or implied, is intended.

Important information regarding risk management and proper use of this report is given in Appendix B entitled "Geotechnical Report Limitations and Guidelines for Use."

Appendix A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1 – Boring Locations
Subsurface Boring Logs
Sieve Analysis Test Results

Appendix A
Geotechnical Field Exploration and Testing
Report No. 01-05655

A.1 FIELD EXPLORATION

The subsurface conditions were explored by drilling and sampling five standard penetration test borings and one flight auger boring. The boring locations appear on attached Figure 1, preceding the Subsurface Boring Logs in this appendix.

A.2 BORING SAMPLING METHODS

A.2.1 Split-Spoon Samples (SS) - Calibrated to N_{60} Values

Standard penetration (split-spoon) samples were collected in general accordance with ASTM: D1586 with one primary modification. The ASTM test method consists of driving a 2-inch O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value. Our method uses a modified hammer weight, which is determined by measuring the system energy using a Pile Driving Analyzer (PDA) and an instrumented rod.

In the past, standard penetration N-value tests were performed using a rope and cathead for the lift and drop system. The energy transferred to the split-spoon sampler was typically limited to about 60% of its potential energy due to the friction inherent in this system. This converted energy then provides what is known as an N_{60} blow count.

Most new drill rigs incorporate an automatic hammer lift and drop system, which has higher energy efficiency and subsequently results in lower N-values than the traditional N_{60} values. By using the PDA energy measurement equipment, we are able to determine actual energy generated by the drop hammer. With the various hammer systems available, we have found highly variable energies ranging from 55% to over 100%. Therefore, the intent of AET's hammer calibrations is to vary the hammer weight such that hammer energies lie within about 60% to 65% of the theoretical energy of a 140-pound weight falling 30 inches. The current ASTM procedure acknowledges the wide variation in N-values, stating that N-values of 100% or more have been observed. Although we have not yet determined the statistical measurement uncertainty of our calibrated method to date, we can state that the accuracy deviation of the N-values using this method is significantly better than the standard ASTM Method.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as "DS" or "SU" on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of "topsoil" layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 SOIL CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

Appendix A
Geotechnical Field Exploration and Testing
Report No. 01-05655

A.4 WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests

Conducted in general accordance with ASTM:D2216.

A.5.2 Atterberg Limits Tests

Conducted in general accordance with ASTM:D4318.

A.5.3 Sieve Analysis Tests

Conducted in general accordance with ASTM:D6913, Method A.

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
AR:	Sample of material obtained from cuttings blown out the top of the borehole during air rotary procedure.
B, H, N:	Size of flush-joint casing
CAS:	Pipe casing, number indicates nominal diameter in inches
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
DP:	Direct push drilling; a 2.125 inch OD outer casing with an inner 1½ inch ID plastic tube is driven continuously into the ground.
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RDA:	Rotary drilling with compressed air and roller or drag bit.
RDF:	Rotary drilling with drilling fluid and roller or drag bit
REC:	In split-spoon (see notes), direct push and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
SS:	Standard split-spoon sampler (steel; 1.5" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring
▽:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
qp:	Pocket Penetrometer strength, tsf (approximate)
qc:	Static cone bearing pressure, tsf
qu:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designation of Rock Core, in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remolded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES (Calibrated Hammer Weight)

The standard penetration test consists of driving a split-spoon sampler with a drop hammer (calibrated weight varies to provide N_{60} values) and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM: D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM: D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

**AMERICAN
ENGINEERING
TESTING, INC.**

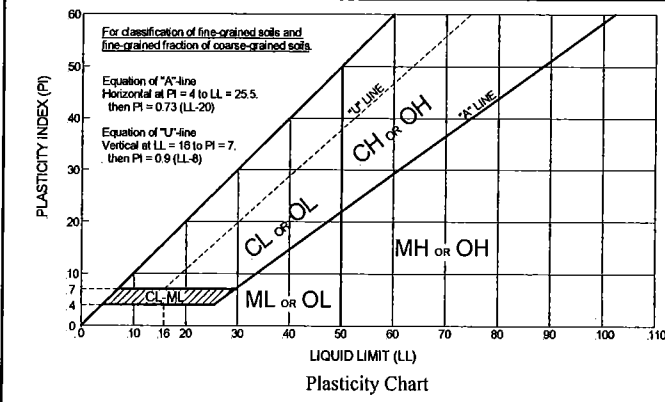
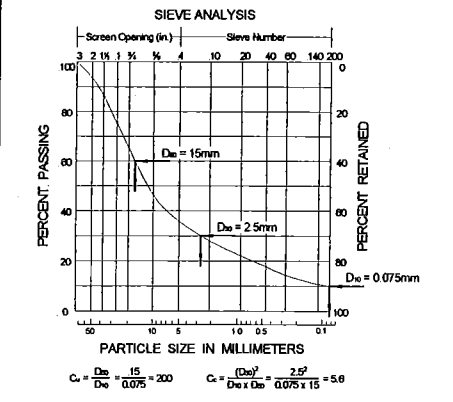


Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well graded gravel ^F
		Gravels with Fines more than 12% fines ^C	$Cu < 4$ and/or $1 > Cc > 3$ ^E	GP	Poorly graded gravel ^F
			Fines classify as ML or MH	GM	Silty gravel ^{F,G,H}
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
			$Cu < 6$ and/or $1 > Cc > 3$ ^E	SP	Poorly-graded sand ^I
		Sands with Fines more than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G,H,I}
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}
			PI < 4 or plots below "A" line ^J	ML	Silt ^{K,L,M}
		organic	Liquid limit—oven dried < 0.75 Liquid limit – not dried	OL	Organic clay ^{K,L,M,N} Organic silt ^{K,L,M,O}
			Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line
	PI plots below "A" line	MH			Elastic silt ^{K,L,M}
	organic	Liquid limit—oven dried < 0.75 Liquid limit – not dried		OH	Organic clay ^{K,L,M,P} Organic silt ^{K,L,M,Q}
		Primarily organic matter, dark in color, and organic in odor		PT	Peat ^R

Notes
^ABased on the material passing the 3-in (75-mm) sieve.
^BIf field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
^CGravels with 5 to 12% fines require dual symbols:
 GW-GM well-graded gravel with silt
 GW-GC well-graded gravel with clay
 GP-GM poorly graded gravel with silt
 GP-GC poorly graded gravel with clay
^DSands with 5 to 12% fines require dual symbols:
 SW-SM well-graded sand with silt
 SW-SC well-graded sand with clay
 SP-SM poorly graded sand with silt
 SP-SC poorly graded sand with clay

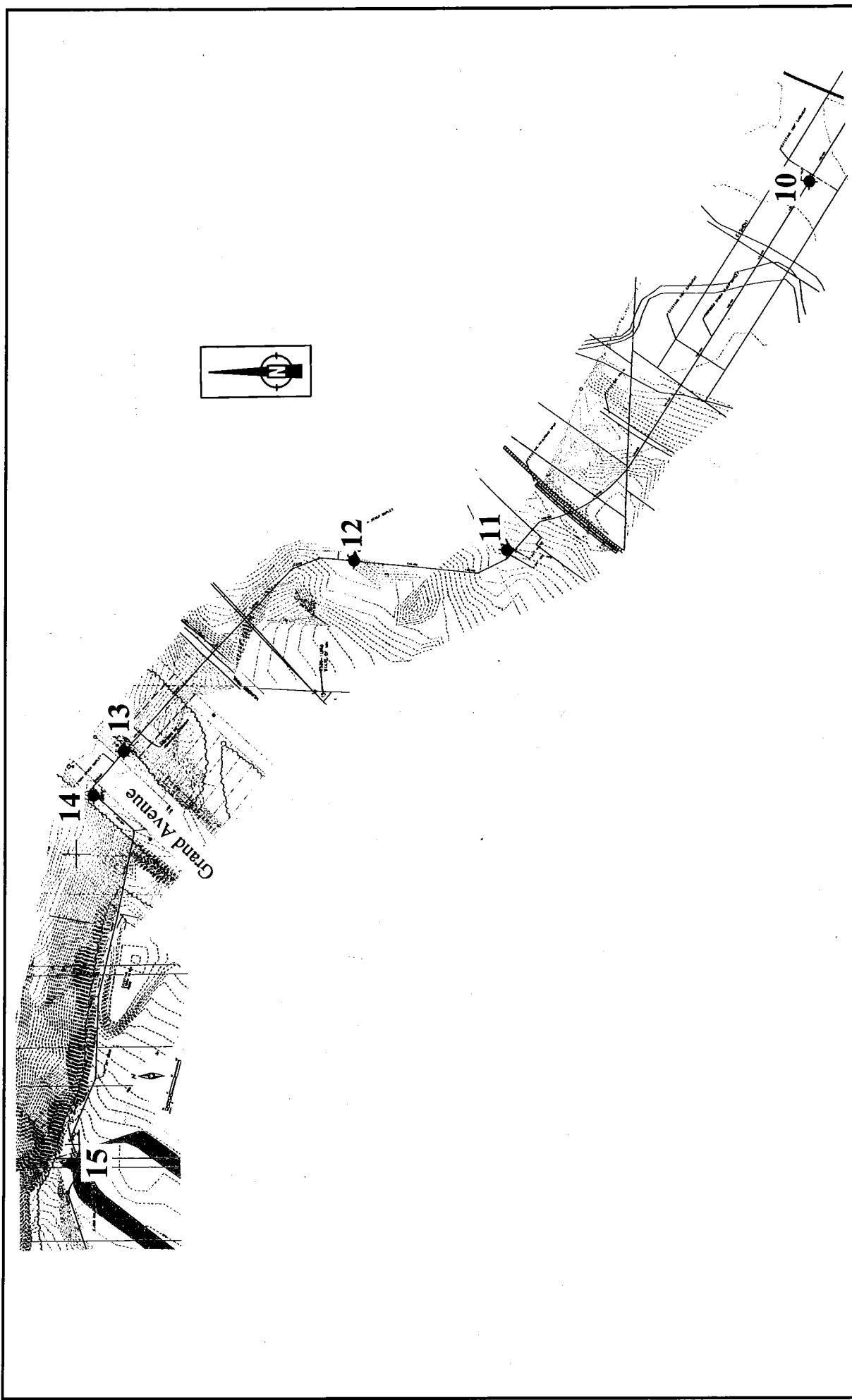
$$C_u = D_{60} / D_{10}, \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^FIf soil contains $\geq 15\%$ sand, add "with sand" to group name.
^GIf fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
^HIf fines are organic, add "with organic fines" to group name.
^IIf soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
^JIf Atterberg limits plot is hatched area, soils is a CL-ML silty clay.
^KIf soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.
^LIf soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
^MIf soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
^NPI ≥ 4 and plots on or above "A" line.
^OPI < 4 or plots below "A" line.
^PPI plots on or above "A" line.
^QPI plots below "A" line.
^RFiber Content description shown below.



ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Term	Grain Size	Gravel Percentages		Consistency of Plastic Soils		Relative Density of Non-Plastic Soils	
	Particle Size	Term	Percent	Term	N-Value, BPF	Term	N-Value, BPF
Boulders	Over 12"	A Little Gravel	3% - 14%	Very Soft	less than 2	Very Loose	0 - 4
Cobbles	3" to 12"	With Gravel	15% - 29%	Soft	2 - 4	Loose	5 - 10
Gravel	#4 sieve to 3"	Gravelly	30% - 50%	Firm	5 - 8	Medium Dense	11 - 30
Sand	#200 to #4 sieve			Stiff	9 - 15	Dense	31 - 50
Fines (silt & clay)	Pass #200 sieve			Very Stiff	16 - 30	Very Dense	Greater than 50
	Moisture/Frost Condition (MC Column)		Layering Notes		Peat Description		Organic Description (if no lab tests)
D (Dry):	Absence of moisture, dusty, dry to touch.	Laminations:	Layers less than 1/2" thick of differing material or color.	Term	Fiber Content (Visual Estimate)		Soils are described as <i>organic</i> , if soil is not peat and is judged to have sufficient organic fines content to influence the Liquid Limit properties. <i>Slightly organic</i> used for borderline cases.
M (Moist):	Damp, although free water not visible. Soil may still have a high water content (over "optimum").			Fibric Peat:	Greater than 67%	With roots:	Judged to have sufficient quantity of roots to influence the soil properties.
W (Wet/ Waterbearing):	Free water visible intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.	Lenses:	Pockets or layers greater than 1/2" thick of differing material or color.	Hemic Peat:	33 - 67%	Trace roots:	Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.
F (Frozen):	Soil frozen			Sapric Peat:	Less than 33%		



AMERICAN ENGINEERING TESTING, INC.	PROJECT	Spirit Mountain Runoff Collection System, Duluth, Minnesota		AET NO.	01-05655
	SUBJECT	Approximate Boring Locations		DATE	December 31, 2012
	SCALE	1" = 240'±	DRAWN BY	SEH	FIGURE 1



SUBSURFACE BORING LOG

AET JOB NO: 01-05655 LOG OF BORING NO. 10 (p. 1 of 1)
 PROJECT: Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>603.4</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	SANDY SILT, slightly organic, trace roots, dark brown, moist (ML) SAND WITH SILT, trace roots, fine grained, brown, moist to about 2½' then waterbearing (SP-SM)	TOPSOIL		M	DS		42				
2		COARSE ALLUVIUM		M/W	DS						
3											
4											
5											
6				W	DS						
7											
8	LEAN CLAY, brownish gray, laminations of silty sand (CL)	FINE ALLUVIUM		M/W	DS		32				
9											
10	END OF BORING										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG	
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL		WATER LEVEL
0-10'	Hand Auger	11/21/12							2.5
BORING COMPLETED: 11/21/12									
DR: TN LG: DG Rig: HA									

AET CORP 01-05655.GPJ AET+CPT+WELL.GDT 12/7/12



SUBSURFACE BORING LOG

AET JOB NO: **01-05655** LOG OF BORING NO. **11 (p. 1 of 2)**
 PROJECT: **Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN**

DEPTH IN FEET	SURFACE ELEVATION: 630.4 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DEN	LL	PL	%-#200	
1	LEAN CLAY, slightly organic, trace roots, dark brown (CL) (possible fill)	TOPSOIL OR FILL			SU		26					
2	FAT CLAY, brown, very stiff, laminations of silty sand (CH)	FINE ALLUVIUM	18	M	SS	5	20					
3												
4	FAT CLAY, brown, a little light brown, stiff, laminations of silt (CH)											
5												
6												
7												
8												
9	FAT CLAY, dark brown, a little gray, stiff, laminations of silty sand (CH)	COARSE ALLUVIUM	15	M/W	SS	11	21					
10												
11	SILTY SAND, fine grained, dark brown, wet, medium dense, laminations of lean clay (SM)											
12	SAND WITH SILT AND GRAVEL, medium to fine grained, brown, wet, medium dense (SP-SM)	FINE ALLUVIUM	20	W	SS	7	14					9
13												
14	GRAVELLY SAND WITH SILT, fine to medium grained, brown, wet (SP-SM)	FINE ALLUVIUM	20	W/M	SS	6	16					6
15	FAT CLAY, gray, a little dark brown, very stiff, laminations of silty sand (CH)											
16												
17												
18	FAT CLAY, brown to gray, soft to stiff (CH)											
19												
20												
21												

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
0-39½'	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
		11/20/12	3:15	41.0	39.5	41.0		37.5	
BORING COMPLETED: 11/20/12									
DR: LA LG: TD Rig: 51									

AET CORP 01-05655.GPJ AET+CPT+WELL_GDT 12/4/12



SUBSURFACE BORING LOG

AET JOB NO: 01-05655 LOG OF BORING NO. 11 (p. 2 of 2)
 PROJECT: Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DEN	LL	PL	%-#200	
23	FAT CLAY, brown to gray, soft to stiff (CH) <i>(continued)</i>											
24												
25			4	M	SS	18	40					
26												
27												
28												
29												
30			2	M	SS	18	57		72	18		
31												
32												
33												
34												
35			14	M	SS	12	43		68	17		
36												
37												
38												
39												
40			15	M	SS	6	54					
41	END OF BORING											

AET_CORP 01-05655.GPJ AET+CPT+WELL_GDT 12/7/12



SUBSURFACE BORING LOG

AET JOB NO: 01-05655 LOG OF BORING NO. 12 (p. 1 of 1)
 PROJECT: Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>639.8</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	LEAN CLAY, slightly organic, trace roots, dark brown to brown, stiff (CL)	TOPSOIL					39				
2	FAT CLAY, brown, a little light brown, stiff, laminations of silt (CH)	FINE ALLUVIUM	15	M	SS	10	28				
3	SILTY SAND WITH GRAVEL, fine to medium grained, brown, moist, medium dense (SM)	COARSE ALLUVIUM	24	M	SS	9	19				
4	SANDY LEAN CLAY, brown, very stiff (CL/CH)	FINE ALLUVIUM									
5	FAT CLAY, brown, stiff to firm (CH)		13	M	SS	9	35				
6											
7											
8			8	M	SS	14	44		92	22	
9											
10			6	M	SS	16	49				
11	END OF BORING										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-9½'	3.25" HSA	11/21/12	9:00	11.0	9.5	11.0		None	
BORING COMPLETED:	11/21/12								
DR: LA	LG: TD	Rig: 51							

AET CORP 01-05655.GPJ AET-CPT-WELL.GDT 12/7/12



SUBSURFACE BORING LOG

AET JOB NO: 01-05655 LOG OF BORING NO. 13 (p. 1 of 1)
 PROJECT: Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>649.7</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	FILL, mixture of lean clay and sandy lean clay, slightly organic, a little gravel, trace roots, dark brown and brown	FILL	16	M	SS	11	30				
2	FAT CLAY, trace roots, brown, a little light brown, very stiff, laminations of silt and sandy silt (CH)	FINE ALLUVIUM	21	M	SS	7	18				
3											
4	FAT CLAY, brown, stiff to firm (CH)										
5											
6											
7											
8			8	M	SS	13	41				
9											
10			11	M	SS	10	34			82	21
11	END OF BORING										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-9½'	3.25" HSA	11/21/12	11:00	11.0	9.5	11.0		None	
BORING COMPLETED: 11/21/12									
DR: LA LG: TD Rig: 51									

AET CORP 01-05655.GPJ AET-CPT+WELL.GDT 12/7/12



SUBSURFACE BORING LOG

AET JOB NO: **01-05655** LOG OF BORING NO. **14 (p. 1 of 1)**
 PROJECT: **Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN**

DEPTH IN FEET	SURFACE ELEVATION: <u>652.1</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	SANDY LEAN CLAY WITH GRAVEL, brown, a little light brown, stiff, laminations of silt (CL) (possible fill)	TILL OR FILL	12	M	SS	8	28				
2	FAT CLAY, brown, a little light brown, very stiff, laminations of silt (CH)	FINE ALLUVIUM	17	M	SS	6	18				
3											
4											
5	SILTY SAND, a little gravel, fine to medium grained, brown, moist, medium dense, lenses and laminations of fat clay around 9' (SM)	TILL	15	M	SS	6	18				
6											
7	END OF BORING		15	M	SS	7					
8											
9											
10											
11											

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG	
0-9½'	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL		WATER LEVEL
		11/21/12	11:45	11.0	9.5	11.0			None
BORING COMPLETED: 11/21/12									
DR: LA	LG: TD	Rig: 51							

AET CORP 01-05655.GPJ AET+CPT+WELL.GDT 12/13



SUBSURFACE BORING LOG

AET JOB NO: **01-05655** LOG OF BORING NO. **15 (p. 1 of 1)**
 PROJECT: **Spirit Mountain Infrastructure Improvements, Runoff Collection System; Duluth, MN**

DEPTH IN FEET	SURFACE ELEVATION: 693.8 MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DEN	LL	PL	%-#200	
1	FILL, mostly silty sand, a little gravel and clayey sand, brown	FILL	9	M	SS	15						
2												
3												
4	GRAVELLY SILTY SAND, possible cobbles at 4.8', fine to medium grained, dark brown, moist, dense to very dense, lens of lean clay at 7.8' (SM)	TILL	44	M	SS	9						
5												
6												
7												
8												
9												
10												
11	END OF BORING											

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-9½'	3.25" HSA	11/21/12	1:16	11.0	9.5	10.0		None	
BORING COMPLETED:	11/21/12								
DR: LA	LG: TD	Rig: 51							

AET CORP 01-05655.GPJ AET+CPT+WELL.GDT 1/2/13

SIEVE ANALYSIS TEST RESULTS

PROJECT:
Spirit Mountain Runoff Collection System
Duluth, Minnesota

AET NO.: 01-05655
DATE: December 31, 2012

TEST METHOD: General Conformance with ASTM: D6913, Method A

RESULTS:

Boring Number	11	11
Sample Depth	12'-13.5'	14.5'-14.8'
Dry Sample Weight (gms)	207.86	155.34
Sieve Size or Number	Percent Passing by Weight	
1½"	100	100
1"	100	80
¾"	100	80
⅝"	100	80
½"	92	77
⅜"	87	70
#4	74	62
#10	59	54
#20	46	45
#40	34	34
#100	14	11
#200	8.8	5.9

Note: The small sample size limits the accuracy of the test, and the sample may not necessarily be representative of the entire layer shown on the boring log.

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Report No. 01-05655

B.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by ASFE¹, of which, we are a member firm.

B.2 RISK MANAGEMENT INFORMATION

B.2.1 Geotechnical Services are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. And no one, not even you, should apply the report for any purpose or project except the one originally contemplated.

B.2.2 Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

B.2.3 A Geotechnical Engineering Report is Based on an Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typically factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, always inform your geotechnical engineer of project changes, even minor ones, and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

B.2.4 Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

¹ ASFE, 8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733; www.asfe.org

Appendix B
Geotechnical Report Limitations and Guidelines for Use
Report No. 01-05655

B.2.5 Most Geotechnical Findings Are Professional Opinions

Site exploration identified subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

B.2.6 A Report's Recommendations Are Not Final

Do not overrely on the construction recommendations included in your report. Those recommendations are not final, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

B.2.7 A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

B.2.8 Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognizes that separating logs from the report can elevate risk.

B.2.9 Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, but preface it with a clearly written letter of transmittal. In the letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need to prefer. A prebid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

B.2.10 Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their report. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

B.2.11 Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a geoenvironmental study differ significantly from those used to perform a geotechnical study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated environmental problems have led to numerous project failures. If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. Do not rely on an environmental report prepared for someone else.