CONSTRUCTION OF SANITATION FACILITIES
FOR EXISTING HOMES
AT SCATTERED SITES ON THE
MILLE LACS INDIAN RESERVATION
MILLE LACS, KANEBEC, AITKIN, AND PINE COUNTIES, MINNESOTA

BE 17-L02

Steven Pewaush

BID SCHEDULE

Schedule A - Individual Wastewater Facilities

NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL COST
1	1600 Gallon Septic Tank	1	EA	_____	_____
2	1000 Gallon Pump Tank	1	EA	_____	_____
3	4" Solid PVC Pipe	20	FT	_____	_____
4	Two-way cleanout	1	EA	_____	_____
5	Effluent Pump With Controls	1	EA	_____	_____
6	Electric Cable	22	FT	_____	_____
7	2-inch Solid PVC Effluent Pipe	35	FT	_____	_____
8	Mound System Constructed on Existing Mound Site	1	LS	_____	_____
9	ISTS Permit	1	EA	_____	_____
10	Abandon Existing Tank	1	LS	_____	_____
				Subotal Schedule A	_____

_____
Contractor's Authorized Signature

ENVIRONMENTAL SYSTEMS LLC.

2358 HWY# 23
MORA MN. 55051
Ph. 320-241-7036

TYPE III DESIGN EXISTING SITE

LOCATION: 19500 WHITEFISH ONAMIA MN
OWNER: MILLE LACS BAND OF OJIBWE

SYSTEM TYPE: TYPE III MOUND

DESIGN FLOW: 3 BEDROOM DESIGNED @ 450 GPD

TREATMENT AREA: 380 SQ.FT.

SLOPE: 5 %

SEPTIC TANK: 1600 GAL. SPLIT/COMBO

PUMP TANK: 1000 GAL.

PUMP: GOULDS WE 511H
FILTER: POLYLOK PL120 WITH ALARM
FLOW METER: SEPTRONICS W/EVENT COUNTER

- NOTE A TEMPORARY ENTRANCE IS NEEDED TO COMPLETE THIS WORK, THIS WILL INCLUDE FILLING THE ROAD DITCH AND REMOVING AND REPLACING A SECTION OF CHAIN LINK FENCE

KEVIN HERWIG M.P.C.A. 3945

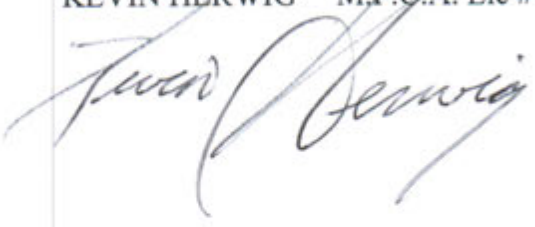
MOUND SYSTEM UPGRADE to Type III
ON EXISTING SITE

The top of the mound including the rock bed will be removed down to the clean sand layer (existing sand and the new sand is to be jar tested) Approx. elevation of new rock and sand interface 101.90
The sand depth will be verified at time of removal.
New washed sand will be added to achieve a minimum of 3' on upslope side of rock bed.
Approximate elevation of top of sand will be 101.90
East end of mound to be removed to virgin soil and roughed up to accommodate new 38 foot rock bed.
New washed rock will be added (6" depth) approximate lateral elevation 102.40
3 new 2" laterals 36' long with ¼" holes spaced at 3' will be placed on rock bed.
12" of loam and 6" of topsoil will finish the repair.
The area will be allowed dry to as long as necessary after removal and before reconstruction will begin.
All work will be completed to 7080 rule.

All rock, pipe, and debris removed from the mound is to be disposed of off-site.

Benchmark is the top of the South edge of the patio slab. Elevation. 100.00

KEVIN HERWIG M.P.C.A. Lic # 3945



CONSTRUCTION NOTES

PRODUCT BRAND & MODEL LISTED IN DESIGN MUST BE USED. BROWN-WILBERT TANKS – SEPTIC 1600 GAL. COMBO WITH POLYLOK PL-122 FILTER AND ALARM, PUMP TANK 1000 GAL. BROWN-WIFLBERT PUMP – GOULDS WE511H ** PUMP CHAMBER AND PUMP SETTINGS WILL NOT BE CORRECT IF OTHER PRODUCTS ARE USED.

SJE RHOMBUS EZPIIW6COHIJV8GI0EP17A22C CONTROL

IT IS THE DESIGNER'S DISCRETION TO APPROVE OR DISAPPROVE SUBSTITUTIONS.THE INSTALLER WILL BE RESPONSIBLE FOR DESIGN CHANGE FEE.

ALL PRODUCTS AND CONSTRUCTION PRACTICES ARE TO MEET M.P.C.A. 7080 RULE AND MILLE LACS BAND SPECIFICATION FOR SEWAGE TREATMENT SYSTEMS

KEVIN HERWIG LIC # 3945

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

v 03.15.2023

1. Contact Information

Property Owner/Client: MILLE LACS BAND OF OJIBWE | Date Completed: 5/26/2023

Site Address: 19500 WHITEFISH RD ONAMIA MN | Project ID:

Email: | Phone:

Mailing Address: | Alt Phone:

Legal Description:

Parcel ID: | SEC: | TWP: | RNG:

2. Flow and General System Information

A. Client-Provided Information

Project Type: ☐ New Construction ☑ Replacement ☐ Expansion ☐ Repair

Project Use: ☑ Residential ☐ Other Establishment:

Residential use: # Bedrooms: 3 | Dwelling sq.ft.: 1000 | Unfinished sq.ft.:

Adults: 1 | # Children: | # Teenagers:

In-home business (Y/N): No | If yes, describe:

Water-using devices: *(check all that apply)*

- ☐ Garbage Disposal/Grinder
- ☐ Dishwasher
- ☐ Hot Tub*
- ☐ Sewage pump in basement
- ☐ Water Softener*
- ☑ Sump Pump*
- ☐ Large Bathtub >40 gallons
- ☐ Iron Filter*
- ☐ Self-Cleaning Humidifier*
- ☑ Clothes Washing Machine
- ☐ High Eff. Furnace*
- ☐ Other:

* Clear water source - should not go into system

Additional current or future uses:

Anticipated non-domestic waste:

The above is complete & accurate: *Client signature & date*

B. Designer-determined Flow and Anticipated Waste Strength Information

Attach additional information as necessary.

Design Flow: 450 GPD | Anticipated Waste Type: Other Est. - Resid.

Maximum Concentration BOD: 170 mg/L | TSS 60 mg/L | Oil & Grease 25 mg/L

3. Preliminary Site Information

A. Water Supply Wells

#	Description	Mn. ID#	Well Depth (ft.)	Casing Depth (ft.)	Confining Layer	STA Setback	Source
1	CASING WELL		55'+				OWNER
2							
3							
4							

Additional Well Information:

ONSITE SEWAGE TREATMENT PROGRAM

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Site within 200' of noncommunity transient well (Y/N)	No	Yes, source:
Site within a drinking water supply management area (Y/N)	No	Yes, source:
Site in Well Head Protection inner wellhead management zone (Y/N)	No	Yes, source:
Buried water supply pipes within 50 ft of proposed system (Y/N)	No	
B. Site located in a shoreland district/area?	No	Yes, name: N/A
Elevation of ordinary high water level:	N/A ft	Source: N/A
Classification: N/A	Tank Setback: N/A ft.	STA Setback: N/A ft.
C. Site located in a floodplain?		Yes, Type(s):
Floodplain designation/elevation (10 Year):	ft	Source:
Floodplain designation/elevation (100 Year):	ft	Source:

D. Property Line Id / Source: ☑ Owner ☐ Survey ☐ County GIS ☐ Plat Map ☐ Other:

E. ID distance of relevant setbacks on map: ☐ Water ☐ Easements ☑ Well(s) ☐ Building(s) ☑ Property Lines ☐ OHWL ☐ Other:

4. Preliminary Soil Profile Information From Web Soil Survey (attach map & description)

Map Units: C41B Slope Range: 5 %

List landforms: MORAINES

Landform position(s): Back/ Side Slope

Parent materials: Till

Depth to Bedrock/Restrictive Feature: in Depth to Watertable: in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:	
Septic Tank Absorption Field- Mound:	Moderately Limited
Septic Tank Absorption Field- Trench:	

5. Local Government Unit Information

Name of LGU:	MILLE BAND
LGU Contact:	CARLA
LGU-specific setbacks:	
LGU-specific design requirements:	
LGU-specific installation requirements:	
Notes:	

ONSITE SEWAGE TREATMENT PROGRAM

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

v 03.15.2023

1. Project Information

Property Owner/Client: MILLE LACS BAND OF OJIBWE | Project ID:

Site Address: 19500 WHITEFISH RD ONAMIA MN | Date Completed: 5/25/2023

2. Utility and Structure Information

Utility Locations Identified ☐ Gopher State One Call # | ☐ Any Private Utilities:

Locate and Verify (*see Site Evaluation map*) ☐ Existing Buildings ☐ Improvements ☐ Easements ☐ Setbacks

3. Site Information

Vegetation type(s): Lawn | Landscape position: Shoulder

Percent slope: 5 % | Slope shape: Linear, Linear | Slope direction: south

Describe the flooding or run-on potential of site:

Describe the need for Type III or Type IV system: SOIL LIMITING

Note:

Proposed soil treatment area protected? (Y/N): Yes | If yes, describe: EXISTING

4. General Soils Information

Filled, Compacted, Disturbed areas (Y/N): Yes

If yes, describe: 1 SOIL TEST DISTURBED SOIL

Soil observations were conducted in the proposed system location (Y/N): Yes

A soil observation in the most limiting area of the proposed system (Y/N): Yes

Number of soil observations: 3 | Soil observation logs attached (Y/N): Yes

Percolation tests performed & attached (Y/N): No

5. Phase I. Reporting Information

	Depth		Elevation	
Limiting Condition*:	0	in	**98.9**	ft
Periodically saturated soil:	0	in	98.9	ft
Standing water:		in		ft
Bedrock:		in		ft
Benchmark Elevation:	100.0	ft		

*Most Restrictive Depth Identified from List Below

Soil Texture: Loam

Percolation Rate: min/inch

Soil Hyd Loading Rate: gpd/sq.ft

Elevations and Benchmark on map? (Y/N):

Benchmark Elevation Location: PATIO SLAB SOUTH EDGE

Differences between soil survey and field evaluation: CLOSE TO SAME

Site evaluation issues / comments:

Anticipated construction issues:

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 03.15.2023

Client:	MILLE LACS BAND OF OJIBWE	Location / Address:	19500 WHITEFISH RD ONAMIA MN

Soil parent material(s): (Check all that apply) ☑ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill

Landscape Position:	Shoulder	Slope %:	5.0	Slope shape:	Linear, Linear	Flooding/Run-On potential:	No
Vegetation:	Lawn	Soil survey map units:	C41B			Surface Elevation-Relative to benchmark:	97.4
Date/Time of Day/Weather Conditions:		9AM	OVERCAST			Limiting Layer Elevation:	97.1
Observation #/Location:	1			Observation Type:	Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-4	Loam	5	10YR 3/2				Granular	Weak	Friable
4-6	Silt Loam	5	10YR 4/2	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
6-9	Silt Loam	5	7.5YR 4/4	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
				10YR 5/2	Depletions	S2			
9-15	Silt Loam	5	7.5YR 5/4	7.5YR 4/6	Concentrations	S2	Blocky	Moderate	Friable

Comments:

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

KEVIN HERWIG		3945	5/25/2023
(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU/Designer/Inspector)	(Signature)	(Cert #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID: v 03.15.2023

Client:	MILLE LACS BAND OF OJIBWE	Location / Address:	19500 WHITEFISH RD ONAMIA MN

Soil parent material(s): (Check all that apply) ☑ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill

Landscape Position:	Shoulder	Slope %:	5.0	Slope shape:	Linear, Linear	Flooding/Run-On potential:	No
Vegetation:	Lawn	Soil survey map units:	C41B			Surface Elevation-Relative to benchmark:	97.7
Date/Time of Day/Weather Conditions:		9AM	OVERCAST			Limiting Layer Elevation:	97.4
Observation #/Location:	2			Observation Type:	Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure Shape	Structure Grade	Structure Consistence
0-3	Loam	5	10YR 5/2				Granular	Weak	Friable
3-6	Silt Loam	5	10YR 6/2	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
6-9	Silt Loam	5	7.5YR 4/4	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
				10YR 5/2	Depletions	S2			
9-16	Silt Loam	5	7.5YR 5/4	7.5YR 4/6	Concentrations	S2	Blocky	Moderate	Friable

Comments:

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

KEVIN HERWIG		3945	5/25/2023
(Designer/Inspector)	(Signature)	(License #)	(Date)

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(LGU/Designer/Inspector)	(Signature)	(Cert #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 03.15.2023

Client:	MILLE LACS BAND OF OJIBWE	Location / Address:	19500 WHITEFISH RD ONAMIA MN

Soil parent material(s): (Check all that apply) ☑ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill

Landscape Position:	Shoulder	Slope %: 5.0	Slope shape:	Linear, Linear	Flooding/Run-On potential: No
Vegetation:	Lawn	Soil survey map units:	C41B		Surface Elevation-Relative to benchmark: 97.0
Date/Time of Day/Weather Conditions:	9AM	OVERCAST			Limiting Layer Elevation: 97.0
Observation #/Location:	1			Observation Type:	Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-3	Loam	5	10YR 3/2				Granular	Weak	Friable
3-6	Silt Loam	5	10YR 4/2	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
6-9	Silt Loam	5	7.5YR 4/4	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
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9-15	Silt Loam	5	7.5YR 5/4	7.5YR 4/6	Concentrations	S2	Blocky	Moderate	Friable

Comments:

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KEVIN HERWIG		3945	5/25/2023
(Designer/Inspector)	(Signature)	(License #)	(Date)

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(LGU/Designer/Inspector)	(Signature)	(Cert #)	(Date)

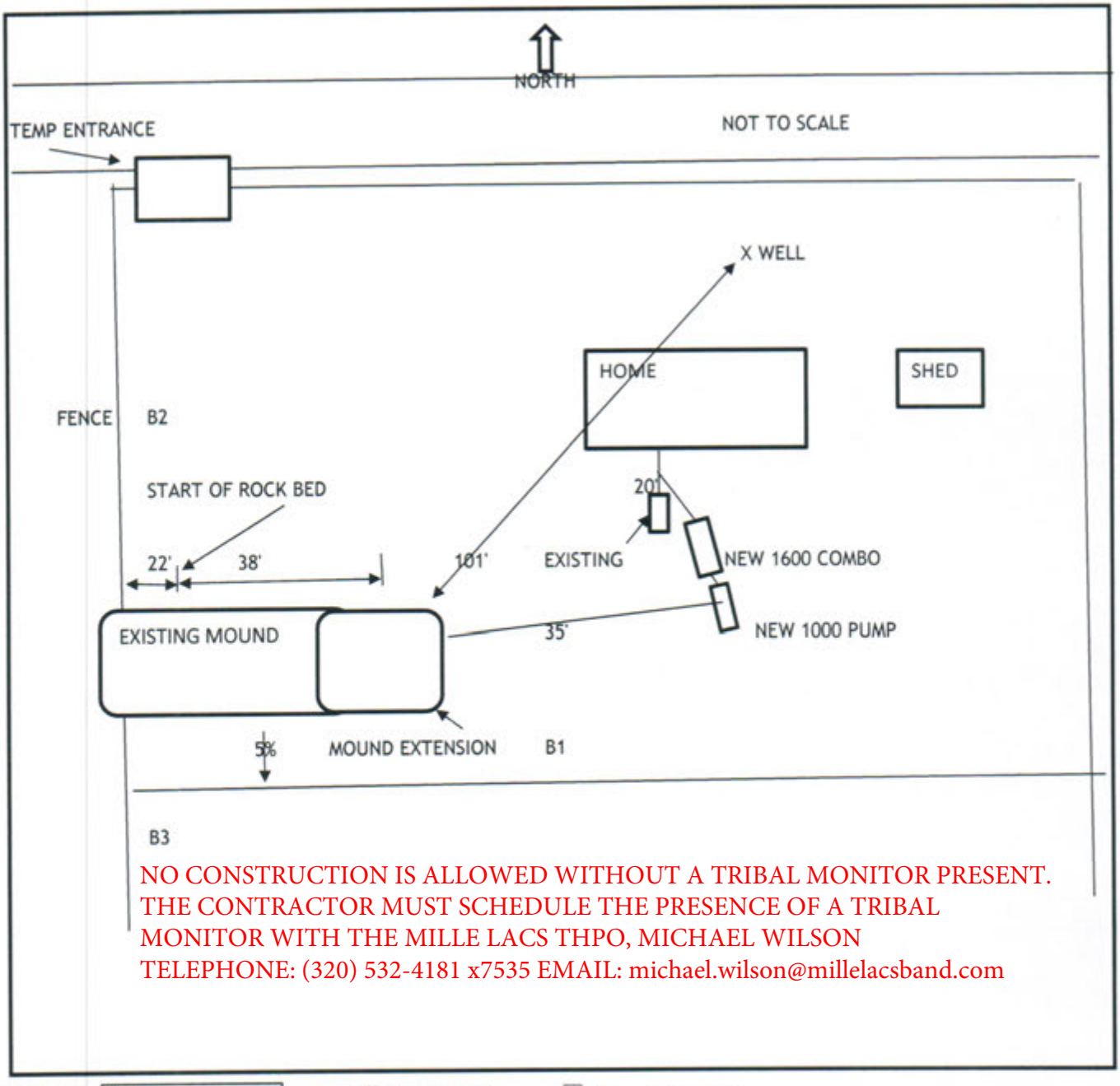
ONSITE SEWAGE TREATMENT PROGRAM

Proposed Design Map

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 03.15.2023

Property Owner/Client: MILLE LACS BAND OF OJIBWE



NO CONSTRUCTION IS ALLOWED WITHOUT A TRIBAL MONITOR PRESENT. THE CONTRACTOR MUST SCHEDULE THE PRESENCE OF A TRIBAL MONITOR WITH THE MILLE LACS THPO, MICHAEL WILSON TELEPHONE: (320) 532-4181 x7535 EMAIL: michael.wilson@millelacsband.com

Map scale: NONE ☑ Indicated north ☐ Show slope/contours

Elevations in feet Benchmark: 100 ft

System Corners:

NW:	EXISTING	ft
NE:	98.9	ft
SW:	EXIXTING	ft
SE:	98.46	ft

Soil Observation:

#1:	97.44	ft
#2:	97.74	ft
#3:	97.02	ft
#4:		ft

Tank inlet 95.9 ft

Other: ft

ft

Date Completed: 5/26/2023

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

v 03.15.2023

1. PROJECT INFORMATION

Property Owner/Client: MILLE LACS BAND OF OJIBWE
Project ID:
Site Address: 19500 WHITEFISH RD ONAMIA MN
Date: 05/26/23
Email Address:
Phone:

2. DESIGN FLOW & WASTE STRENGTH

Attach waste strength data/estimated strength for Other Establishments

Design Flow: 450 GPD
Anticipated Waste Type: Other Est. - Resid.
BOD: 170 mg/L TSS: 60 mg/L Oil & Grease: 25 mg/L
Treatment Level: C *Select Treatment Level C for residential septic tank effluent*

3. HOLDING TANK SIZING

Minimum Capacity: Residential =1000 gal or 400 gal/bedroom, Other Establishment = Design Flow x 5.0, Minimum size 1000 gallons

Code Minimum **Holding Tank** Capacity: Gallons with Tanks or Compartments
Recommended **Holding Tank** Capacity: Gallons with Tanks or Compartments
Type of High Level Alarm: (Set @ 75% tank capacity)
Comments:

4. SEPTIC TANK SIZING

A. Residential dwellings:

Number of Bedrooms (Residential): 3
Code Minimum **Septic Tank** Capacity: 1000 Gallons with 1 Tanks or Compartments
Recommended **Septic Tank** Capacity: 1600 Gallons with 2 Tanks or Compartments
Effluent Screen & Alarm (Y/N): Yes Model/Type: PL120

B. Other Establishments:

Waste received by: GPD x Days Hyd. Retention Time
Code Minimum **Septic Tank** Capacity: Gallons with Tanks or Compartments
Recommended **Septic Tank** Capacity: Gallons with Tanks or Compartments
Effluent Screen & Alarm (Y/N): Model/Type:

* Other Establishments Require Department of Labor and Industry Approval and Inspection for Building Sewer *

5. PUMP TANK SIZING

Soil Treatment Dosing Tank

Pump Tank Capacity (Minimum): 500 Gal
Pump Tank Capacity (Recommended): 1000 Gal
Pump Req: 29.0 GPM Total Head 18.0 ft
Supply Pipe Dia. 2.00 in Dose Vol: 112.0 gal

Other Component Dosing Tank:

Pump Tank Capacity (Minimum): Gal
Pump Tank Capacity (Recommended): Gal
Pump Req: GPM Total Head ft
Supply Pipe Dia. in Dose Vol: Gal

* Flow measurement device must be incorporated for any system with a pump: Elapsed Time Meter and/or Event Counter *

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

6. SYSTEM AND DISTRIBUTION TYPE

Project ID:

Soil Treatment Type:	Mound	Distribution Type:	Pressure Distribution-Level
Elevation Benchmark:	100.0 ft	Benchmark Location:	PATIO SLAB SOUTH EDGE
MPCA System Type:	Type III	Distribution Media:	Rock
Type III/IV/V Details:	SOIL SATURATION		

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition: Redoximorphic Features/Saturated Soils

Layers with >35% Rock Fragments? (yes/no) No If yes, describe below: % rock and layer thickness, amount of soil credit and any additional information for addressing the rock fragments in this design.

Note:

	Depth		Depth		Elevation of Limiting Condition		
Limiting Condition:	0	inches	0.0	ft	98.90	ft	*Critical for system compliance*
Minimum Req'd Separation:	36	inches	3.0	ft	Elevation		*Distribution Elevation >Code Max Depth*
Code Max System Depth*:	Mound	inches	-3.0	ft	101.90	ft	Elevation OK

*This is the maximum depth to the bottom of the distribution media for required separation. Negative Depth (ft) requires a mound.

Designed Distribution Elevation: 101.9 ft Minimum Sand Depth: 36.0 inches

A. Soil Texture: Loam B. Organic Loading Rate (optional): lbs/sq.ft/day 0

C. Soil Hyd. Loading Rate: 0.50 GPD/ft^2 D: Percolation Rate: MPI

E. Contour Loading Rate: 12 Note:

F. Measured Land Slope: 5.0 % Note:

Comments:

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area		sq.ft	Sidewall Depth		in	Trench Width	ft
Total Lineal Feet		ft	No. of Trenches			Code Max. Trench Depth	in
Contour Loading Rate		ft	Minimum Length		ft	Designed Trench Depth	in

Bed:

Dispersal Area		sq.ft	Sidewall Depth		in	Maximum Bed Depth	in
Bed Width		ft	Bed Length		ft	Designed Bed Depth	in

Mound:

Dispersal Area	380.0	sq.ft	Bed Length	38.0	ft	Bed Width	10.0	ft
Absorption Width	24.0	ft	Clean Sand Lift	3.0	ft	Berm Width (0-1%)		ft
Upslope Berm Width	13.1	ft	Downslope Berm	19.4	ft	Endslope Berm Width	16.5	ft
Total System Length	71.0	ft	System Width	42.5	ft	Contour Loading Rate	12.0	gal/ft

ONSITE SEWAGE TREATMENT PROGRAM

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

Project ID:

At-Grade:

Dispersal Area		sq.ft	Bed Length		ft	Bed Width	ft
Upslope Berm		ft	Downslope Berm		ft	Finished Height	ft
System Length		ft	Endslope Berm		ft	System Width	ft

Level & Equal Pressure Distribution Soil Treatment Area

No. of Laterals	3		Lateral Diameter	2.00	in	Lateral Spacing	0	ft
Perforation Spacing	3	ft	Perforation Diameter	1/4	in	Drainback Volume	6	gal
Min Dose Volume	73	gal	Max Dose Volume	113	gal	Total Dosing Volume	118	gal

Non-Level and Unequal Pressure Distribution Soil Treatment Area

	Elevation (ft)	Pipe Size (in)	Pipe Volume (gal/ft)	Pipe Length (ft)	Perf Size (in)	Spacing (ft)	Spacing (in)
Lateral 1							
Lateral 2							
Lateral 3							
Lateral 4							
Lateral 5							
Lateral 6							

Minimum Dose Volume: _____ gal

Maximum Dose Volume: _____ gal

Total Dosing Volume: _____ gal

9. Organic Loading and Additional Info for At-Risk, HSW or Type IV Design

Organic Loading to Soil Treatment

A. Starting BOD Concentration = Design Flow X 0.7 X Starting BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,000 = _____ lbs. BOD/day (Organic Loading Design)

B. Organic Loading to Soil Treatment Area: (enter loading value in 7B)

_____ mg/L X _____ gpd X 0.7 X 8.35 ÷ 1,000,000 ÷ _____ sq.ft = _____ lbs./day/sqft

HSW Technology Strength Reduction

A. Starting BOD Concentration = Design Flow X Starting BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,000 = _____ lbs. BOD/day (HSW Technology Design)

B. Target BOD Concentration = Design Flow X Target BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,000 = _____ lbs. BOD/day (HSW Technology Design)

Lbs. BOD To Be Removed: _____ lbs. BOD/day (HSW Technology Design)

Pretreatment Technology: _____ *Must Meet or Exceed Target

Disinfection Technology: _____ *Required for Levels A & B

10. Comments/Special Design Considerations:

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

KEVIN HERWIG		3945	5/26/2023
(Designer)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Mound Design Worksheet
≥1% Slope

MINNESOTA POLLUTION CONTROL AGENCY

1. SYSTEM SIZING: Project ID: v 03.15.2023

A. Design Flow:	450	GPD
B. Soil Loading Rate:	0.50	GPD/sqft
C. Depth to Limiting Condition	0.0	ft
D. Percent Land Slope:	5.0	%
E. Media (Sand) Loading Rate:	1.2	GPD/sqft
F. Mound Absorption Ratio:	2.40	

Table I
MOUND CONTOUR LOADING RATES:

Measured Perc Rate	← OR →	Texture - derived mound absorption ratio		Contour Loading Rate:
≤ 60mpi		1.0, 1.3, 2.0, 2.4, 2.6	→	≤12
61-120 mpi	← OR →	5.0	→	≤12
≥ 120 mpi*		>5.0*	→	≤6*

TABLE IXa
LOADING RATES FOR DETERMINING BOTTOM ABSORPTION AREA AND ABSORPTION RATIOS USING PERCOLATION TESTS

Percolation Rate (MPI)	Treatment Level C		Treatment Level A, A-2, B,	
	Absorption Area Loading Rate (gpd/ft²)	Mound Absorption Ratio	Absorption Area Loading Rate (gpd/ft²)	Mound Absorption Ratio
<0.1	-	1	-	1
0.1 to 5	1.2	1	1.6	1
0.1 to 5 (fine sand and loamy fine sand)	0.6	2	1	1.6
6 to 15	0.78	1.5	1	1.6
16 to 30	0.6	2	0.78	2
31 to 45	0.5	2.4	0.78	2
46 to 60	0.45	2.6	0.6	2.6
61 to 120	-	5	0.3	5.3
>120	-	-	-	-

*Systems with these values are not Type I systems. Contour Loading Rate (linear loading rate) is a recommended value.

2. DISPERSAL MEDIA SIZING

A. Hydraulic Absorption Required Bottom Area: Design Flow (1A) ÷ Design Media Loading Rate(1E)

450 GPD ÷ 1.2 GPD/sqft = 375 sq.ft

Organic Sizing (OPTIONAL)

B. Organic Absorption Bed Area = Organic Loading (Summary 9A) ÷ Organic Soil Loading Rate (Summary 7B)

lbs BOD ÷ lbs BOD/sq.ft = sq.ft

C. Required Bed Area = Greater of Hydraulic (1D) or Organic Bed Area (1E) 375 sq.ft

D. Designed Dispersal Media Area: 375 sq.ft *Optional upsizing of area to be larger than 2C*

B. Enter Dispersal Bed Width: 10.0 ft *Can not exceed 10 feet*

C. Calculate Contour Loading Rate: Bed Width(2B) X Design Media Loading Rate(1E)

10 ft X 1.2 GPD/sqft = 12.0 gal/ft *Can not exceed Table 1*

D. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area(2A) ÷ Bed Width(2B)

375 sqft ÷ 10.0 ft = 37.5 ft

If a larger dispersal media Length is desired, enter size: 38 ft

3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width(2B) X Mound Absorption Ratio(1F)

10.0 ft X 2.4 = 24.0 ft

B. For slopes >1%, the Absorption Width is measured downhill from the upslope edge of the Bed.

Calculate Downslope Absorption Width: Absorption Width(1F) - Bed Width(2B)

24.0 ft - 10.0 ft = 14.0 ft

4. DISTRIBUTION MEDIA:

Project ID:

Select Dispersal Media: Rock — Enter Either 4A or 4B

A. Rock Depth Below Distribution Pipe

6 in

B. Registered Media

Registered Media Depth in

Check registered product information for specific application details and design

Specific Media Comments:

5. MOUND SIZING

Project ID:

A. Clean Sand Lift: Required Separation - Depth to Limiting Condition = Clean Sand Lift (1 ft minimum)

3.0 ft - ft = 3.0 ft Design Sand Lift (optional): ft

B. Upslope Height: Clean Sand Lift(6A) + Depth of Media(4AorB) +Depth to Cover Pipe+ Depth of Cover (1 ft)

3.0 ft + 0.50 ft + 0.5 ft + 1.0 ft = 5.0 ft

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12
Upslope Berm Ratio	3:1	3.00	2.91	2.83	2.75	2.68	2.61	2.54	2.48	2.42	2.36	2.31	2.26	2.21
	4:1	4.00	3.85	3.70	3.57	3.45	3.33	3.23	3.12	3.03	2.94	2.86	2.78	2.70

C. Select Upslope Berm Multiplier (based on land slope): 2.61

D. Calculate Upslope Berm Width: Multiplier (5C) X Upslope Mound Height (5B)

2.61 X 5.0 ft = 13.1 ft

E. Calculate Drop in Elevation Under Bed: Bed Width(2B) X Land Slope(1D) ÷ 100 = Drop (ft)

10.0 ft X 5.0 % ÷ 100 = 0.50 ft

F. Calculate Downslope Mound Height: Upslope Height(5B) + Drop in Elevation(5E)

5.0 ft + 0.50 ft = 5.5 ft

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12
Downslope Berm Ratio	3:1	3.00	3.09	3.19	3.30	3.41	3.53	3.66	3.80	3.95	4.11	4.29	4.48	4.69
	4:1	4.00	4.17	4.35	4.54	4.76	5.00	5.26	5.56	5.88	6.25	6.67	7.14	7.69

G. Select Downslope Berm Multiplier (based on land slope): 3.53

H. Calculate Downslope Berm Width: Downslope Multiplier(5G) X Downslope Height (5F)

3.53 x 5.5 ft = 19.4 ft

I. Calculate Minimum Berm to Cover Absorption Area: Downslope Absorption Width(3A) + 4 feet

14.0 ft + 4 ft = 18.0 ft

J. Design Downslope Berm = greater of 5H and 5I: 19.4 ft

K. Select Endslope Berm Multiplier: 3.00 *(usually 3.0 or 4.0)*

L. Calculate Endslope Berm Width = Endslope Berm Multiplier(5K) X Downslope Mound Height(5F)

3.00 X 5.5 ft = 16.5 ft

M. Calculate Mound Width: Upslope Berm Width(5D) + Bed Width(2B) + Downslope Berm Width(5J)

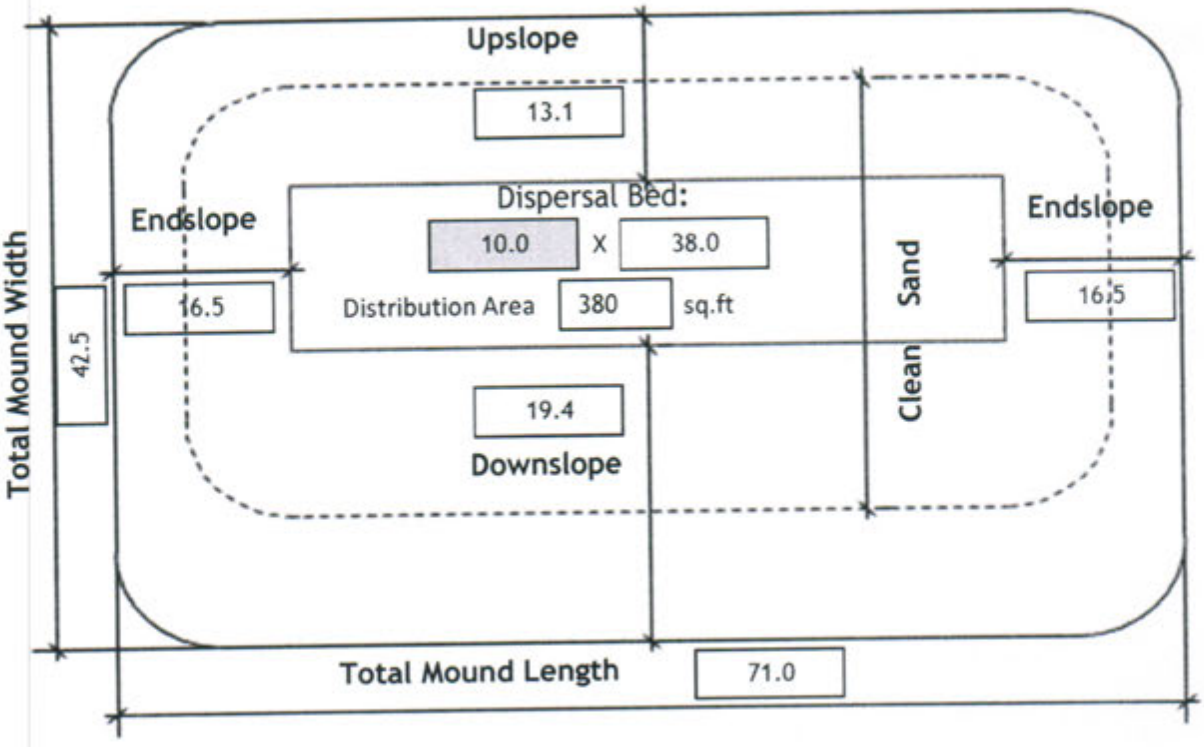
13.1 ft + 10.0 ft + 19.4 ft = 42.5 ft

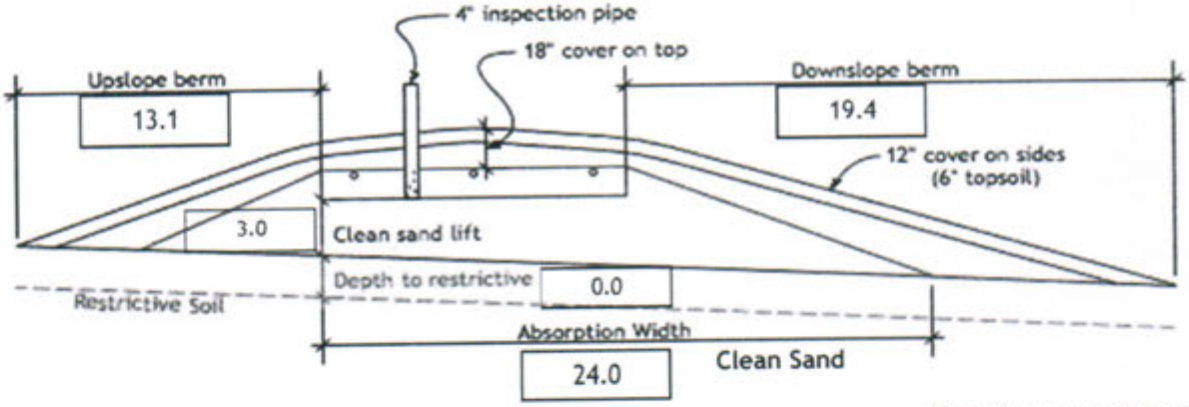
N. Calculate Mound Length: Endslope Berm Width (5L) + Bed Length(2D) + Endslope Berm Width(5L)

16.5 ft + 38.0 ft + 16.5 ft = 71.0 ft

6. MOUND DIMENSIONS (Feet)

Project ID:





Elevation to Benchmark

Required Separation: 36 (in)

Distribution Media: Rock

Media Depth: 6.0 (in)

Manifold Connection: End

Lateral Pipe Diameter: 2.00 (in)

Perforation Size: 1/4 (in)

Elevation Limiting Layer: 98.9 ft

Elevation required Separation: 101.9 ft

Elevation Distribution Media Bottom: 101.9 ft

Elevation Top of Media(min): 102.9 ft

Elevation Top of System(min): 103.9 ft

Perforation Spacing: 36.0 (in)

If Split and Non-Level Pressure Distribution Used: See Non-Level Pressure Distribution Form

Comments:

ONSITE SEWAGE TREATMENT PROGRAM

Mound Materials Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 03.15.2023

A. Rock *Volume*: (Rock Below Pipe + Rock to cover pipe (*pipe outside dia + ~2 inch*)) X *Bed Length* X *Bed Width* = *Volume*

(6 in + 5.0 in) ÷ 12 X 37.5 ft X 10.0 ft = 343.8 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 343.8 cu.ft ÷ 27 = 12.7 cu.yd

Add 30% for constructability: 12.7 cu.yd X 1.3 = 16.6 cu.yd

B. Calculate *Clean Sand Volume:*

Volume Under Rock bed: *Average Sand Depth* x *Media Width* x *Media Length* = cubic feet

3.3 ft X 10.0 ft X 38 ft = 1235 cu.ft

For a Mound on a slope from 0-1%

Volume from Length = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Length)

(ft - 1) X X ft =

Volume from Width = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Width)

(ft - 1) X X ft =

Total Clean Sand Volume: *Volume from Length* + *Volume from Width* + *Volume Under Media*

cu.ft + cu.ft + cu.ft = cu.ft

For a Mound on a slope greater than 1%

Upslope Volume: ((*Upslope Mound Height - 1*) x 3 x *Bed Length*) ÷ 2 = cubic feet

((5.0 ft - 1) X 3.0 ft X 38.0) ÷ 2 = 228.0 cu.ft

Downslope Volume: ((*Downslope Height - 1*) x Downslope Absorption Width x *Media Length*) ÷ 2 = cubic feet

((5.5 ft - 1) X 14.0 ft X 38.0) ÷ 2 = 1197.0 cu.ft

Endslope Volume: (*Downslope Mound Height - 1*) x 3 x *Media Width* = cubic feet

(5.5 ft - 1) X 3.0 ft X 10.0 ft = 135.0 cu.ft

Total Clean Sand Volume: *Upslope Volume* + *Downslope Volume* + *Endslope Volume* + *Volume Under Media*

228.0 cu.ft + 1197.0 cu.ft + 135.0 cu.ft + 1235.0 cu.ft = 2795.0 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 2795.0 cu.ft ÷ 27 = 103.5 cu.yd

Add 30% for constructability: 103.5 cu.yd X 1.3 = 134.6 cu.yd

C. Calculate *Sandy Berm Volume:* SAND VOLUME MAY BE LESS, SOME EXISTING SAND MAY PASS JAR TEST

Total Berm Volume (approx.): ((Avg. Mound Height - 0.5 ft topsoil) x Mound Width x Mound Length) ÷ 2

(5.3 - 0.5)ft X 42.5 ft X 71.0) ÷ 2 = 7160.7 cu.ft

Total Mound Volume - Clean Sand volume -Rock Volume = cubic feet

7160.7 cu.ft - 2795.0 cu.ft - 343.8 cu.ft = 4021.9 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 4021.9 cu.ft ÷ 27 = 149.0 cu.yd

Add 30% for constructability: 149.0 yd^3 x 1.3 = 193.6 cu.yd

D. Calculate *Topsoil Material Volume: Total Mound Width X Total Mound Length X .5 ft*

42.5 ft X 71.0 ft X 0.5 ft = 1507.5 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 1507.5 cu.ft ÷ 27 = 55.8 cu.yd

Add 30% for constructability: 55.8 cu.yd X 1.3 = 72.6 cu.yd

Pressure Distribution Design Worksheet

ONSITE SEWAGE TREATMENT PROGRAM

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 03.15.2023

1. Media Bed Width: 10 ft

2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

[(10 - 4) ÷ 3] + 1 = 3 laterals *Does not apply to at-grades*

3. Designer Selected *Number of Laterals*: 3 laterals
Cannot be less than line 2 (Except in at-grades)

4. Select *Perforation Spacing*: 3.00 ft

5. Select *Perforation Diameter Size*: 1/4 in

6. *Length of Laterals* = Media Bed Length(1.) - 2 Feet.

38.0 - 2ft = 36.0 ft *Perforation can not be closer then 1 foot from edge.*

7. Determine the *Number of Perforation Spaces*. Divide the *Length of Laterals(6.)* by the *Perforation Spacing* (4.) and round down to the nearest whole number.

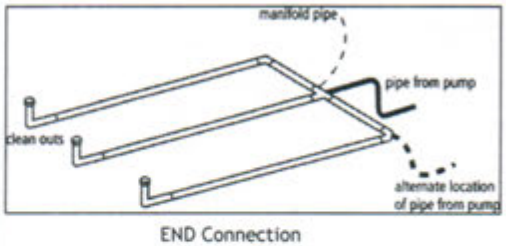
Number of Perforation Spaces = 36.0 ft ÷ 3.0 ft = 12 Spaces

8. *Number of Perforations per Lateral* is equal to 1.0 plus the *Number of Perforation Spaces(7.)*. Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.

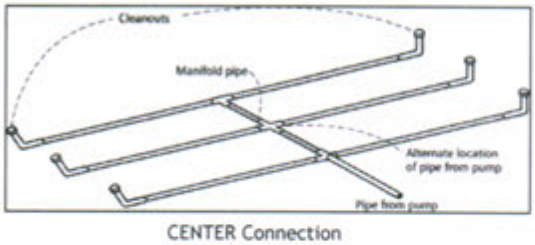
Perforations Per Lateral = 12 Spaces + 1 = 13 Perfs. Per Lateral

Maximum Number of Perforations Per Lateral to Guarantee <10% Discharge Variation

1/4 Inch Perforations						7/32 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3		1	1¼	1½	2	3
2	10	13	18	30	60	2	11	16	21	34	68
2½	8	12	16	28	54	2½	10	14	20	32	64
3	8	12	16	25	52	3	9	14	19	30	60
3/16 Inch Perforations						1/8 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3		1	1¼	1½	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2½	12	17	24	40	80	2½	20	30	41	69	135
3	12	16	22	37	75	3	20	29	38	64	128



END Connection



CENTER Connection

Perf Per Lateral: 13

Perf Per Lateral Equal Split: 7 | 6

OPTIONAL Perf Per Lateral Non-Equal Split*: ___ | ___

* must not exceed maximum number perfs per lateral in table

9. *Total Number of Perforations* equals the *Number of Perforations per Lateral (8.)* multiplied by the *Number of Perforated Laterals.(3.)*

13 Perf. Per Lat. X 3 Number of Perf. Lat. = 39 Total Number of Perf.

10. Spacing of laterals; Must be greater than 1 foot and no more than 3 feet: ___ ft

11. Select *Type of Manifold Connection* (End or Center): End

12. *Select Lateral Diameter (See Table)*: 2.00 in

If Center Manifold Connection the max number of perfs per lateral in the table can be doubled.

ONSITE SEWAGE TREATMENT PROGRAM

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

13. Calculate the *Square Feet per Perforation.*

Recommended value is 4-11 ft2 per perforation, Does not apply to At-Grades

a. *Bed Area* = Bed Width (ft) X Bed Length (ft)

10	ft	X	38	ft =	380	sq.ft

b. *Square Foot per Perforation* = *Bed Area* ÷ by the *Total Number of Perfs*

380	sqft ÷		39	perf =	9.7	sq.ft/perf

14. Select *Minimum Average Head*: 1.0 ft

15. Select *Perforation Discharge* based on Table: 0.74 GPM per Perf

16. *Flow Rate* = *Total Number of Perfs(9.) X Perforation Discharge(15.)*

39	Perfs	X	0.74	GPM per Perforation =	29	GPM

17. *Volume of Liquid Per Foot of Distribution Piping (Table II)*: 0.170 Gallons/ft

18. *Volume of Distribution Piping* = *Number of Perforated Laterals(3.) X Length of Laterals(6.) X Volume of Liquid Per Foot of Distribution Piping (17.)*

3	X	36	ft	X	0.170	gal/ft =	18.4 Gallons

19. Minimum Delivered Volume = Volume of Distribution Piping X 4

18.4	gals	X	4	=	73.4 Gallons

20. Maximum Delivered Volume = Design flow x 25%

450.0	gpd	X	25%	=	112.5 Gallons

21. Minimum Delivered vs Maximum Delivered evaluation: Volume ratio correct

Perforation Discharge (GPM)

Head (ft)	Perforation Diameter 3/16	1/4	7/32	1/4
1.0*	0.18	0.41	0.56	0.74
1.5	0.22	0.51	0.69	0.9
2.0*	0.26	0.59	0.80	1.04
2.5	0.29	0.65	0.89	1.17
3.0	0.32	0.72	0.98	1.28
4.0	0.37	0.83	1.13	1.47
5.0*	0.41	0.93	1.26	1.65

1 foot	Dwellings with 3/16 inch to 1/4 inch perforations
2 feet	Dwellings with 1/8 inch perforations
	Other establishments and MSTS with 3/16 inch to 1/4 inch perforations
5 feet	Other establishments and MSTS with 1/8 inch perforations

Table II Volume of Liquid in Pipe

Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

Comments/Special Design Considerations:

Basic STA Pump Selection Design Worksheet

Onsite Sewage Treatment Program

Minnesota Pollution Control Agency

1. PUMP CAPACITY

Project ID:

v 03.15.2023

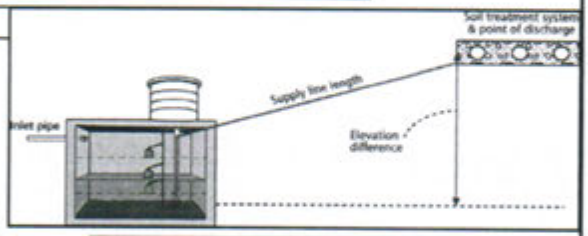
Pumping to Gravity or Pressure Distribution: Pressure

A. If pumping to gravity enter the gallon per minute of the pump: ____ GPM *(10 - 45 gpm)*

B. If pumping to a pressurized distribution system: 29.0 GPM

C. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 12 ft

B. Distribution Head Loss: 5 ft

C. Additional Head Loss*: ____ ft (due to special equipment, etc.)

* Common additional head loss: gate valve = 1 ft each, globe valve = 1.5 ft each, splitter valve = see manufacturers details

Distribution Head Loss	
Gravity Distribution = 0ft	
Pressure Distribution based on Minimum Average Head Value on Pressure Distribution Worksheet:	
Minimum Average Head	**Distribution Head Loss**
1ft	5ft
2ft	6ft
5ft	10ft

D. 1. Supply Pipe Diameter: 2.0 in

2. Supply Pipe Length: 35 ft

E. **Friction Loss in Plastic Pipe per 100ft** from Table I:

Friction Loss = 2.23 ft per 100ft of pipe

F. Determine *Equivalent Pipe Length* from pump discharge to soil dispersal area discharge point. Estimate by adding 25% to supply pipe length for fitting loss.
Supply Pipe Length X 1.25 = *Equivalent Pipe Length*

35 ft X 1.25 = 43.8 ft

Table I. Friction Loss in Plastic Pipe per 100ft

Flow Rate (GPM)	Pipe Diameter (inches)			
	1	1.25	1.5	2
10	9.1	3.1	1.3	0.3
12	12.8	4.3	1.8	0.4
14	17.0	5.7	2.4	0.6
16	21.8	7.3	3.0	0.7
18		9.1	3.8	0.9
20		11.1	4.6	1.1
25		16.8	6.9	1.7
30		23.5	9.7	2.4
35			12.9	3.2
40			16.5	4.1
45			20.5	5.0
50				6.1
55				7.3
60				8.6
65				10.0
70				11.4
75				13.0
85				16.4
95				20.1

G. Calculate *Supply Friction Loss* by multiplying *Friction Loss Per 100ft(E.)* by the *Equivalent Pipe Length(F.)* and divide by 100.

Supply Friction Loss =

2.23 ft per 100ft X 43.8 ft + 100 = 1.0 ft

H. *Total Head* requirement is the sum of the *Elevation Difference(2A)* + Distribution Head Loss(2B) + Additional Head Loss(2C) + Supply Friction Loss(2G)

12.0 ft + 5.0 ft + ____ ft + 1.0 ft = 18.0 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **29.0** GPM with at least **18.0** feet of total head.

Comments:

STA Dosing Pump Tank Design Worksheet (Demand Dose)

MINNESOTA POLLUTION CONTROL AGENCY

DETERMINE TANK CAPACITY AND DIMENSIONS Project ID: v 03.15.2023

1. A. *Design Flow (Design Sum. 1A):* 450 GPD C. Tank Use: Dosing
   B. Min. required pump tank capacity: 500 Gal D. Recommended pump tank capacity: 1000 Gal

2. A. Tank Manufacturer: BROWN - WILBERT B. Tank Model: SINGLE 1000
   C. Capacity from manufacturer: 1012 Gallons
   D. Gallons per inch from manufacturer: 21.1 Gallons per inch
   E. Liquid depth of tank from manufacturer: 48.0 inches

Note: Design calculations are based on this specific tank. Substituting a different tank model will change the pump float or timer settings. Contact designer if changes are necessary.

DETERMINE DOSING VOLUME

3. Calculate *Volume to Cover Pump* (The inlet of the pump must be at least 4-inches from the bottom of the pump tank & 2 inches of water covering the pump is recommended)

   (Pump and block height + 2 inches) X *Gallons Per Inch* (2D)

   (12 in + 2 inches) X 22.3 Gallons Per Inch = 312 Gallons

4. ***Minimum*** *Delivered Volume* = 4 X Volume of Distribution Piping:

   -Item 19 of the Pressure Distribution STA or Item 11 of Non-level STA 73 **Gallons (Minimum dose)** 3.3 inches/dose

5. Calculate ***Maximum*** *Pumpout Volume* (25% of Design Flow(1A))

   Design Flow: 450 GPD X 0.25 = 113 **Gallons (Maximum dose)** 5.1 inches/dose

6. *Select a pumpout volume that meets both Minimum and Maximum:* 112 Gallons

7. Calculate *Doses Per Day* = Design Flow(1A) ÷ *Delivered Volume(6.)*

   450 gpd ÷ 112 gal = 4.02 *Doses**

   *** Doses need to be equal to or greater than 4**

8. Calculate Drainback:
   A. *Diameter of Supply Pipe* = 2 inches
   B. Length of Supply Pipe = 35 feet
   C. *Volume of Liquid Per Lineal Foot of Pipe* = 0.170 Gallons/ft
   D. *Drainback = Length of Supply Pipe(8B) X Volume of Liquid Per Lineal Foot of Pipe(8C)*

   35 ft X 0.170 gal/ft = 6.0 Gallons

9. *Total Dosing Volume = Delivered Volume(6.) + Drainback* (8D)

   112 gal + 6.0 gal = 118 Gallons

10. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank(2D)

    2 in X 22.3 gal/in = 44.5 Gallons

11. Reserve Capacity Volume = [Tank Liquid Depth(2E) - Alarm Float Depth(10.)] x gallons per inch of tank(2D)

    [48.0 in - 21.6 in] X 21.1 gal/in = 556.6 Gallons

Volume of Liquid in Pipe	
Pipe Diameter (inches)	**Liquid Per Foot (Gallons)**
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

DEMAND DOSE FLOAT SETTINGS **Alarm and Pump are to be wired on separate circuits and inspected by the electrical inspector**

12. Calculate *Float Separation Distance* using *Dosing Volume*.

    Total Dosing Volume(9.) ÷ Gallons Per Inch(2D)

    118 gal ÷ 21.1 gal/in = 5.6 inches

13. Measuring from bottom of tank:
    A. *Distance to set Pump Off Float* = Pump + block height + 2 inches

    12 in + 2 in = 14 inches

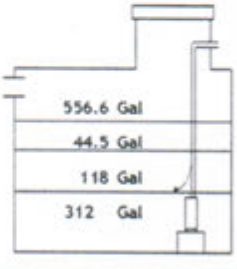
    B. *Distance to set Pump On Float=Distance to Set Pump-Off Float(13A) + Float Separation Distance(12.)*

    14 in + 5.6 in = 20 inches

    C. *Distance to set Alarm Float = Distance to set Pump-On Float(13B) + Alarm Depth* (2-3 inches)(10.)

    20 in + 2.0 in = 22 inches

Inches for Dose:	5.6	in
Alarm Depth	21.6	in
Pump On	19.6	in
Pump Off	14.0	in



MONITORING AND MITIGATION

SEPTIC SYSTEM CLASSIFIED AS TYPE III

Should the system fail a new site for the septic system may be considered or the owner agrees to repair the septic system if it is possible. If the septic system is not repairable the homeowner agrees to disconnect the septic tanks from the septic system and use and maintain the septic tanks as holding tanks.

Mille Lacs Band of Ojibwe and Kevin Herwig are to be notified as soon as possible about any operational problems. If a failure occurs the septic pump must be disconnected immediately and remain disconnected until all repairs are completed. A pumping contract will need to be set up with a septic maintenance contractor. A copy of all documents must be submitted to the county.

The system must be monitored for a minimum of three years. The mound system is to be inspected by the homeowner for leaks or saturated areas. Inspections are to be done every month for 36 months. Any leaks or failures in the system must be reported to the county within 24 hours.

All expenses for repair or replacement are the homeowner's responsibility.

Type III systems are not warranted by the Inspector, Designer, or Installer

I _____ , property owner of 19500 Whitefish Rd. Onamia Mn.

Hereby agree that as long as I am the owner of the property, to accept all legal and financial responsibility for future system repair and/or replacement expenses in the event that failure of the system on the above referenced property occurs.

_____

Owner

_____

Date

Owners Septic System Management Plan

Date: 5/26/2023

Property Address: 19500 Whitefish rd Onamia Mn.

Septic Systems can be an expensive investment, good maintenance will ensure they last a lifetime. The purpose of a septic system is to properly "decompose" the pollutants before the water is recycled back into the groundwater. If you're not taking this seriously, ask yourself where your well water comes from.

Your septic design lists all the components of your system and their location. Keep the design, this management plan and the UofM "Septic System Owners Guide" in a safe place for future reference. For a copy of the Owners guide call the University of MN at 1-800-876-8636.

Some of the following tasks you can do yourself, some require a professional, but is it YOUR responsibility to see that it gets done.

Homeowner Tasks

- Do your best to conserve water. Don't overload your septic with multiple large water uses at the same time or on the same day.
- Fix household leaks promptly (leaky toilet, dripping faucets).
- Limit bleach and anti-bacterial products. Use Biodegradable dishwasher detergent.
- Consider a lint filter on your clothes washer.
- Regularly check for wet or spongy soil around your drainfield.
- Have a septic professional check your tanks every 3 years to determine if they need pumping.
- If you have a septic tank filter (effluent filter) clean it on a regular basis (or have a professional do it).
- If a septic alarm goes off, call your septic professional to diagnose the problem.
- Notify the County/City/Township when this management plan is not being met.
- Be aware of and protect your secondary drainfield site.

Professional Tasks

- Disclose the location of the secondary drainfield (if applicable).
- Respond to alarms and diagnose problems as needed.
- Review water use with the owner, check for a "soggy" drainfield.
- Pump the septic tanks as needed and ensure they are in proper working order.
- Verify the pump, dose amount, HI Level Alarm & drainback are all working properly.

"As the owner, I understand it is my responsibility to properly operate and maintain this septic system".

Property Owner Signature: _____ **Date** _____

Table of Contents

July 2023 Specifications:

Mille Lacs Project

BE17-L02 HPS Scattered Tribal Procurement

Indian Health Service Bemidji Area

SECTION 01100
SUMMARY OF WORK

PART 1 - GENERAL

1.01 SUMMARY

A. The work to be performed under this contract shall consist of furnishing the following to perform the work outlined in these specifications and as indicated by Project Drawings:

1. tools
2. equipment
3. materials
4. labor
5. supplies
6. manufactured articles
7. all transportation to complete the work
8. temporary facilities

B. Location of Work: Steven Pewaush, 19500 South Whitefish Dr., Onamia, Minnesota, for the Mille Lacs Band of Ojibwe

C. Incidentals Items: All work, materials, and services not expressly listed as being provided by others or not expressly called for in the contract but are necessary for the completion of the work in good faith, shall be furnished, installed, and performed by the contractor.

1.02 SUMMARY OF WORK TO BE DONE BY CONTRACTOR

A. Individual Wastewater Facilities

1. Install Holding Tank System.
2. Install per design, drawing and specifications.
3. Acquire ISTS Permit.

1.03 ADDITIONAL INFORMATION

A. For information regarding the technical aspects of the project, contact the Engineer:

Joseph Dalrymple
Indian Health Service
705 5th Street NW, Suite E
Bemidji, MN 56601
Telephone: (218)-444-0520

Email: joseph.dalrymple@ihs.gov

B. For information regarding contracting information, contact the Owner's Representative for this project:

Brian Scheinost
Public Works Administrator
Mille Lacs Public Works
43408 Oodena Drive
Onamia, MN 56359
Telephone: (320) 532-7437
Email: brian.scheinost@millelacsband.com

C. Comply with all Tribal regulations related to the completion of the work including the acquisition of necessary permits and the payment of Tribal taxes. No work is allowed to occur at the site of construction without a tribal monitor present. The contractor must schedule to have a tribal monitor present with the THPO:

Mike Wilson
Tribal Historic Preservation Officer
43408 Oodena Drive
Onamia, MN 56359
Telephone: (320) 532-4181 x7535
Email: michael.wilson@millelacsband.com

1.04 WARRANTY

A. Provide a minimum one (1) year warranty for all materials and labor, covering defects in the materials or deficiencies resulting from Contractor installation and materials.

1.05 ADDITIONAL REQUIREMENTS

A. Contractor shall be licensed and insured.

END OF SECTION

SECTION 01270
PRICE AND PAYMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Work covered by this section includes method of measurement and basis of payment for all divisions included.

B. Payment for the various items of the Bid Schedules, as further specified herein, shall include all compensation to be received by the Contractor for furnishing all tools, equipment, materials, labor, supplies, manufactured articles, transportation, and temporary facilities required to complete the work in accordance with contract documents including incidentals.

C. Respective prices and payment shall constitute full compensation for all work completed including incidentals.

D. All items not expressly listed as being provided by others that are necessary for the completion of work shall be furnished and installed by the Contractor.

E. No payment shall be made for mobilization and demobilization of equipment.

1.02 ESTIMATED QUANTITIES

A. All quantities stipulated in the bid schedule or other contract documents are approximate and are to be used: (1) as a basis for estimating the probable cost of the work and (2) for the purpose of comparing the bids submitted.

B. The Contractor shall be paid for actual quantities installed based on the quantities measured in the field. The actual amounts of work completed and materials furnished may differ from estimated quantities. The Contractor shall make no claim for damages, anticipated profits, or otherwise, on account of differences between the estimated amounts and the actual amount of work performed and materials furnished.

1.03 SURVEY AND MEASUREMENTS

A. All quantity measurements shall be the responsibility of the Contractor and will be verified by the Engineer.

B. All measurements and subsequent payments will be based on completed and accepted work performed in strict accordance with the drawings, specifications, and other contract documents.

PART 2 – BID SCHEDULE ITEMS

2.01 GENERAL

A. Payment shall be full compensation to complete the work items in good faith, including incidental work.

B. In addition to those things listed under each item, the unit price bid shall be full compensation for all of the following:

1. General requirements in Division 01, but not limited to the following.

    a. Submittals
    b. Record drawings

2. Specific requirements in Division 02, including but not limited to the following (unless otherwise expressly defined as a line item in the bid schedule):

    a. Erosion control
    b. Clearing and grubbing
    c. Removal and replacement of obstructions
    d. Associated trenching, excavation and backfill including the removal of any nuisance water, bedding, haunching, and compaction.
    e. Disposal of any excess material
    f. Traffic control
    g. Rough grading
    h. Finish work, where called for, including finish grading, topsoiling, and landscaping

2.02 BID ITEMS

1. Mobilization/demobilization

    a. Measurement: By the hour. To be paid once per project site as one round trip to move heavy construction equipment to/from site. Measured as the average time to travel from construction office to project work site and return to the construction office. Not to include all incidental travel to and from site as work progresses or to reimburse contractor for additional trips as needed to work site.

    b. Basis of Payment: Includes all equipment and costs associated with travel to set up at new work site.

2. 4-inch Schedule 40 PVC Gravity Pipe

a. Measurement: By linear feet of pipe installed measured horizontally over the centerline of the pipe.

b. Basis of Payment: Includes pipe, fittings, connections, and all other appurtenances required to complete the work as specified.

3. 2-inch Schedule 40 PVC Force Main

a. Measurement: By linear feet of pipe installed measured horizontally over the centerline of the pipe.

b. Basis of Payment: Includes pipe, fittings, connections, and all other appurtenances required to complete the work as specified.

4. 1.5-inch Schedule 40 PVC Perforated Lateral

a. Measurement: By linear feet of pipe installed measured horizontally over the centerline of the pipe.

b. Basis of Payment: Includes pipe, fittings, perforations, connections, and all other appurtenances required to complete the work as specified.

5. Two-Way Cleanout

a. Measurement: By each two-way cleanout installed.

b. Basis of Payment: Includes two-way cleanout, fittings, covers, connections, and all other appurtenances required to complete the work as specified.

6. 1,500-Gallon Concrete Tank

a. Measurement: By each tank installed.

b. Basis of Payment: Includes tank, lids, one 6-inch riser, safety screen, fittings, connections, insulation, and all other appurtenances required to complete the work as specified.

7. Risers

a. Measurement: By the vertical feet of riser installed.

b. Basis of Payment: Includes riser, grout, cover, chain, lock, insulation on underside of riser cover, and all other appurtenances required to complete the work as specified.

8. Piggyback Pump Connection Post

    a. Measurement: By each pump connection post installed.

    b. Basis of Payment: Includes post, alarm system, control float switches, electrical wiring, tank wiring, conduit, and all other appurtenances required to complete the work as specified.

9. Effluent Filter and Alarm

    a. Measurement: By each filter and alarm installed.

    b. Basis of Payment: Includes effluent filter, alarm, control panel, wiring, conduit, and all other appurtenances required to complete the work as specified.

10. Electrical Cable Trench

    a. Measurement: By linear feet of trenching measured horizontally over the centerline of the trench from the control panel to the home.

    b. Basis of Payment: Includes pump cable with ground, alarm cable, float cable, splices, conduit, breaker, connection to the house, and all other appurtenances and trench work required to complete the work as specified.

11. 1/3 HP Effluent Pump

    a. Measurement: By each pump installed.

    b. Basis of Payment: Includes pump, in tank piping, fittings, support block, wiring, connections, pull chains, and all other appurtenances required to complete the work as specified.

12. Mound

    a. Measurement: Lump Sum

    b. Basis of Payment: Installed in accordance with county design

13. Mound Incidentals:

    a. Measurement: Lump sum per mound.

    b. Basis for Payment: All other mound specific incidental items not covered in the other pay line items or in excess of the general specific requirements in Section 2.01 Part B Sub-part 2 including the plowing

of the original topsoil, removing excessive vegetation, clean outs, observation pipes, and all other appurtenances required to complete the work as specified.

14. ISTS Permit

    a. Measurement: Permit obtained

PART 3 – EXECUTION (N/A)

END OF SECTION

SECTION 01300
ADMINISTRATIVE REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the administrative notes and requirements for this contract.

1.02 For all contracts:

A. The Indian Health Service (IHS) is the engineer for this project; however, this is not a federal contract. IHS reserves the right to inspect the work performed by the Contractor or any of its Subcontractors. IHS does not represent the Tribe and the Tribe does not represent IHS regarding any matter related to administration of this Contract.

B. IHS Indian preference requirements apply to the solicitation and award of this contract. If the tribe has enacted an Indian preference ordinance, it may apply in lieu of the IHS requirements.

C. SUSPENSION AND TERMINATION OF WORK

1. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than 90 consecutive days by written notice to Contractor and Engineer. Such notice will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be entitled to an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension. Any change proposal seeking such adjustments shall be submitted no later than 30 days after the date fixed for resumption of Work.

2. If the Contractor fails to perform the work in accordance with the Contract Documents, Owner may declare the Contractor to be in default and give Contractor notice that the Contract is terminated. The termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue, or any rights or remedies of Owner against Contractor.

3. Upon seven days written notice to Contractor and Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, terminate the Contract. In such case, Contractor shall be paid for completed and acceptable work executed in accordance with the Contract Documents prior to the effective date of termination. Contractor shall not be paid on account of loss of anticipated overhead, profits, or revenue, or other economic loss arising out of or resulting from such termination.

D. Contractor shall comply with 41 CFR 60-1.4(b) in accordance with Executive Order 11246, “Equal Employment Opportunity,” as amended by Executive Order 11375, “Amending Executive Order 11246 Relating to Equal Employment Opportunity.

E. Debarment and Suspension (Executive Orders 12549 and 12689)—A contract award (see 2 CFR 180.220) must not be made to parties listed on the government-wide exclusions in the System for Award Management (SAM), in accordance with the OMB guidelines at 2 CFR part 180 that implement Executive Orders 12549 (3 CFR part 1986 Comp., p. 189) and 12689 (3 CFR part 1989 Comp., p. 235), “Debarment and Suspension.” SAM Exclusions contains the names of parties debarred, suspended, or otherwise excluded by agencies, as well as parties declared ineligible under statutory or regulatory authority other than Executive Order 12549.

F. Contractor is required to perform thirty-three and one-third percent of the total amount of the Work using its own employees and equipment. Copies of subcontract agreements may be requested to verify the amount of Work performed.

1.03 For Contracts Exceeding $2,000:

A. The Contractor shall comply with wage and provisions of the Davis-Bacon Act (40 U.S.C. 3141-3148) as supplemented by Department of Labor regulations (29 CFR part 5). In accordance with the statute, Contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor.

B. The Contractor shall comply with the Copeland “Anti-Kickback” Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR part 3). The Act provides that each Contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled.

1.04 For Contracts Exceeding $10,000:

A. Contractor shall comply with the requirements of 41 CFR 60-4 regarding required notices and procedures to be followed in soliciting for federally assisted construction contracts (including subcontracts). Compliance with Executive Order 11246 and 41 CFR part 60-4 shall be based on implementation of the Equal Opportunity Clause, specific affirmative active obligations required by the Standard Federal Equal Employment Opportunity Construction Contract Specifications, as set forth in 41 CFR Part 60-4.3(a) and efforts to meet the goals established for the geographical area where the Contract is to be performed.

1.05 For Contracts Exceeding $100,000:

A. The Contractor shall comply with the provisions of the Work Hours and Safety Standards Act (40 U.S.C. 3701-3708). Under 40 U.S.C. 3702 of the Act, each Contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous.

B. The Contractor shall comply with the provisions of the Byrd Anti-Lobbying Amendment (31 U.S.C. 1352), certifying that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award.

END OF SECTION

SECTION 01310
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes the preconstruction conference, construction scheduling and coordination requirements.

1.02 PRE-CONSTRUCTION CONFERENCE

A. Required after award of contract and prior to start of construction.

B. Representatives from the following shall attend.

1. Prime Contractor
2. Subcontractors
3. Engineer and Technical Representative
4. Owner/Owner's Representative

C. Owner will arrange a date that is mutually acceptable to all parties planning to attend.

D. Contractor shall notify subcontractors of time and date of meeting.

1.03 CONSTRUCTION SCHEDULE

A. Present Owner with a written preliminary construction schedule containing start and completion dates of the major items at the preconstruction meeting.

B. Notify the Owner seven (7) days in advance of any construction.

C. Communicate major changes to the schedule to the Owner in writing.

1.04 WORKING HOURS/DAYS

A. Except as required for safety purposes, all work shall be performed during regularly scheduled working hours. The Contractor shall not work on Saturday, Sunday, or a Federal holiday without the Owner's consent.

1.05 COORDINATION WITH OTHER CONTRACTORS/UTILITIES

A. Coordinate work with other contractors (i.e. roads, building, etc) in the area as necessary to complete the work specified.

B. Coordinate work with local utilities (i.e. water and sewer, power, telephone). Note: all buried utilities may not be shown on the plans. Contractor's responsibility for having utilities marked prior to construction.

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURE

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes information on submittal procedures. Materials requiring submittal are listed in the appropriate specification section.

1.02 SUBMITTAL PROCEDURES

A. Submit copies of submittals to the Owner, unless requested otherwise.

1. Contractor's option:
    i. Two (2) hard copies.
    ii. An electronic copy in pdf format delivered to Owner via email or other means as approved by the Engineer.

B. Identify each cut sheet or shop drawing with the following information:

1. Contract number.
2. Supplier.
3. Specification section to which the submittal pertains.

C. Submit the following information, as applicable:

1. Manufacturer's cut sheets indicating compliance with references (e.g. applicable ASTM, AWWA standards).
2. Laboratory results, as applicable.
3. Dimensional drawings or shop drawings, as applicable.
4. Other information necessary for the Engineer to determine compliance with the specifications.
5. Clearly identify brand, manufacturer, model number, sizes, and all other information on each cut sheet to identify the exact product being submitted for approval.

D. Identify variations from the contract documents and product or system limitations that may be detrimental to successful performance of the completed work.

E. Revise and resubmit submittals as required and identify all changes made since previous submittal.

F. Distribute copies of reviewed submittals to concerned parties, (i.e. suppliers, sub-contractors).

G. Submit written communication of any inability to comply with the Owner's comments.

H. Submit information to the Owner at least three weeks in advance of the work to be performed.

I. Approval of submittals must be provided by the Owner prior to installation of materials.

END OF SECTION

SECTION 01430
QUALITY ASSURANCE

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes prerequisites and procedures to assure the quality of construction.

1.02 SUBMITTALS

A. Contractor Name and License Number

1.03 INSTALLER QUALIFICATIONS

A. Work shall be performed under the direction of personnel licensed in the state/reservation where the project is proposed and where licensing of the trade is regulated by the state/reservation including, but not limited to, plumbing, well drilling, septic system installation, HVAC, and electrical work.

1.04 CONTROL OF INSTALLATION

A. Review materials for acceptability when delivered to the site.

B. Store and handle materials to prevent damage.

C. Review materials, services, and workmanship to ensure that work is performed in accordance with the specifications.

D. Comply fully with manufacturers' instructions.

E. Should manufacturers' instructions conflict with contract documents, request clarification from Engineer before proceeding.

F. Correct defective work to the satisfaction of the Owner.

1.05 MANUFACTURER'S FIELD SERVICES

A. Provide reports on observations and documentation of workmanship to the Owner within 30 days of visit for review where manufacturers' field services are provided.

1.06 WARRANTY

A. Provide a minimum one (1) year warranty for all materials and labor, covering defects in the materials or deficiencies resulting from contractor installation.

B. Provide additional warranties as required under other sections.

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 SUMMARY

A. The work covered by this section includes all temporary facilities and controls needed to complete work under the Contract in a manner that protects public safety and worker safety, that preserves both public and private property and that appropriately involves local governments, emergency and law enforcement.

1.02 RELATED WORK

A. Section 02315 – Excavation, Trenching and Backfill

1.03 REFERENCES

A. Manual on Uniform Traffic Control Devices

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 GENERAL

1. Provide temporary facilities and controls that are necessary to carry out the requirements of the Contract in a manner

    1. That protects public safety and worker safety
    2. That preserves both private and public property
    3. That communicates and cooperates with local authorities and governments.

3.02 TEMPORARY SANITARY FACILITIES

A. Provide and maintain a chemical toilet approved by the State Department of Health (MN) for the use of all workers of all trades.

B. Place temporary facilities in an inconspicuous place and keep clean.

C. Remove temporary sanitary facilities after completion of the project.

3.03 BARRICADES & WARNING DEVICES

A. Notify local police, fire departments and other emergency programs of any proposed barricading or detouring.

B. Erect and maintain barricades, guardrails, lights and signs as necessary for public convenience and safety.

C. Ensure that barricades remain in place during critical hours.

D. Comply with "Occupational Safety and Health Act" and local safety requirements, as they apply.

3.04 TRAFFIC CONTROL

A. Conduct all traffic control operations in accordance with the latest issues of the "Manual On Uniform Traffic Control Devices" (MUTCD).

B. Coordinate and obtain approval for all traffic control from local law enforcement.

C. Signs, Signals and Devices

1. Place warning signs in the region of the work.
2. Warn of types of conditions that may be encountered.
    a. Muddy Roads
    b. Slippery Roads
    c. Flagman
    d. Detour
    e. Slow Moving Traffic
    f. Trucks Entering Roadway
3. Traffic Control Signals: Meet the needs of the local government authority.
4. Traffic Cones and Drums, Flares and Lights:
    a. Meet the needs of the local jurisdictions.
    b. Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.
    c. Ensure that flares, lights, etc. remain in position throughout the night.
5. Flagman:
    a. Meet the needs of the local jurisdictions.
    b. Provide trained and equipped flagmen to regulate traffic when construction operations or traffic encroach on public traffic lanes.

C. Haul Routes:

1. Consult with authority having jurisdiction in establishing public thoroughfares to be used for haul routes and site access.
2. Confine construction traffic to designated haul routes.
3. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

D. Removal of Traffic Control:

1. Remove equipment and devices when no longer required.
2. Repair damage caused by installation.

3.05 ACCESS ROADS

A. Construct and maintain temporary roads accessing public thoroughfares to serve construction area.

B. Provide detours necessary for unimpeded traffic flow.

C. Provide and maintain access to fire hydrants, free of obstructions.

D. Permanent access roads and parking areas, if applicable, will be covered in Division 2, Site Work.

3.06 PARKING

A. If the site is large enough, the Contractor may park their own and employees' vehicles on the site without charge after obtaining permission from the Owner.

B. If the site is not large enough, the Contractor shall make parking arrangements.

C. Prevent interference with the flow of local traffic.

D. Prevent interference with emergency vehicle functions.

3.07 ROAD SURFACE MAINTENANCE

A. Remove mud and excavated spoils from the affected roadway at the end of each workday in order to preserve the roadways and maintain safe driving conditions.

B. Contractor is responsible for any costs associated with repairing the roadways that are damaged due to construction equipment.

3.08 WATER CONTROL

A. Grade site to drain.

B. Protect site from puddling or running water.

C. Provide water barriers as required to protect site from soil erosion.

3.09 DUST CONTROL

A. Use measures to minimize dust caused by the project.

B. Avoid dust-creating activities during dry, windy conditions.

3.10 SECURITY

A. The Owner will **not** be responsible for security on the site of work.

B. Each Contractor will be held responsible for loss or injury to persons or property where their work is involved.

C. Provide (if deemed necessary) such watchmen and take such other precautionary measures as deemed necessary to protect facilities during the contract period.

3.11 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.

B. Remove waste materials, debris, and rubbish from site weekly and dispose off-site.

3.12 REMOVAL OF UTILITIES, FACILITIES & CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities, materials, prior to inspection.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition.

3.13 TEMPORARY FIRST AID FACILITIES

A. Provide temporary first aid facilities for employees in sufficient quantity for the number of workers.

3.14 TEMPORARY FIRE PROTECTION

A. Post fire department telephone numbers at the jobsite.

B. Keep fire extinguishers on the job that are appropriate for the type of work being performed.

3.15 TEMPORARY PROJECT SIGNAGE

A. Construct project signage to the specifications as shown in template.

END OF SECTION

SECTION 01770
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes information on closeout procedures and final cleaning.

1.02 RELATED WORK

A. Section 01780 – Closeout Submittals

1.03 CLOSEOUT PROCEDURES

A. Submit written certification that work is complete in accordance with contract documents and ready for final inspection at least three (3) working days prior to final inspection.

B. Provide warranties and record documents (e.g. as-built drawings) to the Owner that are required within ten (10) days after date of first beneficial use. Refer to Section 01780.

1.04 FINAL CLEANING

A. Complete final clean-up prior to final inspection.

B. Remove waste and surplus materials, rubbish, and construction facilities from the site.

1.05 FINAL INSPECTION

A. A final inspection of the facilities shall be conducted in the presence of the Owner, the Engineer, and the Contractor, at a minimum.

B. Final inspection shall include inspection of all facilities installed under the project.

1.06 PUNCH LIST

A. Any deficiencies noted at the Final Inspection will be communicated to the Contractor through a letter from the Engineer.

B. All deficiencies will need to be completed before full payment is made.

C. Retainage for punch list items shall be based on the estimated cost to retain another contractor to finish the deficient work items.

END OF SECTION

SECTION 01780
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.01 SUMMARY

A. This section describes the requirements for closeout submittals including, record drawings, warranty information and general operation and maintenance information.

1.02 RELATED WORK

A. Section 01430 – Quality Assurance
B. Section 01770 – Closeout Procedures

1.03 DELIVERY

A. Provide all closeout submittals meeting these requirements and any specific requirements of each section.

B. Closeout submittals must be received before payment is requested for the work that the drawings describe or illustrate.

C. All closeout submittals must be received in a correct and complete manner before final payment can be made. If material is deficient, the deficiencies will be indicated in punch lists (Section 01770).

1.04 DEFINITIONS

A. Record Drawing: A drawing showing the actual installation of facilities, showing changes from the plans, and showing detail enough that future persons can readily locate all objects.

B. Ties: Measurements from permanent easily located objects to an installed object.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 RECORD DRAWINGS

A. Provide record data in one of the following manners:

1. On a set of project drawings, neatly draw tie measurements and changes.

2. On separate 8½ X 11 sheets (see 01780D – Closeout Submittal Drawings), neatly draw site sketches, structure sketches, etc., indicating the necessary information.

B. Provide three (3) swing tie measurements to all buried utility objects that may need to be located in the future, including, but not limited to:

1. Gate valves
2. Corporation stops
3. Curb stops
4. Water main fittings
5. Couplings to existing water systems.
6. Cleanouts
7. Sewer wyes.
8. Utility crossings.
9. Septic tank manholes and access covers.
10. Corners of drainfields
11. Tracer Wire Boxes

C. Provide offset measurements for buried utilities (e.g. water main) installed parallel to roads.

D. Provide revised elevation data for all items that have elevations shown on the plan drawings, including, but not limited to, the following:

1. Manhole inverts (inlet and outlet)
2. Manhole rims
3. Lift station invert
4. Lift station top
5. Lift station pipe penetrations
6. Float elevations
7. Septic tank elevations
8. Elevations of pipe entering and leaving structures
9. Elevation of sewer service line stub (if terminated at right of way)
10. Other elevations indicated on profiles.

E. Provide installed bid schedule items quantities for individual facilities on 8½ X 11 sheets.

1. Engineer may supply standard forms for use by the Contractor.

3.02 WARRANTIES

A. Submit all warranty information regarding the materials installed.

B. Minimum warranty information is listed in Section 01430.

3.03 OPERATION AND MAINTENANCE INFORMATION

A. Submit all operation and maintenance information as included in the packaging from the manufacturer regarding the materials installed.

END OF SECTION

SECTION 01781
SITE INSPECTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. This section describes the requirements for inspection and documentation of the services installed at the sites.

1.02 RELATED WORK

A. Section 02500-series – Water and Sewer Construction Specifications

1.03 REFERENCES

A. Minnesota State Rules Chapter 7080 - Minnesota Pollution Control Agency Design Standards for Individual Subsurface Sewage Treatment Systems

B. Minnesota State Rules Chapter 4725 – Department of Health Wells and Borings

1.04 SUBMITTALS

A. “MPCA Compliance Inspection Form” – https://www.pca.state.mn.us/sites/default/files/wq-wwists4-31b.docx

B. Site Drawing

1.05 QUALITY ASSURANCE

A. All inspections must be performed and signed by a licensed ISTS Inspector in accordance with Minnesota State Rules Chapter 7080 and applicable local statutes.

B. All inspections should be documented on the latest forms available from the University of Minnesota Onsite Sewage Treatment Program. Designs submitted using forms which are not the latest revision will not be accepted.

C. All inspections must be done by a third-party. Inspections by the owner or the installer will not be accepted.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 SITE EVALUATION

A. Coordinate with Tribal Public Works to receive a list of home sites which need inspection services and the design specifications for each site.

B. Coordinate with property owner and Tribal Public Works department to gather information necessary to complete the Inspection Forms and arrange opportunity to review each site.

C. Inspection of water service lines, sewer service lines, wells, and individual sewer treatment system all require submittal of a site drawing.

D. Inspection of an individual sewer treatment system requires submittal of the MPCA Compliance Inspection Form. Verification methods used in the inspection must be noted on the forms.

E. Soil separation compliance shall be performed by conducting new, independent soil observations.

3.01 SITE DRAWINGS

A. Provide site drawing on the attached form.

B. One drawing per sheet is adequate, unless the services installed render the drawing too complicated to be legible. In that case, additional pages will be accepted.

C. All drawings should be neatly drawn.

1. On a set of project drawings, neatly draw tie measurements and changes.
2. On separate 8½ X 11 sheets, neatly draw site sketches, structure sketches, etc., indicating the necessary information.

D. Provide three (3) swing tie measurements to all visible components of the system and inspection, including:

1. Well heads
2. Cleanouts
3. Septic tank manholes and access covers.
4. Inspection pipes
5. Structure corners
6. Soil borings

END OF SECTION

SECTION 02230
CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers clearing and grubbing within the proposed areas of construction.

1.02 RELATED WORK (as applicable)

A. Section 02315 - Excavation, Trenching, and Backfill

PART 2 – PRODUCTS (N/A)

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

A. Obtain necessary permit from Owner prior to cutting any trees or brush (if applicable.)

B. Remove and dispose of all trees, stumps, brush, debris, and all other obstructions as needed to complete construction as specified.

C. If possible within right-of-way and property lines, extend clearing and grubbing a minimum of 10 feet beyond all proposed structures unless otherwise directed by the Engineer.

D. The Contractor shall not burn, bury, and/or leave materials in construction areas unless approved by the Tribe

END OF SECTION

SECTION 02310
GRADING

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes rough and finished site grading of all areas disturbed during construction.

1.02 RELATED WORK

A. Section 02315 – Excavation, Trenching and Backfill
B. Section 02370 – Temporary Erosion and Sediment Control
C. Section 02920 – Topsoiling, Seeding, Fertilizing and Mulching

PART 2 – PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 ROUGH GRADING

A. Grade the area in the vicinity of the excavation to prevent surface water from flowing into the excavation.

B. Maintain existing drainage.

3.02 FINISH GRADING

A. Grade site to true grades as specified on the plans after all structures and piping have been installed. Allow for settling.

B. Grade sites for effective drainage away from structures.

C. Dress and trim all slopes.

END OF SECTION

SECTION 02315
EXCAVATION, TRENCHING, AND BACKFILL

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes excavation, trenching and backfill necessary for the construction of the facilities as indicated on the plans including, but not limited to: water mains and service lines, sewer mains and service lines, concrete manholes, septic tanks, and other structures.

1.02 RELATED WORK (as applicable)

A. Section 01780 – Closeout Submittals
B. Section 02310 – Grading
C. Section 02370 – Temporary Erosion And Sediment Control
D. Section 02511 – Water Service Lines
E. Section 02920 – Topsoiling, Seeding, Fertilization and Mulching

1.03 REFERENCES

A. Manual on Uniform Traffic Control Devices.

B. ASTM D698 – Test Methods for Moisture Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb. Rammer and 12-in. Drop [Standard Proctor Test].

C. ASTM D2321 – Underground installation of Flexible Thermoplastic Sewer Pipe.

D. ASTM D2487 – Classification of Soils for Engineering Purposes [Unified Soil Classification System].

E. OSHA – Occupational Safety and Health Standards 1910 and 1926.

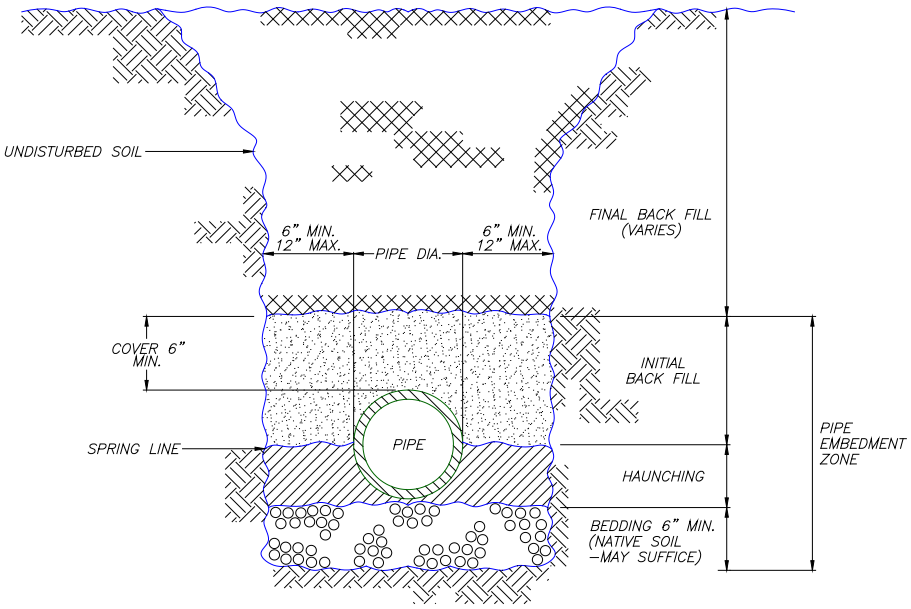
1.04 SUBMITTALS

A. Polystyrene Insulation

B. Polyethylene Encasement (as applicable)

1.05 DEFINITIONS

A. Bedding, Haunching and Initial Backfill zones as defined herein and on the standard pipe trench detailed drawing below:



PIPE TRENCH DETAIL

B. Soil Materials as summarized in the table below and defined in ASTM D2321 and ASTM D2487

Description and Comparison of Soil Material Classifications

ASTM D2321		*ASTM D2487*	
Class	*Type*	*USCS Group Symbol*	*Description*
IA	Manufactured aggregates: ¼ to 1 ½ inch open graded, clean.	* *None*	Closest to "Poorly graded gravel (GP)"
IB	Manufactured aggregates: ¼ to 1 ½ inch dense graded, clean.	* *None*	Closest to "Poorly graded gravel with sand (GP)"
II	Coarse sands and gravels with maximum particle size of 1 ½ inch, clean.	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.
		GP	Poorly graded gravels and gravel sand mixtures; little or no fines.
		SW	Well-graded sands and gravelly sands; little or no fines.
		SP	Poorly graded sands and gravelly sands; little or no fines
	Coarse sands and gravels with maximum particle size of 1 ½ inch, borderline clean.	GW-GC SP-SM Etc.	Sands and gravels which are borderline between clean and with fines
III	Fine sand and clayey gravels.	GM	Silty gravels, gravel-sand-silt mixtures.
		GC	Clayey gravels, gravel-sand-clay mixtures
		SM	Silty sands, sand-silt mixtures

		SC	Clayey sands, sand-clay mixtures
IV	Fine grained soils (inorganic)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, silts with slight plasticity.
		CL	Inorganic clays of low to medium plasticity, gravely clays, sandy clays, silty clays, lean clays.
		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
V	Organic soils	OL	Organic silts and organic silty clays of low plasticity.
		OH	Organic clays of medium to high plasticity, organic silts.
		PT	Peat and other high organic soils.

* USCS system is limited to naturally occurring soils. Manufactured aggregates not covered.

PART 2 – PRODUCTS

2.01 BEDDING, HAUNCHING AND INITIAL BACKFILL MATERIAL

A. Class I, Class II or Class III, utilized in accordance with restrictions described in Part 3 - Execution.

2.02 INSULATION

A. Rigid extruded polystyrene insulation board, having a minimum compressive strength of 25 psi.

B. Width:

1. 4-foot for mains 6-inch (nominal diameter) and larger.
2. 2-foot for mains and service lines less than 6-inches (nominal diameter).

C. Thickness: As stipulated on the bid schedule.

2.03 POLYETHYLENE ENCASEMENT

D. Minimum 8 mils thickness.

PART 3 - EXECUTION

3.01 GENERAL

A. Trenching and excavation work shall be done in accordance with proper emphasis on safety as determined by the Contractor to conform to recommended safety standards such as OSHA 1910 and 1926.

B. Obtain all permits from appropriate road agency for construction within road right of way.

C. Repair damage resulting from settlement, slides, cave-ins, water pressure, and other causes.

D. Provide adequate signs, barricades, fences and amber lights and take all necessary precautions to protect the work and the safety of the public in all construction areas.

1. Placement of construction signs and barricades shall conform to the “Manual on Uniform Traffic Control Devices.”

2. Protect barricades and obstructions at night by amber signal lights that burn from sunset to sunrise. Barricades shall also be of substantial construction, painted white or with reflective paint to increase their visibility at night.

3. Perform work without obstruction to traffic or inconvenience to the general public and the residents in the vicinity of the work.

E. Road Crossing

1. Comply with all construction and material requirements of roadway authorities having jurisdiction.

2. Maintain one lane of traffic open at all times.

3. Refer to Section 02705 – Road Restoration for backfill and restoration requirements.

3.02 EXCAVATION

A. Remove trees and stumps from excavation and site.

B. Remove and stockpile existing topsoil.

C. Install facilities as staked unless otherwise approved by Engineer.

D. Maintain surface drainage away from trenching or excavation.

E. Remove unsuitable foundation materials from excavation as shown on the plans or as authorized by the Engineer.

F. Maintain a minimum 1-foot clearance between outer surface of structure being installed and wall of excavation.

G. Rock encountered shall be excavated

3.03 TRENCHING

A. Bottom width: No less than 12 inches or more than 36 inches wider than the outside diameter of the pipe.

B. Depth: Provide minimum cover as specified, or depths shown on plans.

3.04 BEDDING

A. If existing soil cannot provide uniform, stable bearing support, over-excavate 6 inches below bottom of pipe or structure and provide bedding material.

B. Utilize Class I, II or III materials as appropriate for bedding as listed in Table below.

Use of Soils and Aggregate for Bedding

	Class IA	*Class IB*	*Class II*	*Class III*
General	Excellent pipe support. Excellent drainage.	Excellent pipe support. Good drainage. Minimizes migration of adjacent material.	Good pipe support. Fair drainage.	Reasonable pipe support. Poor drainage
Compaction	Not required	Not required	Required 90% of Standard Proctor.	Required 90% of Standard Proctor.
Wet Conditions (below current or future water table). Rock Cuts	Acceptable. Must use same material for Haunching.	Acceptable. Must use same material for Haunching.	Acceptable. Clean groups only suitable for drainage blanket.	Not- Acceptable
Dry Conditions	Acceptable	Acceptable	Acceptable	Acceptable

3.05 HAUNCHING AND INITIAL BACKFILL

A. General

1. Provide complete and uniform bearing and support for the pipe, including allowance for bell holes, or structure.

2. Work material under and around the pipe to ensure full pipe support.

3. Prevent movement of the pipe during placement of material.

4. Avoid contact between the pipe and mechanical compaction equipment.

B. Utilize Class I, II or III materials as appropriate for haunching and initial backfill as listed in Table below. No frozen materials or frozen clods.

Use of Soils and Aggregate for Haunching and Initial Backfill

	Class IA	*Class IB*	*Class II*	*Class III*
General	Excellent pipe support. Excellent drainage. Install to a minimum of 6" above the pipe crown.	Excellent pipe support. Good drainage. Minimizes migration of adjacent material. Install to a minimum of 6" above the pipe crown.	Good pipe support. Fair drainage. Install and compact to a minimum of 6" above the pipe crown.	Reasonable pipe support. Poor drainage. Install and compact to a minimum of 6" above the pipe crown.
Compaction	Not required	Not required	Required 85% of Standard Proctor. 6 inch maximum lifts.	Required 90% of Standard Proctor. 6 inch maximum lifts.
Wet Conditions (below current or future water table). Rock Cuts	Acceptable. Must use same material for Bedding. Extend Haunching to the top crown of the pipe.	Acceptable. Must use same material for Bedding. Extend Haunching to the top crown of the pipe.	Acceptable. Clean groups only suitable for drainage.	Not- Acceptable
Dry Conditions	Acceptable	Acceptable	Acceptable	Acceptable

3.06 FINAL BACKFILL

A. Backfill remainder of excavation with native material, free from large clods, large stones, organic material or frost chunks unless otherwise specified below.

B. Backfill within roadways, driveways, and shoulders.

1. Conform to Section 02705 – Road Restoration for backfill requirements under roadways, driveways, and shoulders.

C. Backfill around structures.

1. Backfill and compact around manholes, valve boxes, and other appurtenances in 12-inch lifts.

a. Compact with a mechanical tamper to a density not less than 90% of the maximum dry density, determined by ASTM D 698.

b. Compaction around structures in roadways, driveways, and shoulders shall conform to Section 02705.

2. Backfill around septic tanks in 18-inch lifts.

a. Compact in a manner that will not produce undue strain on the tank.

b. Compaction may be accomplished with the use of water, provided the material is thoroughly wetted from the bottom up, and the tank is filled with water to prevent floating.

D. Backfill of trenches and other locations not listed above.

1. Compact in 18-inch lifts to a density not less than the density of the surrounding undisturbed soil.

2. Provide 3 feet minimum of backfill over the pipe before wheel loading the trench.

3. Provide 4 feet minimum cover over the top of the pipe before utilization of hydrohammer compaction equipment.

4. Compact in smaller lifts if the required compaction cannot be obtained.

5. Lifts may be increased at the discretion of the Project Engineer if required compaction can be obtained.

E. Repair any trenches improperly backfilled or where settlement occurs, then refill and compact.

F. Restore surface to the required grade and compaction. Conform to Section 02310 – Grading for rough grading, finish grading and site surface drainage.

G. Remove all surplus backfill materials to a location approved by the Engineer.

3.07 FROST PROTECTION

A. Place insulation in areas where water main, sewer service lines or water service lines cross a road, driveway, traveled path, as indicated on the plans or as directed by the Engineer.

B. Center insulation over the main with no more than 6 inches of compacted fill between the pipe and the insulation. Grade fill so insulation lays flat.

C. Maintain a straight alignment of insulation.

D. Extend insulation a minimum of 5 feet on each side of the crossing.

E. Lap insulation by 6 inches or stagger by 6 inches if composed of two layers.

F. Minimum thickness for the first lift of backfill over the insulation is 8 inches.

1. Do not operate construction equipment directly on insulation. Do not compact first lift with backhoe-mounted compactor, or any other large compaction equipment.

2. Compact remaining backfill using normal construction practices.

3.08 POLYETHYLENE ENCASEMENT

A. All metallic mainline pipe, fittings, and appurtenances installed in aggressive soils shall be wrapped with polyethylene in accordance with ANSI/AWWA C105/A21.5.

B. The wrap shall extend 2-feet beyond all metallic fittings/appurtenances and cover the entire length of metallic pipe. All rips or punctures shall be repaired with tape or by rewrapping that area with polyethylene film.

C. After assembling the pipe joint, the polyethylene shall be overlapped approximately 1-foot and at all joints sealed with approved adhesive tape. Additional taping shall be used at 3-foot intervals along the pipe. All copper service connections shall be wrapped for a distance of 3-feet from the center line of the main. Before installing the polyethylene wrap, the exterior of the pipe shall be free of foreign material.

3.09 REMOVAL OF NUISANCE WATER

A. Remove nuisance water entering the trenches. Nuisance water that can be removed through the use of sump or trash pumps is not considered dewatering.

B. Keep trenches free from water until the facilities are in place, sealed against the entrance of water, and backfill has been placed and compacted above the water level.

3.10 LOCATE EXISTING UTILITIES

A. Field locate all existing underground utilities.

1. Utilize state “dig-safe” or “one-call” hotlines.

2. Contact all other utility owners not covered by the state “dig safe” hotlines.

3.11 UTILITY CONFLICTS

A. Protect existing utilities from damage during excavation and backfilling operations.

B. Provide temporary support for existing water, gas, telephone, power, or other utility services that cross the trench until backfilling of trench is complete

1. Compact backfill to 95% of Standard Proctor Density under disturbed utilities.

2. Repair or replace any damaged existing utilities, at no additional cost to the project.

C. Water and sewer main crossing and parallel installation

1. Maintain a 10 foot horizontal separation (O.D. to O.D.) for parallel mains.

2. Upon approval by the Engineer, water and sewer mains may be installed closer than 10 feet, provided all of the following conditions;

a. Vertical separation is 18 inches (O.D. to O.D.)
b. Water main is above the sewer main.
c. Separate trenches are maintained.

3. Maintain a minimum 18-inch vertical separation (O.D. to O.D.) for crossing mains.

a. Lay pipe with joints equidistant from the point of crossing.

4. If it is impossible to meet any of the above separation distances and deviations, one of the following methods shall be adhered to.

a. Sewer main shall be constructed to water main pressure pipe standards, and successfully pass a 150-psi pressure test prior to backfilling.

b. Either the water main or the sewer main may be encased in a watertight carrier pipe that extends 10 feet on both sides of the crossing. The carrier pipe shall be of materials approved by the regulatory agency for use in water main construction.

D. Water and sewer service crossing and parallel installation.

1. Maintain a 30-inch horizontal separation from water and sewer services.

2. Maintain a 12-inch vertical separation for crossing water and sewer services.

3. Water service line splices or joints will not be permitted within 10 feet of a sewer line crossing.

3.12 MOVING FENCES AND MINOR STRUCTURES

A. Remove and reset culverts, drainage pipes or other minor structures that fall within the alignment of the new construction, to their original location and grade.

B. Visit the project site and determine actual conditions with regard to the existence of old car bodies, abandoned houses, fences, driveways, trees, stumps, brush, sidewalks, approaches, and other miscellaneous obstacles to construction.

1. Unless specifically referenced in a bid item, no separate payment will be made for the removal or replacement of these items.

3.13 RECORDS

A. Conform to as-built requirements in Section 01780 – Closeout Submittals.

END OF SECTION

SECTION 02370
TEMPORARY EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes temporary erosion and siltation control measures accomplished through the use of silt fences, hay bales, erosion mats and other erosion control devices or methods.

1.02 RELATED WORK (as applicable)

A. Section 02310 – Grading
B. Section 02315 – Excavation, Trenching and Backfill
C. Section 02920 – Topsoiling, Seeding, Fertilizing and Mulching

1.03 REFERENCES

A. Minnesota Pollution Control Agency – Best Management Practices Handbook

B. Environmental Protection Agency - 1987 Congressional Amendments, Clean Water Act, Section 402.

1.04 SUBMITTALS

A. Method of Erosion Control
B. Silt Fence and Appurtenances
C. Erosion Mats and Appurtenances
D. Erosion Control Plan (If requested by the Engineer)

1.05 QUALITY ASSURANCE

A. Erosion control materials, methods and practices shall conform to the applicable state agency handbooks of Best Management Practices, or tribal laws established for the purpose of erosion control on construction sites.

B. Obtain and pay for permits and inspections in accordance with the provisions of all local government agencies having jurisdiction. No additional claim for compensation will be allowed because of the Contractor's failure to obtain or pay for such permits and inspections.

PART 2 - PRODUCTS

2.01 SILT FENCING

A. Applicability

1. Heavy Duty: General use during site grading to protect critical areas and bodies of water.
2. Standard: Light-duty applications to protect temporary construction or to supplement the other types of silt fence.
3. Machine-slice: For most applications.

B. Geotextile properties:

Description	Heavy Duty	Standard	Machine Slice
Type	Woven	Woven	Monofilament
Width	48 inches	36 inches	36 inches
Grab Tensile Strength (ASTM D 4632)	100 lb Min	100 lb Min	130 lb Min
Apparent Opening Size (ASTM D 4751)	20-70 Sieve	20-70 Sieve	30-40 Sieve
UV Stability (ASTM D 4355 500 hr)	70% Min	70% Min	70% Min
Top-fastening Component	Overlap around woven wire backing	Sewn-In cord	

* From Minnesota BMP

C. Net Backing

Description	Heavy Duty	Standard	Machine Slice
Material	Woven wire	N/A	N/A
Min. Weight	14-1/2 gauge		
Min. Mesh Opening	2 inches		
Max Mesh Opening	6 inches		
Min. Width	30 inches		
Tensile Strength (ASTM D 4595)	100 lb/ft		
UV Stability (ASTM D 4355 500 hr)	70% Min		

* From Minnesota BMP

D. Post properties:

Description	Heavy Duty	Standard	Machine Slice
Material	Metal	Wood	Metal
Min. Size	1.25 lb/ft	1.5 inch x 1.5 inch	1.25 lb/ft
Min. Length	5 feet	4 feet	5 feet
Min. Embedment	2 feet	1.5 feet	2 feet
Max. Spacing	8 feet	8 feet	6 feet
Type of Post Fasteners	U-shaped clips. No. 16 gauge wire	Gun staples 0.5 inch long	Plastic zip ties (50lb tensile strength)
Min. Fasteners per Post	3	5	3

* From Minnesota BMP

E. All seams shall be heat sealed or sewn

2.02 EROSION BALES

A. Applicability: Can be used in locations where silt fencing is used.

B. Rectangular clean hay bales or straw bale.

C. Posts: Wood or steel, 2” x 2” x 54” minimum.

2.03 EROSION CONTROL MATS

A. Biodegradable or photodegradable erosion control mat equal to American Excelsior Curlex II with a minimum 4-foot mat width.

2.04 OTHER

A. Other materials proposed by the Contractor shall conform to standards published by the applicable state agency handbooks of Best Management Practices (BMP’s).

PART 3 – EXECUTION

3.01 GENERAL

A. Coordinate temporary and permanent erosion control measures to assure economical, effective and continuous erosion control.

B. Keep construction areas small.

C. Divert drainage away from construction areas.

D. Perform construction in and adjacent to rivers, streams, lakes or other waterways in such a manner as to avoid washing, sloughing or deposition of material into waterways which will result in undue or avoidable contamination, pollution or siltation of such waterways.

E. Inspect and maintain erosion control materials to ensure its continued effectiveness.

1. Remove sediment material captured by erosion control systems before systems fails.
2. Inspect and repair erosion control systems within 48 hours of rain event.

F. Remove erosion control only after the area has stabilized and vegetation has developed to the extent that further erosion is unlikely.

G. Submit a plan for erosion control measures that are in compliance with State BMPs and/or Federal EPA requirements, if the area to be disturbed is greater than one (1) acre total.

3.02 TEMPORARY EROSION CONTROL

A. Use temporary erosion control measures to protect ditches and drainage ways as shown on the detailed drawings and as directed by the Engineer.

B. Silt fencing (in lieu of or in combination with erosion bales)

1. Install silt fence in accordance with manufacturer's recommendations.
2. Construct the silt fence as shown on the plans and/or install on the contour of the slope.
3. Place silt fences in an arc or horseshoe shape with the ends pointing up towards the slope.
4. Maximum drainage area = ¼ acre per 100 feet of fence
5. Installation limitations:

Slope Steepness	Maximum Slope Length
2:1 (50%)	15 feet
3:1 (33%)	15 feet
4:1 (25%)	15 feet
5:1 (20%)	25 feet
10:1 (10%)	50 feet
20:1 (5%)	75 feet

6. Compact the soil immediately next to the silt fence fabric.
7. Clean silt fence when sediment reaches 1/3 height of the silt fence.

C. Erosion Bales

1. Install hay bales as shown on the plans and/or install on the contour of the slope.
2. Installation limitations:

Slope Steepness	Maximum Slope Length
2:1 (50%)	15 feet
3:1 (33%)	15 feet
4:1 (25%)	15 feet
5:1 (20%)	25 feet
10:1 (10%)	50 feet
20:1 (5%)	75 feet

3. Install hay bales in 4-inch deep trench.
4. Place bales at right angles to the direction of flow.
5. Securely anchor each bale with stakes as shown on the plans.
6. Compact soil on the upslope side of the hay bales.
7. Fill gaps between bales with straw.

8. Clean sediment away from bale when sediment reaches 1/2 height of the hay bale.
9. Replace damaged, destroyed or rotted bales immediately.
10. Bales may be used for mulching material if they meet the specifications of Section 02920.

D. Erosion Control Mats

1. Where indicated on the plans, by the Project Engineer, or on slopes greater than 5%, use a wood fiber mat in lieu of mulch.
2. Install in accordance with manufacturer's recommendations
3. Roll matting strips in the direction of the flow.
4. Spread mat evenly, smoothly, and in a natural position without stretching and with all parts touching the soil.

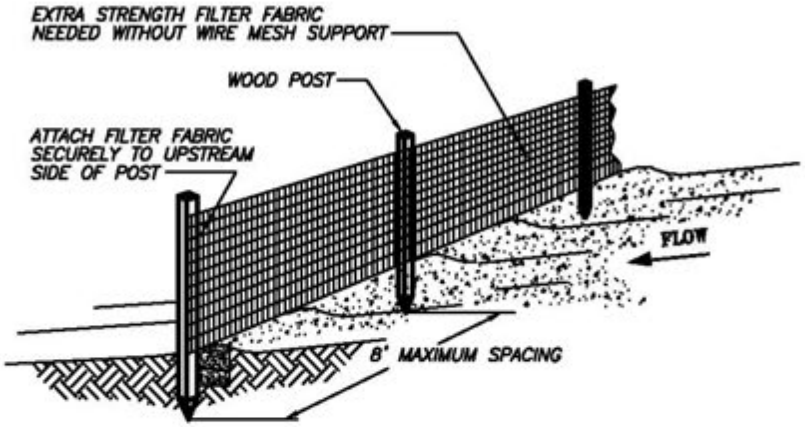
END OF SECTION

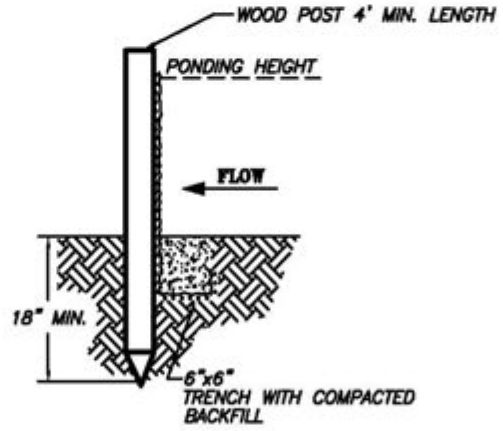
NOTES:

1. SILT FENCE & OR STRAW BALES SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

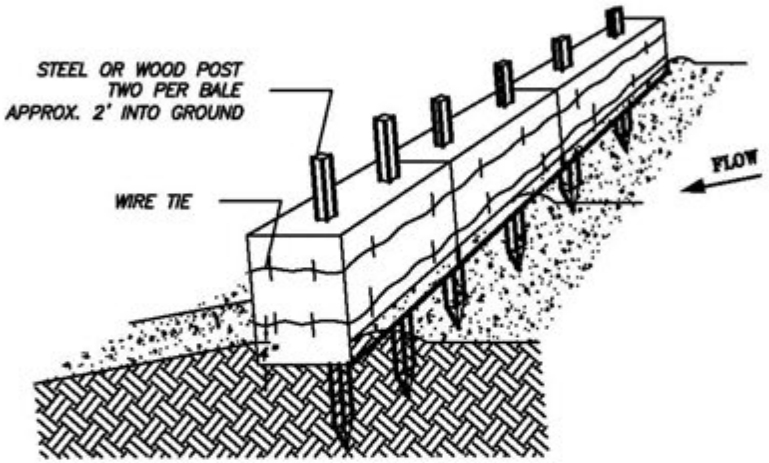
2. INSPECT AND REPAIR AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.

3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.





SILT FENCE DETAIL



STRAW BALE SEDIMENT BARRIER

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

EROSION CONTROL SILT FENCE STANDARD APPLICATION

FOR SANITARY FACILITIES CONSTRUCTION UNDER PUBLIC LAW 86-121

DRAWN BY: P.M.	CHK'D BY: B.M.W.	DRAWING NO. 02370-1A
REV. DATE: 03-31-11	REV. DATE: 03-31-11	1 OF 3

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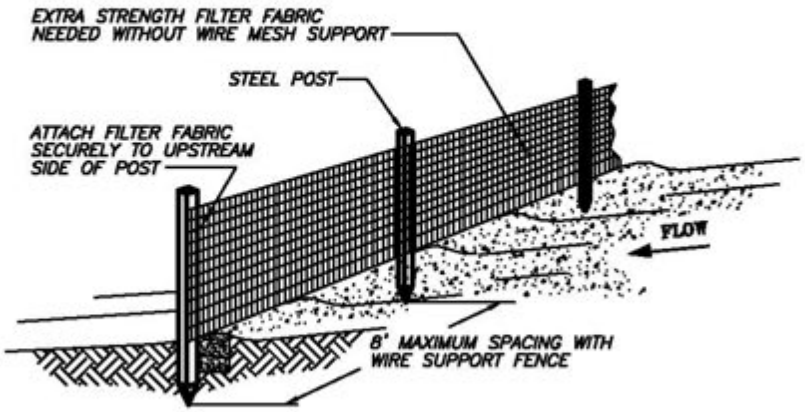
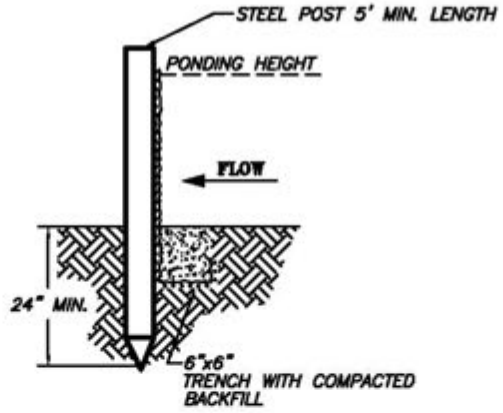
NOTES:

1. SILT FENCE & OR STRAW BALES SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

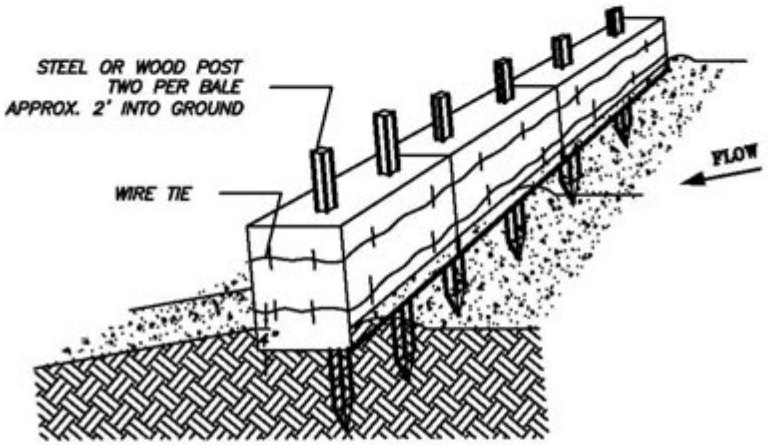
2. INSPECT AND REPAIR AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.

3. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.





SILT FENCE DETAIL



STRAW BALE SEDIMENT BARRIER

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

EROSION CONTROL SILT FENCE HEAVY DUTY APPLICATION

FOR SANITARY FACILITIES CONSTRUCTION UNDER PUBLIC LAW 86-121

DRAWN BY: P.M.	CHK'D BY: B.M.W.	DRAWING NO. 02370-1B
REV. DATE: 03-31-11	REV. DATE: 03-31-11	2 OF 3

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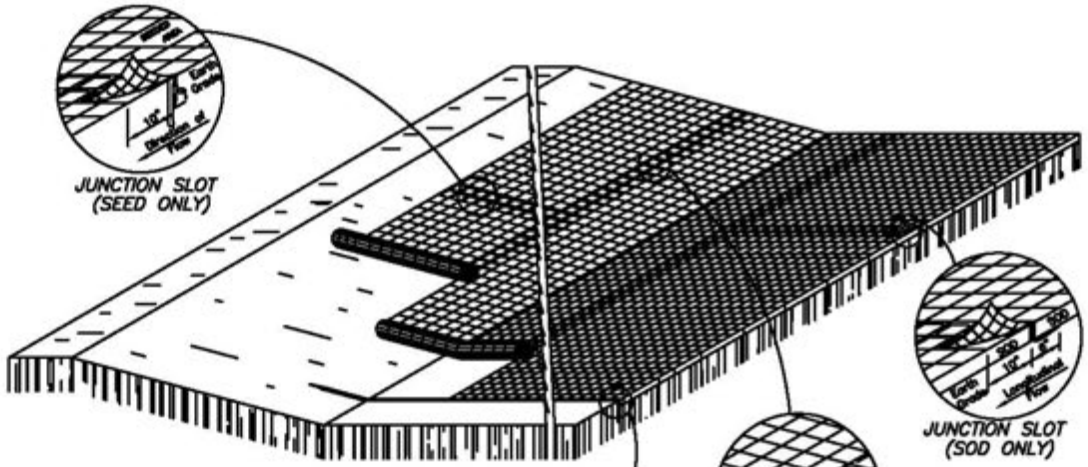

EROSION CONTROL

GENERAL NOTES:

DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL SPECIFICATIONS.

VARIATIONS IN THE DIMENSIONS OF MATERIALS SHOWN HEREON SHALL BE PERMITTED IF THEY PROVIDE EQUIVALENT PROTECTION AND MATERIAL STRENGTH AND IF PRIOR APPROVAL OF THE ENGINEER IS OBTAINED.

LAP JOINTS SHALL NOT BE PLACED IN THE BOTTOM OF V-SHAPED DITCHED.

JUNCTION SLOTS ON ADJACENT STRIPS OF MATTING SHALL BE STAGGERED A MINIMUM OF 4 FEET APART.

EDGES OF THE EROSION MAT SHALL BE IMPRESSED IN THE SOIL.

EROSION MAT SHALL BE MEASURED AND PAYED FOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS

EROSION MAT OVER SOD:

A: ONLY JUTE FABRIC WILL BE PERMITTED OVER SOD.
B: ROAD STAKES FOR THE SOD MAY BE OMITTED BY THE ENGINEER IF THE EXISTING SLOPE AND SOIL CONDITIONS SO WARRANT.
C: THE WIDTH OF EROSION MAT SHALL ALWAYS EQUAL THE SOD WIDTH.
D: SOD STRIPS MAY BE PLACED EITHER LONGITUDINALLY OR TRANSVERSELY TO THE FLOW LINE OF THE DITCH.

EROSION MAT OVER SEEDING:

JUNCTION OR ANCHOR SLOTS SHALL BE AT MINIMUM INTERVALS OF 100 FEET ON GRADES UP TO AND INCLUDING 3 PERCENT, AND 50 FEET ON GRADES EXCEEDING 3 PERCENT.

EROSION MAT

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

EROSION MAT

FOR SANITARY FACILITIES CONSTRUCTION
UNDER PUBLIC LAW 86-121

DRAWN BY: P.M.	CHK'D BY: B.M.W.	DRAWING NO. 02370-1C
REV. DATE: 03-31-11	REV. DATE: 03-31-11	3 OF 3

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SECTION 02531
SANITARY SEWER SERVICE LINES

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes sewer service lines, connection to sewer mains (wyes), service cleanouts, and abandonment of existing septic tanks.

1.02 RELATED WORK (as applicable)

A. Section 01780 – Closeout Submittals
B. Section 02315 – Excavation, Trenching and Backfill

1.03 REFERENCES

A. ASTM D 3034 – Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings

B. ASTM D 3212 – Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

C. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe

D. ASTM F1336 – PVC Gasketed Sewer Fittings

1.04 SUBMITTALS

A. Sewer Service Line Pipe and Fittings

B. Sewer Wyes and Saddles

C. Tracing Wire, Box, and Splice Materials

D. PE to PVC Gasketed Coupling for PE to PVC Transitions

1.05 ACCEPTANCE

A. The work will not be accepted until satisfactory pipe backfilling and clean up is complete.

B. If the work does not meet the specified requirements of this section and related sections, remove, and replace at no additional cost.

PART 2 - PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Conform to ASTM D 3034

B. Pipe Class: SDR 35

C. Bell ended joints conforming to ASTM D 3212

D. Elastomeric gaskets conforming to ASTM F 477

E. 4-inch nominal diameter unless otherwise indicated.

F. Each length of pipe shall be clearly marked with the following:

1. Manufacturer
2. Nominal Pipe Size
3. The PVC Cell Classification
4. Type PSM PVC Sewer Pipe
5. ASTM Designation
6. Pipe Class

2.02 SEWER WYES

A. Connection to New Sewers:

1. In-line fittings conforming to ASTM F1336.

B. Connection to Existing Sewers:

1. PVC Sewer Mains:

a. PVC conforming to ASTM 3034, watertight with gasket.
b. Two stainless steel bands and connectors for securing to the main.
c. GPK Products, Fargo, ND, or approved equal.

2. Asbestos-Cement, Concrete, or Vitrified Clay Sewers: Neoprene rubber boot with stainless steel bands for concrete, asbestos-cement or vitrified clay sewer main.

a. Submit other saddle wyes to the Engineer for review and approval.

2.03 CLEANOUTS AND FROST SLEEVES

A. Cleanout:

1. SDR 35 PVC riser pipe conforming to ASTM D 1785.
2. SDR 35 PVC pipe and fittings conforming to ASTM D 3034.
3. Inspection port plug shall be Sch. 40 PVC and threaded if installed above ground. Plug shall be cast iron and threaded if installed below ground.

B. Frost sleeve (WI and MI only):

1. Schedule 40 PVC or SDR 35 PVC
2. Cap: Slip on or threaded
3. Diameter: 2-inches bigger than cleanout diameter or sewer service line diameter

C. Minimum length: from ground surface to elbow

2.04 TRACER WIRE AND BOX

A. Wire: Provide #10 AWG jacketed solid copper wire, with 30 mil HDPE coating rated for direct bury or #12 AWG extra-high-strength copper-clad steel tracing wire, insulated with 45 mil HDPE, equal to Copperhead #12 (EHS-CCS) Tracing Wire, or Trace Safe #19 AWG, tin coated CU, SOL, 300V, with Blue 32 mil HDPE jacket, wove UOM:FT, manufactured by NEPTCO or equal.

B. Box: Tracer wire access box with ABS stand and cast iron top and lockable lid. Valvco Tracer Wire Access Box, SnakePit Roadway Box, Trace Safe, Rhino Triview, or equal.

C. Splice Kit: Provide underground waterproof splice materials.

2.05 PIPE HANGERS

A. Shall be made of a material compatible with piping material.

B. Shall be of sufficient strength to support the pipe at full capacity.

C. Shall not affect pipe integrity by either abrading, cutting or bending of pipe.

2.06 PIPE TRANSISTIONS

A. PE to PVC Transition Gaskets shall be equal to GPS Products Schedule 40 PCV Gasketed Coupling for SDR 35/26 PVC to DR 11 IPS/DIPS PE pipe (as applicable)

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that dimensions and elevations are as indicated on the Drawings.

B. Verify that all products are in new condition.

C. Inspect pipe and fittings for defects.

D. Remove materials from the site that are defective, damaged, used, unsound, or that otherwise do not meet the specifications.

3.02 UTILITY CONFLICTS

A. Refer to Section 02315.

3.03 SEWER SERVICE LINE INSTALLATION

A. Sewer Wyes and Saddles:

1. Connection to New PVC: Furnish and install wyes at the locations indicated by the plans or by the Engineer.

2. Install a solvent weld cap or a plug and leave in place until service line construction begins.

3. Properly reference, record and stake wye locations to permit ready relocation, in accordance with Section 01780, and provide information to the Engineer.

4. Connection to Existing PVC:

   a. Install saddle wyes at the locations indicated by the plans or by the Engineer.
   b. Repair damage caused during the tapping process at no additional cost.

5. Rotate the branch or wye of the saddle no more than 45 degrees from horizontal.

B. Risers:

1. Extend riser from sanitary wye to an elevation that will allow for a service line to be laid at specified grades.

2. Install riser at an angle equal to or less than 45 degrees measured from horizontal.

3. Risers in Rock Trenches:

    a. Install riser pipe in the sewer trench.
    b. Install riser pipe approximately vertical.
    c. Encase the bottom of riser, wye and 1/8 bend in crushed rock or sand.
    d. Extend bedding the full width of the trench as excavated and not less than 18 inches in length from either side of the center of the riser.
    e. Place bedding material to a point 12 inches above centerline of the sewer main at the location of the wye.

4. No separate payment will be made for risers.

C. Service Lines:

1. Furnish and install sewer service lines at the locations on the plans or as directed by the Engineer.

    a. Connect to the existing home sewer stub out if present underground outside the home.
    b. For connecting beneath the home, place pipe hangers at a maximum distance of 4 feet apart for horizontal PVC pipe.
    c. Cap sewer service, and stake if no connection is made.
    d. Install a frost sleeve for the vertical service line connection beneath the home from 2” above grade to within 6” of the top of the below ground horizontal sewer service line for a mobile home connection.

2. Follow general pipe installations requirements of Section 02315 – Excavation, Trenching and Backfill.

3. Minimum slope for sewer service lines is 1/8-inch per foot (1%).

4. Maximum slope for sewer service lines is ½-inch per foot (4 %), unless otherwise specified.

5. Ninety-degree bends are not allowed between the house and the sewer main.

6. Install tracing wire with all pipe.

    a. Wrap or tape tracing wire to pipe a minimum of every 20 feet.
    b. Make all splices with an underground, waterproof splice kit.
    c. Run tracing wire from connection at main and bring tracing wire up along outside of the cleanout, and tape wire to stem of the

cleanout just below cap. Fold wire back down over tape leaving approximately 12” of extra wire.

d. Terminate the tracing wire in tracing wire box within 3 feet of the home or at the cleanout, as specified by the Engineer.

7. Connection of Sewer Service Lines to Manholes:

   a. Connect to manholes only where permitted and approved by the Engineer.

D. Sewer Service Line Cleanouts:

1. Two-Way Cleanouts: Install at the locations indicated on the drawings or as directed by the Engineer.

2. One-Way Cleanouts:

   a. Install one-way cleanouts at a spacing not to exceed 100 feet.
   b. Install one-way cleanouts so that the service can be rodded or snaked in the direction of flow.

3. Construct as shown on the standard details.

4. Install a 4-inch sewer wye in the sewer service line and connect risers of the same material from the wye to the ground surface.

   a. Attach a schedule 40 PVC adapter and threaded plug to the end of the riser.
   b. Install vertically a piece of No. 3 rebar, 1-foot in length, next to each cleanout riser. Bury rebar 6 inches below ground surface.

5. The Engineer may specify that cleanouts be buried 3 to 6 inches below grade and be fit with a threaded cast iron plug.

E. Pipe Transitions:

1. PE and PVC pipe shall have a maximum of 3-inches of space between the ends at location of transition.

2. Center gasketed coupling over transition so PE pipe and PVC pipe are equidistant inside the sleeve.

3. Install gasketed couplings in accordance with manufacturer recommendations.

4. Provide stone bedding material to fill any areas disturbed under the connection area.

3.04 EXISTING SEPTIC TANK ABANDONMENT

A. Abandon existing septic tanks and/or wet wells where directed by the Engineer.

B. Pump tanks prior to abandonment. Dispose the contents in accordance with state and federal requirements.

C. Remove and dispose of any interior pipes, plumbing, or pumps.

D. Remove and dispose of concrete tank cover, risers, and inspection pipes.

E. Backfill interior of the tank with suitable, compactable soil material.

F. Conform to Section 02315 – Excavation, Trenching, and Backfill and Section 02920 – Topsoiling, Seeding, Fertilizing and Mulching.

G. Locate abandoned septic tanks on the as-built drawing.

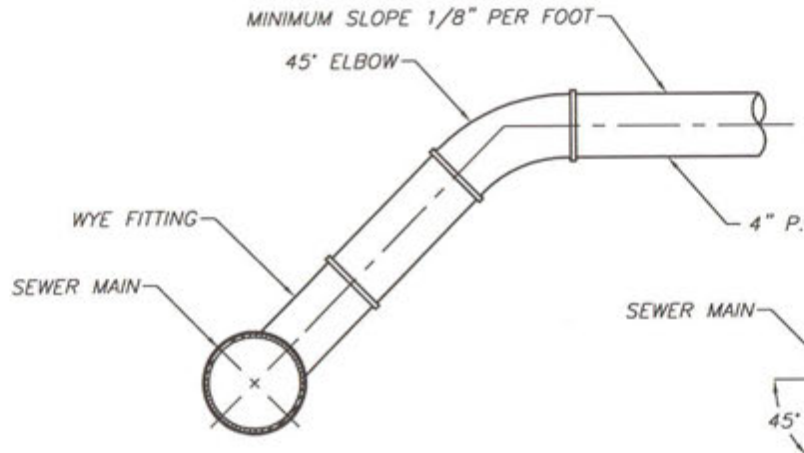
3.05 AS-BUILTS

A. Provide as-built information on each system in accordance with Section 01780. Use standard forms (if supplied) by the Engineer.

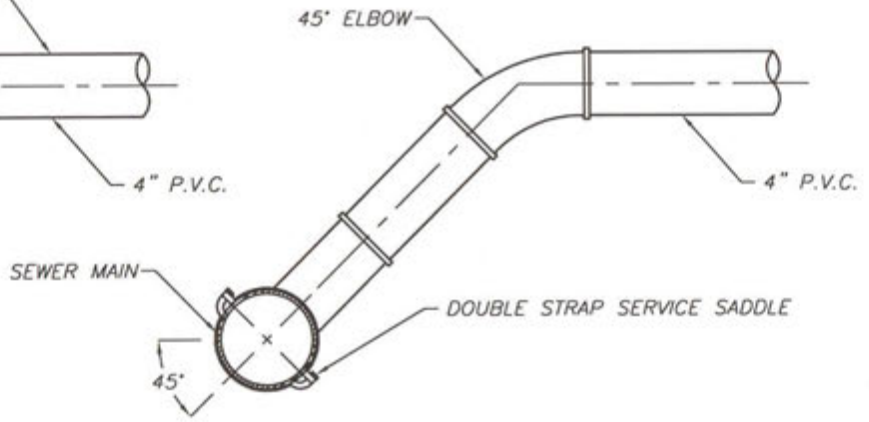
3.06 TESTING

A. Test tracing wire for proper functioning using a conductive/inductive type locator in the presence of the Tribal Representative or Engineer.

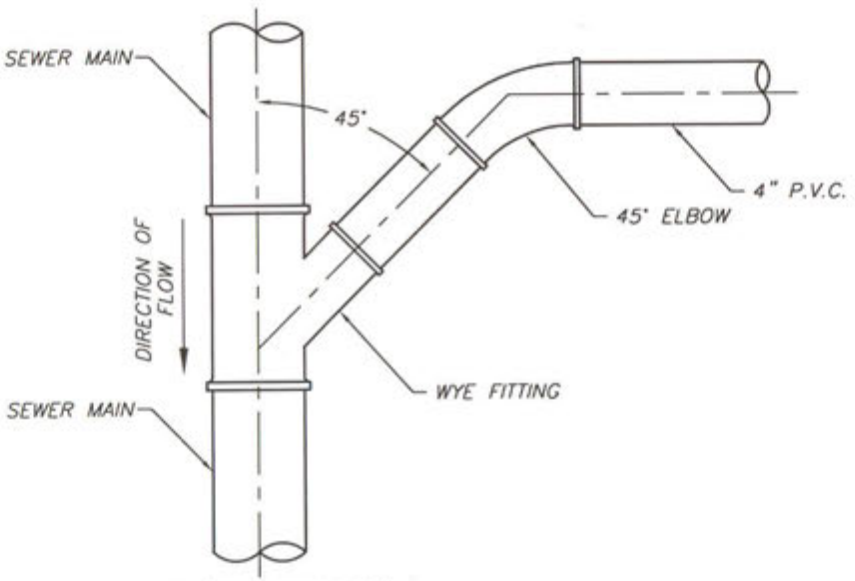
END OF SECTION



PROFILE (WYE CONNECTION)



PROFILE (SADDLE CONNECTION)



PLAN (WYE CONNECTION)

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

SEWER SERVICE CONNECTION

FOR SANITARY FACILITIES CONSTRUCTION
UNDER PUBLIC LAW 86-121

DRAWN BY: L.A.F.	CHK'D BY: S.M.H.	DRAWING NO. 02531-1
REV. DATE: 05/09/00	REV. DATE: 05/09/00	1 OF 2

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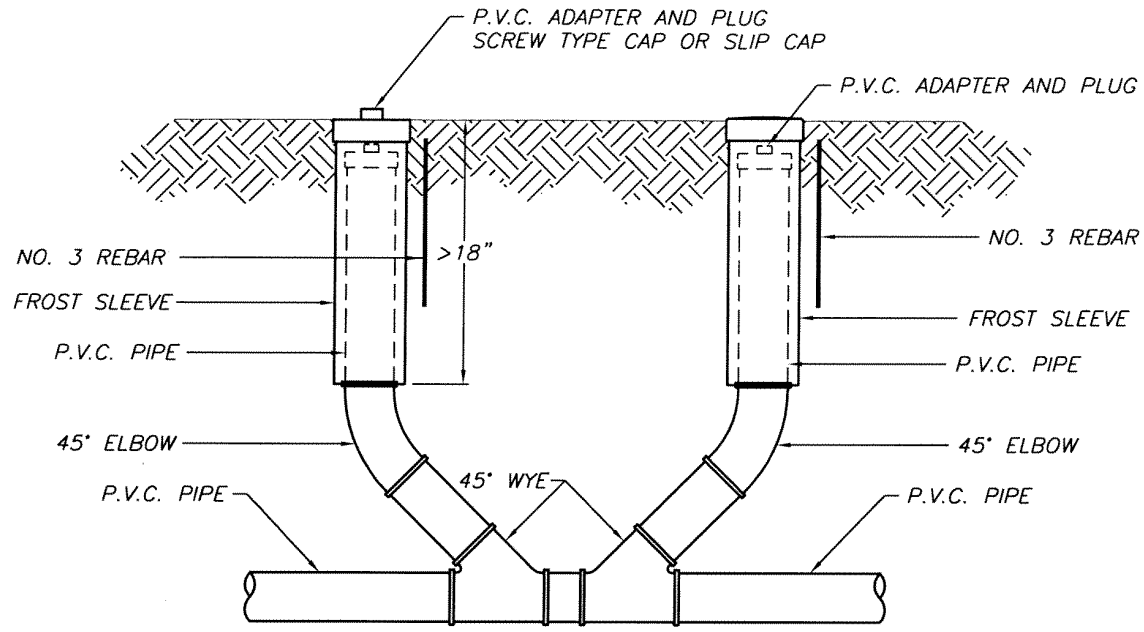
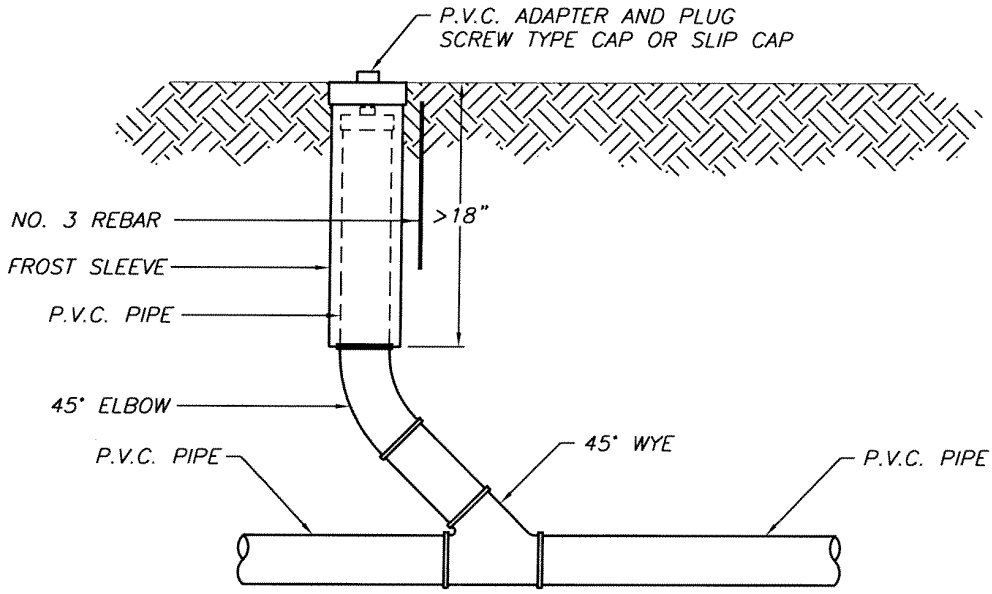


TWO-WAY DETAIL



ONE-WAY DETAIL

NOTE:
FROST SLEEVES TO BE INSTALLED ON WI. & MI. SITES ONLY.

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

SEWER SERVICE CLEANOUT

FOR SANITARY FACILITIES CONSTRUCTION
UNDER PUBLIC LAW 86-121

DRAWN BY: P.M.	CHK'D BY: S.K.W.	DRAWING NO. 02531-2
DATE: 03/30/07	DATE: 03/30/07	2 OF 2

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SECTION 02541
PRESSURE DOSED MOUND SYSTEM (MDO VERSION)

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes the installation and construction of an individual waste water disposal system composed of a pump chamber, pump, controls, piping and a mound disposal field.

1.02 RELATED WORK (as applicable)

A. Section 01780 – Closeout Submittals
B. Section 02315 – Excavation, Trenching and Backfill
C. Section 02545 – Concrete Septic Tank and Piping
D. Section 02920 – Topsoiling, Seeding, Fertilizing, and Mulching

1.03 REFERENCES

A. ASTM D1785 – Polyvinyl Chloride (PVC) Plastic Pipe Schedule 40, 80 and 120.

B. ASTM D2241 – Polyvinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)

C. ASTM C33 – Standard Specification for Concrete Aggregates

D. Minnesota Pollution Control Agency, Minnesota Rules Chapter 7080 – Subsurface Sewage Treatment Systems Program

E. National Electric Code (NEC)

1.04 SUBMITTALS

A. Pump Tank, Riser, Cover, and Safety Screen

B. Effluent Pump, Controls and Alarm System

C. Force Main, Manifold, Lateral Piping, and Fittings

D. Source of Mound Material, Drainfield Gravel and Sieve Analysis for Clean Sand, or Distribution Media

E. Geotextile Fabric

F. Gravelless Drainfield Distribution Media, if required

PART 2 - PRODUCTS

2.01 CONCRETE PUMP TANK

A. Material: Watertight, reinforced concrete

B. Size: Volume of container as listed in the design and/or bid schedule

C. Comply with applicable state requirements. Refer to Section 02545 for appropriate state references.

D. Combination septic tank/ pump tanks are acceptable, provided they meet applicable state requirements. Refer to Section 02545 for septic tank requirements.

E. Manhole risers and covers

1. Provide at least one manhole opening, no less than 24 inches square or 24 inches in diameter, situated over the pump.

2. Manhole riser shall be cast in place polyethylene with gasketed connections or other approved water-tight material.

3. Extend riser 6-inches above finished grade.

4. Covers shall be of the same material as the riser, with a warning label, printed with information regarding the hazards present when entering a septic tank affixed or supplied by the manufacturer.

5. Cover shall be secured to the riser with locking screws or approved equal.

2.02 PUMPS AND CONTROLS

A. Effluent Pump Requirements

1. Size: Total dynamic head and flow requirements shall be listed in the design by the Engineer.

2. Equal to Peabody Barnes Model EH522, Myers Model ME 50, Goulds Model 3885, Zoeller 270, or approved equal.

3. The pump motor shall have a built-in thermal overload protection with automatic reset.

B. The Engineer will determine the type and size of pump to be used.

C. Power Supply Requirements: 120/240 volt, single phase, three wire service from one/two pole breaker off lighting panel in the residence on a separate/dedicated circuit.

1. Use wire sized in accordance with NEC.

D. Install two mechanical float switches to detect on-off control levels for the pump.

1. Use SJE Rhombus Signal Master Control Switch or equal.

E. Pump Controls: Furnish and install controls to operate the pump based on on-off level control floats.

1. Option #1: A control panel compatible with the pumps supplied.

a. Enclosure: Weatherproof NEMA 4X fiberglass
b. Pump Control: Hand-Off-Auto switch
c. Circuit breakers for pump and alarm
d. Provide terminal blocks for connection of on-off level control floats.
e. Equal to Rhombus Model 112 Control Panel or Rhombus EZ Series single Phase Simplex

2. Option #2: Pump Switch with Piggy-Back Plug and outlet rated for exterior use

a. Enclosure: Weatherproof NEMA 4X fiberglass
b. Size pump switch to be compatible with selected pump
c. Enclosure area shall be a minimum of 1.5 times the area of the piggybackswitch, outlet, and folded cables.
d. Equal to Alderon Power Post 4X Filter/Dual Alarm.

3. Provide terminal blocks for connection of on-off level control floats.

F. Provide an alarm system on a separate circuit from the pump.

1. Alarm system shall consist of a direct acting mechanical float switch, 24-volt control transformer, red alarm light, horn, push-to-test alarm button and a horn silence switch.

2. The indoor alarm system shall be Powertronics Model MD 3875, Rhombus Model 101-01H(Tank Alert 1) or approved equal.

3. Outdoor alarm on the control panel is a contractor option. Rhombus Control panel Model #1121W111H10E or approved equal.

2.03 ELECTRICAL CABLE

A. Electrical cable shall be type UF for direct burial.

B. Use 12/2 wire with ground to provide power to the effluent pump.

C. Use 14/2 wire to provide power to the float switches.

D. Size underground cable to limit voltage drop from power source to pump motor in accordance with pump manufacturer's recommendations.

2.04 FORCE MAIN AND MOUND PIPING

A. Force Main Pipe

1. Material: Schedule 40 PVC must conform to ASTM D 1785.

2. Material: 160 psi SDR 26 PVC must conform to ASTM D 2241.

3. Size: Diameter shall be indicated on design drawings.

4. Insulated pipe may be used if approved by the Engineer:

a. Material: Insulated Schedule 40 PVC with 6-mil polyethylene protective sleeve. Must conform to ASTM D 1785.
b. Insulation: R-value of 13 and 6-inch diameter of urethane foam.
c. Other: Belled ends and solvent joints.

B. Manifold Pipe

1. Material: Schedule 40 PVC must conform to ASTM D 1785.

2. Material: 160 psi SDR 26 PVC must conform to ASTM D 2241.

3. Size: 2 inch diameter unless otherwise indicated in design drawings.

C. Lateral Pipe

1. Material: Schedule 40 PVC must conform to ASTM D 1785.

2. Material: 160 psi SDR 26 PVC must conform to ASTM D 2241.

3. Size: Diameter shall be indicated on design drawings.

4. The pipe shall be field perforated.

5. Lateral cleanouts shall be Schedule 40 PVC or SDR 26 PVC.

6. Lateral cleanout caps shall be Schedule 40 PVC with PVC adapter and screw type plug or a female threaded cap.

7. Lateral cleanouts shall be installed with an insulated access box or 4 inch PVC cover pipe with cap.

D. OBSERVATION PIPE

1. Material: Schedule 40 PVC

2. Size: 4-inch diameter

3. Observation pipe caps shall be 4-inch Schedule 40 PVC with PVC adapter and screw type plug with female threaded cap or slip on cap.

4. Cap shall be non-vented plastic

2.05 MOUND MATERIAL AND DISTRIBUTION MEDIA

A. Clean sand shall meet the following ASTM C33 requirements for fine aggregate:

Sieve No.	Percent Finer by Weight
3/8 inch	100%
No. 4	95-100%
No. 8	80-100%
No. 16	50-85%
No. 30	25-60%
No. 50	10-30%
No. 100	2-10%
No. 200	0-3%

B. Distribution Media Options:

1. Drainfield Gravel: Gravel shall be clean and may vary in size from ½-inch to 2 inches, with not more than 5 percent fines below the ½-inch size.

2. Infiltrators Systems Inc, Quick 4 Standard Chambers or approved equal.

3. Infiltrators Systems Inc, EZ Flow Systems or approved equal.

C. Synthetic material shall be TYPAR Style 3151 or equal.

2.06 GEOTEXTILE FABRIC

A. Material: Synthetic, nonwoven material shall be TYPAR Style 3151 or approved equal.

PART 3 - EXECUTION

3.01 GENERAL

A. Construct mound in accordance with Minnesota Rules 7080 and Engineer's design.

B. If changes to mound are found to be necessary at the time of construction, notify Engineer immediately for approval or redesign.

3.02 CONCRETE PUMP TANK AND PUMP

A. Install 4-inch Schedule 40 PVC from the septic tank to pump chamber.

B. Seal all joints between inlet piping, vent pipe, riser, etc. to eliminate ground water infiltration.

C. Extend risers 3 to 6 inches above finished grade.

D. Install vent on pump chamber in accordance with state codes.

E. Install all buried electrical cable (1 pump wire and 3 float switch wires) in one trench.

F. Mount floats in pump chamber.

3.03 CONTROL PANEL AND ALARM SYSTEM

A. Install all wiring in accordance with the NEC.

B. Mount control panel in a location specified by the Engineer.

C. Seal all conduit openings entering the control panel and pump chamber with silicone caulk or other appropriate material.

D. Install the alarm system in the residence in a location to be selected by the Engineer and homeowner.

1. Install the alarm system on a separate circuit from the pump.

2. Set up the alarm so that upon the occurrence of an alarm condition, the high alarm sensor will close its circuit, thus energizing the red alarm light and sounding the horn.

3. Provide a switch that when moved from the “normal” to “silence” position will silence the audible alarm, and allow the red alarm light to remain energized.

4. The high alarm sensor shall continue to show an alarm condition until the operating condition has returned to normal and the silencing switch has been returned to its “normal” position.

3.04 FORCE MAIN, MANIFOLD, AND LATERAL PIPING

A. Install force main piping and union in the pump chamber, as shown in the detail drawings, to allow the removal of the pump through the riser by only disconnecting the union.

1. Union shall be a maximum of 24 inches below top of tank riser.

B. Alternative discharge piping layout: exit through the pump tank opening.

1. Discharge piping shall be brought up into the riser so that the union is within 24 inches of the top of the tank riser.
2. Drill a 1/4-inch weep hole in the bottom elbow of the outlet pipe.

C. Slope force main continuously up to the mound at no less than 1/8 inch per foot or minimum of 6 inches to ensure drain back of main to the pump tank.

D. Trench force main pipe up to the mound area and slope into the mound within the fill from the upslope side or the end of the mound per the design drawings.

E. Mound Distribution Piping:

1. Install piping per design completed and/or approved by Engineer and as shown in the drawings.

2. Field perforate lateral piping per approved plan using sharp drill bit.

3. Remove all burrs and filings from the interior of the pipe.

4. Pressure distribution pipe cleanouts must be installed and accessible from final grade to verify system for proper operation and for cleaning of plugged perforations.

F. Lateral cleanouts:

1. Located at the terminal end of each lateral.

2. Accessible from final grade

3. Large enough to allow access to caps or plugs with hands, tools, etc.

G. Observation pipes:

1. Install observation pipe in between the 2 laterals on the downslope side. Install a second observation pipe in between the 2 laterals on the upslope side and opposite end from the downslope observation pipe.

2. Drill a minimum of 2 holes in observation pipe located within the distribution media zone. Holes shall be a minimum of 3/8” in diameter and no more than 6 inches apart vertically.

3. Install a piece of 1/4” to 3/8” diameter rebar through bottom of observation pipe to anchor pipe in distribution media.

4. The observation pipe shall extend from the bottom of the trench to a height of 12 to 24 inches above grade.

H. Refer to Section 02315 for excavation and backfilling procedures.

3.05 MOUND SURFACE PREPARATION

A. If tree removal is required, cut trees flush with the ground and remove. Leave stumps in the ground.

B. Remove excessive vegetation from the mound area by clearing and mowing.

C. Mound absorption area shall be roughened to a depth of 8 inches and perpendicular to the slope with backhoe teeth or plow.

D. Do not compact or mix soil.

E. Never use a rototiller.

F. Obtain a minimum plowing depth of 7 to 8 inches below original grade.

3.06 MOUND CONSTRUCTION

A. Application of mound basal sand must be completed immediately after surface plowing has been accomplished.

B. Place a minimum of 12 inches of clean sand upon plowed surface, below drainfield gravel.

C. Place sand by dumping along the upslope side and/or ends of the plowed area.

D. Use tracked equipment to spread the sand and keep at least 6 inches of sand under the tracks at all times.

E. Distribution Media Construction:

1. Gravel:

a. Place gravel the full width of the trench and lay perforated pipe level.
b. Gravel shall be 2 inches above the pipe and 6 inches below the pipe unless otherwise indicated by Engineer.
c. Cover the top of the gravel bed with geotextile fabric.

2. Gravel-less Distribution Media: Install media approved by the Engineer as shown on the detail drawings and according to manufacturer specifications.

a. Install observation pipe on each gravel-less drainfield lateral end.
b. Cover the top of the media with geotextile fabric.

F. Place fill material above the drainfield media as shown on the detail drawings.

1. The fill material layer shall be a minimum of 12 inches deep at the center of the mound and a minimum of 6 inches deep at the sides.

G. Cover the entire mound with a minimum of 6 inches of topsoil.

H. Seed and mulch entire mound area to provide immediate erosion in accordance with Section 02920. Repairing erosion damage and re-seeding the mound area is required until a complete vegetation cover is achieved.

3.07 FIELD QUALITY CONTROL

A. No plowing shall take place when the moisture content of the soil, at a depth of 7 to 8 inches, is such that rolling a sample between the hands forms a roll.

B. The Engineer reserves the right to conduct a field test of mound sand and reject the aforesaid sand should it fail to meet the gradation requirements.

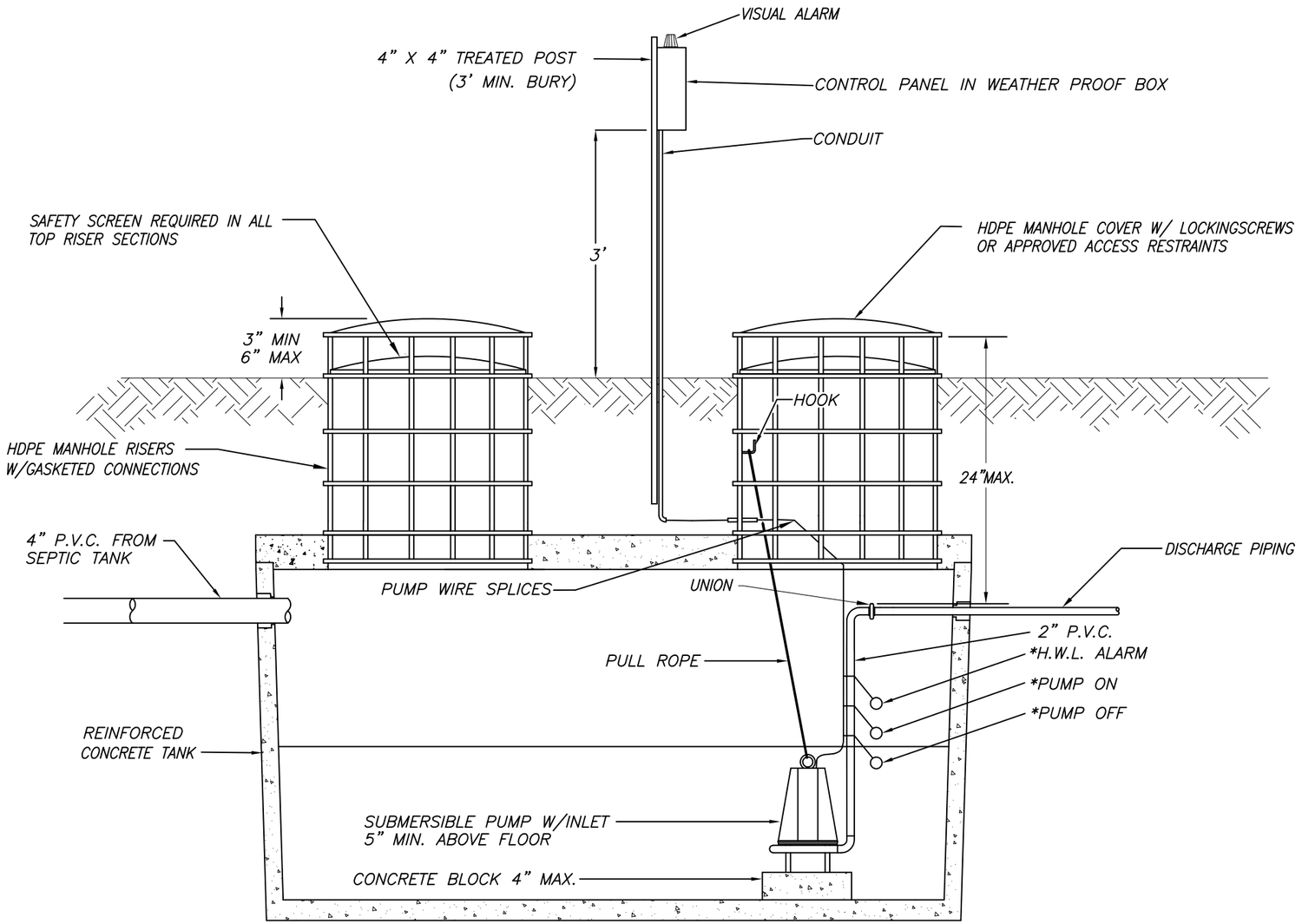
C. No rubber tired or wheeled equipment or material stockpiles will be allowed on the mound basal area and/or the designated down-slope area.

D. Draw-down test may be requested by the Engineer.

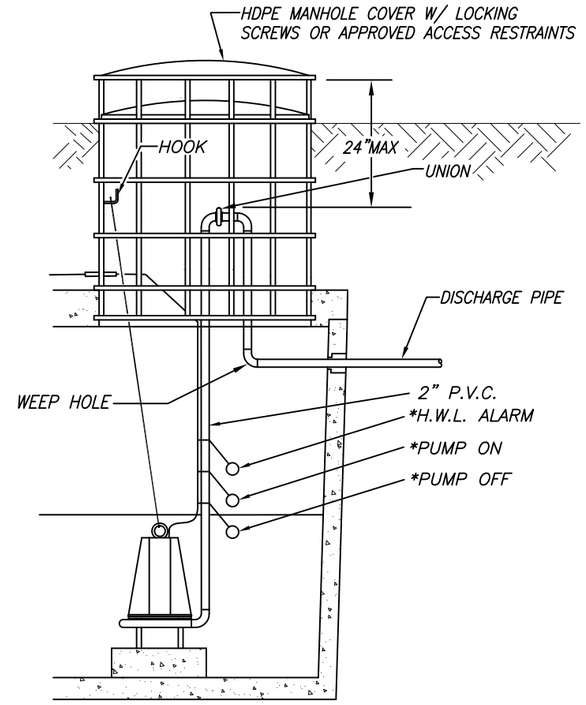
3.08 AS-BUILTS

A. Provide as-built information on each system in accordance with Section 01780. Use IHS forms (if supplied) by the Engineer.

END OF SECTION



STANDARD DISCHARGE PIPING
N.T.S.



ALTERNATE DISCHARGE PIPING
N.T.S.

NOTES:

1.) FLOAT SETTINGS TO BE SPECIFIED BY THE PROJECT ENGINEER.

2.) DISTANCE FROM ELBOW TO THE TOP OF THE RISER IS A MAX. OF 24" OR OPTIONAL PIPING SHALL BE USED.

THIS DRAWING NOT TO SCALE

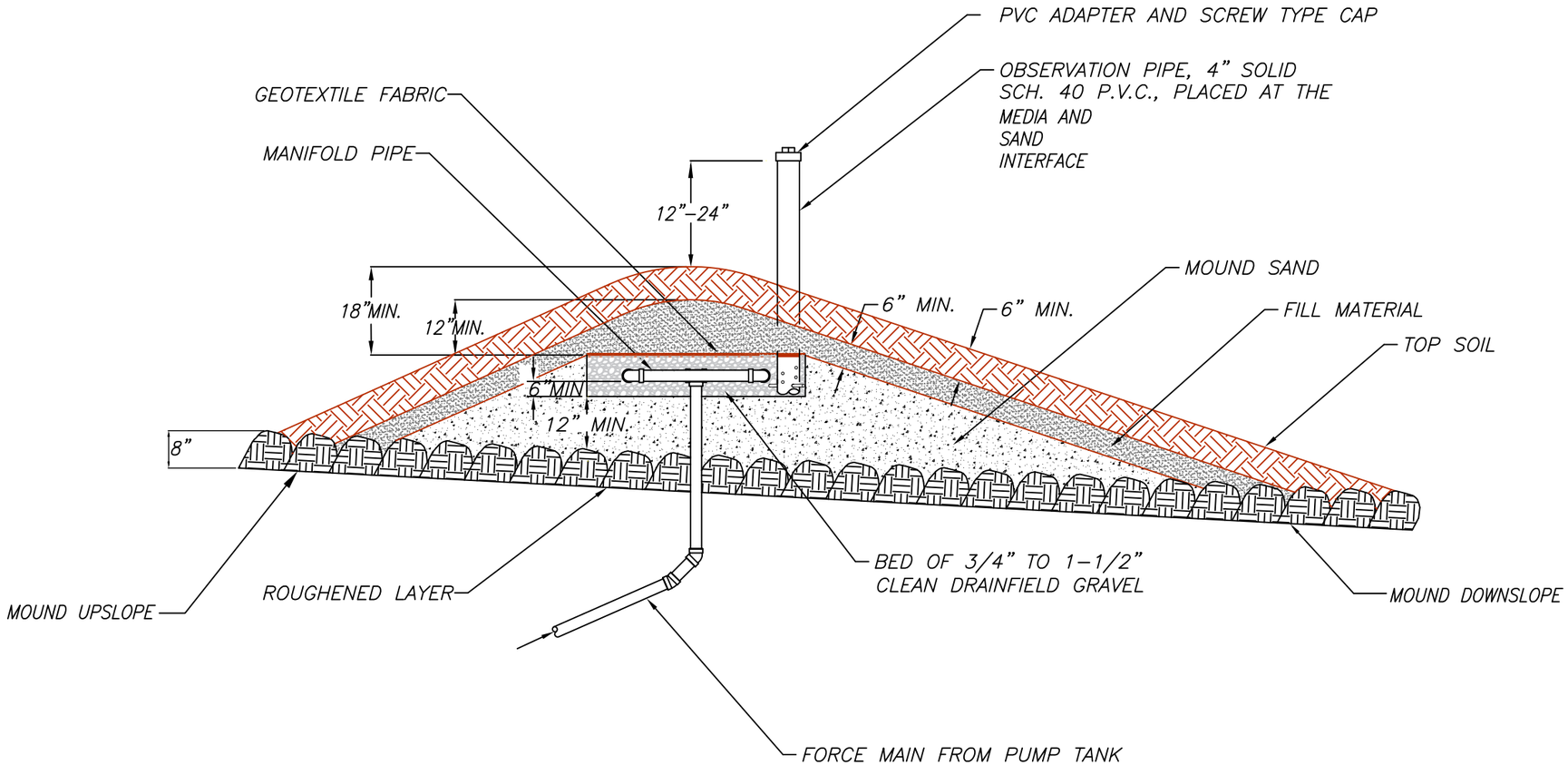
U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

TYPICAL CONCRETE PUMP TANK

FOR SANITARY FACILITIES CONSTRUCTION
UNDER PUBLIC LAW 86-121

DRAWN BY: R.A.M.	CHK'D BY: B.A.R.	DRAWING NO. 02541-D
REV. DATE: 02/10/16	REV. DATE: 02/10/16	1 OF 4



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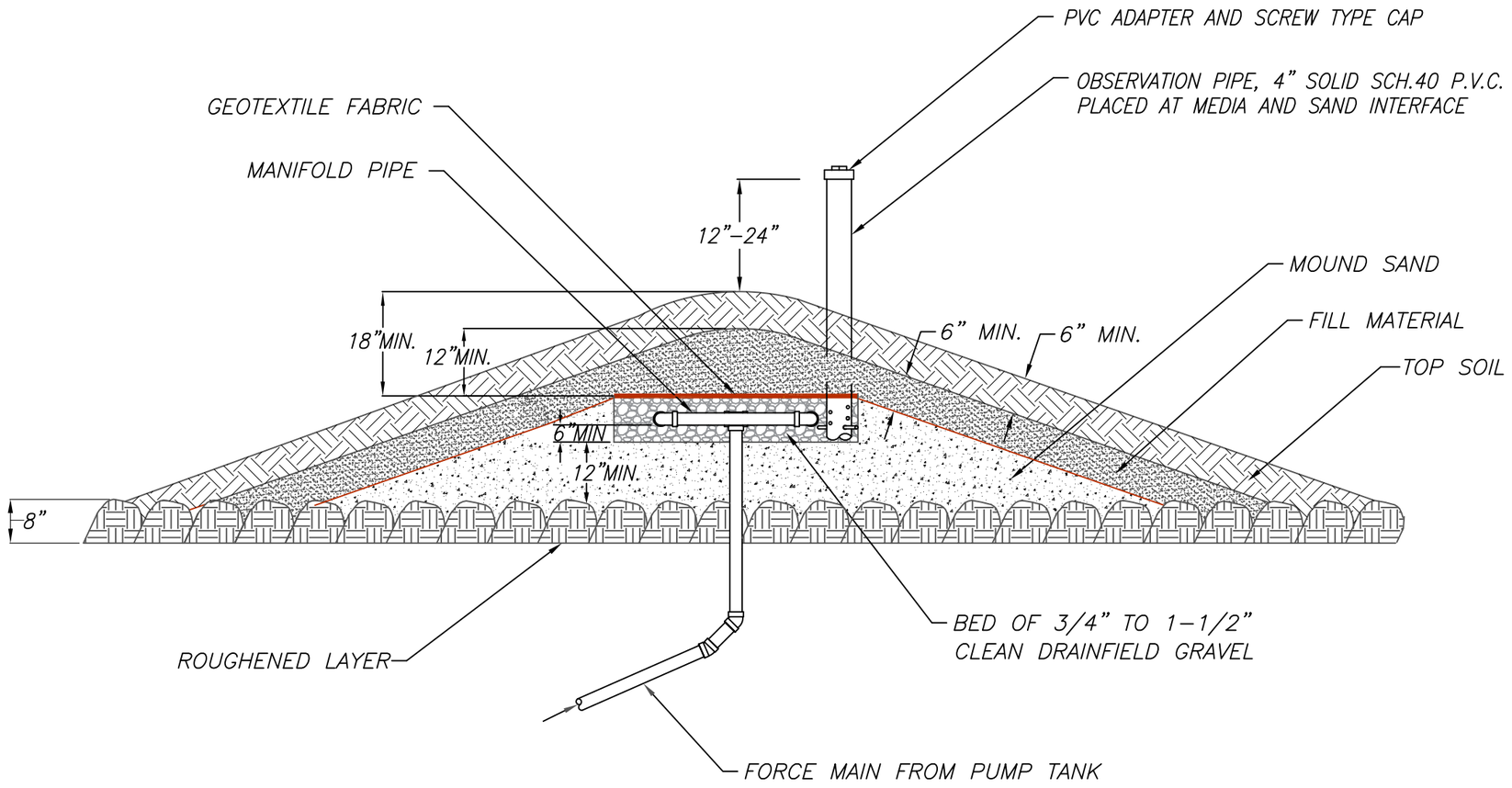
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

TYPICAL MOUND CROSS SECTION ON SLOPE>1%

FOR SANITARY FACILITIES CONSTRUCTION
UNDER PUBLIC LAW 86–121

DRAWN BY: R.A.M.	CHK'D BY: B.A.R.	DRAWING NO. 02541-D
REV. DATE: 02/09/16	REV. DATE: 02/09/16	2 OF 4



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BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

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DRAWN BY: R.A.M.	CHK'D BY: B.A.R.	DRAWING NO. 02541-D
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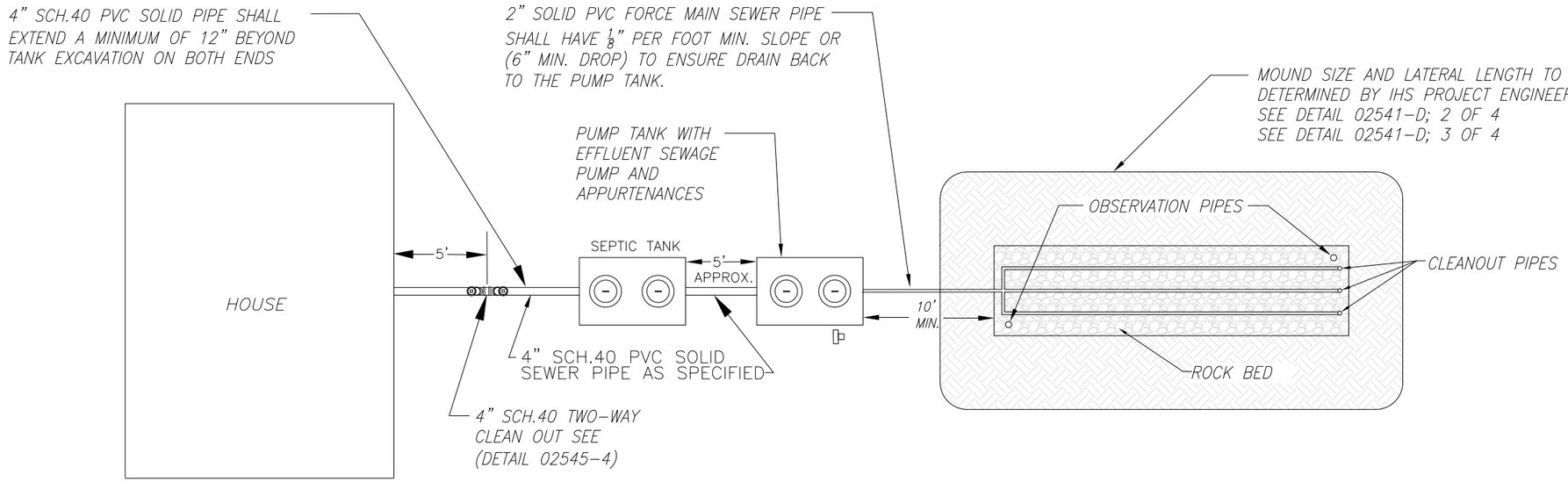
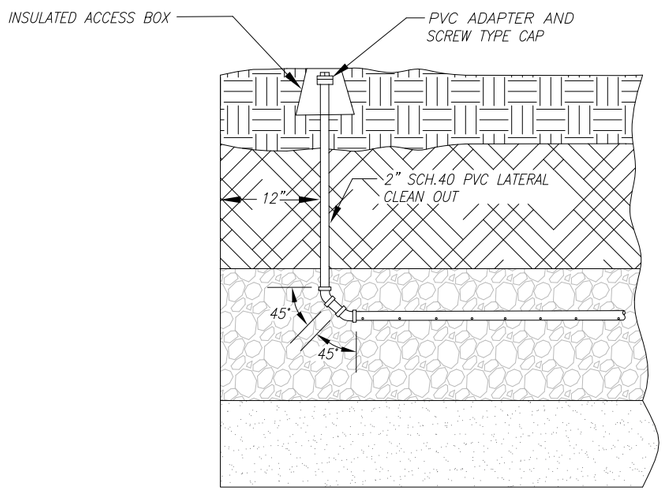
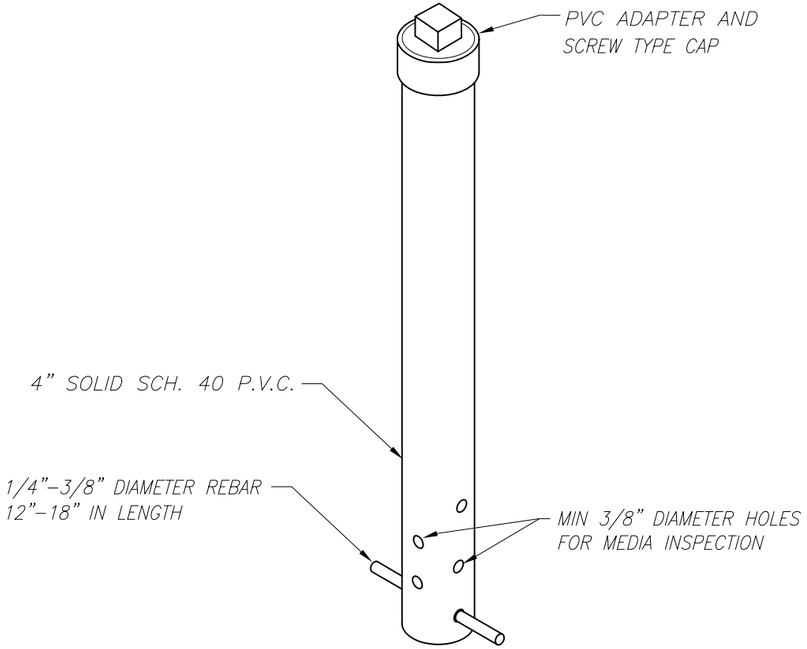


PLAN VIEW MOUND DETAIL
N.T.S.

NOTE:
*SEE ENGINEER DESIGN FOR TYPE OF MANIFOLD CONNECTION (END FEED IS SHOWN IN TYPICAL DRAWINGS)



LATERAL CLEAN OUT DETAIL
N.T.S.



OBSERVATION PIPE DETAIL
N.T.S.

THIS DRAWING IS NOT SCALE

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OFFICE OF ENVIRONMENTAL HEALTH
BEMIDJI AREA OFFICE BEMIDJI, MINNESOTA

TITLE:

TYPICAL MOUND LAYOUT

FOR SANITARY FACILITIES CONSTRUCTION
UNDER PUBLIC LAW 86-121

DRAWN BY: R.A.M.	CHK'D BY: B.A.R.	DRAWING NO. 02541-D
REV. DATE: 02/10/16	REV. DATE: 02/10/16	4 OF 4

SECTION 02545
CONCRETE SEPTIC TANK AND PIPING

PART 1 - GENERAL

1.01 SUMMARY

A. This section covers single and multiple compartment, rectangular and cylindrical precast septic tanks. Also included is the piping from the home to the septic tanks along with two-way cleanouts and septic tank abandonment.

1.02 RELATED WORK (as applicable)

A. Section 01119 – Revisions to Standard Specifications
B. Section 01780 – Closeout Submittals
C. Section 02315 – Excavation, Trenching and Backfill
D. Section 02540 – Drainfields
E. Section 02541 – Pressure Dosed Mound System (Minnesota)
F. Section 02542 – Pressure Dosed Mound System (Michigan and Wisconsin)

1.03 REFERENCES

A. ASTM D 1785 – Polyvinyl Chloride (PVC) Plastic Pipe Schedule 40, 80 and 120.

B. ASTM D 3034 – Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings.

C. Minnesota Pollution Control Agency, Chapter 7080 – Individual Sewage Treatment Systems

D. State of Wisconsin, Industry and Human Relations Committee. Chapter 83, Private Onsite Wastewater Treatment Systems. Chapter 84, Plumbing Products.

E. State of Michigan, Western Upper Peninsula District Health Department, Superior Environmental Health Code.

F. State of Michigan, Public Health Code, Act 368.

1.04 SUBMITTALS

A. Septic tank (including wire mesh detail or manufacturers literature on fibers)
B. Septic tank riser and cover.
C. Effluent Filter

D. Solid sewer pipe
E. Cleanout and Inspection plug

1.05 QUALITY ASSURANCE

A. Septic tanks and other materials shall meet minimum requirements of the appropriate state agency regulating onsite septic systems.

PART 2 - PRODUCTS

2.01 SEPTIC TANKS

A. Septic Tank Requirements

1.	Min. reinforced concrete wall thickness	2 inches
2.	Minimum capacity below outlet	1,000 gallons, or as specified on the bid schedule
3.	Minimum liquid depth	2 1/2 feet
4.	Maximum liquid depth	5 1/2 feet
5.	Concrete compressive strength	3,000 psi

B. Rectangular tanks shall have a minimum width of 36 inches and be constructed with the longest dimension parallel to the direction of flow.

C. Reinforce throughout with 6-inch x 6-inch – 10/10 wire mesh or fiber mesh.

D. Cylindrical tanks shall have an inside diameter of not less than 48 inches.

E. Joints below the liquid level shall be of monolithic construction or have interlocking V-notch, shiplap or tongue and grove joints.

F. Inlet and Outlet

1. Provide tanks with inlet and outlet connections for 4-inch Schedule 40 PVC.

2. Provide rubber boots on all inlet and outlet openings to prevent the insertion of the sewer piping beyond the inside wall of the tank.

3. Provided an open-end coated sanitary tees or baffles made of approved materials at the inlet.

4. Tees or baffles shall extend at least 6 inches above and 9 inches below the liquid level, but not exceed 1/3 of the liquid depth.

5. Provide at least 2 inches of clear space over the top of tees or baffles.

6. The bottom of the outlet opening shall be at least 2 inches lower than the bottom of the inlet.

G. Manhole Risers and Covers
   1. Provide at least two manhole openings, no less than 24 inches square or 24 inches in diameter, with each single or multiple compartment tanks, situated over the inlet pipe & baffle and outlet pipe & effluent filter.

   2. Manhole riser shall be cast in place polyethylene with gasketed connections or other approved water-tight material.

   3. Covers shall be of the same material as the riser, with a warning label, printed with information regarding the hazards present when entering a septic tank affixed or supplied by the manufacturer.

H. Septic tanks must conform to state specific codes identified in Section 1.03 References.

2.02 SOLID SEWER PIPE, CLEANOUT AND FITTINGS

A. Schedule 40 PVC fittings and caps shall conform to ASTM D 1785.

B. SDR 35 PVC pipe and fittings shall conform to ASTM D 3034.

C. Cleanout piping and cap shall be PVC and threaded if installed above ground. Plug shall be cast iron and threaded if installed below ground.

D. Frost Sleeve (WI and MI only)

   1. Schedule 40 PVC or SDR 35 PVC
   2. Cap: Slip on or threaded
   3. Diameter: 2-inches bigger than cleanout diameter
   4. Minimum length: from ground surface to elbow

2.03 EFFLUENT FILTER

A. Rated for 3,000 gpd flow rate.

B. Maximum filter opening, 1/16 inch.

C. Equal to Polylok PL-525 or Zabel A100 (12 x 20 inches).

2.04 PIPE HANGERS

A. Shall be made of a material compatible with piping material.

B. Shall be of sufficient strength to support the pipe at full capacity.

C. Shall not affect pipe integrity by either abrading, cutting or bending of pipe.

PART 3 - EXECUTION

3.01 SOLID SEWER PIPE and CLEANOUTS

A. Install solid sewer pipe from the house to the septic tank.

1. Connect to the existing home sewer stub out if present underground outside the home.

2. For connecting beneath the home, place pipe hangers at a maximum distance of 4 feet apart for horizontal PVC pipe.

3. Cap sewer service, and stake if no connection is made.

4. Install a frost sleeve for the vertical service line connection beneath the home from 2” above grade to within 6” of the top of the below ground horizontal sewer service line for a mobile home connection.

B. Minimum cover over solid sewer pipe is 12-inches.

C. Insert inlet piping to be at least 6 inches, but no more than 12-inches from baffle.

D. Schedule 40 PVC pipe shall extend from the septic tank inlet and outlet a minimum of 12-inches past the edges of the tank excavation.

E. Minimum slope between the house and the septic tank is 1/8-inch per foot or 6 inches, which ever is greater.

F. There shall be no 90-degree bends in the pipe between the house and the Septic tank.

G. Install two-way cleanouts approximately 5 feet from the outside wall of each home or mobile home.

1. Cleanout shall allow rodding the sewer line both towards the home and towards the septic tank.

2. Fit cleanout with a threaded plug.

3. Install cleanout so the top is flush with the ground or as specified by the Engineer.

4. Install frost sleeve around each cleanout riser.

5. Install vertically a piece of No. 3 rebar, 1-foot in length, next to each cleanout riser. Bury rebar 6 inches below ground surface.

H. Properly seal pipe connections to tanks to prevent groundwater infiltration.

I. Terminate inspection opening 6 inches above final grade and securely cap.

J. Solvent weld all joint connections.

K. Install insulation in traveled areas as specified by the Engineer in accordance with Section 02315 – Excavation, Trenching and Backfill.

3.02 TANK INSTALLATION

A. Place tanks in excavations at the locations and elevations designated on the plans or by the Engineer.

B. Refer to Section 02315 for excavation, backfill, and grading requirements.

C. Place tanks level.

D. Install tanks in accordance with manufacturer's recommendations.

E. Seal joints when the tank is set with an epoxy based sealing compound or Rub-R-Nek flexible gasket, as manufactured by the Henry Group (formerly K.T. Snyder Company Inc.), Houston, Texas, or equal.

F. Seal inlet and outlet with temporary plugs until connections are made to the inlet and outlet lines.

G. Set the top of the tank a minimum of 6-inches below finished grade. Do not exceed 24-inch cover depth unless tank is designed for deeper bury depth and Engineer approves.

1. Install manhole risers and terminate access cover 3-6-inches above finished grade. Provide suitable locking screws or locking device that meets with Engineer's approval.

2. Where manhole risers are required more to be than 24 inches in height, risers and manhole shall be made of concrete with approved watertight seals.

H. Do not drive over the tank during and after construction.

3.03 EFFLUENT FILTER

A. Center filter under the outlet manhole opening.

B. Solvent weld to 4-inch PVC Schedule 40 outlet pipe. Extend a minimum of 12-inches beyond the outside of the septic tank before connecting to SDR 35 pipe.

C. Install filter handle and extend handle to within 6-inches of the top of the access riser for easy access.

D. Conform to manufacturer's installation instructions.

3.04 EXISTING SEPTIC TANK ABANDONMENT

A. Abandon existing septic tanks and/or wet wells where directed by the Engineer.

B. Pump tanks prior to abandonment. Dispose the contents in accordance with state and federal requirements.

C. Remove and dispose of any interior pipes, plumbing, or pumps.

D. Remove and dispose of concrete tank cover, risers, and inspection pipes.

E. Backfill interior of the tank with suitable, compactable soil material.

F. Conform to section 02310 – Grading, and section 02920 – Topsoiling, Seeding, Fertilizing and Mulching.

G. Locate abandoned septic tanks on the as-built drawing.

3.05 AS–BUILTS

A. Provide as-built information on each system in accordance with Section 01780.

END OF SECTION

SECTION 02920
TOPSOILING, SEEDING, FERTILIZING, AND MULCHING

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes topsoiling, seeding, fertilizing, and mulching areas disturbed by construction activities.

1.02 RELATED WORK (as applicable)

A. Section 02310 – Grading
B. Section 02370 – Temporary Erosion and Sediment Control

1.03 REFERENCES

A. Minnesota Department of Transportation – Seeding Manual 2014 Edition.

1.04 SUBMITTALS

A. Topsoil
B. Seed Mixture and Application Rate Data
C. Mulching Material

PART 2 - PRODUCTS

2.01 TOPSOIL

A. Natural loam, sandy loam, silt loam, silty clay loam, or clay loam humus-bearing soils adapted to the sustenance of plant life.

B. Neither excessively acid nor excessively alkaline.

2.02 FERTILIZER

A. Use a 20-10-10 mixture of 20% Nitrogen, 10% Phosphorous, and 10% Pot Ash.

2.03 SEED MIXTURE

A. Use Minnesota DOT seed mixture #240 or other Engineer accepted seed mixture for well drained sandy soils:

<u>Minnesota DOT Seed Mixture #240</u>

13% Smooth Brome Grass
27% Kentucky Bluegrass
13% Canadian Bluegrass
2.5% Switch Grass
4.0% Slender Wheat-grass
7.0% “Reliant II” Hard Fescue
20% Perennial Rye-grass
2.5% Sand Dropseed
3.5% Little Bluestem
7.0% Red Clover
0.5% Purple Prairie Clover

B. Use Minnesota DOT seed mixture #250 or other Engineer accepted seed mixture for average loam, heavy clay or predominately moist soils:

Minnesota DOT Seed Mixture #250
14% Smooth Brome Grass
29% Kentucky Bluegrass
14% Canadian Bluegrass
3.0% Switch Grass
21% Perennial Rye-grass
3.0% Timothy
3.0% Redtop
6.0% Creeping Alfalfa
3.0% White Clover

2.04 MULCHING MATERIAL

A. Straw or hay

PART 3 - EXECUTION

3.01 TOPSOIL

A. After grading is completed, spread stockpiled topsoil over all disturbed areas, excluding those where another type of finished surface is being provided.

3.02 FERTILIZING

A. Work soil to be seeded until soil is reasonably even and loose.

B. Fertilize all topsoiled areas using 20-10-10 fertilizer at an application rate of 400-600 pounds per acre.

3.03 SEEDING

A. Sow seed using either equipment suited to that purpose or scatter seed uniformly over area with hand seeders when the weather is sufficiently quiet to prevent seeds from blowing away. Use an appropriate method and rate as directed by the Mn/DOT Seeding Manual.

B. Lightly rake soil to cover the seed with approximately ¼ inch of soil.

3.04 MULCHING

A. Place hay or straw mulching on seeded area loose enough to allow some sunlight to penetrate and air to circulate but thick enough to shade the ground, conserve soil moisture, and prevent/reduce erosion.

B. Do not perform mulching activities during periods of excessively high winds, which would preclude the proper placing of the mulch.

C. Apply straw or hay uniformly over the disturbed area to a loose depth of ½ to 1½ inches using 1½ to 3 tons of mulch per acre.

D. Immediately after spreading, anchor mulch using a mulch tiller consisting of a series of dull flat discs with notched edges or other approved equipment.

E. Anchor mulch to a depth of approximately 1½ to 2½ inches in the soil.

3.05 QUALITY CONTROL

A. All work necessary for topsoiling, fertilizing, seeding and mulching shall be completed to insure adequate re-establishment of vegetation.

B. The Contractor is responsible for re-establishing vegetation.

END OF SECTION

SECTION 03300
CAST-IN-PLACE CONCRETE (NON-STRUCTURAL)

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes provisions for non-structural cast-in-place concrete.

1.02 REFERENCES

A. ASTM C33 – Standard Specification for Concrete Aggregates.

B. ASTM C94 – Standard Specification for Ready Mix Concrete.

C. ASTM C150 – Standard Specification for Portland Cement.

D. ASTM A1064 – Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

E. ASTM A615 – Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

1.03 QUALITY ASSURANCE

A. Obtain cement and aggregate from the same source for all work.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: ASTM C150, Portland Cement Type – IA, Air Entrained.

B. Aggregates: ASTM C33.

1. Fine Aggregates:

a. Fine aggregates shall be clean, hard, tough, water sound and free of deleterious substances.

b. One hundred percent passing 3/8 inch sieve.
At least fifty percent passing No. 16 sieve.

2. Coarse Aggregates

a. Coarse aggregates shall be clean, hard, tough, water sound and free of deleterious substances.

b. Maximum aggregate size for reinforced concrete shall not be larger than 1/5 of the narrowest dimension between forms, nor larger than 3/4 of the minimum clear spacing between reinforcing bars or between bars and forms.

c. Maximum aggregate size for unreinforced slabs shall not be larger than 1/3 the slab thickness or 2 inches, whichever is smaller.

C. Mixing Water

1. Use potable water unless approved by the Engineer.

D. Material Storage

1. Store materials in such a manner as to prevent deterioration or intrusion of foreign matter.

2.02 METAL REINFORCEMENT

A. Rebar: Conforming to ASTM A615

B. Welded Wire Fabric: Conform to ASTM A1064

PART 3 - EXECUTION

3.01 PLACING CONCRETE

A. Concrete shall not be placed when atmospheric temperature is below 40 degrees Fahrenheit unless authorized in writing by the Engineer.

B. Forms shall conform to shapes, lines and dimensions of members as called for on the plans and shall be sufficiently tight to prevent leakage of mortar.

1. Properly brace and tie forms together to maintain position and shape and prevent leakage.

C. Remove water from place of deposit before concrete is placed.

D. Moisten subgrade at the time the concrete is deposited.

E. For job mixed concrete, rotate the mix at the speed recommended by the manufacturer in a clean batch machine. Mix the materials until they are uniformly distributed.

F. Deliver and mix Ready-Mixed Concrete in accordance with ASTM C94.

G. Access to the mixing plant shall be provided to the Engineer.

H. Tickets indicating time of adding initial mixing water may be required by the Engineer.

I. Place concrete in one continuous operation, once placing is started.

J. Remove supporting forms and shoring after members have acquired sufficient strength to support their weight and imposed loads safely.

K. If concrete placement is authorized for atmospheric temperatures at or below 40 degrees Fahrenheit, concrete temperature shall not be less than 45 degrees Fahrenheit at the time of placement.

    1. Heating procedures that alter or prevent the entrainment of the required amount of air in the concrete will not be permitted.

    2. Do not heat aggregates and water used for mixing to a temperature exceeding 120 degrees Fahrenheit.

L. Air temperatures surrounding concrete shall be maintained at a temperature of not less than 45 degrees Fahrenheit, nor more than 70 degrees Fahrenheit, for a period of four days.

    1. Following the four-day period, the concrete shall be protected from air temperatures below 35 degrees Fahrenheit, for an additional four-day period.

M. Chemical or other foreign material shall not be added to the concrete.

3.02 FIELD QUALITY CONTROL

A. Concrete shall have a compressive strength of 3000 psi at 28 days.

B. The Engineer may require slump and compression tests.

END OF SECTION