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

36564 208th Place, McGregor, MN

BID SCHEDULE

Schedule A - Individual Wastewater Facilities

NO.	DESCRIPTION	EST QTY	UNIT	UNIT COST	TOTAL COST
1	2000 Gallon Septic Tank	1	EA		
2	1000 Gallon Pump Tank	1	EA		
3	4" Solid PVC Pipe	25	FT		
4	Two-way cleanout	1	EA		
5	Effluent Pump With Controls	1	EA		
6	Electric Cable	100	FT		
7	2-inch Solid PVC Effluent Pipe	62	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

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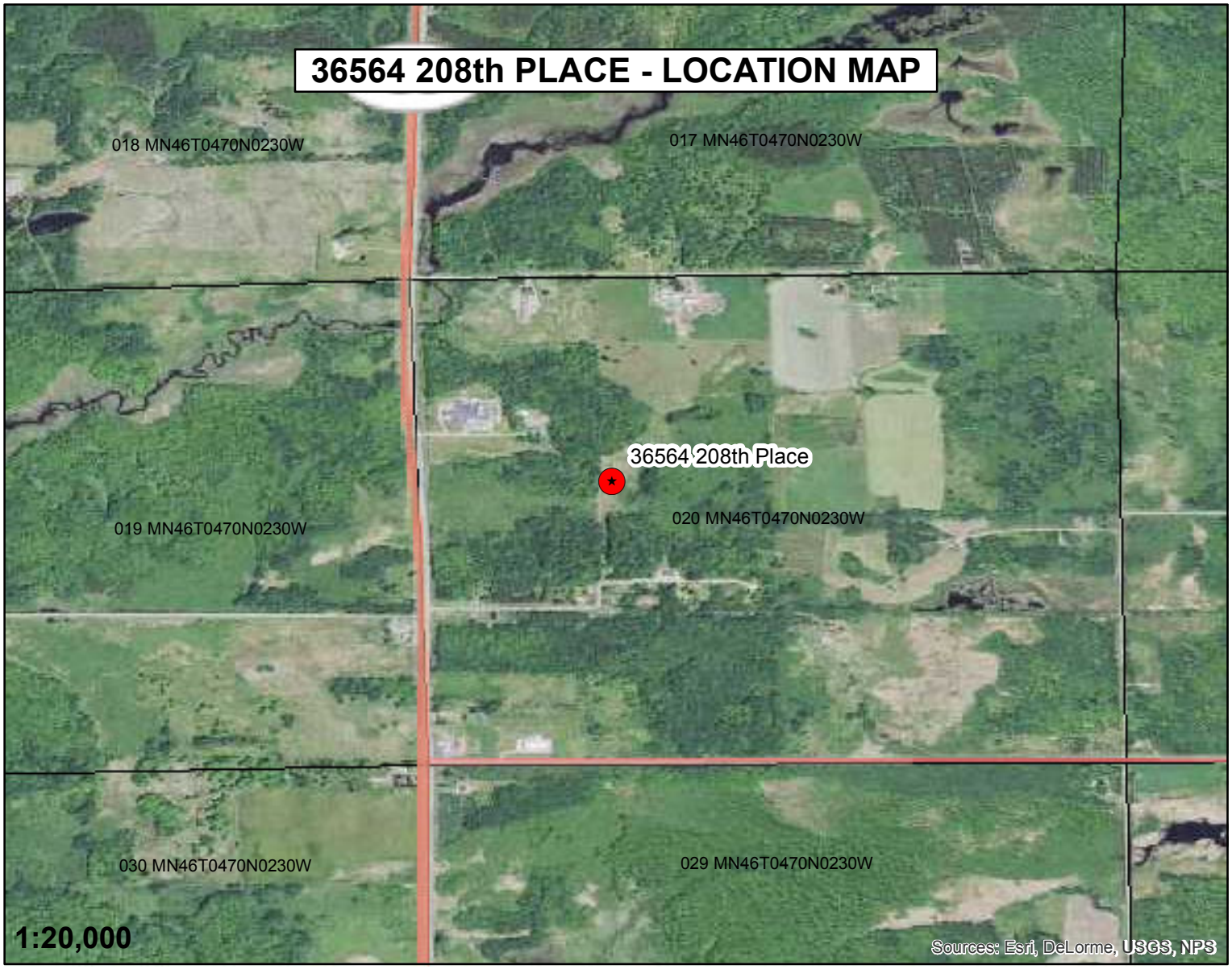
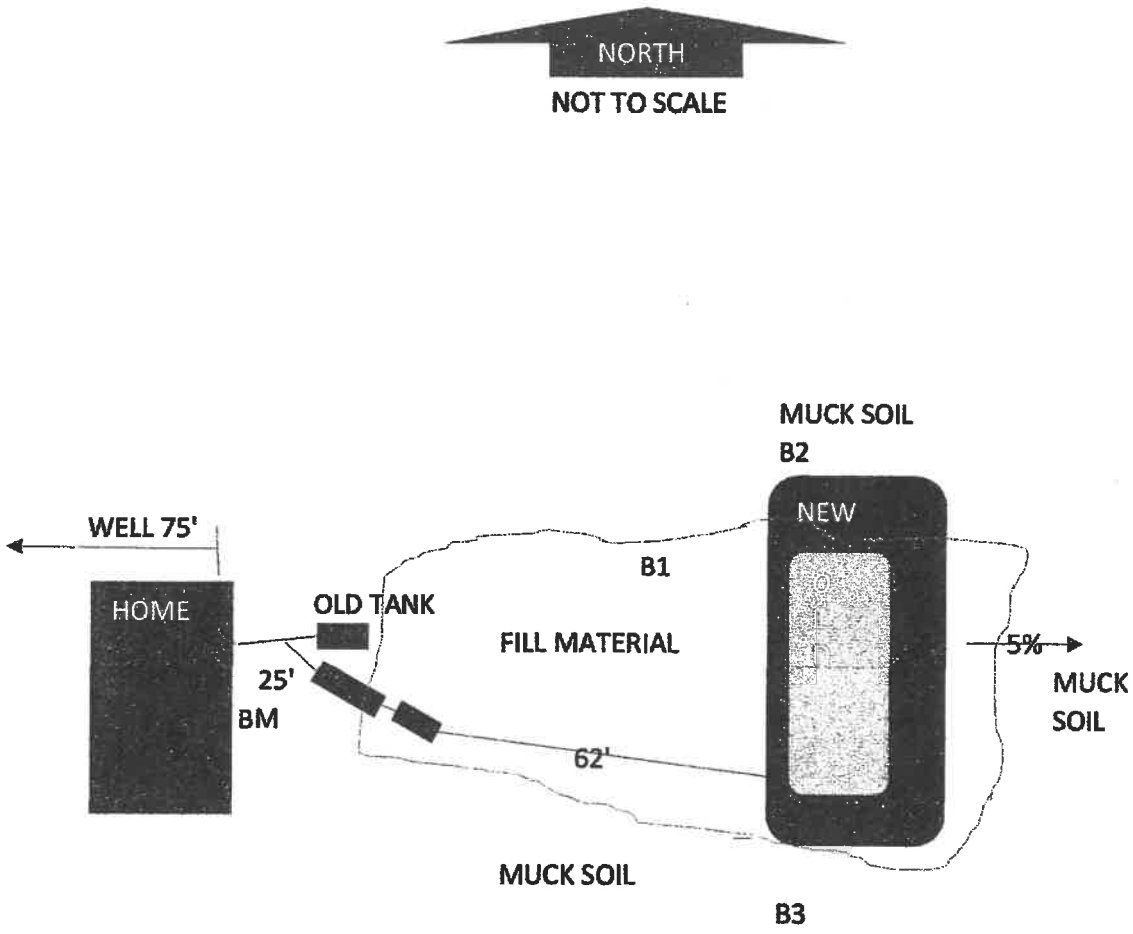
36564 208th PLACE - LOCATION MAP



LOCATION	Date: 3/5/2019 ★ 36564 208th Place N	INDIAN HEALTH SERVICE · PHS · 1955 ·	SHEET NO. 1 of 1


NORTH
NOT TO SCALE
MUCK SOIL
B2
NEW
WELL 75'
B1
HOME
OLD TANK
FILL MATERIAL
5%
25'
BM
MUCK
SOIL
62'
MUCK SOIL
B3

Site Elevation Sheet

LOCATION

BENCHMARK LOCATION BOTTOM OF SIDING ELEVATION 100.00

TANK #1 surface 99.30 inlet 96.70

PUMP TANK surface 98.90 inlet 96.00

EXISTING MOUND SURFACE AT NEW ROCKBED

N.E. 98.90

N.W. 99.00

S.E. 100.88

S.W. 100.74

GRADE EXISTING MOUND TO APROX. 98.80

SAND TO ROCK INTERFACE 101.80

SOIL PITS OR BORINGS

#1 SURFACE 96.70 REDOX 96.10

#2 SURFACE 95.70 REDOX 95.30

#3 SURFACE 94.80 REDOX 94.60 WATER 94.50

KEVIN HERWIG

E-Z EXCAVATING LLC LLC.

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

DESIGN

LOCATION: 36564 208TH PLACE MCGREGOR MN

OWNER: MILLE LACS BAND OF OJIBWE

SYSTEM TYPE: TYPE III MOUND

DESIGN FLOW: 3 BEDROOM DESIGNED @ 600 GPD

TREATMENT AREA: 500 SQ.FT.

SLOPE: 5 %

SEPTIC TANK: 2000 GAL. SPLIT/COMBO WITH FILTER AND ALARM

PUMP TANK: 1000 GAL

PUMP: GOULDS WE0551H

FLOW METER: SJE RHOMBUS AB DUO W/EVENT COUNTER

KEVIN HERWIG M.P.C.A. 1472

INSTALLATION NOTES

This mound system is an upgrade from three bedrooms to four bedrooms. The existing mound absorption area shall be increased due to soil type. The existing mound is to be stripped down to the washed sand in all areas, upslope, downslope and end slopes are to stripped to virgin soil. Sand is to be jar tested to ensure cleanliness. Any contaminated sand is to be removed and replaced with new washed sand. The new down slope and end extension absorption area is to be roughed up in cover with washed sand. The remainder of the construction of the mound is normal Type III mound construction and practices.

Topsoil may be reused.

Contaminated sand, rock and piping are to be disposed of offsite.

KEVIN HERWIG M.P.C.A.

STREET ADDRESS, CITY, ST ZIP CODE
T TELEPHONE U WEBSITE

CONSTRUCTION NOTES

PRODUCT BRAND & MODEL LISTED IN DESIGN MUST BE USED. (CEMSTONE TANKS –1 SEPTIC 2000 GAL. COMBO(#9552001) W/ POLYLOK PL-122 FILTER WITH ALARM, 1-PUMP TANK 1000 GAL.(# 9551001) PUMP – GOULDS WE0511H) PUMP CHAMBER AND PUMP SETTINGS WILL NOT BE CORRECT IF OTHER PRODUCTS ARE USED.**

SJE RHOMBUS AB DUO CONTROL WITH EVENT COUNTER(POLYLOC FILTER PL-122 WITH ALARM)

IT IS THE DESIGNERS 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 # 1472

UNIVERSITY OF MINNESOTA

OSTP Soil Observation Log

Project ID:

v 05.13.14

Client/ Address:	36564 208TH PLACE			Legal Description/ GPS:			
Soil parent material(s): (Check all that apply)	☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter						
Landscape Position: (check one)	☐ Summit ☑ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope				Slope shape	LIN	
Vegetation	GRASS	Soil survey map units	504B	Slope%	5.0	Elevation:	96.7
Weather Conditions/Time of Day:	OVERCAST				Date	11/15/18	
Observation #/Location:	1E/C				Observation Type:	Soil Pit	

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-6	Fill Soil	<35%	10YR 3/2				Granular	Weak	Friable
6-12	Fill Soil	<35%	10YR 4/3	7.5YR 4/6	Concentrations	S1	Platey	Moderate	Friable
12-18	Clay Loam	<35%	5YR 4/4				Massive	Strong	Firm

Comments

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

KEVIN HERWIG		3945	11/15/2018
(Designer/Inspector)	(Signature)	(License #)	(Date)

Additional Soil Observation Logs

Project ID:

University of Minnesota Onsite Sewage Treatment Program

Client/ Address:	36564 208TH PLACE	Legal Description/ GPS:	

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

Landscape Position: (check one) ☐ Summit ☑ Shoulder ☐ Back/Side Slope ☐ Foot Slope ☐ Toe Slope

Vegetation	LAWN	Soil survey map units	504B	Slope%	5.0	Slope shape	LIN
Weather Conditions/Time of Day:	OVERCAST			Date	11/15/18	Elevation:	95.7
Observation #/Location:	2			Observation Type:	Soil Pit		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-8	Fill Soil	<35%	10YR 3/2	7.5YR 4/6	Concentrations	S1	Granular	Weak	Friable

Comments:

Observation #/Location:				Observation Type:			

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-5	Fine Sandy Loam	<35%	10YR 3/2				Granular	Weak	Friable
5-13	Fine Sandy Loam	<35%	10YR 5/3	7.5YR 4/6	Concentrations	S1	Platey	Weak	Friable

Comments:

Minnesota Pollution Control Agency

OSTP Design Summary Worksheet

UNIVERSITY OF MINNESOTA

Property Owner/Client: MILLE LACS BAND OF OJIBWE | Project ID: | v 04.20.2016

Site Address: 36564 208TH NPLACE MCGERGOR MN | Date: 11/16/18

1. DESIGN FLOW, STRENGTH OF WASTE, AND TANKS

A. *Design Flow:* 600 Gallons Per Day (GPD) | Number of Bedrooms (Residential): 3

Type of Wastewater: Residential | Treatment Level: C | Nutrients:

Commercial (select method and provide data): ☐ Measured Flow: GPD | ☐ Estimated Flow: GPD

B. *Septic Tanks:*

Minimum Code Required Septic Tank Capacity (Dwellings): 1500 Gallons, in 1 Tanks or Compartments

Minimum Septic Tank Capacity for Other Establishments = Design Flow X 3.0 if received by gravity or 4.0 if received by pressure

Waste received by: Gravity GPD X 3 = 0 Gallons

Recommended Septic Tank Capacity: 1600 Gallons, in 2 Tanks or Compartments

Effluent Screen & Alarm: ☑ Yes ☐ No ☐ Optional ☐ Screen Only | Effluent Screen Manufacturer/Model: PL122

C. *Holding Tanks Only:* Minimum Capacity: Residential =400 gal/bedroom, Other Establishment = Design Flow x 5.0, Minimum size 1000 gallons

Minimum Code Required Capacity: Gallons, in Tanks | Type of High Level Alarm:

Designer Recommended Capacity: Gallons, in Tanks

D. *Pump Tank 1* Capacity (Code Minimum): 500 Gallons | *Pump Tank 2* Capacity (Code Minimum): Gallons

Pump Tank 1 Capacity (Designer Rec): 1000 Gallons | *Pump Tank 2* Capacity (Designer Rec): Gallons

Pump 1: 38.0 GPM Total Head 18.8 ft | Pump 2 GPM Total Head ft

Supply Pipe Dia. 2.00 in Dose Volume: 148.0 gal | Supply Pipe Dia. in Dose Volume: gal

2. SYSTEM AND DISTRIBUTION TYPE

Soil Treatment Area Type: Mound | Distribution Type: Pressure Distribution-Level

Benchmark Reference Elevation: 100.00 ft | Benchmark Location: BOTTOM OF SIDING

MPCA Type: Type III | Type of Distribution Media: ☑ Drainfield Rock ☐ Registered Treatment Media:

Comments: BUILT ON EXISTING SITE

3. SITE EVALUATION:

A. Depth to Limiting Layer: 0 in 0.0 ft

B. Elevation of Limiting Layer: 99.5

C. Loc. of Restricive Elevation: 1

D. Minimum Required Separation: 36 in 3.0 ft

E. Code Maximum Depth of System: Mound in

F. Measured Land Slope %: 5.0 %

G. Soil Texture: Silt Loam

H. Soil Hyd. Loading Rate: 0.42 GPD/ft²

I. Perc Rate: MPI

J. Soil with >35% Rock Fragments Present? ☐ Yes ☑ No

If yes describe below: % rock and layer thickness, amount of soil credit and any additonal information for adressing the rock fragments in this design.

Comments:

4. DESIGN SUMMARY

Trench Design Summary

Dispersal Area ft² | Sidewall Depth in | Trench Width ft

Total Lineal Feet ft | Number of Trenches | Code Maximum Trench Depth in

Contour Loading Rate ft | Min Trench Length ft | Designer's Max Trench Depth in

OSTP Design Summary Worksheet

Minnesota Pollution Control Agency

University of Minnesota

Bed Design Summary

Absorption Area	ft²	Depth of sidewall	in	Code Maximum Bed Depth	in
Bed Width	ft	Bed Length	ft	Designer's Max Bed Depth	in

Mound Design Summary

Absorption Bed Area	500.0 ft²	Bed Length	50.0 ft	Bed Width	10.0 ft
Absorption Width	29.0 ft	Clean Sand Lift	3.0 ft	Berm Width (0-1%)	ft
Upslope Berm Width	13.8 ft	Downslope Berm Width	23.0 ft	Endslope Berm Width	21.0 ft
Total System Length	92.0 ft	Total System Width	46.8 ft	Contour Loading Rate	12.0 gal/ft

At-Grade Design Summary

Absorption Bed Width	ft	Absorption Bed Length	ft	System Finished Height	ft
Contour Loading Rate	gal/ft	Upslope Berm Width	ft	Downslope Berm Width	ft
Endslope Berm Width	ft	System Length	ft	System Width	ft

Level & Equal Pressure Distribution Summary

No. of Perforated Laterals	3	Perforation Spacing	3 ft	Perforation Diameter	1/4 in
Lateral Diameter	2.00 in	Min. Delivered Volume	98 gal	Maximum Delivered Volume	150 gal

Non-Level and Unequal Pressure Distribution Summary

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

Minimum Delivered Volume ____ gal

Maximum Delivered Volume ____ gal

Additional Info for Type IV/Pretreatment Design

A. *Calculate the organic loading*

1. *Organic Loading to Pretreatment Unit = Design Flow X Estimated BOD* in mg/L in the effluent X 8.35 ÷ 1,000,000

____ gpd X ____ mg/L X 8.35 ÷ 1,000,000 = ____ lbs BOD/day

2. Type of Pretreatment Unit Being Installed: ____

3. Calculate *Soil Treatment System Organic Loading: BOD concentration after pretreatment ÷ Bottom Area* = lbs/day/ft²

____ mg/L X 8.35 ÷ 1,000,000 ÷ ____ ft² = ____ lbs/day/ft²

Comments/Special Design Considerations:

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

KEVIN HERWIG		1472	11/16/18
(Designer)	(Signature)	(License #)	(Date)

Minnesota Pollution Control Agency

OSTP Mound Design Worksheet >1% Slope

University of Minnesota

1. SYSTEM SIZING: Project ID: v 04.20.2016

A. Design Flow:	600	GPD
B. Soil Loading Rate:	0.42	GPD/ft²
C. Depth to Limiting Condition:		ft
D. Percent Land Slope:	5.0	%
E. Design Media Loading Rate:	1.2	GPD/ft²
F. Mound Absorption Ratio:	2.90	

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)	0.8	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	0.6	2.4	0.78	2
46 to 60	0.45	2.8	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. Calculate Dispersal Bed Area: Design Flow ÷ Design Media Loading Rate = ft²

600 GPD ÷ 1.2 GPD/ft² = 500 ft²

If a larger dispersal media area is desired, enter size: ft²

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

C. Calculate Contour Loading Rate: Bed Width X Design Media Loading Rate

10 ft² X 1.2 GPD/ft² = 12.0 gal/ft *Can not exceed Table 1*

D. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area ÷ Bed Width = Bed Length

500 ft² ÷ 10.0 ft = 50.0 ft

3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width X Mound Absorption Ratio = Absorption Width

10.0 ft X 2.9 = 29.0 ft

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

Calculate Downslope Absorption Width: Absorption Width - Bed Width

29.0 ft - 10.0 ft = 19.0 ft

4. DISTRIBUTION MEDIA: ROCK

A. Rock Media Depth Below Distribution Pipe

0.50 ft estimated volume of rock on mound materials page

5. DISTRIBUTION MEDIA: REGISTERED TREATMENT PRODUCTS: CHAMBERS AND EZFLOW

A. Enter Dispersal Media:

B. Enter the Component: Length: ft Width: ft Depth: ft

C. Number of Components per Row = Bed Length divided by Component Length (Round up)

ft ÷ ft = components/row

D. Actual Bed Length = Number of Components/row X Component Length:

components X ft = ft

E. Number of Rows = Bed Width divided by Component Width (Round up)

ft ÷ ft = rows *Adjust width so this is an whole number.*

F. Total Number of Components = Number of Components per Row X Number of Rows

X = components

6. MOUND SIZING

A. Calculate Minimum Clean Sand Lift: 3 feet minus Depth to Limiting Condition = Clean Sand Lift

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

B. Calculate Upslope Height: Clean Sand Lift + media depth + cover (1 ft.) = Upslope Height

3.0 ft + 0.8 ft + 1.0 ft = 4.8 ft

C. Select Upslope Berm Multiplier (based on land slope): 2.91

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

D. Calculate Upslope Berm Width: Multiplier X Upslope Mound Height = Upslope Berm Width

2.91 ft X 4.8 ft = 13.8 ft

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

10.0 ft X 5.0 % ÷ 100 = 0.50 ft

F. Calculate Downslope Mound Height: Upslope Height + Drop in Elevation = Downslope Height

4.8 ft + 0.50 ft = 5.3 ft

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

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

H. Calculate Downslope Berm Width: Multiplier X Downslope Height = Downslope Berm Width

3.53 x 5.3 ft = 18.5 ft

I. Calculate Minimum Berm to Cover Absorption Area: Downslope Absorption Width + 4 feet

19.0 ft + 4 ft = 23.0 ft

J. Design Downslope Berm = greater of 4H and 4I: 23.0 ft

K. Select Endslope Berm Multiplier: 4.00 *(usually 3.0 or 4.0)*

L. Calculate Endslope Berm X Downslope Mound Height = Endslope Berm Width

4.00 ft X 5.3 ft = 21.0 ft

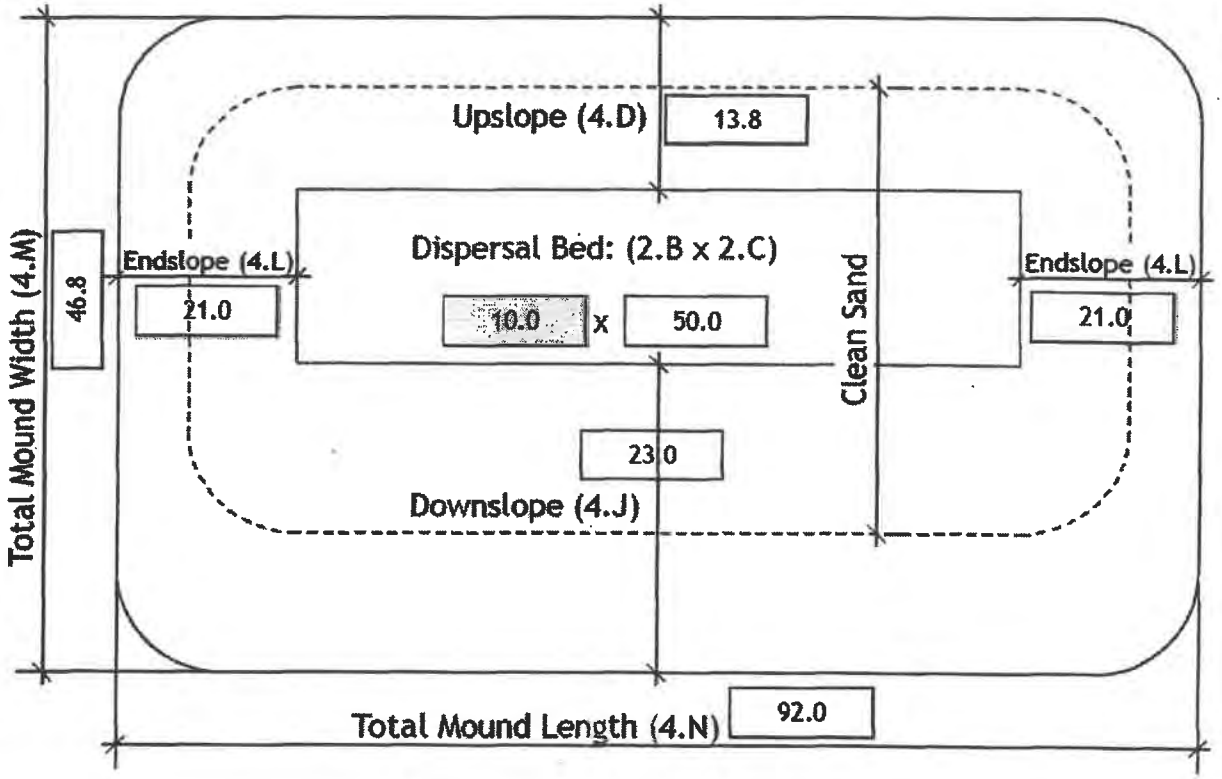
M. Calculate Mound Width: Upslope Berm Width + Bed Width + Downslope Berm Width

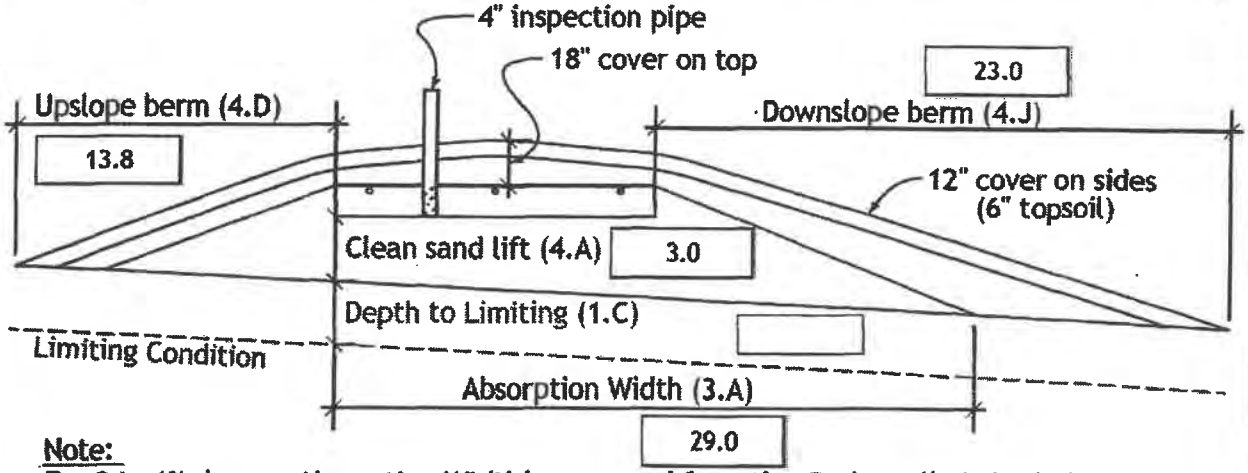
13.8 ft + 10.0 ft + 23.0 ft = 46.8 ft

N. Calculate Mound Length: Endslope Berm Width + Bed Length + Endslope Berm Width

21.0 ft + 50.0 ft + 21.0 ft = 92.0 ft

7. MOUND DIMENSIONS





Note:
For 0 to 1% slopes, *Absorption Width* is measured from the *Bed* equally in both directions.
For slopes >1%, *Absorption Width* is measured downhill from the upslope edge of the *Bed*.

Comments:

Minnesota Pollution Control Agency

OSTP Mound Materials Worksheet

UNIVERSITY OF MINNESOTA

Project ID:

v 04.20.2016

A. Calculate Rock *Volume*: (Rock Below Pipe + Rock to cover pipe (*pipe dia + 1 inch*)) X *Bed Length* (2.D) X *Bed Width* (2.B) = *Volume* (ft^3)

(6 in + 3 in) ÷ 12 X 50.0 ft X 10.0 ft = 375.0 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards:

375.0 ft^3 ÷ 27 = 13.9 yd^3

Add 20% for constructability:

13.9 yd^3 X 1.2 = 16.7 yd^3

For systems using other distribution media - see product registration for material required

B. Calculate *Clean Sand Volume*:

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

3.0 ft X 10.0 ft X 50.0 ft = 1500.0 ft^3

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*

ft^3 + ft^3 + ft^3 = ft^3

For a Mound on a slope greater than 1%

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

((4.8 ft - 1) X 3.0 ft X 50.0) ÷ 2 = 281.3 ft^3

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

((5.3 ft - 1) X 19.0 ft X 50.0) ÷ 2 = 2018.8 ft^3

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

(5.3 ft - 1) X 3.0 ft X 10.0 ft = 127.5 ft^3

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

281.3 ft^3 + 2018.8 ft^3 + 127.5 ft^3 + 1500.0 ft^3 = 3927.5 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards:

3927.5 ft^3 ÷ 27 = 145.5 yd^3

Add 20% for constructability:

145.5 yd^3 X 1.2 = 174.6 yd^3

C. Calculate *Sandy Berm Volume*:

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

(5.0 - 0.5)ft X 46.8 ft X 92.0) ÷ 2 = 9692.3 ft^3

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

9692.3 ft^3 - 3927.5 ft^3 - 375.0 ft^3 = 5389.8 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards:

5389.8 ft^3 ÷ 27 = 199.6 yd^3

Add 20% for constructability:

199.6 yd^3 x 1.2 = 239.5 yd^3

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

46.8 ft X 92.0 ft X 0.5 ft = 2153.8 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards:

2153.8 ft^3 ÷ 27 = 79.8 yd^3

Add 20% for constructability:

79.8 yd^3 x 1.2 = 95.7 yd^3

OSTP Pressure Distribution Design Worksheet

Minnesota Pollution Control Agency

University of Minnesota

Project ID: v 04.20.2016

1. Media Bed Width: 10 ft

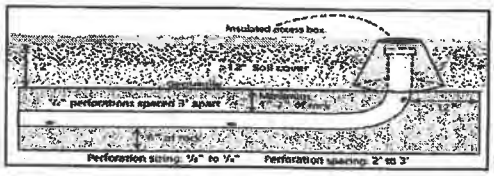
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

[(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 (accept in at-grades)

4. Select *Perforation Spacing*: 3.0 ft

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



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

50 - 2ft = 48 ft *Perforation can not be closer then 1 foot from edge.*

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

Number of Perforation Spaces = 48 ft ÷ 3 ft = 16 Spaces

8. *Number of Perforations per Lateral* is equal to 1.0 plus the *Number of Perforation Spaces*. 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 = 16 Spaces + 1 = 17 Perfs. Per Lateral

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

¼ Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	10	13	18	30	60
2½	8	12	16	28	54
3	8	12	16	25	52

7/32 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	11	16	21	34	66
2½	10	14	20	32	64
3	9	14	19	30	60

3/16 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	12	18	26	46	87
2½	12	17	24	40	80
3	12	16	22	37	75

1/8 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	21	33	44	74	140
2½	20	30	41	69	135
3	20	29	38	64	128

9. *Total Number of Perforations* equals the *Number of Perforations per Lateral* multiplied by the *Number of Perforated Laterals.*

17 Perf. Per Lat. X 3 Number of Perf. Lat. = 51 Total Number of Perf.

10. Select *Type of Manifold Connection* (End or Center): ☑ End ☐ Center

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

Minnesota Pollution Control Agency

OSTP Pressure Distribution Design Worksheet

University of Minnesota

12. 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	50	ft	=	500	ft^2

b. *Square Foot per Perforation* = *Bed Area* divided by the *Total Number of Perforations*.

500	ft^2	÷	51	perforations	=	9.8	ft^2/perforations

13. Select *Minimum Average Head*: 1.0 ft

14. Select *Perforation Discharge* (GPM) based on Table: 0.74 GPM per Perforation

15. Determine required *Flow Rate* by multiplying the *Total Number of Perfs.* by the *Perforation Discharge.*

51	Perfs	X	0.74	GPM per Perforation	=	38	GPM

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

17. *Volume of Distribution Piping* =
= [*Number of Perforated Laterals* X *Length of Laterals* X (Volume of Liquid Per Foot of Distribution Piping]

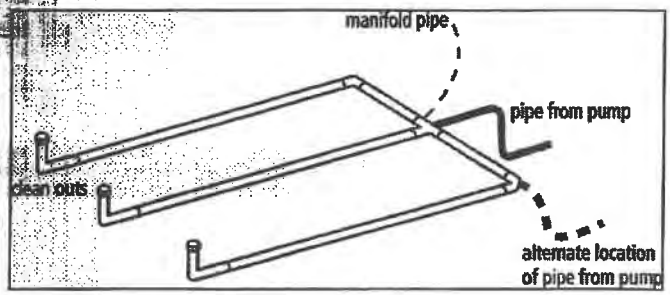
3	X	48	ft	X	0.170	gal/ft	=	24.5	Gallons

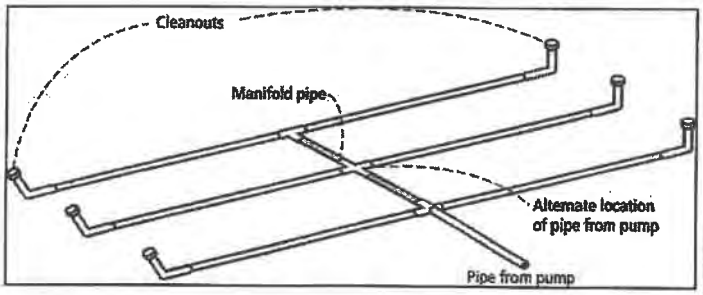
18. Minimum Delivered Volume = Volume of Distribution Piping X 4

24.5	gals	X	4	=	97.9	Gallons

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:

Minnesota Pollution Control Agency

OSTP Basic Pump Selection Design Worksheet

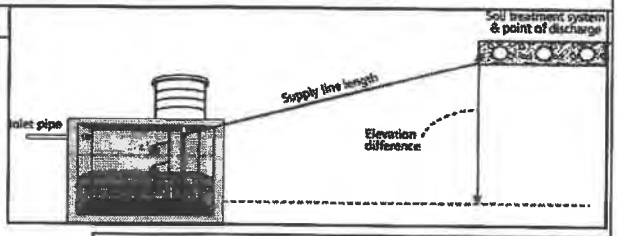
University of Minnesota

1. PUMP CAPACITY Project ID: v 04.20.2016

Pumping to Gravity or Pressure Distribution: Pressure

1. If pumping to gravity enter the gallon per minute of the pump: _____ GPM *(10 - 45 gpm)*
2. If pumping to a pressurized distribution system: 38.0 GPM
3. Enter pump description: Demand Dosing Soil Treatment

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 11 ft

B. Distribution Head Loss: 5 ft

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

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: 62 ft

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

Friction Loss = 3.67 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 (D.2)* X 1.25 = *Equivalent Pipe Length*

62 ft X 1.25 = 77.5 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* (Line E) by the *Equivalent Pipe Length* (Line F) and divide by 100.

Supply Friction Loss =

3.67 ft per 100ft X 77.5 ft ÷ 100 = 2.8 ft

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

11.0 ft + 5.0 ft + _____ ft + 2.8 ft = 18.8 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **38.0** GPM (Line 1 or Line 2) with at least **18.8** feet of total head.

Comments:

Minnesota Pollution Control Agency

OSTP Pump Tank Design Worksheet (Demand Dose)

University of Minnesota

DETERMINE TANK CAPACITY AND DIMENSIONS | Project ID: | v 04.20.2016

1. A. *Design Flow (Design Sum.1A)*: 600 GPD
   B. Min. required pump tank capacity: 500 Gal C. Recommended pump tank capacity: 1000 Gal

2. A. Tank Manufacturer: CEMSTONE B. Tank Model: 9551001
   C. Capacity from manufacturer: ____ Gallons
   D. Gallons per inch from manufacturer: ____ Gallons per inch
   E. Liquid depth of tank from manufacturer: ____ 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.

PUMP DOSING VOLUME

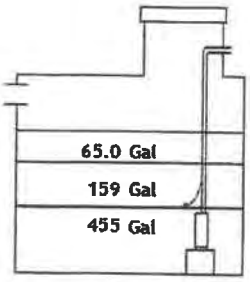
3. Calculate *Volume to Cover Pump* (The inlet of the pump must be at least 4-inches from the bottom of the pump tank & 2 inches of water covering the pump recommended)
   (Pump and block height + 2 inches) X *Gallons Per Inch* (2C or 3E)
   (12 in + 2 inches) X 32.5 Gallons Per Inch = 455 Gallons
4. *Minimum Delivered Volume* = 4 X Volume of Distribution Piping:
   - *Line 17 of the Pressure Distribution or Line 11 of Non-level* 98 Gallons (minimum dose)
5. Calculate *Maximum Pumpout Volume* (25% of Design Flow)
   Design Flow: 600 GPD X 0.25 = 150 Gallons (maximum dose)
6. *Select a pumpout volume that meets both Minimum and Maximum:* 148 Gallons
7. Calculate *Doses Per Day* = Design Flow ÷ *Delivered Volume*
   600 gpd ÷ 148 gal = 4 *Doses*
8. Calculate Drainback:
   A. *Diameter of Supply Pipe* = 2 inches
   B. Length of Supply Pipe = 62 feet
   Volume of Liquid Per Lineal Foot of Pipe = 0.170 Gallons/ft
   Drainback = Length of Supply Pipe X Volume of Liquid Per Lineal Foot of Pipe
   62 ft X 0.170 gal/ft = 10.5 Gallons
9. *Total Dosing Volume = Delivered Volume* plus *Drainback*
   148 gal + 10.5 gal = 159 Gallons
10. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank
    2 in X 32.5 gal/in = 65.0 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

11. Calculate *Float Separation Distance* using *Dosing Volume*.
    Total Dosing Volume / Gallons Per Inch
    159 gal ÷ 52.0 gal/in = 3.0 Inches
12. 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 + Float Separation Distance*
    14 in + 3.0 in = 17 Inches
    Distance to set Alarm Float = Distance to set Pump-On Float + Alarm Depth (2-3 inches)
    17 in + 2.0 in = 19 Inches

Inches for Dose: 3.0 in
Alarm Depth 19.0 in
Pump On 17.0 in
Pump Off 14.0 in



UNIVERSITY
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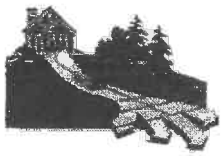


Septic System Management Plan for Above Grade Systems

The goal of a septic system is to protect human health and the environment by properly treating wastewater before returning it to the environment. Your septic system is designed to kill harmful organisms and remove pollutants before the water is recycled back into our lakes, streams and groundwater.

This **management plan** will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic maintainer or service provider. However, it is **YOUR** responsibility to make sure all tasks get accomplished in a timely manner.

The University of Minnesota's *Septic System Owner's Guide* contains additional tips and recommendations designed to extend the effective life of your system and save you money over time.

Proper septic system design, installation, operation and maintenance means safe and clean water!

Property Owner MILLE LACS BAND OF OJIBWE	Email
Property Address 36564 208TH PLACE	Property ID
System Designer KEVIN HERWIG	Contact Info 320-241-706
System Installer	Contact Info
Service Provider/Maintainer	Contact Info
Permitting Authority	Contact Info
Permit #	Date Inspected

Keep this Management Plan with your Septic System Owner's Guide. The Septic System Owner's Guide includes a folder to hold maintenance records including pumping, inspection and evaluation reports. Ask your septic professional to also:

- Attach permit information, designer drawings and as-built of your system, if they are available.
- Keep copies of all pumping records and other maintenance and repair invoices with this document.
- Review this document with your maintenance professional at each visit; discuss any changes in product use, activities, or water-use appliances.

For a copy of the *Septic System Owner's Guide*, visit www.bookstores.umn.edu and search for the word "septic" or call 800-322-8642.

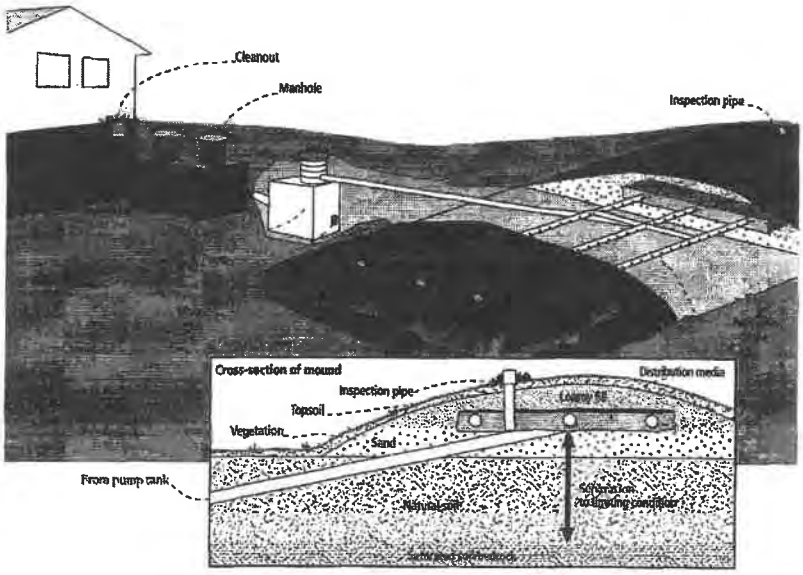
For more information see http://septic.umn.edu

Version: August 2015

UNIVERSITY OF MINNESOTA

Septic System Management Plan for Above Grade Systems

Your Septic System



Septic System Specifics

System Type: ○ I ○ II ◉ III ○ IV* ○ V*

(Based on MN Rules Chapter 7080.2200 – 2400)

**Additional Management Plan required*

☐ System is subject to operating permit*

☐ System uses UV disinfection unit*

Type of advanced treatment unit _____

Dwelling Type

Number of bedrooms: 3

System capacity/ design flow (gpd): 600

Anticipated average daily flow (gpd): 450

Comments _____

Business? : ○ Y ◉ N What type? _____

Well Construction

Well depth (ft): _____

- ☐ Cased well Casing depth: YES
- ☐ Other (specify): _____

Distance from septic (ft): 180+

Is the well on the design drawing? ◉ Y ○ N

Septic Tank

- ☐ First tank *Tank volume:* 2000 *gallons*
  Does tank have two compartments? ◉ Y ○ N
- ☐ Second tank *Tank volume:* _____ *gallons*
- ☐ Tank is constructed of CONCRETE
- ☐ Effluent screen: ◉ Y ○ N Alarm ◉ Y ○ N

- ☐ Pump Tank 1000 *gallons*
- ☐ Effluent Pump *make/model:* GOULDS WE0511H
  Pump capacity 60 GPM
  TDH 20 Feet of head
- ☐ Alarm location HOME

Soil Treatment Area (STA)

Mound/At-Grade area (width x length): 46.8 ft x 92.0 ft

Rock bed size (width x length): 10 ft x 50 ft

Location of additional STA: _____

Type of distribution media: ROCK

☑ Inspection ports ☑ Cleanouts

☑ Surface water diversions

☐ Additional STA not available

CONTRUCTION OF SANITATION FACILITIES
FOR

EXISTING HOMES
AT

SCATTERED SITES
ON THE

MILLE LACS INDIAN RESERVATION
MILLE LACS, KANEBEC, AITKIN, AND PINE COUNTIES, MINNESOTA

PROJECT BE 17-L02
36564 208th Place, McGregor, MN

SPECIFICATIONS

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
INDIAN HEALTH SERVICE
OFFICE OF ENVIRONMENTAL HEALTH
AND ENGINEERING
BEMIDJI AREA OFFICE

SPECIFICATION INDEX

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: 36564 208th Place, McGregor, Aitkin County, 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 Septic Tanks, Pump Tank and Mound System per design, drawing and specifications.
2. Abandon Existing Septic Tank and Existing Mound System per design drawing and specifications.
3. Acquire ISTS Permit

1.03 ADDITIONAL INFORMATION

A. 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

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.

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 the 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

A. Individual Wastewater Facilities Design

1. 2000 Gallon Septic Tank

a. Measurement: Per each tank installed.

b. Basis for Payment: Payment shall be full compensation for septic tank, fittings, risers, connections, excavation, compaction, grading, and site restoration.

2. 1000 Gallon Pump Tank

a. Measurement: Per each tank installed

b. Basis for Payment: Payment shall be full compensation for pump tank, fittings, risers, connections, excavation, compaction, grading, and site restoration

3. 4-Inch Solid PVC Pipe:

   a. Measurement: Per linear foot,

   b. Basis for Payment: Includes pipe, fittings, connections, excavation, trenching, bedding, haunching, backfill, compaction, grading, and site restoration.

4. Two-way Cleanout:

   a. Measurement: By each unit installed.

   b. Basis for Payment: Includes pipe, fittings, covers, connections, excavation, trenching, bedding, haunching, backfill, compaction, grading, and site restoration.

5. Effluent Pump with Controls:

   c. Measurement: By each unit installed.

   d. Basis for Payment: Includes pump, control, alarm system, float switches, above ground electrical wiring, in-chamber piping, union, fittings and connections.

6. Electrical Cable:

   a. Measurement: Per linear foot.

   b. Basis for Payment: Payment shall be full compensation for cable, splices, conduit, excavation, trenching, bedding, backfill, compaction, grading, and site restoration.

7. 2-inch Solid PVC Effluent Pipe:

   a. Measurement: Per linear foot.

   b. Basis for Payment: Payment shall be full compensation for pipe, fittings, connections, excavation, trenching, bedding, haunching, backfill, compaction, grading, and site restoration.

8. Mound System Constructed on Existing Mound Site:

   a. Measurement: Lump Sum for the complete mound system.

b. Basis for Payment: Payment shall be full compensation for a complete and operational mound system per the design and specifications. This includes removal of all existing piping, rock, sand, loam cover topsoil and debris above the original rough in, installation of new clean sand material, loam fill, topsoil, gravel synthetic material and placement, plowing of the original topsoil, removing excessive vegetation, manifold piping, perforated pipe, seeding, protective cover for seeding, observation pipes and all other incidentals.

9. ISTS Permit:

   a. Measurement: Per each permit obtained.

   b. Basis for Payment: Payment includes site evaluation, permit application, and permit fee submitted to appropriate local authority.

10. Abandon Existing Tank:

   a. Measurement: Lump Sum for the abandoned septic tank.

   b. Basis for Payment: Payment shall be full compensation for all work necessary to properly abandon the existing septic tank per state code.

PART 3 – EXECUTION (N/A)

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’s Representative

C. Engineer 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 and Engineer with a written preliminary construction schedule containing start and completion dates of the major items at the preconstruction meeting.

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

C. Communicate major changes to the schedule to the Owner and Engineer 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 and Engineer’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 Engineer, unless requested otherwise.

1. Contractor's option:
    i. Two (2) hard copies.
    ii. An electronic copy in pdf format delivered to Engineer 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 Engineer's comments.

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

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

END OF SECTION

SECTION 01420
REFERENCES

PART 1 - GENERAL

1.01 SUMMARY

A. This section includes a list of common organizations, associations or appropriate agencies with jurisdiction that have references, standards, laws or regulations cited in these specifications. This list is not all-inclusive. Other agencies (county, local, tribal) with jurisdiction might not be listed here.

B. Use latest revision of all references, standards, laws or regulations.

1.02 LIST OF ORGANIZATIONS, ASSOCIATIONS & AGENCIES

A. National Standards Organizations & Associations

American Association of State Highway and Transportation Officials (AASHTO)
444 North Capital Street NW, Suite 249
Washington DC, 20001
(202) 624-5800
www.aashto.org

American Concrete Institute (ACI)
ACI International
PO Box 9094
Farmington Hills, Michigan 48333-9094
(810) 848-3700
www.aci-int.org

American Society for Testing and Materials (ASTM)
100 bar Harbor Drive
West Conshohocken, Pa 19428-2959
(610) 832-9585
www.astm.org

American Water Works Association AWWA
6666 West Quincy Avenue
Denver, CO 80235
(303) 794-7711
www.awwa.org

National Electric Code (NEC)
National Fire and Protection Association
1 Batterymarch Park
Quincy, MA 02269-9959
1 888 632-2633
www.nec.com

National Electrical Manufacturer's Association
NEMA
1300 North 17th Street
Rosslyn, VA 22209
(703) 841-3200
www.nema.org

Underwriters' Laboratories, Inc. UL
333 Pfingston Road
Northbrook, IL 60062
(847) 272-8800
www.ul.com

B. Federal Agencies

Environmental Protection Agency (EPA)
Region 5
77 West Jackson
Chicago, IL 60604-3507
http://www.epa.gov/r5water/

Occupational Health and Safety Administration
Region 5 (OSHA)
238 South Dearborn Street , Room 3244
Chicago, IL 60604
www.osha.gov

C. State Agencies

Minnesota Department of Transportation
(MNDOT)
Transportation Building
395 John Ireland Boulevard
St. Paul, MN 55155
1 800 651-3774
www.dot.state.mn.us

Minnesota Pollution Control Agency (MPCA)
Individual Sewage Treatment System Standard
520 Lafayette Road
St Paul, MN 55155
1 800 657-3864
www.pca.state.mn.us

Minnesota Department of Health
717 Delaware Street South East
Minneapolis, MN 55440-9441
(651) 201-5000
www.health.state.mn.us

D. Local Agencies

1. Contractor shall review other local agency requirements to determine applicability with this project.

E. Tribal Organizations

1. See Section 01100 for appropriate tribal contact regarding tribal laws.

PART 2 – PRODUCTS (N/A)

PART 3 – EXECUTION (N/A)

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 Project Engineer.

1.05 MANUFACTURER'S FIELD SERVICES

A. Provide reports on observations and documentation of workmanship to the Engineer 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

B. Section 02705 – Road Restoration

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 WATER (IF APPLICABLE)

A. If there is an existing building or hydrant on the site from which water can be taken, Contractor may use the available water if authorized by the Owner.

B. If the Owner has water supply mains, but no hydrant is available, Contractor may make a water main tap and create a service line if authorized by the Owner.

C. If the Owner does not have a water supply, make arrangements to obtain water and pay for it at no direct cost to the project.

D. Cross Connection Control: When connecting to the Owner's water supply, provide appropriate backflow prevention devices in accordance with State codes and the Owner's requirements.

3.03 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.

3.04 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.

3.05 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.

3.06 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.

3.07 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.

3.08 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.

3.09 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.

3.10 DUST CONTROL

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

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

3.11 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.

3.12 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.

3.13 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.

3.14 TEMPORARY FIRST AID FACILITIES

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

3.15 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.

3.16 TEMPORARY PROJECT SIGNAGE

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

B. Install project signage at the locations indicated on the plans or as approved by the Engineer.

END OF SECTION

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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 Engineer 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

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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.

B. Additional project specific operation and maintenance requirements are listed in Section 01785.

END OF SECTION

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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.

B. Grade sites for effective drainage away from structures.

C. Dress and trim all slopes.

END OF SECTION

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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 01720 – Staking and Construction Surveying
B. Section 01780 – Closeout Submittals
C. Section 02310 – Grading
D. Section 02317 – Structural Fill
E. Section 02370 – Temporary Erosion And Sediment Control
F. Section 02511 – Water Service Lines
G. Section 02530 – Sanitary Sewer
H. Section 02532 – Sanitary Sewer Manholes
I. Section 02538 – Sewage Force Main
J. 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.

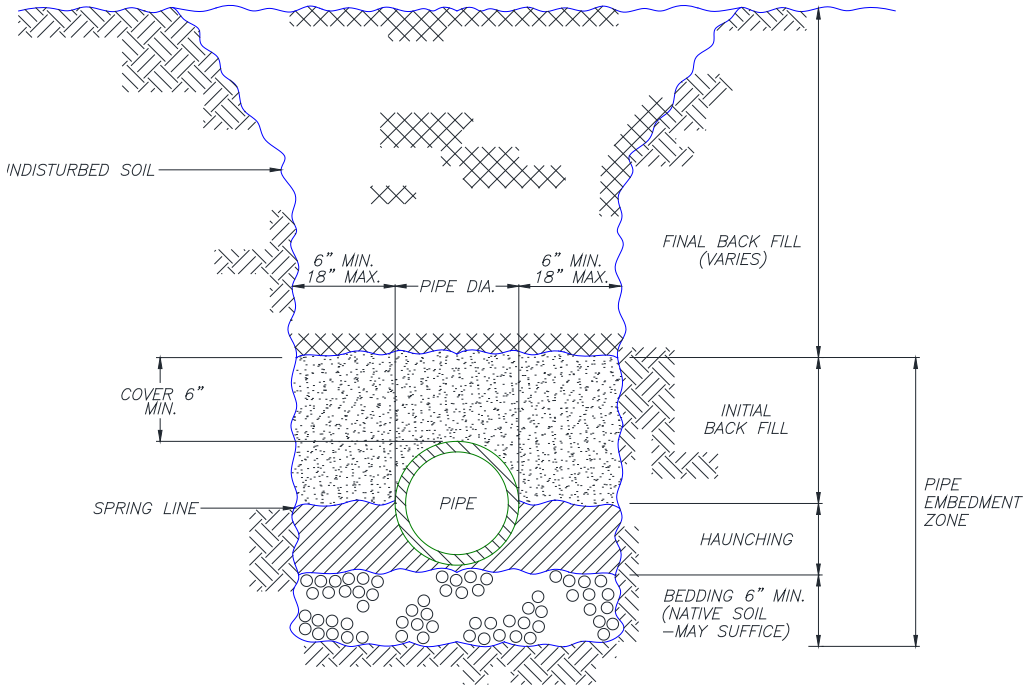
1.04 SUBMITTALS

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 classified, excavated and measured in accordance with Section 02316 – Rock Excavation

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

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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

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. National Electric Code (NEC)

1.04 SUBMITTALS

A. Pump Chamber, Riser and Cover

B. Effluent Pump, Controls and Alarm System

C. Force Main, Manifold, and Lateral Piping

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

E. Synthetic Gravel Cover

PART 2 - PRODUCTS

2.01 CONCRETE PUMP CHAMBER

A. Fabricate from watertight reinforced concrete as shown on the attached drawings.

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

C. Volume of container is listed in the bid schedule.

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. Extend riser 6-inches above finished grade.

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

2.02 PUMPS AND CONTROLS

A. Effluent Pump Requirements

1. 1/2 horsepower, 115/230 volt, single phase submersible, 2 inch discharge outlet, capacity of 50 gpm against a total dynamic head of 20 feet unless specified otherwise in Section 01119.

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

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

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

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. 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.

F. 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 pump supplied and housed in a weatherproof enclosure equal to a NEMA Type 4X fiberglass enclosure.

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

b. A separate dead front enclosure section shall house a load switching motor contactor with door mounted heavy-duty hand-off-auto switch and a service disconnect mechanism.

c. Equal to Rhombus Inc., Model 1120W115H1E10E11C17A, phone (218) 847-1317 / (888) 342-5753 or approved equal

2. Option #2: Pump Switch with Piggy-Back Plug and outlet rated for exterior use and housed in a weatherproof enclosure equal to a NEMA Type 4X fiberglass enclosure.

a. Size pump switch to be compatible with selected pump (ie voltage and horsepower rating)

b. Enclosure area shall be a minimum of 1.5 times the area of the piggyback switch, outlet, and folded cables to allow for easy access, removal, and replacement of switch, outlet, and cables.

c. Size power cable in accordance with the NEC.

d. Equal to Rhombus Inc, Double Float pump switch.

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

G. 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 piping shall be PVC (160 psi SDR 26 or Schedule 40). The diameter shall be as indicated on the design drawings.

B. Manifold piping shall be PVC (160 psi SDR 26 or Schedule 40). The diameter shall be as indicated on the design drawings.

C. Lateral piping shall be PVC (160 psi SDR 26 or Schedule 40). The pipe shall be field perforated. The pipe diameter shall be as indicated on the design drawings.

D. Observation pipes shall be 4-inch solid cast iron pipe or Schedule 40 PVC.

2.05 MOUND MATERIAL AND DISTRIBUTION MEDIA

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

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.

D. Fill material may be subsoil if it is not heavy clay or glacial till, with stones and boulders. Sandy loam is the preferred material.

E. The seed mixture shall be recommended by a local agricultural extension agent and shall be approved by the Engineer.

PART 3 - EXECUTION

3.01 CONCRETE PUMP CHAMBER 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, as approved by the Engineer.

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

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

E. Floats:

1. Mount floats in pump chamber as directed by Engineer.

3.02 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.

3.03 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 unless otherwise directed by the Engineer.

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. Refer to Section 02315 for excavation and backfilling procedures.

3.04 MOUND SURFACE PREPARATION

A. Approval for surface preparation shall be obtained from the Engineer.

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

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

D. Plow, with a chisel type plow, perpendicular to the slope.

E. Scratching of the surface by a backhoe may be allowed with approval of the Engineer.

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

3.05 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 a crawler tractor with a blade to spread the sand, keeping at least 6 inches of sand under the tracks at all times.

E. Distribution Media Construction:

1. Drainfield Gravel: Install drainfield gravel approved by the Engineer and as shown on the detail drawings with a crawler tractor.

2. Manufactured Media: Install media approved by the Engineer and as shown on the detail drawings.

F. Refer to 3.03 for manifold and lateral piping installation requirements.

G. Install observation pipes at locations shown on design drawings so that the bottoms of the observation pipes are flush with the infiltrative surface of the mound (gravel/sand interface).

H. Observation pipes shall be constructed per the detail drawing, fitted with a secure state approved cover, and extended 12 to 24 inches above grade.

I. Cover drainfield gravel with synthetic material as shown in detail drawings.

J. Place fill material above the drainfield gravel 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.

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

L. Seed and mulch entire mound area to provide immediate erosion control as recommended by a local agricultural extension agent.

M. Repairing erosion damage and re-seeding the mound area is required until a complete vegetation cover is achieved.

3.06 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.

3.07 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

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 2007 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:

Minnesota DOT Seed Mixture #240

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

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