Preliminary & Field Evaluation Form

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Owner Information

Date	10/22\2018	Sec / Twp / Rng	
Parcel ID	29-0-040604	LUG (county, city, township)	Aitkin Co.
Property Owner:	Leonard Carlson	Owners address (if different)	
Property Address:	Next to 48495 216th Pl. McGregor		17208 Tungsten St. NW
City / State / Zip:			Ramsey MN 55303

Flow Information and Waste Type / Strength

Estimated Design flow: 450

Comments: Camper hook-up first few years

Future Cabin will have walk-out with lift for basement

Anticipated Waste strength	☐ Hi Strength	☑ Domestic
Any Non-Domestic Waste	☐ Yes (class V)	☑ No
Sewage ejector/grinder pump	☑ Yes	☐ No
Water softener	☐ Yes	☑ No
Garbage Disposal	☐ Yes	☑ No
Daycare / In home business	☐ Yes	☑ No

Site Information

Existing & proposed lot improvements located (see site map)	☑ Yes	☐ No	Well casing depth	Proposed deep well
Easements on lot located (see site map)	☐ Yes	☑ No	Drainfield w/in 100' of residential well	☑ Yes ☐ No
Property lines determined (see site map)	☑ Yes	☐ No	Site w/in 200' of transient noncommunity water supply (TNCWS)	☐ Yes ☑ No
Req'd setbacks determined (see site map)	☑ Yes	☐ No	Site w/in an inner wellhead mgmt zone (CWS/NTNCWS)	☐ Yes ☑ No
Utilities located & identified (gopher state one call)	☐ Yes	☑ No	Buried water supply pipe w/in 50' of system	☐ Yes ☑ No
Access for system maintenance (shown on site map)	☑ Yes	☐ No	Site located in Shoreland (w/in 1000' of lake, 300' of river)	☑ Yes ☐ No
Soil treatment area protected	☑ Yes	☐ No	Site map prepared with previous items included	☑ Yes ☐ No

Construction related issues: Ave of 10% slope were trenches are located.

Keep trenches bottoms level and try to stay approx. 30" deep.

trench design for 12" rock under pipe OR High Capacity Chambers.

See Site Evaluations sheets for Alt. Site A Info.

Soil Information

Original soils	☑ Yes	☐ No	Evidence of site:	
			Cut	☐ Yes ☑ No
			Filled	☐ Yes ☑ No
			Compacted	☐ Yes ☑ No
			Disturbed	☐ Yes ☑ No
Soil logs completed and attached	☑ Yes	☐ No	Perk test completed and attached (if applicable)	☐ Yes ☑ No
Soil loading rate (gpd/ft^2)	1.27		Percolation rate (if applicable)	
Depth/elev to SHWT	76"		Flooding or run-on potential (comments)	☐ Yes ☐ No
Depth to system bottom maximum (or elev minimum)	40"		Flood elevation (if applicable)	
Depth/elev to standing water (if applicable)			Elevation of ordinary high water level (if applicable)	
Depth/elev to bedrock (if applicable)			Floodplain designation and elev - 100 yr/10 yr (if applicable)	
Soil Survey information determined (see attachment)	☑ Yes	☐ No		
Differences between soil survey and field evaluation (if applicable)				

See Site Evaluations sheets for Alt. Site A Info.

I hereby certify this evaluation was completed in accordance with MN 7080 and any local req's.

Designer Signature

Brummer Septic LLC.
Company

L-1347
License #

Soil Observation Log

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Owner Information

Property Owner / project: Leonard Carlson Date 10/22\2018

Property Address / PID: Next to 48495 216th Pl. McGregor MN 55760

Soil Survey Information

☐ refer to attached soil survey

Parent matl's: ☐ Till ☑ Outwash ☐ Lacustrine ☐ Alluvium ☐ Organic ☐ Bedrock

landscape position: ☐ Summit ☐ Shoulder ☑ Side slope ☐ Toe slope

soil survey map units: 268C & 302B slope 10 % direction- West

Soil Log #1

☑ Boring ☐ Pit Elevation 91.5' Depth to SHWT 78"

Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0 - 6	Topsoil Sandy Loam	<35	10YR3/2		Loose	Loose	Granular
6 - 36	Sandy Loam	<35	10YR4/4		Loose	Loose	Granular
36 - 78	Med Sand	<35	10YR5/4		Loose	Loose	Granular
78	Med Sand	<35	10YR5/4	7.5YR5/4	Loose	Loose	Granular
		<35			Loose	Loose	Granular

Comments:

Next to 48495 216th Pl. McGregor **Soil Log #2**

☑ Boring ☐ Pit Elevation 89.8' Depth to SHWT 80"

Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0 - 6	Topsoil Sandy Loam	<35	10YR3/2		Loose	Loose	Granular
6 - 39	Sandy Loam	<35	10YR4/4		Loose	Loose	Granular
39 - 80	Med Sand	<35	10YR5/4		Loose	Loose	Granular
80	Med Sand	<35	10YR5/4	7.5YR5/4	Loose	Loose	Granular
		<35			Loose	Loose	Granular

Next to 48495 216th Pl. McGregor **Soil Log #4**

☑ Boring ☐ Pit Elevation 89.2' Depth to SHWT 76"

Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0 - 7	Topsoil Sandy Loam	<35	10YR3/2		Loose	Loose	Granular
7 - 18	Sandy Loam	<35	10YR4/4		Loose	Loose	Granular
18 - 50	Med Sand	<35	10YR4/4		Loose	Loose	Granular
50 - 68	Med Sand	<35	10YR5/4		Loose	Loose	Granular
68 - 76	Med Sand	<35	10YR/6/4	76" Mottles 7.5YR5/4	Loose	Loose	Granular

I hereby certify this work was completed in accordance with MN 7080 and any local req's.

Designer Signature

Brummer Septic LLC.
Company

L-1347
License #

Aitkin Co.

Crow Wing/Cass County Trench/Pressure Bed Design

Property Owner: Leonard Carlson Date: 10/18/2018

Mailing Address: 17208 Tungsten St. NW

City: Ramsey State: MN Zip: 55303

Home Phone Number: Cell: (612) 328-532

Site Address: Lot South of 48495 216th Pl.

City: McGregor State: MN Zip: 55760

Driving directions if no address issued:

Legal Description: PT Lot 4 as in Doc. 322045

Sec: 19 Twp: 49 Range: 23 Twp Name: Shamrock

Parcel Number: 29-0-040604

Lake/ River: Big Sandy River Lake/River Classification: RD

Flow Data

Number of Bedrooms: 3

Dwelling Classification: I

System Type: I

GPD: 450

Estimated Flow in Gallons per Day (GPD)			
Bedrooms	Class I	Class II	Class III
2	300	225	180
3	450	300	218
4	600	375	256
5	750	450	294
6	900	525	332
7	1050	600	370
8	1200	675	408

Wells

Deep Well: Proposed Deep

Shallow Well: None

Wells to be sealed (if applicable)?

Setbacks

Tank(s) to: Well +50, House +15, Property Line +10

Drainfield to: Well +75, House +30, Property Line 10

Sewer Line to well: +50

Air Test: No

Additional System Notes and Information:

Design is for 12" rock under pipe OR Infiltrator High Capacity Chambers.

Designer Name: Jeff Brummer License Number: L-1347

Address: 7450 Burr Lane

City: Brainerd State: MN Zip: 56401

Home Phone Number: Cell: 218-821-0704

E-Mail Address: brummerseptic@gmail.com

Designer Signature: _____ Date: 10/18/2018

Page: 1 of

Aitkin Co.

Crow Wing/Cass County Trench/Pressure Bed Design

Property Owner: Leonard Carlson Date: 10/18/2018 Designer's Initials:

Tank Sizing

A. Septic Tank Capacity: 1500 Gallons
Tank Type: 2 Compartments Filter: No
Garbage Disposal/Basement Lift Station: Lift Only

B. Pump Tank Capacity: 500 Gallons (7080.2100)
   a. Alarm Type: Electric

Septic Tank Capacity		
Bedrooms	Minimum	GD/BL
6 or less	1,500	2,250
7 or 8	2,000	3,000

Soils

C. Depth to Restricting Layer: 6.8ft.

D. Native SSF:1.27
(Perc. Rate [Optional] MPI)

Enter GPD next to the type of system

Rock Trenches

E. 6 in. Trench Depth GPD × D = 0.0sq. ft. Cubic Yards of Rock: 0.0 yds³

F. 12 in. Trench Depth 450 GPD × D × .8 = 457.2sq. ft. Cubic Yards of Rock: 25.4 yds³

G. 18 in. Trench Depth GPD × D × .66 = 0.0sq. ft. Cubic Yards of Rock: 0.0 yds³

H. 24 in. Trench Depth GPD × D × .6 = 0.0sq. ft. Cubic Yards of Rock: 0.0 yds³

I. Divide (E-H) by Trench Width for lineal feet: 457.2 ÷ 3 = 152.4

4 trenches 3 ft. wide 40 ft. long

Chamber Trenches

J. Brand: Infiltrator Quick High Cap. or Dimensions of one chamber (L x W): 4ft. × 3 ft.

K. 6-11 in. Chamber Depth GPD × D = 0.0sq. ft.

OR L. 12 in. Chamber Depth 450 GPD × D × .8 = 457.2sq. ft.

M. Select from (K-L) if installing Chamber Trenches: 457.2

N. Divide (M) by Trench Width for lineal feet: 457.2 ÷ 3 = 152.4 Lineal Feet

O. Total Chambers Needed (**Round Up**): 38.1 Chambers

4 trenches, 3 ft. wide, 40 ft. long.

Seepage/Pressure Beds

P. Seepage Bed GPD × D × 1.5 = 0.0sq. ft.
   a. Bed Dimensions ft. × ft.
   b. Cubic Yards of Rock Bed Length × Bed Width × Rock Depth ft. ÷ 27 = 0.0 yds³

Q. Pressure Bed GPD × D = 0.0sq. ft.
   a. Bed Dimensions ft. × ft.
   b. Cubic Yards of Rock Bed Length × Bed Width × Rock Depth ft. ÷ 27 = 0.0 yds³

Additional System Notes and Information: 4 trenches 40 ft. long
Use 12" rock under pipe OR
Infiltrator High Capacity Chambers (= 12" rock sidewall)

Aitkin Co.

Gravity/Capacity Trench/Pressure Bed Design

Property Owner: Leonard Carlson
Date: 10/18/2018

Designer's Initials:

Determine Pump Capacity

1) Gravity Distribution Pump Capacity Range: 10 - 45 GPM

*Skip to Pump Head Requirements if pumping to gravity

2) Pressure Distribution:

a) Number of laterals: 1

b) Lateral Size: 1in.

c) Perforation spacing: 1ft.

d) Check Table 4 to see the maximum number of perforations per lateral.

3) Lateral Length (choose):

a) End manifold: rock bed length: - 2 ft. = -2ft.

b) Center manifold: rock bed length /2: - 1 ft. = -1ft.

c) Choose 3a or 3b: ft.

4) Total Perforation Determination:

a) (3c): 0ft. ÷ (2c): 1ft. + 1 = 1 Perforations / Lateral

b) (4a): 1 × (2a): 1 = 1 Total Number of Perforations

c) Select perforation discharge from Table 1 = 15 GPM/Perf.

d) (4b): 1 × (4c): 15 GPM/Perf. = 15 GPM

PUMP HEAD REQUIREMENTS

5) Elevation difference:

a) Elevation difference between pump and point of discharge 20ft.

b) If pumping to a pressure distribution system, (5a) + 5 = 25ft.

c) Choose 5a if pumping to gravity or 5b for pressure: 20ft.

6) Friction loss:

a) Select a value from Table 2: .73ft. / 100 ft. of pipe

b) Pipe length to drainfield: 95ft. × 1.25 = 118.7ft.

c) (6a): 0.73 × (6b): 118.7 ÷ 100 = 0.87 Total Friction Loss

7) Drainback:

a) Actual Pipe length 95ft. × .17 gal/ft. (Table 3) = 16.15 gal

8) (5c): 20ft. + (6c): 0.87ft. = 20.87 Total Head Required

9) Minimum Pump Size 15 GPM (4d) & 20.87ft. of dynamic head (8)

Use 15 GPM at 21 ft of Head.

Table 1
Perforation Discharge (GPM/perf.)

Ft. of Head	7/32 Perf Diameter	1/4 Perf Diameter
1.0	0.56 in.	0.74 in.
2.0	0.80 in.	1.04 in.

Use 1.0 for single homes, 2.0 for everything else

Table 2
Friction Loss in Plastic Pipe

Flow (GPM)	1.5"	2"	3"
20	2.47	0.73	0.11
25	3.73	1.11	0.16
30	5.23	1.55	0.23
35	6.96	2.06	0.30
40	8.91	2.64	0.39
45	11.07	3.28	0.48
50	13.46	3.99	0.58
55		4.76	0.70
60		5.60	0.82
65		6.48	0.95
70		7.44	1.09

Table 3
Volume of Liquid in Pipe

Pipe Diameter	Gal/Ft.
1.25 in.	0.078
1.5 in.	0.11
2.0 in.	0.17

Table 4
Max Perforations/Lateral

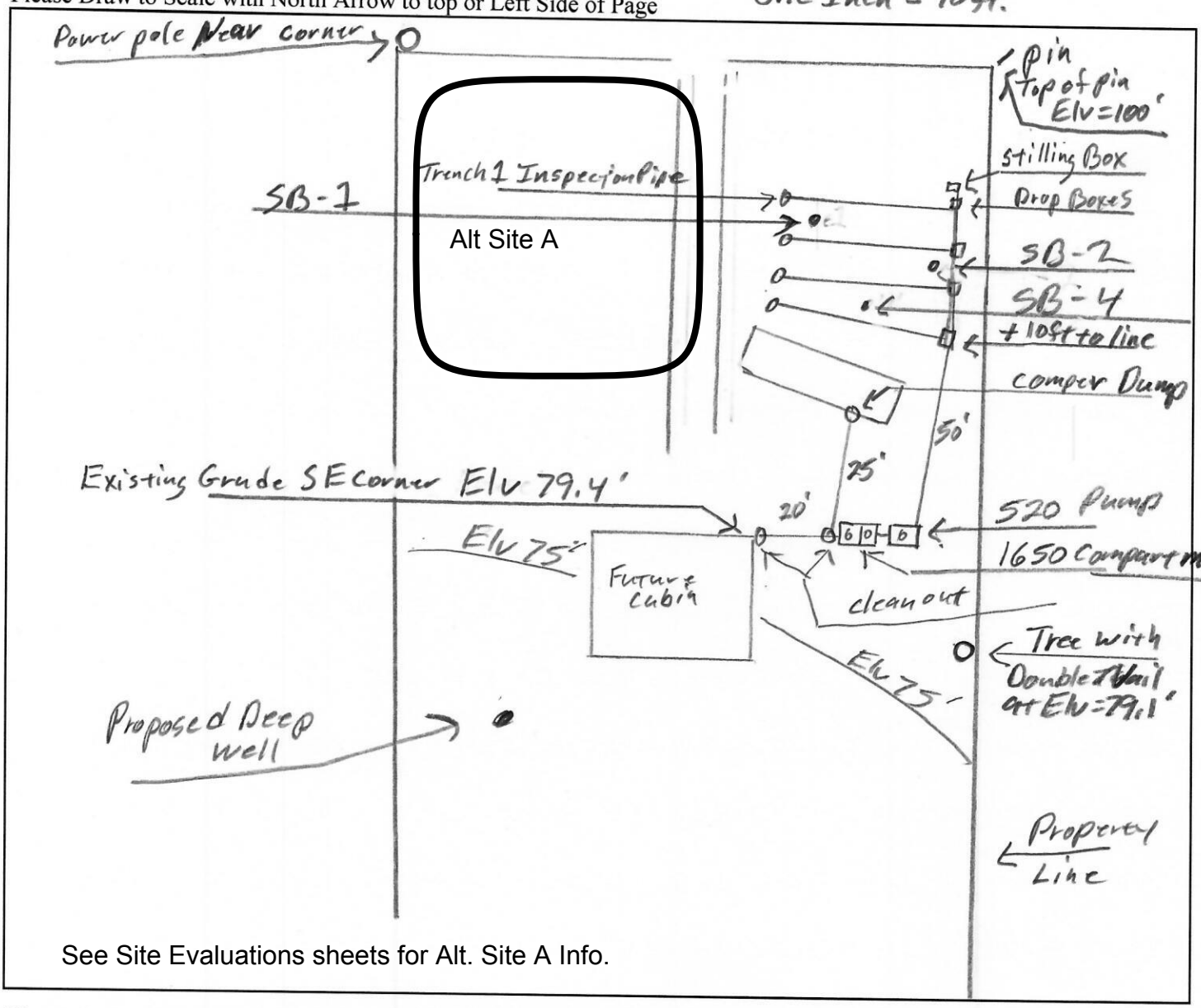
Perf. Spacing	1.25" Pipe	1.5" Pipe	2" Pipe
2.5 ft.	14	18	28
3 ft.	13	17	26
3.3 ft.	12	16	25
4 ft.	11	15	23
5 ft.	10	14	22

Page: of 0

Crow Wing/Cass County Trench/Pressure Bed Design

Property Owner: Leonard Carlson Date: 10/18/2018 North Page: of 0

Please Draw to Scale with North Arrow to top or Left Side of Page One Inch = 40ft.



See Site Evaluations sheets for Alt. Site A Info.

Please show all that apply (Existing or Proposed):

Wells within 100 ft. of a Drainfield	Disturbed/Compacted Areas	Access Route for Tank Maintenance
Water lines within 10 ft. of a Drainfield	Component Location	Property Lines
Drainfield Areas	OHW	Structures
Boring Locations	Lot Easements	Setbacks

Elevations: Top of Survey pin at SE lot Corner Elv.= 100'

Benchmark Elevation:
Elevation of Sewer Line at House: Approx. Elv.= 79.4'
Tank Inlet Elevation: Approx. Elv.= 97'
Drainfield Elevation:
Pump Elevation: Approx. Elv.= 75'
Pump Discharge Elevation: Elv. = 93'
Restricting Layer Elevation: 76"

Designer Signature: _____
Date: 10/18/2018

License Number: L-1347

Septic System Design Notes - Aitkin county

Property Owner: Leonard Carlson **Date:** 10/22\2018

Site Address: Next to 48495 216th Pl. McGregor **PID:** 29-0-040604

Comments: ***design may not follow Aitkin co. Auto fill form for septic system designs.***

1 This is a type I mound for a Future 2 or 3 bedroom House. Proposed deep well location will be West of House.
2 Will have camper hookup for now.
3 SE property corner has survey pin on corner, use to of pin as Bench Mark Elv. = 100'
The double nail Elevation on a tree near tank location is at Elv.= 79.1'.
4 Install Jacobson 1650 Compartment tank for main floor gravity flow from future house (Elv. not set)
Lift in basement of future house. Install Jacobson 520 pump tank for gravity flow from 1650 tank.
5 Install Camper hook-up to gravity flow to 1650 tank, install clean-out at junction of 4" pipe from house.
Install 4" sewer pipe from house when house is built, install clean-out near house.
6 Install pump (15 GPM and 21 Ft Head) on a block in 520 pump tank.
Set pump to dose 6 times a day based on 450 GPD, set electric alarm float approx. 3" above that.
7 Install 2" supply pipe to drain back to pump tank. Install a stilling box above first drop box.
8 Install 4 trenches on contour with level bottoms approx. 30" to bottom of trenches.
Install trenches +10ft. From South property line.
9 Installer may use 12" of rock under pipe or install High Capacity chambers.
10 All four trenches will be 40 ft. long 3 ft. wide.
Install inspection pipes at terminal trench ends, recommend at drop boxes also.
Install all manholes, inspection pipes and clean-outs to grade or above, insulate top of tank.

11 The nail on the tree near tank area, BM = Elv. 79.1'.
Installer to double check bench mark. Installer should confirm bench mark and sand height Elv. with inspector.
Installer should record bench mark Elv. and sand height on installation inspection form.

Designed to Aitkin Co. and MPCA recommendations and requirements.

Designer Signature | Brummer Septic LLC. (Design Company) | L-1347 (License#)

Elevation	
91.5'	Soil Bore #1
89.8'	Soil Bore # 2
89.2'	Soil Bore # 4
92.3'	Approx. 1st trench
91.2'	Approx. 2nd trench
89.8'	Approx. 3rd trench
88.5'	Approx. 4th trench
85'	Grade at Camper hook-up
80.7'	Grade at 1650 tank
79.4'	Grade at SE Corner of Future house

Stilling box is an extra drop box that is used to slow down the flow velocity from trhe pump.

See Site Evaluations sheets for Alt. Site A Info.

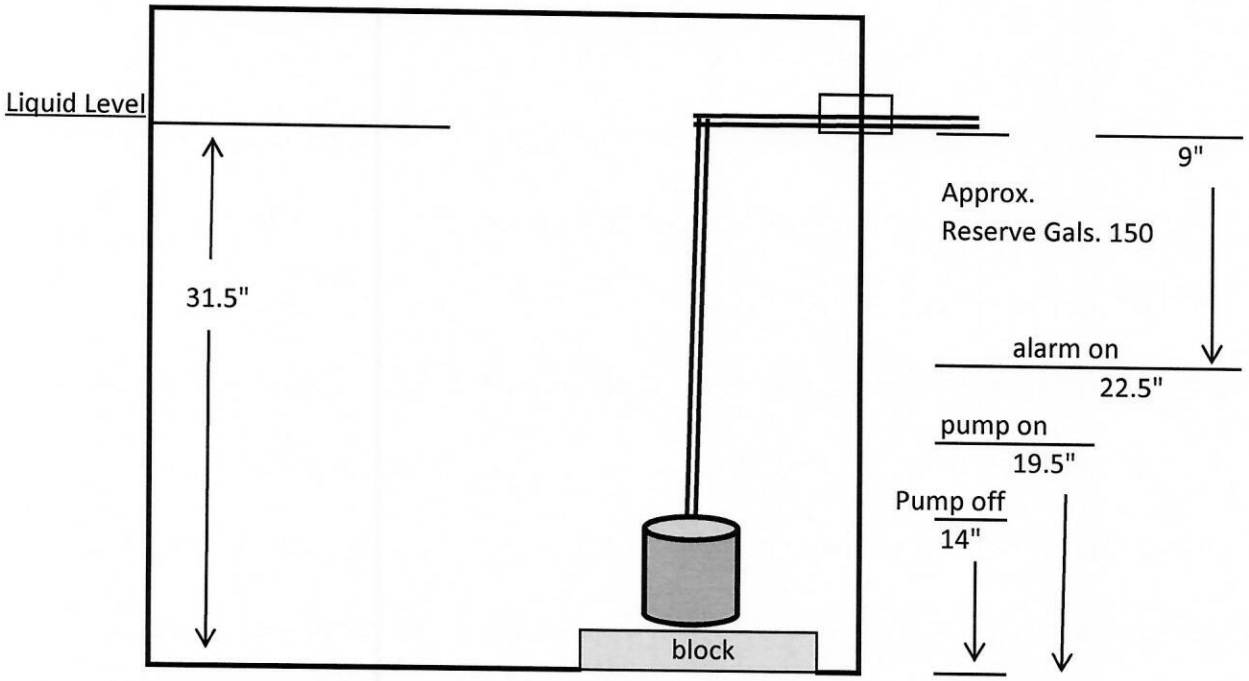
Pump settings for 520 gal lift tank. Page: ___ of _____

Leonard Carlson

Parcel ID. 29-0-040604

Tank Mfg. Jacobson Pump Tank 520 gallons

Tank Size: MFG. 16.57 gals. Per inch



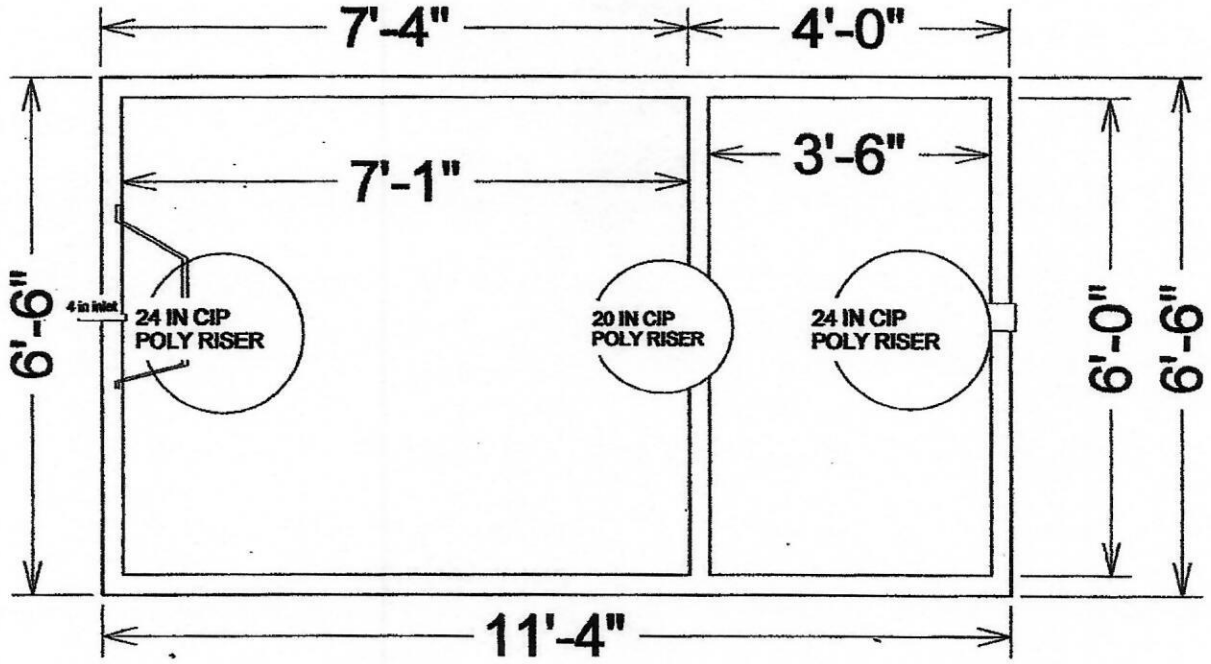
Assumes 10" pump

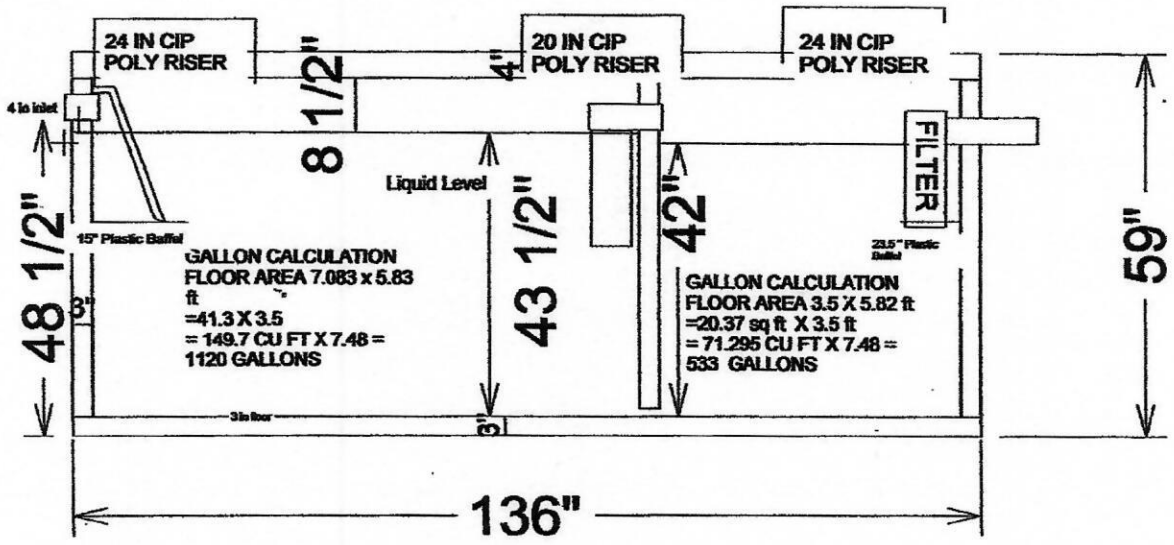
Pump out dose at 5.5" = (75 gals. dose + 17 drain back) = 92 pump out gals.

450 gpd ÷ 6 = 75 gals. Per Dose

1650 Gallon 2 Compartment Septic Tank

TOP VIEW



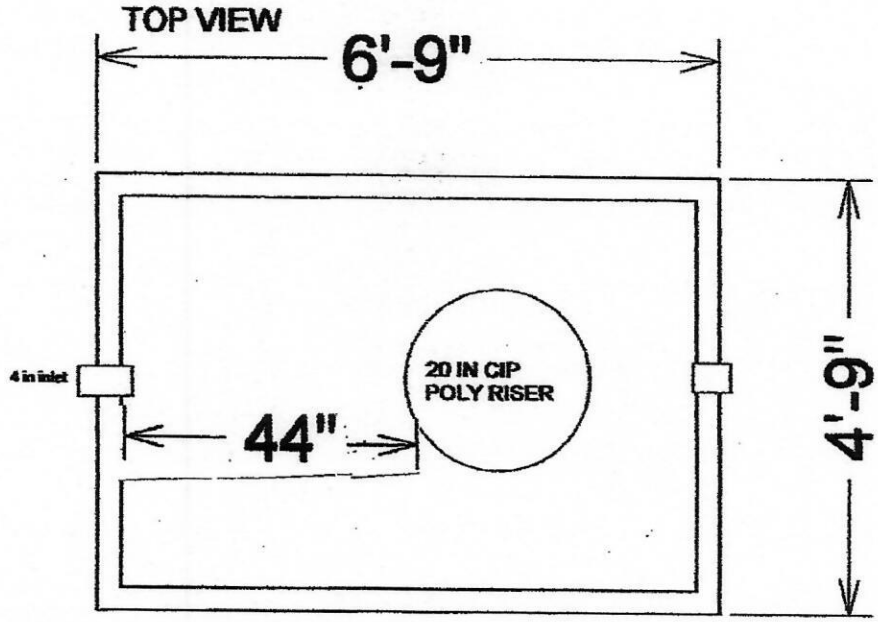


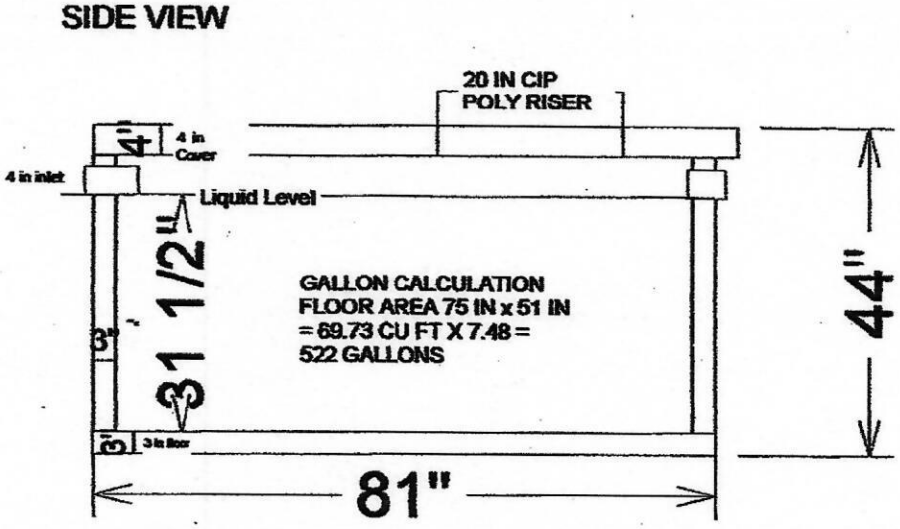
SIDE VIEW

533 / 42" = 12.69 GPI

Drawings Owned BY Jacobson Precast, Inc.
36641 HWY 169, Aitkin, Mn 56431

520 Gallon Pump Tank





522 gals. / 31.5" = 16.57 GPI

Drawings Owned BY Jacobson Precast, Inc.
36641 HWY 169, Aitkin, Mn 56431
DDo not copy drawings without permission of the Owner

Aitkin County

Detailed Parcel Report

Parcel Number: 29-0-040604

General Information

Township/City:	SHAMROCK TWP
Taxpayer Name:	CARLSON, LEONARD & SHERYL
Taxpayer Address:	17208 TUNGSTEN ST NW RAMSEY MN 55303
Property Address:	
Township:	49
Range:	23
Section:	19
Green Acres:	No
Plat:	
Brief Legal Description:	PT LOT 4 AS IN DOC 322045

Lake Number:	1006000
Lake Name:	BIG SANDY RIVER
Acres:	1.10
School District:	4.00

Tax Information

Class Code 1:	Rural Vacant Land
Class Code 2:	Unclassified
Class Code 3:	Unclassified
Homestead:	Non Homestead
Assessment Year:	2018

Estimated Land Value:	$55,900.00
Estimated Building Value:	$0.00
Estimated Total Value:	$55,900.00
Prior Year Total Taxable Value:	$55,900.00
Current Year Net Tax (Specials Not Included):	$420.00
Total Special Assessments:	$0.00
****Current Year Balance Not Including Penalty:**	$0.00
Delinquent Taxes:	No

*** For more information on delinquent taxes, please call the Aitkin County Treasurer's Office at 218-927-7325.**

**** Balance Due on a parcel does not include late payment penalties.**

Aitkin County

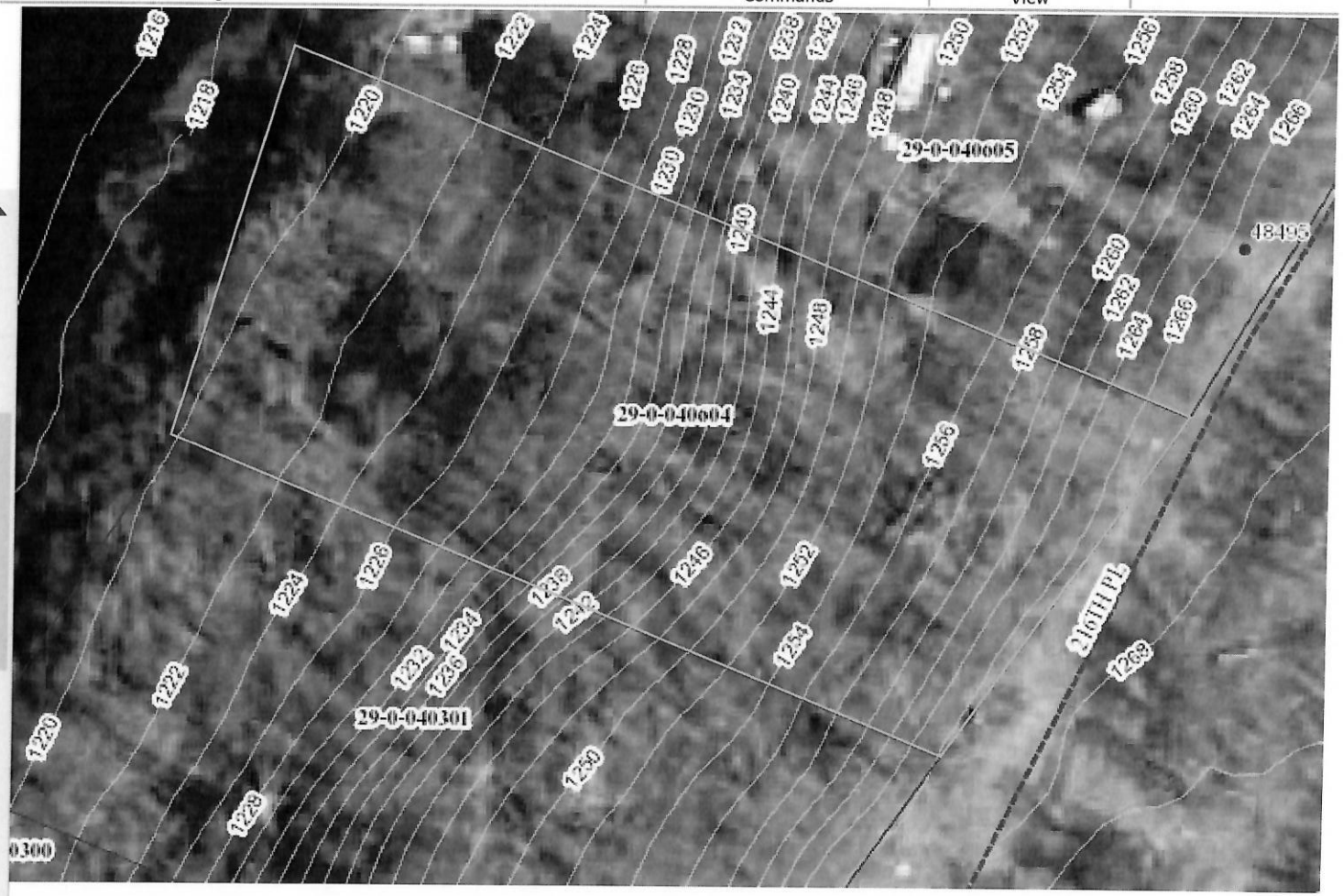
Zoom In | Zoom Out | Pan | Zoom Prev | Zoom Next | Zoom Select | Zoom Extent
Navigation

Clear | Search | Identify
Commands

Legend | Results
View

Buffer | X/Y | Map

Layers **Transparency**



- 2013 FSA Color Imagery
- 2014 FSA Spring Color Imagery
- 2014 FSA CIR Spring Imagery
- 2015 FSA Color Imagery
- 2016 ESRI Color Imagery
- 2017 FSA Color Imagery
- Shaded Relief - LiDAR DEM
- USGS Topo Map - Medium Scale
  - USA Topo Maps
- Topo 24k - Large Scale
- Basemap
  - Transportation
  - Trails and Recreation

Scale 1: 1128

No Tool Active

USDA United States Department of Agriculture
Natural Resources Conservation Service

Web Soil Survey

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A | A | A

Area of Interest (AOI) | Soil Map | Soil Data Explorer | Download Soils Data | Shopping Cart (Free)

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Search

Map Unit Legend

Aitkin County, Minnesota (MN001)

Aitkin County, Minnesota (MN001)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
268C	Cromwell sandy loam, 6 to 12 percent slopes	1.0	61.9%
302B	Rosholt fine sandy loam, 2 to 6 percent slopes	0.2	13.9%
D458E	Menahga loamy sand, 15 to 30 percent slopes	0.4	24.2%
Totals for Area of Interest		**1.6**	**100.0%**

Soil Map

Scale (not to scale)

Warning: Soil Map may not be valid at this scale.

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:20,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

FOIA | Accessibility Statement | Privacy Policy | Non-Discrimination Statement | Information Quality | USA.gov | White House

Aitkin County, Minnesota

268C—Cromwell sandy loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: gjgd
Elevation: 980 to 1,640 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Cromwell and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cromwell

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash

Typical profile

A - 0 to 2 inches: sandy loam
Bw,2Bw,2C - 2 to 60 inches: gravelly sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Forage suitability group: Sloping Upland, Low AWC, Acid (G090AN008MN)
Hydric soil rating: No

Minor Components

Oesterle and similar soils
Percent of map unit: 8 percent
Hydric soil rating: No

Leafriver and similar soils
Percent of map unit: 7 percent
Landform: Depressions
Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Aitkin County, Minnesota
Survey Area Data: Version 18, Oct 4, 2017

Aitkin County, Minnesota

302B—Rosholt fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: gjgl
Elevation: 980 to 1,640 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 120 to 140 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Rosholt and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rosholt

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope, summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash

Typical profile

E - 0 to 9 inches: fine sandy loam
E/B - 9 to 15 inches: fine sandy loam
Bt1 - 15 to 22 inches: sandy loam
2Bt2 - 22 to 30 inches: gravelly loamy sand
2C - 30 to 60 inches: stratified very gravelly coarse sand to extremely gravelly sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Forage suitability group: Sloping Upland, Low AWC, Acid (G090AN008MN)

Hydric soil rating: No

Minor Components

Leafriver and similar soils
Percent of map unit: 8 percent
Landform: Depressions
Hydric soil rating: Yes

Oesterle and similar soils
Percent of map unit: 7 percent
Hydric soil rating: No

Data Source Information

Soil Survey Area: Aitkin County, Minnesota
Survey Area Data: Version 18, Oct 4, 2017

Aitkin County, Minnesota

D458E—Menahga loamy sand, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2t4t3
Elevation: 590 to 2,030 feet
Mean annual precipitation: 23 to 33 inches
Mean annual air temperature: 36 to 48 degrees F
Frost-free period: 90 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Menahga and similar soils: 87 percent
Minor components: 13 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Menahga

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash

Typical profile

A - 0 to 3 inches: loamy sand
Bw - 3 to 17 inches: loamy sand
C - 17 to 79 inches: sand

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A

Forage suitability group: Steep; Coarse Texture; Low AWC (G057XN018MN)
Hydric soil rating: No

Minor Components

Eagleview
Percent of map unit: 8 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Roscommon
Percent of map unit: 2 percent
Landform: Swales
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Andrusia
Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Leafriver, frequently ponded
Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Meehan
Percent of map unit: 1 percent
Landform: Swales
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Aitkin County, Minnesota
Survey Area Data: Version 18, Oct 4, 2017

'At a Glance' Listing of Proprietary Distribution Media Products

Subsurface Sewage Treatment Systems

Company name Proprietary product name Product models	Soil treatment and dispersal components			
	Trenches	**Seepage beds**	**At-grades**	**Mounds**
Infiltrator Systems, Inc. Arc chambers				
Arc 18	✓			
Arc 24	✓	✓	✓	
Arc 36	✓	✓	✓	✓
Arc 36 Low Profile (LP)	✓	✓	✓	✓
Arc High Capacity (HC)	✓	✓	✓	✓
Infiltrator Systems, Inc. BioDiffuser chambers				
11" Standard	✓	✓	✓	✓
16" High Capacity	✓	✓	✓	✓
Infiltrator Systems, Inc. EZflow bundled polystyrene aggregate				
1202 H	✓ See footnote 1	✓	✓	✓
1202 H-GEO	✓ See footnote 1	✓	✓	✓
1203 H	✓ See footnote 1	✓	✓	✓
1203 H-GEO	✓ See footnote 1	✓	✓	✓
Infiltrator Systems, Inc. Quick4 chambers				
Quick4 Equalizer 24 Low Profile (LP)	✓			
Quick4 Equalizer 24	✓			
Quick4 Equalizer 36	✓			
Quick4 Plus Standard Low Profile (LP)	✓	✓	✓	✓
Quick4 Standard	✓	✓	✓	✓
Quick4 Plus Standard	✓	✓	✓	✓
Quick4 High Capacity (HC) ✓	✓ See footnote 2	✓	✓	✓
Quick4 Plus High Capacity (HC) ✓	✓ See footnote 2	✓	✓	✓

Footnote 1: The double-stacked EZflow bundled aggregate installed in trenches with ≥18 inches of sidewall infiltrative surface are registered for use with a maximum 34 percent reduction in trench bottom area.

✓ Footnote 2: The Quick4 High Capacity and Quick4 Plus High Capacity chambers installed in trenches with at least 12 inches of sidewall infiltrative surface are registered for use with a maximum 20 percent reduction in trench bottom area.

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Quick4™ CHAMBER SYSTEMS

The Quick4® High Capacity Chamber

Quick4® Series

The Quick4® High Capacity Chamber fits in a 36" wide trench and is ideal for curved or straight systems. It features the patent-pending Contour Swivel Connection™ which permits turns up to 15°, right or left. The MultiPort™ endcap allows multiple piping options and eliminates pipe fittings. The chamber's four-foot length provides optimal installation flexibility.

Chamber Benefits:

- Advanced contouring connections swivel up to 15°, right or left
- Latching mechanism allows for quick installation
- Compact nesting provides more trench length in an equivalent stack height
- Four-foot chambers are easy to handle and install
- The Quick4 High Capacity Chamber supports wheel loads of 16,000 lbs/axle with only 12" of cover
- Certified by the International Association of Plumbing and Mechanical Officials (IAPMO)

MultiPort Endcap Benefits:

- Tear-out seals on inlet ports provide a tight fit to the pipe
- Eight molded-in inlets/outlets allow for maximum piping flexibility
- Fits on either end of the Quick4 High Capacity Chamber

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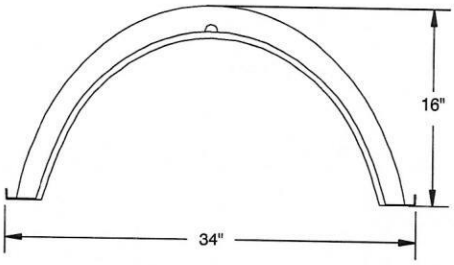
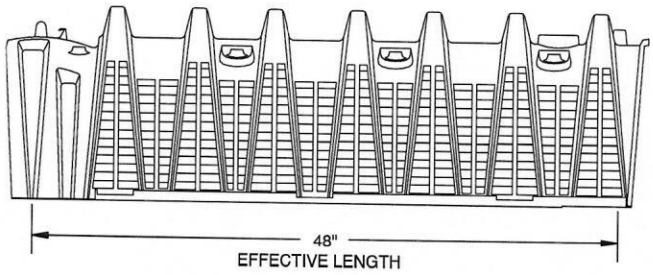
Quick4® Series

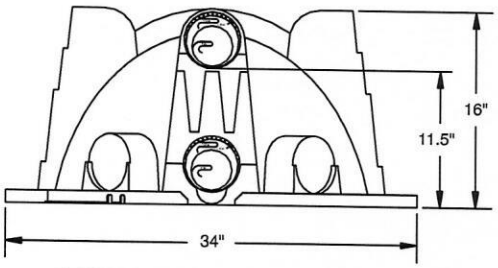
Because installations are faster with Quick4 chambers, you save on heavy equipment operation and labor.

Quick4 High Capacity Chamber

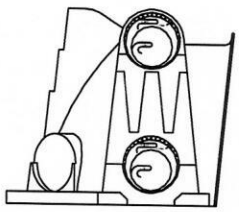




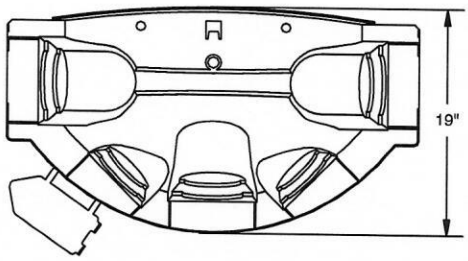
MultiPort EndCap



FRONT VIEW

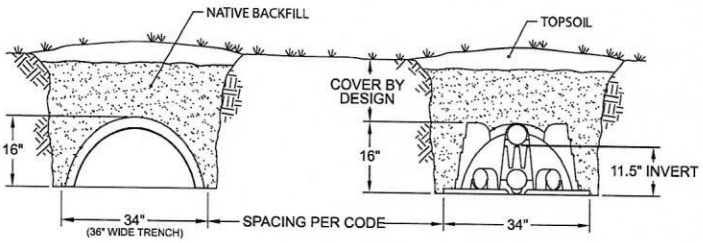


SIDE VIEW



TOP VIEW

Typical Trench View



Quick4® High Capacity Chamber Specifications	
Size	34"W x 53"L x 16"H (864 mm x 1346 mm x 406 mm)
Effective Length	48" (1219 mm)
Louver Height	12.2" (310 mm)
Storage Capacity	62 gal (235 L)
Invert Height	11.5" (292 mm)

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www.infiltratorwater.com

INFILTRATOR WATER TECHNOLOGIES STANDARD LIMITED WARRANTY

(a) The structural integrity of each chamber, endcap and other accessory manufactured by Infiltrator ("Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one year from the date that the septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required by applicable law, the warranty period will begin upon the date that installation of the septic system commences. To exercise its warranty rights, Holder must notify Infiltrator in writing at its Corporate Headquarters in Old Saybrook, Connecticut within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for Units determined by Infiltrator to be covered by this Limited Warranty. Infiltrator's liability specifically excludes the cost of removal and/or installation of the Units.

(b) THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE UNITS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE

(c) This Limited Warranty shall be void if any part of the chamber system is manufactured by anyone other than Infiltrator. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage are damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting or improper sizing, excessive water usage, improper grease disposal, or improper operation; or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty. Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Infiltrator's installation instructions.

(d) No representative of Infiltrator has the authority to change or extend this Limited Warranty. No warranty applies to any party other than the original Holder.

The above represents the Standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of Units should contact Infiltrator's Corporate Headquarters in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty, and should carefully read that warranty prior to the purchase of Units.

U.S. Patents: 4,759,661; 5,017,041; 5,156,488; 5,336,017; 5,401,116; 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844 Canadian Patents: 1,329,959; 2,004,564 Other patents pending.
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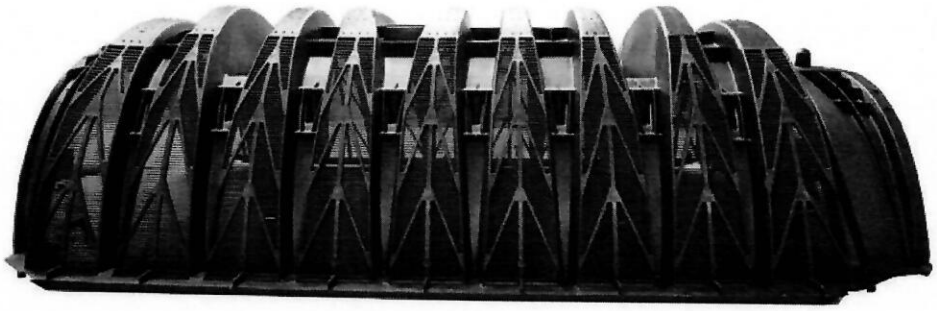
Quick4 PLUS™ CHAMBER SYSTEMS

The Quick4® Plus High Capacity Chamber

Quick4 Plus™ Series

The Quick4 Plus High Capacity Chamber offers maximum strength through its two center structural columns. This chamber can be installed in a 36-inch-wide trench. Like the original line of Quick4 chambers, it offers advanced contouring capability with its Contour Swivel Connection™ which permits turns up to 15-degrees, right or left. It is also available in four-foot lengths to provide optimal installation flexibility. The Quick4 Plus All-in-One 12 Endcap, and the Quick4 Periscope are available with this chamber, providing increased flexibility in system configurations.

Maximum Strength



Quick4 Plus High Capacity Chamber Benefits:

- Two center structural columns offer increased stability and superior strength
- Advanced contouring connections
- Latching mechanism allows for quick installation
- Four-foot chamber lengths are easy to handle and install
- Supports wheel loads of 16,000 lbs/axle with 12" of cover

Quick4 Plus High Capacity Chamber Specifications

Size 34"W x 53"L x 14"H (864 mm x 1346 mm x 356 mm)
Effective Length 48" (1219 mm)
Louver Height 12" (305 mm)
Storage Capacity 54 gal (204 L)
Invert Height 0.8" (20 mm), 5.3" (135 mm), 8.0" (203 mm), 12.7" (323 mm)

Quick4 Plus All-in-One 12 Endcap Benefits:

- May be used at the end of chamber row for an inlet/outlet or can be installed mid-trench
- Mid-trench connection feature allows construction of chamber rows with center feed, as an alternative to inletting at the ends of chamber rows
- Center-feed connection allows for easy installation of serial distribution systems
- Pipe connection options include sides, ends or top

Quick4 Plus All-in-One Periscope Benefits:

- Allows for raised invert installations
- 180° directional inletting
- 12" raised invert is ideal for serial applications

Certified by the International Association of Plumbing and Mechanical Officials (IAPMO)

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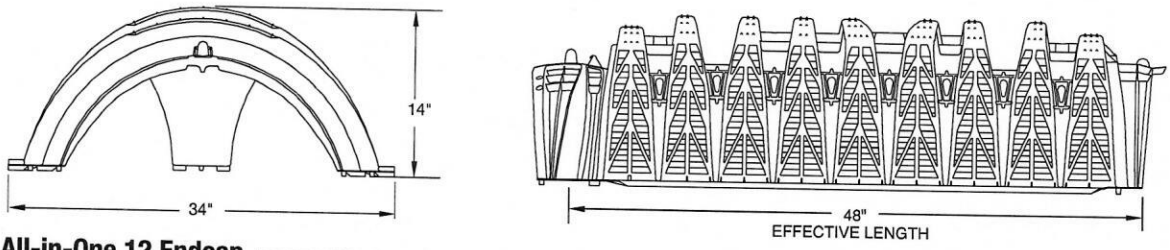
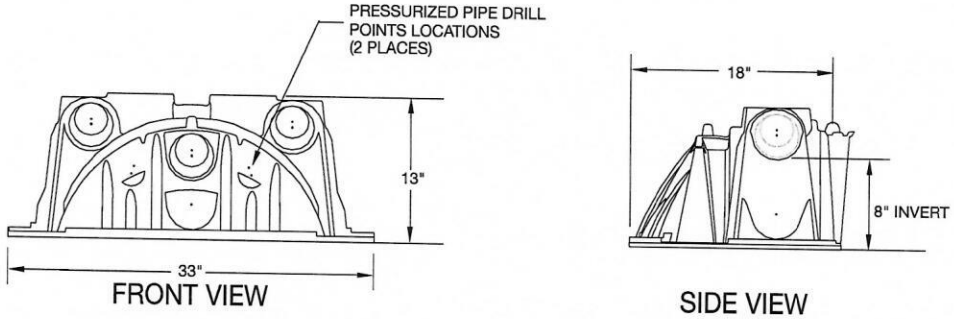
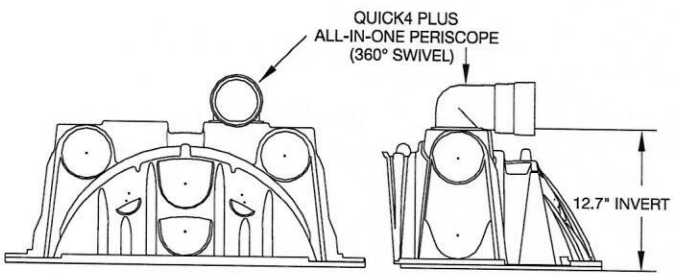
Quick4 Plus High Capacity Chamber

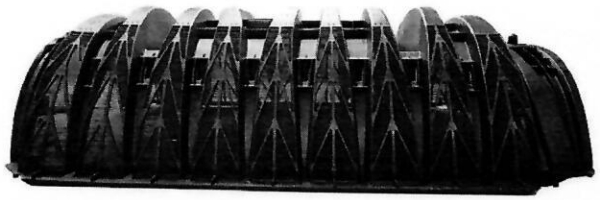


Quick4 Plus All-in-One 12 Endcap



Quick4 Plus All-in-One Periscope





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(c) This Limited Warranty shall be void if any part of the chamber system is manufactured by anyone other than Infiltrator. The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs, or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage are damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting or improper sizing, excessive water usage, improper grease disposal, or improper operation; or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty. Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes; all other applicable laws; and Infiltrator's installation instructions.

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