APPENDIX P

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NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

DRAWN BY	DATE
SDS	MAY 2023
CHECKED BY	D&K PROJECT #
JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

SHEET NUMBER

SHEET OF

I:\2\227947 Waitsfield Water and Wastewater Feasibility Study\Drawings\Civil\227947-KeySheet - Sewer.dwg 5/23/2023 8:06 PM

8' x 16' WASTE SOLIDS TANK

Parcel ID: 99205.000

12' WIDE GRAVEL ACCESS

26' x 10' MBBR 1026

25' x 10' MBBR 1025

31' x 10' MBBR 1031

UNDERGROUND ELECTRIC TO SERVICE CONTROL BUILDING

30'ø EQ TANK 10' DEEP 50,000 GALS.

HAMMERHEAD TURN AROUND

5' WIDE GRAVE WALK

164+45.07

164+00

163+00

162+00

161+00

160+00

Kingsbury Road (gravel)

Kingsbury Rd. (gravel)

gravel

paved

Route 100 (paved)

open

Class III Wetland #2007-34

class 2 constructed pond and associated ss/fo wetlands with 50' wetland buffer

pond

Parcel ID: 99206

Parcel ID: 99204

Parcel ID: 99202

buried utilities

b02-1

1426 / 1256 / 1330 / 38sa

1358 / 255 / 77

1357 / 254 / 76

1355 / 253 / 75

257 / 1363 / 79

Y 1361 / 256 / 78-17

Y-1 74g

30' 0 30' 60' 120'

SCALE IN FEET

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WASTEWATER MUNN SITE

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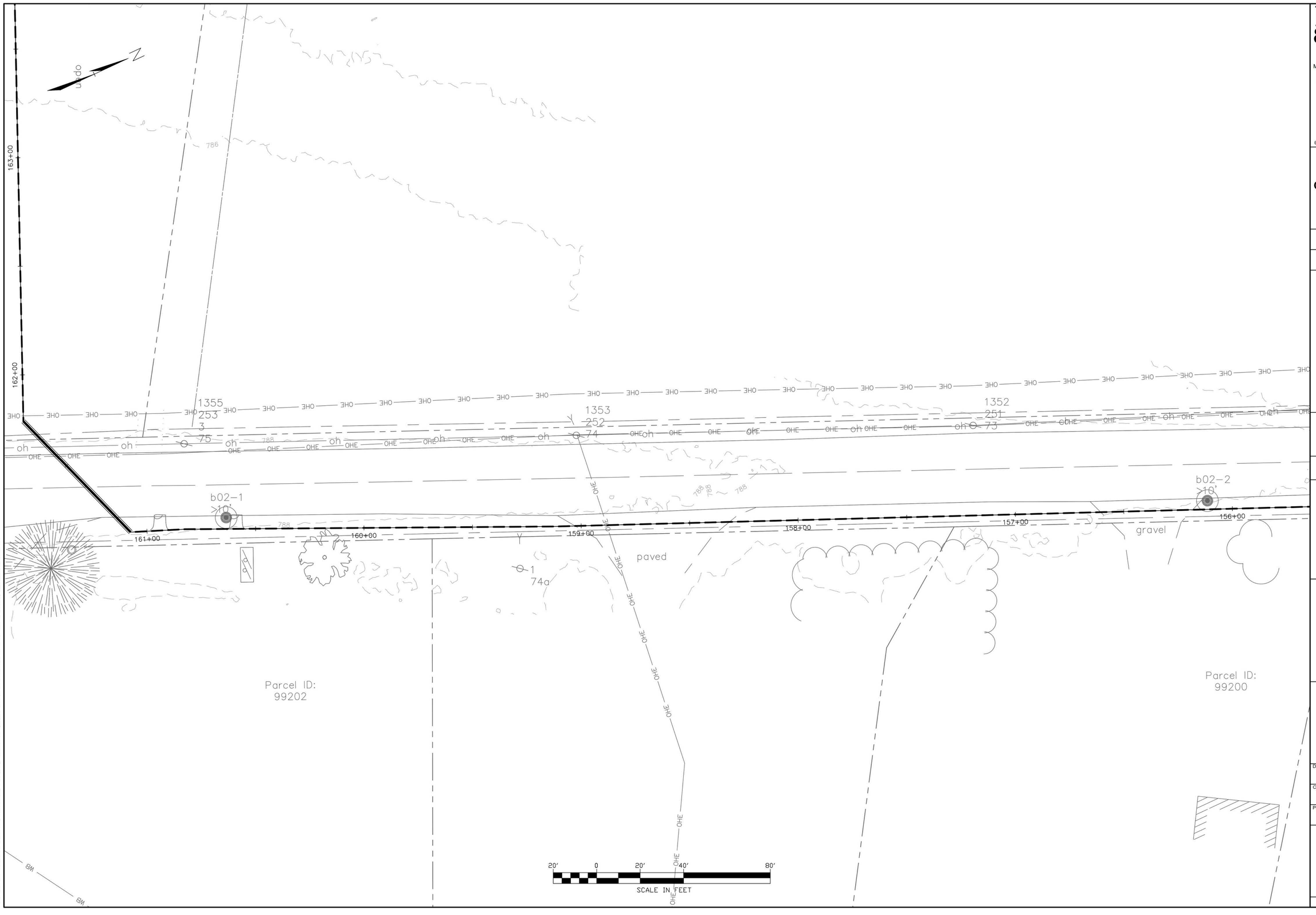
SHEET NUMBER

C3

SHEET 3 OF 41

edge of river
WB
woods
existing woods
Class III Wetland #2007-33
RC
FIELD #1A
FIELD #2A
FIELD #3A
FIELD #1B
FIELD #2B
FIELD #3B
4B
5A
4A
3A
2A
1A
5B
3B
2B
1B
10' x 20' VALVE VAULT
6' x 20' PUMP STATION
AXMAX 850 POLISHING 3 MODULES ARE 7' X 42' EACH
CARBON FEED
P REMOVAL
12' X 20' CONTROL BUILDING
ALKALINITY FEED
UNDERGROUND ELECTRIC TO SERVICE CONTROL BUILDING
30'ø EQ TANK 10' DEEP 50,000 GALS.
HAMMERHEAD TURN AROUND
UGE
80'
164+48.07
SCALE IN FEET
30' 0 30' 60' 120' 40'
SCALE IN FEET
Kings



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SHEET TITLE

WASTEWATER ROUTE 100

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SHEET NUMBER

C4

N

wetlands swl6. class 3
roadside drainage ditch.

103401
249
71

Route 100
(paved)

b02-3
>10'

155+00
154+00
153+00
152+00
151+00
150+00

ifp
1350
01
72-1

mile marker 1000/1216/0120

gravel

inv.
779.2'

mb
15" cmp
gravel

inv.
778.6'

1347
70a

Y 102699
247
69

wetlands SWL5.
class 3 roadside
drainage ditch.

wetlands 2002-9. cl
seepage w

Parcel ID:
99199

Parcel ID:
99199

Parcel ID:
99198

limit of vtrans
r.o.w.

20' 0 20' 40' 80'
SCALE IN FEET

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SHEET NUMBER

C5

SHEET 5 OF 41

N

wetlands 2002-3b. class 3
perennial stream and
assoc. wetlands

sfh

102697
246
68

dead

gravel

1340
10k
245
67

grass

inv.
738.9'

244
1339
66

gravel

48" cmp

b02-4
>10'

144+00

145+00

146+00

147+00

148+00

149+00

mile marker
1000/1216/0140

102698
246
30
68s

gravel

inv.
741.4'

class 3
wetland

abandoned
spring box

Class III Wetland
#2007-32

wetlands 2002-3a. class 3 perennial
stream and assoc. wetlands.

WASTEWATER AIR RELEASE/
FLUSHING MANHOLE
(SEE DETAIL)

Parcel ID:
99197.100

20' 0 20' 40' 80'
SCALE IN FEET

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VILLAGE
WASTEWATER
PRELIMINARY
ENGINEERING
REPORT
(PER)

SHEET TITLE

WASTEWATER
ROUTE 100

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SHEET NUMBER

C6

N

wetland swl2. class 3 roadside drainage ditch.

wetland 2002-4b. class 3 intermittent stream and assoc. wetlands

wetlands tb1. class 3 ditched perennial stream and assoc. wetlands.

1337
243
3
65
102632
242
64
inv. 738.4'
102631
241
63
1333
240
62
24" rcp
b02-5
10'
inv. 739.6'
Class II Wetland #2007-31
Class II Wetland #2007-35
gravel
wetlands swl1.. class 3 roadside ditch.
wetlands 2002-4a. class 3 intermittent stream and assoc. wetlands
Barn moved to this approximate location
WB
138+00
139+00
140+00
141+00
142+00
143+00
20' 0 20' 40' 80'
SCALE IN FEET

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WASTEWATER ROUTE 100

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SHEET NUMBER

C7

SHEET 7 OF 41

N

mile marker 1000/1216/0160

102643
1216
0160

102644
1216
0160

Route 100
(paved)

inv.
729.8'

inv.
732.0'

inv.
734.6'

inv.
736.4'

15" cmp

18" cmp

b02-6
10'

132+00
133+00
134+00
135+00
136+00
137+00

742
738

paved

gravel

Hazardous Waste
Site# 911128

wetland swl3. class 3
roadside drainage ditch

approx. loc.

Parcel ID:
99195

spring on top of hill

20' 0 20' 40' 80'
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ROUTE 100

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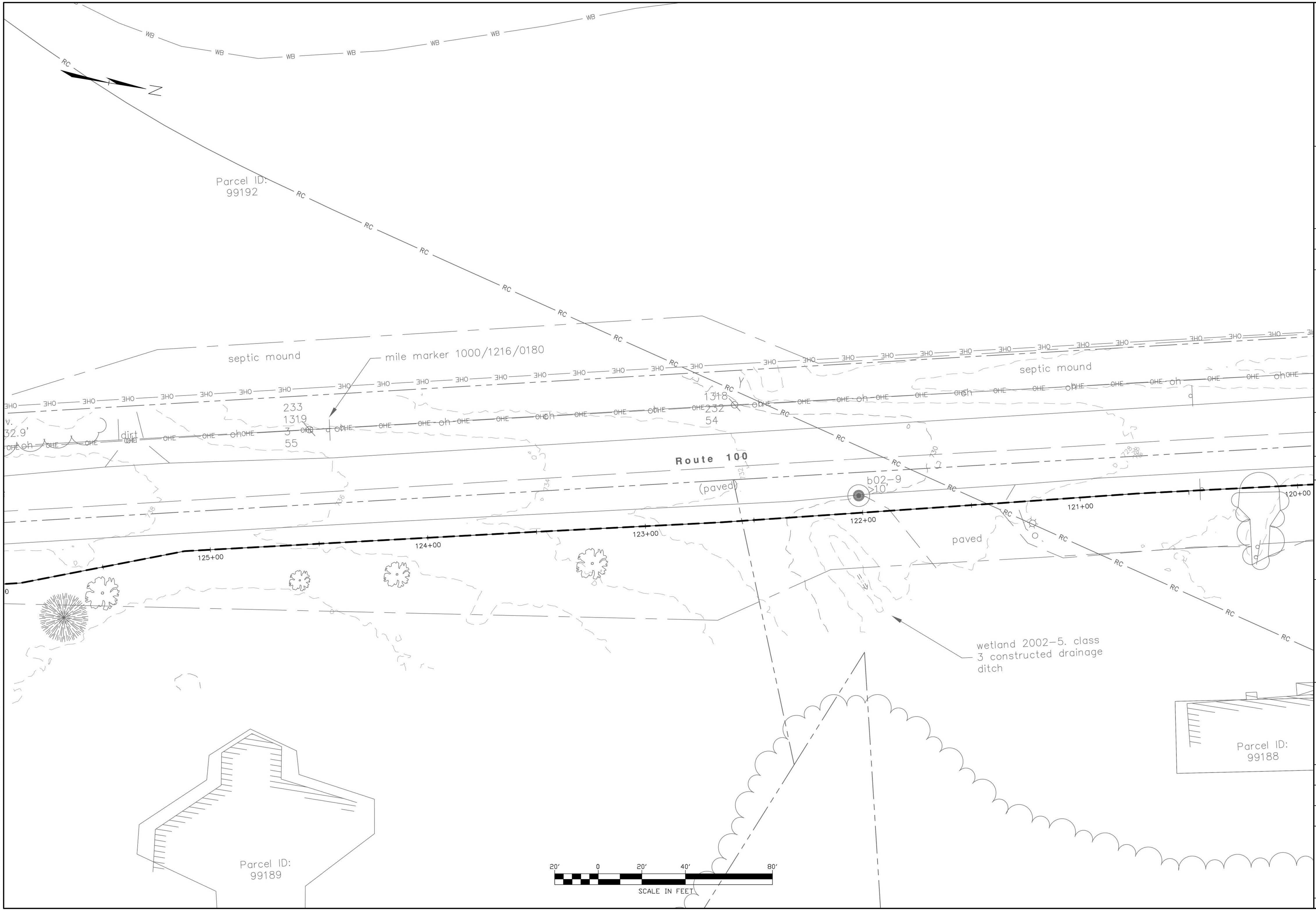
C9



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WASTEWATER
ROUTE 100

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C10

SHEET 10 OF 41

N

Mad River

wetland 2002–6. class 3
scrub–shrub wetland

approx. inv.
718.5'

1314
230
52

1311
229
51

btm river=704'

btm river=704.4'

1310
228
3
50

b02–10
refusal 4.5'

1313
229
30
51s

Bridge 157L

btm river=704.6'

btm river=709'

btm river=704.6'

approx. loc.
b07–11a

120+00

119+00

118+00

117+00

116+00

115+00

114

paved

20" cmp

inv.
719.1'

rim=723.8'
inv. 30" cmp in and out= 719.6'

approx. loc.
b07–10b
>10'

approx. loc.
b07–10c
>10'

b02–10a
refusal 4.5'

approx. loc.
b07–10d
Refusal 4'
99187

River

20' 0 20' 40' 80'
SCALE IN FEET

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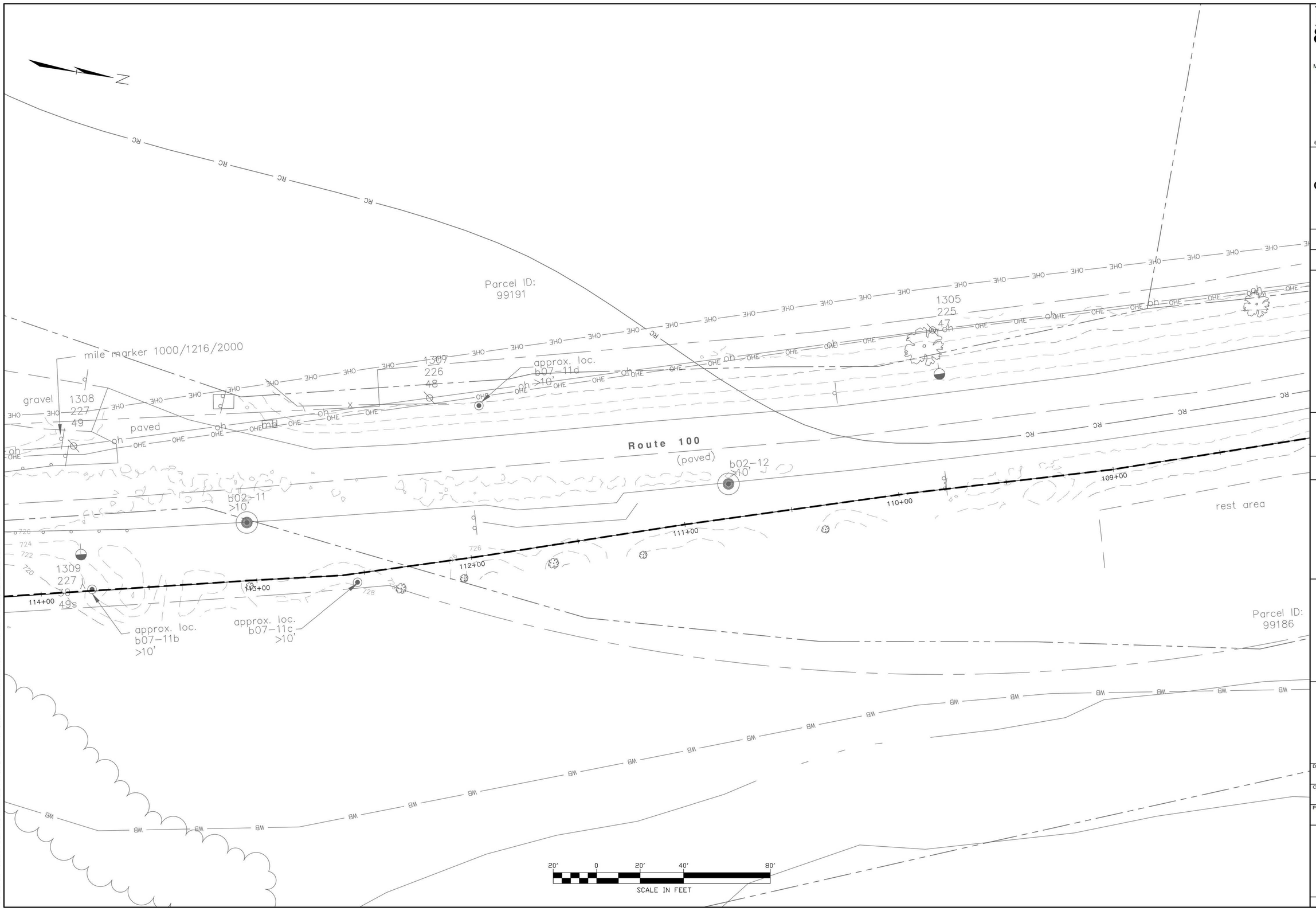

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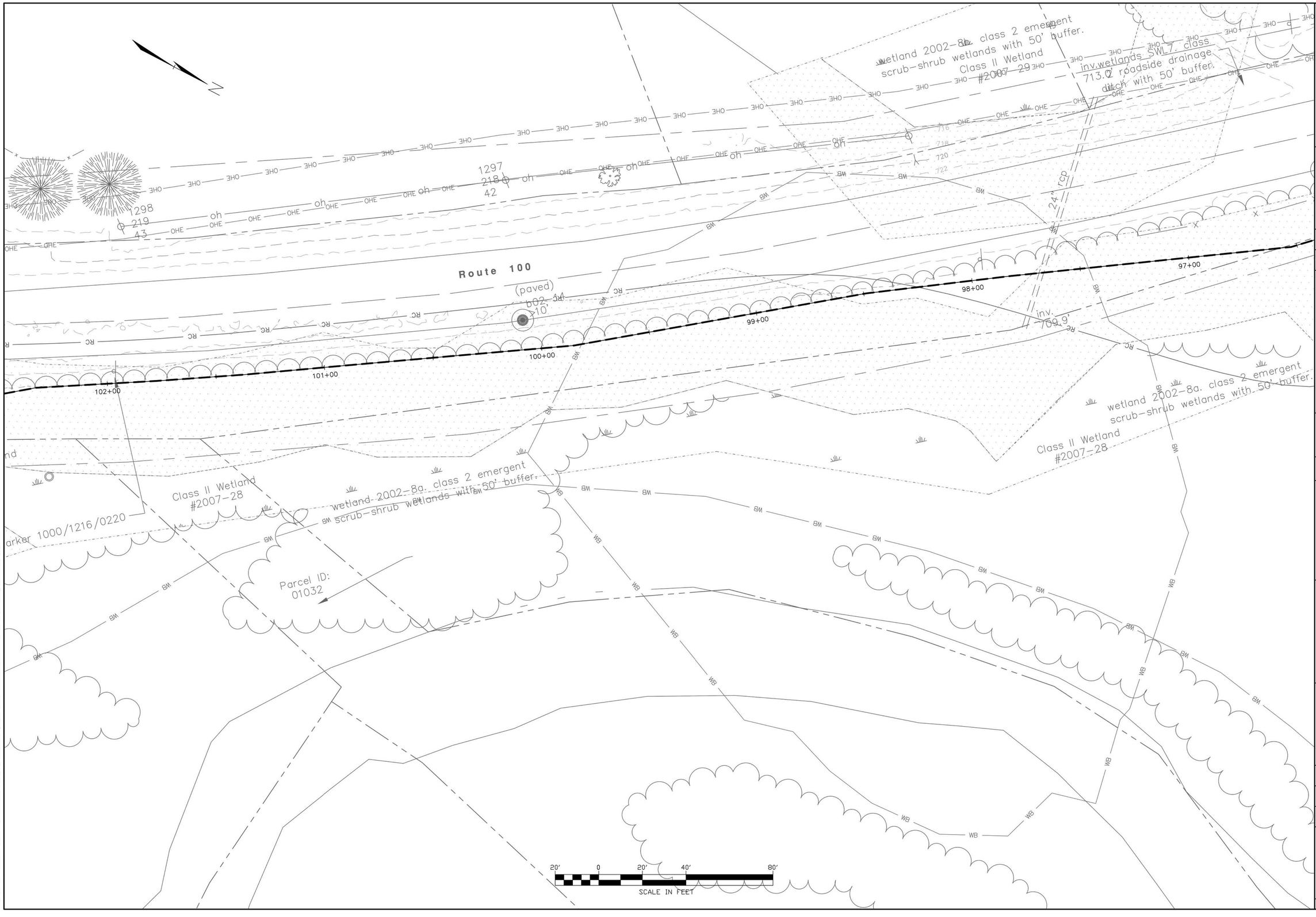

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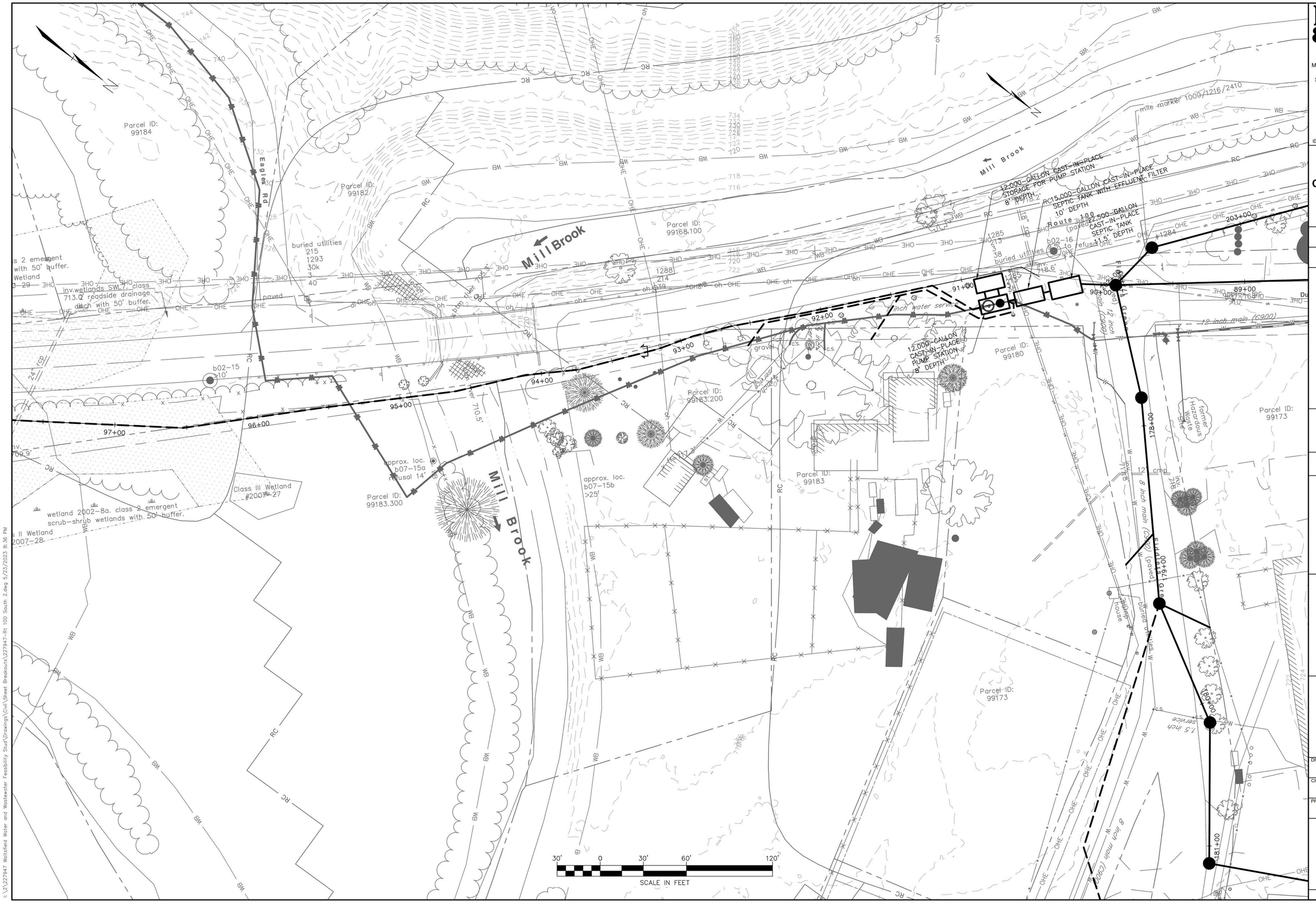

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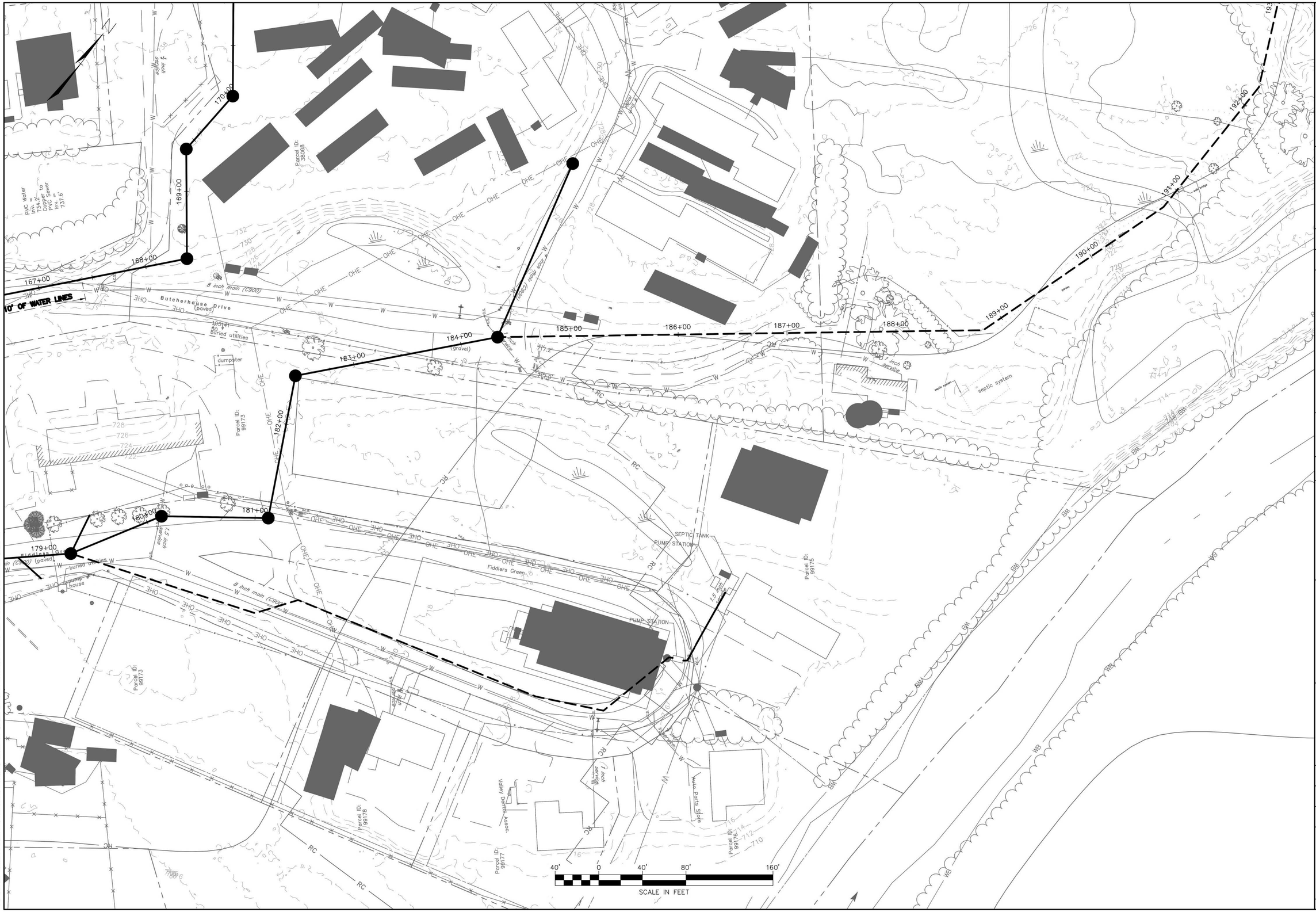

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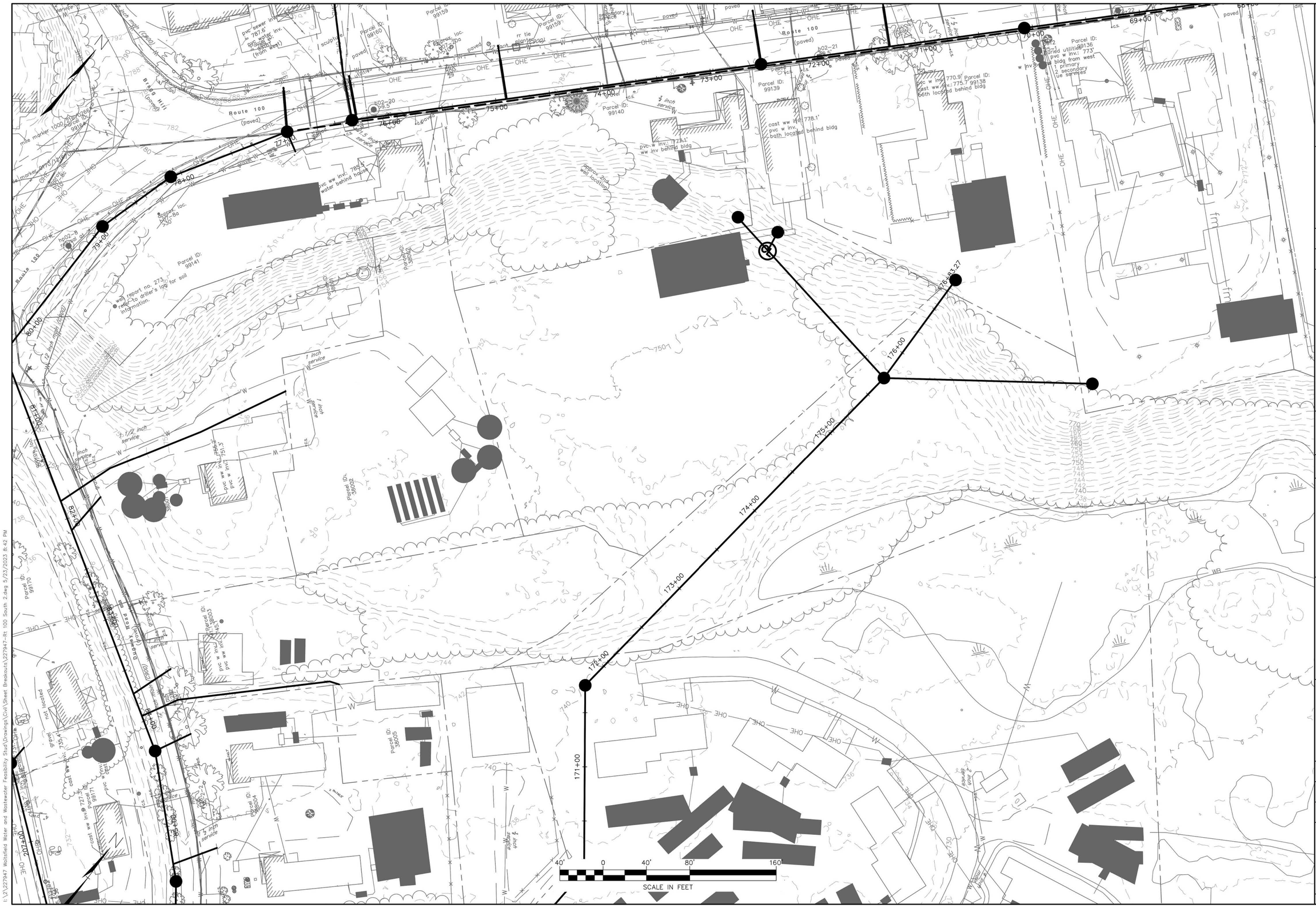
SCALE IN FEET: 20′ 0 20′ 40′ 80′


Route 100
(paved)
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170+00
171+00
172+00
173+00
174+00
175+00
176+00
176+83.27
Parcel ID: 99159
Parcel ID: 99160
Parcel ID: 99139
Parcel ID: 99140
Parcel ID: 99141
Parcel ID: 99136
Parcel ID: 98005
Parcel ID: 98006
Parcel ID: 98007
Parcel ID: 98008
Parcel ID: 98009
Parcel ID: 98010
Parcel ID: 98011
Parcel ID: 98012
Parcel ID: 98013
Parcel ID: 98014
Parcel ID: 98015
Parcel ID: 98016
Parcel ID: 98017
Parcel ID:

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WASTEWATER ROUTE 100

DRAWN BY	DATE
SDS	MAY 2023
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JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

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WASTEWATER ROUTE 100

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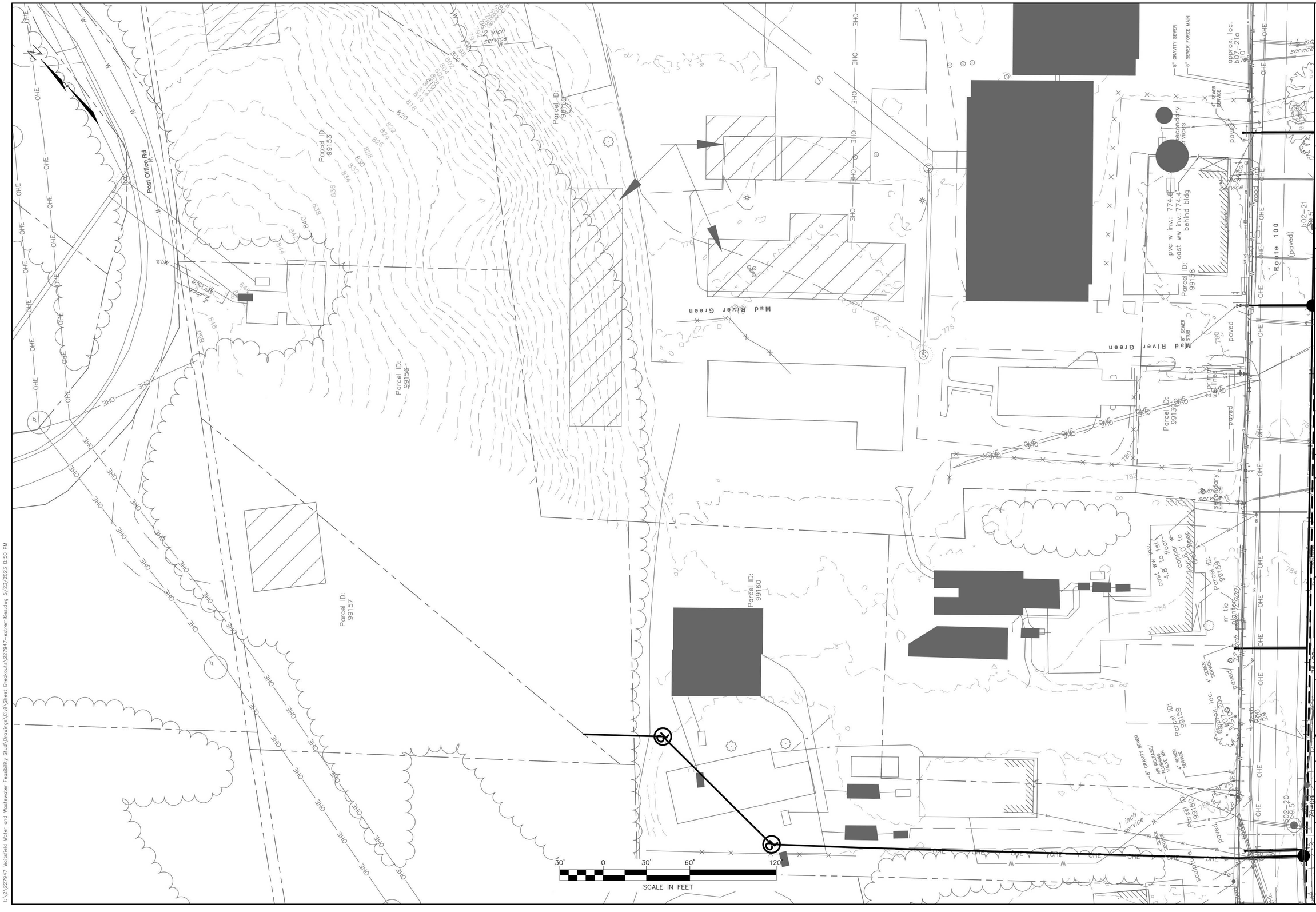

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

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WASTEWATER MAD RIVER GREEN AND POST OFFICE RD

DRAWN BY	DATE
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SHEET NUMBER

C23

SHEET 23 OF 41

Parcel ID: 99152
cast ww inv.: 770',773',775'
w inv behind bldg from west
mile marker 1000/1296/0285
is there a Sidewalk here?
Mad River Green
approx. loc. b07-21a 10'
12 inch main (C900)
6610' 195 24 buried utilities
POI=0+10.32
Parcel ID: 99145
both pvc w/ww located
ww inv: 768.25'
pvc w inv.: 764.2'
cast ww inv behind bldg
Parcel ID: 99144
former Hazardous Waste Site #941634
6609' 194 3 buried utilities
6608' 193 22 buried utilities
Route 100
(paved)
granite curb
paved
dirt
Parcel ID: 99135
Parcel ID: 99136
6612' 25-1 buried utilities
pvc w inv.: 773'
w inv behind bldg from west
1 primary
2 secondary
ue services
pvc w inv.: 770.9'
cast ww inv.: 775.7'
both located behind bldg
Parcel ID: 99138
FUTURE
OHE
c.s.
ff=771.0'
ff=779.2'
ff=776.2'
20' 0 20' 40' 80'
SCALE IN FEET

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WASTEWATER SLOW RD AND MAD RIVER GREEN

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30' 0 30' 60' 120'
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WASTEWATER ROUTE 100

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SHEET NUMBER

C25

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Parcel ID: 99144
FUEL STATION
(paved)
pvc w inv.: 764.1'
pvc ww inv.: 767.3'
ww behind bldg
Parcel ID: 99143
cast ww inv.: 767.8'
pvc w inv behind bldg
unknown w/ww location or material
Parcel ID: 99142
paved
Route 100
curb
gravel
paved
concrete
gas pumps
conc.
fuel fillers
buried tanks
former Hazardous Waste Site #890416
Parcel ID: 99132
both w/ww located behind bldg
Parcel ID: 99131
unknown w/ww location or material
Hazardous Waste Site #20053344
12 inch main (C900)
2 inch service
¾ inch service
6" service
6599
6597
6603
20+81
Slow Road
15 CMP
18" cmp
12" pe
12" cmp
12" GV
mile m
buried utilities
OHE
C.S. 64+00
61+00
62+00
60+00
SCALE IN FEET
20' 0 20' 40' 80'

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STUB FOR POTENTIAL FUTURE GRAVITY SEWER

MEHURON SUPERMARKET

PROPOSED DOSING STATION

Route 100

Baird Lane

Mad River

unknown w/ww location or material

both w/ww located behind bldg

former Hazardous Waste Site #890418

Hazardous Waste Site #28053344

Parcel ID: 99131

Parcel ID: 99132

Parcel ID: 99135

Parcel ID: 99130.100

12 inch main (C900)

2 inch force main

gas pumps

conc.

concrete

paved

dirt

buried utilities

OHE

WB

RC

0+10.32

64+00

65+00

66+00

67+00

65+00

193+00

194+00

195+00

196+00

197+00

198+00

199+00

200+00

201+00

201+27.25

40' 0 40' 80' 160'

SCALE IN FEET

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SHEET TITLE

WASTEWATER ROUTE 100

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WASTEWATER MAD RIVER CANOE RD

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C27

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30' 0 30' 60' 120'
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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WASTEWATER ROUTE 100

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SDS	

SHEET NUMBER

C28

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Parcel ID: 99142
Parcel ID: 99128.003
Parcel ID: 99131
Parcel ID: 99130
Parcel ID: 99127
Parcel ID: 99128.000
Route 100
Baird Lane
North PVC Sewer Inv. =760.5' West Copper to 4" Cast Sewer Inv. = 761.5' PVC Water Inv. = 758.7' rear of bldg note: water entrance in basement
pvc w inv.: 758.7'
ww inv.: 760.6'
ff=765.1'
ff=767.0'
ff=761.6'
12 inch main (c900)
18" cmp
paved
ledge
class I
approx. loc. refusal at 10'
approx. loc. b07=24 refusal at 1'4"
approx. loc. b07=24 refusal at 5' refusal at 4'
approx. loc. b07=24 refusal at 4'
ww inv.: 765.1'
pvc w inv.: 762.3'
inv. 757.8'
SCALE IN FEET

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SHEET TITLE

WASTEWATER BAIRD LN

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C30

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20' 0 20' 40' 80'
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SHEET TITLE

WASTEWATER CARROLL RD

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30' 0 30' 60' 120'
SCALE IN FEET

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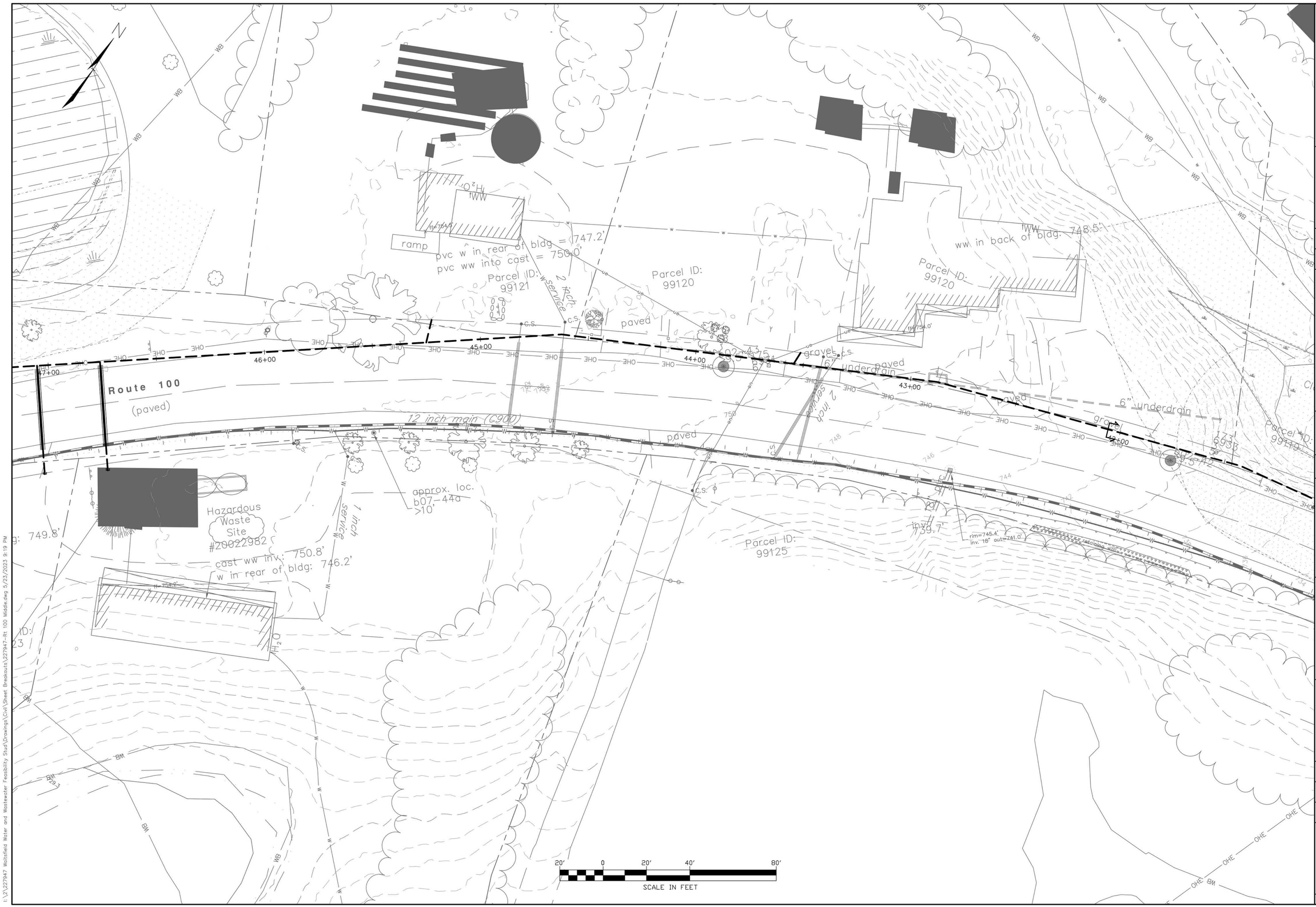

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N

Parcel ID: 99115

Parcel ID: 99107

Parcel ID: 99116

Parcel ID: 99114

Parcel ID: 99112

Parcel ID: 99109

Parcel ID: 99111

Parcel ID: 99113

spring

ledge

rim=706.2'
inv. 18" out=703.4'

w location, material & inv unknown

unable to contact

gravel

not located

b02-36

12 inch Ductile Iron (C900)

Route 100

(paved)

buried utilities

no w/ww
No water, wastewater

PVC to 4"Cast Sewer Inv. = 699.7'
PVC Water Inv. = 699.4'

PVC w inv.: 699.6'

PVC w inv.: 700.8'
Cast Sewer Inv. = 700.8'
PVC Water Inv. = 700.8'

w in rear corner bldg/Plastic into Cast Sewer Inv. = 701.8'
H_2O PVC Water Inv. = 699.4'

No w/ww water/ww

inv. 699.7' Parcel ID: 99115

inv. 698.4'

inv. 698.0'

rim=704.2'
inv. 18" in=699.4'
inv. 18" out=699.2'

rim=703.2'
inv. 18" in=698.5'
inv. 18" out=698.5'

Class III Wetland #2094-1a

Mad river

35+00

36+00

SCALE IN FEET
20' 0 20' 40' 80'

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NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WASTEWATER ROUTE 100

DRAWN BY: SDS	DATE: MAY 2023
CHECKED BY: JBA	D&K PROJECT #: 227947
PROJ. ENG.: SDS	D&K ARCHIVE #:

SHEET NUMBER

C35

SHEET 34 OF 41

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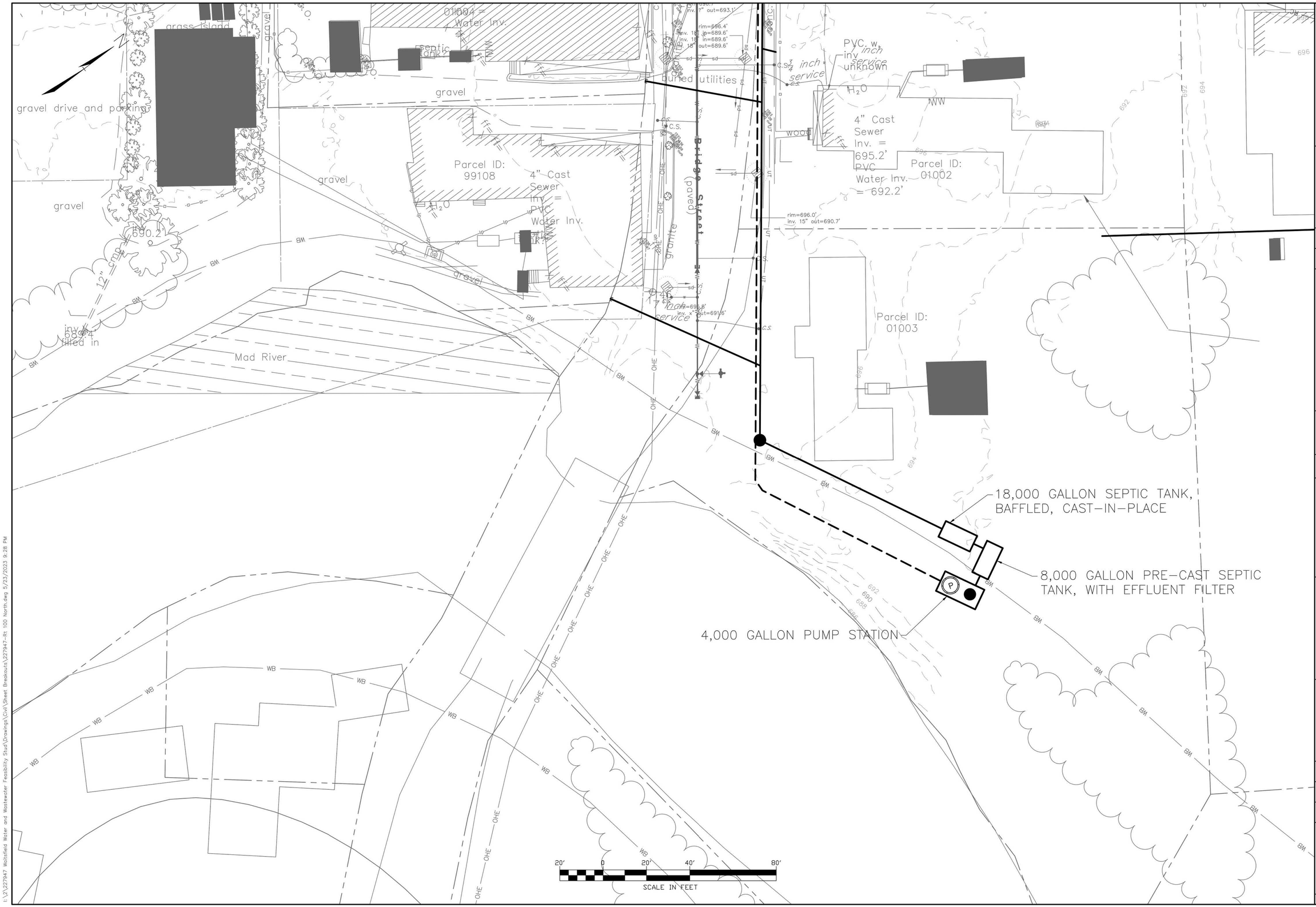

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WASTEWATER ROUTE 100

DRAWN BY	DATE
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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

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SHEET TITLE

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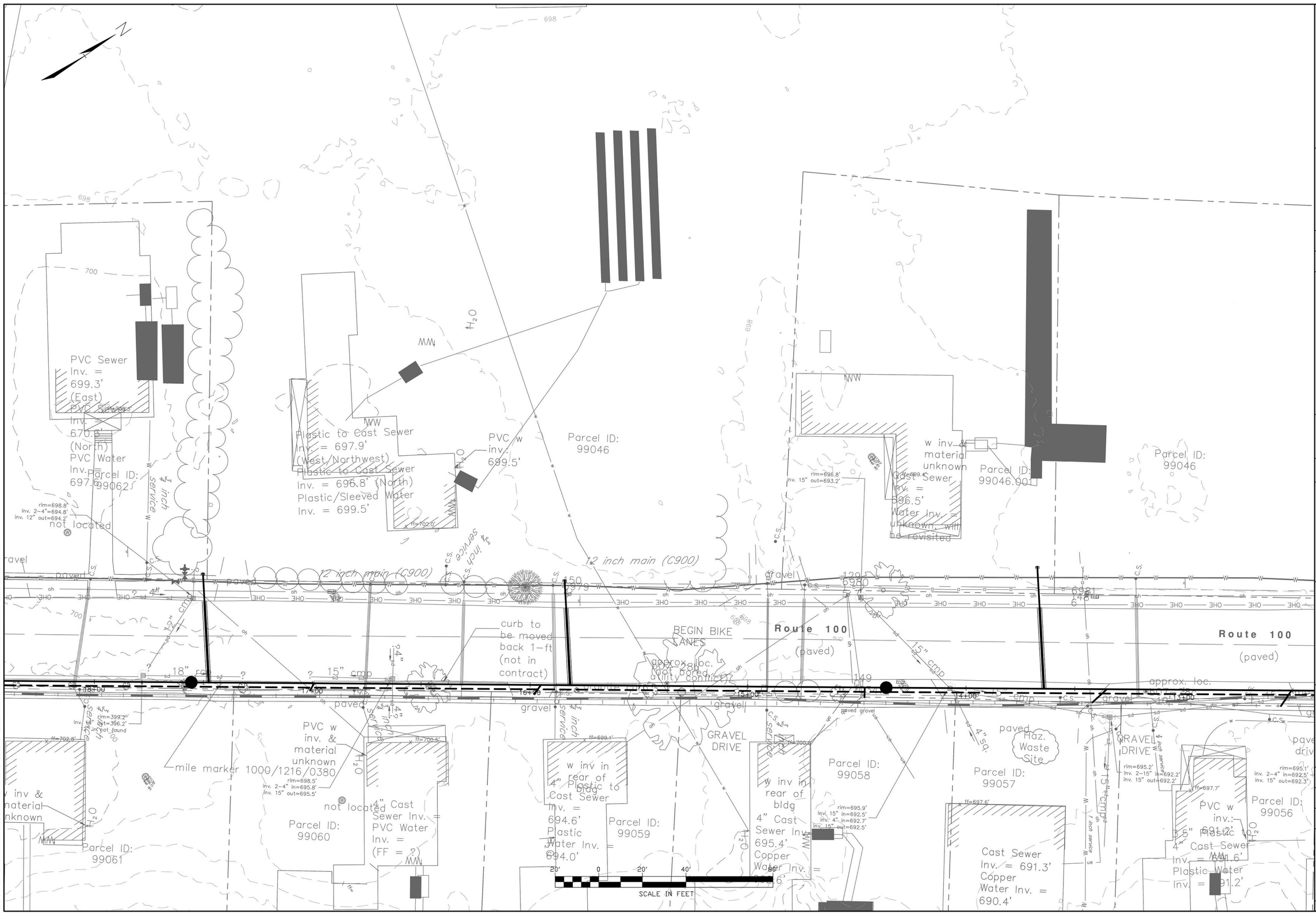

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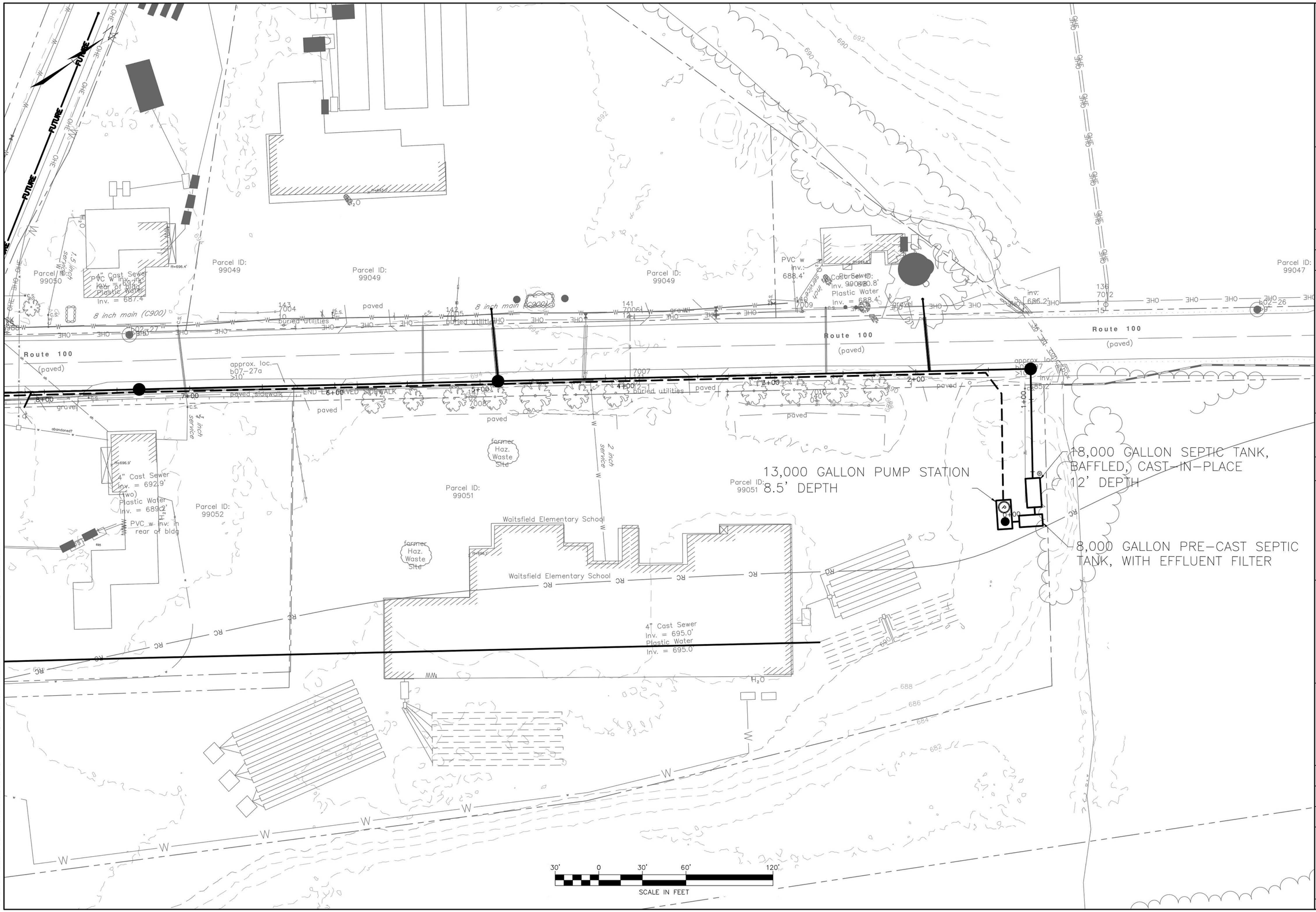

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PROJ. ENG.	D&K ARCHIVE #
SDS	

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SHEET 40 OF 41

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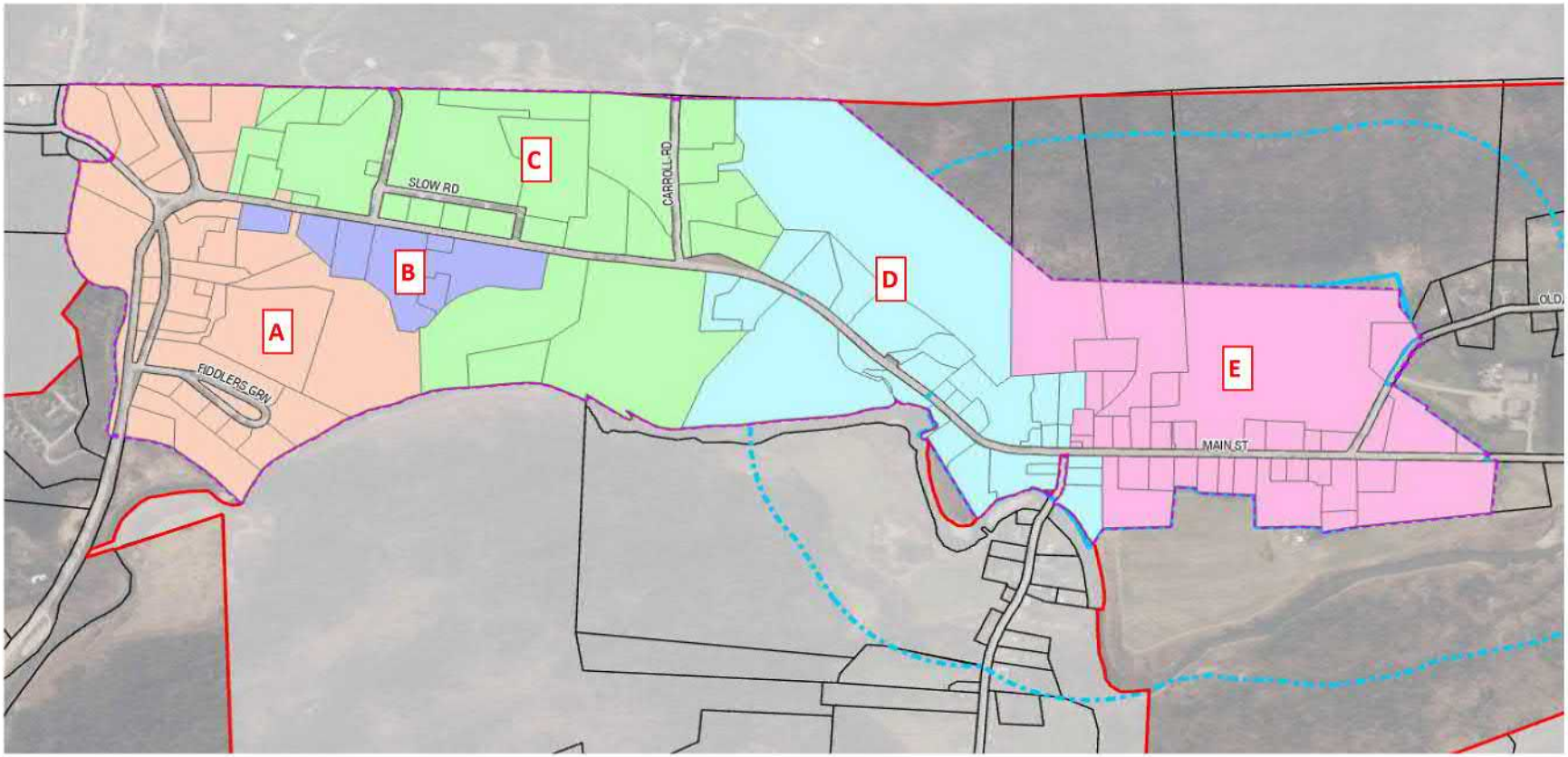
APPENDIX Q

WW Flows with Community System, gpd

	Existing	Future
A	30,811	33,805
B	6,918	8,729
C	30,087	36,128
D	11,909	12,981
E	24,186	32,636
	103,911	124,278

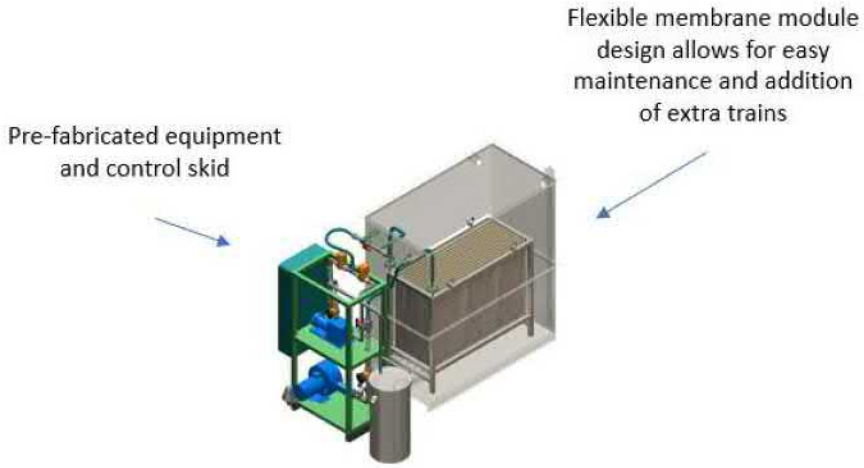


APPENDIX R

Globally, residential and commercial developers are being challenged to find sustainable and cost-effective solutions to satisfy the specific water supply and wastewater management requirements of their sites. The Enereau nrPUR™ family of Membrane BioReactor (MBR) systems provides the solutions these applications require:

- Low CAPEX
- Small Footprint
- Off-grid Solution
- Turn-key
- Reuse Quality Effluent
- Low Impact (Visual, noise & odor)

Prefabricated Turn-Key Modules Allows for Quick and Easy Installation



Prefabricated Modules For Quick Installation Onsite

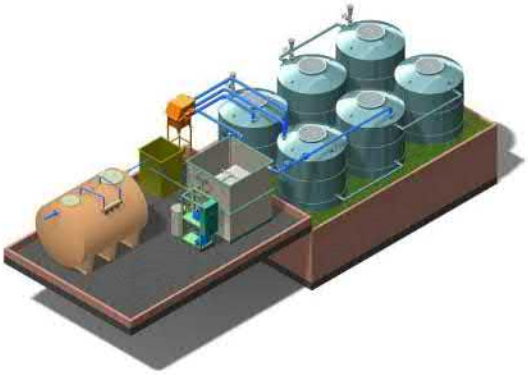
Advanced Ultrafilter (UF) Membranes – Absolute Barrier to Suspended Solids & Micro-organisms

ENEREAU

SMART SOLUTIONS FOR WATER & WASTEWATER

Modular & scalable solutions for flows ranging from 1,000 USgpd to 100,000 USgpd

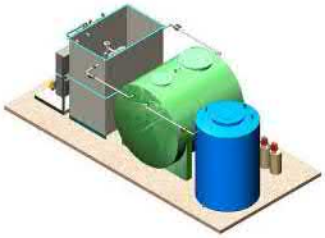
nrPUR™ Membrane BioReactor (MBR)



Advanced MBR Technology for flows from 5,000 to 100,000 USgpd (20-400 m^3/d)

- Modular prefabricated elements enhance speed of construction
- Flexible solutions that can grow easily with the facility
- UF Membrane Filtration combined with high-efficiency Aerobic & Anoxic treatment delivers state-of-the-art advanced wastewater treatment

nrPUR™ *ESTATE* Series



Advanced MBR Technology for flows up to 5,000 USgpd (20 m^3/d)

- High-quality effluent for any non-potable reuse application
- With a footprint of only 25ft^2 when combined with below-grade primary treatment tankage and as little as 100 ft^2 with all above-grade tankage, the most compact wastewater platform in the industry
- Easy-to-install and easy-to-operate Plug 'n Play design

The optimum solution for a wide range of off-grid applications

Residential

Hotels & Resorts

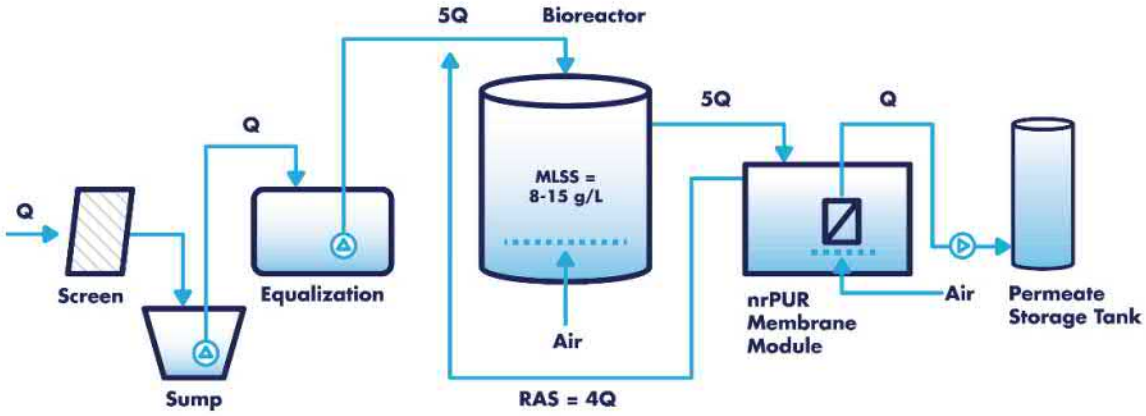
Office Buildings

Work Camps

Membrane BioReactor Process

Wastewater is centrally collected and pretreated to remove non-biodegradable solids and transferred to an Equalization (EQ) tank, where variations in flow and concentration are moderated. The balanced wastewater is transferred under level control to the system's BioReactor. Wastewater is recirculated between the BioReactor and the Membrane tank at a rate of 4-5 times average daily flow.

The BioReactor is a continuously-stirred, complete-mix reactor designed to ensure effective biological digestion of the organic materials in the secondary aeration step of the activated sludge process. The appropriate BioReactor volume is dictated by the Food to Micro-organism (F/M) Ratio and the mass loading of BOD per cubic volume of reactor.



KEY : RAS = Return Activated Sludge; MLSS = Mixed Liquor Suspended Solids

The activated sludge process converts the soluble organic material present in the wastewater into CO_2, H_2O and biological cell mass. An aeration system provides the oxygen required for this process. The mass of oxygen transferred is based upon the design daily influent BOD load.

The liquid phase of the mixed liquor is pulled through the membrane at a predetermined rate, or flux, established for each specific application. The mixed liquor suspended solids (MLSS) are rejected and moved away from the membrane by the air scour and hydraulic action. Permeate is drawn through the membranes under suction by permeate pumps and discharged to a clean water storage tank or for further polishing.

Typical System Results:

BOD: < 10 mg/L

TSS: < 5 mg/L

Nutrient removal levels (e.g. Total Nitrogen, Total Phosphorus) may be tailored to specific discharge or reuse requirements.

For more information visit www.enereau.com or contact us at sales@enereau.com

The Enereau nrPUR™ MBR System

Proposal Number	**ESP23021**
Project Name	**Waitsfield WWTP, VT**
Submitted to	**Jonathan Ashley** **DuBois & King**
Submitted by	**Alec Distler** **(802) 879-7136 - Alec@ChamplinAssociates.com**
Date	**2023-05-10**

Based around the most advanced biological wastewater treatment in the industry, the nrPUR™ Membrane BioReactor (MBR) system offers unparalleled process effectiveness for high-strength and highly variable organic wastewater (WW) in the most compact footprint. Compared to any other biological treatment system, the MBR reduces the physical footprint for the process by at least 50% and as much as 75%, consistently, reliably & efficiently.

From decades of experience on a diverse array of applications around the world, Enereau has developed a unique family of fully standardized and modular MBR platforms that offer the most cost-effective, easy to operate & maintain solutions for the biological treatment of WW from residential, commercial, institutional and light industrial applications.

Typical Project Criteria and Concept:

The proposed nrPUR™ MBR system is to treat sanitary wastewater from the municipality of Waitsfield, VT. The facility is designed to be developed across three phases.

The design parameters for the proposed nrPUR™ MBR system are:

Parameter	Phase	Influent	Effluent		Units
Average Daily Flow	1	50,000	50,000		USgpd
	2	90,000	90,000		USgpd
	3	161,000	161,000		USgpd
BOD_5 Concentration at ADF		300	<5		mg/L
COD Concentration		600	n.a.		mg/L
TSS		300	<5		mg/L
TKN		60	5(1)	10(2)	mg/L
Ammonia (as N)		35	1(1)	2(2)	mg/L
Nitrate Nitrogen			5(1)	10(2)	mg/L
Total Dissolved Phosphorus		10	0.2(1)	1(2)	mg/L
Design Water Temperature		12	12		C°

(1) Monthly Average
(2) Daily Maximum

For the first Phase, the proposed system has:

- A client-supplied, in-ground Equalization (EQ) tank, of approximately 16,000 USgal capacity (recommended dimensions by Champlin Associates),
- Rotary Drum fine screen pre-treatment,
- A client-supplied, in-ground BioReactor tank, approximately 50,000 USgal capacity, segmented into anoxic (AnBR) & aerobic (ABR) zones (recommended dimensions by Champlin Associates),

- An AnBR mixing unit,
- An ABR process aeration module,
- Two (2) independent Membrane Filtration Modules (MFM's), each complete with above ground Membrane Tanks, Ultrafiltration (UF) Membrane Cassettes, and Permeate Skids, in order to provide mechanical process redundancy on the solids-liquid separation step,
- A Chemical Feed Module for Phosphorus reduction,
- A Sludge Thickening module comprising a thickening tank & screw press.

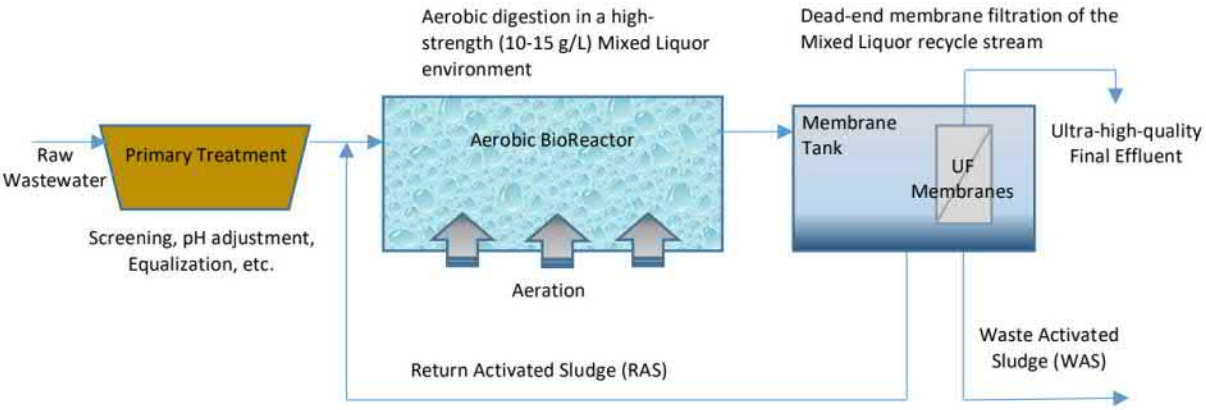
For the second Phase:

- The Phase 1 EQ tank is repurposed as an independent AnBR tank (16,000 USgal capacity),
- The Phase 1 BioReactor tank is repurposed as a full 50,000 USgal ABR,
- A new, client-supplied, in-ground EQ tank, of approximately 30,000 USgal capacity, is constructed,
- A third MFM, complete with above-ground Membrane Tank, UF Membrane Cassette, and Permeate Skid is installed.

For the third Phase:

- A second complete process train, similar to Phases 1 and 2 as described above, is installed with exception that the third MFM unit is now repurposed as the second MFM unit on the new train.

The ABR is a continuously stirred, completely mixed reactor designed to ensure effective biological digestion of the organic materials in the aeration step of the activated sludge process. The appropriate BioReactor volume is dictated by the Food to Micro-organism (F/M) Ratio and the mass loading of BOD per cubic volume of reactor. A submersible jet aeration system is installed in the ABR and provides the oxygen required for respiration by the beneficial micro-organisms used to digest the organic materials in the WW. This high strength biological broth is termed mixed liquor. The activated sludge process converts the soluble organic material present in the wastewater into CO_2, H_2O, and biological cell mass.



The Mixed Liquor Suspended Solids (MLSS) concentration, at 10-15 g/L, enhances the ability of the biomass to handle highly variable and higher strength wastewater influent. The ultrafiltration (UF) membrane is an absolute barrier to any particulate matter larger than the membrane pore size, typically <0.1 µm in size. Typically, final effluent quality is suitable for many non-potable reuse applications with TSS <<5 mg/L and BOD reduced by 98% or more.

The Membrane BioReactor Process

Submersible Feed-forward (FF) pumps are installed in the ABR and transfer the mixed liquor on a continuous basis to the above ground Membrane Tanks at a rate of 4-5 times average daily flow which, in turn, overflows from the Membrane Tanks back to the anoxic zone of the BioReactor by gravity. This continuously recirculated flow of WW is defined as Return Activated Sludge (RAS).

Based on the flow of raw WW into the EQ tank, as noted by the EQ tank level control sensor, a permeate pump on each Enereau Membrane Filtration Module (MFM) pulls the liquid phase of the mixed liquor (Permeate) through the membranes under suction at a predetermined rate, or flux, established for each specific application and discharges the treated effluent. The mixed liquor suspended solids (MLSS) are rejected and moved away from the membrane by the air scour and hydraulic action.

Surplus biomass generated by the conversion of BOD into cell mass is wasted periodically from the system, on an as-needed basis, as Waste Activated Sludge (WAS), for thickening & dewatering prior to off-site disposal.

Key features and benefits of the Enereau nrPUR™ platform:

Standardized & Modular Design

Developed around a series of standard, modular building blocks, the nrPUR™ family of systems offers unparalleled flexibility and reliability for wastewater treatment systems from less than 500 USgpd to over 100,000 USgpd (2-400 m^3/d). Factory assembled and tested prior to shipment, with integrated automation, permeate & CIP pumps, air scour blowers and instrumentation, the use of proven process modules to configure the specific treatment system for each unique application ensures that each platform goes together seamlessly on site and simplifies commissioning greatly.

nrPUR™ Technology: Best-in-Class Membrane Technologies

- Ultrafiltration separation technology (less than 0.1 micron)
- High flux with low pressure
- Low-fouling membranes
- Self-cleaning (air scour with optional backpulse)
- Temperature range: 10-45°C

UF membranes offer the optimal mechanism for the advanced separation of suspended solids and micro-organisms

Champlin Associates Scope of Supply:

Phase 1

Pre-Treatment

One (1) EQ Liquid level monitoring & control module,
One (1) EQ transfer pump module,
One (1) Rotary Drum Screen.

Biological Treatment

One (1) Anoxic Mixer Module,
One (1) Process Aeration Module,
Two (2) Feed Forward Pump & control modules.

Phosphorus Reduction

One (1) Chem-Feed Module.

Membrane Filtration

Two (2) nrPUR™ Membrane Filtration Modules, each including:

- One (1) Above-ground Membrane Tank, FRP or SS304 construction,
- One (1) Cassettes of submerged UF membranes,
- One (1) Permeate Process Module, including:
  - One (1) Permeate pump,
  - One (1) Flowmeter for permeate flow,
  - One (1) Integrated Backpulse/CIP Module,
  - One (1) Air scour system,
  - One (1) Control Panel,
  - One (1) lot of manual &/or automatic valves, process sensors, piping, and additional accessories.

Post-Treatment

One (1) Sludge Thickening Tank
One (1) Screw Press

Phase 2

Biological Treatment

One (1) Anoxic to Aerobic Zone Transfer Pump Module,
One (1) Process Aeration Module,
One (1) Feed Forward Pump & control module.

Membrane Filtration

One (1) nrPUR™ Membrane Filtration Module, including:

- One (1) Above-ground Membrane Tank, FRP or SS304 construction,
- One (1) Cassettes of submerged UF membranes,
- One (1) Permeate Process Module, including:
  - One (1) Permeate pump,
  - One (1) Flowmeter for permeate flow,
  - One (1) Integrated Backpulse/CIP Module,
  - One (1) Air scour system,
  - One (1) Control Panel,
  - One (1) lot of manual &/or automatic valves, process sensors, piping, and additional accessories.

Phase 3

Pre-Treatment

One (1) EQ Liquid level monitoring & control module,
One (1) EQ transfer pump module,
One (1) Rotary Drum Screen.

Biological Treatment

One (1) Anoxic Mixer Module,
One (1) Anoxic to Aerobic Zone Transfer Pump Module,
Two (2) Process Aeration Modules,
Two (2) Feed Forward Pump & control modules.

Phosphorus Reduction

One (1) Chem-Feed Module.

Membrane Filtration

Two (2) nrPUR™ Membrane Filtration Modules, each including:

- One (1) Above-ground Membrane Tank, FRP or SS304 construction,
- One (1) Cassettes of submerged UF membranes,
- One (1) Permeate Process Module, including:
  - One (1) Permeate pump,
  - One (1) Flowmeter for permeate flow,
  - One (1) Integrated Backpulse/CIP Module,
  - One (1) Air scour system,
  - One (1) Control Panel,
  - One (1) lot of manual &/or automatic valves, process sensors, piping, and additional accessories.

Post-Treatment

One (1) Sludge Thickening Tank
One (1) Screw Press

Client Scope:

The Client will be responsible for all items not specifically detailed in the Champlin Associates Scope of Supply including, but not limited to the following:

- All required permits to construct, install and operate the proposed wastewater treatment system.
- All site and civil works, including a clear site and concrete pads of a sufficient size to accommodate the proposed system.
- For Phase 1:
    - In-ground Equalization Tank of approximately 16,000 USgal capacity, details to be provided by Champlin Associates.
    - In-ground BioReactor Tank of approximately 50,000 USgal capacity, details to be provided by Champlin Associates.
- For Phase 2:
    - In-ground Equalization Tank of approximately 30,000 USgal capacity, details to be provided by Champlin Associates.
    - Conversion of Phase 1 Equalization Tank to an Anoxic Zone Tank.
    - Conversion of Phase 1 BioReactor Tank to a full 50,000 USgal capacity Aerobic Tank, details to be provided by Champlin Associates.
- For Phase 3:
    - In-ground Equalization Tank of approximately 30,000 USgal capacity, details to be provided by Champlin Associates.
    - In-ground Anoxic Tank of approximately 16,000 USgal capacity, details to be provided by Champlin Associates.
    - In-ground BioReactor Tank of approximately 50,000 USgal capacity, details to be provided by Champlin Associates.
- Receiving, unloading and installation of Champlin Assocaites deliverables (e.g., tankage and system modules).
- Supply or provision of a climate-controlled area to house the Membrane Filtration Modules.
- All Mechanical & Electrical connections to the Enereau unit, including utility services, and all inter-connecting electrical wiring from the control panel to all mechanical components (pumps, aeration equipment, etc.) not integral to the Champlin-supplied Permeate Process Module.
- All installation labor and piping/pumping from their existing system to the Enereau unit.
- All interconnecting piping between the system's components and to the ultimate discharge point.
- Treatment chemicals.
- Seed sludge.

Pricing & Terms:

Item	Description	Price per Item (USD)
1	One (1) nrPUR™ MBR System, as described above for Phase 1 ADF	**$757,400.00**
2	Adder for Phase 2 nrPUR™ MBR Process Equipment, as described above, to increase capacity from Phase 1 ADF to Phase 2 ADF	**$402,300.00**
3	Adder for Phase 3 nrPUR™ MBR Process Equipment, as described above, to increase capacity from Phase 2 ADF to Phase 3 ADF	**$548,850.00**

Payment terms: 15% with Purchase Order
60% upon review of design details and approval to proceed to manufacturing
15% upon notice of readiness to ship
10% net 30 days from delivery

Taxes: Price does not include any taxes or duties. All pertinent taxes and duties are the responsibility of the client.

Delivery Terms: Ex-works – Fort Erie, Canada – (Incoterms 2020)
Lead time: 16-20 weeks upon approval of drawings and receipt of 2nd payment.
Offer Validity: For Phase 1, 30 days from proposal date.
For Phases 2 and 3, Champlin Associates reserves the right to update the Pricing to reflect changes in costs that may have occurred between the current proposal date and dates at which the equipment for these subsequent Phases is ordered.

Appendices: 1. General Terms & Conditions

Offer submitted by:

Alec Distler

Alec Distler
Business Development / Pretreatment Designer
Champlin Associates

Offer accepted by:

Name:
Title:
Firm:

ENEREAU™

Champlin Associates
Pump & Controls Specialists
A Crawford Champlin Company

Tank Volumes:
EQ1 = 16,000 gal.
ABR1 = 40,000 gal.
AnBR1 = 10,000 gal.

Waitsfield WWTP
Phase 1 Flow: 50,000 GPD

ENEREAU™

Champlin Associates
Pump & Controls Specialists
A Crawford Champlin Company

Tank Volumes:
EQ1 = 30,000 gal.
ABR1 = 50,000 gal.
AnBR1 = 16,000 gal.

Waitsfield WWTP
Phase 2 Flow: 90,000 GPD

ENEREAU™

Champlin Associates
Pump & Controls Specialists
A Crawford Champlin Company

Tank Volumes:
EQ1 = 30,000 gal.
ABR1 = 50,000 gal.
AnBR1 = 16,000 gal.
EQ2 = 30,000 gal.
ABR2 = 50,000 gal.
AnBR2 = 16,000 gal.

Waitsfield WWTP
Phase 3 Flow: 161,000 GPD

ENEREAU™

Champlin Associates
Pump & Controls Specialists
A Crawford Champlin Company

Appendix 1

GENERAL TERMS AND CONDITIONS

APPLICABLE TERMS

These terms govern the purchase and sale of the equipment and related services if any (collectively, “Equipment") referred to in Seller's quotation, proposal or acknowledgement, as the case may be (Seller's "Documentation"). Whether these terms are included in an offer or an acceptance by Seller, such offer or acceptance is conditioned on Buyer's assent to these terms. Seller rejects all additional or different terms in any of Buyer's forms documents.

VALIDITY OF QUOTATION

30 days from date of offer. Shipment to occur within 20 weeks from the order date (down payment received). Non-compliance to the above stated timeline will result in a price review.

DELIVERY DATE

For ex-Works shipments, the Delivery date milestone is defined as the date on which Buyer is notified of “Readiness to Ship”. For all other shipping terms, delivery is defined as the date on which delivery is made to the specified delivery location. In the event Buyer is not able to receive the goods when notified of “Readiness to Ship” delivery is defined as seven (7) days from notice of “Readiness to Ship”. Any delays in receipt of payments may result in schedule delays. In the event Buyer is not able to collect/receive the goods when notified of “Readiness to Ship” the goods can be stored at Seller’s facility (and at the discretion of Seller) for a maximum of 30 days at a cost of $0.50 per ft2 per day.

PAYMENT TERMS

Payments will be invoiced according to the milestones outlined in Seller’s proposal with payment due according to the date specified on the invoice. Interest will be charged on the unpaid invoiced balance at the rate of one and one half percent (1.5%) per month for any amount received after thirty (30) days from the due date of the invoice. Any collection costs and/or legal fees incurred by CHAMPLIN ASSOCIATES in order to collect payment due will be invoiced to Buyer, and Buyer agrees to pay said costs.

OWNERSHIP OF MATERIAL

All devises, designs (including drawings, plans and specifications), estimates, prices, notes, electronic data and other documents or information prepared or disclosed by Seller, and all related intellectual property rights, shall remain Seller's properties. Seller grants Buyer a non-exclusive, non-transferable license to use any such material solely for Buyer's use of the equipment. Buyer shall not disclose any such material to third parties without Seller's prior written consent.

CHANGES

Seller shall not implement any changes in the scope of work described in Seller's documentation unless Buyer and Seller agree in writing to the details of the changes and any resulting price, schedule, or contractual modifications. This includes any changes necessitated by a change in applicable law occurring after the effective date of any contract including these terms.

FORCE MAJEURE

"Force Majeure" shall mean any act or event which is outside the reasonable control of a party including, without prejudice to the foregoing generality, Acts of God, epidemics, tidal waves, explosions, lightning, earthquakes, hurricanes, wars (whether declared or not), riots, strikes and industrial actions (other than among the employees of party seeking to rely on such event, or its subcontractor), civil and military disturbances and unrest, acts of the public enemy, action or inaction of the government or governmental authorities or of representatives thereof. If Champlin Associates is prevented from or delayed in performing its obligations as a result of Force Majeure, such prevention or delay shall not be considered a breach of the Agreement but shall for the duration of such event relieve Champlin Associates of its respective obligations thereunder. Should the Force Majeure suspension period last for more than one (1) month, Champlin Associates may terminate this quote or agreement.

WARRANTY

The seller warrants all equipment of its own manufacture to be free of defects caused by faulty material or workmanship for a period of eighteen (18) months from date of shipment or twelve (12) months from date of start-up, whichever first occurs. In the event that defects develop during the warranty period, under normal and proper use, Champlin Associates is to be notified promptly and with their consent the products are to be returned to Champlin Associates F.O.B. to a designated receiving facility.

In the case of components purchased by Champlin Associates and incorporated into the equipment, such as Electrical Controls, Instrumentation, Electrical Motors, Gear Reducers and related items, Champlin Associates warranty is limited to the individual manufacturer's warranty for that component, usually one year. This warranty does not apply to equipment or parts thereof which have been altered or repaired other than by a representative of Champlin Associates or damaged by improper installation, application, erosion or corrosion of any sort, or subjected to misuse, abuse, neglect or accident.

THIS WARRANTY, INCLUDING THE STATED REMEDIES, IS EXPRESSLY MADE BY CHAMPLIN ASSOCIATES AND ACCEPTED BY PURCHASER IN LIEU OF ALL OTHER WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHETHER WRITTEN, ORAL, EXPRESS, IMPLIED, OR STATUTORY. CHAMPLIN ASSOCIATES NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR IT ANY OTHER LIABILITIES WITH RESPECT TO ITS EQUIPMENT. CHAMPLIN ASSOCIATES SHALL NOT BE LIABLE FOR NORMAL WEAR AND TEAR, NOR FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGE DUE TO INOPERABILITY OF ITS EQUIPMENT FOR ANY REASON NOR ANY CLAIM THAT ITS EQUIPMENT WAS NEGLIGENTLY DESIGNED OR MANUFACTURED.

TERMINATION

Buyer may at any time terminate this order or any part hereof for its sole convenience. In the event of such termination, Seller shall immediately stop all work hereunder, and shall immediately cause any of its suppliers or subcontractors to cease such work. Seller shall be paid a reasonable termination charge consisting of a percentage of the order price reflecting the percentage of the work performed prior to the notice of termination, including without limitations any and all engineering work completed in submittal preparation, plus actual direct costs resulting from termination. Seller shall not be paid for any work done after receipt of the notice of termination, nor for any costs incurred by the Seller's suppliers or subcontractors which Seller could reasonably have avoided. Buyer will make no payments for finished work, work in process, or raw material fabricated or procured by the Seller in excess of any order or release.

Any payment delays longer than 60 days from the due dates specified in Seller's invoices may result in cancellation of the order by Seller. Seller will be able to Resell any finished or unfinished materials at their discretion to cover any amounts outstanding at that time.

LIMITATION OF LIABILITY

In no event shall Seller be liable for anticipated profits or for incidental or consequential damages. Seller's liability on any claim of any kind for any loss or damage arising out of or in connection with or resulting from this contract or from the performance or breach thereof shall in no case exceed the price allocable to the goods or services which gives rise to the claim. Seller shall not be liable for penalties of any description. Any action resulting from any breach on the part of Seller as to the goods or services delivered hereunder must be commenced within one (1) year after the cause of action has accrued.

APPLICABLE LAW & DISPUTE RESOLUTION

The laws of Ontario, Canada apply exclusively and the courts of Hamilton, Ontario have exclusive jurisdiction.

Aqua CAM-D®

Combination Aerator/Mixer/Decanter

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

System Features and Advantages

The AquaCAM-D® is a combination aerator/mixer/decanter designed for use in sequencing batch reactor systems (SBRs), treating flows as low as a few thousand gallons per day up to 100,000 gallons per day. The unit independently aerates and mixes the reactor to achieve anaerobic, anoxic and aerobic environments, while offering subsurface decanting of the final effluent. These capabilities make the AquaCAM-D ideal for low level phosphorus and total nitrogen applications. The unit has proven performance in a variety of municipal and industrial applications for both pretreatment and secondary wastewater treatment.

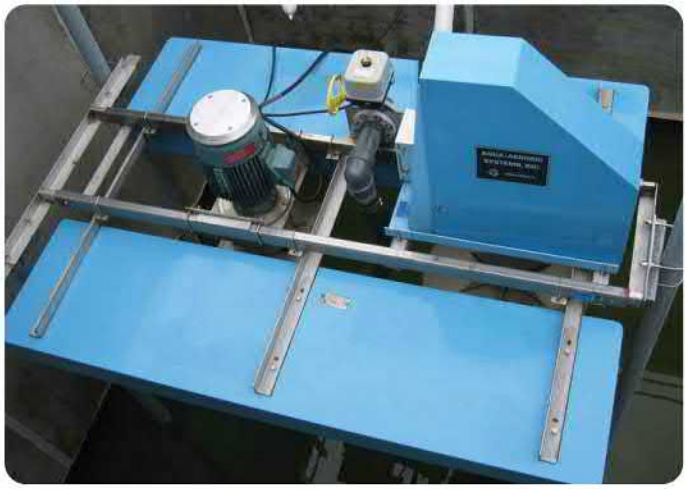
Features and Advantages

- Economical Enhanced Biological Nutrient Removal for Lower Flows
- Simple, Low Cost Installation
- Surface Accessible Components
- Proven Aqua-Aerobic Decanter
- Modular Design Promotes Easy Expansion
- Flexible Tank Options
- No Aeration Yard Piping or Blower Buildings
- Ideal for Cold Climates

Overview of the AquaCAM-D® unit in a SBR reactor.

Typical Applications

- Schools
- Residential Subdivisions
- Shopping Malls
- Parks, Camps, and Resorts
- Mobile Home Parks
- Nursing Homes
- Landfill Leachate
- Industrial Wastewater



Close-up view of the AquaCAM-D® system.

Operation Description

High velocity movement of water through the air induction volute creates a pressure differential. Atmospheric air is drawn into the volute through the air intake port and forcefully discharged into the basin, enhancing oxygen transfer. By opening the unit's electrically operated air valve, the Aqua CAM-D is operated as an aerator. Closing the air valve enables the unit to operate as a mixer, allowing for anoxic mixing during selected phases of the SBR cycle. Following the Settle phase of the SBR cycle, the submerged weir of the decanter opens and draws clear effluent from below the water surface. The AquaCAM-D is then ready to begin its next cycle of treatment.

Operation of the unit is controlled by a microprocessor with automatic level overrides to control the system during conditions of greater than peak flow.

Aqua CAM-D®

Combination Aerator/Mixer/Decanter

AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

www.aqua-aerobic.com
6306 N. Alpine Road, Loves Park, IL 61111-7655
p 815.654.2501 | f 815.654.2508 | solutions@aqua-aerobic.com

Bulletin #951D

Smith & Loveless Inc.

14040 Santa Fe Trail Dr.
Lenexa, KS 66215-1284
Phone: (913) 898-5201
Fax: (913) 888-2173

TITAN MBR™ Budget Proposal:

Packaged Membrane Bioreactor
5/23/2023

Prepared For:

DuBois & King, Inc.
Waitsfield, VT

Represented by:

Russell Resources

Proposal Table of Contents

Proposal Introduction

Smith & Loveless, Inc., having an office at 14040 Santa Fe Trail Drive, Lenexa, Kansas 66215 (hereinafter referred to as “Seller”), hereby agrees to sell to the buyer designated below (hereinafter referred to as “Buyer”), the following equipment subject to all of the provisions set forth in this Sales Agreement. The Sales Representative is not an agent or employee of Seller and is not authorized to enter into any agreement on Seller’s behalf or bind Seller in any way.

The information contained herein is considered proprietary and confidential. It is not to be released without prior written permission from Smith & Loveless, Inc.

Understanding Your Treatment System Needs

The membrane system shall be able to treat the design daily flow of 90,000 gallons per day with a dual train Titan MBR. All controls are included with remote monitoring capability and alarm system with auto dialer.

The wastewater characteristics you provided are summarized below:

Flow Conditions	
Design Flow Rate (each train):	49,500 GPD
Primary Source / Type:	Residential/Mix

Site	
Elevation:	ft
Summer Air Temperature:	30° C Max
Winter Air Temperature:	0° C Max
Available Footprint / Area:	N/A

Influent Waste Characteristics	
BOD5:	350 mg/L
TSS:	300 mg/L
TKN:	65 mg/L
NH_3-N:	N/A mg/L
pH:	6.5 to 8 pH units
Alkalinity:	100 mg $CaCO_3$/L
Min. Water Temperature:	13° C
Max. Water Temperature:	25° C

Effluent Requirements	
BOD:	< 5 mg/L
TSS:	< 5 mg/L
TN:	≤ 5 mg/L
TP:	≤ 1 mg/L
pH:	6.5 to 8 pH units
Alkalinity (No Less Than):	75 mg $CaCO_3$/L

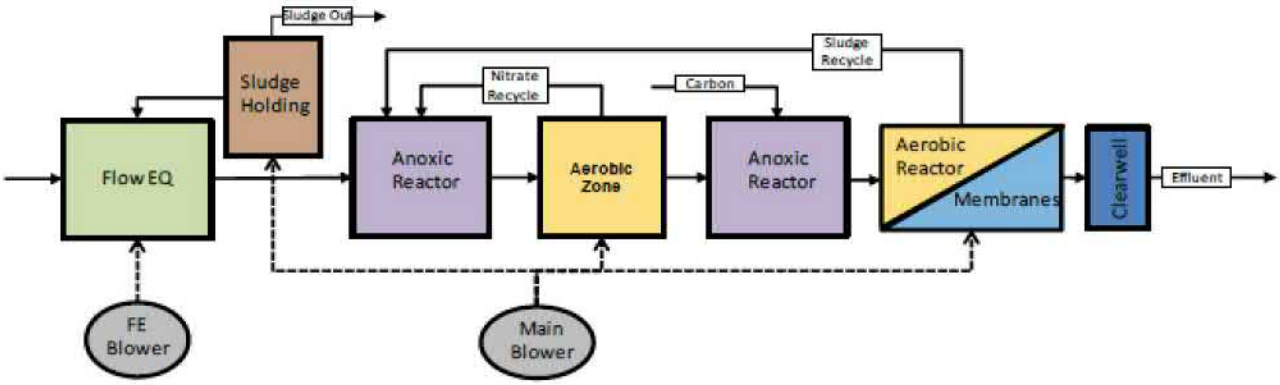
Achieving Results

To address Waitsfield Community treatment system needs we recommend our **TITAN MBR™** system. This system will arrive in two complete sections ready for installation.

TITAN MBR™ Features

1. **MBR (Aeration) Zone** (with S&L Membrane Modules)
2. **Submerged S&L Flat-Plat Membranes**
3. **Anoxic Zones** (Optional) **for Nutrient Removal with Submersible Mixers**
4. **LIQUIDLIFT™ Automatic Anoxic Recycle System**
5. **Flow Equalization Zone** (Optional)
6. **Automatic Fine Screening**
7. **QUICKSMART™ PLC Touchscreen Controls**

Basic Process Flow Scheme



EQUIPMENT DESCRIPTION AND PROPOSED DESIGN

GENERAL

Two (2) Smith & Loveless **TITAN MBR™** Treatment Plants, as described herein. The plant shall include separate zones: flow equalization, sludge holding, anoxic/aerobic, aeration/**TITAN MBR™** and clearwell.

CONSTRUCTION

The treatment plant structure shall be completely factory-built, shippable as a unit with the bottom, side walls, end plates, partitions and other factory-built shell tankage will be constructed of not less than 1/4" thick structural grade steel plate reinforced to withstand all hydrostatic pressures. The structural reinforcing shall be accomplished by forming the sides, partitions and end plates with V-shapes. The use of reinforcing beams will not be allowed. The corners of the "V" shall be rounded to a minimum radius of 3/8" to eliminate sharp corners to provide better adhesion of the protective coating system. The V-shape shall have a minimum section modulus of 2.8 cubic inches to provide adequate rigidity. The tank volumes described in these specifications shall be strictly adhered to. All major treatment and holding zones shall be completely dewaterable, independently, when installed on grade.

All welded steel structural members shall be joined by electric arc welding with fillets of adequate section for the joint involved. Where required for additional strength or watertight integrity, such welds shall be continuous inside and out. Inlet and outlet connections shall be as shown on the drawings.

AUTOMATIC FINE SCREEN

An automatic fine screen shall be mounted at the influent to the flow equalization zone. The mechanism shall consist of a combination of a fine screen, auger, and screenings press all into one. The screen shall consist of drilled metal trough with mesh of 3 mm opening. The screen shall be capable of passing a peak flow rate of 0.050 MGD. The screenings remain on the auger, and inside of the screen shall be cleaned by brushes fixed on the outside diameter of the shaftless screw. The auger shall be a shaftless spiral and convey solids up towards the pressing zone. All components shall be of 304 stainless steel with the conveying screw of high tensile steel.

FLOW EQUALIZATION ZONE
The flow equalization tank, provided by others, shall have a capacity suitable for the process design of the MBR.

Each train will have the following process zones.

PRE ANOXIC ZONE
As flow enters the dual pre-anoxic zone it is combined with a recycle flow from the Aerobic reactor. The aerobic reactor contains oxidized nitrogen in the form a nitrate. Under anoxic conditions, the biomass converts nitrate to nitrogen gas while reducing BOD. The contents of the pre anoxic zone shall be mixed by a 2.4 HP submersible mixer in each zone and shall have a capacity of approximately 1,645 ft^3. Recycle to the anoxic zone will be by a pump through a pipe from the effluent end of the aeration zone to the front section of the pre anoxic zone.

PRE AEROBIC REACTOR
The flow will be transferred to the aerobic zone from the anoxic zone. In Aerobic conditions the biomass reduces BOD and oxidizes ammonia to nitrate. This zone will have a capacity of approximately 1,645 ft^3.

POST ANOXIC ZONE
Flow entering the post anoxic zone is combined with a recycle flow from the Aerobic reactor. The aerobic reactor contains oxidized nitrogen in the form of a nitrate. Under anoxic conditions the biomass converts nitrate to nitrogen gas while reducing BOD. This zone will have a capacity of approximately 1,152 ft^3.

POST AEROBIC / TITAN MBR™ ZONE
This zone shall include membrane filtration modules and a fine bubble aeration system as described below. The membrane modules shall be of the submerged flat plate type. The system shall not require the use of permeate pumps. The flow through the membrane shall be induced by the head differential across the membrane. The system shall be designed to allow cleaning in-place of the membranes.

The membrane filtration modules shall utilize flat-plate PVDF+PET membranes connected to an ABS resin support plate. Total membrane area provided is 4,521 ft^2 with a nominal pore size of 0.08 microns. The membrane module shall have a 304 stainless steel frame that shall include an integral stainless steel coarse bubble diffused aeration system. The integral air diffuser system shall provide a minimum of 0.03 SCFM of air per FT^2 of membrane surface area. It shall also include the permeate water manifold system. The membrane module shall be designed for easy removal and installation.

An air distribution header and individual air diffusion assemblies shall be provided in the **TITAN MBR™** zone. The air header shall be rectangular tubing and the air supply duct shall extend from the header to a point just outside the tank. A flanged connection shall be supplied at the outer end or top of the supply duct. The connecting air main from the blowers to the treatment unit shall be provided by the purchaser. The header shall support drop pipe(s) to which are attached fine bubble diffusion devices. Each drop pipe assembly shall include a union to permit removal of the diffuser assembly grid and an air control valve to permit regulation of the air supply.

The fine bubble air diffusion system shall be designed to minimize clogging as well as to insure proper air diffusion and distribution in the **TITAN MBR™** zone. The diffusers and piping shall be of corrosion resistant construction and the entire assembly shall be removable for inspection or servicing. The oxygen transfer efficiency of the devices shall be such that an adequate supply of dissolved oxygen can be maintained in the

TITAN MBR™ zone to meet the treatment requirements at the organic load for which the plant is designed.

CLEAN-IN-PLACE SYSTEM

A chemical clean-in-place system shall be provided. The chemical holding/mixing tank shall be of polyethylene material of construction and shall be complete with an inlet nozzle, low level switch, full cover and outlet nozzle. The spent chemical waste tank shall shall be of polyethylene material of construction sufficient to withstand 1% chlorine and shall include a metering pump, inlet and outlet nozzle and full cover. Metering pump rated to pump a maximum of 151 gpd.

A chemical circulation pump shall be provided. The wetted parts shall be corrosion resistant and compatible with the chemicals utilized in membrane cleaning. The pump shall have a 1/2 HP, 1 phase, 60 cycle, 115 volt motor. Additionally, a constant head tank shall be provided with a working volume of 35 gallons. It shall be of polyethylene material of construction.

All inter-connecting piping between the pumps and tanks shall be of polyethylene material of construction. The piping shall be field installed and supplied by the installing contractor.

SLUDGE HOLDING ZONE

A sludge holding zone can be provided with a capacity of 4,999 gallons. Air shall be distributed to the sludge holding zone through S&L **MULTIFUSER®** diffusers, and all necessary air control valves shall be provided. Dimensions shall be as shown on the drawings.

A decanting airlift shall be provided to pump the supernatant into the flow equalization zone. The assembly shall be designed to be raised and lowered a maximum of 24" below static water level. A waste sludge airlift pump shall be provided in the MBR zone and shall pump into the sludge holding zone.

BLOWERS AND MOTORS

Three main blowers shall be furnished by the Manufacturer of the treatment plant, each to deliver 561 SCFM of free air measured at the blower inlet of 6.9 PSI. Two blowers shall be duty and the other shall be standby. Blowers shall be rotary positive displacement type with guarded V-belt connection to the motors. Blowers shall be equipped with filter silencers with optional weather-hood, specially built check valve and adjustable pressure relief valve.

Each main blower shall be driven by a 30 HP, 1750 RPM, 460 volt, 3 phase, 60 Hertz, horizontal totally enclosed and fan cooled, ball bearing electric motor.

Motors shall be mounted on a steel base plate with slots provided for adjustment. The motors shall have a 15% service factor but shall not be overloaded beyond the nameplate rating at the design conditions specified above.

Blower/motor units shall be off-plant mounted in close proximity to the plant. They are to be installed by the purchasing contractor.

VARIABLE FREQUENCY DRIVE FOR MAIN BLOWER

Included is two Variable Frequency Drives (VFD) unit appropriately sized for the necessary load. The VFD will be provided in a NEMA 4X rated panel and will be installed outside of the main control panel.

SOUND ENCLOSURE

An aluminum reinforced, insulated, one-piece rectangular housing, hinged at the base and provided with provisions for locking will be furnished to protect the motors and blowers, and to reduce the sound level from the blowers. Pricing can be provided upon request.

ELECTRICAL CONTROLS

A PLC based control system shall be provided for operation of the **TITAN MBR™** Treatment Plant. Programming shall be included for proper operation and control of the **TITAN MBR™** Treatment System. An HMI color panel display is included for control, programming adjustments and monitoring of the plant.

The electrical components shall be furnished in a NEMA 4X stainless steel cabinet with stand. The cabinet and stand shall be mounted by the purchasing contractor as shown on the drawings. A separate thermal magnetic circuit breaker and magnetic contactor shall be furnished for each blower motor. A selector switch shall control blower starters. Starters for 3-phase circuits shall have overload and under voltage release protection on each conductor.

A separate 115-volt, single-phase supply circuit breaker shall be provided for control circuits and auxiliary equipment. A manual starter with thermal overload protection shall be provided for all auxiliary motor-driven devices furnished with the **TITAN MBR™** Treatment Plant.

An un-interruptible power supply (UPS) unit will be provided in the panel. The UPS will be sized to operate the PLC controls and screen for a period not less than 30 minutes.

Wiring in the control cabinet shall be color-coded and shall be in accordance with the National Electrical Code.

The purchasing contractor shall provide all conduit and wiring between the electrical control panel enclosure and the various motors and electrical items furnished with the **TITAN MBR™** Treatment Plant. Wiring and conduit between the panel and the power utility pole shall also be furnished and installed by the purchasing contractor.

PROCESS INSTRUMENTATION

Instrumentation for the **TITAN MBR™** Treatment Plant will include all necessary flow meters and level transducers required for monitoring membrane flow, flux and **TITAN MBR™** Zone water levels. A combination pH, DO, and temperature sensor shall be provided for monitoring the **TITAN MBR™** Zone during operation.

The system shall include a means of transmitting data via phone or wireless service. Specific communication interface card (if required to be compatible with the system or service) and phone or wireless service is by others. Signal cable and conduit for signal cable is not included with the treatment plant.

WELDING

All steel structural members shall be joined by electric arc welding with fillets of adequate section for the joint involved. Where required for additional sectional strength, such welds shall be continuous inside and out.

PROTECTION AGAINST CORROSION AND ABRASION

After welding, all steel surfaces shall be blasted to remove rust, mill scale, weld slag, etc. All weld spatter and surface roughness shall be removed by grinding. Following cleaning, a single heavy inert coating shall be applied to all surfaces. This coating shall be of **VERSAPOX®** epoxy resin, specially formulated by Smith & Loveless for abrasion and corrosion-resistance. The dry coating shall contain a minimum of 85% epoxy resin with the balance being pigments and thixotropic agents. The dry coating shall be a minimum of 6 mils thickness. In addition to the heavy inert coating, the tanks' exterior surface shall receive a second coating of polyurethane paint.

All stainless steel, aluminum, and other corrosion resistant surfaces shall not be coated. A touch-up kit shall be provided by the Manufacturer for repair of all scratches or mars occurring during installation. This kit shall contain detailed instructions for use and shall be a material that is compatible with the original coatings.

OPERATION AND MAINTENANCE INSTRUCTIONS

A manual shall provide complete and detailed operation and maintenance instructions. This manual shall include detailed operation and maintenance procedures regarding proper process control of the treatment plant and troubleshooting guide for specific process problems. The manual shall also provide operation maintenance and servicing procedures of the major individual components provided with the treatment plant.

STARTUP

The Manufacturer shall provide the services of a factory-trained representative for 9 days over 3 trips on-site to assist with the initial startup, and to instruct the Owner's operating personnel in the operation and maintenance of the equipment.

Proposed Footprint

See Attached General Arrangement Drawing. Two Tanks approximately 55' long.

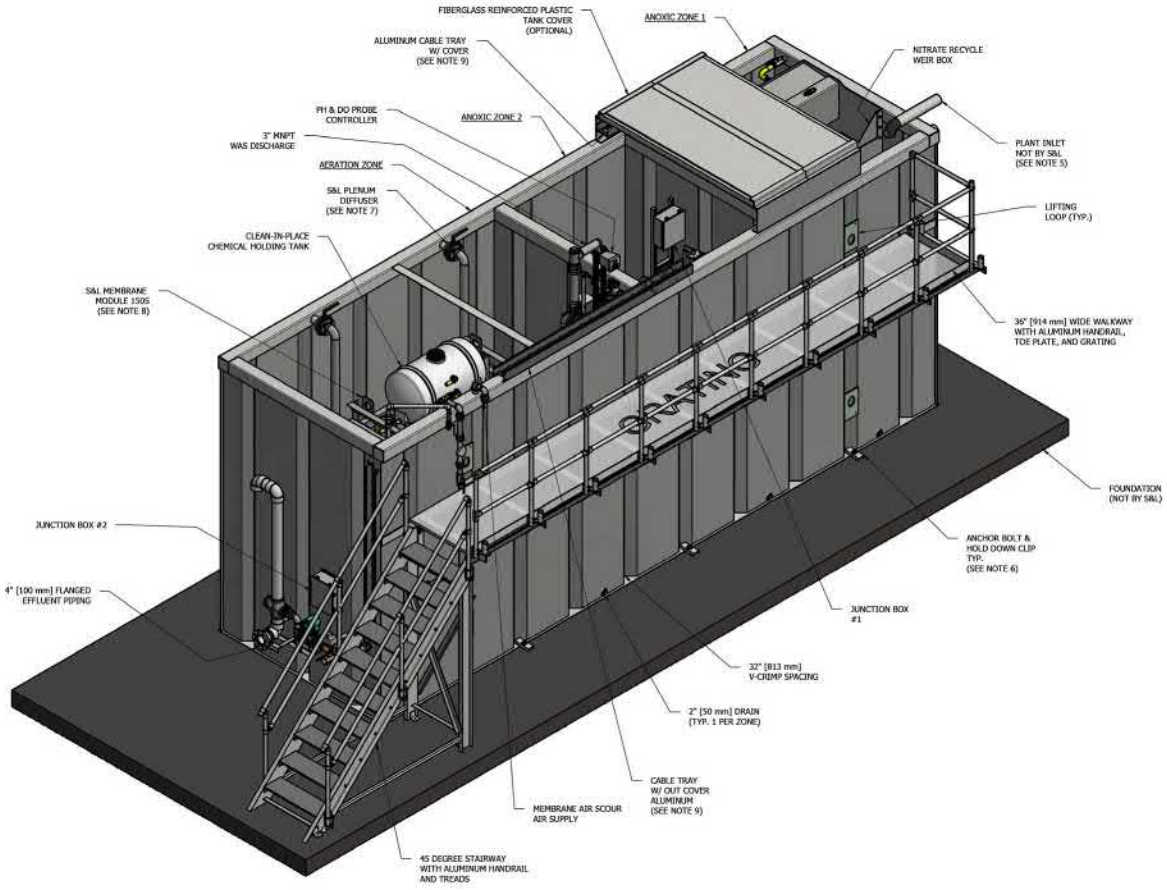
Height:	11'-6"
Width:	12'-0"

Nominal Zone Sizes (length / volume or surface area):

Sludge Holding	Pre-Anoxic Zones	Pre-Aeration Zone	Post Anoxic Zone	Aerobic/MBR Zone	Clearwell Zone
5'-7.5" 4,999 gal.	13'-8.5" 12,305 gal.	14'-3/4" 12,305 gal	8'-3.5" 7,226 gal.	9'-3.25" 7,226 gal.	4'-0" 1,700 gal.

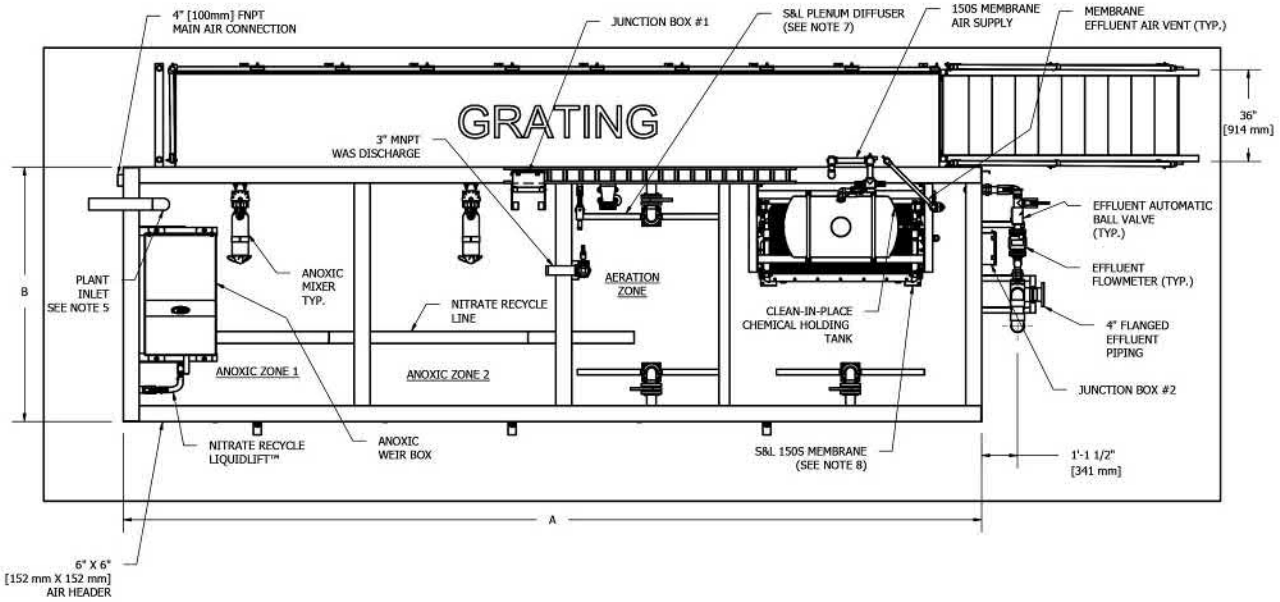
Example Drawings

Isometric View

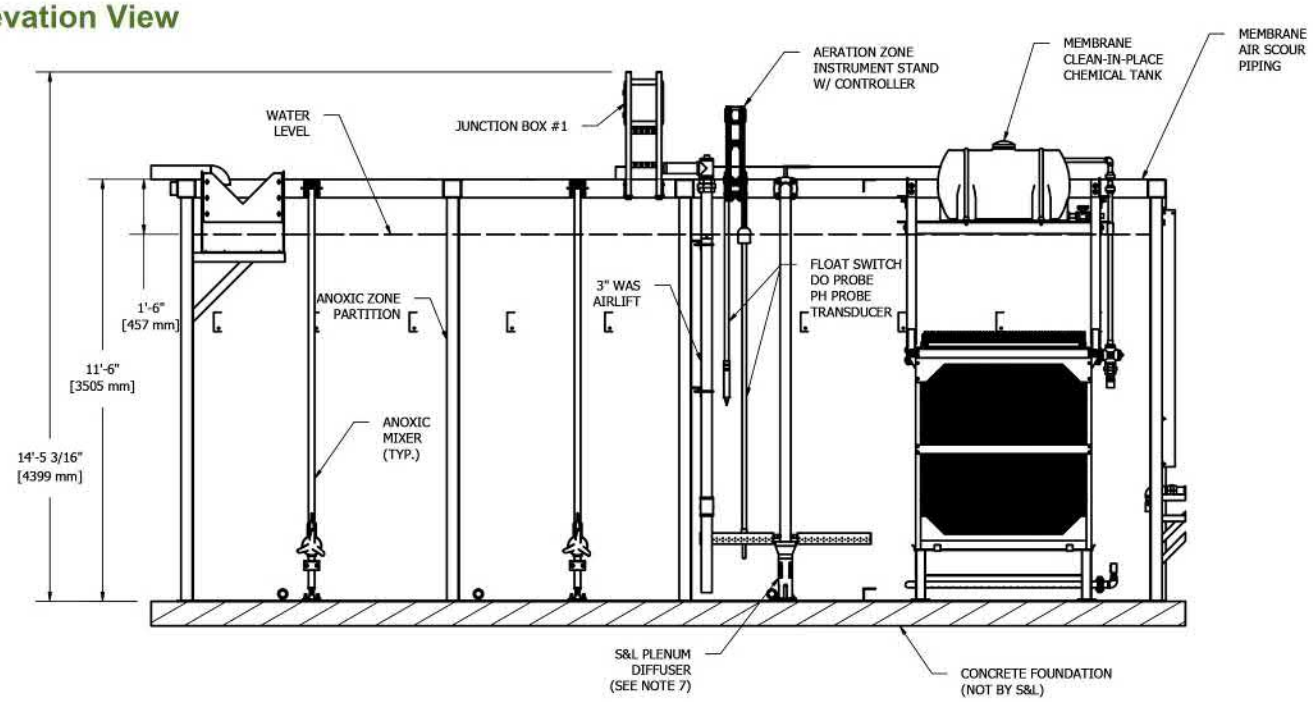


Example Drawings (Continued)

Plan View



Elevation View



Scope of Supply

Items Included (per train):

- One (1) 304 stainless steel, 3mm mechanical fine screen*
- Factory-built, epoxy coated tankage
- Two (2) S&L-150 Membrane Bio Reactor modules (Title 22 Approved)
- Fine bubble diffusers (EDI or equal)
- Coarse bubble diffusers for flow equalization and sludge holding
- Integral air headers
- Air piping to Membrane Bio Reactor modules within tank
- Flow equalization level transducer and MINI-JECT® with 316SS control solenoid and piping
- Wasting sludge airlift
- Decanting sludge airlift
- Valves for diffuser drop pipes
- Four (4) duty 316SS continuous duty mixers with 316SS guide rails
- LIQUIDLIFT™ nitrate recycle automatic airlift with V-notch weir box in 316SS
- Two (2) Main plant blowers (one duty, one standby)
- One (1) Effluent Pump to pump treated water from Wet Well to UV System (by others)
- NEMA 4X Control Panel, including steel support stand and mounting hardware
- Main blower VFD
- PLC controls with HMI and remote monitoring (Allen Bradley or equal)
- DO, pH, temperature (HACH or equal)
- Flow meter
- Chemical clean in place constant head tank and system
- Stairs and walkway
- 12 month parts warranty
- Twelve (12) days start-up over 3 trips
- Clearwell with effluent pump
- Design submittals with CAD drawings
- O&M Manuals
- Spare Parts (one V-belt per blower)

One (1) Mechanical Fine Screen needed to feed both trains.

Items Not Included:

- Interconnecting piping and wiring (outside of tanks)
- FE Zone (required by others) and FE zone blower (by others)
- Chlorine disinfection system or UV disinfection system (Optional)
- Turbidity Meter/probe(s)
- FRP Covers and odor control connections
- Pump station(s)
- Any civil or site work or excavation
- Any lighting of the site
- Any landscaping/roads around the plant
- Any buildings (if required)

Investment and Timeline:

Total Equipment Cost:	$1,980,000
Startup & Training Cost:	Included
Shipping (FOB Factory):	Included
Submittal Timeline:	8-10 Weeks (after receipt of complete details)
Mfg. Timeline:	32-36 Weeks (after receipt in Seller's office of approved Submittal Data)

Additional Price Details:

The estimated cost of this budget proposal constitutes a non-binding estimate for certain goods and/or services and is exclusive of applicable taxes.

F.O.B. factory plus any taxes, which may apply. Truck/Rail freight allowed to the job site, rail siding or nearest unloading area-unloading to be by Buyer. Due to the spike in gas prices, which is beyond the control of Smith & Loveless at the time of our quotation/bid, a fuel surcharge may need to be assessed at time of shipment.

Smith & Loveless, Inc. will provide one electronic copy of the O&M on CD in PDF format and four hard copies of the O&M. Additional copies can be provided for $50 per copy.

Smith & Loveless Inc.

Understanding Your Effluent Goals: TITAN MBR™

Project Name: AOAO MBR
Project Manager: Jeff Hunninghake

Units: US Customary

Date: 8/2/2021

Flow Conditions	
Design Flow	49.5 kGPD
Maximum Month Flow	N/A kGPD
Peak Day Flow	N/A kGPD
Peak Hour Flow	N/A kGPD
Peak Hour Flow Duration	N/A hr

Influent Waste Characteristics	
Design Flow Rate	49.8 kGPD
BOD	350 mg/L
TSS	300 mg/L
NH_3-N	N/A mg/L
TKN	65 mg/L
TP	7 mg/L
pH*	7-8 pH units
Alkalinity	100 mg $CaCO_3$/L
Min. Water Temperature*	13 °C
Max. Water Temperature*	25 °C

Site	
Elevation	ft
Summer Air Temperature	30 °C
Winter Air Temperature	0 °C
Available Footprint / Area	N/A ft.2

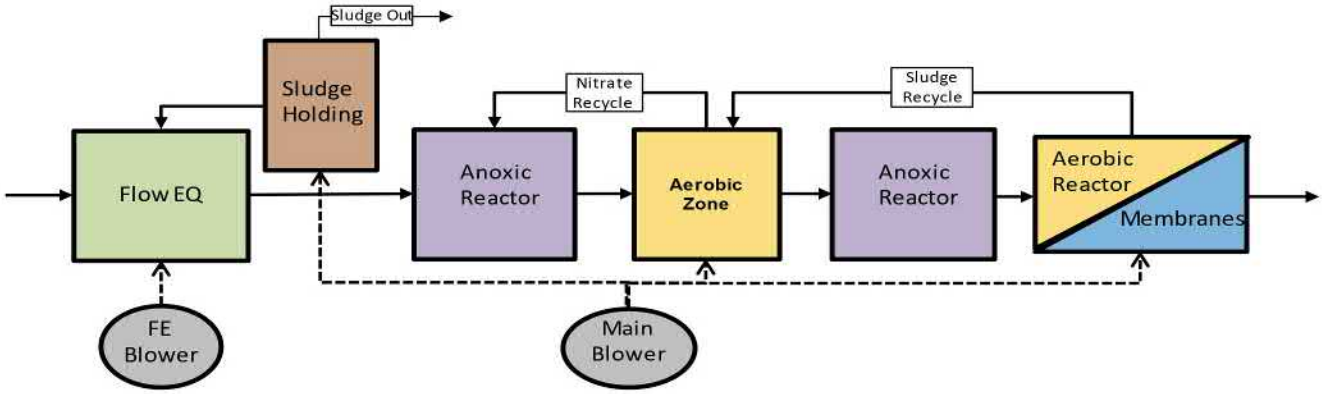
Effluent Requirements	
BOD	5 mg/L
TSS	5 mg/L
NH_3-N	1.0 mg/L
TN	5 mg/L
TP	5 mg/L
pH*	7-8 pH units
Alkalinity*	75 mg $CaCO_3$/L

*Assumed values

Smith & Loveless Inc.

Achieving Results: TITAN MBR™ Process Design Summary

Units: US Customary



Flow Equalization	Design Goals
Number of Zones	1 Zones
Peak Day Flow	by others kGPD
Equalized Design Flow	by others kGPD
Volume Each Zone	ft³
Retention Time at Design Flow	hrs

Influent in Flow Equalization (FE) zone is mixed with coarse bubble diffusers to keep solids in suspension. At design flow condition, the FE zone can hold the water for the retention time, that can help the maintenance and improve the consistency of flow to the system.

Sludge Holding	Design Goals
Number of Zones	1 Zones
Volume each Zone	668.3 ft³
Estimated Solids Production	110.4 lb TSS/d
Waste Sludge Concentration	10,000 mg TSS/L
Volume of WAS per Day	1,322 gpd
% Solids After Concentration (Est.)	2.0 %
Solids Holding Time with Decanting	8 days

Excess solids produced during biological treatment are removed from the system through wasting process and are held in a sludge holding (SH) zone until they can be properly dealt with. This zone has the capabilities to further concentrate the solids and decant the supernatant back to the FE zone. The sludge holding zone was designed based the values listed at right.

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Achieving Results: TITAN MBR™ Process Design Summary

Anoxic Basin (1)	*Design Goals*
Number Of Zones	2 Zones
Volume Each Zone	823 ft^3
Design Anoxic Recycle Ratio	4.0 QIR/Q
Design Denitrification Rate	15.6 lb NO_3-N/d
Design Effluent Nitrate	0.3 mg/L

Flow entering the Anoxic Basin (1) is combined with a recycle flow from Aerobic reactor (1). The aerobic reactor contains oxydized nitrogen in the form of nitrate. Under anoxic conditions, the biomass converts nitrate to nitrogen gas while reducing BOD.

Aerobic Basin (1)	*Design Goals*
Number of Zones	1 Zones
Volume Each Zone	1,645 ft^3
Total Aerobic Solids Retention Time	17 days
Hydraulic Retention Time	5.9 hours
Mixed Liquor Concentration	10,000 mg TSS/L
Volatile Mixed Liquor Concentration	6,989 mg VSS/L
F/M Ratio MLVSS Basis	0.075
BOD Loading Rate	32.67 lb/kft^3.d

The flow enters the Aerobic Basin (1), in which the biomass converts BOD into inoccuous products such as carbon dioxide and water while producing additional biomass. A portion of ammonia or total Kjeldahl nitrogen (TKN) is utilized by bacteria for growth and maintenance while the remaining portion is converted to nitrate. This zone is designed based on the characteristics listed at right.

Anoxic Basin (2)	*Design Goals*
Number Of Zones	1 Zones
Volume Each Zone	1,152 ft^3
Design Anoxic Recycle Ratio	2.0 QIR/Q
Design Denitrification Rate	3.57 lb NO_3-N/d
Design Effluent Nitrate	3.5 mg/L

Flow enters the Anoxic Basin (2) to further remove nitrate by reducing it to nitrogen gas. Additional carbon may need to be externally added for the denitifrification process.

Aeration Basin (2)/MBR Basin	*Design Goals*
Number Of Zones	1 Zones
Volume Each Zone	1,152 ft^3
Hydraulic Retention Time	4.2 hours

Flow enters the Aeration Basin (2) (Post-Aerobic Basin) from the Anoxic Basin (2). This basin is utilized to oxidize any unused carbon in Anoxic Basin (2) and nitrify ammonia to low levels, typically < 1mg/L and meet the effluent requirements. This Basin is also used to house membranes and can be referred to as membrane bioreactor (MBR) zone.

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Membrane Characteristics		Design Goals
Membranes housed in the Aerobic Basin (2) filter the treated wastewater by retaining the solids. The membranes contain very small pores that allow only water to flow through, removling virtually all solids. The solids will be recycled with a pump back to the head of the Anoxic Basin (1). The Membranes were design based on the physical parameters listed at right.	**Total Membranes**	2 S&L 150 Unit
	Membrane Area	4,521 ft²
	Average Day Flux at Min Water Temp	12.2291 gpd/ft²
	Peak Day Flux at Min Water Temp	6.14 gpd/ft²
	Peak Hour Flux at Min Water Temp	17.1209 gpd/ft²
	Total Air Scour Required	106 scfm

Re-Aeration		Design Goals
Filtered effluent enters the Reaeration Basin where it is aerated to achieve the desired effluent dissolved oxygen concentration. The Reaeration Basin is designed based on the characteristics listed at right.	**Number Of Zones**	1 Zone
	Volume Each Zone	494 ft³
	Hydraulic Retention Time	1.8 hours
	Effluent DO Required	5 mg/L

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Achieving Results: TITAN MBR™ Process Design Summary

Aeration Requirements

To supply the system with the required dissolved oxygen for BOD and ammonia removal as well as to provide adequate mixing energy, air diffusers are installed in the aeration zone. A main blower is used to provide air to aerated zones except FE zone. A FE blower is used to provide air to mix the FE zone. The aeration requirements were designed as follows.

Diffuser Design	
Coarse Bubble Diffusers	
Actual O_2 Requirement (AOR)	185.2 lb O_2/d
O_2 Credit From Air Scour	76.7 lb O_2/d
Alpha	0.63
Beta	0.95
Coarse Bubble Air	355 scfm
Total Aerobic Zone Air	355 scfm

Additional Operational Air Requirements	
Mixing in the SH Zone(s)	20 scfm
Air For Airlifts	72 scfm
Mixing in the FE Zone(s)	47 scfm

Total Air Requirements	
Main Blower	561 scfm
FE Blower	49 scfm

Power Requirements

Main Blower Design	
Main - Gauge Pressure	6.9 psi
Calculated Power Req'd	24.2 BHP

Flow Equalization Blower Design	
FE Blower Gauge Pressure	6.4 psi
Calculated Power Req'd	1.8 BHP

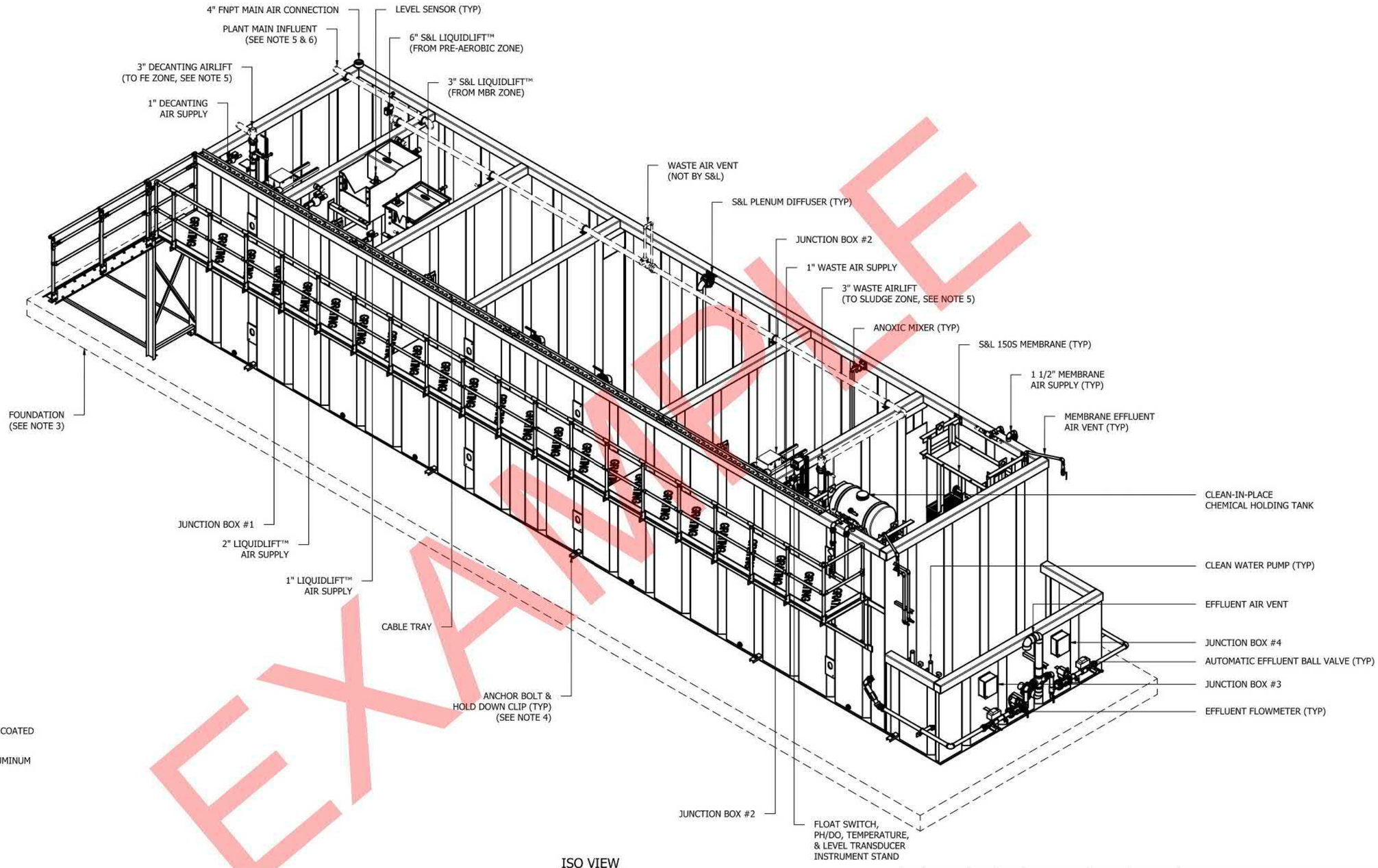
Nutrients Required for BOD Removal

MacroNutrients	
N Req'd. for BOD Removal	12.7 mg N/L
P Req'd. for BOD Removal	2.7 mg P/L

Chemical Addition

Alkalinity Addition	
Inf. Alkalinity (Client Verify)	100 mg $CaCO_3$/L
Supplimental Alk Required?	Yes
Alkalinity to be Added	67 lb $CaCO_3$/d

Supplimental Carbon Dosing	
Anoxic (1) Zone Carbon Dosing ?	No
Anoxic (2) Zone Carbon Dosing ?	Yes
Anoxic (1) Dosing	0 lb CH_3OH/d
Anoxic (2) Dosing	4 lb CH_3OH/d



ISO VIEW

NOTES:

1. MATERIALS OF CONSTRUCTION:
   TANK STRUCTURE: CARBON STEEL, EPOXY COATED
   WALKWAY STRUCTRUE: CARBON STEEL
   HANDRAIL, TOE PLATE, AND GRATING: ALUMINUM
   MEMBRANE FRAME: 304 SST
   AIR AND WATER PIPING: CPVC
   CABLE TRAY: 316 SST
2. EQUIPMENT WEIGHT:
   DRY WEIGHT: 58,000 LBS
   OPERATING WEIGHT: 465,000 LBS
3. FOUNDATION NOT BY S&L.
4. WATER TABLE MUST BE BELOW SLAB WHEN TANK IS DEWATERED. IF NOT, ADDITION BOTTOM REINFORCEMENT AND ANCHORS ARE REQUIRED. ANCHOR BOLTS NOT BY S&L.
5. FIELD PIPING NOT BY S&L.
6. ACTUAL POSITION AND SIZE WILL VARY BASED ON PROJECT REQUIREMENTS.
7.

SHEET 1 OF 3

				DRAWN BY: KHP	DATE: 2/14/2020	ALLOWABLE TOLERANCES
				CHECKED BY: KWC	DATE: 2/20/2020	FRACTIONS ±1/16"
				APPROVED BY: RMV	DATE: 2/20/2020	DECIMALS -
LET	ECN NO	DATE	BY APP'D	SCALE: NTS	CODE:	ANGLES ±0°-30'

FOR

FACTORY BUILT TITAN MBR™ TREATMENT SYSTEM PLAN AND ELEVATION

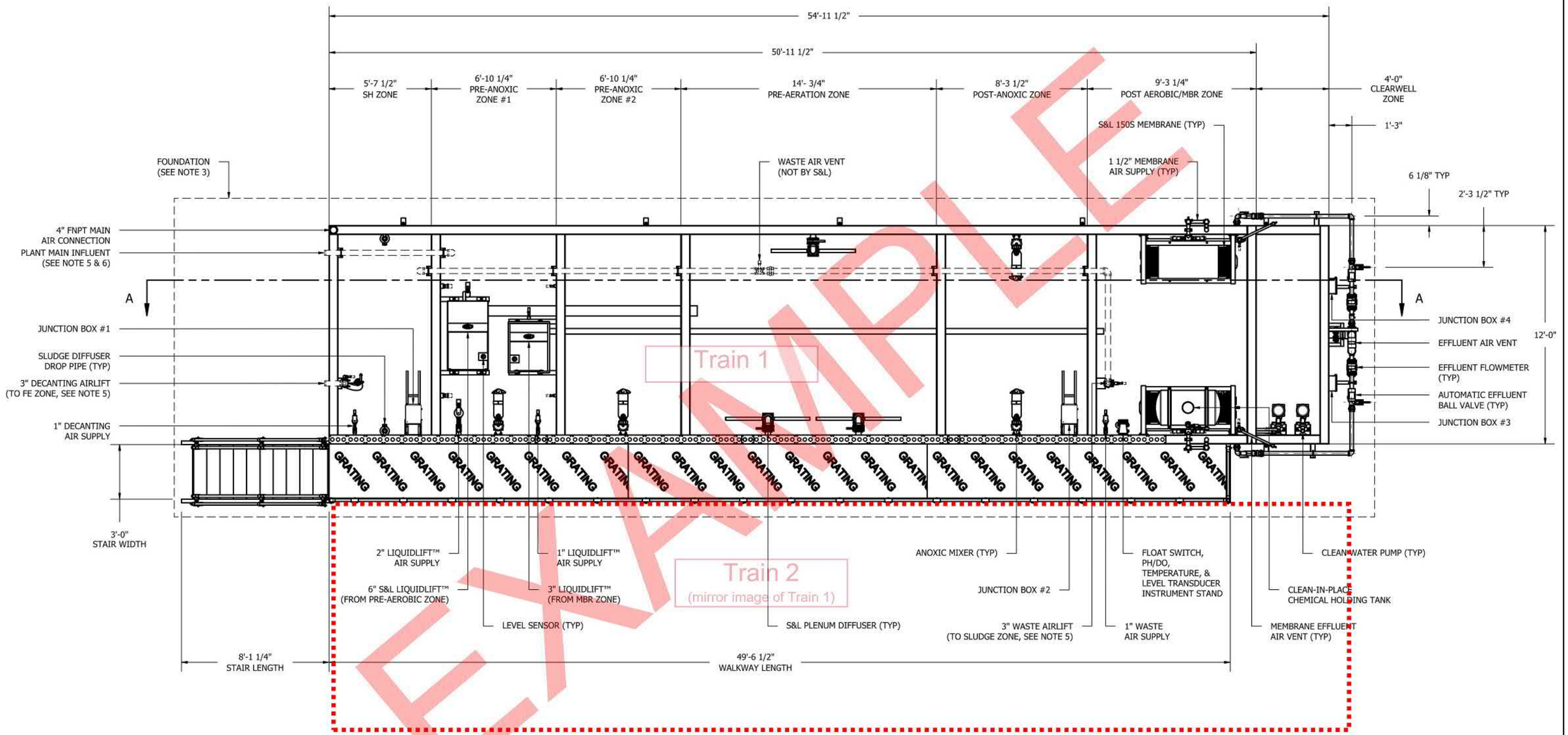
SIZE | U/M EA | WT.

FILE NAME C29880-44-001.dwg | PLOT SCALE 1:1

ORIGINAL ISSUE | | SERIAL NO INQ-29880 | DWG NO C29880-44-001 | REV

THIRD ANGLE PROJECTION

Smith & Loveless, Inc.



PLAN VIEW

SHEET 2 OF 3

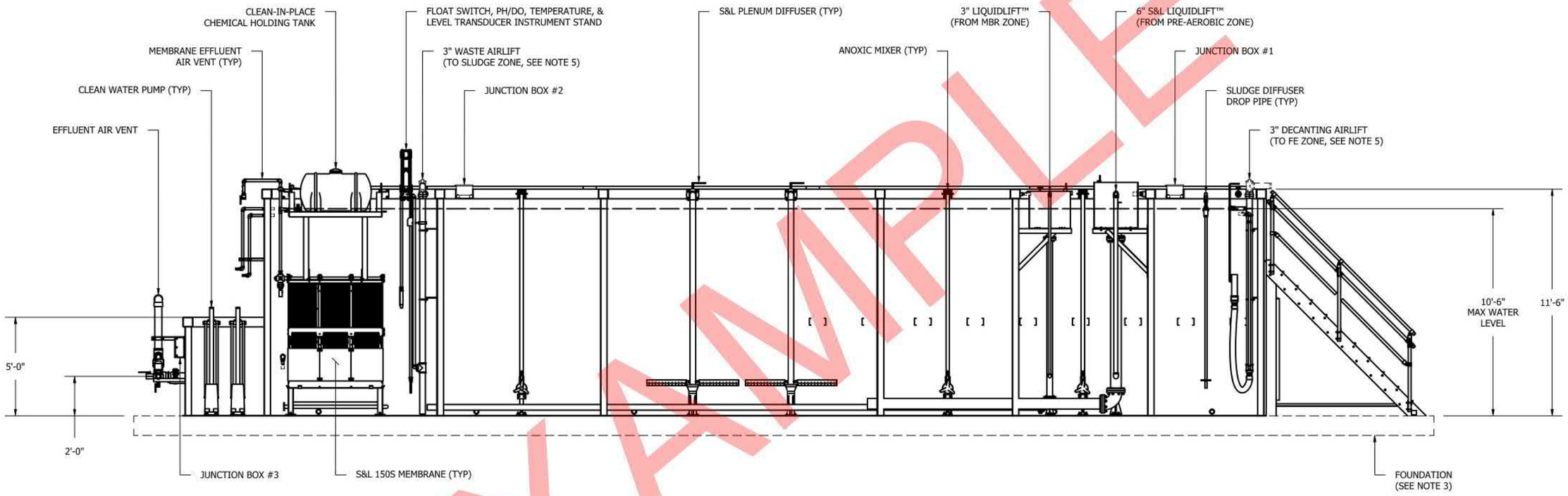
				DRAWN BY: KHP	DATE: 2/14/2020	ALLOWABLE TOLERANCES
				CHECKED BY: KWC	DATE: 2/20/2020	FRACTIONS ±1/16"
				APPROVED BY: RMV	DATE: 2/20/2020	DECIMALS -
LET	ECN NO	DATE	BY APPV'D	SCALE: NTS	CODE:	ANGLES ±0°-30'

FOR: FACTORY BUILT TITAN MBR™ TREATMENT SYSTEM PLAN AND ELEVATION

SIZE	U/M EA	WT.	
FILE NAME C29880-44-001.dwg		PLOT SCALE 1:1	
ORIGINAL ISSUE	© Smith & Loveless, Inc. 2020	SERIAL NO INQ-29880	DWG NO C29880-44-001 REV

THIRD ANGLE PROJECTION

Smith & Loveless, Inc.



SECTION A-A
ELEVATION VIEW

SHEET 3 OF 3

				DRAWN BY: KHP	DATE: 2/14/2020	ALLOWABLE TOLERANCES	FOR
				CHECKED BY: KWC	DATE: 2/20/2020	FRACTIONS ±1/16"	FACTORY BUILT TITAN MBR™ TREATMENT SYSTEM PLAN AND ELEVATION
				APPROVED BY: RMV	DATE: 2/20/2020	DECIMALS -	SIZE / U/M EA / WT.
LET	ECN NO	DATE	BY APPV'D	SCALE: NTS	CODE:	ANGLES ±0°-30'	FILE NAME C29880-44-001.dwg / PLOT SCALE 1:1
ORIGINAL ISSUE				© Smith & Loveless, Inc. 2020			SERIAL NO INQ-29880 / DWG NO C29880-44-001 / REV

THIRD ANGLE PROJECTION

Smith & Loveless, Inc.

AdvanTex Treatment
Budgetary Estimate

Project Name: Waitsfield, Village of

Project Location: Waitsfield, VT

Application: Community

Date: May 11, 2023

TREATMENT SYSTEM BUDGETARY ESTIMATE

OPTION #2 - All MBBR Treatment

Treatment Systems Installed Cost Estimate		
Description	**Quantity**	**Estimated Cost**
Flow EQ/Pre-Anoxic Tank 50,000-gal FRP Tank w/ Appurtenances	LS	$234,031
MBBR Treatment Plant – Stage One MBBRa1031 w/ Appurtenances – Stage Two MBBRd1025- MBBRc1026 w/ Appurtenances – Stage Three AX-Max Plant (850sqft) w/ Appurtenances	LS	$1,073,307
Ancillary Equipment – Flow Meters – *Alkalinity Feed Systems – Carbon Feed System – Telemetry Control Panel w/ Cell Modem	LS	$153,393
Shipping	LS	$85,529
Construction	LS	$388,959
Operator Training	LS	Included
Warranty	LS	Included
Start-Up and Commissioning	LS	Included

Estimated Cost		$1,935,219
Cost Per Gallon Capacity (DADF)		$38.70

*supplied by others

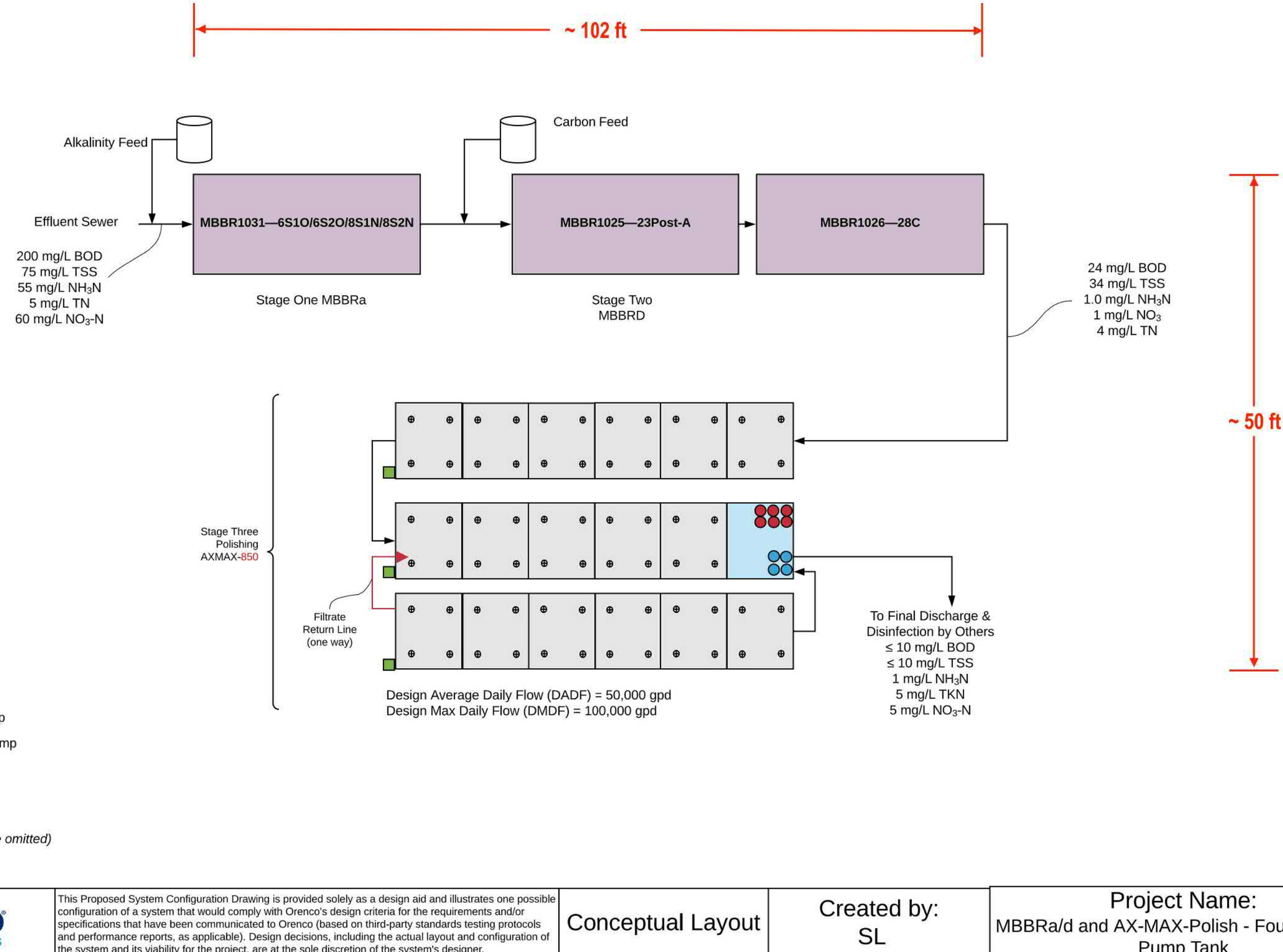
The costs in this proposal are budgetary estimates. Final costs for Orenco's equipment can only be presented once final construction documents are provided to Orenco for pricing. This preliminary estimate is based on information currently available and any assumptions that Orenco has had to make. Costs do not include materials and labor costs for controls building, site work, utilities, state or local taxes, permitting, inspections, administration, engineering, etc. Costs also do not include AX-Max Anti-Flotation Flanges.

If Anti Flotation flanges are required, please see the following table.

Anti-Buoyancy Adder:	$120,000
Change in cost per gallon (DAFD)	$41.10

NOTE: This site will require a control building to house the control panel, alkalinity and carbon feeds systems.

Composite Building (10 ft x 8 ft x 25ft)	$123,600



Key

- Effluent Filter
- Flow Modulating Pump
- Pre-Anoxic Return Pump
- Recirculation Pump
- Discharge Pump
- AdvanTex Vent Fan
  (Air Transfer Lines are omitted)

Orenco SYSTEMS

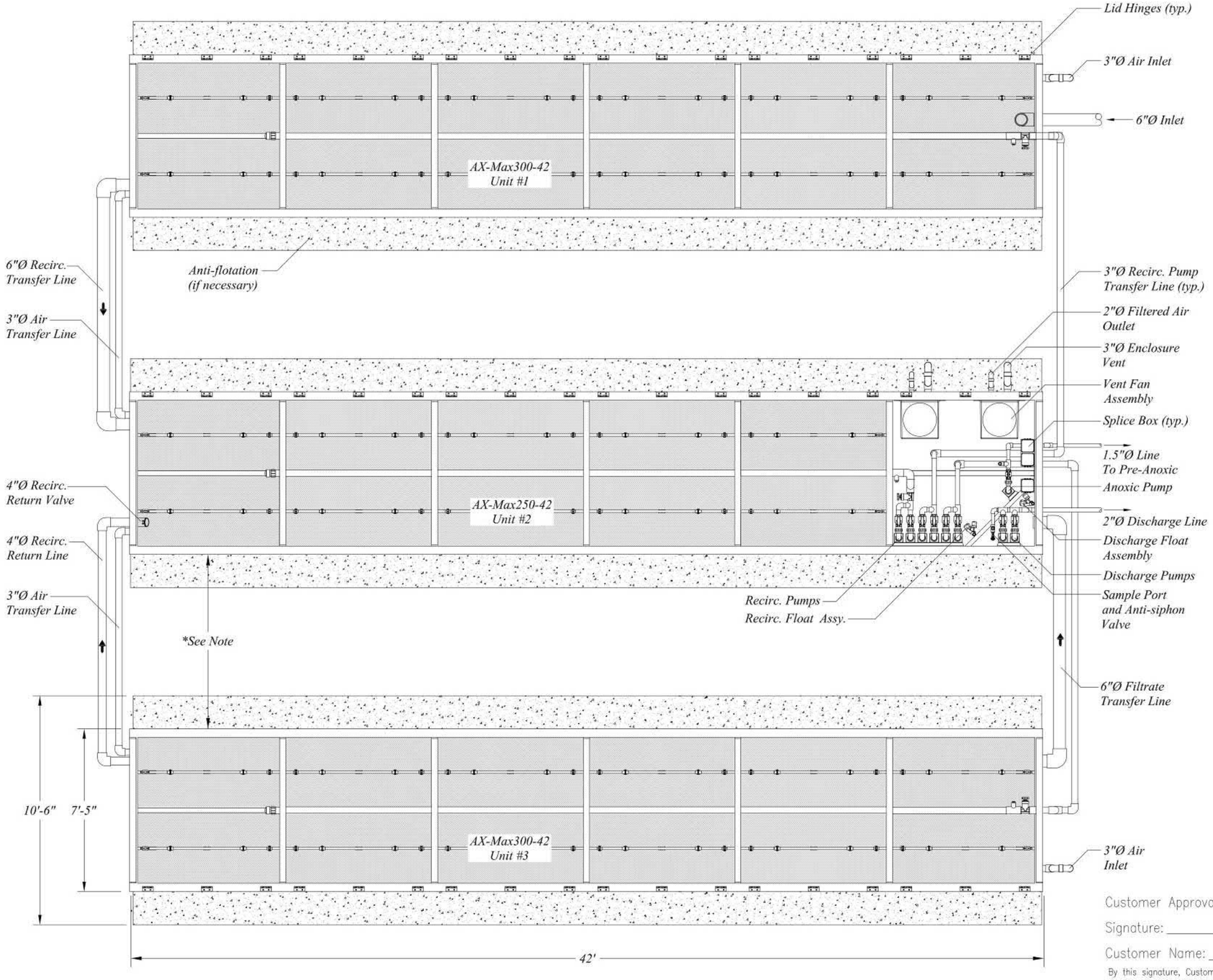
This Proposed System Configuration Drawing is provided solely as a design aid and illustrates one possible configuration of a system that would comply with Orenco's design criteria for the requirements and/or specifications that have been communicated to Orenco (based on third-party standards testing protocols and performance reports, as applicable). Design decisions, including the actual layout and configuration of the system and its viability for the project, are at the sole discretion of the system's designer.

Conceptual Layout

Created by:
SL

Project Name:
MBBRa/d and AX-MAX-Polish - Four Stage W/ Pump Tank

Note: Spacing between AX-Max units is dependent on desired bury depth. Consult Orenco Engineering for details.



Customer Approval

Signature: _____ Date: _____

Customer Name: _____

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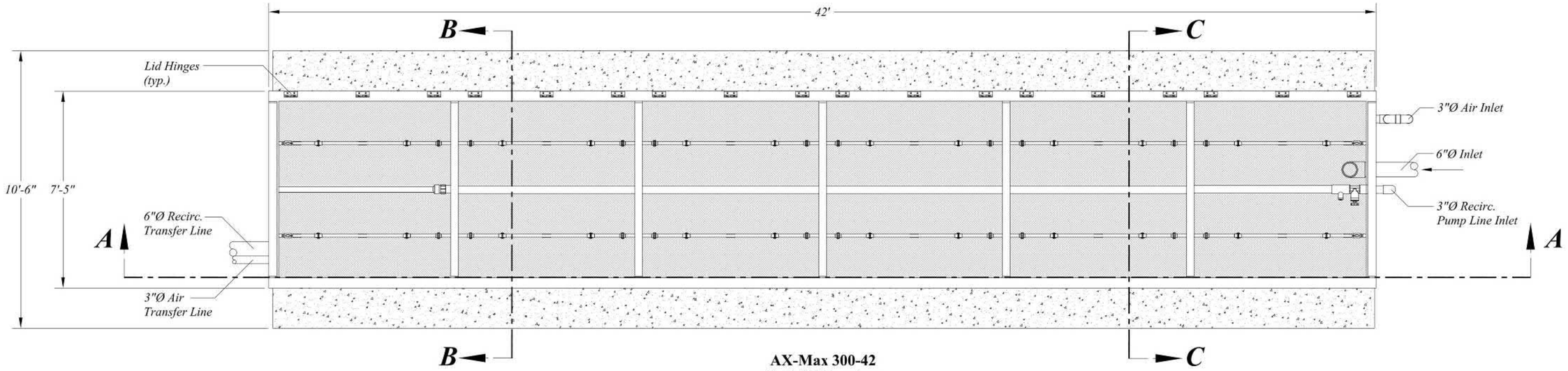
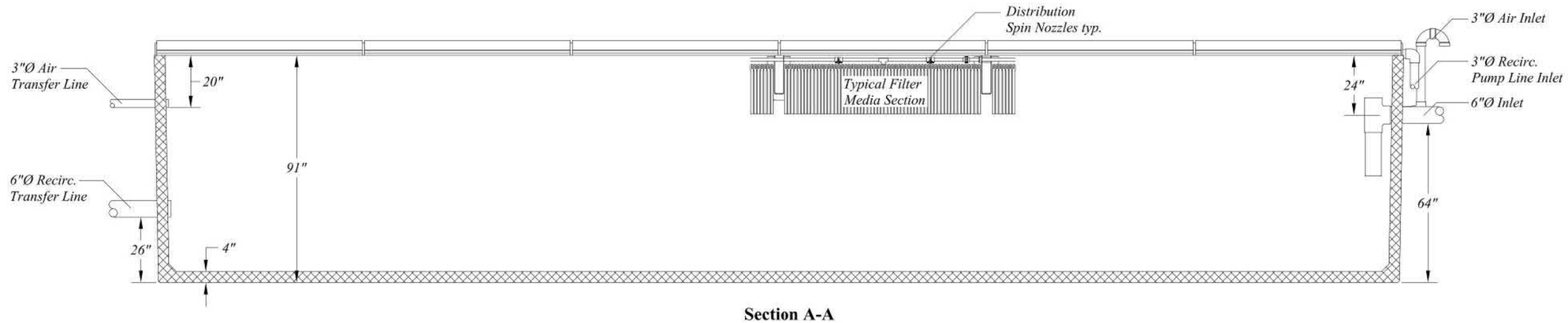
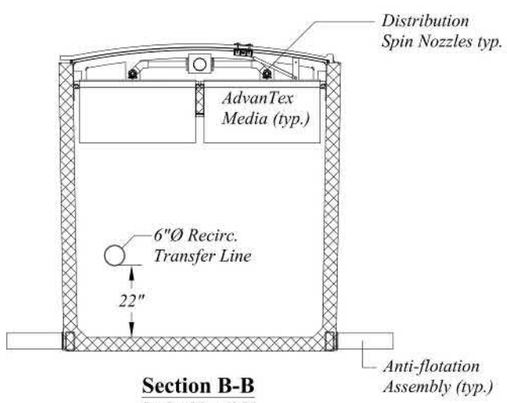
AdvanTex AX-MAX 850 Pump Discharge	Drawn By: BAS	Scale: 1" = 5'-0"	
	Reviewed By: SH	Sheet: 1 OF 1	
Plan View	File Name: AX-MAX850-1.DWG	Rev: 3.0	Date: 9/19/2019



AX-Max 300-42
Unit #1 Planview
Scale: 1" = 4'-0"



Section A-A
Scale: 1" = 4'-0"



Section B-B
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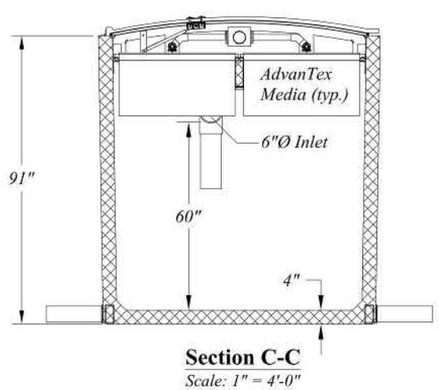

Section C-C
Scale: 1" = 4'-0"

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Signature: _____ Date: _____

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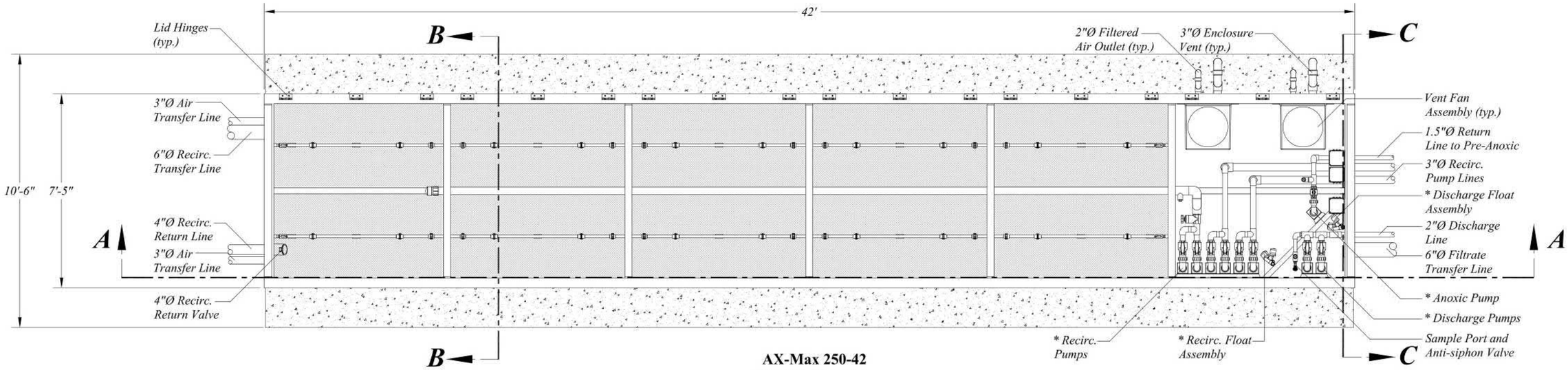
Orenco SYSTEMS

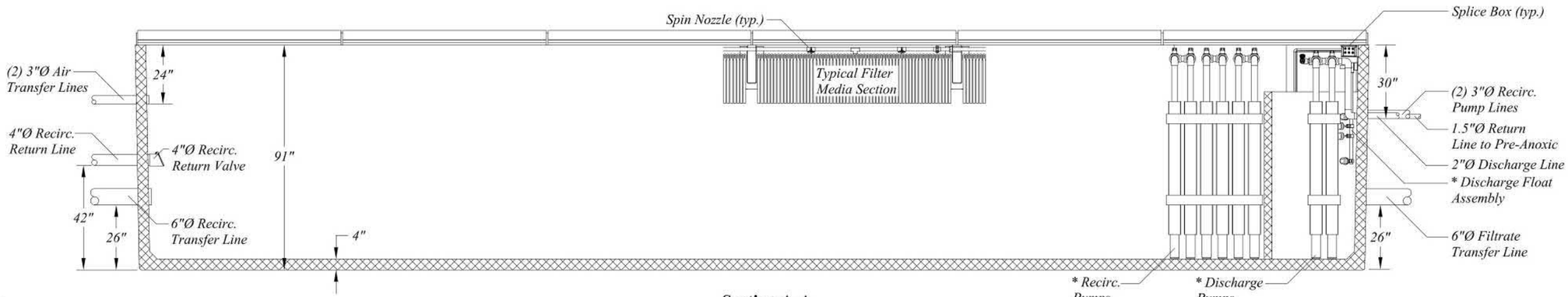
AdvanTex AX-Max850
Pump Discharge

Unit #1 Details

Drawn By: BAS		Scale: 1" = 4'-0"	
Reviewed By: SH		Sheet: 2 OF 4	
File Name: AX-MAX850-2.DWG	Rev: 3.0	Date: 9/19/2019	



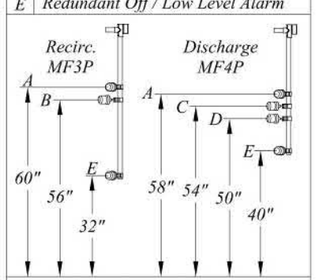
AX-Max 250-42
Unit #2 Planview
Scale: 1" = 4'-0"



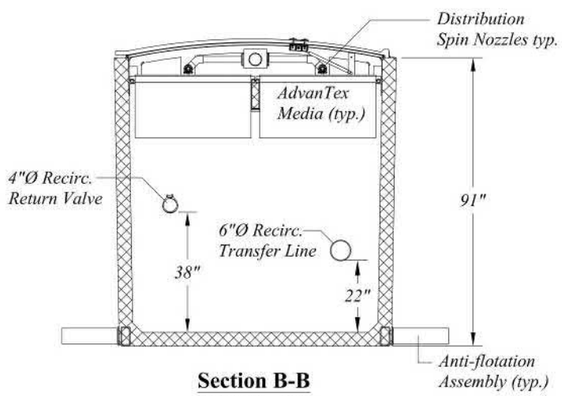
Section A-A
Scale: 1" = 4'-0"

* Float Functions & Pump Index

A	High Level Alarm / Lag Enable
B	Override Timer
C	Pump ON
D	Pump OFF
E	Redundant Off / Low Level Alarm



Recirculation Pumps: TBD
Discharge Pumps: TBD
Anoxic Return Pump: 3005



Section B-B
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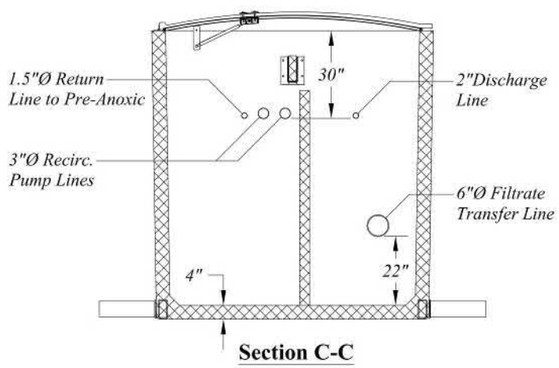

Section C-C
Scale: 1" = 4'-0"

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Customer Name: _____

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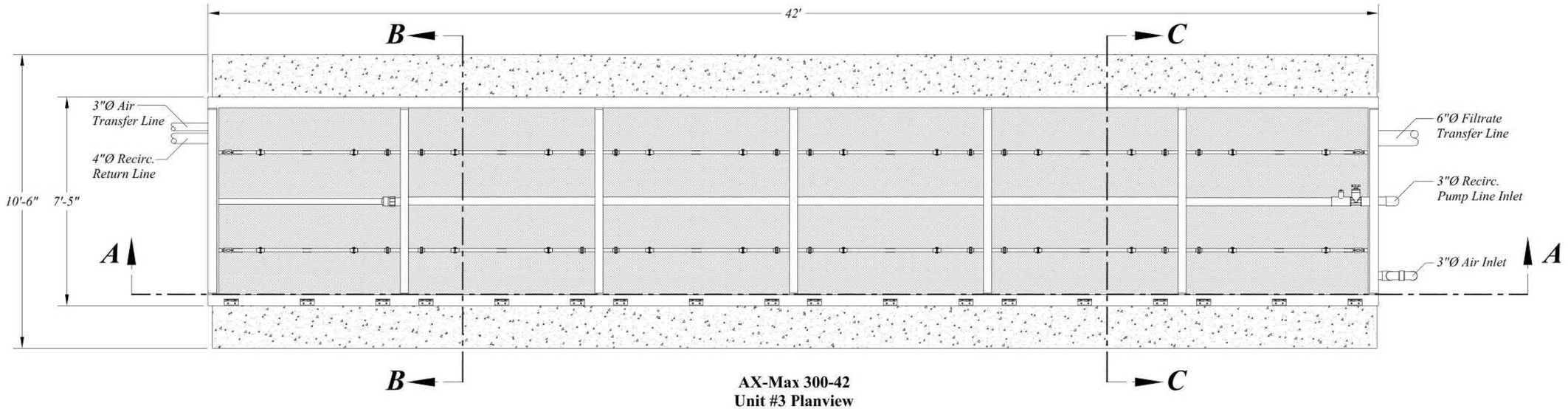
Orenco SYSTEMS

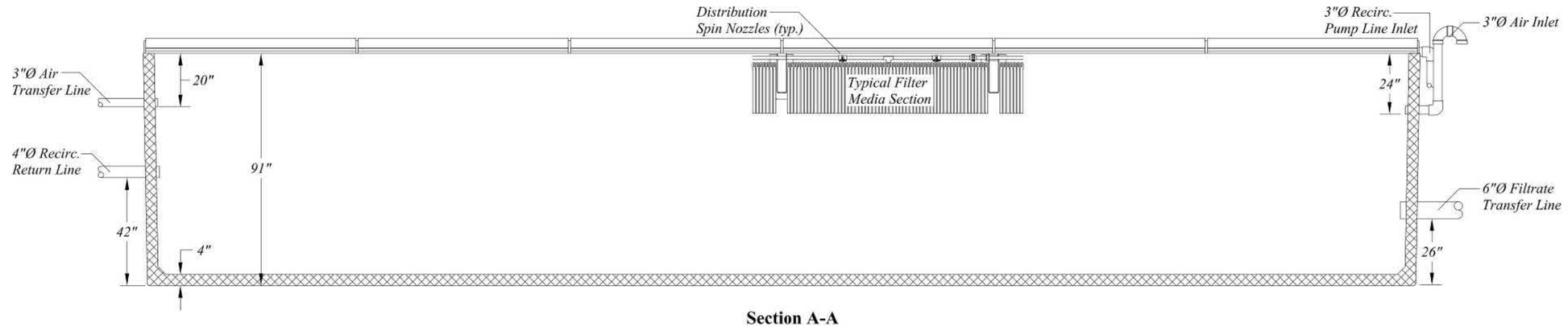
AdvanTex AX-Max850
Pump Discharge

Unit #2 Details

Drawn By:	BAS	Scale:	1" = 4'-0"
Reviewed By:	SH	Sheet:	3 OF 4
File Name:	AX-MAX850-3.DWG	Rev: 3.0	Date: 9/19/2019



AX-Max 300-42
Unit #3 Planview
Scale: 1" = 4'-0"



Section A-A
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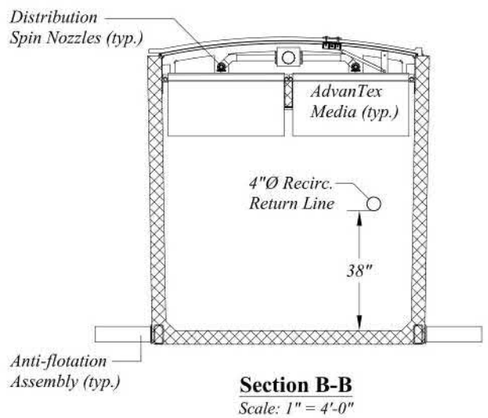

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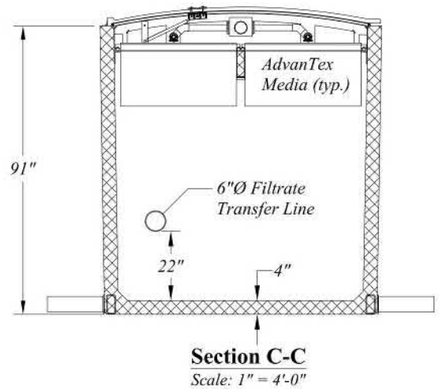

Section C-C
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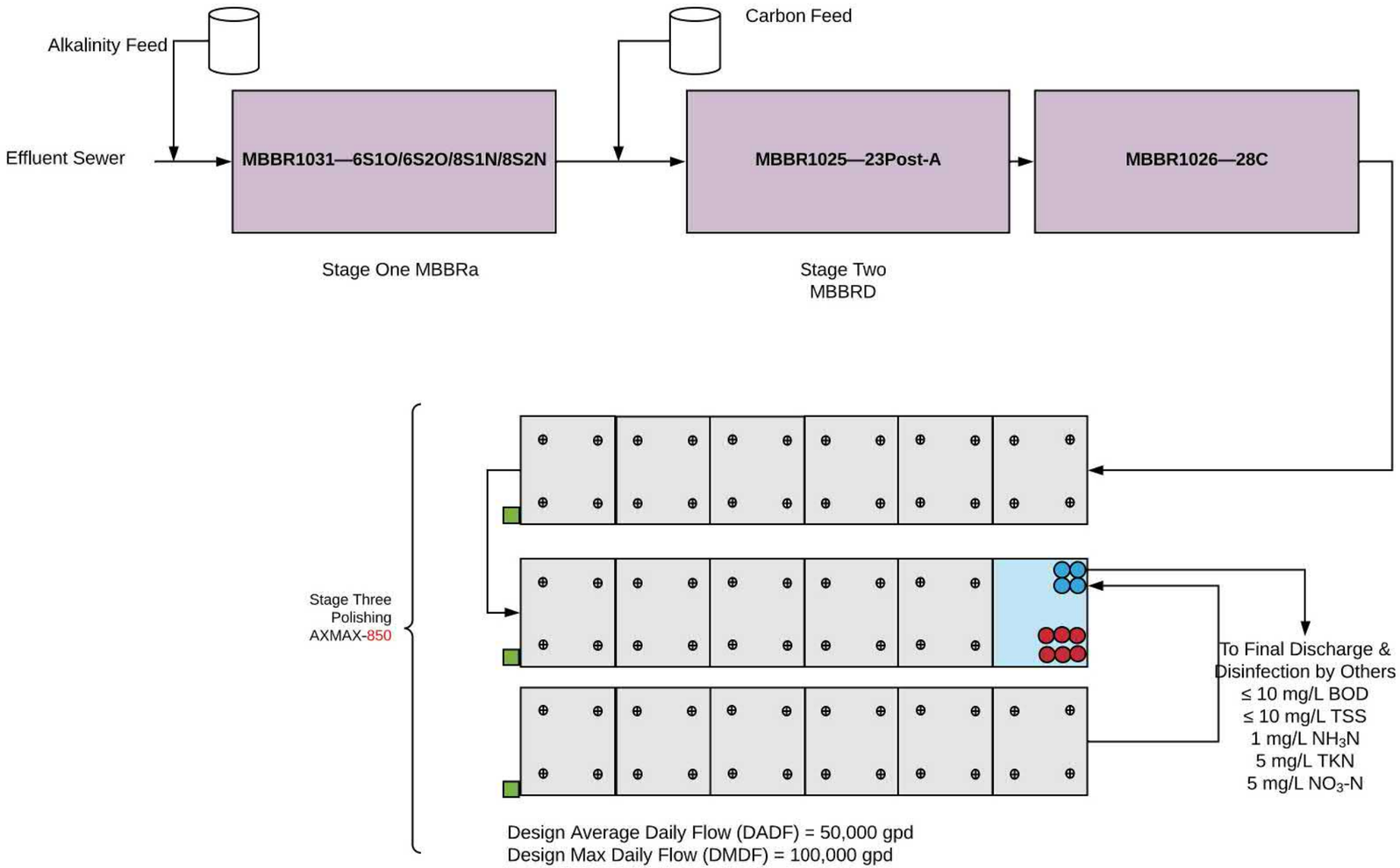
Orenco SYSTEMS

AdvanTex AX-Max850
Pump Discharge

Unit #3 Details

Drawn By:	BAS	Scale:	1" = 4'-0"
Reviewed By:	SH	Sheet:	4 OF 4
File Name:	AX-MAX850-4.DWG	Rev: 3.0	Date: 9/19/2019

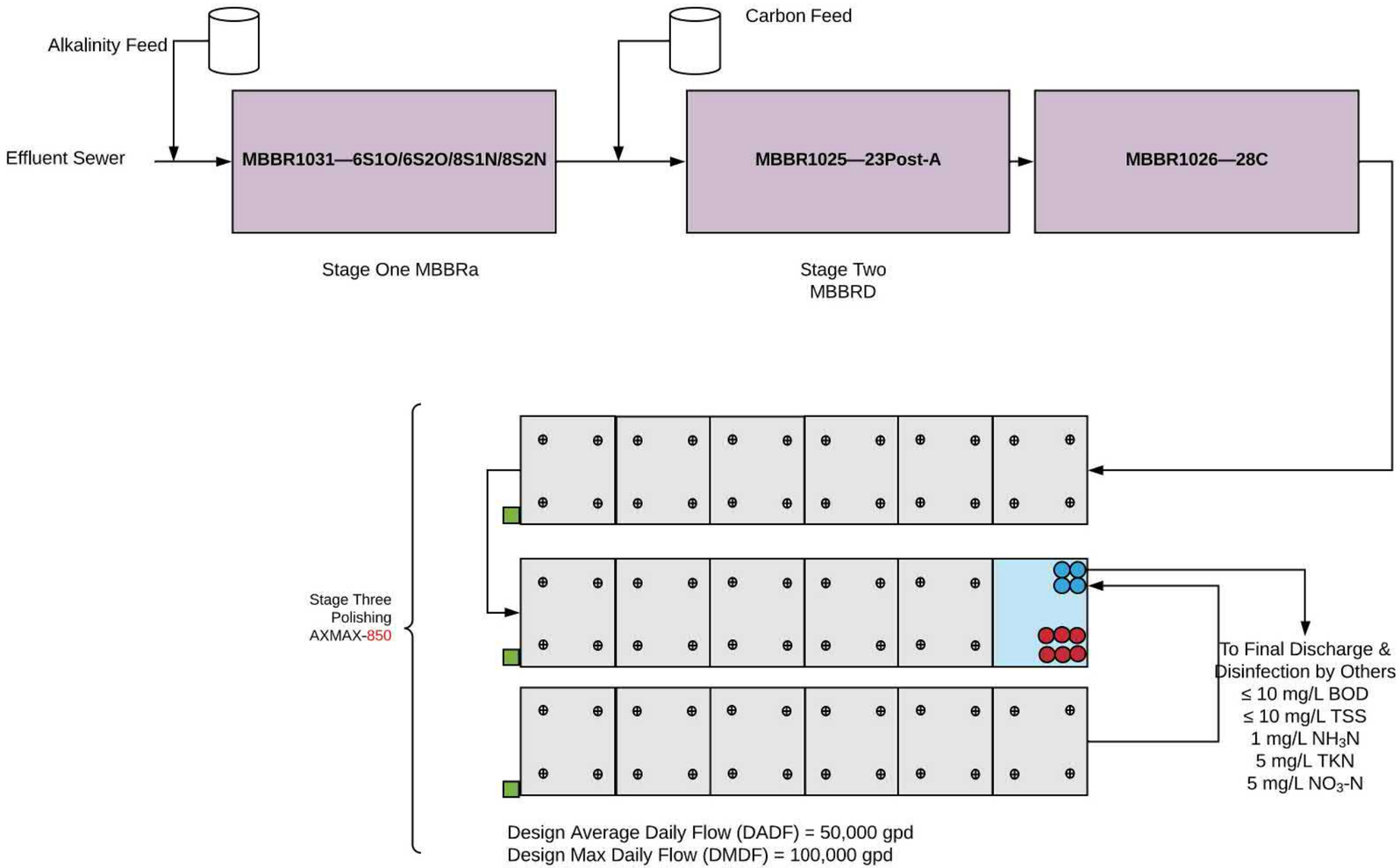


Design Average Daily Flow (DADF) = 50,000 gpd
Design Max Daily Flow (DMDF) = 100,000 gpd

Key

- Effluent Filter
- Flow Modulating Pump
- Pre-Anoxic Return Pump
- Recirculation Pump
- Discharge Pump
- AdvanTex Vent Fan
  (Air Transfer Lines are omitted)

Orenco SYSTEMS	This Proposed System Configuration Drawing is provided solely as a design aid and illustrates one possible configuration of a system that would comply with Orenco's design criteria for the requirements and/or specifications that have been communicated to Orenco (based on third-party standards testing protocols and performance reports, as applicable). Design decisions, including the actual layout and configuration of the system and its viability for the project, are at the sole discretion of the system's designer.	Conceptual Layout	Created by: SL	Project Name: MBBRa/d and AX-MAX-Polish - Four Stage W/ Pump Tank



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Technical Data Sheet

AdvanTex® AX-Max Treatment Systems

Applications

Orenco's AdvanTex® AX-Max is a complete, fully-plumbed, AdvanTex Wastewater Treatment Plant for residential, commercial, municipal, and mobile applications with medium-to-large-flows and permits requiring secondary treatment or better. It can be used as a stand-alone unit or in multi-unit arrays under adverse conditions in a wide range of environments. The AX-Max is ideal for:

- Small sites and poor soils
- At-grade or above-grade installations
- Mobile and temporary installations
- Disaster response sanitation
- Remote locations
- Extreme hot or cold climates

General

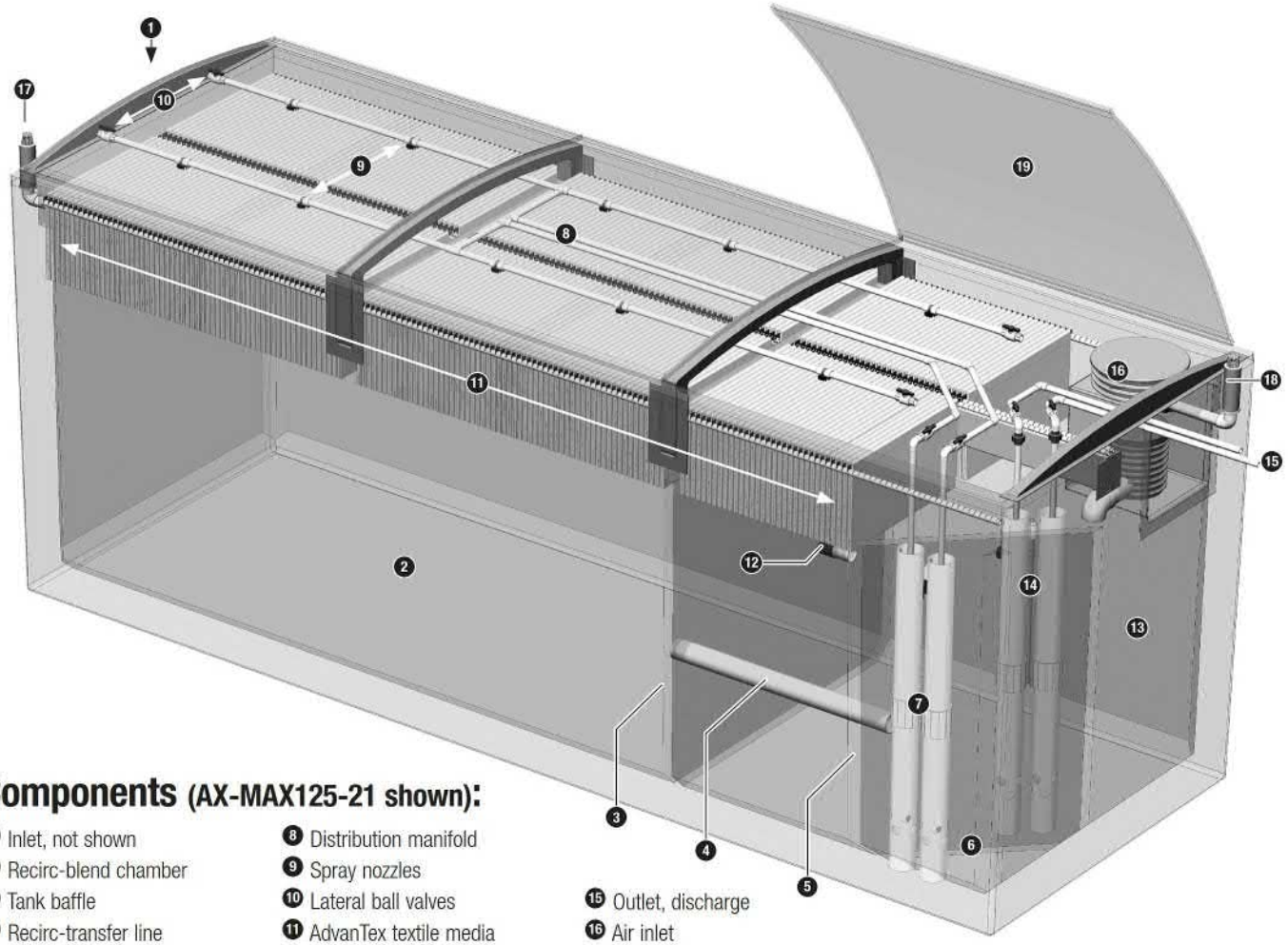
The AX-Max is a modular system that can be preceded by primary treatment or configured to incorporate primary, secondary, and tertiary wastewater treatment before reuse or dispersal.

The heart of the AX-Max system is the AdvanTex Recirculating Treatment Tank, a sturdy, watertight, corrosion-proof fiberglass tank that includes the same dependable, textile treatment media found in all AdvanTex products.

Standard Models

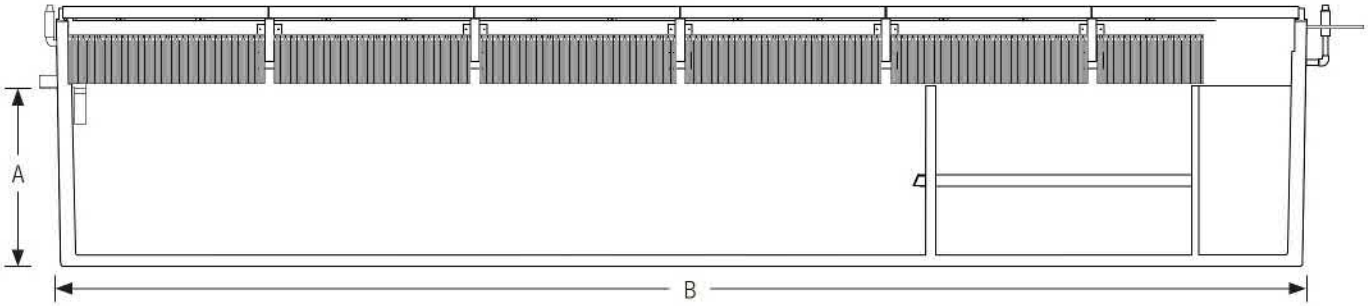
AX-MAX100-14, AX-MAX150-21, AX-MAX200-28, AX-MAX250-35, AX-MAX300-42 (Standard models without pump systems.)

AX-MAX075-14, AX-MAX125-21, AX-MAX175-28, AX-MAX225-35, AX-MAX275-42 (Standard models with pump systems.)

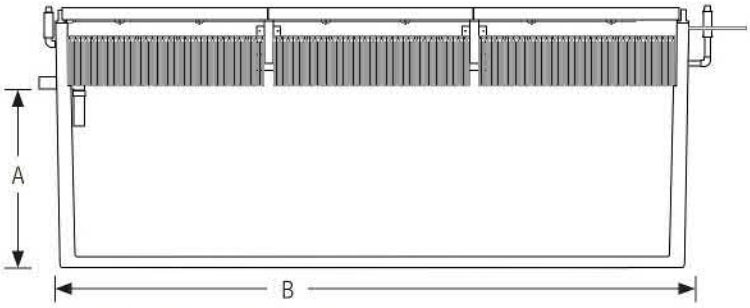


Components (AX-MAX125-21 shown):

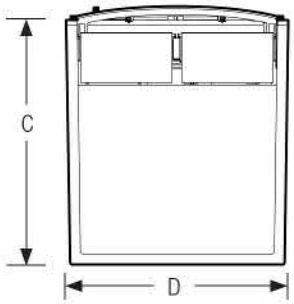
1. Inlet, not shown
2. Recirc-blend chamber
3. Tank baffle
4. Recirc-transfer line
5. Recirc-pump chamber baffle
6. Recirc-pump chamber
7. Recirc pumping assembly
8. Distribution manifold
9. Spray nozzles
10. Lateral ball valves
11. AdvanTex textile media
12. Recirc-return valve
13. Recirc-filtrate chamber
14. Discharge pumping assembly
15. Outlet, discharge
16. Air inlet
17. Vent fan assembly
18. Air outlet
19. Hinged lid, typical



AdvanTex AX-MAX275-42, side view



AdvanTex AX-MAX150-21, side view



AdvanTex AX-MAX, end view (all models)

Specifications

Nominal Dimensions*

Model	AX-MAX100-14	AX-MAX150-21	AX-MAX200-28	AX-MAX250-35	AX-MAX300-42
A, ft (m)	variable	variable	variable	variable	variable
B, ft (m)	14.0 (4.2)	21.0 (6.4)	28.0 (8.5)	35.0 (10.7)	42.0 (12.8)
C, ft (m)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)
D, ft (m)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)
Footprint, ft^2 (m^2)	112.0 (10.4)	168.0 (15.6)	224.0 (20.8)	280.0 (26.0)	336.0 (31.2)
Model	**AX-MAX075-14**	**AX-MAX125-21**	**AX-MAX175-28**	**AX-MAX225-35**	**AX-MAX275-42**
A, ft (m)	5.7 (1.7)	5.7 (1.7)	5.7 (1.7)	5.7 (1.7)	5.7 (1.7)
B, ft (m)	14.0 (4.2)	21.0 (6.4)	28.0 (8.5)	35.0 (10.7)	42.0 (12.8)
C, ft (m)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)	7.6 (2.3)
D, ft (m)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)	7.5 (2.3)
Footprint, ft^2 (m^2)	112.0 (10.4)	168.0 (15.6)	224.0 (20.8)	280.0 (26.0)	336.0 (31.2)

**See AdvanTex® AX-Max Treatment System drawings for exact dimensions and specific treatment configurations.*

Products Highlight

PuraACE™
Puralinity™
AeroCell®

Name:
Bayside Travel Centre

Location:
Afton Station, Nova Scotia

Owner:
Paqtnkek Mi'kmaw Nation

Project Manager/Engineer:
Hatch Ltd.

General Contractor:
Lindsay Construction

Civil Subcontractor:
Francis J Boyle Construction

Creative Solution for C-Store on Tight Site with Approaching Deadline

Overview

The Bayside Travel Centre required a specialized onsite treatment system that could be built quickly. This travel centre is a new rest stop off of Trans Canada Highway 104 that features a gas station, convenience store, restaurants, small casino, and restrooms with showers.

The engineering team needed to find a solution that could be produced quickly and treat their effluent onsite to the standards required by the local government. Anua had the perfect solution to their problem.

Situation

The construction of the Bayside Travel Centre had gone smoothly right up until the managing engineer was notified that the town had decided that this project could no longer tap into the sewer line that was part of the original site plan. This was a big problem because the project was on a tight timeline and could not afford any major delays.

The engineers quickly reached out to a local wastewater treatment company who came up with a plan. However, they could not produce a viable treatment system until "early summer" 2020 and the Bayside Travel Centre was slated to open in March of 2020.

The engineers reached out to Sansom Equipment Ltd of Nova Scotia to find other manufacturers who could meet their strict deadline. Sansom called Anua, which had the perfect solution and knowledge to solve the problem at hand.

ANUA

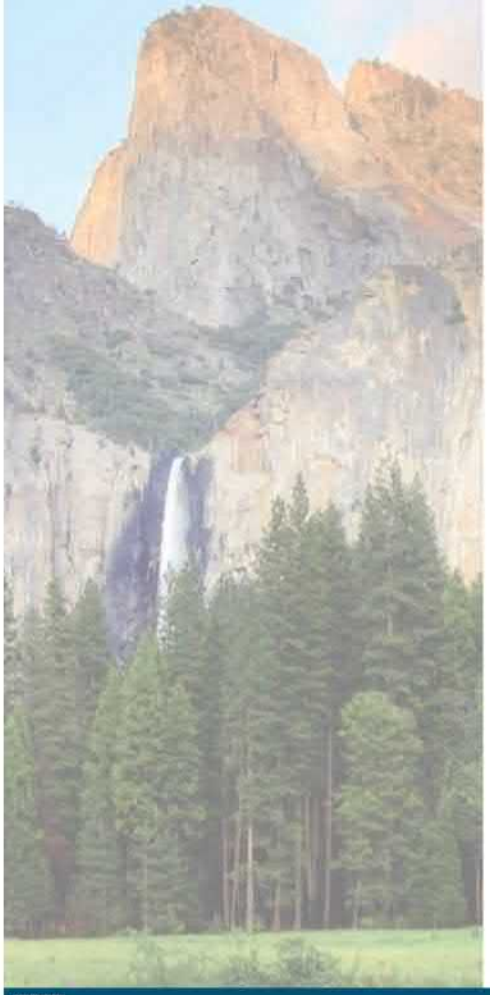
Technical Details

Products Used:
- (6) PuraACE
- (1) Puralinity 30"
- (10) AeroCell IM1530

Influent:
- Hydraulic – 6,500 gpd
- Organic – 48.5 lbs BOD_5/day (22 kg)

Effluent:
- BOD_5 – 30 mg/l
- TSS – 30 mg/l

Tank Sizes:
- Primary – 4,200 gal
- Flow Equalization – 5,400 gal
- Pre-Aeration Tanks (2) – 2,400 gal ea.
- Clarifier – 2,400 gal
- Dosing Tank – 5,400 gal



Solution

Anua recommended a multi-stage treatment solution utilizing PuraACE, Puralinity, and AeroCell. The original site plans did not leave much room for a system, but Anua was creative and used these three systems in concert to ensure Bayside could meet its treatment needs within the small footprint.

The ingenuity, flexibility, and speedy production of Anua's engineering and manufacturing teams were pivotal to the completion of this project on schedule during the cold winter months.

The customized Anua solution using standard products was perfect for this particular application and as a result, the planning, designing, manufacturing, and delivery were all completed on time and Bayside opened without issue in early March of 2020.

Results

The engineers are extremely happy with the system and with his experience with Anua. Here's what he had to say about it:

"The project had some last-minute changes to specification that required a complete overhaul of the on-site sewage disposal system late in construction. I spoke with Anua and their local supplier, Sansom Equipment, the week prior to Christmas with what seemed like an impossible deadline. Both provided incredible support during the design validation process, which was completed in time to have equipment on-site with installation underway within four weeks of that first call. Sean from Anua supported the work at every step, fielding questions quickly from our design team and local contractors installing the system. The support was pro-active and Sean provided input throughout that saved time and prevented potential operational issues."

More on the System

The solution consists of a large primary septic tank, flow equalization tank with duplex pumps, six **PuraACE** high strength pretreatment pods, clarifier with sludge return, dosing tank with duplex pumps, ten **AeroCell IM1530** pods for a recirculating media filter, and a **Puralinity** passive pH biobuffer basin.

ANUA

AeroCell®

Open Cell Foam Biofilter

Quick Facts

Application:
Residential Community

Product:
AeroCell

Location:
Wild Briar Ridge, TN

Preserving Water Quality in the Great Smokey Mountains

Overview

Wild Briar Ridge is a 70-lot residential development located in the shadow of The Smoky Mountains in East Tennessee. The developers of this subdivision were faced with the prospect of building in a pristine rural setting without the advantages of urban infrastructure such as sewer.

Situation

The challenges presented by the site included shallow soil over bedrock and excessive slopes. Traditionally, each lot would be served by an individual onsite system, but the conditions made that possible for only a few of the building sites.

ANUA

Features

- Flexible configurations
- Multiple sizes available
- Lightweight pods
- Synthetic media
- Unique 80%/20% effluent splitting
- No gravity recirculation valve needed

Solution

The answer to the problem was an AeroCell cluster with drip irrigation. The treatment system designed consists of 24 AeroCell modules located at the base of the development with all lots being upslope from the treatment cluster. Each lot is served by its own collection tank. The wastewater from these tanks is then sent to a tank farm where it initially goes to a 25,000 gallon recirculation tank. The next step is dosing of the treatment cluster. Treated water then undergoes an 80/20 split, with 80% going back for treatment and the remaining 20% being discharged into a 15,000-gallon drip dosing tank. After ultra-violet disinfection, the treated water is dosed to a 6-zone drip field. The drip system is in two large fields located at the bottom of the development that were installed using a vibrating plow.

Routine maintenance and mandatory testing are performed by a Level 5 management entity as is required by The Tennessee Department of Environment and Conservation.

ANUA

AeroCell®

Open Cell Foam Biofilter

Quick Facts

Application:
Residential Community

Product:
AeroCell

Location:
Wild Briar Ridge, TN

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Overview

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Routine maintenance and mandatory testing are performed by a Level 5 management entity as is required by The Tennessee Department of Environment and Conservation.

ANUA

DuBois & King Inc.

Jonathan Ashley <jashley@dubois-king.com>

VT Treatment

Sean McGuigan <sean.mcguigan@anuainternational.com> Tue, May 9, 2023 at 4:49 PM

To: Jonathan Ashley <jashley@dubois-king.com>

Hi Jonathan,
This is a really big moving target so numbers are appropriate.

Secondary
For secondary treatment of 50,000 GPD of WW in the 250 BOD/150 TSS range a budgetary number would be $880,000 for equipment.
You would need around 100,000 gal of primary treatment, like STEP collection or however you want to break it down.
You will also need 50,000 gal of dosing tank to feed the recirc treatment.
Footprint will be around 4,000 sqft plus tank areas.
Treatment priced is Aerocell.

Tertiary
For 90,000 gpd at tertiary level the Aerocell treatment would be around 10,000 sqft.
It will contain two stages, a 60 unit primary and a 40 unit secondary to pretreat for the tertiary system.
This part has a budgetary number of 2,500,000.
Tank volumes needed here and not included are 1800,000 gal septic, 90,000 gal stage one dosing and 60,000 gal stage two.

The final of this 90,000 gpd is as follows,

Footprint 20,000 – 25,000 sf

Nitrex-N Removal $1.0 +/- million, which consists of lined treatment cells with install allowance and engineering support. Local engineer would produce construction docs. We could do so at add'l cost

P Removal $0.6 +/- million – P removal is integrated with Nitrex unit along with polishing step. Method uses Fe media which will need to be injected very 5 – 7

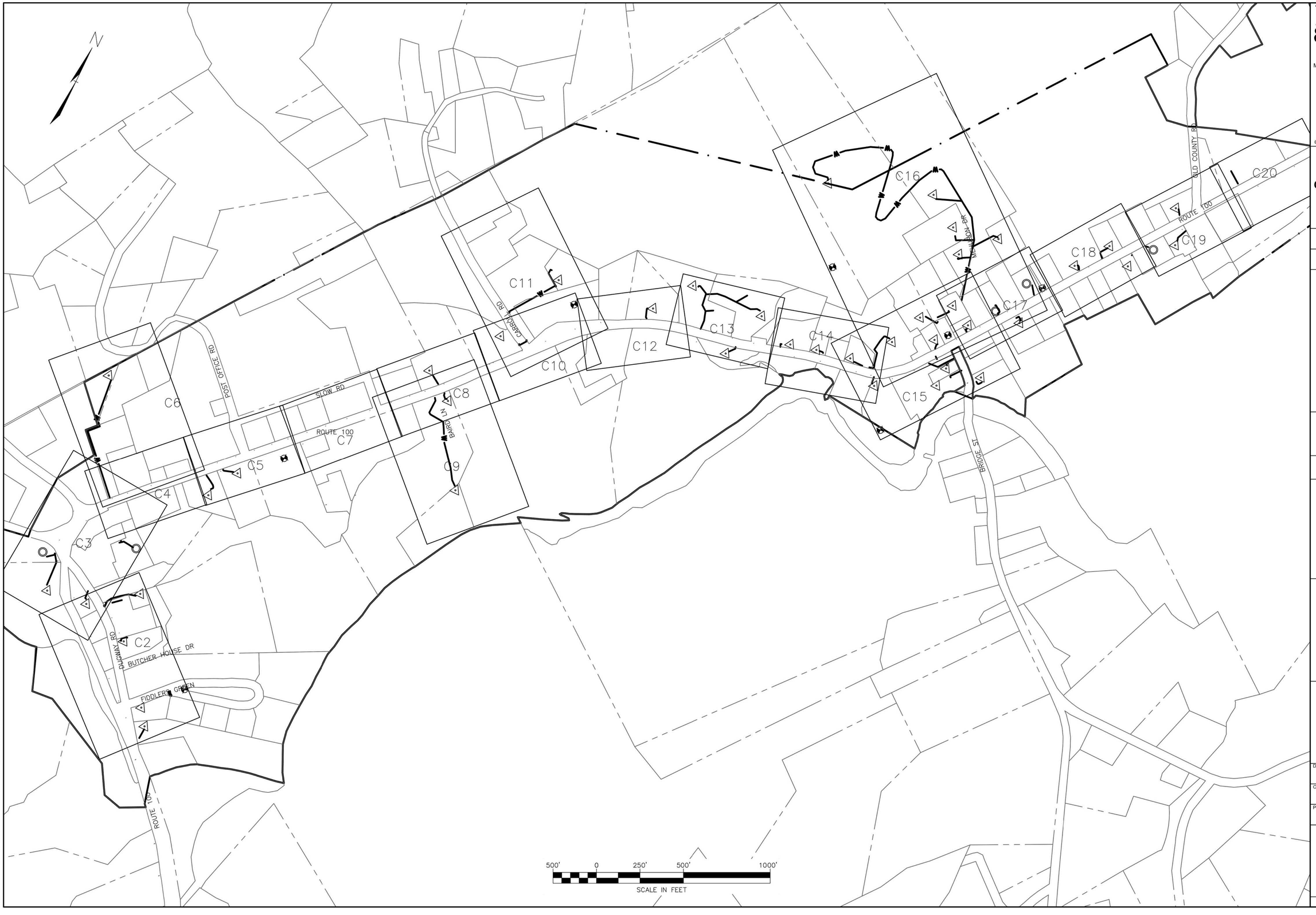
Total $1.6 - $1.9 million

Both of these scenarios will not function if grinder style pumps are used in the collection system. Solid handling pumps and effluent pumps are fine.

Hope this is what you need.
Sean

I'll be driving to Savannah tomorrow all day if you want to go over this.
[Quoted text hidden]

APPENDIX S



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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS KEY SHEET

DRAWN BY	DATE
SDS	MAY 2023
CHECKED BY	D&K PROJECT #
JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

SHEET NUMBER

C1

SHEET 1 OF 21

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS DUGWAY RD AND ROUTE 100

DRAWN BY	DATE
SDS	MAY 2023
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JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

SHEET NUMBER

C2

SHEET 2 OF 21

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Mill Brook
Route 100 (paved)
Dugway Road (gravel)
Fiddlers Green (paved)
Gulf Hollow Dr (paved)
Parcel ID: 99182
Parcel ID: 99180
Parcel ID: 99172.1
Parcel ID: 99172
Parcel ID: 99171
Parcel ID: 99173
Parcel ID: 38010
Parcel ID: 38006
Parcel ID: 38004
Parcel ID: 38005
Parcel ID: 38003
mile marker 1000/1216/2410
EXISTING DEMAND: 0 GPD
UNDEVELOPED PARCEL
EXISTING DEMAND: 900 GPD
EXISTING DEMAND: 345 GPD
EXISTING DEMAND: 140 GPD
PROPOSED CURB STOP
PROPOSED CORP STOP
PROPOSED CURB STOP
PROPOSED CORP STOP
PROPOSED CORP STOP
PROPOSED CURB STOP
1 inch service
1 inch service
1 inch service
1 inch service
1 inch service
1 inch water service
1.5 inch service
12 inch main (C900)
8 inch main (C900)
12" cmp
buried utilities
house
former Hazardous Waste Site
septic system
10 Tanks
gravel
paved
not located
PVC Water Inv. = 734.2' Copper to PVC Sewer Inv. = 737.6'
pvc w inv.: south 727.5' pvc ww inv.: east 727.5'
cast ww inv.@ 727.3'
cast ww inv.: 735.4'
pvc w inv.: east
pvc w inv.: pvc ww inv.: 745.1
pvc ww inv.: 734.1' behind bldg
pvc ww inv.: 737.1'
inv. 718.2'
inv. 718.6'
inv. 718'
inv. 724.8'
inv. 736.7'
inv. 730.6'
inv. 731.4'
refusal at 9.5'
refusal
#12798
#12797
#12796
#12795
#12794
#12793
#12792
#12791
#12790
#12789
#12788
#12787
#12786
#12785
#12784
#12783
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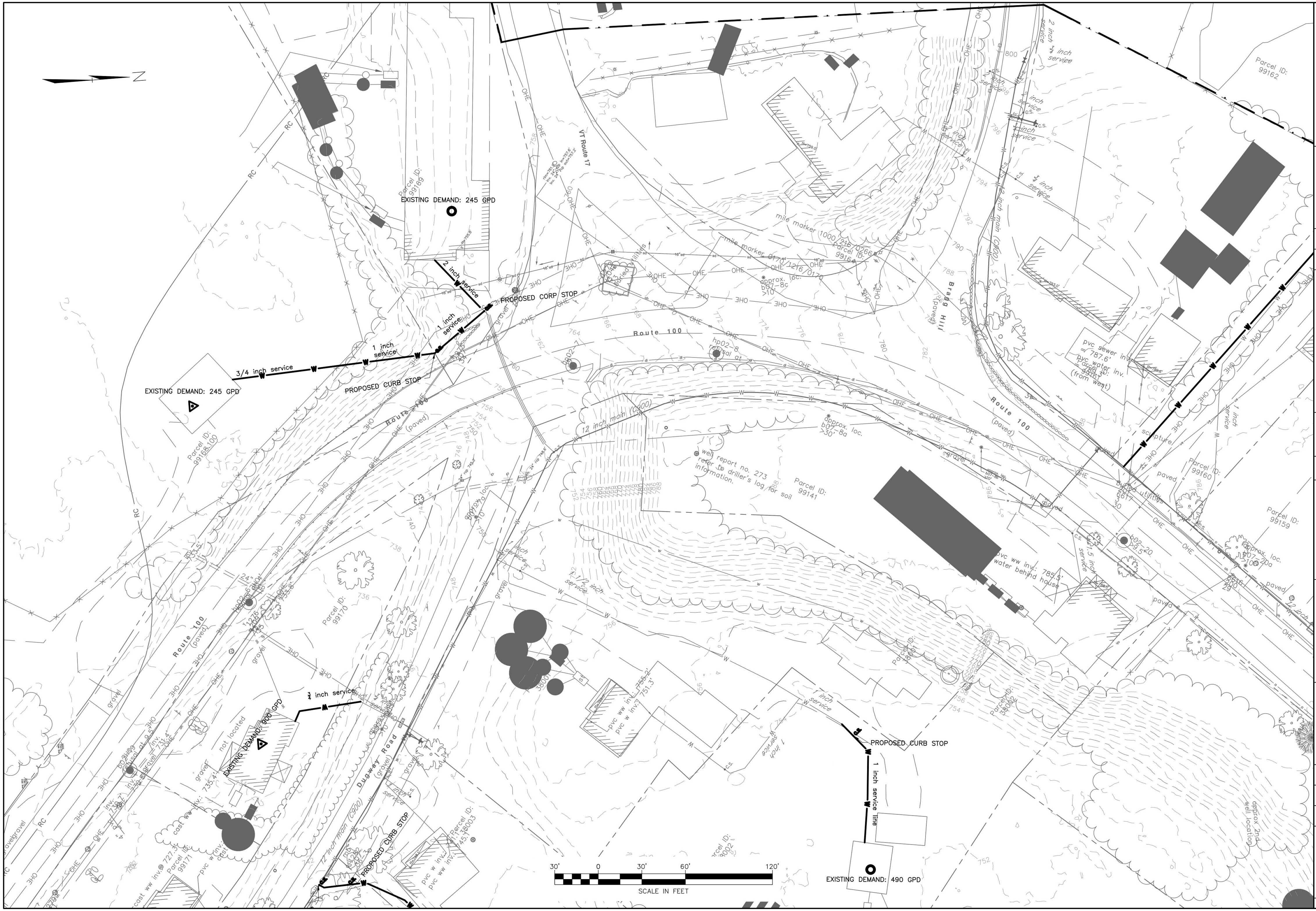

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WATER SERVICE
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SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

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SHEET NUMBER

C4

SHEET 4 OF 21

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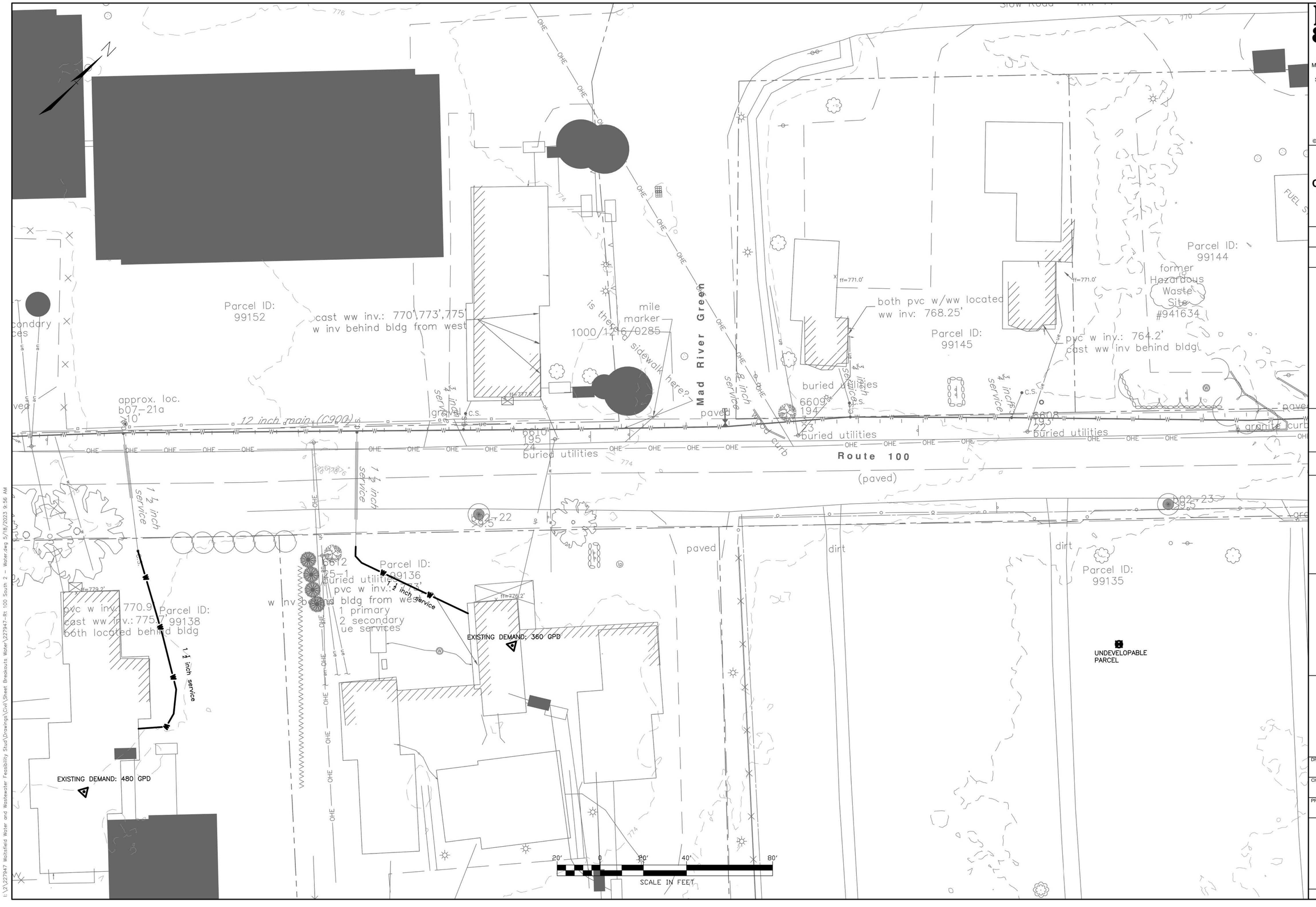

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PROJ. ENG.	D&K ARCHIVE #
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SHEET NUMBER

C5

SHEET 5 OF 21

EXISTING DEMAND: 500 GPD

1 inch service

Post Office Rd

Route 100

Mad River Green

Parcel ID: 99153

Parcel ID: 99156

Parcel ID: 99157

Parcel ID: 99160

Parcel ID: 99138

Parcel ID: 99139

Parcel ID: 99159

pvc w inv:: 774.4
cast ww inv:: 774.4
behind bldg

paved

2 primary service lines

rr tie

30' 0 30' 60' 120'

SCALE IN FEET

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS POST OFFICE RD

DRAWN BY	DATE
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PROJ. ENG.	D&K ARCHIVE #
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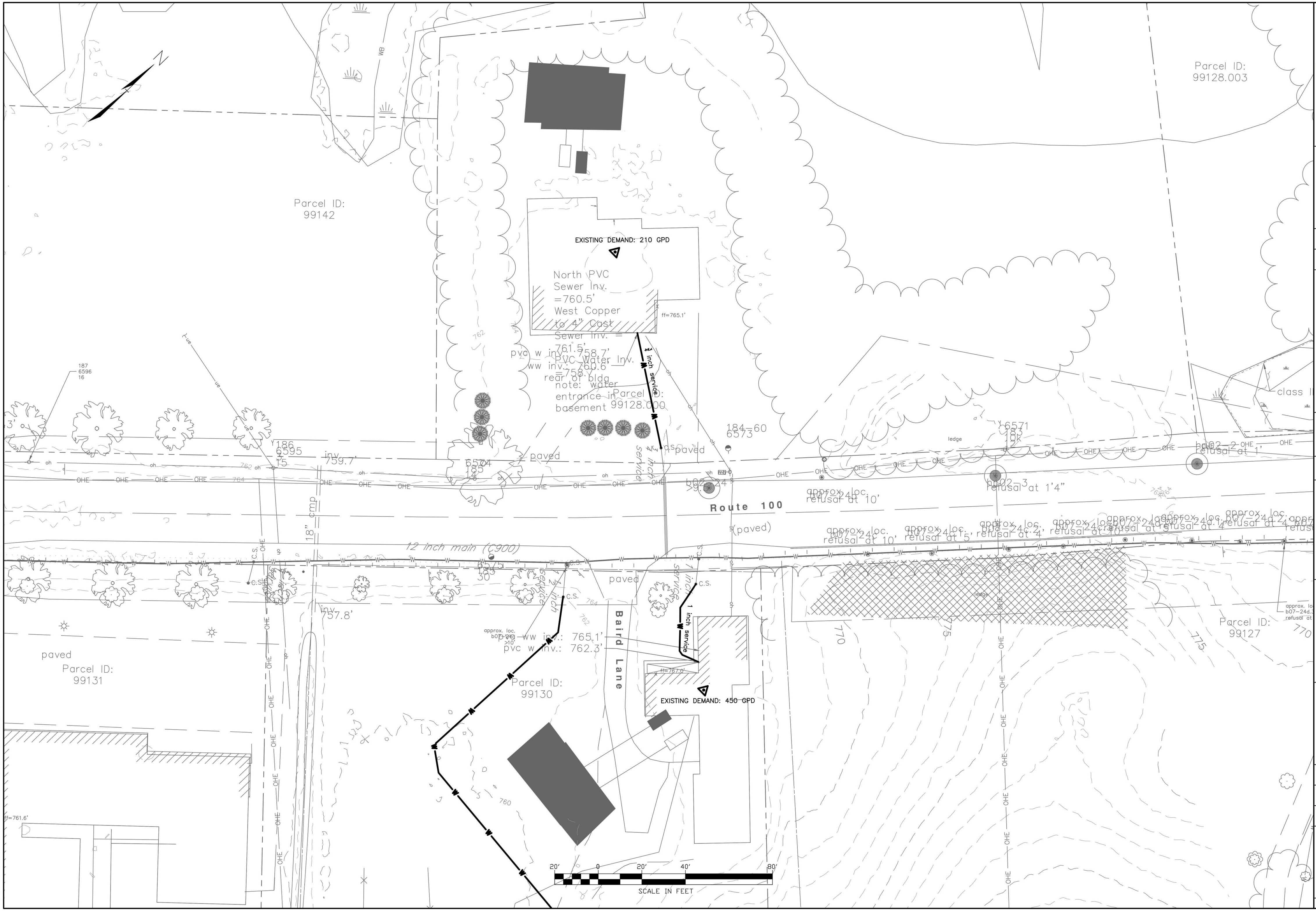
SDS	

SHEET NUMBER

C7

SHEET 7 OF 21

Parcel ID: 99144
FUEL STATION
(paved)
pvc w inv.: 764.1'
pvc ww inv.: 767.3'
ww behind bldg
ff=770.5
6601
20.1
Parcel ID: 99143
cast ww inv.: 767.8'
pvc w inv behind bldg
unknown w/ww location or material
ff=767.2'
paved
Parcel ID: 99142
mile m
Slow
Road
(paved)
Parcel ID: 99143
8 inch main (C900)
1 inch service
6599
20.1
buried utilities
6597
20.1
buried utilities
Route 100
(paved)
18" cmp
inv. 761.3
inv. 761.25
curb
gravel
paved
6603
20.1
concrete
gas pumps
conc.
paved
fuel fillers
buried tanks
former Hazardous Waste Site #890416
Parcel ID: 99132
ff=767.6'
both w/ww located behind bldg
1 inch service
2 inch service
12 inch main (C900)
12" GV
C.S.
15 CMP
paved
Hazardous Waste Site #20053344
ff=765.2'
Parcel ID: 99131
unknown w/ww location or material
db rim=761.3' inv. out=756.9'
15" cmp
db rim=760.1' inv. in=753.7' inv. out=754.1'
12" pe
12" cmp
20' 0 20' 40' 80'
SCALE IN FEET



I:\V\227947 Waitsfield Water and Wastewater Feasibility Stud\Drawings\Civil\Sheet Breakouts Water\227947-Rt 100 Middle - Water.dwg 5/18/2023 10:02 AM

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NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF
WAITSFIELD, VT

VILLAGE
WASTEWATER
PRELIMINARY
ENGINEERING
REPORT
(PER)

SHEET TITLE

WATER SERVICE
CONNECTIONS
ROUTE 100

DRAWN BY SDS	DATE MAY 2023
CHECKED BY JBA	D&K PROJECT # 227947
PROJ. ENG. SDS	D&K ARCHIVE #

SHEET NUMBER

C8

SHEET 8 OF 21

EXISTING DEMAND: 450 GPD

1 inch service

1 inch service

1 1/2 inch service line

Baird Lane

1 1/2 inch service line

1 inch service

EXISTING DEMAND: 450 GPD

Baird Lane

Route 100

(paved)

paved

Parcel ID: 99130

Parcel ID: 99131

Parcel ID: 99130.100

12" inch main (2000)

18" cmp

15 CMP

12" cmp

sfh

spring

SCALE IN FEET

30' 0 30' 60' 120'

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS BAIRD LANE

DRAWN BY	DATE
SDS	MAY 2023
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JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

SHEET NUMBER

C9

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

DRAWN BY	DATE
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SDS	

SHEET NUMBER

C10

SHEET 10 OF 21

Route 100 (paved)
Carroll Road
Carroll Road (paved)
sculpture
CONTRACTOR TO RELOCATE SCULPTURE AS DIRECTED
Parcel ID: 99122
UNDEVELOPABLE PARCEL
EXISTING DEMAND: N/A
UNDEVELOPED PARCEL
Parcel ID: 99128.003
class II wetland
Class III Wetland #2006-4
Class III Wetland #2006-5
mile marker 1000/1216 03'17
Class II Wetland #2006-1
Class III Wetland #2006-2
Class III Wetland #2006-3
Parcel ID: 99124
Parcel ID: 99123
pond
inv. 742.0' 48" cmp
inv. 742.3'
inv. 742.1'
inv. 743.7'
inv. 751.9' 18" cmp
inv. 751.4'
24" cmp
12 inch main (C900)
2 inch service
3 inch service
1" service
6" service
pvc w inv.: 749.1'
ww in room of bldg: 749.8'
rim=753.3'
inv. 18" in=750.0'
inv. 18" in=750.0'
inv. 24" out=749.8'
approx. loc.
refusal at 5'-wet
refusal at 10'
gravel drive
gravel park
6567 301
6570 182
6570 181
6570 180
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6570 175
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6570 -11
6570 -12
6570 -13
6570 -14
6570 -15
6570 -16
6570 -17
6570 -18
6570 -19
6570 -20
6570

EXISTING DEMAND: 1,938 GPD

PROPOSED CURB STOP

UNDEVELOPABLE PARCEL

PROPOSED CORP STOP

PROPOSED CURB STOP

EXISTING DEMAND: N/A

UNDEVELOPED PARCEL

Carroll Road - T.H. 23

Route 100 (paved)

SCALE IN FEET

30' 0 30' 60' 120'

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS CARROLL RD

DRAWN BY	DATE
SDS	MAY 2023
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SHEET NUMBER

C11

SHEET 11 OF 21

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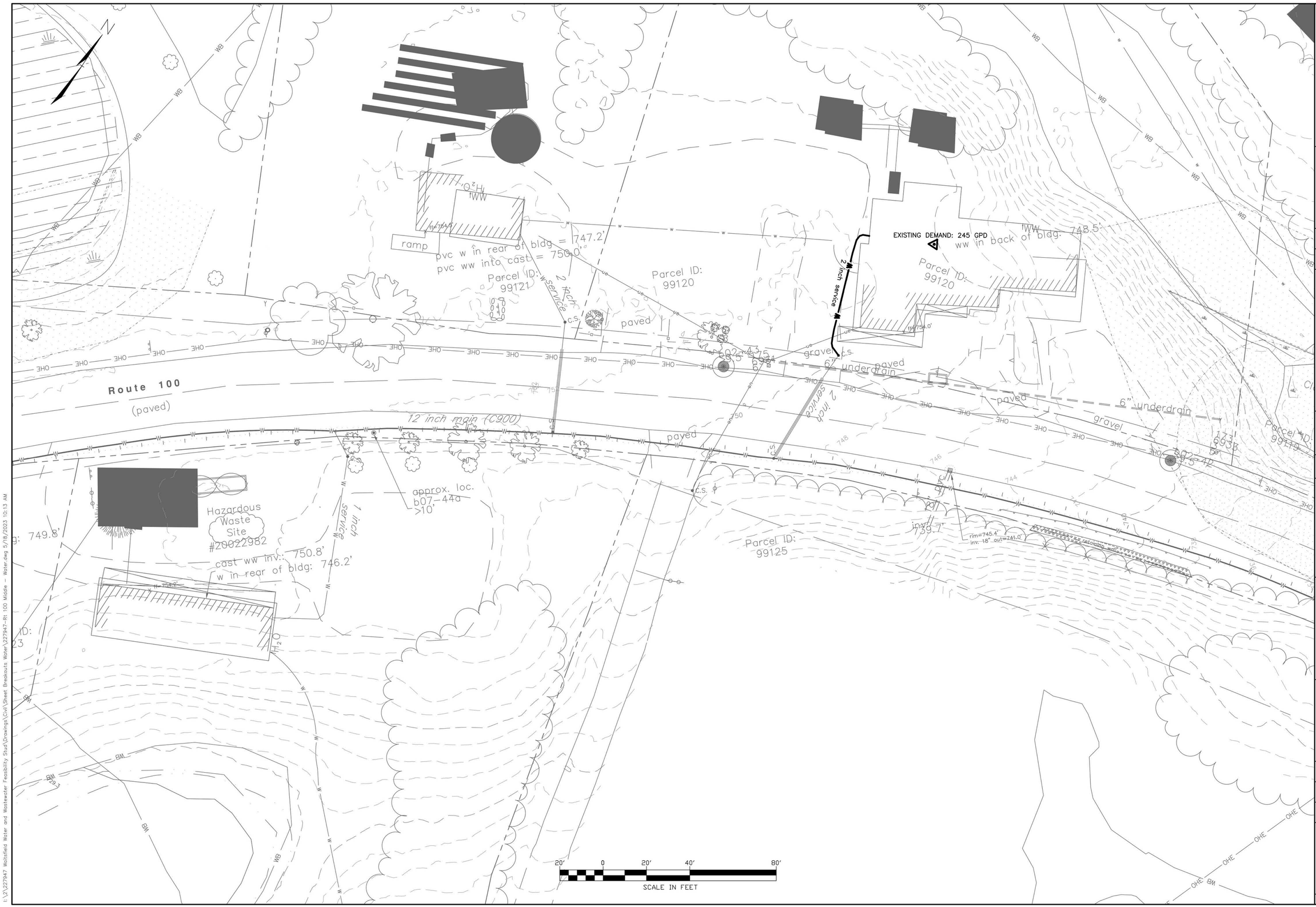

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

DRAWN BY	DATE
SDS	MAY 2023
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JBA	227947
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SDS	

SHEET NUMBER

C12

SHEET 12 OF 21

I:\2\227947 Waitsfield Water and Wastewater Feasibility Study\Drawings\Civil\Sheet Breakouts Water\227947-Rt 100 Middle - Water.dwg 5/18/2023 10:13 AM

EXISTING DEMAND: 245 GPD

¾ inch service

1 inch service

1 inch service

1 inch service

EXISTING DEMAND: 245 GPD

2 inch service

¾ inch service

Class II Wetland #2004-1c

pond

wetland 2004-1c. class 2 constructed pond with 50' buffer.

Parcel ID: 99119

Class II Wetland #2004-1b

wetland 2004-1b. class 2 intermittent stream and assoc. wetlands with 50' buffer.

Parcel ID: 99119

Parcel ID: 99118

Parcel ID: 99115

Route 100

(paved)

12 inch main (C900)

gravel

c.s.

not located

cast ww inv.: 709.2'

w in back of bldg

Parcel ID: 99117

¾ inch service

EXISTING DEMAND: 245 GPD

Cast Sewer Manhole Rim = 712.2' Inv. = 710.2'

NWN

ff=716.7'

Class III Wetland #2004-1a

stream

wetland 2004-1a. class 2 intermittent

rim=727.93' inv. 15" out=723.7'

inv 722.0'

inv 701.8'

6935

6933

6934

6910

171-60 69.57

172-10k

172-40 at 5.5

172-42

172-57

172-58 at 9'

02-41 at 9'

02-42

02-57

02-58

gravel

ledge

stream

oh

OHE

WB

WW

SCALE IN FEET

20' 0 20' 40' 80'

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WATER SERVICE CONNECTIONS ROUTE 100

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SHEET NUMBER

C13

SHEET 13 OF 21

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SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100 AND BRIDGE ST

DRAWN BY	DATE
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PROJ. ENG.	D&K ARCHIVE #
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SHEET NUMBER

C15

SHEET 15 OF 21

E:\2\227947 Waitsfield Water and Wastewater Feasibility Stud\Drawings\Civil\Sheet Breakouts Water\227947-Rt 100 Middle – Water.dwg 5/18/2023 10:18 AM

N

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 420 GPD

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 1,680 GPD

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 800 GPD

EXISTING DEMAND: 1,120 GPD

UNDEVELOPABLE PARCEL

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 560 GPD

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 245 GPD

4 inch main (C900)

2 inch service

1 inch service

¾ inch service

Mehuron Dr

Parsonage Ln

Route 100

OHE

Parcel ID: 37006

Parcel ID: 37005

Parcel ID: 37004

Parcel ID: 37001

Parcel ID: 37007

Parcel ID: 9910

Parcel ID: 9906

Parcel ID: 9905

Parcel ID: 9907

50' 0 50' 100' 200'

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS MEHURON DR

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PROJ. ENG.	D&K ARCHIVE #
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SHEET NUMBER

C16

SHEET 16 OF 21

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SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

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SHEET NUMBER

C17

SHEET 17 OF 21

PVC Sewer Inv. = 699.3' (East)
PVC Sewer Inv. = 670.5' (North)
PVC Water Inv.= 697.5
Parcel ID: 99062
rim=698.8'
inv. 2-4"=694.8'
inv. 12" out=694.2'
not located
¾ inch service
Plastic to Cast Sewer Inv. = 697.9' (West/Northwest)
Plastic to Cast Sewer Inv. = 696.8' (North)
Plastic/Sleeved Water Inv. = 699.5
EXISTING DEMAND: 840 GPD
PVC w inv.: 699.5'
Parcel ID: 99046
¾ inch services
12 inch main (C900)
curb to be moved back 1-ft (not in contract)
BEGIN BIKE LANES
approx. loc. (not bored, utility conflicts)
Route 100
(paved)
granite curb
GRAVEL DRIVE
CONNECT TO EXISTING SERVICE LINE
4" sq.
Haz. Waste Site
Parcel ID: 99057
EXISTING DEMAND: 500 GPD
Cast Sewer Inv. = 691.3'
Copper Water Inv. = 690.4'
w inv. & material unknown
Parcel ID: 99061
rim=399.2'
inv. out=396.2'
inv. in not found
mile marker 1000/1216/0380
PVC w inv. & material unknown
rim=698.5'
inv. 2-4" in=695.8'
inv. 15" out=695.5'
not located
4" Cast Sewer Inv. = PVC Water Inv. = (FF = ?)
Parcel ID: 99060
w inv in rear of 4" Plastic to Cast Sewer Inv. = 694.6'
Plastic Water Inv. = 694.0'
Parcel ID: 99059
w inv in rear of bldg 4" Cast Sewer Inv. = 695.4'
Copper Water Inv. = 692.6'
rim=695.9'
inv. 15" in=692.5'
inv. 4" in=692.7'
inv. 15" out=692.5'
Parcel ID: 99058
w inv. & material unknown
Cast Sewer Inv. = 696.5
Water Inv. = unknown, will be revisited
rim=696.8'
inv. 15" out=693.2'
¾ inch service
Parcel ID: 99046.001
Parcel ID: 99046
rim=695.2'
inv. 2-15" in=692.2'
inv. 15" out=692.2'
PVC w inv.: 691.2'
4" Cast Sewer Inv. = 691.6'
Plastic Water Inv. = 691.2'
rim=695.1'
inv. 2-4" in=692.5'
inv. 15" out=692.3'
Parcel ID: 99056
20' 0 20' 40' 80'
SCALE IN FEET

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

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SHEET NUMBER

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VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

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WATER SERVICE CONNECTIONS ROUTE 100

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SHEET NUMBER

C19

SHEET 19 OF 21

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 1,400 GPD

EXISTING DEMAND: 245 GPD

EXISTING DEMAND: 245 GPD

2 inch service

1 inch service

1.5 inch service

3 inch service

2 inch service

Old County Rd.

Route 100

Parcel ID: 99046

Parcel ID: 99054

Parcel ID: 99053

Parcel ID: 99050

Parcel ID: 99049

Parcel ID: 99055

Parcel ID: 104000

Parcel ID: 99051.100

Parcel ID: 99052

8 inch main (C900)

2 inch main (C900)

mile marker 1000/1216/3940

broken paved/gravel

buried utilities

flag pole

SCALE IN FEET

20′ 0 20′ 40′ 80′

EXISTING DEMAND: 150 GPD

1 inch service

Parcel ID: 99049

Parcel ID: 99049

Parcel ID: 99049

PVC w
inv.:
688.4'

4 inch service

Cast Sewer
Inv. = 690.8'
Plastic Water
Inv. = 688.4'

inv.
686.2'

143
7004
12

c.s.

paved

buried utilities

142
7005
12

8 inch main

141
7006
12

gravel

141
7009

Route 100

(paved)

36" sq. conc.

approx. loc.
b07-27a
>10'

paved sidewalk

END EX. PAVED SIDEWALK

141
7002
7008

7007
141
01
12-1

buried utilities

paved

7010

paved

paved

approx. loc.
b07-9.7
>10'

inv.
685.2'

1 inch service

former Haz. Waste Site

2 inch service

Parcel ID: 99051

Parcel ID: 99051

Parcel ID: 99052

Waitsfield Elementary School

former Haz. Waste Site

ff=696.1'

Waitsfield Elementary School

RC

4" Cast Sewer
Inv. = 695.0'
Plastic Water
Inv. = 695.0'

MW

20' 0 20' 40' 80'

SCALE IN FEET

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TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS ROUTE 100

DRAWN BY	DATE
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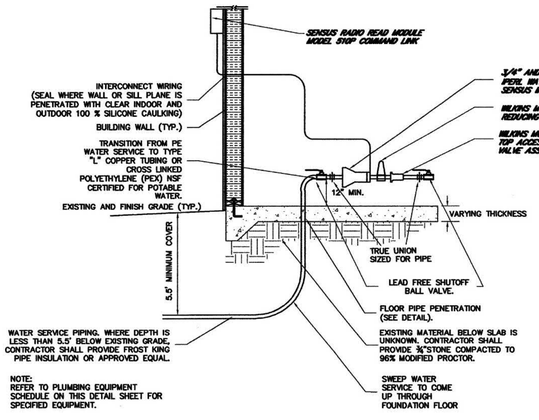
CHECKED BY	D&K PROJECT #
JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

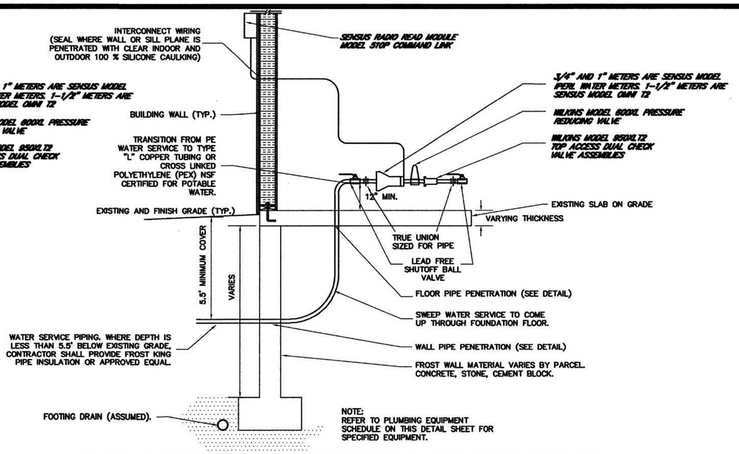
SHEET NUMBER

C20



FOUNDATION PENETRATION AND METER ASSEMBLY DETAIL- SLAB ON GRADE

NOT TO SCALE



FOUNDATION PENETRATION AND METER ASSEMBLY DETAIL- SLAB ON GRADE W/ FROST FOOTINGS

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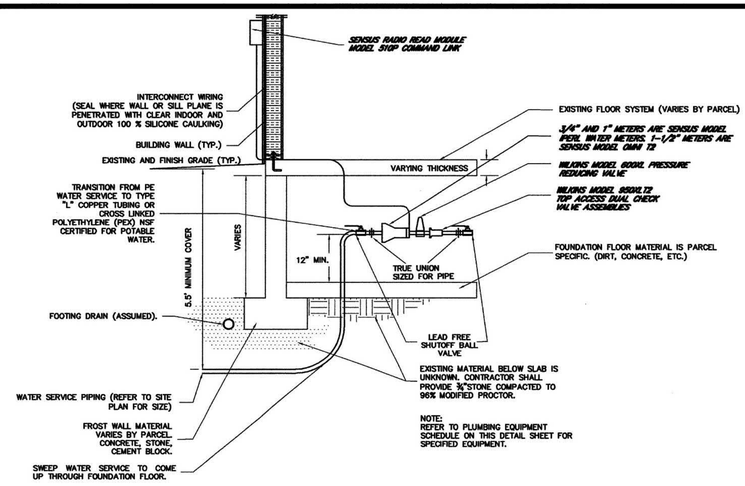
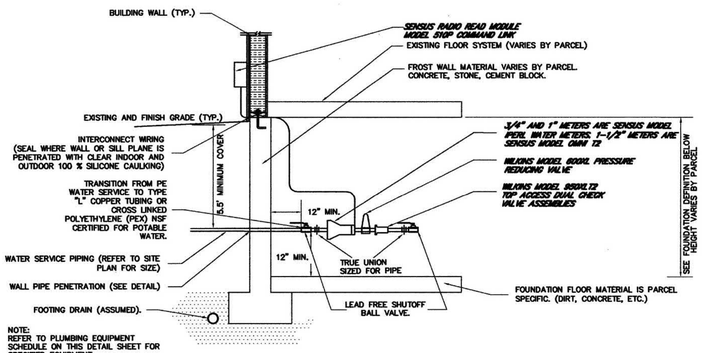


FOUNDATION PENETRATION AND METER ASSEMBLY DETAIL- CRAWL SPACE W/ FROST FOOTINGS

NOT TO SCALE



FOUNDATION PENETRATION AND METER ASSEMBLY DETAIL- BASEMENT

NOT TO SCALE

FOUNDATION PENETRATION NOTES

1. ALL FOUNDATION WALL AND FLOOR PENETRATIONS SHALL RECEIVE 4" SCHEDULE 80 PVC SLEEVES. FLOOR PENETRATION SHALL INCLUDE APPROPRIATELY SIZED LINK SEAL BETWEEN SERVICE PIPING AND SLEEVE.

2. ALL FLOOR AND WALL SLEEVE AND LINK SEAL SIZING SHALL BE PERFORMED BY THE CONTRACTOR AND REVIEWED BY THE ENGINEER PRIOR TO CONSTRUCTION. SUBMITTALS REQUIRED AS FOLLOWS:
   A. 2" WATER SERVICE PIPE, SLEEVE, AND LINK SEALS
   B. 1¼" WATER SERVICE PIPE, SLEEVE, AND LINK SEALS
   C. 1" WATER SERVICE PIPE, SLEEVE, AND LINK SEALS
   D. ¾" WATER SERVICE PIPE, SLEEVE, AND LINK SEALS

3. IF DEPTH TO WATER SERVICE PIPE IS LESS THAN 5 1/2 FEET, AND APPROVED BY THE ENGINEER, THE CONTRACTOR SHALL INSULATE WITH FROST KING PIPE WRAP INSULATION SUITABLE FOR DIRECT BURY OR APPROVED EQUAL.

4. MEASUREMENT AND PAYMENT FOR FOUNDATION PENETRATION SHALL INCLUDE THE FOUNDATION CORE, WATER SERVICE PIPE FROM 12" OUTSIDE OF THE FOUNDATION WALL TO 12" INSIDE THE FOUNDATION WALL, SLEEVE PIPE, LINK SEALS, AND BALL VALVE, ALL OF APPROPRIATE SIZE, SPRAY FOAM INSULATION AND HYDRAULIC CEMENT /AND OR NON-SHRINK GROUT. REFER TO MEASUREMENT AND PAYMENT SECTION OF THE PROJECT DOCUMENTS FOR ADDITIONAL INFORMATION

5. BALL VALVE SHALL BE CLOSED, AND REMAIN CLOSED UNTIL THE INSTALLATION OF THE WATER METER ASSEMBLY HAS BEEN COMPLETED.

6. IF SLAB OR CRAWL SPACE IS UN-HEATED, ALL INTERIOR PIPING SHALL BE WRAPPED WITH FROST KING PIPE INSULATION OR APPROVED EQUAL. IN SOME CASES. ENGINEER MAY REQUEST THE USE OF "THERMAL PROTECTION." CONTRACTOR SHALL PROVIDE (48) HOUR WRITTEN NOTICE TO ENGINEER IF AN UNHEATED OR FROST PENETRATING ZONE IS ENCOUNTERED.

7. FOUNDATIONS TYPES SHALL BE DEFINED AS FOLLOWS:
   A. SLAB ON GRADE
      – 0 TO 18" OF WORKABLE VERTICAL SPACE
   B. CRAWL SPACE
      – 18" TO 36" OF WORKABLE VERTICAL SPACE
   C. BASEMENT
      – 36" AND UP OF WORKABLE VERTICAL SPACE

8. PAY LIMIT FOR STONE FOUNDATIONS SHALL BE 1-3 FEET IN THICKNESS. EACH ADDITIONAL 0.5 LINEAR FEET OF FOUNDATION PENETRATION IN A STONE WALL WILL BE PAID FOR UNDER THE ALTERNATE ITEM. IF EXTENUATING CIRCUMSTANCES ARE ENCOUNTERED DURING CONSTRUCTION, CONTRACTOR SHALL COORDINATE WITH ENGINEER, MUNICIPAL PROJECT MANAGER, AND THE TOWN OF WAITSFIELD WATER TASK FORCE, PROVIDING AMPLE TIME FOR REVIEW OF ANY FIELD CHANGES. ANY DELAY WILL NOT RESULT IN ADDITIONAL COST TO THE OWNER, ENGINEER, OR THE TOWN OF WAITSFIELD.

9. ALL WORK ON STONE FOUNDATIONS SHALL BE COMPLETED BY A PROFESSIONAL STONE MASON WITH A TRACEABLE AND ACCEPTABLE WORK HISTORY. FOR BIDDING AND ESTIMATING PURPOSES, CONTRACTOR SHALL ASSUME THAT ALL STONE FOUNDATIONS ENCOUNTERED ARE MORTARED. ALL MASONRY WORK SHALL CONFORM TO THE PROJECT SPECIFICATIONS AND LATEST EDITION OF THE NATIONAL MASONRY STANDARDS.

10. ALL FOUNDATION PENETRATIONS SHALL BE SEALED WITH A NON SHRINK GROUT AND HYDRAULIC CEMENT.

METER ASSEMBLY NOTES

1. ALL METER ASSEMBLIES ARE TO BE INSTALLED IN A FROST FREE LOCATION AND CERTIFIED BY A MASTER PLUMBER. FROST FREE LOCATIONS ARE DEFINED AS ANY OF THE FOLLOWING:
   A. BASEMENT WITH A MINIMUM 5 FOOT WALL (HEATED OR UNHEATED)
   B. ANY HEATED SPACE (SLAB ON GRADE, CRAWL SPACE, OR BASEMENT)
   C. ANY SPACE WHICH CONTAINS EXISTING PIPING THAT HAS NOT FROZEN OR BEEN PRONE TO FREEZING.

2. IF A FROST PENETRATING ZONE IS ENCOUNTERED, CONTRACTOR SHALL PROVIDE WRITTEN NOTICE TO ENGINEER, WITH PHOTOS AND A FIELD SKETCH. ENGINEER MAY COORDINATE A SITE VISIT WITH THE RESIDENT PROJECT ENGINEER TO DEVELOP A SOLUTION. IN THE EVENT NO SOLUTION IS OBTAINED, ENGINEER MAY REQUEST THE INSTALLATION OF A METER PIT, PER THE DETAIL, IN LIEU OF A STANDARD METER ASSEMBLY. IF A METER PIT IS INSTALLED OR IF A FROST PENETRATING ZONE CANNOT BE AVOIDED, ENGINEER MAY REQUEST THE USE OF "THERMAL PROTECTION." THIS INCLUDES SELF REGULATING HEAT TAPE OF APPROPRIATE LENGTH, AND THERMAL JACKETS FOR THE METER ASSEMBLY, PRESSURE REDUCING VALVE, AND BACKFLOW PREVENTION DEVICE. REFER TO MEASUREMENT AND PAYMENT FOR ADDITIONAL INFORMATION.

3. ALL RESIDENTIAL BUILDINGS, INCLUDING APARTMENTS, SHALL RECEIVE A ¾" WATER METER, REGARDLESS OF THE PIPE ENTERING THE BUILDING.

4. ALL FITTINGS REQUIRED TO REDUCE DOWN TO APPROPRIATE METER SHALL BE INCLUDED IN THE METER PAY ITEM. ALL SERVICES SHALL BE REDUCED IN SIZE AFTER THE FOUNDATION BALL VALVE AND PRIOR TO THE METER ASSEMBLY. THE INITIAL BALL VALVE 1 FOOT INSIDE THE FOUNDATION WALL SHALL BE PAID UNDER THE FOUNDATION PENETRATION PAY ITEM.

5. ALL INTERIOR PIPING SHALL BE TYPE L COPPER, CROSS-LINKED POLYETHYLENE (PEX) OR APPROVED EQUAL.

6. PAY LIMIT OF THE METER ASSEMBLY SHALL BE ALL MATERIAL LABOR AND EQUIPMENT TO INSTALL THE METER AS SHOWN IN THE DETAILS BETWEEN THE (2) LEAD FREE BALL VALVES. REFER TO THE MEASUREMENT AND PAYMENT SECTION FOR SPECIFIC INFORMATION.

7. AT THE REQUEST OF THE ENGINEER, THE METER ASSEMBLY MAY BE MOVED TO AN ALTERNATE LOCATION THAN WHERE THE SERVICE PIPE ENTERS THE FOUNDATION TO ACCOMMODATE EXISTING OBSTRUCTIONS AND PROVIDE EASIER ACCESSIBILITY FOR FUTURE WORK. CONTRACTOR SHALL SUBMIT ACTUAL INVOICES FOR MATERIALS USED, AND WORK BASED ON THE HOURLY RATE INCLUDED WITHIN THE BID SCHEDULE. A MAXIMUM OF 15% OVERHEAD AND PROFIT WILL BE ADDED TO THIS ADDITIONAL WORK. ALL WORK COMPLETED MUST BE INVOICED AND REQUISITIONED WITHIN THAT PERIODS PAY REQUEST FOR PAYMENT TO BE OBTAINED.

8. THE SPECIFICATION OF SENSUS AND WATTS METERS AND PARTS IS INTENDED TO DEFINE A LEVEL OF QUALITY AND FUNCTION, AND IS NOT INTENDED AS A SOLE SOURCE SPECIFICATION. ALTERNATE MANUFACTURERS WILL BE CONSIDERED, PROVIDED INFORMATION IS SUBMITTED (14) DAYS PRIOR TO THE BID OPENING.

9. ALL METER ASSEMBLIES SHALL BE SUPPORTED BY A FREE STANDING UNI-STRUT BRACKET TO PROPERLY SECURE THE METER. FOR METERS THAT ARE 1 ¾"AND LARGER, CONTRACTOR SHALL SUPPORT METER TO WALL AND FLOOR WITH UNI-STRUT WALL AND FLOOR MOUNTS. (SHOP DRAWING AND SUBMITTAL REQUIRED PRIOR TO INSTALLATION).

10. FOR ALL METERS REQUISITIONED FOR PAYMENT, CERTIFIED PLUMBER MUST HAVE COMPLETED THE METER INSTALLATION CHECKLIST FOR EACH METER, ATTACHED IN SPECIFICATION 15316 – WATER METERS AND INSTALLATION. ONLY METERS WHICH HAVE AN ASSOCIATED CHECKLIST WITH AS-BUILT INFORMATION AND PHOTOS WILL BE AUTHORIZED FOR PAYMENT.

PLUMBING EQUIPMENT SCHEDULE

1. ALL INTERIOR BALL VALVES SHALL BE MANUFACTURED BY APOLLO, WATTS, OR APPROVED EQUAL AND CERTIFIED LEAD FREE BY THE MANUFACTURER.

2. ALL CHECK VALVES SHALL BE DUAL VALVE ASSEMBLIES (BACKFLOW PREVENTION DEVICES)AS FOLLOWS:
   METER SIZE ¾" TO 1" = WATTS LF7, APOLLO DUC4N, OR APPROVED EQUAL
   METER SIZE 1" TO 2" = WATTS LF 007, APOLLO DC40, OR APPROVED EQUAL
   METER SIZE 2" & UP = FEBCO MASTER SERIES 856, APOLLO RPDA4G, OR APPROVED EQUAL

3. ALL PRESSURE REDUCING VALVES SHALL BE AS FOLLOWS:
   METER SIZE ¾" TO 2" = WATTS LFU5B-Z3, APOLLO PR 36 SERIES, OR APPROVED EQUAL

4. ALL WATER METERS SHALL BE AS FOLLOWS:
   METER SIZE ¾" TO 1" = SENSUS IPERL, SENSUS SRII, ELSTER SM700 SMART METER, OR APPROVED EQUAL.
   METER SIZE 1-1/2" TO 2" = OMNI C2, ELSTER EVO04, OR APPROVED EQUAL

5. ALL RADIO READ MODULES SHALL BE EITHER SENSUS 510P. ITRON 60W-R, OR APPROVED EQUAL.

6. PRESSURE GAGE SHALL BE ASHCROFT, AMETEK P500, OR APPROVED EQUAL 2.5 INCH DIAMETER FACE, 15-1000 PSI RANGE, STEEL CASE, BRASS MOVEMENT CONSTRUCTION, LIQUID FILLED, 1/4-INCH NPT

7. ALL HEAT TAPE SHALL BE RAYCHEM, OMEGALUX OR APPROVED EQUAL SELF REGULATING LONG ENOUGH TO COVER ALL PIPING, AND ABLE TO BE CONNECTED TO AN ELECTRICAL SOURCE. CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR DETERMINING LENGTH OF HEAT TAPE, AND APPROPRIATE NUMBER OF COILS.

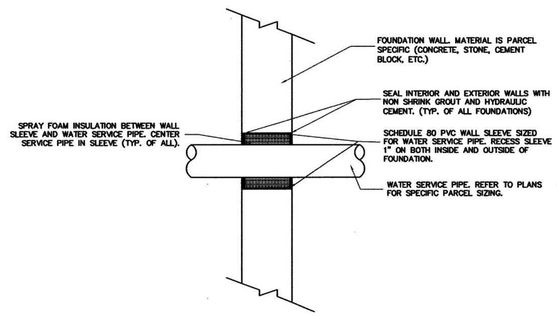
8. INSULATING JACKETS FOR METERS, PRESSURE REDUCING VALVES AND DUAL CHECK VALVE ASSEMBLIES SHALL BE FORBES MARSHALL, THERMA XX, OR APPROVED EQUAL.

9. ALL METERS AND ASSOCIATED RADIO READ MODULES SHALL BE COMPATIBLE WITH NEW ENGLAND MUNICIPAL RESEARCH CENTER (NEMRC) ACCOUNTING AND BILLING MODULE. CONTRACTOR SHALL BE RESPONSIBLE FOR SPEAKING WITH SUPPLIERS PRIOR TO REBID, AND PROVIDING WRITTEN VERIFICATION OF COMPATIBILITY TO ENGINEER PRIOR TO ORDERING MATERIALS.

10. ALL PLUMBING WORK SHALL CONFORM TO FEDERAL, STATE AND LOCAL PLUMBING CODES, WITH PROPER LEAD FREE CERTIFICATION AS APPROPRIATE.

FLOOR PIPE PENETRATION DETAIL

NOT TO SCALE



FOUNDATION WALL PENETRATION AND SLEEVE DETAIL - PROFILE

NOT TO SCALE

DuBois & King inc.
ENGINEERING • PLANNING • MANAGEMENT • DEVELOPMENT
6 GREEN TREE DRIVE
SO. BURLINGTON, VT 05403
TEL: (802) 878-7661
FAX: (802) 783-7101
www.dubois-king.com
BRANDON, VT
RANDOLPH, VT
SPRINGFIELD, VT
BEDFORD, NH
LACONIA, NH

PROFESSIONAL SEAL

NOT FOR CONSTRUCTION PRELIMINARY PLANS

NO.	DATE	DESCRIPTION	BY	CK'D

TOWN OF WAITSFIELD, VT

VILLAGE WASTEWATER PRELIMINARY ENGINEERING REPORT (PER)

SHEET TITLE

WATER SERVICE CONNECTIONS DETAILS

DRAWN BY	DATE
SDS	MAY 2023
CHECKED BY	D&K PROJECT #
JBA	227947
PROJ. ENG.	D&K ARCHIVE #
SDS	

SHEET NUMBER

C21

SHEET 21 OF 21

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APPENDIX T

Private Properties Requiring Easements
Based on May 2023 Preliminary Plans

Parcel Number	Design Plan Sheet Number(s)	Reason for Easement
99173	C16	Sewer lines
99181	C16	Pump station and sewer line/FM
38008	C16, C18	Sewer lines
38009	C16, C18, C26	Sewer lines
99139	C18	Sewer lines
99135	C26	Sewer lines
99128.003	C30	Pump station and sewer line/FM
01003	C36	Pump station and sewer lines/FM
99069	C37, C38	Sewer line
99051	C41	Pump station and sewer lines/FM

Notes:
Only easements that benefit a different landowner are included in this list

APPENDIX U

DuBois & King inc.

JOB: Waitsfield Village Wastewater

PROJECT NO.: 227947
CALCULATED BY: SDS DATE: 5-23-23
CHECKED BY: JBA DATE: 5-23-23

Preliminary Engieneering Report
OPCC: Preliminary

Opinion of Probable Construction Costs (OPCC) - Village and Irasville to Munn Site

NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

Cost Level Type: Preliminary

Collection System

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life
1	Mobilization/Demobilization	LS	1	4%	$285,500	
2	Sanitary Sewer Manhole 0-8 ft deep (4 ft Diameter)	EA	59	$4,800	$283,200	40
3	Sanitary Sewer Manhole 8-12 ft deep (4 ft Diameter)	EA	12	$5,300	$63,600	40
4	8" PVC Sanitary Sewer Main 0-8 ft deep	LF	8,500	$115	$977,500	40
5	8" PVC Sanitary Sewer Main 8-12 ft deep	LF	2,600	$130	$338,000	40
6	8" PVC Sanitary Sewer Main Jack and Bore 20" Steel Sleeve	LF	320	$480	$153,600	40
7	8" Sanitary Sewer Service (Open Cut)	LF	20	$115	$2,300	40
8	8" Sanitary Sewer Service (Jack and Bore)	LF	40	$480	$19,200	40
9	4" Sanitary Sewer Service (Open Cut)	LF	2,120	$70	$148,400	40
10	4" Sanitary Sewer Service (Jack and Bore)	LF	1,000	$350	$350,000	40
11	6" PVC Force Main (Open Cut)	LF	8,900	$70	$623,000	40
12	6" PVC Force Main Colocated with Sewer (Open Cut)	LF	5,800	$30	$174,000	40
13	6" PVC Force Main (Jack and Bore)	LF	200	$145	$29,000	40
14	6" PVC Force Main (Directional Drill)	LF	2,100	$125	$262,500	40
15	4" PVC Force Main Service (open cut)	LF	2,120	$20	$42,400	40
16	4" Force Main Jack and Bore 18" Steel Casing	LF	230	$140	$32,200	40
17	Forcemain Air Release Manhole	EA	1	$4,200	$4,200	40
18	Forcemain Gate Valves	EA	2	$1,600	$3,200	40
19	Forcemain Cleanouts	EA	15	$1,500	$22,750	40
20	Sewer Service Cleanouts	EA	7	$1,000	$7,000	0
21	Pump Stations	EA	5	$330,000	$1,650,000	40
22	Portable Generator	EA	1	$250,000	$250,000	40
23	Septic Tank 1: Baffled Cast-In-Place	GAL	18,000	$5	$90,000	40
24	Septic Tank 2: Precast with Effluent Filter	GAL	8,000	$5	$40,000	40
25	Septic Tank 3: Pre-Cast	GAL	7,500	$5	$37,500	40
26	Septic Tank 4: Pre-Cast with Effluent Filter	GAL	3,500	$5	$17,500	40
27	Septic Tank 5: Cast-In-Place	GAL	19,500	$5	$97,500	40
28	Septic Tank 6: Cast-In-Place with Effluent Filter	GAL	9,500	$5	$47,500	40
29	Septic Tank 7: Cast-In-Place	GAL	22,500	$5	$112,500	40
30	Septic Tank 8: Cast-In-Place with Effluent Filter	GAL	15,000	$5	$75,000	40
31	Roadway and Parking Pavement Restoration	SY	2,090	$50	$104,500	20
32	Driveway Restoration (Paved)	SY	1,100	$50	$55,000	20
33	Removal of Unsuitable Material	CY	560	$30	$16,800	
34	Miscellaneous Earth Excavation	CY	480	$50	$24,000	
35	Rock Excavation and Disposal	CY	620	$200	$124,000	
36	Rock Excavation and Disposal - Irasville to Village Center	CY	1,690	$200	$338,000	
37	Tree Demolition	EA	20	$250	$5,000	
38	Maintenance of Traffic	LS	1	$25,000	$25,000	
39	FUTURE 8" PVC Sanitary Sewer Main 0-8 ft deep	LF	2790	$115	$320,850	40
40	FUTURE Sanitary Sewer Manhole 0-8 ft deep (4 ft Diameter)	EA	10	$4,800	$48,000	40
41	FUTURE 4" PVC Sewer Service (open cut)	LF	200	$70	$14,000	40
42	FUTURE Pavement Replacement	SY	710	$50	$35,500	40
43	EPSC Plan	LS	1	1%	$71,000	
				OPCC Subtotal:	$7,420,700	
				20% Contingency:	$1,484,200	
				OPCC:	$8,904,900	
	Total Opinion of Probable Construction Costs:				**$8,904,900**	

JOB: Waitsfield Village Wastewater

PROJECT NO.: 227947
CALCULATED BY: JBA DATE: 5-23-23
CHECKED BY: EBS DATE: 5-24-23

SCENARIO 6: IRASVILLE AND VILLAGE TO MUNN SITE
OPCC: Preliminary

Opinion of Probable Construction Costs (OPCC) - Irasville and Village to Munn Site

NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein. DuBois & King, Inc. is not providing professional estimating services, and actual pay items and material quantities also may vary from the pay items and quantities included in this opinion of probable construction costs.

Cost Level Type: Preliminary

Munn Site Treatment and Disposal System

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life
1	Mobilization/Demobilization	LS	1	12.5%	$152,400	
2	EPSC Plan	LS	1	$40,000	$40,000	
3	Traffic Control, All-Inclusive	LS	1	$20,000	$20,000	
4	2" Piping in disposal fields	LF	10,800	$20	$216,000	40
5	4" PVC from valve vault to disposal system	LF	2,940	$60	$176,400	40
6	6" Forcemain on-site	LF	270	$70	$18,900	40
7	Trench Excavation of Earth	CY	1,060	$35	$37,100	
8	Stone around piping	CY	3,700	$50	$185,000	
9	Filter Fabric	SY	4,800	$5	$24,000	
10	Pump Station (Assume 12,000 gallon)	EA	1	$99,000	$99,000	60
11	Control Building	EA	1	$124,000	$124,000	60
12	Gravel road	SY	890	$40	$35,600	
13	Valve Vault	EA	1	$66,000	$66,000	40
14	Waste Solids Tank	LF	1	$25,000	$25,000	40
15	Underground Electrical	LF	350	$50	$17,500	50
15	New Electrical Service	LS	1	$10,000	$10,000	
16	50,000-gallon EQ Tank	EA	1	$124,000	$124,000	
17	Wastewater Treatment Facility	EA	1	$1,849,000	$1,849,000	60
				OPCC Subtotal:	$3,219,900	
				20% Contingency:	$644,000	
				OPCC:	$3,863,900	
				Total Opinion of Probable Construction Costs:	**$3,863,900**	

JOB: Waitsfield Village Wastewater

PROJECT NO.: 227947
CALCULATED BY: SDS DATE: 5-23-23
CHECKED BY: JBA DATE: 5-26-23

SCENARIO 6: IRASVILLE AND VILLAGE TO MUNN SITE

NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein. DuBois & King, Inc. is not providing professional estimating services, and actual pay items and material quantities also may vary from the pay items and quantities included in this opinion of probable construction costs.

Project Cost Summary

PRELIMINARY OPINION OF PROBABLE PROJECT COST

Description		Amount	Notes
Preliminary OPCC - Collection	$	8,904,900	
Preliminary OPCC - Treatment and Disposal	$	3,863,900	
Engineering Preliminary Design Phase Cost	$	199,418	Feasibility Study and PER
Engineering Final Design Phase Cost	$	709,300	Based on CWSRF Fee Allowance
Engineering Construction Phase Cost	$	1,300,300	Based on CWSRF Fee Allowance
Legal/Fiscal Cost	$	127,700	
Administration Cost	$	127,700	1% of Construction costs
Sub-Total	$	15,233,218	
Total Project Capital Cost	**$**	**15,233,218**	

General Notes:
1. All estimated project cost amounts are rounded to the neared dollar
2. Total project capital cost is rounded up to the nearest thousands

POTENTIAL FUNDING TERMS & PROJECTED ERU COST

Description		Amount	Notes
Assumed Grant/Subsidy	$	3,808,304	Assumes 25% grant/subsidy
Village WW Planning Loan Forgiveness	$	324,418	Assume $125K subsidy for Step II
Balance for Loan Repayment	$	11,100,500	
Total Repayment on 40-year loan	$	16,232,000	Assume 2%, 40 years
Annual Repayment on 40-year loan	$	405,800	
Loan Payment Cost per ERU	$	1,010	
Annualized Operation & Maintenance	$	146,100	
Total Annual Cost per ERU	$	1,380	

General Notes:
1. All project costs associated with loan terms and projected ERU cost amounts and totals are trounded up to the nearest dollar

APPENDIX V

JOB: Waitsfield Village Wastewater

PROJECT NO.: 227947
CALCULATED BY: SDS DATE: 5-26-23
CHECKED BY: JBA DATE: 5-26-23

SCENARIO 2 - VILLAGE WATER
OPCC: Preliminary

Opinion of Probable Construction Costs (OPCC) - Connect Village District Lots to Water System

NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein.

Cost Level Type: Preliminary

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life	Prop Subtotal
	Service connections:						
	parcel no: 99183 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120
	parcel no: 99180 size: 3/4 in	LF	20	$50	$1,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	3/4 Inch Curb/Corp Stop	EA	2	$755	$1,510		
	Mobilization/Demobilization & Misc work	LS	1	20%	$922		
							$5,532
	parcel no: 99173 size: 3/4 in	LF	30	$50	$1,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	3/4 Inch Curb/Corp Stop	EA	2	$755	$1,510		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,022		
							$6,132
	parcel no: 38006 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120
	parcel no: 38005 size: 1 in	LF	210	$55	$11,550		
	1 Inch Water Meter, Backflow Preventer, MXU C	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	1 in Curb/Corp Stop	EA	2	$920	$1,840		
	Mobilization/Demobilization & Misc work	LS	1	20%	$3,162		
							$18,972
	parcel no: 99170 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life	Prop Subtotal
	parcel no: 99168.1 size: 1 in	LF	190	$55	$10,450		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	1 Inch Curb/Corp Stop	EA	2	$920	$1,840		
	Mobilization/Demobilization & Misc work	LS	1	20%	$2,942		
							$17,652
	parcel no: 99169 size: 2 in	LF	50	$65	$3,250		
	Cable, Pressure Reducing Valve	EA	1	$3,900	$3,900		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,630		
							$9,780
	parcel no: 38002 size: 1 in	LF	90	$55	$4,950		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	1 Inch Curb/Corp Stop	EA	1	$920	$920		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,658		
							$9,948
	parcel no: 99138 size: 1 1/2 in	LF	100	$60	$6,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$3,250	$3,250		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$2,050		
							$12,300
	parcel no: 99136 size: 1 1/2 in	LF	70	$60	$4,200		
	MXU Cable, Pressure Reducing Valve	EA	1	$3,250	$3,250		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,690		
							$10,140
	parcel no: 99157 size: 1 in	LF	770	$55	$42,350		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$8,954		
							$53,724
	parcel no: 99130 size: 1 in	LF	50	$55	$2,750		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,034		
							$6,204
	parcel no: 99128 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120
	parcel no: 99130.1 size: 1 in	LF	580	$55	$31,900		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$6,864		
							$41,184

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life	Prop Subtotal
	parcel no: 99128.003 size: 3/4 in	LF	50	$50	$2,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	3/4 Inch Curb/Corp Stop	EA	2	$755	$1,510		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,222		
							$7,332
	parcel no: 23001.1 size: 1 in	LF	420	$55	$23,100		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	1 Inch Curb/Corp Stop	EA	2	$920	$1,840		
	Mobilization/Demobilization & Misc work	LS	1	20%	$5,472		
							$32,832
	1 inch PVC Lateral Waterline	LF	300	$55	$16,500		
	2 inch PVC Lateral Waterline	LF	220	$65	$14,300		
	parcel no: 99119 size: 3/4 in	LF	80	50	$4,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,220		
							$7,320
	parcel no: 99119 size: 3/4 in	LF	80	$50	$4,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,220		
							$7,320
	parcel no: 99118 size: 1 in	LF	80	$55	$4,400		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,364		
							$8,184
	parcel no: 99118 size: 1 in	LF	40	$55	$2,200		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$924		
							$5,544
	parcel no: 99117 size: 3/4 in	LF	50	$50	$2,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$920		
							$5,520
	parcel no: 99116 size: 3/4 in	LF	30	$50	$1,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$720		
							$4,320
	parcel no: 99114 size: 3/4 in	LF	30	$50	$1,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$720		
							$4,320
	parcel no: 99109 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life	Prop Subtotal
	parcel no: 99110 size: 3/4 in	LF	50	$50	$2,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$920		
							$5,520
	parcel no: 99107 size: 3/4 in	LF	270	$50	$13,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$3,120		
							$18,720
	parcel no: 99108 size: 3/4 in	LF	90	$50	$4,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,320		
							$7,920
	parcel no: 99108 size: 3/4 in	LF	160	$50	$8,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$2,020		
							$12,120
	parcel no: 99108 size: 3/4 in	LF	20	$50	$1,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$620		
							$3,720
	parcel no: 01004 size: 3/4 in	LF	70	$50	$3,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,120		
							$6,720
	parcel no: 01003 size: 3/4 in	LF	40	$50	$2,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$820		
							$4,920
	parcel no: 99104 size: 3/4 in	LF	40	$50	$2,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$820		
							$4,920
	parcel no: 99070 size: 3/4 in	LF	30	$50	$1,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$720		
							$4,320
	parcel no: 99103 size: 3/4 in	LF	90	$50	$4,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,320		
							$7,920
	parcel no: 37001 size: 1 in	LF	80	$55	$4,400		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,364		
							$8,184

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life	Prop Subtotal
	4 Inch PVC Lateral Waterline	LF	600	$70	$42,000		
	parcel no: 37003 size: 3/4 in	LF	80	$50	$4,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$9,620		
							$15,720
	parcel no: 37005 size: 3/4 in	LF	140	$50	$7,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,820		
							$10,920
	parcel no: 37007 size: 3/4 in	LF	50	$50	$2,500		
	2 inch waterline	LF	1710	$65	$111,150		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$23,150		
							$138,900
	parcel no: 37006 size: 1 in	LF	150	$55	$8,250		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$2,134		
							$12,804
	parcel no: 37004 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120
	parcel no: 99068 size: 3/4 in	LF	70	$50	$3,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,120		
							$6,720
	parcel no: 99066 size: 3/4 in	LF	50	$50	$2,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$920		
							$5,520
	parcel no: 99064 size: 3/4 in	LF	60	$50	$3,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,020		
							$6,120
	parcel no: 99057 size: 1 in	LF	10	$55	$550		
	Cable, Pressure Reducing Valve	EA	1	$1,420	$1,420		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$594		
							$3,564
	parcel no: 99046 size: 3/4 in	LF	30	$50	$1,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$720		
							$4,320

Item No.	Description	Unit	Qty	Unit Cost	Cost	Asset Life	Prop Subtotal
	parcel no: 99046.001 size: 3/4 in	LF	90	$50	$4,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,320		
							$7,920
	parcel no: 99055 size: 3/4 in	LF	20	$50	$1,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$620		
							$3,720
	parcel no: 10400 size: 2 in	LF	80	$65	$5,200		
	Cable, Pressure Reducing Valve	EA	1	$3,900	$3,900		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$2,020		
							$12,120
	parcel no: 99053 size: 3/4 in	LF	40	$50	$2,000		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$820		
							$4,920
	parcel no: 99049 size: 3/4 in	LF	90	$50	$4,500		
	MXU Cable, Pressure Reducing Valve	EA	1	$1,100	$1,100		
	Rock Excavation and Disposal	CY	5	$200	$1,000		
	Mobilization/Demobilization & Misc work	LS	1	20%	$1,320		
							$7,920
				OPCC Subtotal:	$709,952		
				20% Contingency:	$142,000		
				OPCC:	$851,952		
	Total Opinion of Probable Construction Costs:				**$851,952**		

Notes:

2. Quantities based on preliminary AutoCAD calculations.

JOB: Waitsfield Village Wastewater

PROJECT NO.: 227947
CALCULATED BY: SDS DATE: 5-23-23
CHECKED BY: JBA DATE: 5-26-23

SCENARIO 2 - VILLAGE WATER

NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein. DuBois & King, Inc. is not providing professional estimating services, and actual pay items and material quantities also may vary from the pay items and quantities included in this opinion of probable construction costs. DuBois & King, Inc. is not providing professional estimating services, and actual pay items and material quantities also may vary from the pay items and quantities included in this opinion of probable construction costs.

Project Cost Summary

PRELIMINARY OPINION OF PROBABLE PROJECT COST

Description		Amount	Notes
Preliminary OPCC	$	852,000	
Engineering Preliminary Design Phase Cost	$	30,400	Based on DWSRF Fee Allowance
Engineering Final Design Phase Cost	$	60,800	Based on DWSRF Fee Allowance
Engineering Construction Phase Cost	$	111,400	Based on DWSRF Fee Allowance
Legal/Fiscal Cost	$	8,600	
Administration Cost	$	8,600	1% of Construction costs
Sub-Total	$	1,071,800	
Total Project Capital Cost	**$**	**1,071,800**	

General Notes:
1. All estimated project cost amounts are rounded to the neared dollar
2. Total project capital cost is rounded up to the nearest thousands

POTENTIAL FUNDING TERMS & PROJECTED ERU COST

Description		Amount	Notes
Assumed Grant	$	-	
Assumed Planning Loan Forgiveness	$	-	
Balance for Loan Repayment	$	1,071,800	
Total Repayment on 30-year loan	$	1,437,000	
Annual Repayment on 30-year loan	$	47,900	
Loan Payment Cost per ERU	$	1,020	
Annualized Operation & Maintenance	$	3,243	
Total Annual Cost per ERU	$	1,089	47 ERUs

General Notes:
1. All project costs associated with loan terms and projected ERU cost amounts and totals are rounded up to the nearest dollar

APPENDIX W

JOB: Waitsfield Wastewater Feasibility Study

PROJECT NO.: 227947
CALCULATED BY: SDS DATE: 5-23-23
CHECKED BY: JBA DATE: 5-26-23

LCCA for Scenario 6: 30

NOTE: In providing opinions of probable construction costs, the Client understands that DuBois & King, Inc. has no control over the cost or availability of labor, equipment or materials, or over market conditions or the Contractor's methods of pricing, and that our Opinion of Probable Construction Costs are made on the basis of our professional judgment and experience. DuBois & King, Inc. makes no warranty, expressed or implied, that the bids or the negotiated costs of the Work will not vary from the Opinion of Probable Construction Cost provided herein. DuBois & King, Inc. is not providing professional estimating services, and actual pay items and material quantities also may vary from the pay items and quantities included in this opinion of probable construction costs.

Life Cycle Cost Analysis

Term of Analysis (Years): 30
Real Interest Rate: 0.5%

Capital Costs			
Description	**Amount**		**Notes**
Opinion of Probable Construction Cost	$	12,768,800	
Engineering Preliminary Design Phase Cost	$	199,418	Feasibility Study and PER
Engineering Final Design Phase Cost	$	709,300	
Engineering Construction Phase Cost	$	1,300,300	
Legal/Fiscal Cost	$	127,700	1% of construction cost
Land/Easement Acquisition	$	127,700	1% assumed allowance
Total Project Capital Cost	$	15,233,218	

O&M Costs				
Description	**Amount**		**Frequency**	**Notes**
Wastewater System Operator	$	60,000	Every Year	Advanced system
Allowance for Pump Replacement	$	60,000	15 Years	$15,000/PS
Sewer Engineering	$	5,000	Every Year	Annual Inspection
Buildings and Grounds Maintenance	$	4,000	Every Year	Assumed Allowance
Laboratory Testing/Samples	$	7,000	Every Year	Assumed Allowance
Solids Removal	$	18,000	Every Year	
Chemicals (Phosphorous Removal)	$	12,000	Every Year	Assumed Allowance
Treatment System/Leachfield Replacement/Repair	$	231,125	15 Years	12.5% CAPEX
Energy Usage	$	34,000	Every Year	
Total Present Worth of O&M Cost	$	4,382,700		

Salvage Value				
Description	**Amount**		**Frequency**	**Notes**
Collection System	$	6,106,100		
Treatment and Disposal System	$	1,001,400		
Analysis Term	$	7,107,500		

Total Net Present Value:	**$12,508,418**
Estimated ERUs at Capacity:	**404**
NPV/ERU:	**$30,960**

Notes:
1. 1 ERU = 210 gpd (design flow for a single family residence connected to a system >50,000 gpd)