SMMA

January 26, 2021

Mr. David R. Consigli
Chairman
Town of Milford - Zoning Board of Appeals (ZBA)
52 Main Street
Milford, MA

Re: The Residences at Stone Ridge - Phase II

Response to Sewer Department Comments *SMMA No. 19162*

Dear Mr. Consigli:

On behalf of our client, The Gutierrez Company (TGC), SMMA has prepared the response below to the Sewer Review letters prepared by Tata & Howard (T&H), dated September 28, 2020 and November 17, 2020. Attached with this letter are the requested pump system details including pump station calculations, pump technical data, and two exhibits showing the proposed 19,000-gallon emergency storage tank.

Per the suggestions in Tata & Howard's September 28, 2020 Sewer Review letter, we propose to eliminate the Upper Deer Street Pump Station and instead provide additional emergency storage at the Lower Deer Street Pump Station. The 8 ft and 10 ft diameter pump stations will remain (bottom of tanks = 284.13, pump range = 286.0 – 287.5). We propose a 19,000 gallon emergency storage tank beneath Deer Street connected to the original 8 ft diameter pump station with two equalization pipes. The equalization pipes and the proposed emergency storage tank bottom will be at upper pump range elevation = 287.5. The emergency storage tank will be located 10 ft from the water main and hydrant service. It will require realigning a short segment of the existing 6" force main around the proposed emergency tank. In the event the tank requires maintenance or cleaning, the tank will have two 24" diameter manhole access covers and there will be direct access from Deer Street. This storage tank will provide sufficient capacity for all of the remaining developable land.

We look forward to discussing this information with the Town of Milford Board of Sewer Commissioners and their consultant, Tata & Howard. If you have any questions, please feel free to contact me at 617-520-9210 or wpark@smma.com.

Very truly yours,

SMMA

William Park, PE
Senior Associate | Civil Engineer

cc: Israel Lopez - The Gutierrez Company, Peter Glick - SMMA, (MF)

enclosures: Pump Station Design Calculations and Exhibits

1000 Massachusetts Avenue
Cambridge, MA 02138
617.547.5400

www.smma.com

SMMA

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Stone Ridge
SMMA #19162
Date: 12/04/2020, Rev. 01/25/2021
Pump Station Design - Currently Proposed -w/Modified & New Pump Station Configuration

I. PUMP STATION DESIGN INFORMATION

Use	Quantity	Unit	Rate		GPD	Hours Op.	Adj. Max. Flow (GPM)	Peak Factor	Peak Flow (GPD)	Adj. Peak Flow (GPM)
Restaurant Depot	63,085	sq. ft.	50	per 1000 sq. ft.	3,154	12	4.38	3.0	9,463	13
Residences - Phase I	383	bedrooms	110	per bedroom	42,130	18	39.01	4.0	168,520	156
Residences - Phase II	460	bedrooms	110	per bedroom	50,600	18	46.85	4.0	202,400	187
Swimming Pool	104	persons	10	gpd/ person	1,040	18	0.96	4.0	4,160	4
I/I	1,450	li. ft.	200	gpd/idm	439	24	0.30	4.0	1,756	1
Future Development	Conceptual Design Flow				21,120	12	29.33	3.0	63,360	88
Total					**118,483**		**121**		**449,659**	**450**

B. High Point in Force Main (ft) = 304.00
Pump Off Elevation (ft) = 286.00
Elevation Head (ft) = 18.00

C. Force Main Velocity Check:

	Dia.(in) =	6
	Length (ft) =	2347
	Assumed Qpump (gpm) =	475
	Material =	PVC
*	Velocity (ft/s) =	5.39
	Hazen-Williams "C" value =	140

* *(3.00 ft/s < velocity <7.00 ft/s)*

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D. Minor Losses in Fittings "K" Value (Included in Total Equivalent Length)

Apparatus	Quantity	"K" Value	Quantity * K
Check Valve	1	1.80	1.80
Enlargement	0	0.10	0.00
90° Bend	4	0.54	2.16
6" Gate Valve	1	0.14	0.14
Tee Branch	0	1.08	0
Tee Through	0	0.36	0.00
45° Bend	8	0.29	2.32
22.5° Bend	0	0.24	0.00
Pipe Exit	1	1.00	1.00
		Total "K" =	7.42

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II. SYSTEM HEAD COMUTATIONS

Given:	Forcemain Diameter (in) =	6
	Length of Forcemain (ft) =	2347
	Hazen-Williams "C" Value =	140
	Minor Loss "K" Value =	7.42
	High Point Elevation (ft) =	304.00
	Pump Off Elevation (ft) =	286.00

Minor Headloss (Hm) = K*((V^2)/(2*G))
Friction Headloss (Hf) = 2.083 * (L/1000)^1.85 * (gpm^1.85 / dia^4.8655)
Static Headloss (Hstat) = Discharge Elevation - Pump Off Elevation
Total Dynamic Head (TDH) = Hm + Hf + Hstat

Q (gmp)	V (fps)	Hm (ft)	Hf (ft)	Hstat (ft)	TDH	
0	0.00	0.00	0.00	18.00	18.00	
25	0.28	0.01	0.17	18.00	18.17	
50	0.57	0.04	0.60	18.00	18.63	
75	0.85	0.08	1.26	18.00	19.35	
100	1.14	0.15	2.15	18.00	20.30	
125	1.42	0.23	3.25	18.00	21.48	
150	1.70	0.33	4.56	18.00	22.89	
175	1.99	0.45	6.06	18.00	24.51	
200	2.27	0.59	7.76	18.00	26.35	
225	2.55	0.75	9.65	18.00	28.40	
250	2.84	0.93	11.72	18.00	30.65	
275	3.12	1.12	13.98	18.00	33.10	
300	3.41	1.34	16.42	18.00	35.76	
325	3.69	1.57	19.04	18.00	38.61	
350	3.97	1.82	21.84	18.00	41.66	
375	4.26	2.09	24.82	18.00	44.90	
400	4.54	2.38	27.96	18.00	48.34	
425	4.83	2.68	31.28	18.00	51.96	
450	5.11	3.01	34.77	18.00	55.78	
475	5.39	3.35	38.43	18.00	59.78	Qpump
500	5.68	3.71	42.25	18.00	63.97	
525	5.96	4.09	46.25	18.00	68.34	
550	6.24	4.49	50.40	18.00	72.89	
575	6.53	4.91	54.72	18.00	77.63	
600	6.81	5.35	59.20	18.00	82.55	

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III. WETWELL DESIGN

A. Volume of Wetwell

$V = t * q / 4$

t = minimum cycle time (min)
q = peak flow (gpm)
V = volume (gal)

t =	15
q =	29
V =	109

B. Wetwell & Pump Elevations:

298.00	Top of Slab
290.00	Invert In
288.00	Lag Pump On & High Water Alarm
287.50	Lead Pump On
286.00	Pumps Off and Alternate
285.80	Low Water Alarm
284.80	Bottom Inside of Chamber

C. Effective Capacity of Wetwell Chamber:

	Wetwell A	Wetwell B
Inside Dia. (ft) =	8.00	10.00
X - Area (sf) =	50.3	78.5
Effective Capacity (gal) =	564	881

Total Capacity Wetwell A + Wetwell B = 1,445

D. Emergency Storage Capacity:

Wetwells A & B Above "Pump On" Elevation to Underside of Slab =	9,471	Gal.
Emergency Storage Tank (ID = 36'-5" L x 10'-0" W x 8'-0" H) Above "HWA" Elevation (288.0) to Underside of Tank Slab (296.0) =	20,645	Gal.
Total =	30,116	Gal.

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IV. WETWELL DETENTION TIMES

A. Time to Empty Wetwell (pump run start to stop)

T1 = Effective Capacity / (Qpump - Qin)

Effective Capacity (gal) =	1445
Pumping Rate (gpm) =	475
Max. Daily Flow (gpd) =	118,483
Peak Flow (gpm) =	450
Max. Daily Flow (gpm) =	121

1. No Inflow:	T1(min) =	3.04
2. Maximum Daily Inflow:	T1(min) =	4.08
3. Peak Inflow:	T1(min) =	57.03
4. 1/2 Of Pump Rate:	T1(min) =	6.09

B. Time to Fill Wetwell (pump off)

T2 = Effective Capacity - Qin

1. No Inflow:	T2(min) =	*N/A*
2. Maximum Daily Inflow:	T2(min) =	11.96
3. Peak Inflow:	T2(min) =	3.21
4. 1/2 Of Pump Rate:	T2(min) =	6.09

C. Cycle Time (pump start to start)

Tt = T1 + T2

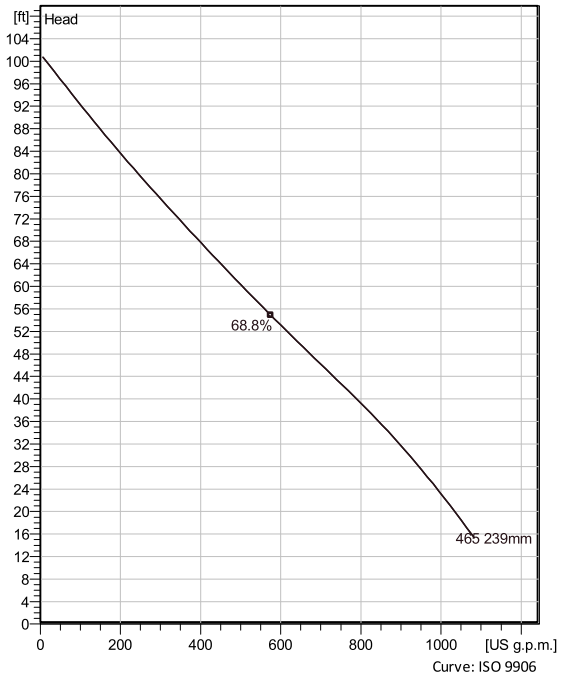
1. No Inflow:	Tt(min) =	*N/A*
2. Maximum Daily Inflow:	Tt(min) =	16.04
3. Peak Inflow:	Tt(min) =	60.24
4. 1/2 Of Pump Rate:	Tt(min) =	12.17

NP 3153 HT 3~ 465

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure ,39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Configuration

Motor number
N3153.830 21-15-4AS-W IE3 14hp

Installation type
P - Semi permanent, Wet

Impeller diameter
239 mm

Discharge diameter
4 inch

Pump information

Impeller diameter
239 mm

Discharge diameter
4 inch

Inlet diameter
150 mm

Maximum operating speed
1800 rpm

Number of blades
2

Max. fluid temperature
40 °C

Materials

Impeller
Hard-Iron ™

Project		**Created by**	Ian Belczyk	**Last update**	12/8/2020
Block		**Created on**	12/8/2020		

NP 3153 HT 3~ 465

Technical specification

Motor - General

Motor number N3153.830 21-15-4AS-W IE3 14hp	**Phases** 3~	**Rated speed** 1800 rpm	**Rated power** 14 hp
ATEX approved FM	**Number of poles** 4	**Rated current** 14 A	**Stator variant** 15
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 830			

Motor - Technical

Power factor - 1/1 Load 0.98	**Motor efficiency - 1/1 Load** 92.8 %	**Total moment of inertia** 1.96 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.97	**Motor efficiency - 3/4 Load** 92.7 %	**Starting current, direct starting** 129 A	
Power factor - 1/2 Load 0.96	**Motor efficiency - 1/2 Load** 91.2 %	**Starting current, star-delta** 43 A	

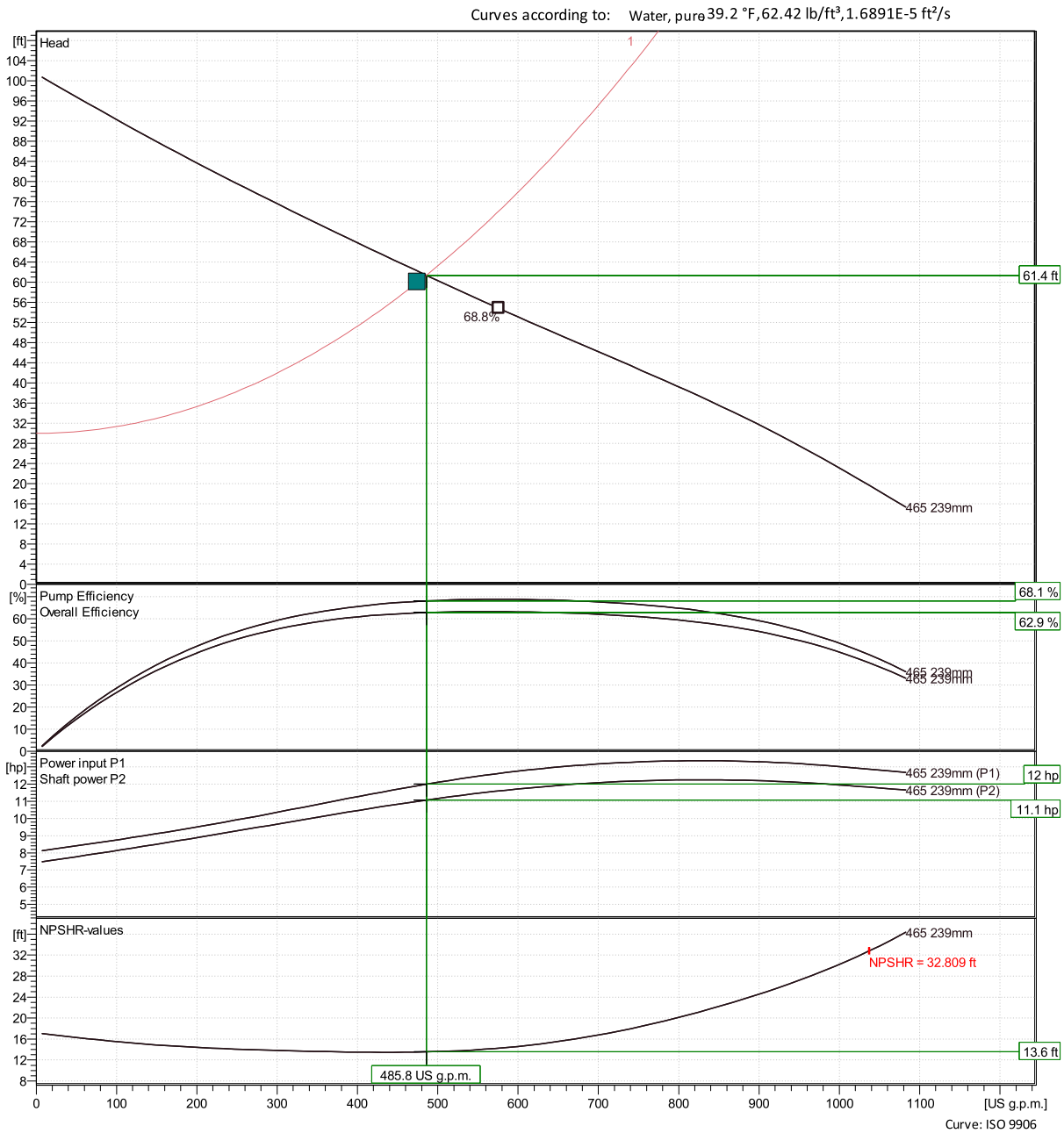
Project		**Created by**	Ian Belczyk	**Last update**	12/8/2020
Block		**Created on**	12/8/2020		

NP 3153 HT 3~ 465

Performance curve

Duty point

Flow	Head
486 US g.p.m.	61.4 ft



Project		**Created by**	Ian Belczyk	**Last update**	12/8/2020
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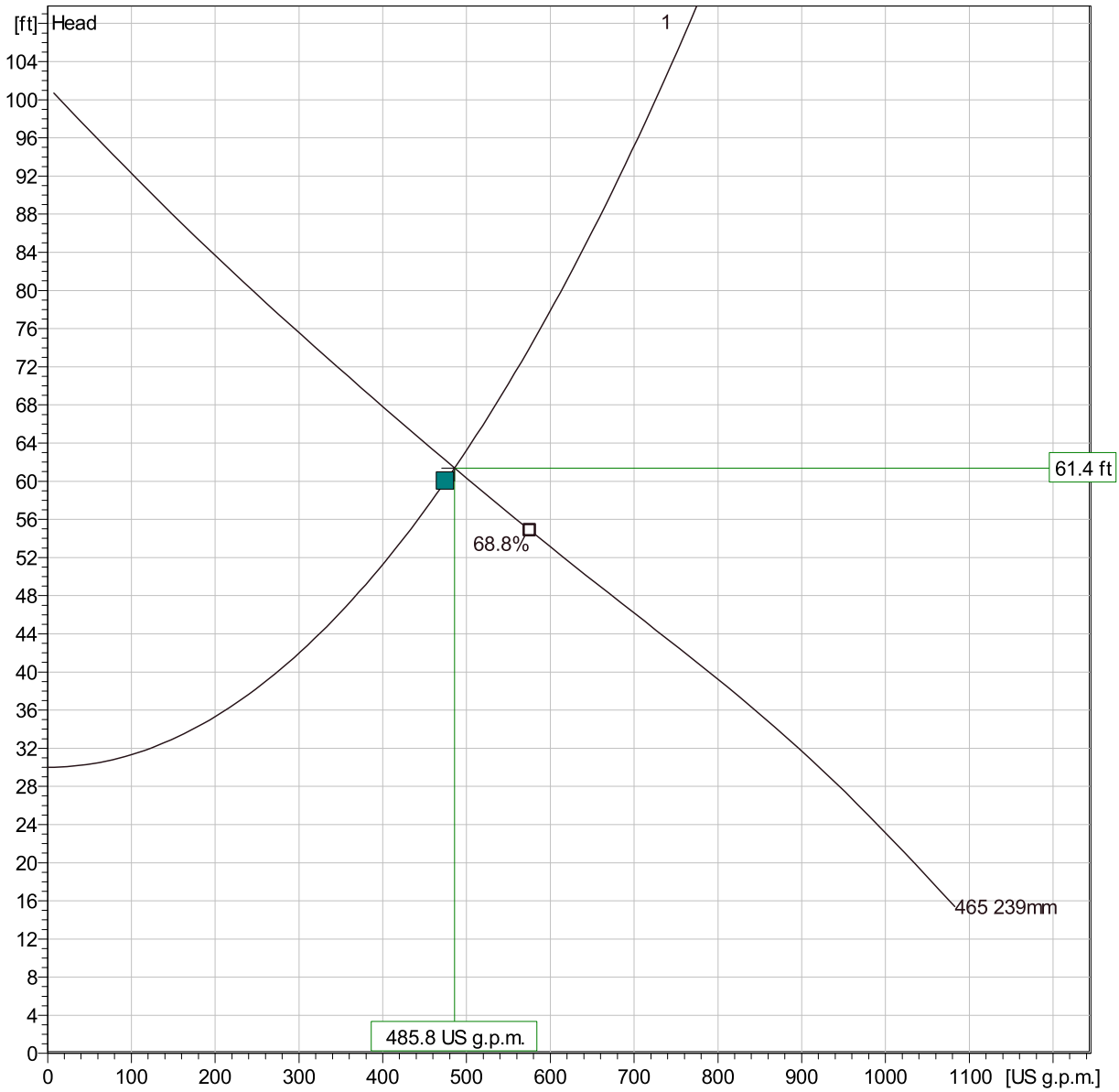
NP 3153 HT 3~ 465

Duty Analysis

Curves according to: Water, pure ,39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	486 US g.p.m.	61.4 ft	11.1 hp	486 US g.p.m.	61.4 ft	11.1 hp	68.1 %	307 kWh/US M(	13.6 ft

Project		**Created by**	Ian Belczyk	**Last update**	12/8/2020
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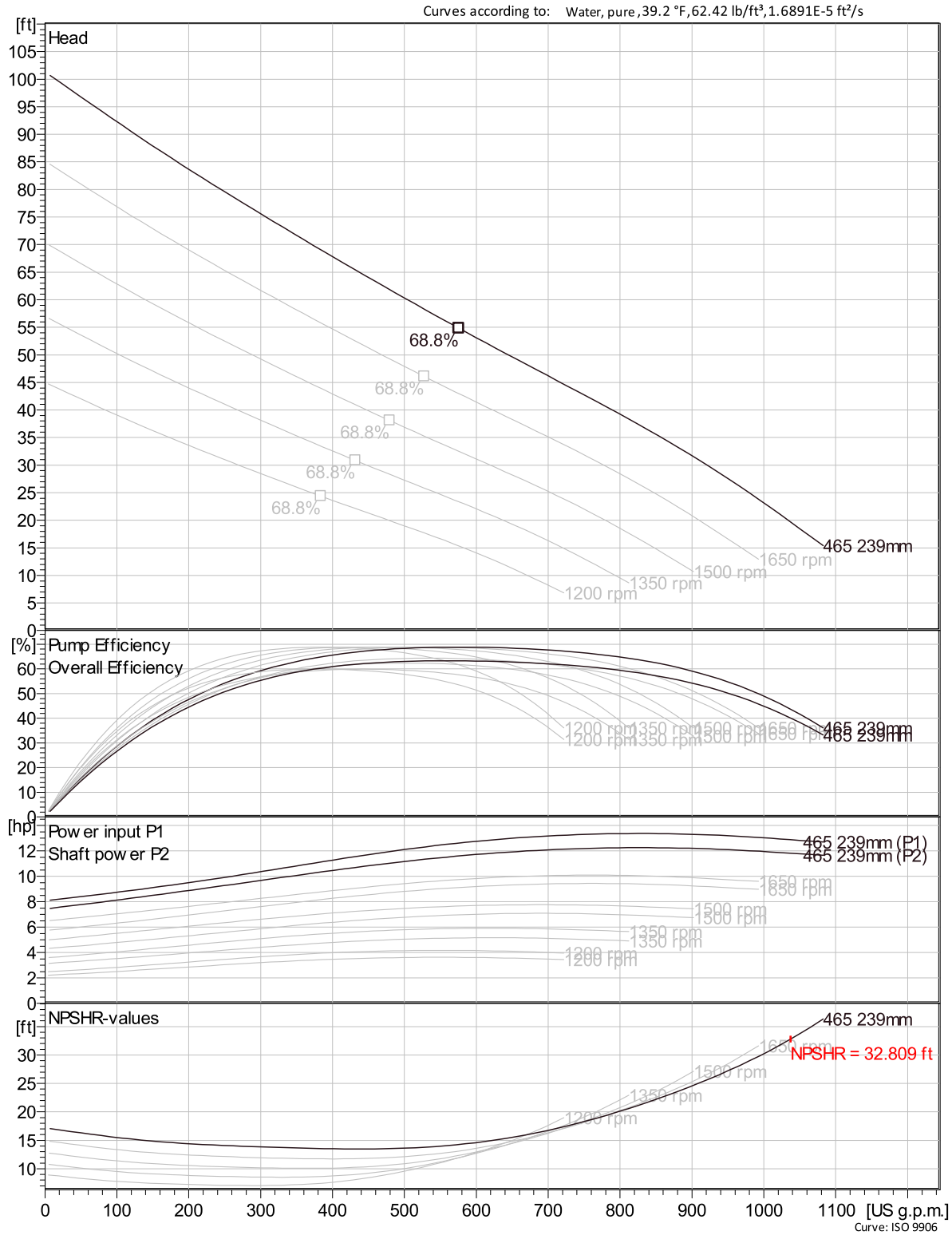
NP 3153 HT 3~ 465

VFD Curve

FLYGT
a xylem brand



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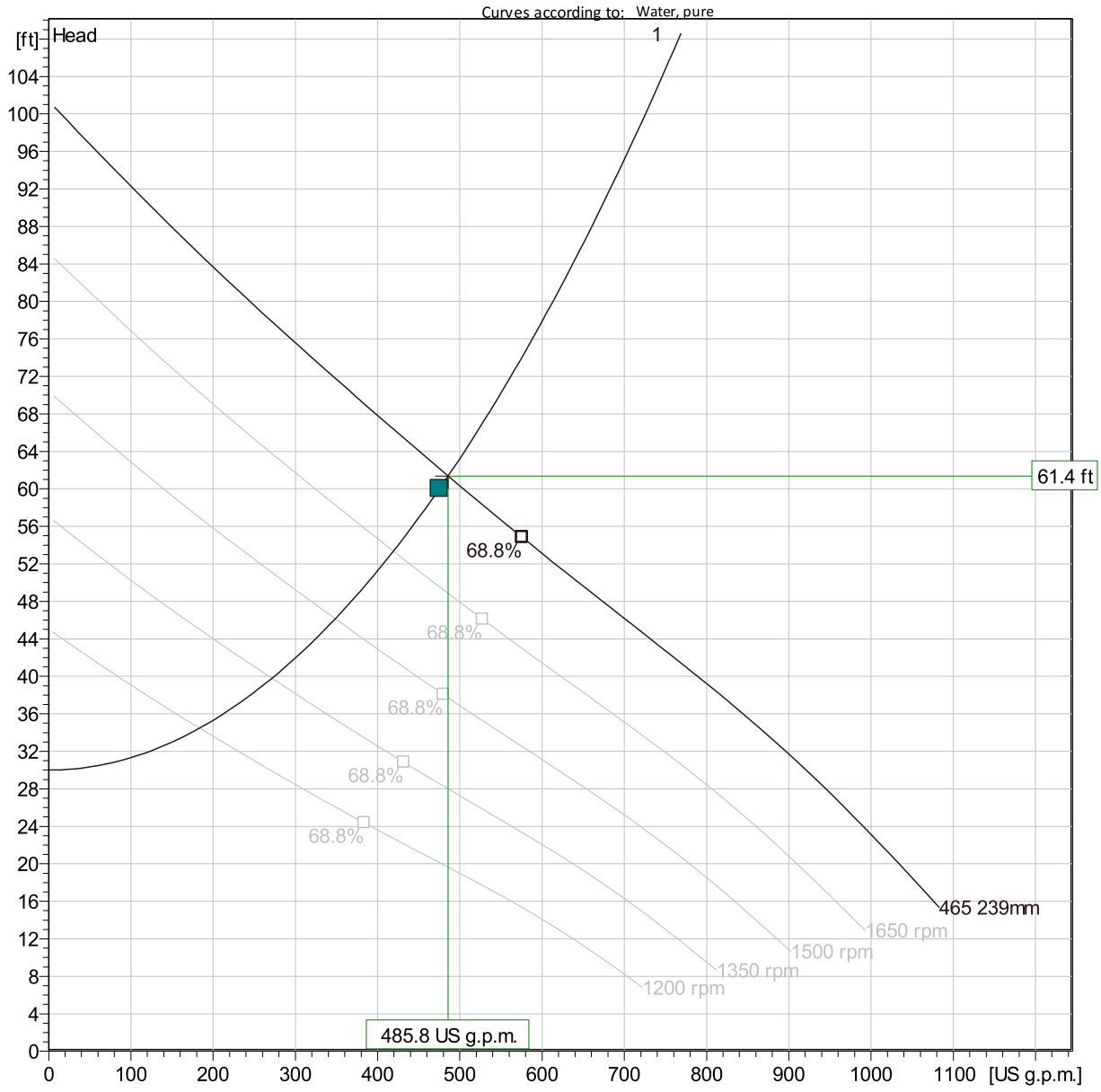
Block		**Created on**	12/8/2020		

NP 3153 HT 3~ 465

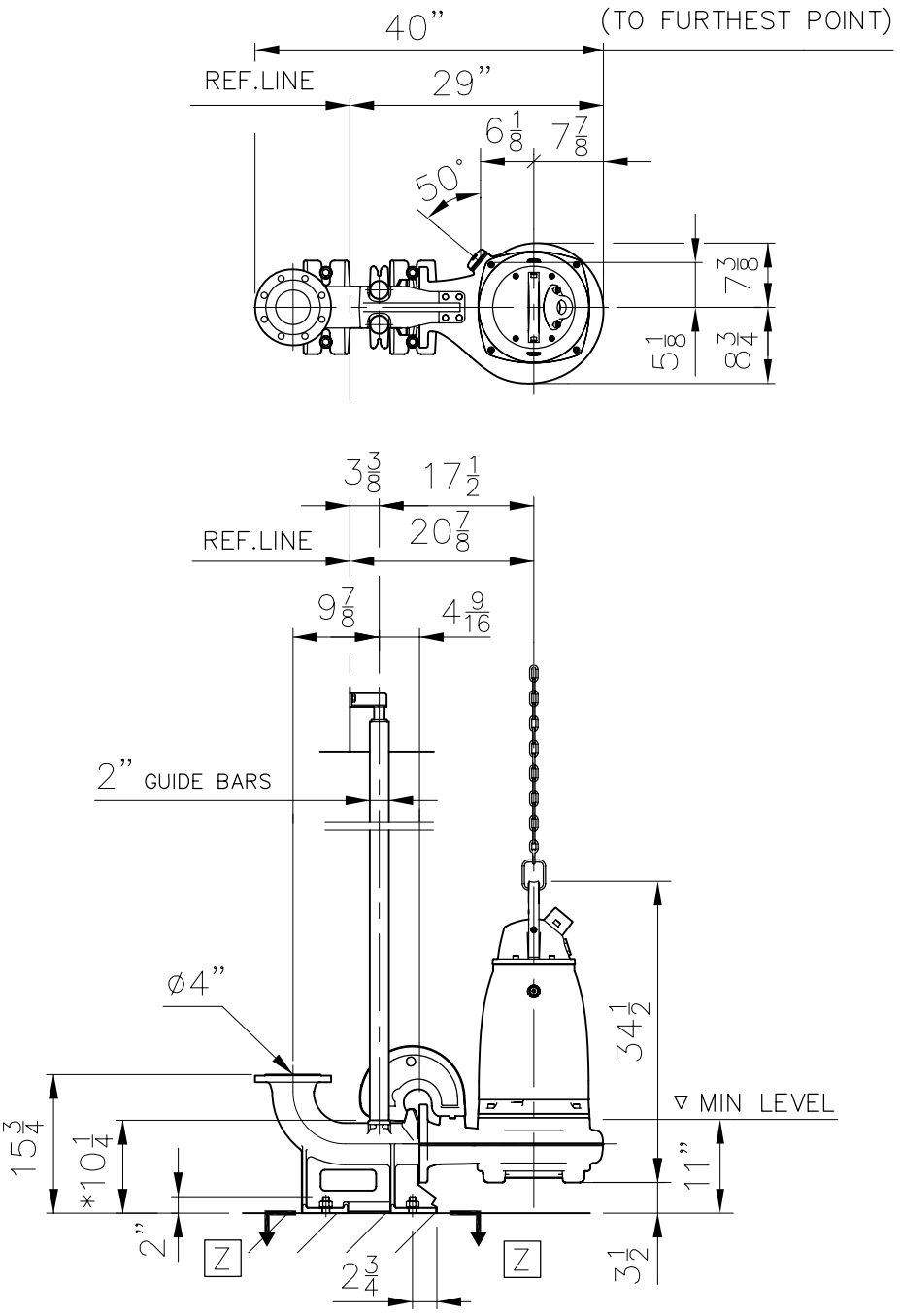
VFD Analysis



Operating characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific Energy	NPSHre
1	60 Hz	486 US g.p.m.	61.4 ft	11.1 hp	486 US g.p.m.	61.4 ft	11.1 hp	68.1 %	307 kWh/US M	13.6 ft
1	55 Hz	419 US g.p.m.	53.4 ft	8.38 hp	419 US g.p.m.	53.4 ft	8.38 hp	67.5 %	267 kWh/US M	11.7 ft
1	50 Hz	348 US g.p.m.	46.1 ft	6.13 hp	348 US g.p.m.	46.1 ft	6.13 hp	66.3 %	245 kWh/US M	10.1 ft
1	45 Hz	271 US g.p.m.	39.8 ft	4.29 hp	271 US g.p.m.	39.8 ft	4.29 hp	63.7 %	227 kWh/US M	8.59 ft
1	40 Hz	183 US g.p.m.	34.5 ft	2.81 hp	183 US g.p.m.	34.5 ft	2.81 hp	57 %	216 kWh/US M	7.29 ft

Project		**Created by**	Ian Belczyk	**Last update**	12/8/2020
Block		**Created on**	12/8/2020		



* DIMENSION TO ENDS OF GUIDE BARS

Weight (lbs)	
Pump	Disch
465	95

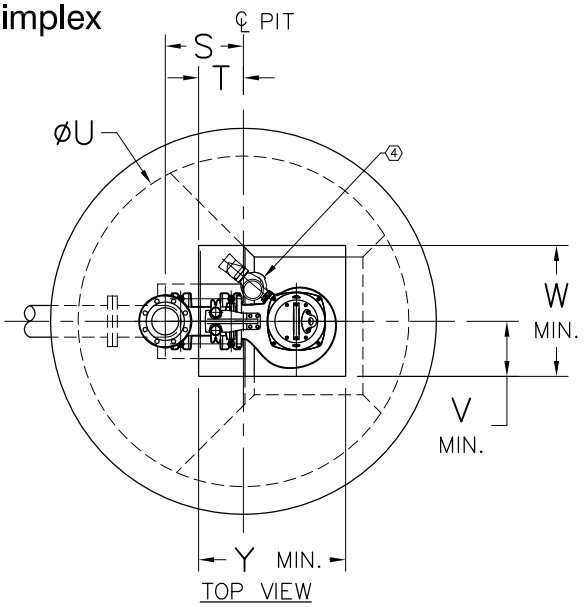
FLYGT AUTOCAD DRAWING	Denomination: Dimensional drwg NP,FP 3153 HT ø4”	Drawn by NK	Checked by SB	Date 081013
		Scale		Reg no 5399
		6504500		11

FP/NP-3153

NOTES:

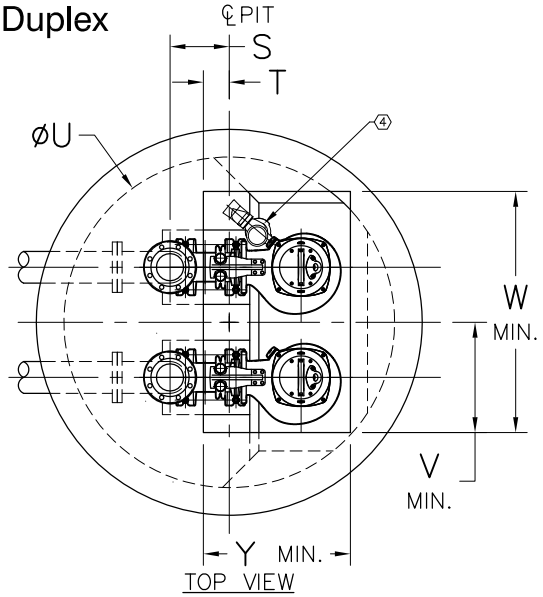
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. ITT FLYGT MIX-FLUSH VALVE.

Simplex

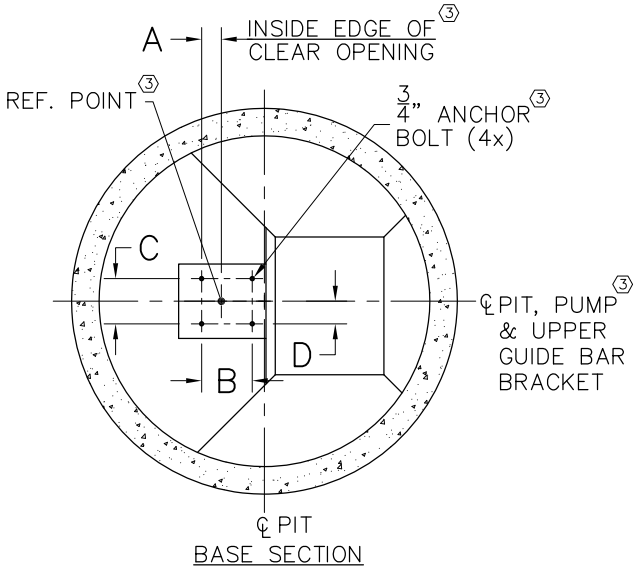


TOP VIEW

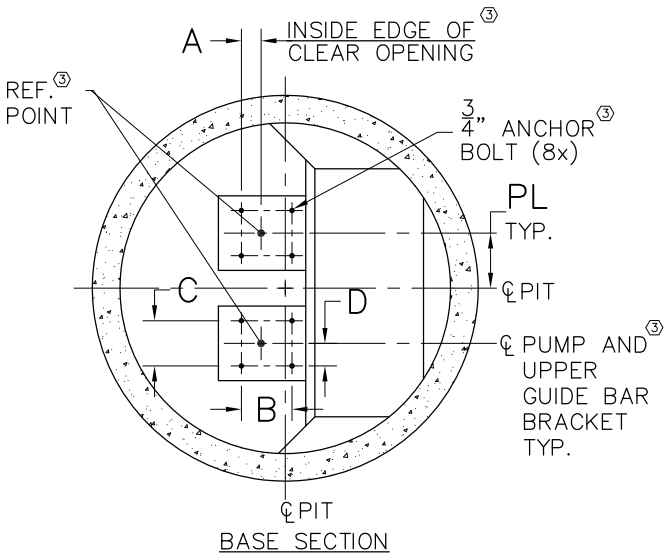
Duplex



TOP VIEW



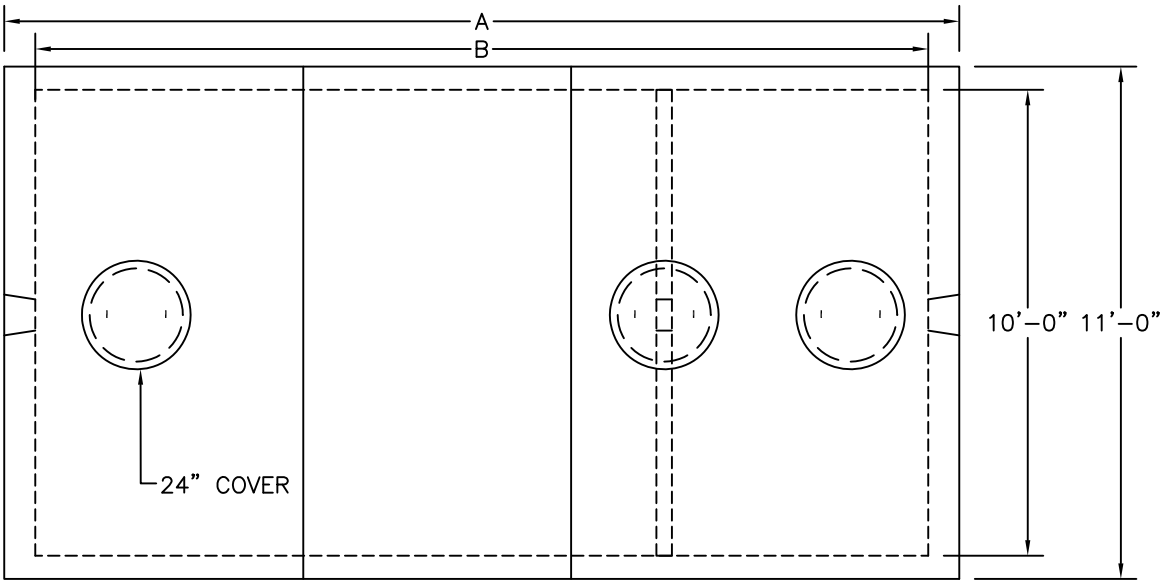
BASE SECTION



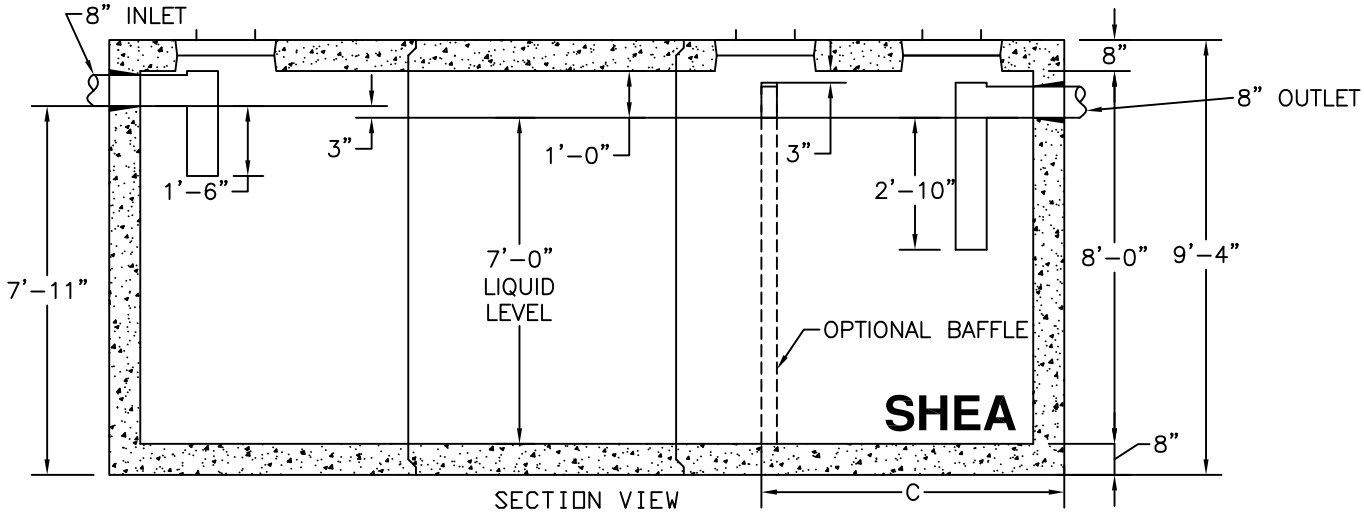
BASE SECTION

ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
FP/NP	3"	SH	2½	9⅞	8	4	21¼	15¼	72	9	27	29½	18⅜	12⅜	72	11	20	49	29½
FP/NP	4"	SH	2¾	9⅞	8	4	19¾	13¼	72	9	27	29½	16½	10	72	11	20	49	29½
FP/NP	4"	HT	2¾	9⅞	8	4	19¾	13¼	72	11	27½	30½	16½	10	72	11	22	49½	30½
FP/NP	6"	MT	4⅛	11	10	5	17⅜	9¾	72	12	28½	32	12⅝	5¼	72	12	24	52½	32
NP	8"	LT	5½	11	10	5	14¼	5⅜	72	14	30½	35	16½	7⅝	84	13	27	56½	35
NP	10"	LT	14⅛	19¾	10	5	23¾	13	96	16½	35½	40	16¾	6	96	18	34½	71½	40

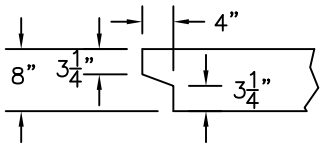


PLAN VIEW



SECTION VIEW

TYPICAL BOLT CONNECTION



TYPICAL JOINT DETAIL

GALLONS	A (LENGTH)	B (LENGTH)	C (BAFFLE)	WEIGHT
13,000	26'–3"	24'–11"	9'–0"	103,950#
14,000	28'–2"	26'–10"	9'–0"	110,386#
15,000	30'–1"	28'–9"	9'–8"	116,822#
16,000	32'–0"	30'–8"	10'–8"	123,258#
17,000	33'–11"	32'–7"	10'–11"	129,694#
18,000	35'–10"	34'–6"	11'–7"	136,130#
19,000	37'–9"	36'–5"	12'–2"	142,566#
20,000	39'–8"	38'–4"	12'–10"	149,002#
21,000	41'–7"	40'–7"	13'–5"	155,438#
22,000	43'–6"	42'–2"	14'–1"	161,874#
23,000	45'–5"	44'–1"	14'–4"	168,310#
24,000	47'–4"	46'–0"	14'–4"	174,746#

NOTES:

1. CONCRETE: 5,000 PSI MINIMUM AFTER 28 DAYS.
2. DESIGN CONFORMS WITH 310 CMR 15.00, DEP TITLE 5 REGS, FOR SEPTIC TANKS.
3. ALL REINFORCEMENT PER ASTM A–615
4. DESIGNED H–20 LOADING, 2 TO 5 FEET COVER.
5. TEES AND BAFFLES SOLD SEPARATELY.
6. TONGUE AND GROOVE JOINT SEALED WITH BUTYL RESIN AND BOLTED WITH 3/4" DIA BOLTS.

SHEA CONCRETE PRODUCTS
New England's Premier Precaster
800–696–7432 (SHEA)
www.sheaconcrete.com

773 Salem Street
P.O. Box 520
Wilmington, MA 01887

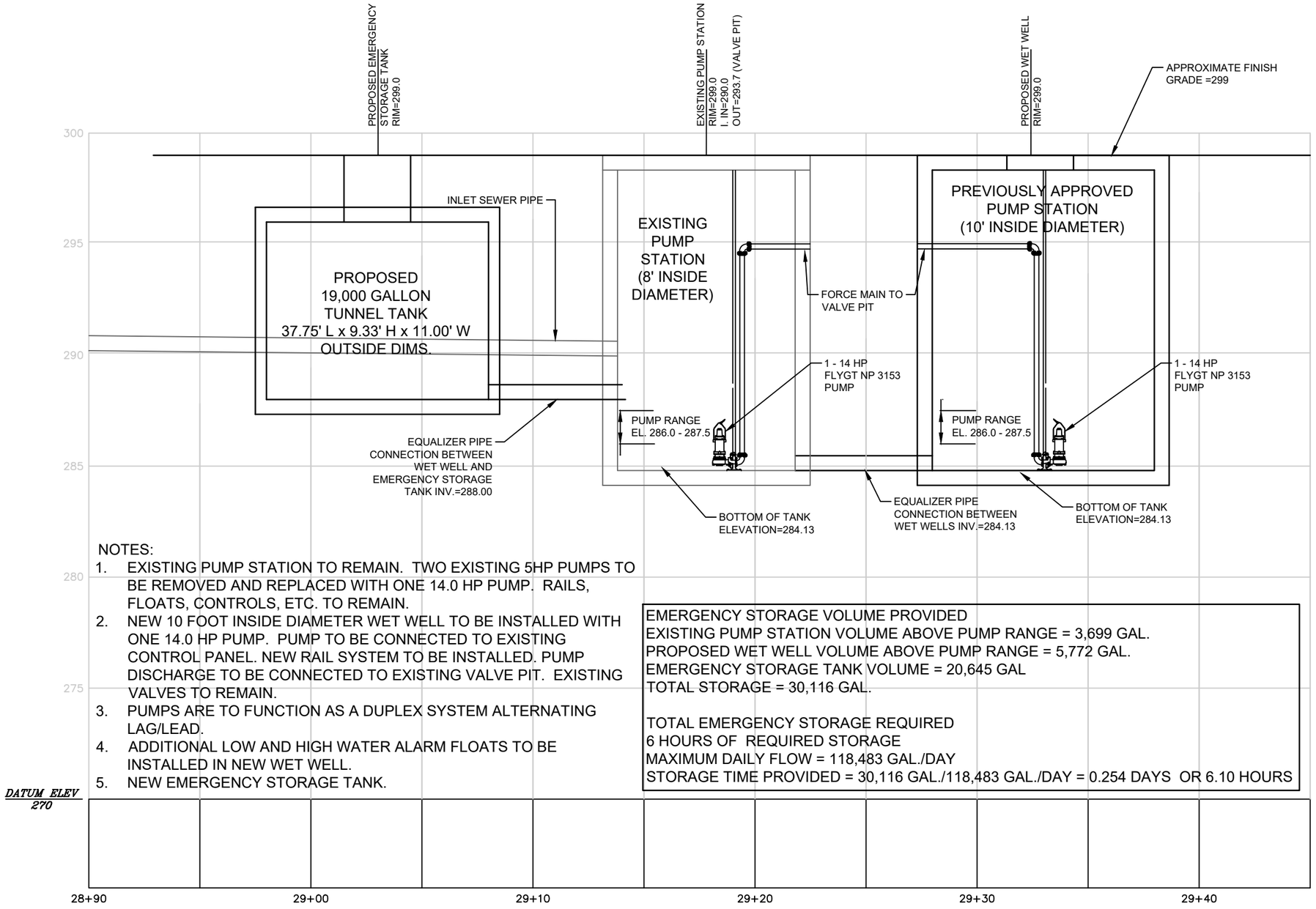
87 Haverhill Road
P.O. Box 807
Amesbury, MA 01913

160 Old Turnpike Road
Nottingham, NH 03290

TUNNEL TANK
13,000 GALLON AND UP

tunneltank.dwg 10/31/2003

NPCA CERTIFIED PLANT



NOTES:

1. EXISTING PUMP STATION TO REMAIN. TWO EXISTING 5HP PUMPS TO BE REMOVED AND REPLACED WITH ONE 14.0 HP PUMP. RAILS, FLOATS, CONTROLS, ETC. TO REMAIN.
2. NEW 10 FOOT INSIDE DIAMETER WET WELL TO BE INSTALLED WITH ONE 14.0 HP PUMP. PUMP TO BE CONNECTED TO EXISTING CONTROL PANEL. NEW RAIL SYSTEM TO BE INSTALLED. PUMP DISCHARGE TO BE CONNECTED TO EXISTING VALVE PIT. EXISTING VALVES TO REMAIN.
3. PUMPS ARE TO FUNCTION AS A DUPLEX SYSTEM ALTERNATING LAG/LEAD.
4. ADDITIONAL LOW AND HIGH WATER ALARM FLOATS TO BE INSTALLED IN NEW WET WELL.
5. NEW EMERGENCY STORAGE TANK.

EMERGENCY STORAGE VOLUME PROVIDED
EXISTING PUMP STATION VOLUME ABOVE PUMP RANGE = 3,699 GAL.
PROPOSED WET WELL VOLUME ABOVE PUMP RANGE = 5,772 GAL.
EMERGENCY STORAGE TANK VOLUME = 20,645 GAL
TOTAL STORAGE = 30,116 GAL.

TOTAL EMERGENCY STORAGE REQUIRED
6 HOURS OF REQUIRED STORAGE
MAXIMUM DAILY FLOW = 118,483 GAL./DAY
STORAGE TIME PROVIDED = 30,116 GAL./118,483 GAL./DAY = 0.254 DAYS OR 6.10 HOURS

SMMA
SYMMES MAINI & McKEE ASSOCIATES
1000 Massachusetts Avenue
Cambridge, Massachusetts 02138
P:617.547.5400 F:617.648.4920

STONE RIDGE

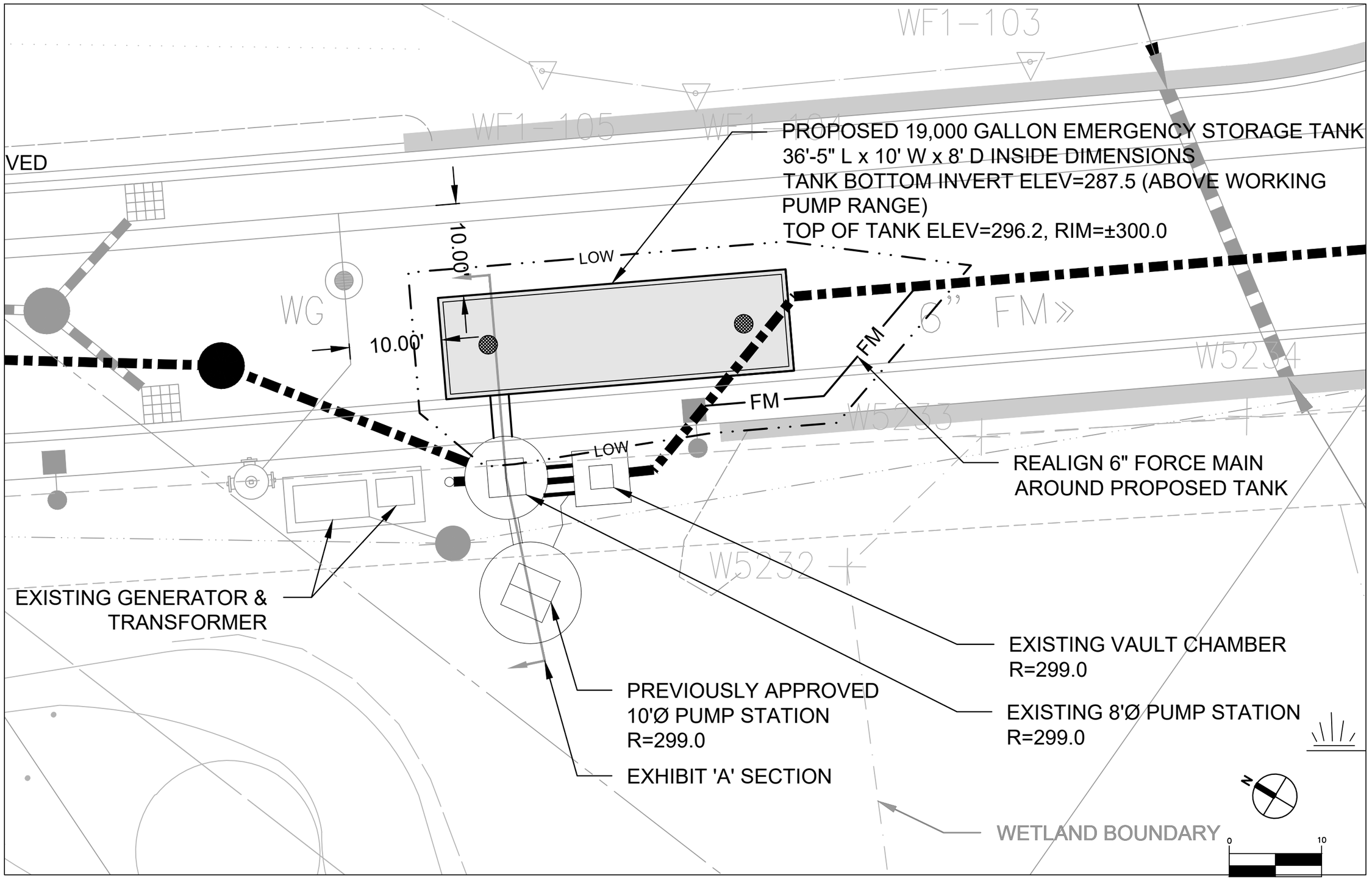
DEER STREET
MILFORD, MA

JOB NO.: 19162.00

DATE: 01/26/2021
ISSUE:
SCALE: 1"=5'
REF:
DR BY: PSG
CK BY: CHK

EXHIBIT A

SECTION THROUGH LOWER DEER STREET EXISTING PUMP STATION PROPOSED WET WELL, AND EMERGENCY STORAGE TANK



SMMA
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STONE RIDGE

DEER STREET
MILFORD, MA

JOB NO.: 19162.00

DATE:	01/26/2021
ISSUE:	
SCALE:	1"=10'
REF:	
DR BY:	WWP
CK BY:	PG

EXHIBIT C

CONCEPTUAL SITE PLAN - LOWER DEER STREET PUMP STATION PROPOSED EMERGENCY STORAGE TANK