

Norfolk Water System Subdivision Review

Subdivision Name: Lakeland Hills Townhouse Community

Owner: Lakeland Hills, LLC
136 Seekonk Street
Norfolk, MA 02056

Engineer: Andrews Surveying & Engineering, Inc.
104 Mendon Street
Uxbridge, Massachusetts 01569

Reviewed By: Ryan Allgrove, P.E.
Alex Richards, P.E.

Date: September 12, 2019

At the request of the Norfolk Department of Public Works, Environmental Partners (EP) has completed an assessment of the future potential water system hydraulics associated with the proposed Lakeland Hills Townhouse Community (LHTC) residential development. The LHTC is located in the northeast area of Norfolk within the parcel of 150 Seekonk Street. This assessment is based on subdivision plans prepared by Andrews Surveying & Engineering, Inc. dated July 25, 2019.

Water Demand

The proposed LHTC residential development consists of seventy developable residential lots; which will represent ninety-six units needing new service connections to the existing distribution system. The following table summarizes the estimated water usage for the development based on information from the Town's recent DEP Annual Statistical Reports (ASR).

Usage Scenario	Calculation	Estimate Usage
Average Day Demand (ADD)	154 gpd / residential service x 96 Units	14,784 gpd
Maximum Day Demand (MDD)	2.2 x ADD	32,525 gpd
Peak Hour Demand (PHD)	2 x MDD	45 gpm

Static Pressure Requirements

Based on DEP Guidelines and Policies for Public Water Systems, the normal working pressure in the distribution system should be approximately 60 pounds per square inch (psi) and not less than 35 psi. The hydraulic grade line (HGL) for the Norfolk water system fluctuates between 365 feet (USGS Datum) when the tanks are full to 355 feet when the water level in the tanks is down 10 feet. In order to maintain a minimum pressure of 35 psi at a HGL of 365 feet, a water customer must be connected to the water system at an elevation no higher than 284 feet (USGS datum). Elevations greater than 284 feet will result in static pressures less than the DEP required pressure of 35 psi.

A review of the plans provided with the proposed LHTC residential development plans indicates that the proposed dwellings will meet minimum DEP pressure requirements. During typical water system operations, the proposed dwellings will experience pressures from 48 to 72 psi (based on proposed top of concrete elevations in NAVD 88 datum).

Fire Flow Requirements

In accordance with DEP Guidelines and Policies for Public Water Systems, water systems shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow, including fire flow. The Norfolk water system hydraulic computer model was used to calculate the available fire flow at the proposed hydrant at station 8+00 (highest elevation) along the access road to the development. Based on the proposed distribution system network with 8-inch piping, the available fire flow was calculated to be approximately 1,200 gpm with 20 psi residual pressure. A schematic diagram of the modeled network is provided in Figure 1. Fire flow guidelines set forth by the Insurance Services Office (ISO) for one and two family dwellings are summarized in the following table:

ISO Needed Fire Flows (one and two family dwellings)

Distance between Dwellings (feet)	Needed Fire Flow (gpm)
Greater than 30	500
21 – 30	750
11 – 20	1000
0 – 10	1500

Based on the proposed residential spacing of the proposed development, the project represents a fire flow requirement of 1,000 gallons per minute (gpm). Actual fire flow requirements should be confirmed by the developer.

Water System Materials

All water system materials shall be as per DPW specifications (latest version). Water mains to be 8-inch ductile iron pipe, class 52, conforming to AWWA C150 and AWWA C151, push on type joints with gaskets conforming to AWWA C111, double cement lined inside conforming to AWWA C104, and asphalt seal coated outside (coal tar coated outside conforming to AWWA 203 in areas where groundwater levels are above the pipe laying depth). All pipe fittings shall be ductile iron, class 350 mechanical joint conforming to AWWA C153. All fittings shall be restrained with Megalug Series 1100. Water mains shall have a minimum of five feet of cover. All gate valves shall be US Pipe Metroseal 250 or American Flow Control Model AFC2500 resilient wedge seated valves conforming to AWWA C-509, open left. Hydrants shall be American Darling (American Flow Control) B62B open right, conforming to AWWA C-502 (Dry Barrel Hydrants) and painted red.

Water service pipe shall be 1" polyethylene tubing, PE4710 with tracer wire. Copper tubing shall not be used. Corporation valves shall be Mueller 300 ball type with Mueller "CC" inlet thread and pack joint connection outlet. Curb stops shall be Mueller Mark II Oriseal Curb Valve Model P-15219N.

All material specifications shall be submitted to the Norfolk DPW for review and approval prior to installation.

Pressure Testing and Chlorination

Water mains shall be tested at minimum of 150 psi or 150% of the static pressure (whichever is greater) for a minimum of two hours. Water mains will have an allowable leakage determined by the DPW. Water mains shall be chlorinated as per AWWA standards with a minimum of 48 hours of contact time. Water mains shall be flushed until chlorine has been eliminated and sampled for total coliform by the DPW. The main shall be tested again after 24 hours of contact time with non-chlorinated water by the DPW.

Distribution System Piping

The water system of the proposed subdivision was also reviewed for discontinuities, looping, valve, and hydrant placement. Comments on the attached plans should be reviewed by the developer and responses should be provided to the Town. Shutdowns shall be limited to 4 hours and shall be coordinated with the Town's Department of Public Works.

Recommendations

The Norfolk water distribution system can provide acceptable pressures to the proposed LHTC residential development. It is not anticipated that pressures will fluctuate significantly during high usage periods. In addition, hydraulic modeling results indicate that the Norfolk water system can narrowly provide fire flows typically considered adequate for similar residential areas. Actual fire flow requirements for the development should be confirmed by the developer. It is recommended that a fire flow test be performed near the development entrance to confirm the model results.

The LHTC residential development will increase the water system demand for the Town of Norfolk by approximately 14,784 gpd representing approximately 10.4% of the new services that the system can support through 2029 under the Town's existing Water Management Act permit, as described in EP's 2017 Water Supply Assessment report. As described in the 2017 Report, EP recommends that the Town continue to pursue development of a new water supply source to meet projected future demands and minimize Norfolk's dependence on existing interconnections with the communities of Wrentham and Franklin.

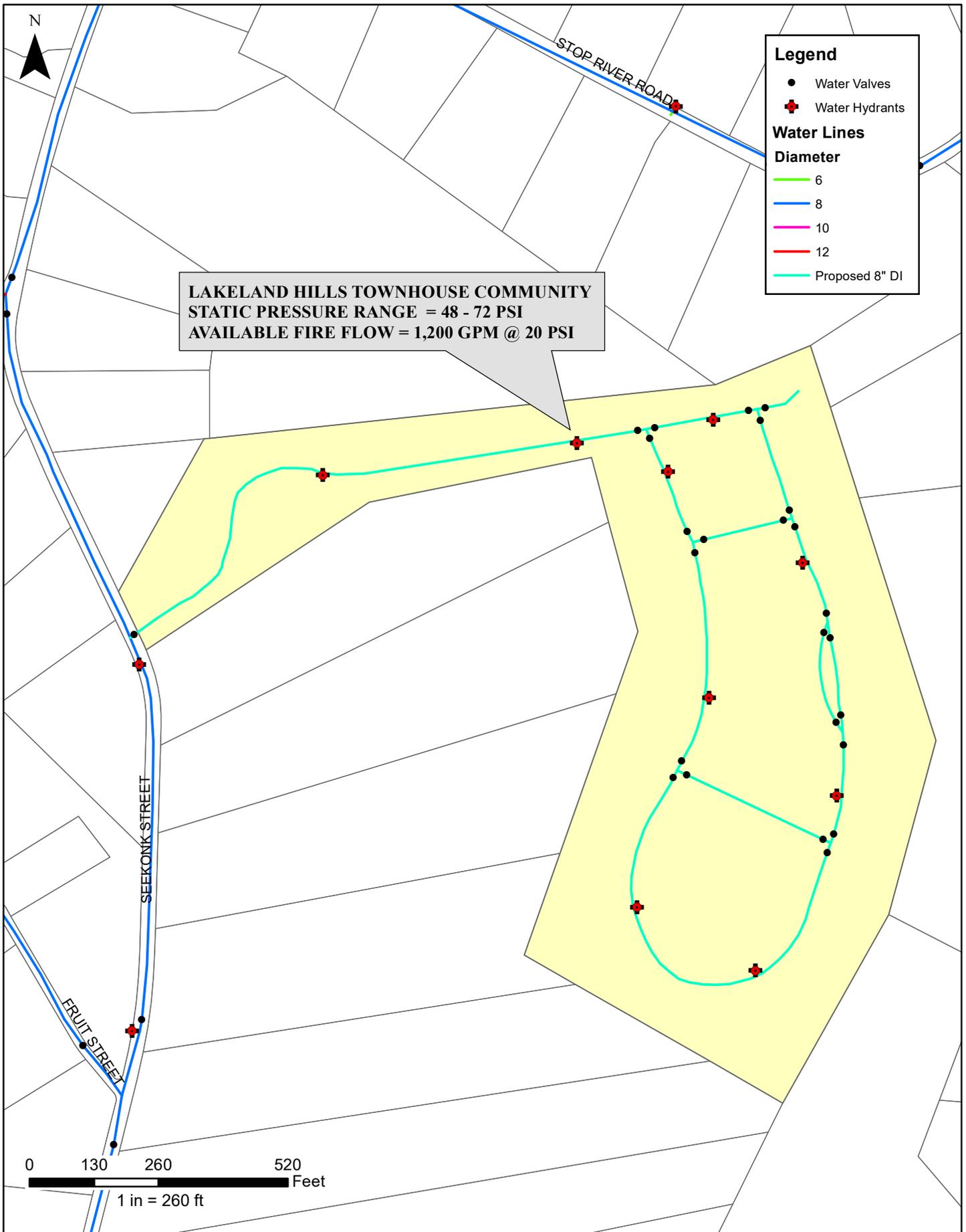
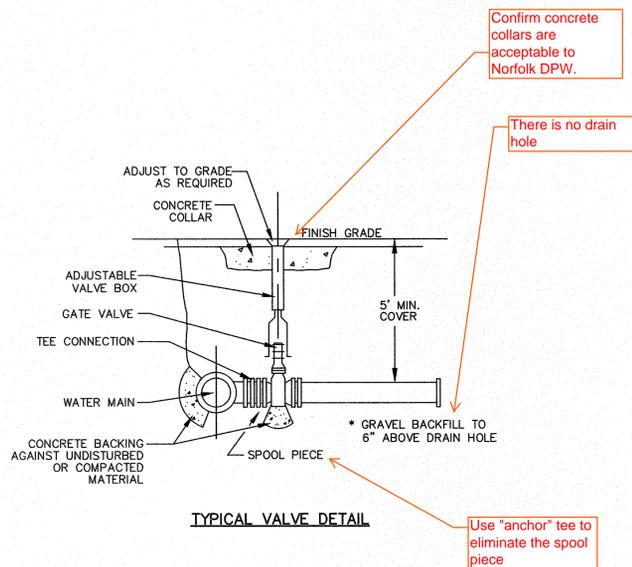
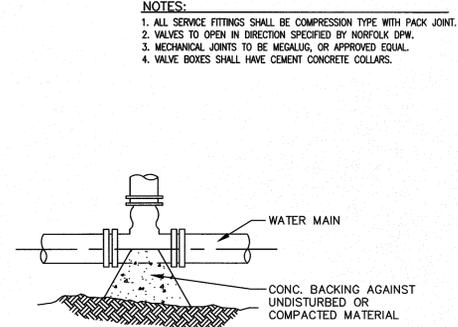


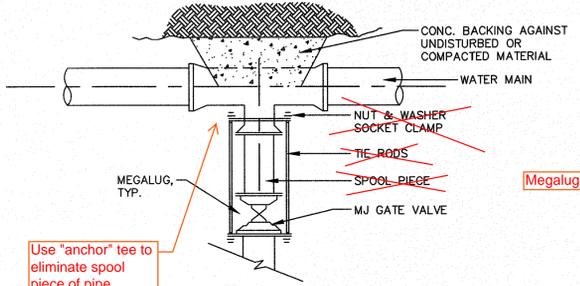
FIGURE 1
LAKELAND HILLS
TOWNHOUSE COMMUNITY
SEPTEMBER 12, 2019



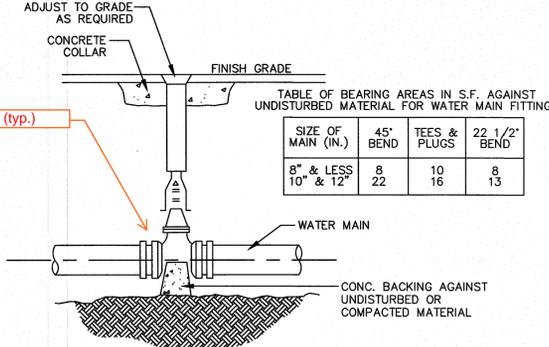
TYPICAL VALVE DETAIL



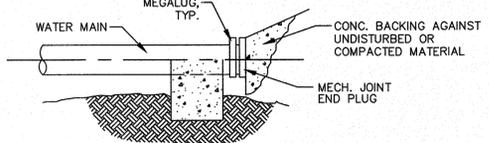
TYPICAL TEE



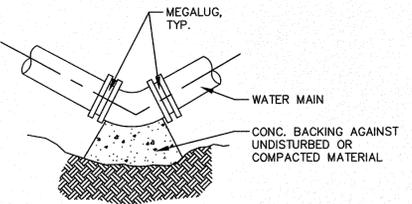
TYPICAL VALVE CONNECTION - RESTRAINED JOINT TEE



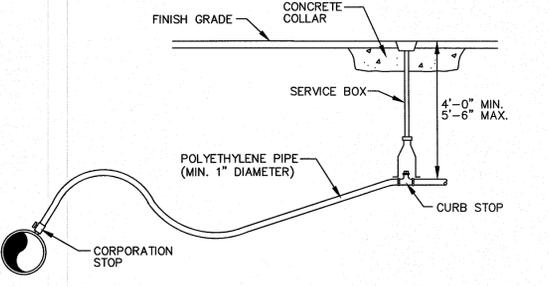
TYPICAL VALVE



TYPICAL PLUG DETAIL



TYPICAL BEND DETAIL

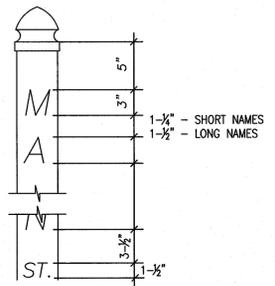


TYPICAL WATER SERVICE DETAIL

NOTE:
WATER APPURTENCIS TO CONFORM WITH LOCAL WATER COMPANY SPECIFICATIONS.

1 TYPICAL WATER SUPPLY DETAILS
SCALE: N.T.S.

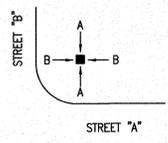
- MATERIAL - POST AND CAP:
- NOMINAL 5" x 5" SQUARE SECTION POST
 - MATCHING GOTHIC CAP
 - WHITE 100% VIRGIN VINYL WITH TITANIUM DIOXIDE CONTENT FOR UV PROTECTION
 - 0.200 IN. WALL THICKNESS
 - AS MANUFACTURED BY KROY BUILDING PRODUCTS, INC. OR APPROVED EQUAL
 - JOIN CAP TO POST WITH CLEAR PVC SOLVENT CEMENT MEETING ASTM D-2584



NOTES:
1. DIG HOLE WITH APPROPRIATELY SIZED POST HOLE DIGGER OR AUGER.
2. POST MUST BE SET PLUMB.
3. BACKFILL IN LIFTS OF NO MORE THAN 6". TAMP EARTH LIFT THOROUGHLY.

- LETTERING:
- HELvetica MEDIUM STYLE
 - VINYL - FOR EXTERIOR USE
 - PRESSURE SENSITIVE ADHESIVE
 - REFLECTIVE BLACK
 - STREET NAME - 3" HIGH LETTERS
 - DESIGNATION (ST, DR, ETC) 1-1/2" HIGH

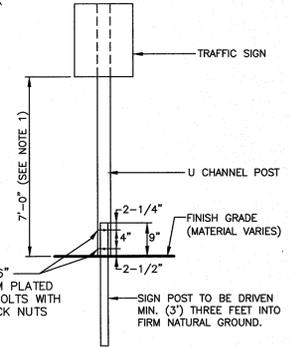
- DESIGNATION ABBREVIATIONS:
- STREET * ST
 - DRIVE * DR
 - WAY * WAY
 - LANE * LA
 - ROAD * RD
 - TERRACE * TER
 - TRAIL * TR
 - PATH * PATH
 - AVENUE * AVE
 - BOULEVARD * BLVD
- SUBMIT OTHERS FOR APPROVAL
NO PERIODS USED



- PULL UP DETERRANT:
- STAINLESS STEEL EYEBOLTS AND NUTS
 - SNUG NUTS ONLY - DO NOT OVERTIGHTEN
 - DRIVEN 1/2" REBAR 2 FOOT MINIMUM LENGTH

2 TYPICAL STREET SIGN
SCALE: N.T.S.

- NOTES:
- SEE TRAFFIC CONTROL SCHEDULE FOR EXACT MOUNTING HEIGHT.
 - CHANNEL POST SECTIONS TO BE CONNECTED WITH AT LEAST TWO(2) APPROPRIATELY SIZED GALVANIZED BOLTS W/ LOCK WASHERS AND NUTS.



3 TYPICAL BREAKAWAY SIGN POST DETAIL
SCALE: N.T.S.

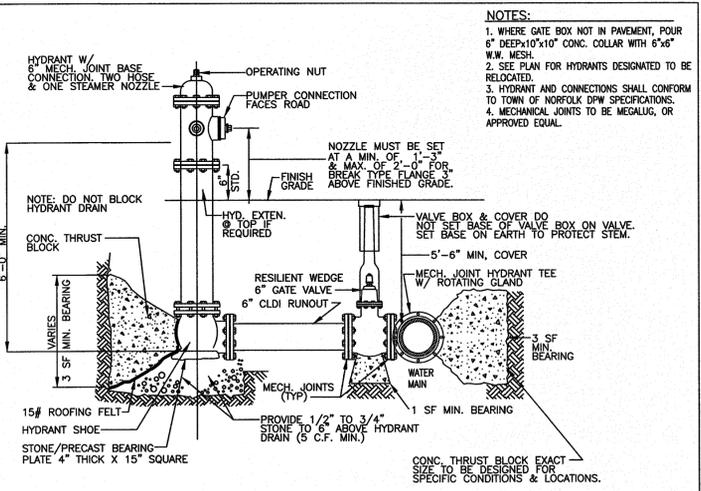
SIGN NO.	SIGN	SIZE AND COLOR
R1-1	STOP	30"x30"; WHITE ON RED
D-3	STREET NAME	6" X VARIES"; WHITE ON GREEN 3" MIN LETTERS
R1-2	YIELD	36"x36"x36"; RED ON WHITE
	NOT A THRU STREET	18"x24"; BLACK ON WHITE

- NOTES:
- ALL SIGNS ARE REFLECTORIZED AND HAVE 7'-0" CHANNEL MOUNTING HEIGHT.
 - ALL REGULATORY SIGNS SHALL MEET THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD).

4 TRAFFIC CONTROL SIGNAGE
SCALE: N.T.S.



5 STOP SIGN
SCALE: N.T.S.



6 TYPICAL FIRE HYDRANT CONNECTION DETAIL
SCALE: N.T.S.

ASE
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Land Surveying - Civil Engineering - Site Planning
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Uxbridge, Massachusetts 01569
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500 East Washington Street
North Attleboro, Massachusetts 02760
P: 508-316-0452 F: 508-316-0963

PROJECT:
LAKELAND HILLS
TOWNHOUSE COMMUNITY
144 SEEKONK STREET
NORFOLK, MA 02056
APPLICANT:
LAKELAND HILLS, LLC
136 SEEKONK STREET
NORFOLK, MA 02056

REVISIONS

NO.	DATE	DESCRIPTION
1	7/25/19	FULL ENGINEERING DESIGN

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DRAWN BY: TRB, R.J.F.
CHECKED BY: RMM, BJA
DATE: NOVEMBER 19, 2018
PROJECT NO.: 2015-219

SHEET TITLE
CONSTRUCTION
DETAILS
SHEET 3 OF 6

SEAL OF PROFESSIONAL ENGINEER
RICHARD M. MARRILLE
CIVIL
No. 29623
12/21/19

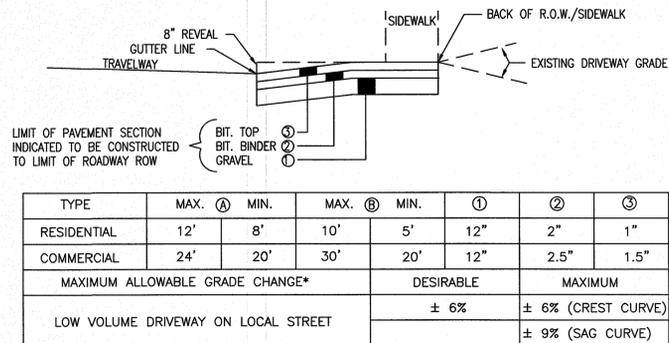
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C-7.3
PLAN NO. L-5239

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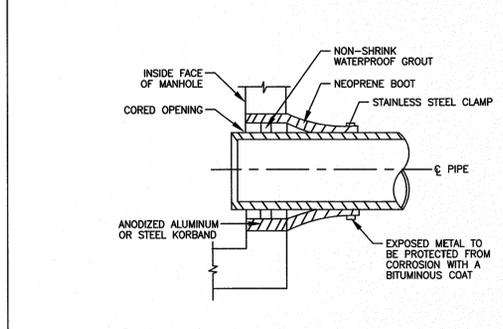
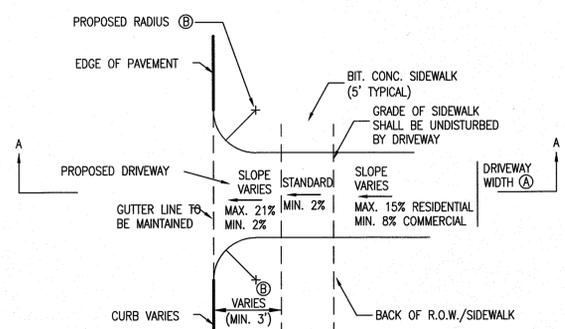


LIMIT OF PAVEMENT SECTION INDICATED TO BE CONSTRUCTED TO LIMIT OF ROADWAY ROW

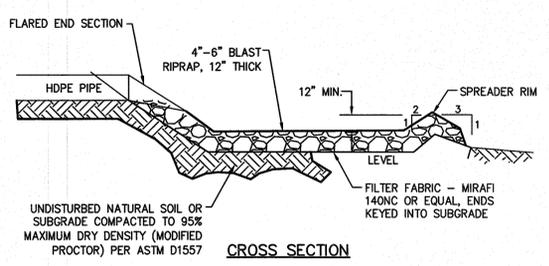
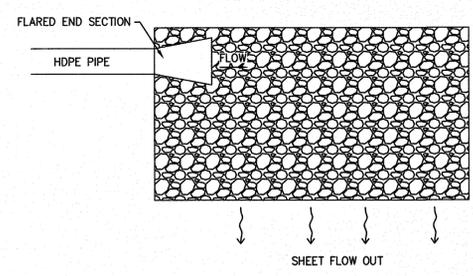
TYPE	MAX. (A)		MIN. (B)		①	②	③
	MAX.	MIN.	MAX.	MIN.			
RESIDENTIAL	12'	8'	10'	5'	12"	2"	1"
COMMERCIAL	24'	20'	30'	20'	12"	2.5"	1.5"
MAXIMUM ALLOWABLE GRADE CHANGE*					DESIRABLE		MAXIMUM
LOW VOLUME DRIVEWAY ON LOCAL STREET					± 6%		± 6% (CREST CURVE) ± 9% (SAG CURVE)

*MORE ABRUPT CHANGES REQUIRE VERTICAL CURVES AT LEAST 10' LONG

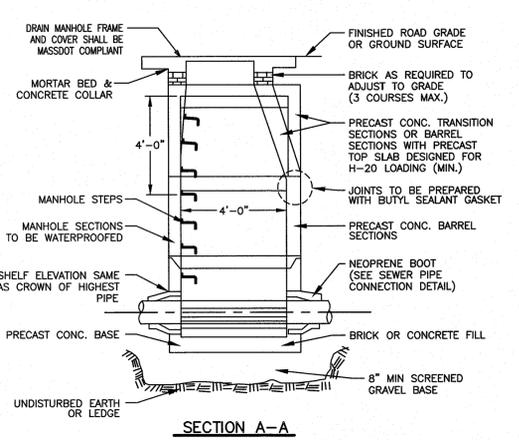
1 TYPICAL DRIVEWAY OPENING
SCALE: N.T.S.



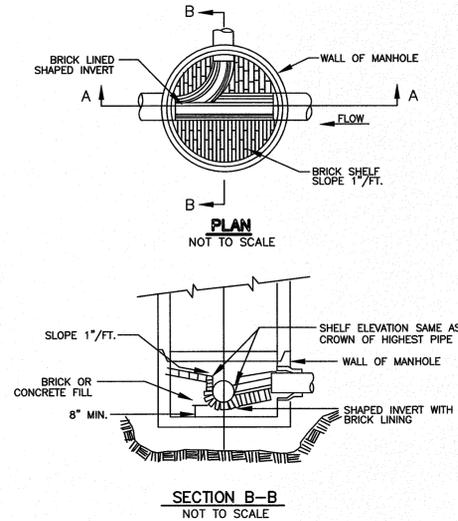
2 SEWER PIPE CONNECTION
SCALE: N.T.S.



3 LEVEL SPREADER
SCALE: N.T.S.

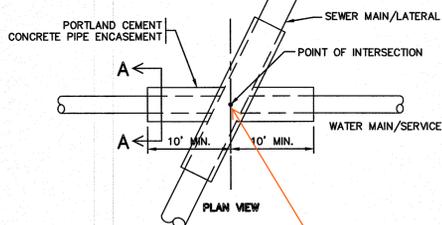


4 TYPICAL PRECAST CONCRETE 48\"/>



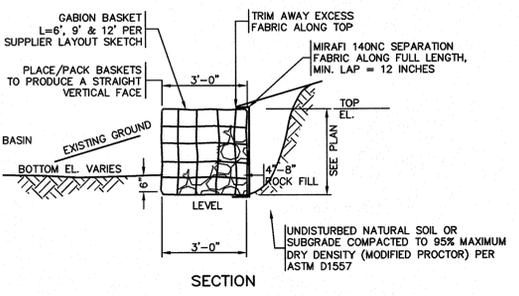
SECTION B-B NOT TO SCALE

NOTES:
 [1] CONCRETE PIPE ENCASUREMENT TO EXTEND 10 FT ALONG SEWER LINE AND WATER LINE FROM POINT OF INTERSECTION.
 [2] DISTANCE EQUAL TO PIPE DIAMETER.
 [3] CONCRETE PIPE ENCASUREMENT WHENEVER PROPOSED SEWER MAIN/LATERAL IS WITHIN 10' OF PROPOSED WATER MAIN/SERVICE.

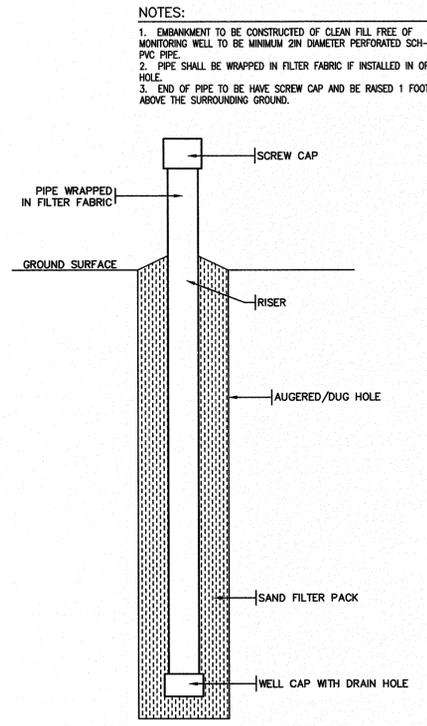


Wrap the water main pipe joints in 8 mil thick polyethylene encasement.

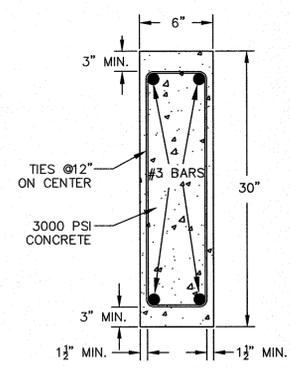
5 PIPE ENCASUREMENT
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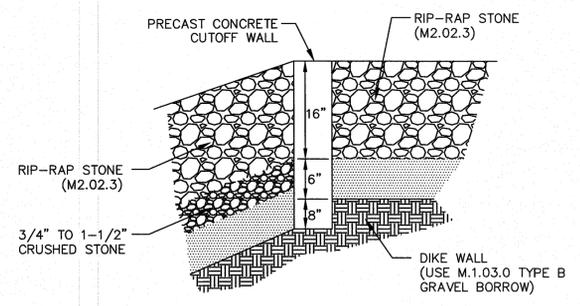
8 GABION FOREBAY DETAIL
SCALE: N.T.S.



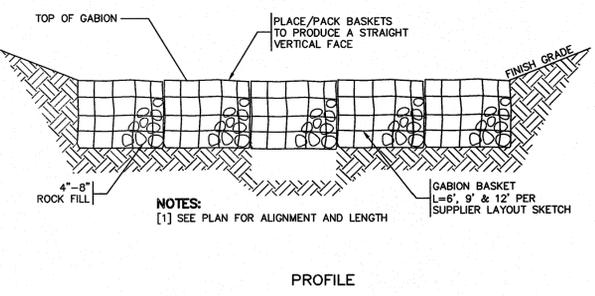
9 MONITORING WELL DETAIL
SCALE: N.T.S.



6 CUTOFF WALL DETAIL
SCALE: N.T.S.



7 CUTOFF WALL CONFIGURATION DETAIL
SCALE: N.T.S.



PROJECT: LAKELAND HILLS TOWNHOUSE COMMUNITY 144 SEEKONK STREET NORFOLK, MA 02056
 APPLICANT: LAKELAND HILLS, LLC 136 SEEKONK STREET NORFOLK, MA 02056

REVISIONS		
NO.	DATE	DESCRIPTION
1	7/25/19	FULL ENGINEERING DESIGN

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 CHECKED BY: RMM, B.J.A.
 DATE: NOVEMBER 19, 2018
 PROJECT NO.: 2015-219

SHEET TITLE: CONSTRUCTION DETAILS SHEET 6 OF 6

DRAWING NO.: C-7.6

PLAN NO.: L-5239

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North Attleboro, Massachusetts 02760
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MAP 23, BLOCK 76, PARCEL 16
N/F MARY DEPASQUALE
160 SEEKONK STREET
BK. 26421, PG. 473

MAP 23, BLOCK 76, PARCEL 52
N/F DAVID G. & DIANE MCELWEE
152 SEEKONK STREET
BK. 6109, PG. 187

MAP 23, BLOCK 76, PARCEL 15
N/F MONICA L. & JASON CULLEN
150 SEEKONK STREET
BK. 28137, PG. 539

MAP 23, BLOCK 76, PARCEL 55
N/F RICHARD M. & DIANE M. ASCI
138 SEEKONK STREET
PG. CTF 141722

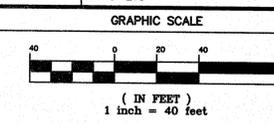
MAP 23, BLOCK 76, PARCEL 25
N/F CAROLINE O'HARTE
136 SEEKONK STREET
BK. 33971, PG. 368

PROJECT:
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144 SEEKONK STREET
NORFOLK, MA 02056

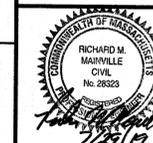
APPLICANT:
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REVISIONS		
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PROJECT NO.	2015-219



SHEET TITLE
UTILITY PLAN
SHEET 1 OF 3



DRAWING NO.
C-4.1
PLAN NO. L-5239

Notes:
1. Maintain 10' of horizontal separation between water main and sewer main.
2. Maintain 12" of vertical separation from other utility lines and structures.

Confirm size and material of existing water main.

Confirm connection method (Tapping sleeve and valve or cutting in a tee). If cutting in a tee, install 3-way valve configuration.

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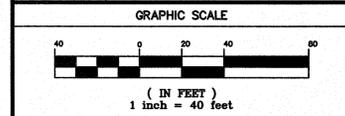
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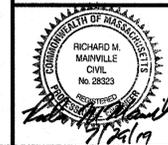
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SHEET TITLE

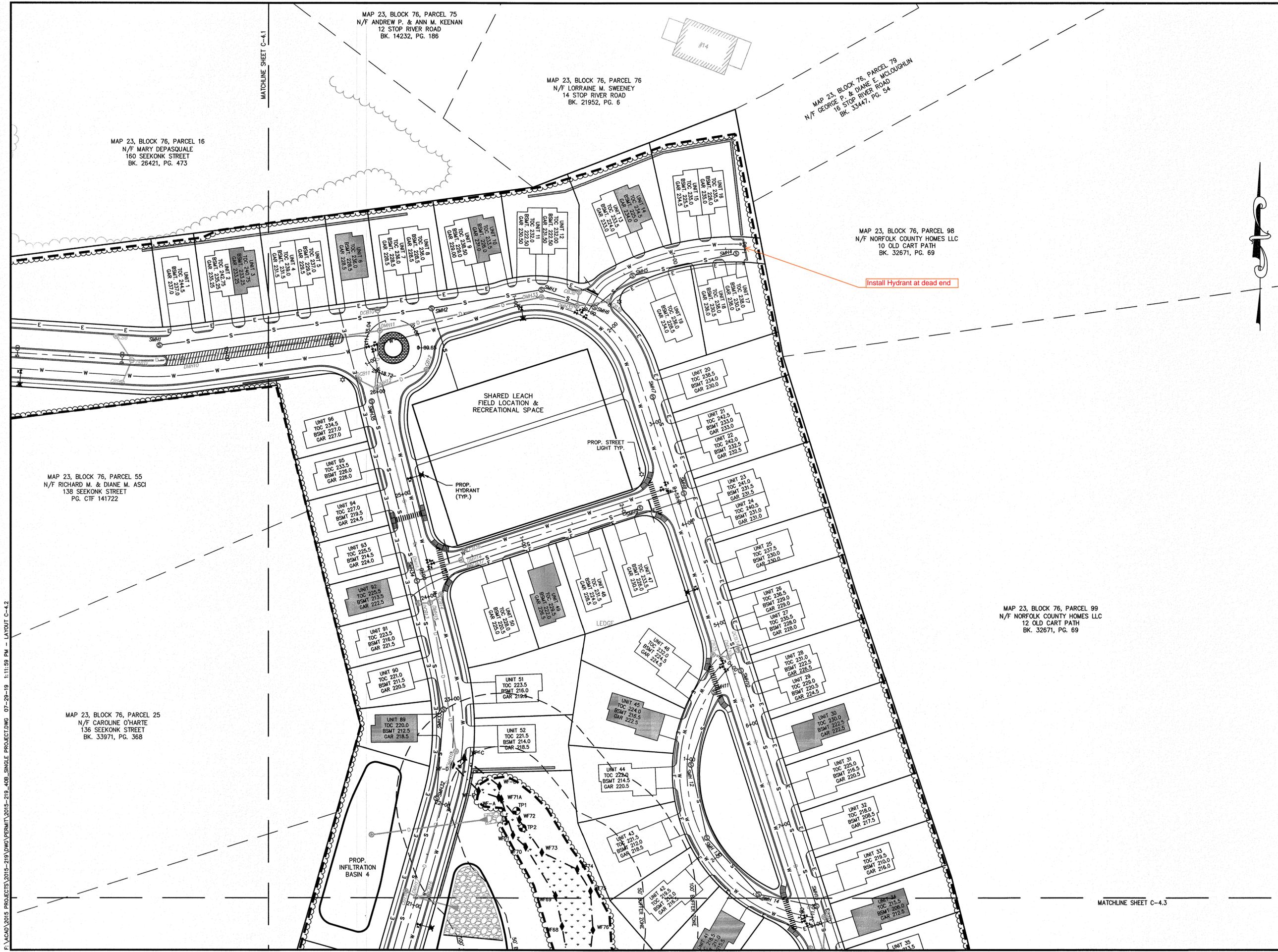
UTILITY PLAN
SHEET 2 OF 3



DRAWING NO.

C-4.2

PLAN NO. L-5239



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MATCHLINE SHEET C-4.1

MAP 23, BLOCK 76, PARCEL 48
N/F STEVEN A. CAMERA
134 SEEKONK STREET
BK. 11577, PG. 592

MAP 23, BLOCK 76, PARCEL 46
N/F LAURENCE & KAREN CLARK
130 SEEKONK STREET
BK. 6357, PG. 196

MAP 23, BLOCK 76, PARCEL 45
N/F KEVIN J. MONAGHAH
128 SEEKONK STREET
BK. 5753, PG. 510

MAP 23, BLOCK 76, PARCEL 53
N/F DAVID A. & COLLEEN C. AXBERG
106 SEEKONK STREET
BK. 27957, PG. 471

MAP 23, BLOCK 76, PARCEL 47
N/F COMMONWEALTH OF MASSACHUSETTS
SEEKONK STREET

MAP 22, BLOCK 76, PARCEL 49
N/F COMMONWEALTH OF MASSACHUSETTS
7 OLD CAMPBELL STREET

MAP 23, BLOCK 76, PARCEL 24
N/F TRISTRAM C. & JEAN CARPENTER
120 SEEKONK STREET
BK. 5383, PG. 165

ASE

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Land Surveying - Civil Engineering - Site Planning

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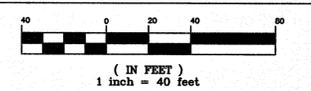
APPLICANT:
LAKELAND HILLS, LLC
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REVISIONS

NO.	DATE	DESCRIPTION
1	7/25/19	FULL ENGINEERING DESIGN

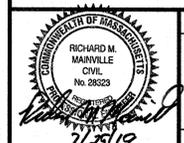
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DRAWN BY	TRB, R/J
CHECKED BY	RMM, BJA
DATE	NOVEMBER 19, 2018
PROJECT NO.	2015-219

GRAPHIC SCALE



SHEET TITLE

UTILITY PLAN
SHEET 3 OF 3



DRAWING NO.

C-4.3

PLAN NO. L-5239

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