

The State of New Hampshire
Department of Environmental Services



Clark B. Freise, Acting Commissioner

January 9, 2017

DONALD WARE
PENNICHUCK WATER WORKS
PO BOX 1947
MERRIMACK NH 03054-1947

SUBJECT: BARNSTEAD, PEU LOCKE LAKE WATER SYSTEM
EPA # 0142010
SANITARY SURVEY 2016

Dear Mr. Ware:

On November 15, 2016, a staff member from the Department of Environmental Services (DES) conducted a sanitary survey of the PEU Locke Lake Water System in Barnstead. The purpose of the survey was to review the capacity of the water system's sources, treatment, distribution, and management to continually produce safe drinking water. We would like to thank Chris Countie, Water Supply Manager, for his assistance in conducting this survey.

The PEU Locke Lake Water System is currently in compliance with Safe Drinking Water Act water quality standards. The operator is very knowledgeable of the components of the water system. Also, the managers continue to invest in water main replacement which continually reduces water losses.

However, this past year the water system has had over 1,500,000 gallons of bulk water delivered since June 2016 with the latest delivery occurring the week of January 4, 2017. The existing water supply capacity cannot meet the current demand of the public water system. This is a significant deficiency and the managers need to develop a water supply which will meet the current demand and accommodate any potential growth.

Typically, significant deficiencies are required to be addressed within 30 days of notification in writing by DES. However, we recognize that this significant deficiency identified may not be able to be addressed within the 30 day time frame. Therefore DES requires that the managers develop a comprehensive action plan (CAP) which would outline the steps the managers will take to address this deficiency. This CAP must be submitted within 30 days of receipt of this sanitary survey letter.

DES recognizes that the managers have an aggressive water main replacement project which included replacement of over 18,000 feet of water main this past year. We commend the managers for undertaking this effort.

www.des.nh.gov

29 Hazen Drive • PO Box 95 • Concord, NH 03302-0095
(603) 271-3503 • TDD Access: Relay NH 1-800-735-2964

PEU Locke Lake Water System, 0142010
January 9, 2017
PAGE 2

FACILITIES DESCRIPTION

The PEU Locke Lake water system provides domestic water to approximately 858 residential services for a total population served of 2,145 people. The reported average daily usage for 2015 was approximately 125,000 gallons per day (GPD). This appears down from average flow in 2013 of 156,000 and substantially lower than 2010 reported usage of 174,000 GPD.

In general, the water system is comprised of seven bedrock wells, associated pump houses, one storage tank having a capacity of 250,000 gallons, and two 18,000 gallon buried steel tanks. The water system serves the Locke Lake residential development from Peacham Road along the south to North Barnstead Road and extending to the Alton town line.

The system draws water from a dispersed group of bedrock wells which are now treated in two treatment systems as follows:

Well EPA ID#	Name	Well pump rate (gpm)	Depth	Treatment Facility
003	BRW 3 Golf Course	2	500	Peacham Road
009	BRW 9 Golf Course	5 (15 current yield)	800	Peacham Road
010	BRW 10 Air Strip	32	563	Air Strip
011	BRW 11 Golf Course	40 (14 current yield)	425	Peacham Road
017	BRW 14 300 S PH	45 (current yield 21)	704	Peacham Road
018	BRW 15 563 S PH	39	662	Peacham Road
116	BRW 13 120 E PS	39	700	Peacham Road

We note that the yield of the existing wells has dropped significantly due to the ongoing drought in 2016. As a result, the managers need to haul in bulk water to meet the demand during peak times. The three Peacham Road wells are adequately protected on 50 acres of property owned by PEU Locke Lake, including a gated entrance and fenced/gated protection around each well. Water from these wells is pumped directly to the Peacham Road treatment facility.

The Golf Course wells are located on the fairways, where there is no evidence of fertilizer or pesticide use. All of these wells are manifolded in a below ground vault with a dedicated raw water transmission main to the Peacham Road treatment facility

The Peacham Road treatment facility is a single story block building housing chemical treatment systems for iron and manganese, arsenic, and disinfection. The specific treatments include injection of sodium hypochlorite (disinfection and pre-oxidation of iron and manganese), ferric chloride (for co-precipitation of arsenic) and carbonic acid (generated on-site for pH depression). Filtration and adsorption takes place in dual

LayneOx pressure filters in series. Periodic backwash (from treated water storage) of the filters flows to a 20,000 gallon backwash holding tank from which decant is recycled into the treatment process prior to the point of raw water chemical injection. Treated water flows to a 250,000 gallon Natgun storage tank adjacent to the treatment facility. Five finished water pumps equipped with variable speed drives draw water from the storage tank and maintain constant pressure to the distribution system. The facility is equipped with backup power which is exercised weekly.

The Airstrip well is located at the edge of the woods along a grassy area beyond the airstrip runway. The Airstrip pumphouse/treatment station is a two story concrete building with the arsenic treatment on the first floor and the pipe gallery and storage tank access in the lower level. The arsenic treatment consists of adsorption vessels containing Arsenex media. Equipment in the lower level includes the two 18,000 gallon steel storage tanks, booster pumps, well pump controls, and flow monitoring equipment. The Airstrip section and 'Section S' section of the distribution system are looped with the Peacham Road distribution system. In the event of a power outage, a pressure loss would trigger the water supply to flow from the Peacham Road system to the Airstrip and Section S systems.

Alarms for the Peacham Road and Airstrip treatment stations communicate with the PEU headquarters in Pittsfield, which in turn communicates with the Pennichuck Water Works headquarters in Nashua and is accessed by the duty operator in Pittsfield.

The distribution system consists of 18 miles of piping which is primarily small diameter plastic mains ranging in size from 2 – 6 inch diameter. Since taking over ownership PEU has been replacing and upgrading the distribution system which will reduce leaks and improve the reliability of the distribution system. PEU has implemented a capital improvement program to replace water mains each year. Each service is metered with either radio-read or touch pad reading capabilities. Pennichuck has installed check valves on all houses with expansion tanks. According to the operator, overnight flow is reported at approximately 20 GPM.

The finish water storage consists of a 250,000 gallon pre-stressed concrete tank at the Peacham Road treatment facility and two 18,000 gallon below ground steel tanks at the airstrip pump house. We note that these steel tanks have been cleaned, sealed, and recoated in 2012. The entire distribution system is flushed every other year. Valve exercising occurs at a rate of approximately 50% each year with an intended goal this year of 100% being exercised. We note that typically storage tanks should be inspected every five years.

CERTIFIED OPERATOR VERIFICATION

The PEU Locke Lake water system is required to retain an operator certified at the Grade I Treatment and the Grade II Distribution level. The following operators are listed as certified operators for this system:

<u>Operator</u>	<u>Cert. No.</u>	<u>Treatment Grade</u>	<u>Distribution Grade</u>
Chad Call	2848	I	II
Dave Hall	1916	II	II
Chris Countie	1426	IV	IV

The current operators are qualified for operation of this water system.

ISSUES AND RECOMMENDATIONS

Currently, reported daily water usage for Locke Lake is approximately 125,000 gallons per day. Large water systems are required to have adequate source capacity to meet average day demand and to meet maximum day demand with the largest well out of service. According to the operator, some of existing wells are decreasing in capacity due to the extreme drought condition this past year. The water system has received over 1,500,000 gallons of bulk water deliveries within the past eight months. DES considers this a significant deficiency which must be addressed. Even if the customer base does not expand due to residential growth, the system now needs to consider additional source capacity not only to meet future demand but to address any potential shortfall that may occur because of depletion of existing supply capacity.

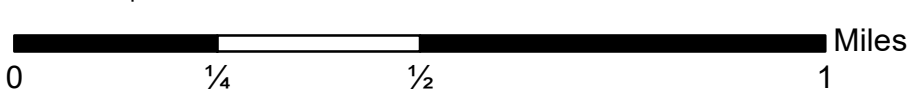
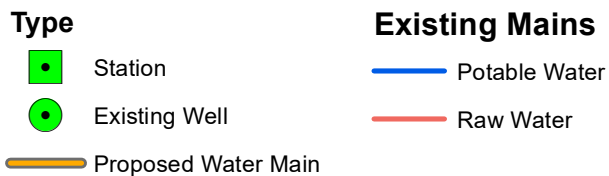
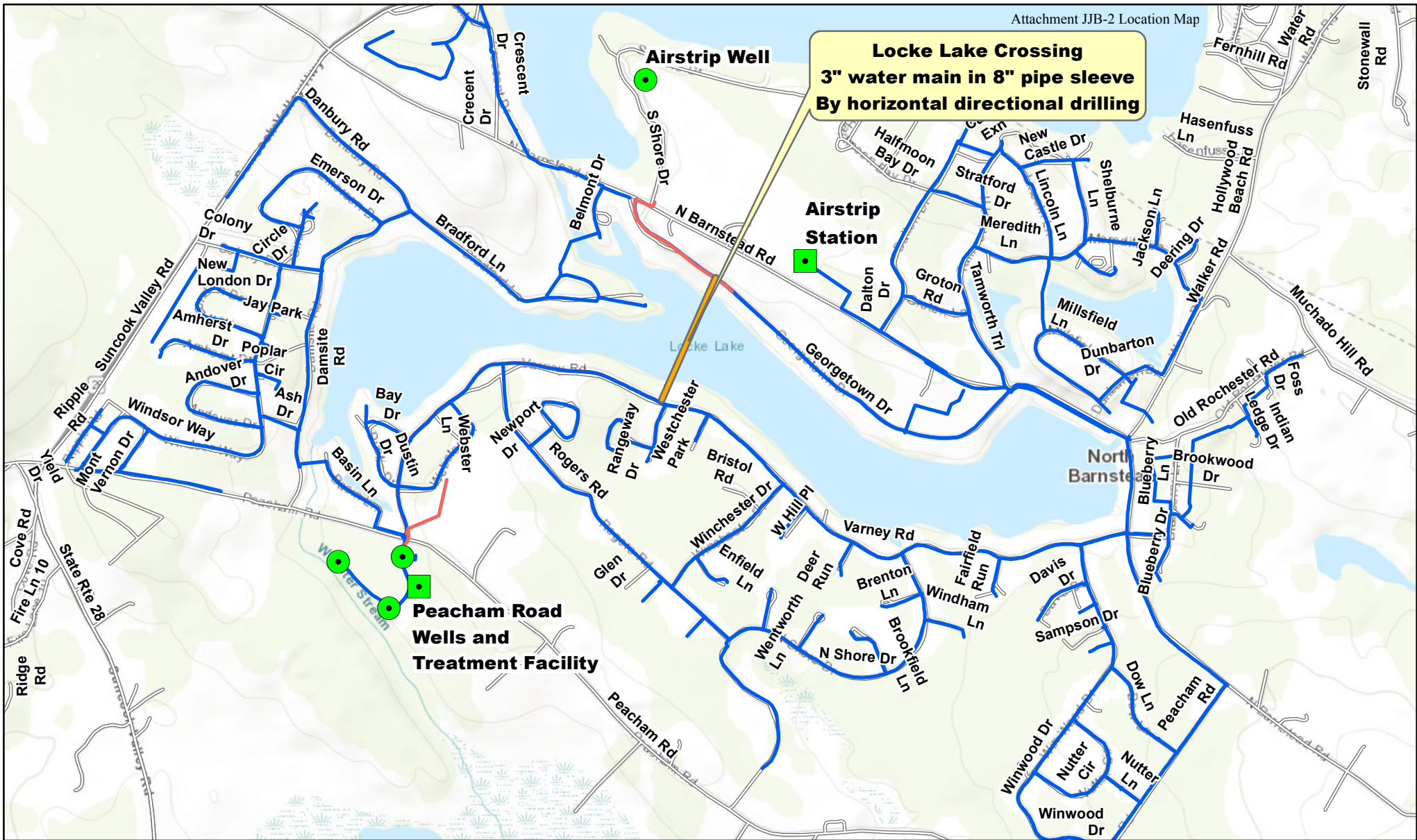
If you have any questions regarding this survey letter please contact me at 271-2948 or Richard.skarinka@des.nh.gov.

Sincerely,



Richard Skarinka, P.E.
Drinking Water and Groundwater Bureau

ec: Chris Countie, PWW



Project Map
 Attachment JJB-1
 Airstrip Well Raw Water Pipeline
 Pennichuck State Revolving Fund Application
 Barnstead - Locke Lake

LOCKE LAKE WATER SOURCE IMPROVEMENTS

AIRSTrip WELL INTERCONNECTION

FALL/WINTER, 2019/2020

CONTRACT 2019-08

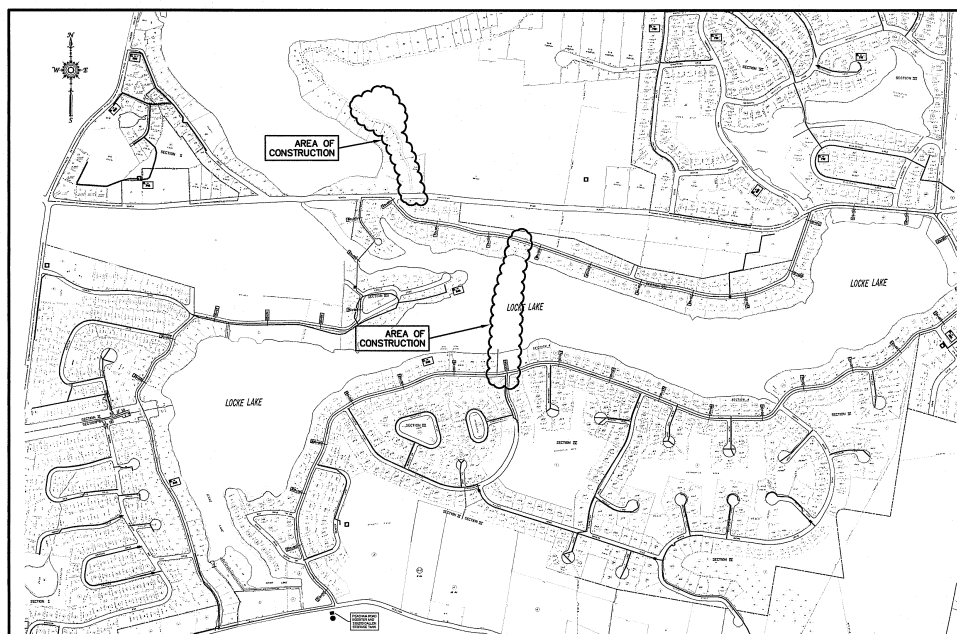
Attachment JJB-3 Airstrip Engineering Plans
Page 1 of 7



25 Manchester Street
Merrimack, N.H. 03054-1947
Tel 603-882-5191
Fax 603-913-2331
www.pennichuck.com

NOTES

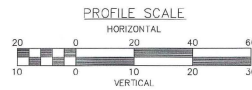
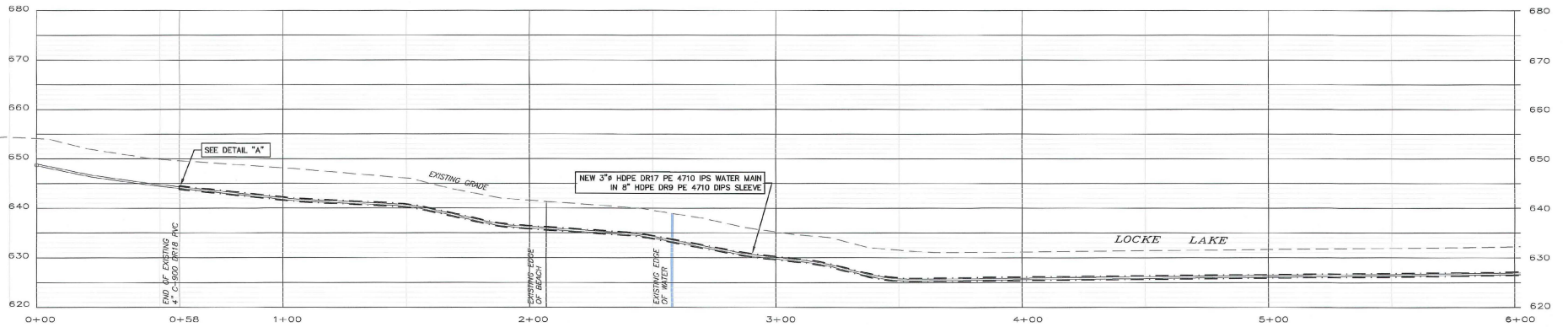
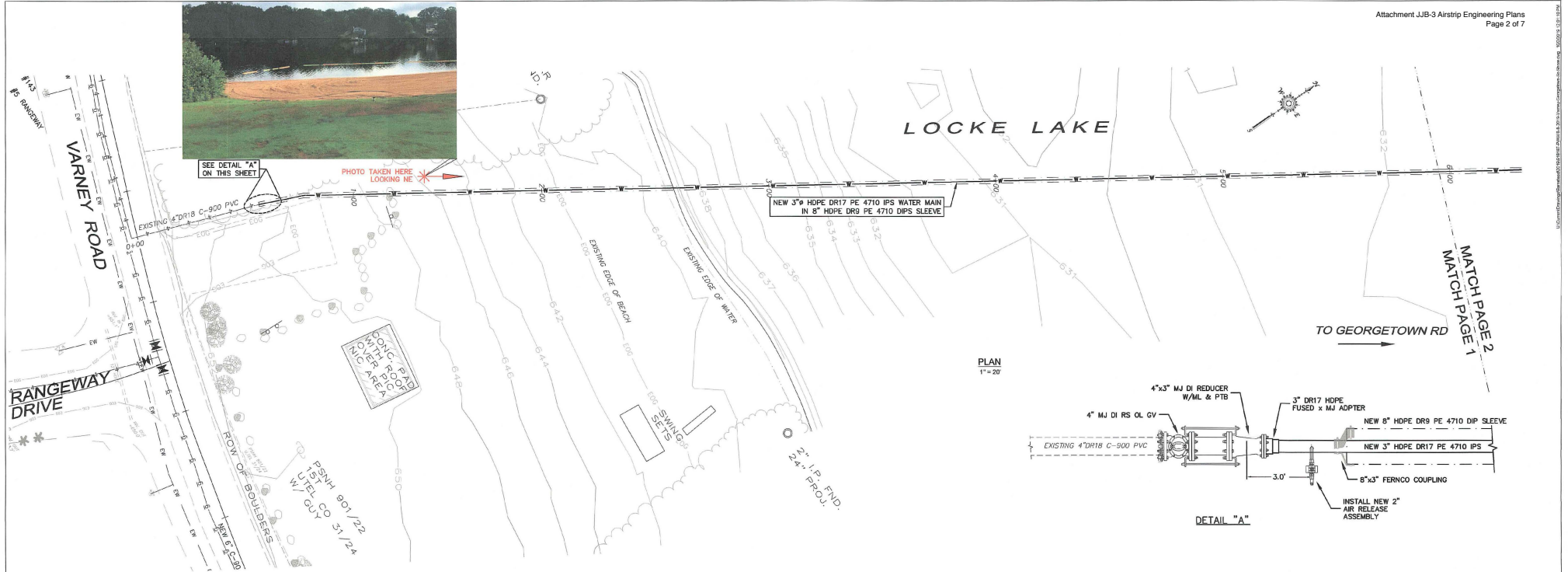
1. LOCATIONS OF EXISTING UTILITIES SHOWN ARE NOT ACCURATE AND ARE SHOWN SCHEMATICALLY FOR REFERENCE ONLY.
2. ACTUAL LOCATIONS OF UTILITIES SHOULD BE INVESTIGATED AND SURVEYED ON-SITE BEFORE INITIATING ANY UNDERGROUND CONSTRUCTION. (*CONTRACTOR TO DIG TEST PITS AT ALL INTERSECTIONS TO DETERMINE DEPTH AND LOCATION OF EXISTING WATER MAINS.)
3. INSTALL 1" TEMPORARY CHLORINE AND PRESSURE TAPS ON NEW WATER MAINS AS REQUIRED TO ACCOMPLISH CHLORINATION AND PRESSURE TESTING. TEMPORARY TAPS TO BE REMOVED AND PLUGGED WITH A BRASS PLUG.
4. PLUG ENDS OF ALL ABANDONED WATER MAINS WITH CEMENT MORTAR.
5. REMOVE GATE BOXES FROM ALL ABANDONED GATE VALVES.
6. HORIZONTAL LOCATION OF WATER MAIN IS AS DESIGNATED ON PLANS AND IS FROM EXISTING WATER MAIN OR TOPO FEATURES AS DETAILED.
7. PERMANENT AIR RELEASES ARE TO BE LOCATED AT ALL HIGH POINTS IN WATER MAINS AND AS DESIGNATED ON THE PLANS PER DETAIL (*PERMANENT AIR RELEASES ARE PAID FOR ON A UNIT BASIS).
8. WHEN RODDING IS CALLED FOR ON PLANS, THERE SHALL BE TWO 3/4" RODS WITH REQUIRED STAINLESS STEEL NUTS. RODS ARE TO BE ATTACHED TO FITTINGS WITH EITHER STAR BOLTS OR DUC LUGS UNLESS OTHERWISE SPECIFIED.
9. ALL NEW WATER MAINS TO BE INSTALLED WITH 5'-0" OF COVER FROM THE CROWN (TOP) OF WATER MAIN TO FINISHED GRADE.
10. ALL GATE VALVES AND CURB STOPS TO BE OPEN LEFT.
11. ALL MAIL BOX REMOVAL & REPLACEMENT IS INCIDENTAL TO WATER MAIN INSTALLATION.



SHEET INDEX

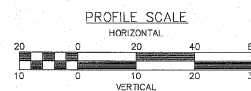
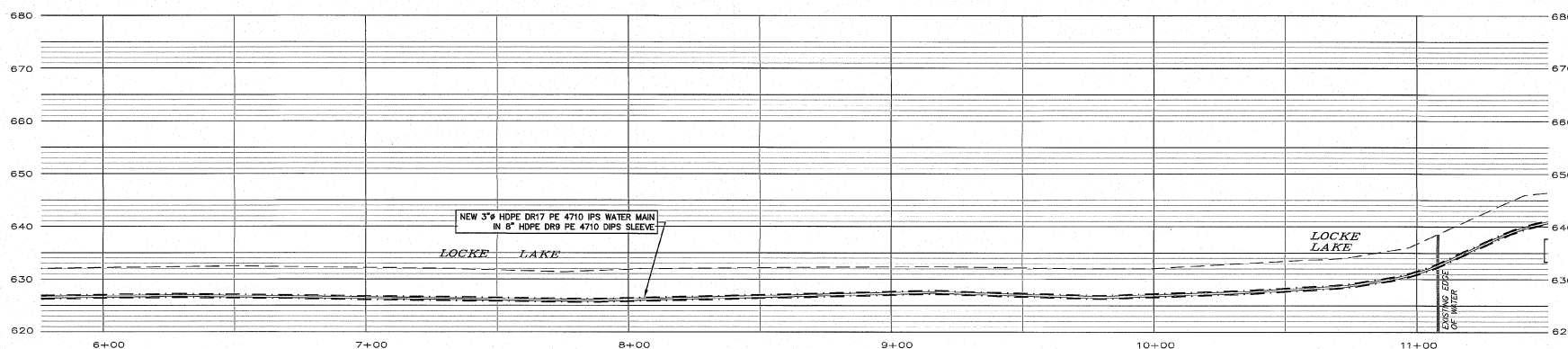
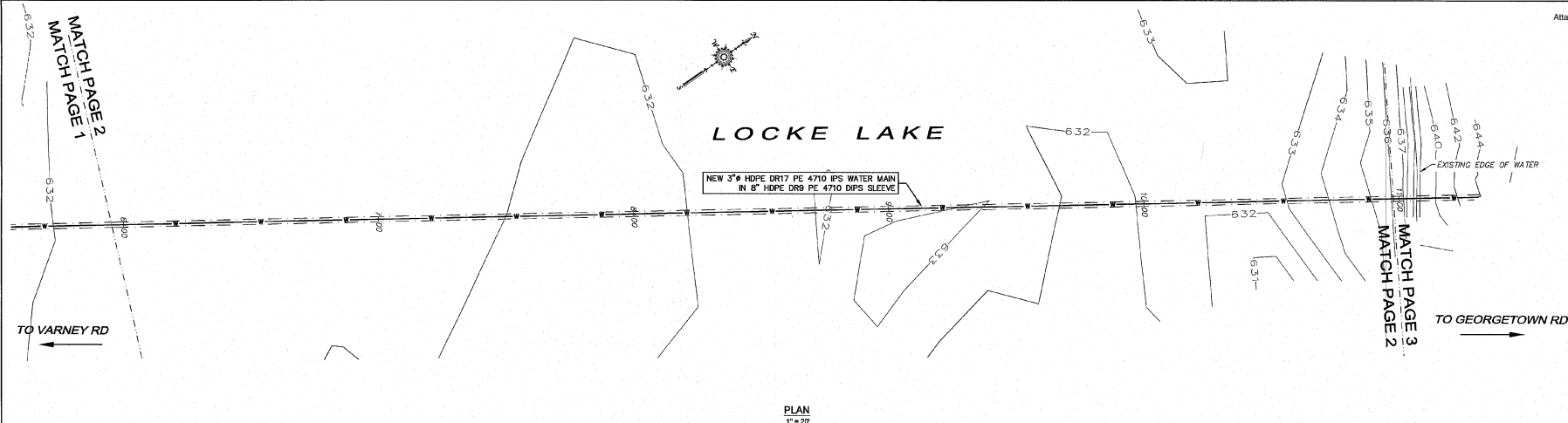
- 1 VARNEY RD & LOCKE LAKE CROSSING
- 2 LOCKE LAKE CROSSING
- 3 GEORGETOWN RD & LOCKE LAKE CROSSING
- 4 SOUTH SHORE DRIVE
- 5 SOUTH SHORE DRIVE
- 6 TYPICAL DETAILS





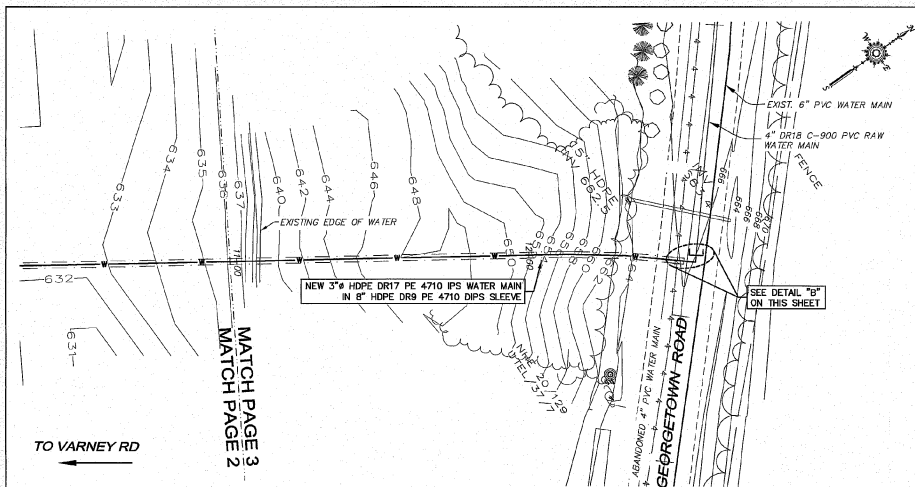
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PENNICHUCK WATER 25 Manchester Street Marblehead, MA 01954-1947 Tel 603-683-0191 Fax 603-913-2331 www.pennichuck.com		LOCKE LAKE WATER SOURCE IMPROVEMENTS AIRSTrip WELL INTERCONNECTION VARNEY RD & LOCKE LAKE CROSSING CENTER BARNSTEAD, NH	
DRAWN M. PEPIN	GRAND DATE OCTOBER 2, 2019	CONSTRUCTION DATE WINTER, 2020	INSTALLED BY -
DESIGNER M. FILION	INSPECTOR P. DUBOWK	SCALE 1" = 20'	SHEET NO. 1 OF 6

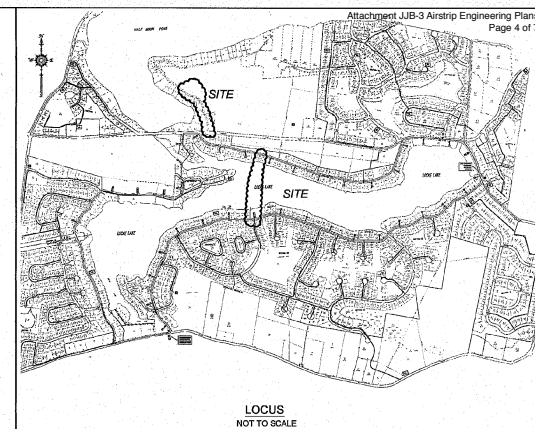
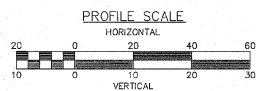
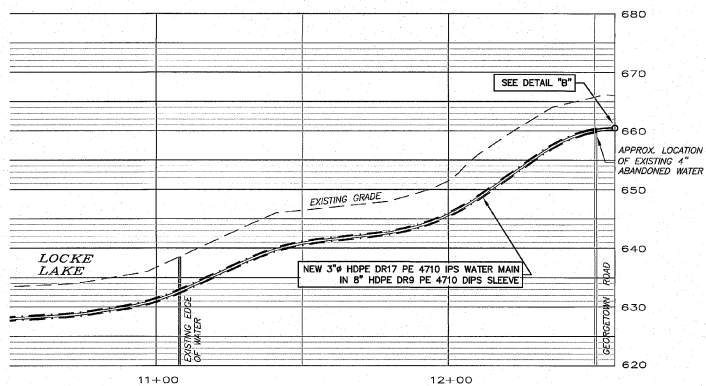
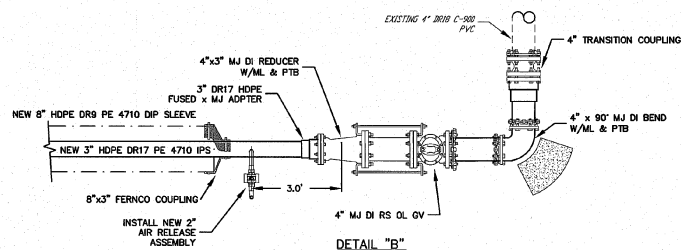


REVISION	DATE	DESCRIPTION
3		
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PENNICHUCK WATER <small>35 Manchester Street Manchester, N.H. 03104-1947 Tel 603-483-5951 Fax 603-913-2331 www.pennichuck.com</small>		LOCKE LAKE WATER SOURCE IMPROVEMENTS AIRSTrip WELL INTERCONNECTION LOCKE LAKE AREA BETWEEN VARNEY RD AND GEORGETOWN RD CENTER BARNSTEAD, NH	
<small>DESIGNED BY</small> M. PEPIN	<small>DRAWING DATE</small> OCTOBER 2, 2019	<small>CONSTRUCTION DATE</small> WINTER, 2020	<small>INSTALLED BY</small>
<small>DESIGNED BY</small> M. FILION	<small>INSPECTOR</small> P. DUBOWIK	<small>SCALE</small> 1" = 20'	<small>SHEET NO.</small> 2 OF 5



PLAN
1" = 20'




REVISION	DATE	DESCRIPTION
3		
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PENNICHUCK WATER 25 Manchester Street Portsmouth, N.H. 03854-1947 Tel 603-463-5101 Fax 603-913-2331 www.pennichuck.com		LOCKE LAKE WATER SOURCE IMPROVEMENTS AIRSTRIP WELL INTERCONNECTION GEORGETOWN RD & LOCKE LAKE CROSSING CENTER BARNSTEAD, NH	
DRAWN BY M. FILION	CHECKED BY P. DUBOWIK	CONSTRUCTION DATE WINTER, 2020	INSTALLED BY -
SCALE 1" = 20'		SHEET NO. 3 OF 6	



REVISION	DATE	DESCRIPTION
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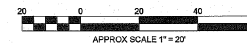
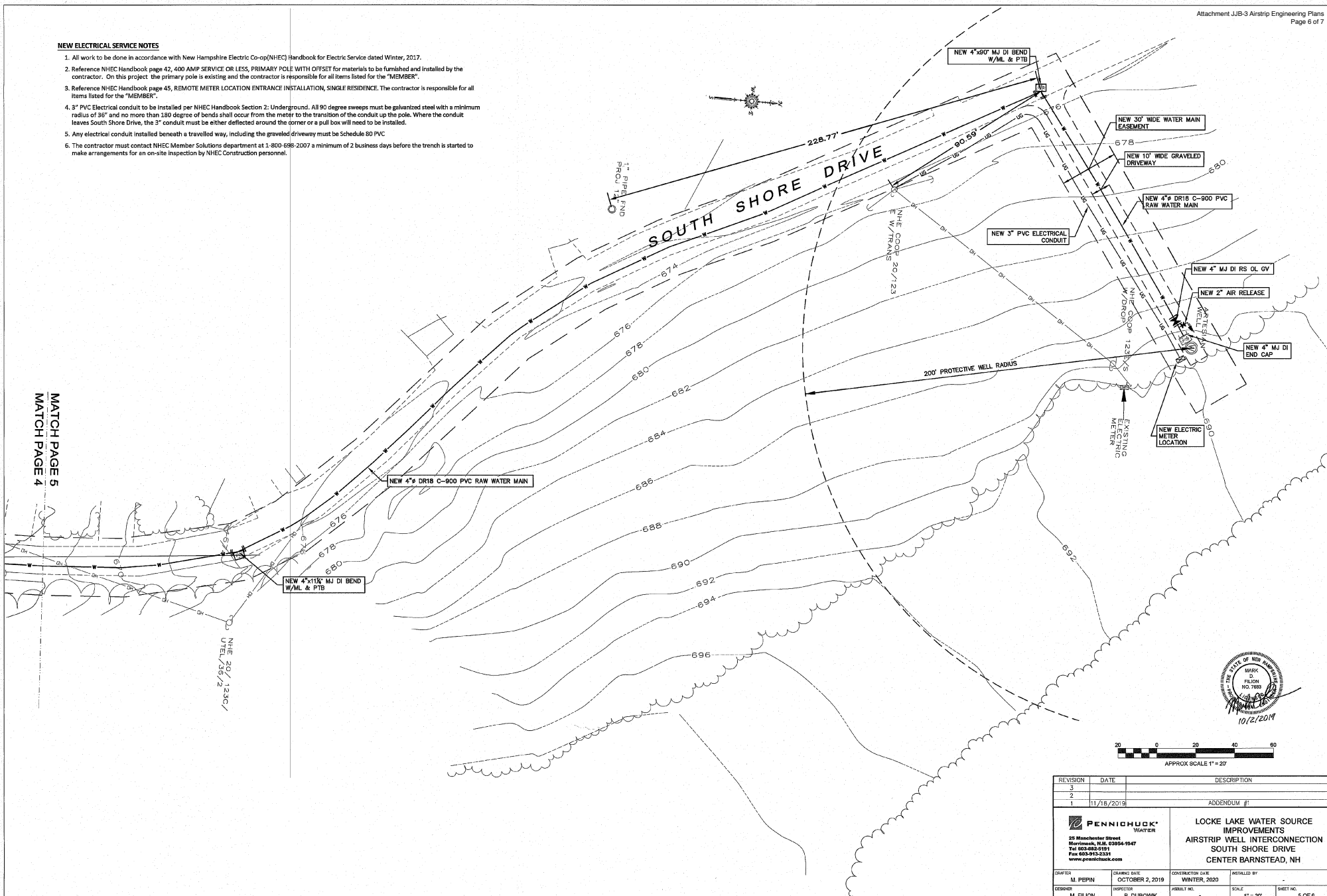
 PENNICHUCK WATER 25 Manchester Street Manchester, N.H. 03105-0947 Tel 603-482-5191 Fax 603-575-2251 www.pennichuck.com	LOCKE LAKE WATER SOURCE IMPROVEMENTS AIRSTrip WELL INTERCONNECTION SOUTH SHORE DRIVE CENTER BARNSTEAD, NH
	DRAFTER M. PEPIN DRAWING DATE OCTOBER 2, 2019 CONSTRUCTION DATE WINTER, 2020 INSTALLED BY SHEET NO. 1 OF 1

DESIGNER	REVISION	ASBUILT NO.	SCALE	SHEET NO.
M. PEPIN			1" = 20'	C.O.F.A.

NEW ELECTRICAL SERVICE NOTES

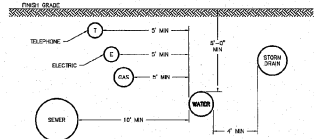
1. All work to be done in accordance with New Hampshire Electric Co-op (NHEC) Handbook for Electric Service dated Winter, 2017.
2. Reference NHEC Handbook page 42, 400 AMP SERVICE OR LESS, PRIMARY POLE WITH OFFSET for materials to be furnished and installed by the contractor. On this project the primary pole is existing and the contractor is responsible for all items listed for the "MEMBER".
3. Reference NHEC Handbook page 45, REMOTE METER LOCATION ENTRANCE INSTALLATION, SINGLE RESIDENCE. The contractor is responsible for all items listed for the "MEMBER".
4. 3" PVC Electrical conduit to be installed per NHEC Handbook Section 2: Underground. All 90 degree sweeps must be galvanized steel with a minimum radius of 36" and no more than 180 degree of bends shall occur from the meter to the transition of the conduit up the pole. Where the conduit leaves South Shore Drive, the 3" conduit must be either deflected around the corner or a pull box will need to be installed.
5. Any electrical conduit installed beneath a travelled way, including the graveled driveway must be Schedule 80 PVC.
6. The contractor must contact NHEC Member Solutions department at 1-800-698-2007 a minimum of 2 business days before the trench is started to make arrangements for an on-site inspection by NHEC Construction personnel.

MATCH PAGE 5
MATCH PAGE 4



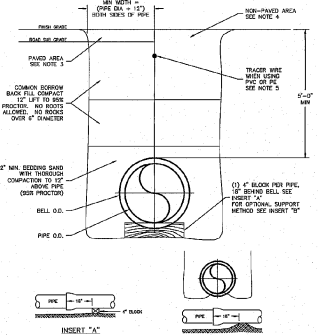
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1	11/18/2019	ADDENDUM #1

PENNICHUCK WATER 25 Manchester Street Portsmouth, N.H. 03804-1947 Tel: 603-433-9191 Fax: 603-913-2331 www.pennichuck.com		LOCKE LAKE WATER SOURCE IMPROVEMENTS AIRSTRIP WELL INTERCONNECTION SOUTH SHORE DRIVE CENTER BARNSTEAD, NH	
DRAWN BY M. PEPIN	CHANGED DATE OCTOBER 2, 2019	CONSTRUCTION DATE WINTER, 2020	INSTALLED BY
DESIGNED BY M. FILION	INSPECTED BY P. DUBOWIK	ASBUILT NO.	SCALE 1" = 20'
			SHEET NO. 5 OF 6



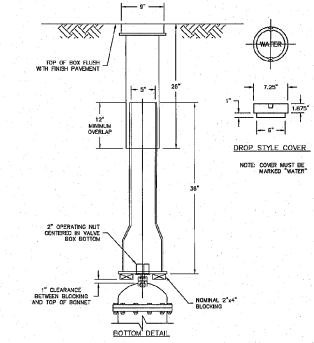
- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.
 2. ALL WATER MAINS SHALL HAVE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M10
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



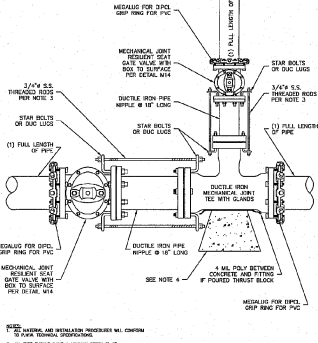
- NOTES:
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 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M11
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



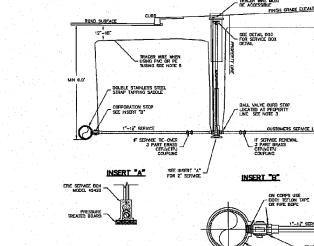
- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.

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WATER
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TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



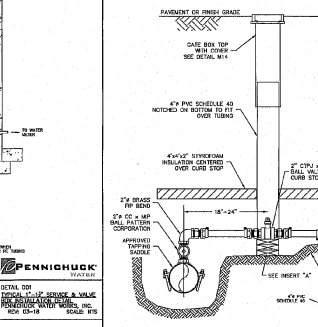
- NOTES:
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 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M13
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.
 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M14
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



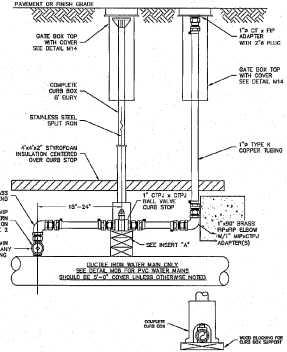
- NOTES:
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WATER
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TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



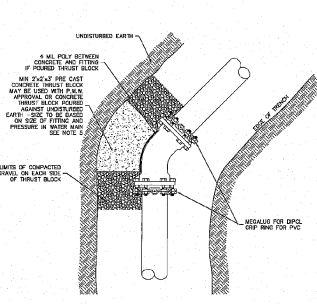
- NOTES:
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PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



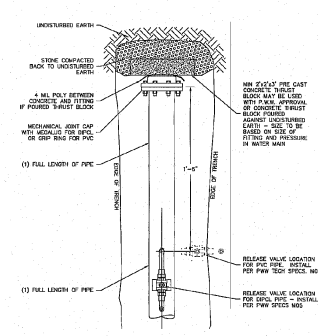
- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.
 2. WATER MAINS MAY BE DIRECT TAPPED WHEN IT IS 6\"/>

PENNICHUCK
WATER
DETAIL M17
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



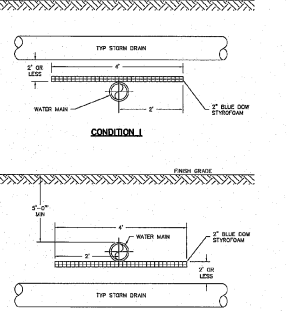
- NOTES:
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 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
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TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



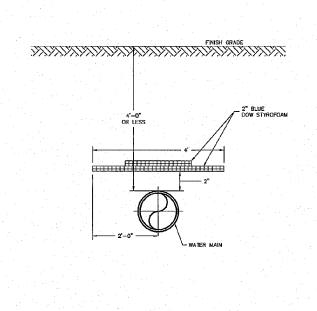
- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.
 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M19
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



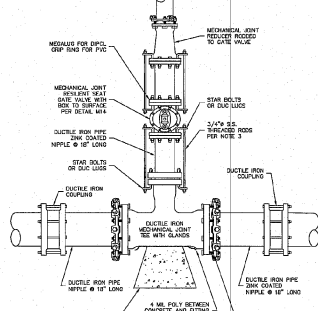
- NOTES:
1. PENNICHUCK WATER WORKS, INC. RESERVES THE RIGHT TO MODIFY ANY REQUIREMENTS AS NECESSARY BASED ON FIELD CONDITIONS, ETC.

PENNICHUCK
WATER
DETAIL M20
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.
 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M21
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>



- NOTES:
1. ALL MATERIALS AND INSTALLATION PROCEDURES WILL CONFORM TO P.W.M. TECHNICAL SPECIFICATIONS.
 2. ALL TRENCHES SHALL BE A MINIMUM DEPTH OF 3'-0\"/>

PENNICHUCK
WATER
DETAIL M22
TYPICAL TRENCH DETAIL
PENNICHUCK WATER WORKS, INC.
REV. 03-18 SCALE: 1/8\"/>

REVISION	DATE	DESCRIPTION
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PENNICHUCK WATER 25 Manchester Street Westport, N.H. 03584-1947 Tel 603-863-4100 Fax 603-913-2531 www.pennichuck.com		LOCKE LAKE WATER SOURCE IMPROVEMENTS AIRSTrip-Well INTERCONNECTION TYPICAL DETAILS CENTER BARNSTEAD, NH	
DRAWN BY M. PEPPIN	DRAWING DATE OCTOBER 2, 2019	CONSTRUCTION DATE WINTER, 2020	INSTALLED BY
DESIGNED BY M. FLICUN	DIRECTOR P. DUBOWIK	ASUILT BY	SHEET NO. 6 OF 6



