
To: Aaron I. Miklosko, Director
Department of Public Works, Town Building
195 Main Street,
Maynard, MA 01754

From: Victor A. Olson, P.E.
5 Burlington Woods Drive Suite 210,
Burlington MA 01803-4542

File: 195110174 -

Date: July 30, 2018

Reference: Powdermill Pump Station Force Main – 12-inch Ductile Iron Under the Assabet River, Maynard, MA

Existing Conditions:

The existing 12-inch diameter ductile iron force main runs approximately 1,055 linear feet from the Powdermill wastewater Pump Station and crosses under the Assabet River to a 24-inch gravity sewer that discharges into the Maynard wastewater treatment plant. The pipe under the Assabet River is concrete encased for 65 linear feet between station 2+20 and 2+85 feet along the force main length.

The force main was constructed in 1984 and a copy of the record drawing is attached and dated 10/1986. The force main was constructed in accordance with latest standards. The configuration and layout of this force main is adequate with the profile laid on a continuous slope to prevent the buildup of air in pockets in each direction from the low point crossing under the Assabet River. The expected design life of a force main in service is approximately 50 years and this pipe is currently 33 years old. The Powdermill Pump Station was also upgraded in 2002 with new pumps and instrumentation. This force main is functionally reliable and takes approximately 75 to 80 percent of the town's current wastewater flows and has sufficient design capacity to handle additional flows.



Powdermill Pump Station Pumps and Wetwell

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Recommendations:

This force main is a critical piece of wastewater infrastructure for the Town of Maynard. It is imperative that the force main remain fully functional and capital planning should include providing for a redundant force main laid parallel to the existing force main over the next 10 to 15 years.

A new redundant force main in the future may be able to utilize trenchless technologies to cross under the Assabet River. A high-density polyethylene (HDPE) plastic pipe laid parallel to the existing force main would provide redundant capacity and the flexibility to alternate flows for cleaning, service and maintenance. Once the new line was in place, the flows could be reconfigured to the new force main. The current force main could then be evaluated for rehabilitation to provide continued redundant capacity. Removal and replacement of bend fittings in the existing force main may be required to clean and closed circuit televise (CCTV) the existing force main and to rehabilitate it. If the line can be rehabilitated, then it should be considered to provide redundancy and flexibility in maintaining service for this critical piece of infrastructure.

An alternative to a redundant force main would be the use of bypass piping to pumper storage trucks to maintain service during maintenance work in future or in the case of a pipe failure. This option is not ideal as there may be a delay in getting a large number of pumper storage trucks to the site which could result in an overflow to the river. Additionally, the cost of a large number of pumper storage trucks would be prohibitive.

One final recommendation is to be sure that the easement and sewer layout remain clear of trees to allow easy access for future maintenance of the pipeline.

Budget Considerations:

Installing a new force main under the Assabet River by open cut excavation would require temporary cofferdams in the river to construct a replacement pipe and extensive environmental permitting at more than \$1,000 per foot cost in today's dollars. Directional drilling could be utilized in place of open cut excavation to install the pipe without the need to excavate in the river. Directional drilling will have an entry pit approximately 100 ft back from edge of river and would need to be at least 10 ft below the riverbed to cross the 100-foot width of the river. It is going to take another 200 feet to get back to surface at a deep exit pit. Soil conditions will also be a factor and steering of the drill bit will be difficult if any significant cobbles are encountered. We recommend completing deep soil borings on each side of the river to confirm soil conditions. Soil borings should extend at least 15 to 20 feet below the riverbed elevation.

The budget includes the installation of approximately 400 linear feet of 12-inch diameter HDPE pipe by directional drilling at \$300 per foot or \$120,000. Soil conditions and space limitations accounted for during design would determine final layout and project costs. Should directional drilling not be feasible, then open cut crossing under the Assabet River would be required. This would result in significantly more permitting requirements and budget costs of at least 3 to 4 times the directional drilling cost.

Once the force main is installed under the river, then connections will be needed at the Powdermill Pump Station and to the force main discharge manhole on the 24-inch diameter gravity sewer line just upstream of the wastewater treatment plant. The remaining force main on each side of the river crossing could be installed by open cut excavation with a budget of \$150 per foot or approximately \$105,000.

Once the new line is in service then an evaluation of the existing force main could be completed to determine if the existing sewer force main could be rehabilitated to provide a redundant line for this critical section of sewer infrastructure.

The total costs to install a redundant sewer force main and to rehabilitate the existing sewer force main are summarized in the Table below.

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Description of Work	Quantity	Unit Price	Estimated Construction Budget
<u>New 12-inch Sewer Force Main</u>			
Soil Borings			
Allowance for Soil Borings	1 L.S.	\$20,000	\$20,000
Sewer Force Main Replacement Under River			
12" HDPE installed by Directional Drilling	400 l.f.	\$300.00/l.f.	\$120,000
Sewer Force Main Replacement Connections			
12" HDPE installed by open cut excavation	700 l.f.	\$150.00/l.f.	\$105,000
Subtotal			\$245,000
Contingencies and Engineering (40%)			\$100,000
Total		SAY	\$345,000
<u>Existing Sewer Force Main Evaluation and Rehabilitation for Redundancy (Future Option)</u>			
Dewater, Clean and CCTV existing sewer	1055 l.f.	\$30.00/l.f.	\$31,650
Sewer Evaluation	1 L.S.	\$30,000 ea.	\$30,000
Excavate and replace Bends and connections	6 Ea	\$10,000 ea.	\$60,000
12-inch Cured in place liner	1055 lf	\$125/l.f.	\$132,000
Subtotal			\$253,650
Contingencies and Engineering (40%)			\$100,000
Total		SAY	\$353,650



July 30, 2018
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Page 4 of 4

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STANTEC CONSULTING SERVICES INC.

A handwritten signature in black ink, appearing to read "Victor Olson".

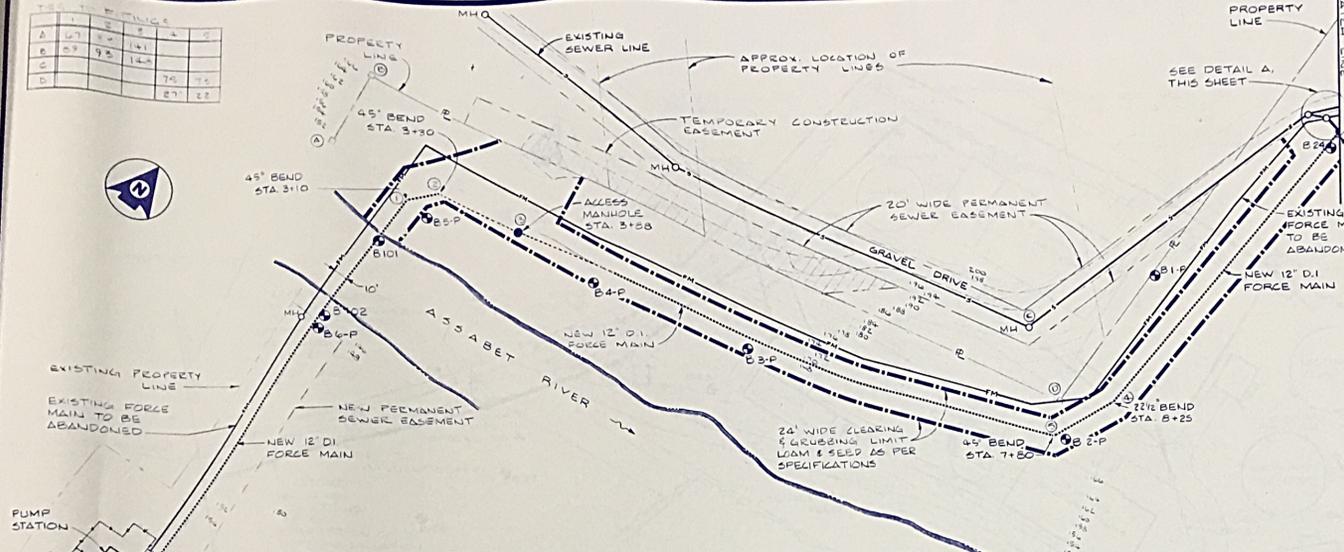
Victor Olson
Senior Project Manager

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Fax: 978-692-4578
victor.olson@stantec.com

Attachment: Attachment

c. Garry McCarthy, Stantec

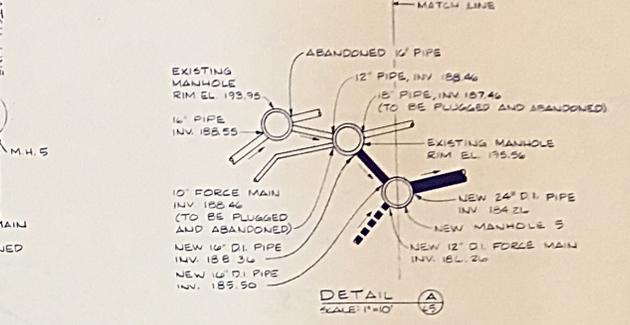
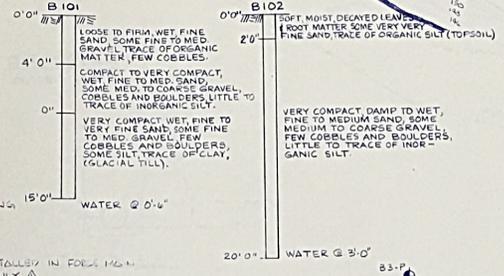
A	27	28	29	30
B	25	26	27	28
C	23	24	25	26
D	21	22	23	24



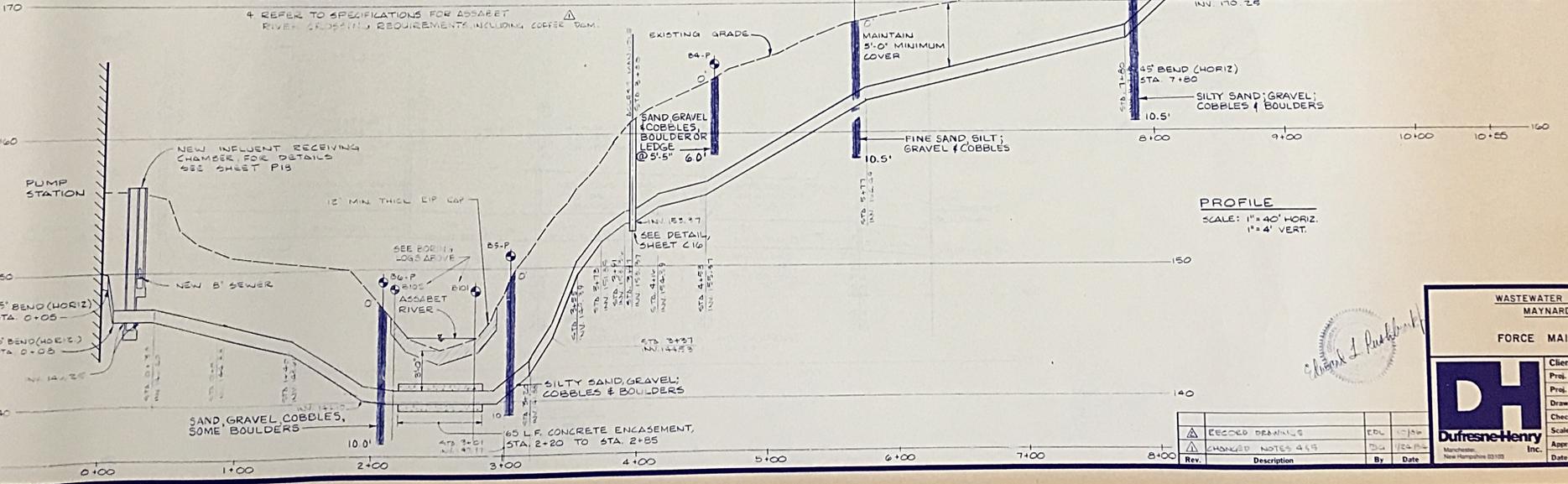
SITE PLAN
SCALE: 1"=40'

NOTES

1. MAINTAIN MINIMUM 15' SEPARATION BETWEEN NEW AND EXISTING FORCE MAIN FROM STA 3+40 TO STA 8+25.
2. SEE SHEET C10 FOR ACCESS MANHOLE DETAIL.
3. 12" FINE DIRECT BURIAL TELEMETRY CABLE TO BE ENCASED IN SAME TRENCH WITH NEW FORCE MAIN. MIN. 3'-0" OF COVER & MAINTAIN 2'-0" SEPARATION w/ FORCE MAIN EXCEPT CABLE TO BE PLACED IN PVC CONDUIT INSTALLED IN FORCE MAIN CONC. ENCASEMENT AT RIVER CROSSING ONLY.
4. REFER TO SPECIFICATIONS FOR ASSABET RIVER CROSSING REQUIREMENTS, INCLUDING COVER DEM.



DETAIL A
SCALE: 1"=10'



PROFILE
SCALE: 1"=40' HORIZ.
1"=4' VERT.

RECORD DRAWINGS

WASTEWATER TREATMENT FACILITIES
MAYNARD, MASSACHUSETTS
FORCE MAIN PLAN AND PROFILE

DH Duffresne-Henry Inc.	Client No. 33-0092	C5
	Proj. Manager E. RUSHBROOK	
Proj. Designer RAH/RHA	Scale AS NOTED	Sheet 11 of 11
Drawn By KLM/DJG	Approved GPC	Date NOV. 1985
Checked By CAH	Date	

Rev.	Description	By	Date
1	RECORDED DRAWINGS	EDL	10/24/85
2	CHANGED NOTES 445	DJA	11/24/85

3057.1