TOWN OF UXBRIDGE
DEPARTMENT OF PUBLIC WORKS
147 HECLA STREET
UXBRIDGE, MASSACHUSETTS 01569-1326
508-278-8616 ♦ Fax 508-278-3179

Benn S. Sherman, P.E.
Director

MEMORANDUM

DATE: March 17, 2021

TO: Steven Sette, Town Manager
Board of Selectmen/Water & Sewer Commissioners

FROM: Benn S. Sherman, P.E.

RE: **DPW Enterprise Funds Capital Planning Requests-FY2022-2031 (Version 1)**

As requested, I am providing the Department of Public Works enterprise funds capital plan for FY2022-2031. This plan considers the needs of the DPW Water and Wastewater Divisions (Enterprise Funds) only. General fund needs were previously presented to the Capital Committee on March 3, 2021 for consideration.

Overall, the capital plan continues to be heavy with large infrastructure projects because a number of previous capital requests have fallen into the "*Previously Requested*" category and not considered for funding. This category continues to grow every year at the same time the condition of our infrastructure, rolling stock, and other equipment continue to decline. I worked with strategic staff throughout the DPW to evaluate and provide a fresh perspective with all the existing and new capital requests submitted. Attached please find the updated capital requests for the Water and Wastewater Divisions. This summary is intended to provide additional information that should be considered while evaluating the merits of the requests.

The updated plan consists of the previously requested, reprioritized requests and new items. The Department utilized the new capital planning committee format for submitting requests. Some of the items include our best estimate for the capital need based on available studies and current project bids. Planning and design estimates were calculated on a percentage of the construction cost. We will continue to work closely with Financial Department staff with respect to funding analysis, pursue other opportunities to secure funding from non-traditional sources, and continue to evaluate the projects and programs and how they impact the Department's mission.

Thank you for your consideration of our plan and the support given the Department of Public Works in past years. Please let me know if this does not meet your needs or if I can provide additional details on the proposals. I will be in attendance at the meeting on March 22, 2021 to answer any questions you may have on these requests.

CC: Jim Boliver, Water Operations Supervisor
Chris Welch, Wastewater Operations Supervisor
Lisa Troast, Treasurer/Collector
Michelle Laramee, Accountant

Attachment: 2022-2031 CIP Long Range Summary
DPW Fleet Schedule
FY2022-2026 CIP Submission Forms-Wastewater Enterprise Fund
FY2022-2026 CIP Submission Forms-Water Enterprise Fund

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DEPARTMENT OF PUBLIC WORKS CAPITAL PLAN
LIST OF CAPITAL PROJECTS/PURCHASES BY DIVISION

DEPART/ DIVISION	PROJECT/PROGRAM	FY2022	FY2023	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029	FY2030	FY2030	TOTALS
HIGHWAY	DPW FACILITY MATERIALS HANDLING	160,000	160,000	170,000	160,000	170,200						820,200
HIGHWAY	PAVEMENT MANAGEMENT PROGRAM	950,000	950,000	950,000	950,000	950,000	950,000	950,000	950,000	950,000	950,000	9,500,000
HIGHWAY	TRACKLESS MACHINE BOOM FLAIL ATTACHMENT	39,000										39,000
HIGHWAY	HIGH & PARK STREETS DRAINAGE STUDY	14,600										14,600
HIGHWAY	LINWOOD AREA DRAINAGE STUDY	15,400										15,400
HIGHWAY	ALBEE ROAD CULVERT REPLACEMENT CONSTRUCTION	150,000										150,000
HIGHWAY	SUTTON ST. CULVERT DESIGN & CONSTRUCTION	165,475	1,200,000									1,365,475
HIGHWAY	BRIDGE & CULVERT REPLACEMENT PROGRAM	73,000	337,000	315,000	351,000	526,000	350,000	350,000	350,000	350,000	350,000	3,352,000
HIGHWAY	FLEET REPLACEMENT PROGRAM	200,000	200,000	120,000	290,000	200,000	150,000	150,000	150,000	150,000	150,000	1,760,000
HIGHWAY	EMERGENCY GENERATOR (ENG. & IMPLEMENTATION)		20,000	200,000								220,000
HIGHWAY	SALT SHED				75,000	500,000						575,000
HIGHWAY	AIR HANDLING SYSTEM				65,000							65,000
HIGHWAY	GARAGE ADDITION ENGINEERING/CONSTRUCTION					1,100,000	1,000,000					2,100,000
	SUBTOTAL	***1,767,475***	***2,867,000***	***1,755,000***	***1,891,000***	***3,446,200***	***2,450,000***	***1,450,000***	***1,450,000***	***1,450,000***	***1,450,000***	
TOTAL - PUBLIC WORKS HIGHWAY DIVISION (10-YEAR)												**19,976,675**
WATER	NEW SOURCE DEVELOPMENT & FACILITY PLAN	100,000										100,000
WATER	WATER WELL REHABILITATION PROGRAM		250,000	250,000	250,000							750,000
WATER	VEHICLE & EQUIPMENT REPLACEMENT PROGRAM		55,000			38,000	46,000	88,588		151,500		379,088
WATER	INFRASTRUCTURE IMPROVEMENT PROGRAM											-
WATER	*A - RT. 16/DOUGLAS ST. EXPANSION*					259,000	1,036,000					1,295,000
WATER	*B - DOUGLAS ST/RT. 146 LOOP*		752,000	3,008,000								3,760,000
WATER	*C - DOUGLAS ST WATER MAIN REPLACEMENT 1*		124,000	496,000								620,000
WATER	*D - DOUGLAS ST WATER MAIN REPLACEMENT 2*		319,000		1,276,000							1,595,000
WATER	*F - RIVULET ST WATER MAIN REPLACEMENT*					815,000						815,000
WATER	*G - HIGH ST WATER MAIN REPLACEMENT*					262,000	1,048,000					1,310,000
WATER	*H - BLACKSTONE ST WATER MAIN REPLACEMENT*			36,000	144,000							180,000
WATER	*I - RT. 122/MILLVILLE RD & ALBEE RD EXPANSION*					765,000		3,060,000				3,825,000
WATER	*J - EAST STREET AREA SYSTEM IMPROVEMENTS*				700,000		3,000,000					3,700,000
	SUBTOTAL WATER ENTERPRISE	***100,000***	***1,500,000***	***3,790,000***	***2,370,000***	***2,139,000***	***5,130,000***	***3,148,588***	***-***	***151,500***	***-***	
TOTAL - PUBLIC WORKS WATER ENTERPRISE (10-YEAR)												**18,329,088**
WASTEWATER	LANDFILL MOWER	70,000										70,000
WASTEWATER	INFLOW/INFILTRATION PROGRAM	300,000	300,000	300,000	300,000	300,000						1,500,000
	SUBTOTAL WASTEWATER ENTERPRISE	***370,000***	***300,000***	***300,000***	***300,000***	***300,000***	-	-	-	-	-	
TOTAL - PUBLIC WORKS WASTEWATER ENTERPRISE (10-YEAR)												**1,570,000**
	SUBTOTAL ENTERPRISE FUNDS	***470,000***	***1,800,000***	***4,090,000***	***2,670,000***	***2,439,000***	***5,130,000***	***3,148,588***	-	***151,500***	-	19,899,088
	SUBTOTAL GENERAL FUND	***1,767,475***	***2,867,000***	***1,755,000***	***1,891,000***	***3,446,200***	***2,450,000***	***1,450,000***	***1,450,000***	***1,450,000***	***1,450,000***	19,976,675
	TOTAL BY YEAR	**2,237,475**	**4,667,000**	**5,845,000**	**4,561,000**	**5,885,200**	**7,580,000**	**4,598,588**	**1,450,000**	**1,601,500**	**1,450,000**	
10-YEAR GRAND TOTAL												**39,875,763**

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Benn S. Sherman, P.E.
Director

Town of Uxbridge
Department of Public Works Fleet Schedule

ITEM	DEPT	CALL #	YEAR	MAKE/MODEL	SERV LIFE EARLY	SERV LIFE LATE	AGE	EARLY	LATE	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
422	DPW/HWY		1985	LONG HAUL	10	15	36	1995	2000												
422	DPW/HWY		1987	GARDN	10	15	34	1997	2002					20,000							
422	DPW/HWY	H-13	1987	MACK R685T	15	20	34	2002	2007				200,000								
422	DPW/HWY	H-8	1988	MACK RD600	15	20	33	2003	2008						200,000		200,000				
422	DPW/HWY		1989	CENTER TA0817	10	15	32	1999	2004												
422	DPW/HWY	H-6	1989	MACK RD600	15	20	32	2004	2009							200,000	200,000				
422	DPW/HWY	H-2	1990	INTERNATIONAL 7100	15	20	31	2005	2010			200,000									
422	DPW/HWY	H-7	1990	INTERNATIONAL 7100	15	20	31	2005	2010												
422	DPW/HWY	H-5	1992	MACK RD600	15	20	29	2007	2012		240,000										
422	DPW/HWY	L-2	1996	VOLVO L90C	10	15	25	2006	2011												
422	DPW/HWY		1997	LOADER UTILITY TRAILER	10	15	24	2007	2012												
422	DPW/HWY	H-15	1998	FORD L8501	15	20	23	2013	2018									210,000			
422	DPW/HWY	BT-1	2000	FORD F350 SUPER DUTY	10	12	21	2010	2012									95,000			
422	DPW/HWY	CH-1	2000	WOODSMAN CHIPPER	12	15	21	2012	2015					100,000							
422	DPW/HWY	H-11	2001	INTERNATIONAL 2554	15	20	20	2016	2021												
422	DPW/HWY	H-9	2003	FORD F-450 SUPER DUTY	10	12	18	2013	2015						90,000						
422	DPW/HWY	DPW-1	2003	FORD CROWN VICTORIA	10	12	18	2013	2015												
422	DPW/HWY	H-3	2003	STERLING L8500	15	20	18	2018	2023									200,000			
422	DPW/HWY		2007	CURTIS	10	15	14	2017	2022												
422	DPW/HWY	T-2	2008	TRACKLESS MT5	10	12	13	2018	2020								187,000				
422	DPW/HWY	H-22	2008	FORD F-350	10	12	13	2018	2020		46,500										
422	DPW/HWY		2009	CARRY ON	10	15	12	2019	2024												
422	DPW/HWY		2010	NORTH NEWTON TRAILER	10	15	11	2020	2025												
422	DPW/HWY	H-18	2012	INTERNATIONAL 7400	15	20	9	2027	2032												
422	DPW/HWY	L-1	2013	JOHN DEERE	10	15	8	2023	2028									200,000			
422	DPW/HWY		2014	CARRY ON TRAILER	10	15	7	2024	2029										11,500		
422	DPW/HWY	L-3	2015	WACKER NEUSON	10	15	6	2025	2030											116,000	
422	DPW/HWY	H-12	2016	FORD F-250	10	12	5	2026	2028									61,000			
422	DPW/HWY	H-17	2016	FORD F-250	10	12	5	2026	2028									61,000			
422	DPW/HWY	H-10	2016	FORD F-550	10	12	5	2026	2028									102,000			
422	DPW/HWY	H-19	2016	FORD F-550	10	12	5	2026	2028									102,000			
422	DPW/HWY	SW-1	2016	ELGIN PELICAN	10	12	5	2026	2028									280,000			
422	DPW/HWY	H-24	2017	MACK GU713	15	20	4	2032	2037												
422	DPW/HWY	E-1	2017	CAT 304E2	10	15	4	2027	2032												
422	DPW/HWY	H-4	2018	FORD F550	10	12	3	2028	2030											109,000	
422	DPW/HWY	H-1	2018	FORD F250	10	12	3	2028	2030											66,000	
422	DPW/HWY	T-1	2019	TRACKLESS MT7	10	12	2	2029	2031											66,000	
422	DPW/HWY	H-25	2019	FORD F550	10	12	2	2029	2031												
423	DPW/HWY	MB-1	2020	VER-MAC PCMS-548	10	15	1	2030	2035												
424	DPW/HWY	MB-2	2020	VER-MAC PCMS-548	10	15	1	2030	2035												
422	**40**								**Highway Division Totals**	**-**	**286,500**	**200,000**	**200,000**	**120,000**	**290,000**	**200,000**	**587,000**	**1,311,000**	**11,500**	**357,000**	**-**

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Benn S. Sherman, P.E.
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ITEM	DEPT	CALL #	YEAR	MAKE/MODEL	SERV LIFE EARLY	SERV LIFE LATE	AGE	EARLY	LATE	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031
440	DPW/SEWER	S-4	2011	INTERNATIONAL 7400 SAF	10	15	10	2021	2026										242,000		
440	DPW/SEWER	S-5	2014	FORD F-150	10	12	7	2024	2026							38,000			38,000		
440	DPW/SEWER		2015	CARMATE	10	15	6	2025	2030												
440	DPW/SEWER	S-2	2016	FORD F-550	10	12	5	2026	2028									115,000			
440	DPW/SEWER	S-3	2017	FORD F-250	10	12	4	2027	2029										63,500		
440	DPW/SEWER	S-1	2017	FORD F-250	10	12	4	2027	2029										63,500		
440	**6**								**Sewer Division Totals**	**-**	**-**	**-**	**-**	**-**	**-**	**38,000**	**-**	**115,000**	**407,000**	**-**	**-**
450	DPW/WATER	W-4	2005	FORD F-650 SUPER DUTY	15	20	16	2020	2025						85,000						
450	DPW/WATER		2007	BELMONT	10	15	14	2017	2022												
450	DPW/WATER		2008	HOMESTEADER	10	15	13	2018	2023												
450	DPW/WATER	W-6	2008	FORD RANGER	10	12	13	2018	2020				55,000								
450	DPW/WATER	W-2	2013	FORD F-550	10	12	8	2023	2025											115,000	
450	DPW/WATER	W-3	2014	FORD F-150 EXTCAB	10	12	7	2024	2026							38,000					
450	DPW/WATER	W-9	2015	FORD F-250 SUPER DUTY	10	12	6	2025	2027								46,000				
450	DPW/WATER	W-7	2015	DITCH WITCH	10	15	6	2025	2030											36,500	
450	DPW/WATER	W-1	2016	FORD F-350	10	12	5	2026	2028									88,588			
450	DPW/WATER	W-8	2018	ALLMAND PRO2	10	15	3	2028	2033												
450	DPW/WATER	W-5	2019	CAT	10	15	2	2029	2034												
450	**11**								**Water Division Totals**	**-**	**-**	**-**	**55,000**	**-**	**85,000**	**38,000**	**46,000**	**88,588**	**-**	**151,500**	**-**
TOTAL	**57**									**-**	**286,500**	**200,000**	**255,000**	**120,000**	**375,000**	**276,000**	**633,000**	**1,514,588**	**418,500**	**508,500**	**-**

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Captial Improvement Request

Date Submitted: 10/6/2016 Date of Last Edit: 3/17/2021

Project Title: Inflow & Infiltration Program
Category: Infrastructure
Department: Public Works-Wastewater Division

Project: [ ] New [X] Recurring [X] Resubmission
[X] Multiyear Phase [ ] of [ ]

Department Priority

[X] Urgent/Legally Required
[X] Maintain Service
[ ] Enhancement

Discuss Operating Budget Impact: *Explain the project's short- and long-term impacts on the community's operating budget.*

Stormwater infiltration and inflow are major contributors to sewer flow, and thus they can be significant triggers for combined and sanitary sewer overflows, both of which introduce contaminants to surface waters. Excess inflow and infiltration into the wastewater collection system increase collection system maintenance and treatment costs.

Recommended Financing

Funding Category	Five-Year Total	Estimated Project Costs by Fiscal Year				
		FY2022	FY2023	FY2024	FY2025	FY2026
Study/Design	$0					
Land Acquisition	$0					
Construction	$1,500,000	$300,000	$300,000	$300,000	$300,000	$300,000
Equipment/Furnishings	$0					
Contingency	$0					
Other	$0					
TOTAL	**$1,500,000**	**$300,000**	**$300,000**	**$300,000**	**$300,000**	**$300,000**

Grant Amount Requested						
CPA Amount Requested						
Net of CPA and Grants	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Operating Budget Impact						
During Project						

Post-Project Annual	
Post-Project One-time	

Funding Source(s)
Check all that apply

X	Tax Levy
X	Debt
X	Enterprise Receipts
X	Stabilization
	Free Cash
	Revolving Fund
	CPA
X	Grant(s) or Other

CPA Purposes(s)
Check all that apply

	Open Space
	Recreation
	Historical
	Housing

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Project Fact Sheet

Project Title: Inflow & Infiltration Program
Initiation Date: 10/6/16
Project Initiator: Benn Sherman
Department: Public Works-Wastewater Division
Projected Fiscal Year Start/Finish: FY2022-2026

Existing Conditions

The existing sanitary collection system ranges in age from the mid 1970's to 2020. Inflow and infiltration into the collection system cause issues in the collection system and treatment process.

Project Description

In 2016 the Town submitted a request to MassDEP to pursue funding approved at the local level to address action items to remove infiltration/inflow as recommended in the Infiltration/Inflow Analysis Final Report, prepared by Beta Group, Inc. and revised in October 2005. Conditional approval was received for the Town's request in a letter from MassDEP dated June 8, 2016. As requested in the letter, a schedule of recommended action items was provided to MassDEP on September 22, 2016. The DPW continued to complete I&I projects at the same time we completed an updated I&I report to meet the regulations. This was submitted to MassDEP in December

Justification/Benefits

Every 10 years, MassDEP requires the I & I plan be reevaluated in accordance with the regulations.

Operating Budget Discussion

Increases in I & I lead to increase collection system and treatment costs.

Estimate Basis

Estimates will be developed based on the recommended action plan approved by MassDEP. For the purposes of this item, we are maintaining the annual commitment that was previously approved by MassDEP.

Time/Project Schedule

To be agreed upon with MassDEP and the Town based on the report findings.

Alternatives

The DPW Wastewater Division needs to constantly monitor and evalute the collection system to elminate I & I from the system.

Key Assumptions

Other

Memorandum

December 21, 2017

To:	David Boyer PE, MassDEP	Ref. No.:	11144264
From:	Anastasia Rudenko PE, BCEE, ENV SP Marc Drainville PE, BCEE, LEED AP	Tel:	774-470-1637 774-470-1637
CC:	Benn Sherman PE, Town of Uxbridge		
Subject:	**Uxbridge – I/I Analysis and SSES Plan – Addendum to 2005 Report**		

1. Background

In 2016 the Town of Uxbridge, MA submitted a request to MassDEP to pursue funding approved at the local level to address action items to remove infiltration/inflow as recommended in the Town of Uxbridge, Massachusetts Infiltration/Inflow Analysis Final Report, prepared by Beta Group, Inc. and revised in October 2005.

Conditional approval was received for the Town's request in a letter from MassDEP dated June 8, 2016. As requested in the letter, a schedule of recommended action items was provided to MassDEP on September 22, 2016. A copy of the letter is attached to this memo.

2. I/I Analysis Update

The June 8 letter requested that the Town provide an update on what recommendations have been completed prior to December 31, 2017 in the form of an addendum to the 2005 Report. The summary provided below is intended to serve as the addendum requested in the MassDEP letter.

1. Town-wide manhole inspections and smoke testing of two sub-sections of the Town were conducted, as recommended in the 2005 Report. The findings of the field investigations are summarized in the 'Draft Manhole Inspections and Smoke Testing Report – Town of Uxbridge' prepared by GHD, dated June 2017 (attached). Due to the low quantity of I/I that was observed during the inspection period, none of the sewer rehabilitation repairs were found to be cost-effective to rehabilitate based on the amount of infiltration observed during the inspection. Although minimal infiltration was noted during the manhole inspections, it was recommended that items related to potential inflow be addressed over a multi-year period with the highest priority items being addressed first. It was also recommended that structural and hydraulic deficiencies identified during the manhole inspection, be rehabilitated to maintain system integrity.

2. The Town has inspected 50 additional manholes and repaired 20 chimneys to reduce I/I.

3. The Town conducted a CCTV inspection of a portion of the main interceptor gravity sewer that was suspected to be in poor condition. Defects were classified using the NASSCO Pipeline Assessment Certification Program (PACP). A point location of infiltration was discovered during the CCTV inspection. During FY 2017, the Town initiated design to repair the defect. Construction is anticipated in Spring 2018.

4. The Town has initiated design of manhole rehabilitation measures to address the deficiencies identified during the manhole inspections. Manhole rehabilitation work is anticipated to be implemented as a multi-year program with the first year of work anticipated to be FY 2018.

Please contact Marc Drainville at marc.drainville@ghd.com or 774-470-1634 with any questions.

Enclosures

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

June 8, 2016

Benn S. Sherman
Uxbridge DPW Director
147 Hecla Street
Uxbridge, MA 01569

Re: UXBRIDE – BWR
314 CMR 12.04(2)(c)
I/I Analysis and SSES Plan
Conditional Approval

Dear Mr. Sherman:

The Central Regional Office of the Massachusetts Department of Environmental Protection ("MassDEP") has completed its review of the town's 2005 Infiltration/Inflow Analysis Final Report submitted to this office on March 31, 2016. The Town requests MassDEP's approval of the report to satisfy the requirements of 314 CMR 12.04(2). The town expects to pursue funding approval at the local level in order to address the 2005 recommended action items to remove infiltration/inflow (i.e. I/I). MassDEP received the following document prepared by Beta Group, Inc.:

Town of Uxbridge, Massachusetts
Infiltration/Inflow Analysis
Final Report
June 2005
Revised October 2005

In 2014, the regulations at 314 CMR 12.04(2) were revised to require all sewer system authorities to develop and implement an ongoing plan to control I/I to the sewer system. As part of these regulations each authority is required to complete and submit the I/I Analysis on or before December 31, 2017. This submittal of a previous analysis performed in 2005 is the Town's effort to comply with 314 CMR 12.04(2). As part of its review, MassDEP notes the following:

a) The 2005 I/I analysis was completed using the one year 6 hour design storm rather than a five year 24 hour storm event required under 314 CMR 12.04(2)
b) A flow monitoring program was conducted within the Town's existing collection system which was divided to eight subareas;

c) Peak infiltration rates for all subareas were not excessively high, ranging from 392 to 2,474 gpd per inch diameter per mile (gpd/idm);

d) Only two of the eight subareas (5 and 6) showed any indication of inflow as a results of the significant storm event, with a total design storm inflow volume of 0.153 million gallons;

d) Flow isolation and manhole inspections were performed in parts of subareas 2 and 4.

Recommended actions, with estimated cost totaling $638,000, were discussed in the 2005 report including:

- $52,000 for smoke testing in subareas 5 and 6, and follow up;
- Repairing selected pipe defects ($3,600, not part of the $638k total);
- $60,000 for repairing all defected manholes; and
- A town wide manhole inspections ($71,000) with follow up repair work ($455,000).

During a meeting held in this office on May 4, 2016 you stated that the Town has included funds to begin addressing the recommendations of the 2005 study in its upcoming FY 2017 budget during May's Town Meeting. If the 2005 I/I study is acceptable regarding the required 2017 submittal, the Town can submit a more detailed schedule to address recommendations from this report.

The Town's WWTF's average flows discharged to the Blackstone River reported for years 2006 through 2014 reveal a 25% increase when compared to flows from 1996 through 2004 (see Table 2-2 of the report). It is quite possible and likely that I/I may have contributed to the flow increase. Current discharge flows from the facility remain below the permit limit; however, the treatment and transport cost analysis provided in Section 6.2.1 of the report does not reflect more stringent discharge limits imposed by the current 2013 discharge permit (MA0102440).

As discussed above, findings of the 2005 I/I analysis may not describe the conditions of the sewer collection system today and does not meet the current I/I analysis requirement regarding the design storm. On the other hand, the 2005 I/I analysis was found to be well prepared and the recommended actions seem to be appropriate for the Town to initiate identifying and removing I/I systematically.

Based on the review, the Department hereby approves the Town's request with the following conditions:

1. Within sixty (60) days of the date of this correspondence, the Town shall submit a definitive schedule to this office of when the recommended action items stated in the 2005 report will be completed. All identified inflows should be removed from the system.

2. On or before December 31, 2017, the Town should submit an addendum to the 2005 report to the Department for review and approval with an update as to what recommendations have been completed up to that date, and what remains to be completed including a schedule for completion. The addendum should also discuss the results of any smoke tests and/or manhole inspections performed so far, history of sanitary sewer overflows (SSOs), when the Town expects to perform additional I/I analysis to meet the 5-year 24-hour design storm requirement, and if an additional Sewer System Evaluation Survey (SSES) is needed to identify excessive I/I.

Should you have any questions regarding this matter, please contact Ning Chen of this office at (508)767-2706.

Sincerely,

David Boyer, P.E.
Section Chief
Wastewater Program

nc\ i-i and sses apr-304

cc: Uxbridge Board of Health

David Ferris, DEP-Boston

TOWN OF UXBRIDGE
DEPARTMENT OF PUBLIC WORKS
147 HECLA STREET
UXBRIDGE, MASSACHUSETTS 01569-1326
508-278-8616 ♦ Fax 508-278-3179

Benn S. Sherman, P.E.
Director

I/I ANALYSIS AND SSES PLAN

The Town of Uxbridge has an I/I study that was completed in 2005. This study has several recommendations including further analyses of Sub Areas 5 and 6 via smoke testing and system-wide manhole evaluations for all manholes that were not subject to inspection in 2005. Specific system improvements include repair to three manholes and one pipe segment. In addition, it was suspected that additional manhole repair and possibly a further investigation of Sub areas 2, 4, 6 and 8 will be needed.
The following is a proposed plan for I/I investigation and reduction work in the Town of Uxbridge. This is based on estimates from the 2005 I/I study and the associated costs below are allowances only. This plan will be revised as work progresses.

Year 1 – 2016-7
Further analysis including:

- Inflow investigations in subareas 5 and 6
- Town-wide MH inspection

Year 2 – 2017-8
Further analysis may include:

- Investigations of sub areas 2, 4, 6 and 8 if deemed to be warranted after MH inspections and and/or sub areas 5 and 6 if deemed to be warranted after smoke testing

Physical improvements

- Design, bid and construct improvements identified in I/I study and year 1 (Phase I of III)

Year 3 – 2018-9
Physical improvements

- Design, bid and construct improvements identified in I/I study and year 1 (Phase II of III)

Year 4 – 2019-20
Physical improvements

- Design, bid and construct improvements identified in I/I study and year 1 (Phase III of III)

Year 5 – 2019-20
Perform new I/I study to meet 5yr-24hr design storm requirement

Draft for Review

This document is in draft form. A final version of this document may differ from this draft. As such, the contents of this draft document shall not be relied upon. GHD disclaims any responsibility or liability arising from decisions made based on this draft document.

Manhole Inspections and Smoke Testing Report

Town of Uxbridge, MA

GHD | 1545 Iyannough Road, Hyannis MA 02601

11134425 | June 2017

Table of Contents

1. Introduction and Background 1
   - 1.1 Background 1
   - 1.2 Scope 1
   - 1.3 Summary of Prior Reports and Projects 1
2. Collection System Methodology and Purpose 2
   - 2.1 Methodology and Purpose 2
   - 2.2 Smoke Testing Methodology 2
   - 2.3 Manhole Inspection Methodology 2
3. Collection System Testing Findings 3
   - 3.1 Introduction 3
   - 3.2 Smoke Testing 3
   - 3.3 Manhole Inspections 4
4. Collection System Recommendation and Cost Effective Analysis 4
   - 4.1 Introduction 4
   - 4.2 Smoke Testing Recommendations 5
   - 4.3 Manhole Rehabilitation Recommendations 5
   - 4.4 Cost-Effective Evaluation 6
   - 4.5 Probable Construction Cost 6
   - 4.1 Next Steps 7

Table Index

Table 4.1 Recommended Manhole Rehabilitation Summary 6

Table 4.2 Probable Construction Costs for Sewer Rehabilitation (2017$) 7

Figure Index

Figure 3.1 Location of Subareas 5 and 6 3

Figure 3.2 Manhole Condition Assessment Findings 4

Appendix Index

Appendix A 2005 I/I Report Excerpt - Subareas

Appendix B Manhole Inspection Reports

Appendix C Smoke Testing Results

Appendix D Uxbridge Collection System Key Map

1. Introduction and Background

1.1 Background

The Town of Uxbridge, MA (Town) owns and operates a central sanitary system. The system includes approximately 179,000 linear feet of gravity sewer, five pumping stations, approximately 2,700 linear feet of force main, and a wastewater treatment facility (WWTF).

Infiltration and Inflow (I/I) is rain or groundwater that seeps or flows into the collection system and contributes to the total volume of wastewater treated by the Uxbridge WWTF. Infiltration is generally defined as a steady 24-hour flow that results from groundwater entering a sewer system through leaking pipe joints and manholes. Infiltration is affected by increases in the groundwater level during periods of wet weather. Inflow is the direct discharge of runoff into the collection system during rainfall events. Inflow can occur when rainwater flows through holes in the manhole covers; or through illegal direct connections of catch basins, roof drains, foundation drains, cellar drains, and sump pumps into the collection system.

An Infiltration and Inflow (I/I) Analysis was completed for the Uxbridge collection system by BETA Group, Inc. in 2005. The study concluded that the Town was not experiencing a significant I/I problem and included several recommendations for further investigation, including: inflow investigations of two sub-areas; repairing select pipe defects; repairing identified manhole defects; and conducting a Town-wide manhole inspection and repair program.

In February 2017, the Town retained GHD to implement two of the 2005 I/I analysis recommendations—inflow investigations of two sub-areas, and a Town-wide manhole inspection.

1.2 Scope

The scope of services provided by GHD in connection with this assignment included the following:

Task 1 – Kickoff Meeting. A kickoff meeting was conducted for the project on March 6, 2017.

Task 2 – Perform Smoke Testing for Subarea 5 and 6. Smoke testing was conducted in Subareas 5 and 6, as defined by the 2005 I/I Analysis Report (see Appendix A).

Task 3 – Perform Level 1 (per NASSCO's Manhole Assessment Certification Program) Manhole Inspection for up to 910 manholes. Level 1 manhole inspections were performed for 849 manholes, as further described in Section 2.

Task 4 – Complete Report and Identify Recommendations for Further Study. A draft and final report was prepared summarizing the results of the smoke testing and manhole inspection and recommendations for further study were identified.

1.3 Summary of Prior Reports and Projects

The following document and datasets were provided by the Town and used in the development of this report:

- 'Town of Uxbridge, Massachusetts Infiltration/Inflow Analysis Final Report,' prepared by BETA Group, Inc., dated June 2005, revised October 2005
- GIS data from 2014

2. Collection System Methodology and Purpose

2.1 Methodology and Purpose

Smoke testing and manhole inspections were performed, as recommended in the 2005 I/I report. Recommendations for the mitigation of I/I and correction of structural problems identified within the sewer system were developed based upon inspection results. The methodology for each type of testing is outlined below.

2.2 Smoke Testing Methodology

The 2005 I/I Report recommended smoke testing be conducted in Subareas 5 and 6 (see Appendix A). Smoke testing was conducted in the two sub-areas by placing a blower over a centrally located manhole and forcing non-toxic, smoke-filled air through a sewer line. The smoke was generated using smoke fluid (vs. smoke candles). Under pressure, the smoke fills the sanitary sewer including service lateral connections. The smoke is blown into the system under pressure and follows the path of the leak to the ground surface, revealing potential sources of inflow. Smoke discharged from storm sewer catch basins, downspouts, or footing drains indicate a connection between these sources and the sanitary sewer and warrant additional investigation.

2.3 Manhole Inspection Methodology

Manholes have been documented to contribute significant quantities of inflow during wet weather. Specific areas that allow large quantities of inflow to enter at manholes are covers with vent holes and the adjustment ring area. Significant reduction of inflow has been achieved within collection systems by addressing these two sources.

At the time of the 2005 I/I report, the Uxbridge collection system included approximately 910 manholes. The 2005 I/I analysis included inspection of 60 manholes (approximately 10% of the existing system) and recommended that manhole inspections be conducted for the remaining manholes in the sewer system. Manholes inspected during the 2005 I/I Report are shown in Appendix A. 834 manholes were inspected as part of this project. Fifteen additional manholes were inspected by Town personnel. Since the 2005 I/I report, a few small sewer extensions have been added to the collection system. The Town indicated that manholes for these sewer extensions should not be included in the project, due to their recent date of construction.

The manhole inspections provided observations about manhole condition and identified sources of inflow or infiltration entering the system via manholes. The inspection notes included manhole location (street, grassed, wooded, marsh, etc.), identification of vented manhole covers, manhole height above grade, evidence of actual infiltration, and general observations on manhole condition. Per the Town's request the type of manhole cover, frame height, and number of brick rows for

chimneys that are over four rows tall were also noted. A blank manhole inspection report template is included in Appendix B. Manhole inspections were conducted during the spring (March 2017 through May 2017), when groundwater is expected to be at its highest. Manhole inspections were not conducted during adverse weather events (snow or rain) at the request of the Town.

3. Collection System Testing Findings

3.1 Introduction

Each of the testing and investigation methods used in the project provides important data and insight into the condition and problems within the Town's sanitary collection system. Defects identified were documented for evaluation by inspection crews. The following sections provide descriptions of the work performed as part of the study and testing results.

3.2 Smoke Testing

The 2005 I/I report recommended inflow investigations be conducted in Subareas 5 and 6. An excerpt from the 2005 I/I Report showing the Subareas is included in Appendix A and Figure 3.1.

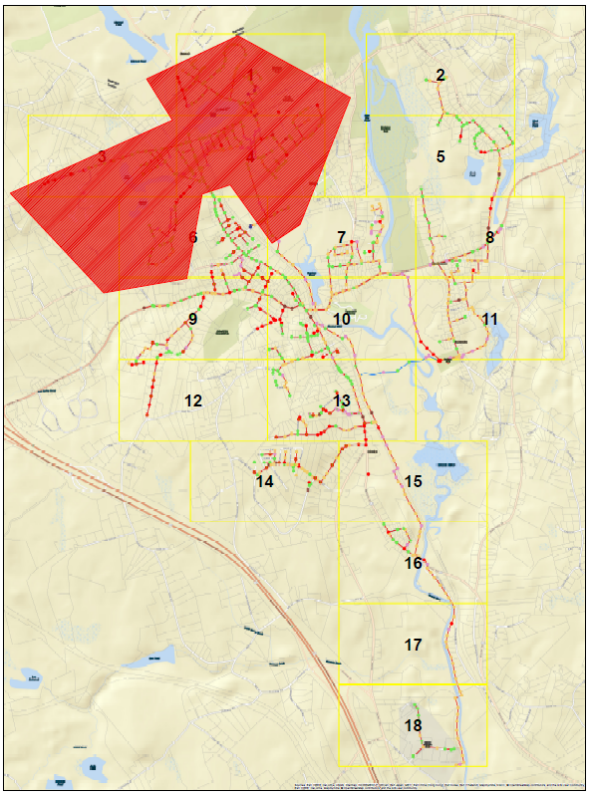


Figure 3.1 Location of Subareas 5 and 6

Approximately 52,000 linear feet (LF) of sewer was smoke tested as part of this project between May 23rd – May 31st, 2017. Smoke testing was conducted between approximately five manholes at

a time. One potential source of inflow through an illegal connection was identified during the smoke testing at 10 Highland Park. Smoke testing reports are included in Appendix B.

3.3 Manhole Inspections

Manhole inspections for the manholes described in Section 2.3 were performed on all but inaccessible or buried manholes (35 manholes were inaccessible). Manhole construction materials include precast concrete and brick. Manhole deficiencies noted by inspectors include: deteriorated manhole chimney, barrel, and/or bench; observed or evidence of leaks; offset frame and cover; and debris in the manhole.

As shown in Figure 3.2, the majority of the 849 manholes inspected were found to be in good to fair structural condition. Active leakage was observed in a small number of manholes. A summary of the findings from the manhole inspections is included in Appendix B. Manhole inspection reports and photos are also included in Appendix B.

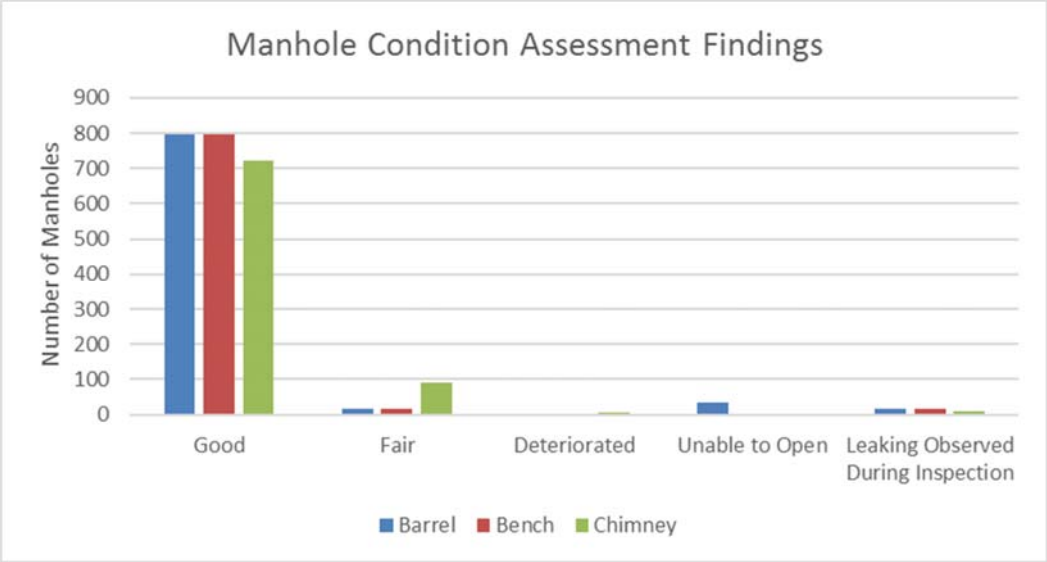


Figure 3.2 Manhole Condition Assessment Findings

4. Collection System Recommendation and Cost Effective Analysis

4.1 Introduction

There are three goals for the findings of the I/I analysis. The first is to repair structurally deficient areas of the sewer to prevent collapse and blockages of high risk sewers. The second goal is to seal the sewer against I/I by closing off parts of the sewer that allow water to enter the system. The third goal is to rehabilitate hydraulic deficiencies—such as manhole blockages—to maintain the design hydraulic conditions of the system.

Testing and inspections identified defective manholes and one inflow source. Rehabilitation recommendations to achieve these goals at these locations are provided in this Section with an opinion of probable project cost.

4.2 Smoke Testing Recommendations

One potential source of inflow through an illegal connection was identified during the smoke testing at 10 Highland Park. Confirmed private I/I sources should be referred to the property owner for correction. Smoke testing findings are summarized in Appendix C.

4.3 Manhole Rehabilitation Recommendations

Manholes within the study area were generally found to be in fair to good condition. Noted deficiencies include deteriorated manhole adjustment rings, barrels, and benches; and either active or evidence of I/I. Manhole rehabilitation methods vary based upon the specific conditions noted for each manhole. Methods that seal the interior of the manhole from water intrusion include manhole adjustment ring or chimney sealing, manhole adjustment ring rebuild and sealing, and sealing of the entire manhole.

Manhole adjustment ring or chimney sealing involves the placement of an epoxy or flexible lining in the chimney extending above the seam where the manhole frame rests on the chimney. This liner blocks water from entering the sewer and effectively seals the chimney from I/I intrusion. The remaining parts of the manhole can be left alone if they are in good condition. Due to the low volume of infiltration observed during the inspections chimney sealing was not recommended for any manholes.

Manhole adjustment ring rebuild and sealing is performed when the manhole chimney, frame, and cover are deteriorated and require that the chimney be rebuilt and the frame and cover reset prior to sealing the chimney. Rebuilding the adjustment ring requires some excavation around the upper part of the manhole to replace any degraded parts but leaves the cone and barrel untouched.

Sealing of the entire manhole involves the application of an epoxy or cement mortar-based coating on the entire manhole interior surface. This rehabilitation method is appropriate for manholes where there are a significant number of inflow points in the manhole or where the manhole interior is deteriorated but still stable. In these cases the manhole chimney, frame, and cover are deteriorated beyond the ability to simply seal them, and therefore, the adjustment ring is rebuilt prior to sealing the entire manhole. In most instances this process forms a water barrier that effectively stops leaks in the manhole.

To prevent inflow through manhole cover vents, it is recommended that watertight plastic dishes be installed in all sewers that are at or below grade. These dishes catch runoff entering the manhole so that it doesn't end up in the sewer system and conveyed to the WWTP. In addition, any manholes with covers that are below grade and in the grass should be raised to 3-inches above grade so that they do not get buried and/or collect runoff.

Specific recommendations for manhole rehabilitation in the study area are summarized in Table 4-1. Three manholes need to be located, raised to above grade, and inspected. It is anticipated that these manholes will require rehabilitation, including manhole bench cleaning and lining. Watertight

inserts are recommended for four manholes. Fifty-seven manholes are recommended to be completely lined. Other recommended repairs include rebuilding manhole benches and cleaning debris from manholes. Three manholes inspected in the program require replacement.

Table 4.1 Recommended Manhole Rehabilitation Summary

Manhole Rehabilitation	Type of Manhole Repair	Number of Manholes
Locate and Uncover Manhole	Infiltration/Inflow	3
Open and Inspect Manhole	Infiltration/Inflow	34
Raise Manhole	Structural	3
Insert Watertight Insert	Infiltration/Inflow	4
Clean Manhole Bench	Hydraulic	306
Rebuild Trough and Bench	Infiltration/Inflow	74
Rebuild Chimney and Seal; Reset Frame and Cover	Infiltration/Inflow	194
Seal Bench	Infiltration/Inflow	37
Seal Joints and Patch Holes	Infiltration/Inflow	60
Reset Frame and Cover	Infiltration/Inflow	9
Line Manhole	Infiltration/Inflow	57
Completely Replace Manhole	Infiltration/Inflow	3

4.4 Cost-Effective Evaluation

A cost-effective analysis was conducted to determine whether system defects are cost-effective to rehabilitate. The cost-effective analysis considered estimated costs to convey and treat I/I and included influent pumping, chemical used during wastewater treatment, and equipment maintenance costs. Due to the low quantity of I/I that was observed during the inspection period, none of the sewer rehabilitation repairs were found to be cost-effective to rehabilitate based on the amount of infiltration observed during the inspections. Although minimal infiltration was noted during the manhole inspections, it is recommended that items related to potential inflow be addressed as funding is available. Structural and hydraulic deficiencies, identified during the manhole inspections, should be rehabilitated to maintain system integrity. Rehabilitation measures could be addressed over a multi-year period with the highest priority items being addressed first.

4.5 Probable Capital Cost

The development of project-specific probable capital costs included the evaluation of historic bid prices for manhole cleaning, manhole rehabilitation, and general contract conditions. Engineering judgement and past experience were also used in preparing the probable costs. The costs for the rehabilitation measures outlined in the 2005 I/I report for the balance of the manholes (which have not been implemented by the Town yet) are also included in the project costs. Probable capital costs for sewer rehabilitation are provided in Table 4-2.

Table 4.2 Probable Capital Costs for Sewer Rehabilitation (2017$)

Item	Infiltration/Inflow Rehabilitation Costs	Hydraulic Rehabilitation Costs	Structural Rehabilitation Cost	Total Project Costs
Manhole Rehabilitation Recommendations from 2017 Inspections (2017$)[1]	$1,160,000	$400,000	$10,000	$1,570,000
Manhole Rehabilitation Recommendations from 2005 I/I Report (inflated to 2017$)[2]	$50,000	$40,000	$0	$90,000
Police Detail Allowance [3]	$30,000	$10,000	$0	$40,000
Total Cost	$1,230,000	$410,000	$50,000	$1,700,000
Total Cost (Midpoint of 3 Year Program)	$1,300,000	$400,000	$100,000	$1,800,000

Notes:

(1) Probable construction costs include a 30% contingency and 30% allowance for Legal, Fiscal, and Engineering Services.
(2) Probable construction costs from 2005 I/I Report, inflated to 2017 dollars through a 3% inflation factor.
(3) Police detail allowance is based on an estimated 120 days of work at $320/day.
(4) Midpoint of construction is anticipated to be halfway through FY19. Cost adjusted through a 3% inflation factor.
(5) Construction costs are based on an outside contractor performing the work. Routine repairs, such as manhole bench cleaning, could be performed by Town personnel.

4.1 Next Steps

It is recommended that the I/I, structural, and hydraulic rehabilitation measures be addressed through a multi-year program. The following is a proposed schedule for implementation:

1. **FY 18** (an allowance of $300,000 has been set aside for this work by the Town)
    - Develop plans, specifications, and a construction schedule for manhole repairs.
    - Initiate construction for manholes that are recommended to be replaced completely (three manholes).
    - Initiate construction for manholes that are recommended for lining, as funding allows. Other rehabilitation measures recommended for these manholes (such as rebuilding portions of the manhole) should be addressed as well.
2. **FY 19** (recommended allowance of $750,000)
    - Continue manhole lining rehabilitation, as funding allows.
    - Initiate other recommended manhole rehabilitation measures, as funding allows.
3. **FY 20** (recommended allowance of $750,000)
    - Continue implementing recommended manhole rehabilitation measures, as funding allows.

The most cost-effective approach for manhole rehabilitation is likely a location based approach, in which all of the manholes in a specified area of Town are addressed prior to moving on to the next location. Additionally, manholes for which the Town has specific concerns should be prioritized. Future infrastructure, utility, and paving projects should also be considered. The prioritization of manhole repairs should be established in the construction schedule during FY18.

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

April 1, 2020

Benn S. Sherman
Uxbridge DPW Director
147 Hecla Street
Uxbridge, MA 01569

Re: Uxbridge - BWR
314 CMR 12.04(2), Operations
Infiltration/Inflow Plan – 2020 Update
Conditional Approval

Dear Mr. Sherman:

The Central Regional Office of the Massachusetts Department of Environmental Protection ("MassDEP") has reviewed the town of Uxbridge's (the "town") infiltration and inflow (I/I) plan update prepared and submitted on behalf of the town by its consultant, GHD Inc., in response to MassDEP's April 13, 2018 conditional approval.

The submittal includes a memorandum dated March 10, 2020 from GHD to MassDEP titled, "Uxbridge, MA Infiltration and Inflow Analysis - Inventory of Existing Conditions." The report summarizes the I/I work that the town completed within the past five years, including smoke testing of two sewer sub-sections, a town-wide manhole inspection, manhole repair/replacement, a CCTV inspection of a portion of the main interceptor gravity sewer and follow-up repairs addressing the defects identified. It briefly describes the town's existing sewerage system which consists of a wastewater treatment plant, five inverted siphons, five pumping stations, approximately 27,000 linear feet (lf) of force main and 189,000 lf of gravity sewer, built since the mid-1970s. Tables 3.1 and 3.2 summarizes the size and material of the gravity sewers.

The town plans to conduct a system-wide flow metering program for ten consecutive weeks in the spring of 2020. Figure 1 shows 15 proposed sewer subarea flow metering locations. Local groundwater conditions and precipitation will also be monitored per MassDEP guidelines. The town reportedly had no I/I related overflows, bypasses or surcharges that occurred from its collection system.

Based on the review, MassDEP hereby approves the plan with the following conditions:

1. By December 31, 2020 the town shall submit a report summarizing its 2020 flow metering and I/I analysis to this office for review and approval. The report shall include a description of its

sewerage system, a table with correct information about the gravity sewer material, and a GIS map of its sewerage system (in addition to maps necessary for the I/I analysis) providing location of major sewer system components (pumping station, siphon, WWTF...), sewer piping size and material, and flow direction. In addition to the recommendations for further study to identify I/I sources, the report shall also discuss a proposed implementation schedule and the town's budgetary commitment.

If you have any questions please feel free to contact Xiaoning.Chen@mass.gov.

Sincerely,

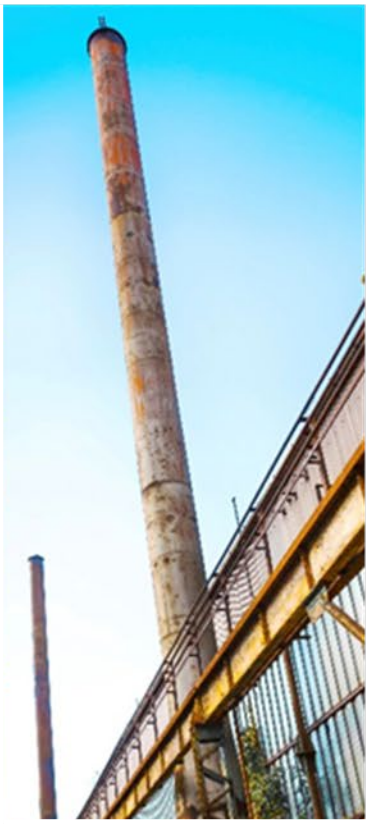
David Boyer, P.E.
Section Chief
Wastewater Program

nc\hs Uxbridge ii plan capv-304

cc: Anastasia Rudenko, GHD, Inc
1545 Iyannough Road
Hyannis, MA 02601

Town of Uxbridge, MA 2020 Flow Metering Program and I/I Analysis

DRAFT – rev 1



Draft for Review

This document is in draft form. A final version of this document may differ from this draft. As such, the contents of this draft document shall not be relied upon. GHD disclaims any responsibility or liability arising from decisions made based on this draft document.

5. Conclusions and Recommendations

Model calibration produced a conservative model that is appropriate for risk analysis and flow projections. As a result, the 5-year 24-hour rainfall event model did not indicate a risk of a sanitary system overflow during the design storm. There are no required capacity related next steps recommended as a result of this study and as a result these are no budgetary recommendations for capacity related inflow/infiltration projects.

The following items are recommended to be completed as next steps in the Town's pro-active infiltration/inflow maintenance program.

- Continue the implementation of the manhole structural rehabilitation program, as recommended in the 'Manhole Inspections and Smoke Testing Report', prepared by GHD and dated 2017.
- Due to the age of the infrastructure, it is recommended that a CCTV inspection program be implemented for at least the main gravity interceptor and asbestos cement portions of the original collection system so that a risk-based rehabilitation and maintenance program can be implemented.

The Town plans to continue this pro-active infiltration/inflow maintenance program through an annual budget appropriation.

Sub Area 10
Sub Area 9
Sub Area 11
Sub Area 8
Sub Area 6
Sub Area 7
Sub Area 5
Sub Area 4
Sub Area 13
Sub Area 12
Sub Area 15
Sub Area 14
Sub Area 3
Sub Area 2
Sub Area 1

Linwood
North Uxbridge
Uxbridge
Centerville
Wheelockville

Town of Uxbridge Wastewater Treatment Facilty

Pipe_Material	Number Of Pipes	Length_FT
AC	457	87171
AC & DI	9	1399
DI & RC	1	142
DUCTILE IRON	15	1487
PVC	382	63645
RC	89	19944
UNKNOWN	18	3630

Legend

- Pump Station
- Flow Meter
- Sewer Manhole
- Force Main

Sewer Pipe MATERIAL

- AC
- AC & DI
- DI & RC
- DUCTILE IRON
- PVC
- RC
- UNKNOWN

Paper Size ANSI D

0 800 1,600

Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001 Feet

GHD

TOWN OF UXBRIDGE, MASSACHUSETTS
INFILTRATION/INFLOW

TOWN OF UXBRIDGE SEWER SYSTEM SEWER PIPE MATERIAL

Project No. 111-44264
Revision No. -
Date 12/17/2020

FIGURE 2

C:\data\Uxbridge\12172020_pdf\111442624F01_PipeMaterial.mxd
Print date: 17 Dec 2020 - 07:48

Memorandum

March 17, 2021

To	Town of Uxbridge		
Copy to	File		
From	Marc Drainville, PE, BCEE, LEED AP	**Tel**	774.470.1634
Subject	Uxbridge I&I Removal and Infrastructure Improvements Program – Progress Report 2021	**Project no.**	11134425

1. Introduction

The purpose of this memo is to provide a periodic update on the I&I Removal program. It should be noted that this program also includes proactive work that includes collection system infrastructure improvements. As a whole, all of this work is related to the "Uxbridge I&I Removal and Infrastructure Improvements Program."

2. Prior Work

There are two primary reports that GHD has completed that define the I&I Removal work. These include the following:

1. Manhole Inspections and Smoke Testing Report, June 2017
    a. Hereinafter referred to as the "2017 Report"
2. Town of Uxbridge, MA 2020 Flow Metering Program and I/I Analysis, December 2020
    a. Hereinafter referred to as the "2020 Report"

Other reports that have been completed on this topic are referenced within the above referenced reports, but it is the above referenced reports that identify all aspects of the I&I Removal program.

3. Summary of Recommendations

Both of the reports above contained recommendations as detailed below.

A. 2017 Report

The recommendations from the 2017 Report are as follows:

Table 4.1 Probable Capital Costs for Sewer Rehabilitation (2017$)

Item	Infiltration/Inflow Rehabilitation Costs	Hydraulic Rehabilitation Costs	Structural Rehabilitation Cost	Total Project Costs
Manhole Rehabilitation Recommendations from 2017 Inspections (2017$)[1]	$1,160,000	$400,000	$10,000	$1,570,000
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Notes:

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(3) Police detail allowance is based on an estimated 120 days of work at $320/day.
(4) Midpoint of construction is anticipated to be halfway through FY19. Cost adjusted through a 3% inflation factor.
(5) Construction costs are based on an outside contractor performing the work. Routine repairs, such as manhole bench cleaning, could be performed by Town personnel.

The report summary includes the following summary:

It is recommended that the I/I, structural, and hydraulic rehabilitation measures be addressed through a multi-year program. The following is a proposed schedule for implementation:

1. **FY 18** (an allowance of $300,000 has been set aside for this work by the Town)
    - Develop plans, specifications, and a construction schedule for manhole repairs.
    - Initiate construction for manholes that are recommended to be replaced completely (three manholes).
    - Initiate construction for manholes that are recommended for lining, as funding allows. Other rehabilitation measures recommended for these manholes (such as rebuilding portions of the manhole) should be addressed as well.
2. **FY 19** (recommended allowance of $750,000)
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    - Initiate other recommended manhole rehabilitation measures, as funding allows.
3. **FY 20** (recommended allowance of $750,000)
    - Continue implementing recommended manhole rehabilitation measures, as funding allows.

The most cost-effective approach for manhole rehabilitation is likely a location based approach, in which all of the manholes in a specified area of Town are addressed prior to moving on to the next location. Additionally, manholes for which the Town has specific concerns should be prioritized. Future infrastructure, utility, and paving projects should also be considered. The prioritization of manhole repairs should be established in the construction schedule during FY18.

B. 2020 Report

Model calibration produced a conservative model that is appropriate for risk analysis and flow projections. As a result, the 5-year 24-hour rainfall event model did not indicate a risk of a sanitary system overflow during the design storm. There are no required capacity related next steps recommended as a result of this study and as a result these are no budgetary recommendations for capacity related inflow/infiltration projects.

The following items are recommended to be completed as next steps in the Town's pro-active infiltration/inflow maintenance program.

- Continue the implementation of the manhole structural rehabilitation program, as recommended in the 'Manhole Inspections and Smoke Testing Report', prepared by GHD and dated 2017.
- Due to the age of the infrastructure, it is recommended that a CCTV inspection program be implemented for at least the main gravity interceptor and asbestos cement portions of the original collection system so that a risk-based rehabilitation and maintenance program can be implemented.

The Town plans to continue this pro-active infiltration/inflow maintenance program through an annual budget appropriation.

It should be noted that this report is currently in draft form and is into DEP awaiting comments.

C. Bernat Interceptor Collapse

After the 2017 Report was issued, a pipe collapse on the main interceptor was discovered and investigated. This work included replacement of portions of the main interceptor as well as a portion of the West River Forcemain which was discovered to have been severely corroded. It is mentioned in this memo because it was a significant amount of I/I reduction occurred with this work.

D. Discussion and progress to date

The 2020 Report provides a summary of all work in that it includes a reference to the work detailed in the 2017 Report as well as one additional recommendation that came from the 2020 Report – CCTV inspection of the main gravity interceptor as well as other asbestos cement pipes.

The Town has been allocating $300,000 per year toward this work. Thus far the following has been completed in the prior years:

- FY 2018 – Bernat Interceptor
- FY 2019 - Uxbridge I&I Removal and Infrastructure Improvements Program – Phase I
- FY 2020 – Initiated Uxbridge I&I Removal and Infrastructure Improvements Program – Phase II and initiated the I&I Study

The following is currently planned:

- FY 2021 – Completion of I&I Study and Uxbridge I&I Removal and Infrastructure Improvements Program – Phase II

The comprehensive program below is updated from the 2017 report when the work was slated for a three year program only. It is projected that at $300,000 per year and considering inflation, the work detailed in the 2017 Report program will be an approximate 7 year program.

With two years of the 7 completed, it is estimated that another 5 years are remaining (FY 2022 through 2026) and that costs should be projected out to the midpoint of this period or Year 3 (2024).

A comprehensive list of work would be the following:

Table 1: I&I Related Past and Future Work and Probable Capital Costs for Sewer Rehabilitation

Item	Infiltration/ Inflow Rehabilitation Costs (2017$)	Hydraulic Rehabilitation Costs (2017$)	Structural Rehabilitation Cost (2017$)	Other Work	Total Project Costs
Manhole Rehabilitation Recommendations from 2017 Inspections (2017$)[1]	$1,160,000	$400,000	$10,000		
Manhole Rehabilitation Recommendations from 2005 I/I Report (inflated to 2017$)[2]	$50,000	$40,000	$0		
Police Detail Allowance [3]	$30,000	$10,000	$0		
Total Cost ($ 2017)	$1,230,000	$410,000	$50,000		
CCTV Allowance (Recommended in 2020 Report)				$200,000	
Bernat Interceptor ($ 2019)				$300,000	
I/I Study($ 2020)				$175,000	
SUBTOTAL ($ 2024) – except “other work”	$1,525,000	$525,000	$75,000	$675,000	$2,800,000
Completed work ($300,000 per year for 4 years)					-$1,200,000
Total Remaining Cost (Projected to Midpoint of 5 Year Program) [4]					$1,600,000

Notes:

(1) Probable construction costs include a 30% contingency and 30% allowance for Legal, Fiscal, and Engineering Services.
(2) Probable construction costs are inflated to 2024 dollars through a 3% inflation factor.
(3) Police detail allowance is based on an estimated 120 days of work at $320/day.
(4) Construction costs are based on an outside contractor performing the work. Routine repairs, such as manhole bench cleaning, could be performed by Town personnel.

4. Future work

Based on the above referenced summaries, it is recommended that the Town continue to allocate $300,000 per year as follows to complete the manhole rehabilitation portion of the work as well as CCTV work on the main interceptor and asbestos cement pipes. The following continuing program is recommended:

Uxbridge I&I Removal and Infrastructure Improvements Program.

FY 2022: $300,000
FY 2023: $300,000
FY 2024: $300,000
FY 2025: $300,000
FY 2026: $300,000

Notes

1. It should be noted that the plan outlined in Section 3 requires approximately $320,000 per year, but the Town is completing some work with their own forces and $300,000 per year is currently estimated to be adequate.
2. Additional costs may be identified with firm costs on the CCTV work (an allowance was currently included), problems identified as a result of the CCTV work and other subsequent investigations.

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Captial Improvement Request

Date Submitted: 3/17/2021 Date of Last Edit: 3/17/2021

Project Title: Wastewater Division Fleet-Equipment Replacement Program
Category: Equipment
Department: Public Works-Wastewater Division

Project: [ ] New [ ] Recurring [ ] Resubmission
[X] Multiyear Phase [ ] of [ ]

Department Priority

[ ] Urgent/Legally Required
[X] Maintain Service
[ ] Enhancement

Discuss Operating Budget Impact: *Explain the project's short- and long-term impacts on the community's operating budget.*

The acquisition of these vehicles as part of the vehicle replacement program updates the DPW fleet and improves efficiency within the department. The goal is to replace equipment before the cost of ongoing repairs exceeds the vehicles usefulness. Annual updating of equipment is a useful tool in stabilizing vehicle repairs costs. Improved fuel economy, cleaner emissions and safer state of the art equipment results in a more efficient management of the fleet.

Recommended Financing

Funding Category	Five-Year Total	Estimated Project Costs by Fiscal Year				
		FY2022	FY2023	FY2024	FY2025	FY2026
Study/Design	$0					
Land Acquisition	$0					
Construction	$0					
Equipment/Furnishings	$70,000		$70,000			
Contingency	$0					
Other	$0					
TOTAL	**$70,000**	**$0**	**$70,000**	**$0**	**$0**	**$0**

Grant Amount Requested						
CPA Amount Requested						
Net of CPA and Grants	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Operating Budget Impact						
During Project						

Post-Project Annual	
Post-Project One-time	

Funding Source(s)
Check all that apply

X	Tax Levy
X	Debt
X	Enterprise Receipts
X	Stabilization
	Free Cash
	Revolving Fund
	CPA
X	Grant(s) or Other

CPA Purposes(s)
Check all that apply

	Open Space
	Recreation
	Historical
	Housing

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Project Fact Sheet

Project Title: Wastewater Division Fleet-Equipment Replacement Program
Initiation Date: 3/17/21
Project Initiator: Benn Sherman
Department: Public Works-Wastewater Division
Projected Fiscal Year Start/Finish: FY2022-2026

Existing Conditions

Equipment and Fleet range in age from 1960's to 2019

Project Description

Establish an equipment and vehicle replacement program

Justification/Benefits

Establish an equipment and vehicle replacement program. The acquisition of these vehicles as part of the vehicle replacement program updates the DPW fleet and improves efficiency within the department/division. The goal is to replace equipment before the cost of ongoing repairs exceeds the vehicles service life. Improved fuel economy, cleaner emissions and safer state of the art equipment results in a more efficient management of the fleet.

Operating Budget Discussion

Control expenses related to equipment and fleet maintenance.

Estimate Basis

Vehicle and equipment costs are from current state contract and recent purchases. These costs were inflated to the future year of purchase/replacement.

Time/Project Schedule

Ongoing annual replacement

Alternatives

Continued use of maintenance funds to keep vehicles on the road.

Key Assumptions

Purchase from State contract and establish a replacement program.

Other

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Captial Improvement Request

Date Submitted: 3/17/2021 Date of Last Edit: 3/17/2021

Project Title: Infrastructure Improvement Program
Category: Infrastructure
Department: Public Works-Water Division

Project: [ ] New [X] Recurring [X] Resubmission
[X] Multiyear Phase [ ] of [ ]

Department Priority

[ ] Urgent/Legally Required
[X] Maintain Service
[X] Enhancement

Discuss Operating Budget Impact: *Explain the project's short- and long-term impacts on the community's operating budget.*

The DPW recently completed an update to the distribution system hydraulic model and recommended master plan for capital projects. Hydraulic improvements and expansion to support economic development are recommended.

Recommended Financing

Funding Category	Five-Year Total	Estimated Project Costs by Fiscal Year				
		FY2022	FY2023	FY2024	FY2025	FY2026
Study/Design	$3,221,000	$100,000	$1,195,000	$36,000	$700,000	$1,190,000
Land Acquisition	$0					
Construction	$5,576,000			$3,504,000	$1,420,000	$652,000
Equipment/Furnishings	$0					
Contingency	$0					
Other	$0					
TOTAL	**$8,797,000**	**$100,000**	**$1,195,000**	**$3,540,000**	**$2,120,000**	**$1,842,000**

Grant Amount Requested						
CPA Amount Requested						
Net of CPA and Grants	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Operating Budget Impact	
During Project	

Post-Project Annual	
Post-Project One-time	

Funding Source(s)
Check all that apply

X	Tax Levy
X	Debt
X	Enterprise Receipts
X	Stabilization
	Free Cash
	Revolving Fund
	CPA
X	Grant(s) or Other

CPA Purposes(s)
Check all that apply

	Open Space
	Recreation
	Historical
	Housing

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Project Fact Sheet

Project Title: Infrastructure Improvement Program
Initiation Date: 3/17/21
Project Initiator: Benn Sherman
Department: Public Works-Water Division
Projected Fiscal Year Start/Finish: FY2022-2026

Existing Conditions

The DPW recently completed an update to the distribution system hydraulic model and recommended master plan for capital projects. Hydraulic improvements and expansion to support economic development are recommended. Other items needed outside of the distribution system master plan are being proposed in through the budget.

Project Description

This capital program includes the annual infrastructure replacement program. This program follows the current capital master plan as well as other needs of the division

Justification/Benefits

The age of the infrastructure ranges from the 1920's to the 2000's. There are a number of items from production, storage, treatment and distribution. These improvements will allow the division to maintain service for the existing customers and plan for future expansion.

Operating Budget Discussion

This will lessen budgetary costs that are put into interim repairs caused by the decline in infrastructure conditions.

Estimate Basis

In house and master plan estimates

Time/Project Schedule

Annually

Alternatives

None. Deferring matenance will only result in increased construction and repair costs.

Key Assumptions

Major improvements were evaluated through the hydraulic model and master plan development.

Other

Section 8
Recommendations

8.1 Recommended Improvements

This Section presents the proposed capital improvements to address system deficiencies identified in the assessments presented in the prior sections. Proposed improvements are classified into the recommended action categories of Low, Medium, and High Priority.

Recommended water main improvements were developed based on findings from this hydraulic evaluation (Section 5), criticality analysis (Section 6), water main asset management (Section 7), and projected development and system expansion (Section 3) to select priority distribution system improvement projects to meet the current and future needs of the Town. Other system improvements listed are based on the supply capacity and storage capacity evaluations, and water quality assessment.

Budgetary cost estimates were developed for capital planning budgeting purposes. Budgetary costs include equipment costs, demolition/removal of existing equipment (if applicable), allowances for installation, contractor overhead and profit (10%), general conditions (15%), engineering (20%), and contingency (20%). The budgetary costs are based on the August 2020 ENR Construction Cost Index of 11,455.

Recommended improvements do not include costs associated with hazardous materials abatement. Prior to any renovation project, an inspection should be completed for the areas where proposed improvements will occur, and suspect materials should be tested for the presence of hazardous substances such as lead, asbestos, and PCBs.

Prioritization and packaging of projects should be performed in conjunction with the Town's ongoing efforts to monitor and adjust rates to ensure that funding is in place as needed. The Town recently completed an update to the rate model.

\\Tighebond.com\data\Data\Projects\U\U5004 Uxbridge\005 Water Model\Report_Evaluation\Draft Uxbridge Distribution System Evaluation Report.docx

TABLE 8-1

Summary of Category Item Capital Cost ($ Thousands)

Recommended Improvements	Low	Medium	High	Total [3]
Evaluate Alternatives to Increase Source of Supply (Section 4.1)				
Alternatives Analysis – Evaluate Options Below			$75	$75
Replacement Well(s) or Rehabilitation at Bernat Wellfield to Restore Capacity (cost for three wells)			$800	$800
Develop Cnossen Well with Treatment System [1]		$7,000		--
Treatment for Iron/Manganese Removal at Rosenfeld and/or Blackstone Wellfields		$6,000		--
Design and Construction of new Pump Station and Storage Tank to Increase Supply and Storage Capacity of East Street Service Area (Sections 4.1.4 / 4.2.3) [6]				
New Booster Pump Station		$750		$750
New 150,000 gallon Storage Tank		$2,000		$2,000
Evaluate Alternatives to Boost Low Pressures in Main (Low) Service Area (Section 4.2.1)				
Alternatives Analysis – Evaluate Options Below [2]	$35			$35
Small Booster Pump System near High Street Tank	$150			$150
Individual Booster Pumps at Customers	$100			--
Evaluate Alternatives to Boost Low Pressures in High Service Area (Section 4.2.2)				
Alternatives Analysis – Evaluate Options Below	$35			$35
Small Booster Pump System near Richardson Tank	$150			$150
Individual Booster Pumps at Customers	$100			--
Distribution System Expansions (Section 3.1.3.2) [4,5]				
Rt 122 (Millville Road) and Albee Road Expansion - Install 17,000 LF of new 6-inch Ductile Iron water main			$3,825	$3,825
Quaker Highway Expansion - Install 16,100 LF of new 6-inch Ductile Iron water main	$3,625			$3,625
Rt 16/Douglas Street Expansion - Install 4,700 LF of new 8-inch Ductile Iron water main			$1,295	$1,295

TABLE 8-1

Summary of Category Item Capital Cost ($ Thousands)

Recommended Improvements	Low	Medium	High	Total [3]
Distribution System Improvements (Sections 5.1.4 / 6.3)				
High Street - Replace 4,025 LF of 12-inch Cast Iron water main with new 12-inch Ductile Iron water main			$1,310	$1,310
Blackstone Street - Replace 790 LF of 6-inch Universal water main with new 6-inch Ductile Iron			$180	$180
Chamberlain Road - Replace 2,400 LF of 8-inch Ductile Iron water main with new 12-inch Ductile Iron		$780		$780
Douglas Street - Replace 4,000 LF of 8-inch Universal water main with new 12-inch Ductile Iron			$1,595	$1,595
Douglas Street/Rt146 Loop - Install 9,400 LF of new 16-inch Ductile Iron water main			$3,760	$3,760
Douglas Street - Replace 2,250 LF of 8-inch Universal water main with new 8-inch Ductile Iron			$620	$620
Rivulet Street - Replace 2,500 LF of 6-inch/8-inch Universal water main with new 12-inch Ductile Iron			$815	$815
Total [3]	**$3,995**	**$3,530**	**$14,275**	**$21,800**

[1] Does not include costs to acquire property.

[2] Analysis should also evaluate conditions at the highest customer in the Main Service Area, located on Sutton Street at an elevation approximately 49 feet higher than the second highest customer in the service area.

[3] Based on only one of the potential alternatives.

[4] Based on cost per linear foot of $225 for 6-inch water main, $275 for 8-inch water main, $325 for 12-inch water main, and $400 for 16-inch water main (all Ductile Iron).

[5] A map of recommended improvements is presented in Figure 8-1.

[6] Based on recommendations from Tata & Howard evaluation dated June 23, 2015; costs converted from 2015 to 2020 dollars.

Proposed Rivulet St Improvement: Replace 2,500 LF of 6-inch/8-inch Universal water main with new 12-inch Ductile Iron

Proposed Chamberlain Rd Improvement: Replace 2,400 LF of 8-inch Ductile Iron water main with new 12-inch Ductile Iron

Proposed Douglas St Improvement: Replace 4,000 LF of 8-inch Universal water main with new 12-inch Ductile Iron

Proposed Douglas St Improvement: Replace 2,250 LF of 8-inch Universal water main with new 8-inch Ductile Iron

Proposed Rt 16/Douglas Street Expansion: Install 4,700 LF of new 8-inch Ductile Iron water main

Proposed Douglas St/Rt 146 Loop: Install 9,400 LF of new 16-inch Ductile Iron water main

Proposed Quaker Highway Expansion: Install 16,100 LF of new 6-inch Ductile Iron water main

Proposed High St Improvement: Replace 4,025 LF of 12-inch Cast Iron water main with new 12-inch Ductile Iron water main

Proposed Blackstone St Improvement: Replace 790 LF of 6-inch Universal water main with new 6-inch Ductile Iron

Proposed Rt 122 (Millville Road) and Albee Road Expansion: Install 17,000 LF of new 6-inch Ductile Iron water main

NORTHBRIDGE, MA
SUTTON, MA
DOUGLAS, MA
MENDON, MA
MILLVILLE, MA
NORTH SMITHFIELD, RI
BURRILLVILLE, RI

High Street Storage Tank
Richardson Street Tank
Fafard Booster Pump Station
Bernat Wells
Blackstone Street Wells
East Street Booster Pump Station
Rosenfeld Well

PS Pump Station
Storage Tank
Well
Water Main
Water Bodies

East Street Service Area
High Service Area
Uxbridge Town Boundary
Other MA Town Boundary
RI Town Boundary

Proposed Water Main Improvements
- Proposed High St Improvement
- Rivulet St Improvement
- Quaker Hwy Expansion
- Millville Rd/Albee Rd Expansion
- Douglas St Improvement
- Douglas St/Rt 146 Loop
- Douglas St Improvement
- Douglas St Improvement
- Chamberlain Rd Improvement
- Blackstone St Improvement

Water Main Size
2" 10" 4" 12" 6" 16" 8" 20"

0 1,500 3,000
Feet
1:36,000

Tighe&Bond

1. Water main data provided by The Town of Uxbridge Department of Public Works.

FIGURE 8-1
UXBRIDGE WATER DISTRIBUTION SYSTEM

Uxbridge Water Master Plan
Recommended Improvements
Uxbridge, Massachusetts

September 2020

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U-5004

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Captial Improvement Request

Date Submitted: 3/17/2021 Date of Last Edit: 3/17/2021

Project Title: Water Equipment Replacement Program
Category: Equipment
Department: Public Works-Water Division

Project: [ ] New [X] Recurring [X] Resubmission
[X] Multiyear Phase [ ] of [ ]

Department Priority

[ ] Urgent/Legally Required
[X] Maintain Service
[X] Enhancement

Discuss Operating Budget Impact: *Explain the project's short- and long-term impacts on the community's operating budget.*

The acquisition replacement vehicles based on service life will update the Water Division fleet and improves efficiency within the division. The goal is to replace equipment before the cost of ongoing repairs exceeds the vehicles usefulness. Annuall updating of equipment is a useful tool in stabilizing vehicle repairs costs. Improved fuel economy, cleaner emissions and safer state of the art equipment results in a more efficient management of the fleet.

Recommended Financing

Funding Category	Five-Year Total	Estimated Project Costs by Fiscal Year				
		FY2022	FY2023	FY2024	FY2025	FY2026
Study/Design	$0					
Land Acquisition	$0					
Construction	$0					
Equipment/Furnishings	$178,000		$55,000		$85,000	$38,000
Contingency	$0					
Other	$0					
TOTAL	**$178,000**	**$0**	**$55,000**	**$0**	**$85,000**	**$38,000**

Grant Amount Requested						
CPA Amount Requested						
Net of CPA and Grants	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Operating Budget Impact						
During Project						

Post-Project Annual	
Post-Project One-time	

Funding Source(s)
Check all that apply

X	Tax Levy
X	Debt
X	Enterprise Receipts
X	Stabilization
	Free Cash
	Revolving Fund
	CPA
X	Grant(s) or Other

CPA Purposes(s)
Check all that apply

	Open Space
	Recreation
	Historical
	Housing

TOWN OF UXBRIDGE
CAPITAL PROJECT SUBMISSION

Project Fact Sheet

Project Title: Water Equipment Replacement Program
Initiation Date: 3/17/21
Project Initiator: Benn Sherman
Department: Public Works-Water Division
Projected Fiscal Year Start/Finish: FY2022-2026

Existing Conditions

The existing fleet is ranges in age from 2005 to 2018.

Project Description

Replace F650 Dump truck; Replace the 2008 Ford Ranger (former Supervisor vehicle that no longer meets the needs of the Division); Replace 2014 F150 service vehicle.

Justification/Benefits

The acquisition of these vehicles as part of the vehicle replacement program updates the Division's fleet and improves efficiency within the Division. The goal is to replace equipment before the cost of ongoing repairs exceeds the vehicles service life. Improved fuel economy, cleaner emissions and safer state of the art equipment results in a more efficient management of the fleet.

Operating Budget Discussion

The vehicles are reaching the end of their useful life. Increased mainteance costs.

Estimate Basis

Vehicle and equipment costs are from current state contract and recent purchases. These costs were inflated to the future year of purchase/replacement.

Time/Project Schedule

Ongoing annual replacement

Alternatives

Continued use of maintenance funds to keep vehicles on the road.

Key Assumptions

Purchase from State contract.

Other