Weston & Sampson SM

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REPORT

August 2020

TOWN OF
DEDHAM
MASSACHUSETTS

2020 Sewer Manhole Investigation Report

55 Walkers Brook Drive, Suite 100, Reading, MA 01867 (HQ)
Tel: 978.532.1900

Town of Dedham, Massachusetts
Weston & Sampson Project No. 2200176

August 26, 2020

Jason L. Mammone, PE
Director of Engineering
Public Works Facility
55 River Street
Dedham, Massachusetts 02026

Re: Report – 2020 Sewer Manhole Investigation

Dear Mr. Mammone:

In accordance with our February 26, 2020 agreement, Weston & Sampson is pleased to submit our report for the 2020 Sewer Manhole Investigation conducted in spring 2020. This project included topside manhole inspections in subareas DD, JJ, LL, MM and RR as delineated in the attached Figure 1.

This report presents our analysis of the manhole inspection results, a cost-effectiveness analysis, and recommendations for sewer system improvements. The Department of Environmental Protection (DEP) *Guidelines for Performing I/I Analyses and Sewer System Evaluation Survey* (DEP Guidelines), updated May 2017, were used as a guide for the analysis.

Area Description and Project Objectives

The Town of Dedham, Massachusetts is a residential community located southwest of Boston. Wastewater collected in the town drains east towards Boston where it enters Massachusetts Water Resources Authority (MWRA) interceptors at multiple locations. The flow is ultimately treated at the Deer Island Wastewater Treatment Plant. The town's wastewater collection system consists of approximately 94 miles of gravity sewer. A summary of the gravity sanitary sewer pipes and manholes is shown in Table 1, *Sewer System Summary*.

The 2020 Sewer Manhole Investigation goal was to identify sources of infiltration and inflow (I/I) in the sewer system. This aligns with one of the Town of Dedham's primary goals of reducing wastewater flow to the MWRA to limit user charges. By removing unnecessary and excessive I/I the sewer system flows will be reduced, leading to increased sewer capacities for future development. Additionally, the manhole inspections would identify and record the location and severity of defects. This is a results-driven approach which seeks to maximize the effectiveness of the investigation through total system maintenance along with I/I removal.

Topside Manhole Inspections

Manhole inspections consist of topside visual inspection of sanitary sewer manholes. Location, diameter, depth, material, casting and cover size, and source of any observed infiltration are recorded for each manhole. The inspections are ideally completed during high groundwater periods in order to identify I/I sources. The inspection also provides data on structural defects in manholes that should be repaired as part of the town's regular maintenance activities.

Weston & Sampson performed the inspection of 542 manholes from March 9 to March 16, April 15 to April 24, 2020. An estimated 36,144 gpd of infiltration was identified in 88 manholes, and an estimated 5,000 gpd of peak design storm inflow was identified in five manholes. Manholes identified as sources

of inflow are generally subject to ponding or can otherwise collect runoff during wet weather. The results of the manhole inspections are summarized in Table 2, *Manhole Summary.*

Non-infiltration related structural defects were found in 25 manholes such as loose or missing bricks in riser, cone, and bench and invert sections, or defective frames and covers. Recommendations for rehabilitation and estimated costs are listed in Table 3, *Manhole Structural Defects.*

Inspections were not performed at 11 locations where the manholes could not be located. The majority of these manholes were located on the Nobles & Greenough Campus. These manholes are listed in Table 4, *Manhole Inspection Status*. All uninspected manholes should be located, opened, and inspected. Any necessary rehabilitation may then be added to the scope of the next construction phase. An electronic copy of all manhole inspection logs and photos are included on the attached external hard drive.

Database Development

Weston & Sampson updated the Microsoft Access database designed specifically for the management of sewer manhole data. The database was developed for the 2018 Sewer Manhole Investigations project and updated during subsequent investigation phases. Allowing for a single, comprehensive sewer manhole database to be created over time. The database contains data fields for sewer system information such as manhole location, diameter, depth, material, casting and cover size, condition of manhole components, and source of any observed infiltration. The incoming and outgoing sewer pipe diameter, material, and position within the manhole are also included. An electronic copy of the database is included on the attached external hard drive.

Cost-Effectiveness Analysis

A cost-effectiveness analysis (CEA) was performed for all manhole defects to determine the merit of performing a given rehabilitation. The CEA compares the estimated cost for removing I/I to the estimated savings in transportation and treatment (T&T) costs resulting from I/I removal. T&T costs consist of capital expenditures required to expand and upgrade the wastewater system, plus annual operation and maintenance (O&M) costs. O&M costs are directly related to the quantity of flow being discharged to pump stations and treatment facilities.

The present worth of the T&T cost for the Town of Dedham was calculated using MWRA charges and O&M and capital costs provided by the town. The T&T costs have been extended throughout the projected life-cycle of the rehabilitation of 20 years. Using the DEP FY20 rate of 2.75%, extended over 20 years, the present worth of the Town of Dedham's T&T costs is $21.97. A memorandum detailing the methodology and the calculation of T&T costs may be found in Appendix A, *MWRA T&T Cost Calculation*. The MWRA portion of the T&T costs are generated using the MWRA's annual Customer Service Report. This Customer Service Report is also attached Appendix A, for your records.

T&T costs can change annually. Therefore, if the recommended rehabilitation program included in this report is not conducted within one year, Weston & Sampson recommends a re-calculation of the T&T costs to assure the design continues to be based on a valid CEA. Typically, when T&T costs increase, the scope of recommended rehabilitation will also increase.

The calculation of T&T costs for a particular I/I source considers only the portion of I/I that can be reduced through rehabilitation. The percentage of I/I that can be reduced depends greatly upon both the individual source and the specified repair method. Due to the potential for infiltration to migrate from a repaired defect to a nearby defect that may not have warranted rehabilitation or could not be identified during the inspection, the percentage of removable I/I is typically estimated to be 50 percent. This

percentage of I/I reduction is identified in the CEA as "removable" infiltration.

The rehabilitation costs used in the CEA for each rehabilitation method are actual as-bid construction unit costs from the Town of Dedham's 2018 Sewer On-Call Services Contract with Municipal Sales, Inc. and the 2020 Sewer On-Call Services Contract with National Water Main Cleaning Company. The rehabilitation costs listed in this report do not include the cost of additional investigative work or engineering services during design and construction. A list of rehabilitation unit costs used in the CEA is included in Appendix A, *As-Bid Unit Costs*.

The CEA table shows the T&T cost associated with the observed infiltration as well as recommended rehabilitation methods and costs. The analysis produces one of four conclusions:

- *Excessive* indicates the cost to rehabilitate the manhole is less than the associated T&T cost and that rehabilitation is recommended.
- *Value-Effective* indicates the rehabilitation cost is more than the T&T cost, but the rehabilitation is still recommended because of the relative value of the repair.
- *Non-Excessive* indicates the cost to rehabilitate the manhole is more than the T&T cost and rehabilitation is not recommended at this time.
- *Non-Excessive Recommended* indicates the rehabilitation cost is more than the T&T cost, but rehabilitation is recommended due to the severity of the defect. Non-Excessive Recommended rehabilitations include defects that are in need of structural repairs and could become sources of infiltration, or result in emergency repairs as the condition of the defect continues to degrade.

The CEA results for manhole infiltration and a summary of the recommended rehabilitation costs are provided in Table 5, *MWRA CEA for Infiltration.* The CEA results for manhole inflow with recommended rehabilitation costs are included in Table 6, *MWRA CEA for Inflow.* A summary of the results of the CEA are as follows:

- 16,560 gpd of excessive removable infiltration at an estimated rehabilitation cost of $121,640. The associated T&T cost is $363,823.
- 720 gpd of value-effective removable infiltration at an estimated rehabilitation cost of $17,343. The associated T&T cost is $15,818.
- 5,000 gpd of peak design storm inflow at an estimated rehabilitation cost of $750.

In addition, the following structural manhole repairs are not cost-effective but are recommended and included in the Recommended Rehabilitation Program:

- $22,500 to replace frame and/or cover of 15 manholes
- $2,500 to repair the bench and invert of five manholes
- $1,500 to build the bench and invert of two manholes
- $500 to repair two manhole chimneys
- $500 to repair the wall of one manhole

Miscellaneous Findings

Based on the observations made during the 2020 Sewer Manhole Investigation, the following conditions were not recommended for rehabilitations, but are worth noting for potential follow up:

- Internal drop structure recommended in manhole DD-30
- External drop connection entering JJ-130 could be partially blocked
- Utility crosses through manhole LL-550
- Concrete protruding from wall possibly covering utility in manhole MM-300

- Utility crosses through manhole MM-500
- Internal drop structure broke off in manhole RR-620
- Service drop structure has disconnected/fallen over in manhole RR-650

The following manholes have debris (brick, broken manhole cover pieces, concrete, broken clay pipe, etc.) on the bench and/or in the invert:

- JJ-640
- JJ-1040
- LL-80
- LL-675

Conclusions & Recommendations

Based on the observations made during the 2020 Sewer Manhole Investigation, Weston & Sampson has developed a Recommended Rehabilitation Program for identified defects and sources of I/I within the inspected manholes. The recommended rehabilitations are provided in Tables 5 and 6, with a summary provided below.

Recommended Rehabilitation Program:

Perform root treatment of three manholes:	$	750
Cementitious lining of 77 manholes:	$	138,233
Replace 15 manhole frames and covers:	$	22,500
Repair two manhole chimneys	$	500
Repair five manhole bench and inverts:	$	2,500
Build two manhole bench and inverts:	$	1,500
Repair one manhole wall:	$	500
Installation of five inflow dishes:	$	750
Total Construction Cost:	**$**	**167,233**

It is important to note that manhole structures may degrade between the time of inspection and the time of rehabilitation. Generally, the more time that elapses the greater the chance of material and structural degradation.

Future Work

Weston & Sampson recommends that the town continue with its proactive approach towards inspection and rehabilitation of its sewer system. Annual sewer system inspection ensures that necessary rehabilitation work is identified and performed on a regular and timely basis to reduce I/I and prevent serious problems requiring costly emergency repairs. It is recommended that manhole inspections of as many as 572 manholes be conducted in sewer subareas BB, GG, UU, XX and YY as part of Year 4 of the Annual I/I Program in Spring 2021. We are available to provide a scope and cost for this work at your request.

We wish to thank you and the members of the Engineering Department staff for their assistance while completing this project. We are available to meet with you at your earliest convenience to discuss this report. Please do not hesitate to contact me at (978) 532-1900 with any questions or comments you may have.

Sincerely,

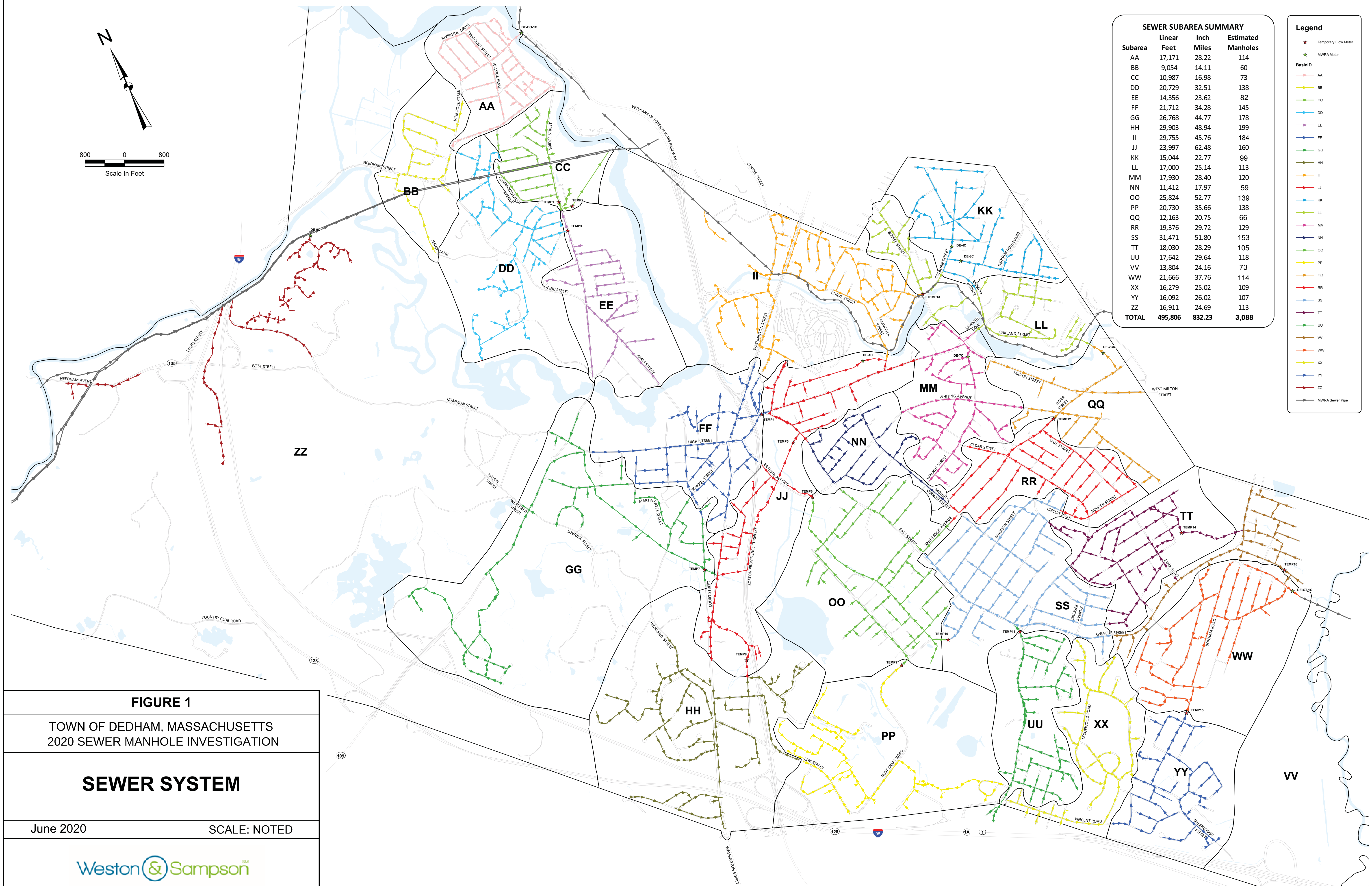
WESTON & SAMPSON

Nathan E. Michael, PE
Team Leader

cc: Nathan S. Buttermore, PE, Infrastructure Engineer
Ronald I. Lawrence, Project Engineer

FIGURES

FIGURE 1 – SEWER SYSTEM



Subarea	Linear Feet	Inch Miles	Estimated Manholes
AA	17,171	28.22	114
BB	9,054	14.11	60
CC	10,987	16.98	73
DD	20,729	32.51	138
EE	14,356	23.62	82
FF	21,712	34.28	145
GG	26,768	44.77	178
HH	29,903	48.94	199
II	29,755	45.76	184
JJ	23,997	62.48	160
KK	15,044	22.77	99
LL	17,000	25.14	113
MM	17,930	28.40	120
NN	11,412	17.97	59
OO	25,824	52.77	139
PP	20,730	35.66	138
QQ	12,163	20.75	66
RR	19,376	29.72	129
SS	31,471	51.80	153
TT	18,030	28.29	105
UU	17,642	29.64	118
VV	13,804	24.16	73
WW	21,666	37.76	114
XX	16,279	25.02	109
YY	16,092	26.02	107
ZZ	16,911	24.69	113
TOTAL	495,806	832.23	3,088

SEWER SUBAREA SUMMARY

FIGURE 1

TOWN OF DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

SEWER SYSTEM

June 2020 SCALE: NOTED

Weston & Sampson

TABLES

TABLE 1
SEWER SYSTEM SUMMARY
DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

Subarea	Estimated Linear Footage (ft)	Inch*Miles	Estimated Manholes
AA	17,171	28.22	114
BB	9,054	14.11	60
CC	10,987	16.98	73
DD	20,729	32.51	109
EE	14,356	23.62	82
FF	21,712	34.28	145
GG	26,768	44.77	178
HH	29,903	48.94	199
II	29,755	45.76	184
JJ	23,997	62.48	143
KK	15,044	22.77	99
LL	17,000	25.14	105
MM	17,930	28.4	110
NN	11,412	17.97	59
OO	25,824	52.77	139
PP	20,730	35.66	138
QQ	12,163	20.75	66
RR	19,376	29.72	86
SS	31,471	51.8	153
TT	18,030	28.29	105
UU	17,642	29.64	118
VV	13,804	24.16	73
WW	21,666	37.76	114
XX	16,279	25.02	109
YY	16,092	26.02	107
ZZ	16,911	24.69	113
TOTAL	495,806	832.23	2,981

TABLE 2
MANHOLE SUMMARY
DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
DD	010	KIELY ROAD	PRECAST	17.1	0	0
DD	020	KIELY ROAD	LINED	22.1	0	0
DD	030	KIELY ROAD	PRECAST	17.1	0	0
DD	040	HILLCREST AVENUE	PRECAST	15.1	0	0
DD	050	VIOLET AVENUE	LINED	17.6	0	0
DD	060	VIOLET AVENUE	LINED	14.5	0	0
DD	070	VIOLET AVENUE	LINED	14	0	0
DD	072	VIOLET AVENUE	PRECAST	9.3	0	0
DD	080	VIOLET AVENUE	LINED	13.9	0	0
DD	085	VIOLET AVENUE	BRICK	11.9	288	0
DD	086	VIOLET AVENUE	LINED	9.9	0	0
DD	087	PINE STREET	PRECAST	13.3	144	0
DD	090	KIELY ROAD	LINED	10.8	0	0
DD	100	HILLCREST AVENUE	BRICK	10	0	0
DD	110	VIOLET AVENUE	BRICK	9.9	432	0
DD	115	VIOLET AVENUE	BRICK	9.7	144	0
DD	120	STIVALETTA DRIVE	LINED	10.2	0	0
DD	130	STIVALETTA DRIVE	LINED	7.2	0	0
DD	140	STIVALETTA DRIVE	LINED	7.6	0	0
DD	150	STIVALETTA DRIVE	LINED	4.5	0	0
DD	160	STIVALETTA DRIVE	LINED	11.8	2,880	0
DD	170	STIVALETTA DRIVE	LINED	6.5	0	0
DD	180	VOLK ROAD	LINED	5.3	0	0
DD	190	VOLK ROAD	BRICK	5.5	144	0
DD	195	VOLK ROAD	BRICK	8.5	0	0
DD	200	VOLK ROAD	LINED	6.1	288	0
DD	210	STIVALETTA DRIVE	LINED	6.7	288	0
DD	220	STIVALETTA DRIVE	LINED	7.1	0	0
DD	230	MASSACHUSETTS AVENUE	BRICK	7	0	0
DD	240	MASSACHUSETTS AVENUE	BRICK	8.7	0	0
DD	260	MASSACHUSETTS AVENUE	LINED	5.7	0	0
DD	270	MASSACHUSETTS AVENUE	LINED	4.8	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
DD	280	MASSACHUSETTS AVENUE	BRICK	7.9	0	0
DD	290	MASSACHUSETTS AVENUE	BRICK	11.3	0	0
DD	295	LINDALE AVENUE	BRICK	8.9	0	0
DD	300	EATON ROAD	BRICK	7.6	0	0
DD	310	EATON ROAD	LINED	6.2	0	0
DD	320	EATON ROAD	LINED	7.9	0	0
DD	330	EATON ROAD	LINED	8.1	0	0
DD	340	EATON ROAD	LINED	9	0	0
DD	350	EATON ROAD	LINED	8.2	0	0
DD	360	EATON ROAD	LINED	5	0	0
DD	362	EGAN TERRACE	PRECAST	8	0	0
DD	365	EGAN TERRACE	PRECAST	7.4	0	0
DD	370	EGAN TERRACE	LINED	7.2	0	0
DD	380	EGAN TERRACE	LINED	12.1	0	0
DD	390	EGAN TERRACE	PRECAST	6.7	0	0
DD	400	EGAN TERRACE	PRECAST	6.7	0	0
DD	410	EGAN TERRACE	PRECAST	9	0	0
DD	420	MULBERRY LANE	PRECAST	6.9	0	0
DD	430	MULBERRY LANE	PRECAST	7.2	0	0
DD	440	ASPEN COURT	BRICK	11.7	0	0
DD	450	ASPEN COURT	LINED	9	0	0
DD	460	ASPEN COURT	BRICK	11.1	0	0
DD	470	ASPEN COURT	BRICK	10.4	0	0
DD	480	ASPEN COURT	BRICK	8.9	0	0
DD	490	PINE STREET	LINED	8.9	0	0
DD	500	PINE STREET	LINED	4.1	0	0
DD	510	VIOLET AVENUE	LINED	11	288	0
DD	520	VIOLET AVENUE	LINED	8.6	144	0
DD	530	SHORT STREET	LINED	9.6	0	0
DD	540	HILLCREST AVENUE	LINED	10.2	0	0
DD	550	HILLCREST AVENUE	LINED	6.7	0	0
DD	560	HILLCREST AVENUE	LINED	5.7	144	0
DD	570	KIELY ROAD	LINED	7.8	144	0
DD	580	KIELY ROAD	LINED	8.1	0	0
DD	590	KIELY ROAD	LINED	9.6	0	0
DD	595	PINE STREET	PRECAST	7.9	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
DD	600	ZOAR AVENUE	LINED	6.6	144	0
DD	610	ZOAR AVENUE	LINED	7.3	0	0
DD	620	ZOAR AVENUE	LINED	6.1	144	0
DD	630	MORELAND AVENUE	LINED	5.8	0	0
DD	640	BROOKSIDE AVENUE	LINED	3.1	0	0
DD	650	BROOKSIDE AVENUE	BLOCK	2.2	0	0
DD	660	ARCADIA AVENUE	LINED	4.4	288	0
DD	665	RODGERS AVENUE	LINED	5.1	0	0
DD	670	ARCADIA AVENUE	LINED	4.3	0	0
DD	680	ARCADIA AVENUE	LINED	5.1	0	0
DD	690	ARCADIA AVENUE EASEMENT	LINED	2.6	0	0
DD	700	HILLCREST AVENUE EASEMENT	LINED	3.7	0	0
DD	860	PINE STREET	PRECAST	5.8	0	0
DD	1040	GLEASON ROAD	PRECAST	4.8	0	0
DD	1050	GLEASON ROAD	PRECAST	4.9	0	0
DD	1060	GLEASON ROAD	CNL			
DD	1070	GLEASON ROAD	PRECAST	3.3	0	0
DD	1110	PINE STREET	CNL			
DD	1120	PINE STREET	CNL			
DD	1130	PINE STREET	CNL			
DD	1140	PUTNAM ROAD	CNL			
DD	1150	PUTNAM ROAD	BRICK	6.4	0	0
DD	1160	PUTNAM ROAD	BRICK	6.5	0	0
DD	1170	PUTNAM ROAD	BRICK	5.5	0	0
DD	1180	PUTNAM ROAD	PRECAST	6	0	0
DD	1190	PUTNAM ROAD	PRECAST	6.5	0	0
DD	1200	PUTNAM ROAD	PRECAST	10.5	0	0
DD	1230	PUTNAM ROAD	BRICK	3.8	0	0
DD	1240	PUTNAM ROAD	BRICK	6.3	0	0
DD	1250	PUTNAM ROAD	CNL			
DD	1260	PINE STREET	PRECAST	9.1	0	0
DD	1270	PINE STREET	CNL			
DD	1280	CAMPUS DRIVE	PRECAST	6.4	1,440	0
DD	1330	CAMPUS DRIVE	CNL			
DD	1340	CAMPUS DRIVE	PRECAST	6.9	0	0
DD	1350	CAMPUS DRIVE	CNL			

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
DD	1360	CAMPUS DRIVE	PRECAST	3.3	0	0
DD	1380	POOL DRIVE	CNL			
DD	1390	CAMPUS DRIVE	BRICK	6.5	144	0
DD	1400	CAMPUS DRIVE	BRICK	7.5	0	0
DD	1410	POOL DRIVE	BRICK	4.4	0	0
JJ	010	MAVERICK STREET	LINED	13.3	144	0
JJ	020	HIGH STREET	BRICK	10.6	0	0
JJ	025	POTTERY LANE	PRECAST	9.5	0	0
JJ	030	HIGH STREET	LINED	9	0	0
JJ	040	HIGH STREET	LINED	10.2	0	0
JJ	050	HIGH STREET	BRICK	10.2	0	0
JJ	060	HIGH STREET	BRICK	10.3	0	0
JJ	070	HIGH STREET	BRICK	9.1	0	0
JJ	080	HIGH STREET	BRICK	11.8	0	0
JJ	090	MT. VERNON STREET	BRICK	8.2	0	0
JJ	100	MT. VERNON STREET	BRICK	7.9	0	0
JJ	120	BERRY LANE	BRICK	18.6	144	0
JJ	130	O'NEIL DRIVE	BRICK	19	0	0
JJ	140	O'NEIL DRIVE	PRECAST	14.3	0	0
JJ	170	BROOKDALE OUTLET	LINED	18.2	0	0
JJ	180	O'NEIL DRIVE	PRECAST	14.9	0	0
JJ	200	O'NEIL DRIVE	BRICK	18.1	432	0
JJ	205	O'NEIL DRIVE	PRECAST	9.8	0	0
JJ	210	DOMINIC COURT	BRICK	19.7	288	0
JJ	220	DOMINIC COURT	LINED	6.4	0	0
JJ	230	ALLEN LANE	LINED	19.6	720	0
JJ	240	ALLEN LANE	LINED	9.6	0	0
JJ	250	CHURCHILL PLACE	LINED	19.4	0	0
JJ	255	CHURCHILL PLACE	PRECAST	7.2	0	0
JJ	260	CHURCHILL PLACE	BRICK	5.4	0	0
JJ	270	CHURCHILL PLACE	LINED	18.4	144	0
JJ	280	HIGH STREET	LINED	21.6	0	0
JJ	290	HIGH STREET	LINED	9.6	0	0
JJ	300	HIGH STREET	BRICK	10.6	0	0
JJ	310	HIGH STREET	LINED	10.1	0	0
JJ	320	HIGH STREET	LINED	8.6	144	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
JJ	325	HIGH STREET	PRECAST	5.9	0	0
JJ	330	HIGH STREET	LINED	8.9	0	0
JJ	340	HIGH STREET	LINED	7.6	0	0
JJ	350	LINDEN PLACE	LINED	7.2	0	0
JJ	360	CROWLEY AVENUE	LINED	6.9	0	0
JJ	370	HIGH STREET	LINED	18.2	0	0
JJ	380	HARVARD STREET	LINED	8.3	0	0
JJ	390	HARVARD STREET	BRICK	10.7	0	0
JJ	400	HARVARD STREET	BRICK	4.3	0	0
JJ	405	COLLEGE PLACE	BRICK	7.3	0	0
JJ	410	HARVARD STREET	BRICK	9.2	0	0
JJ	420	HARVARD STREET	BRICK	9.3	0	0
JJ	430	HARVARD STREET	BRICK	8.8	0	0
JJ	440	HARVARD STREET	BRICK	7.4	0	0
JJ	450	HARVARD STREET	BRICK	6.8	0	0
JJ	460	EAST STREET	LINED	16.4	0	0
JJ	470	EAST STREET	LINED	18.2	0	0
JJ	480	EAST STREET	LINED	19.6	0	0
JJ	490	EAST STREET	LINED	20.7	0	0
JJ	500	EAST STREET	LINED	8.4	0	0
JJ	505	CLARK STREET	PRECAST	9.4	0	0
JJ	508	AVERY STREET	PRECAST	13	0	0
JJ	510	AVERY STREET	LINED	9.7	0	0
JJ	512	EAST STREET	PRECAST	11.2	864	0
JJ	514	EAST STREET	PRECAST	6.9	0	0
JJ	516	EAST STREET	PRECAST	5.2	0	0
JJ	520	AVERY STREET	LINED	8.1	0	0
JJ	530	AVERY STREET	LINED	8.2	0	0
JJ	540	CLARK STREET	BRICK	8.7	0	0
JJ	550	CLARK STREET	BRICK	10.6	144	0
JJ	560	CLARK STREET	LINED	7.2	0	0
JJ	570	CECIL PLACE	LINED	15.6	144	0
JJ	580	CECIL PLACE	LINED	12.3	288	0
JJ	590	CECIL PLACE	LINED	11.5	144	0
JJ	620	EASTERN AVENUE	LINED	12	144	0
JJ	630	EASTERN AVENUE	PRECAST	11.3	432	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
JJ	631	EASTERN AVENUE	LINED	13.4	0	0
JJ	640	EASTERN AVENUE	LINED	9.9	0	0
JJ	650	EASTERN AVENUE	PRECAST	11.4	0	0
JJ	660	EASTERN AVENUE	PRECAST	11.9	0	0
JJ	670	EASTERN AVENUE	PRECAST	11.8	432	0
JJ	680	EASTERN AVENUE	LINED	10.4	288	0
JJ	690	EASTERN AVENUE	LINED	10.2	0	0
JJ	700	EASTERN AVENUE	LINED	14.1	288	0
JJ	701	BOSTON-PROVIDENCE HIGHWAY	PRECAST	15.1	0	0
JJ	702	BOSTON-PROVIDENCE HIGHWAY	LINED	14.8	0	0
JJ	703	BOSTON-PROVIDENCE HIGHWAY	PRECAST	15.6	288	0
JJ	704	BOSTON-PROVIDENCE HIGHWAY	LINED	13.8	864	1,000
JJ	710	BOSTON-PROVIDENCE HIGHWAY	LINED	13.4	288	0
JJ	711	BOSTON-PROVIDENCE HIGHWAY	CNL			
JJ	712	BOSTON-PROVIDENCE HIGHWAY	LINED	15	288	0
JJ	720	BOSTON-PROVIDENCE HIGHWAY	LINED	15.6	576	0
JJ	740	MAH WAY	LINED	15.1	0	0
JJ	750	BOSTON-PROVIDENCE HIGHWAY	LINED	8.4	0	0
JJ	752	BOSTON-PROVIDENCE HIGHWAY	PRECAST	7.9	0	0
JJ	754	BOSTON-PROVIDENCE HIGHWAY	PRECAST	6.5	0	0
JJ	760	DWIGHT STREET	BRICK	7.7	0	0
JJ	770	WILLOW STREET	LINED	11.1	288	0
JJ	780	WILLOW STREET	BRICK	8.1	0	0
JJ	790	SPRUCE STREET	LINED	8.4	0	0
JJ	800	SPRUCE STREET	LINED	8.1	0	0
JJ	810	WILLOW STREET	LINED	9.9	0	0
JJ	815	MARION STREET	BRICK	7.2	0	0
JJ	820	WILLOW STREET	BRICK	10.6	0	0
JJ	830	WILLOW STREET	LINED	8.1	0	0
JJ	840	METCALF STREET	BRICK	8.8	0	0
JJ	850	WASHINGTON STREET	LINED	11.7	864	1,000
JJ	860	WASHINGTON STREET	LINED	12.6	144	0
JJ	865	WASHINGTON STREET	LINED	9.9	144	0
JJ	870	WASHINGTON STREET	PRECAST	9.2	0	0
JJ	880	WASHINGTON STREET	BRICK	9.7	0	0
JJ	890	WASHINGTON STREET	BRICK	9.8	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
JJ	900	WASHINGTON STREET	BRICK	10.2	0	0
JJ	910	RICHARDS STREET	LINED	9.9	0	0
JJ	920	WASHINGTON STREET	BRICK	11.2	720	0
JJ	925	WASHINGTON STREET	LINED	9.4	0	0
JJ	930	WASHINGTON STREET	PRECAST	9.5	0	0
JJ	940	WASHINGTON STREET	PRECAST	11.7	0	0
JJ	950	WASHINGTON STREET	PRECAST	17.5	4,320	0
JJ	960	WASHINGTON STREET	LINED	9.3	0	0
JJ	970	WASHINGTON STREET	BRICK	11.5	720	0
JJ	980	WASHINGTON STREET	BRICK	10.7	0	0
JJ	982	MONTAGUE ROAD	PRECAST	9.9	0	0
JJ	984	MONTAGUE ROAD	PRECAST	9	0	0
JJ	986	MONTAGUE ROAD	PRECAST	7.1	0	0
JJ	990	WASHINGTON STREET	BRICK	11.8	288	0
JJ	992	WASHINGTON ST	PRECAST	12	0	0
JJ	995	ALLBA LANE	PRECAST	5.8	0	0
JJ	996	BOSTON-PROVIDENCE HIGHWAY	PRECAST	5.3	0	0
JJ	1000	WASHINGTON STREET	LINED	7.8	0	0
JJ	1010	WASHINGTON STREET	PRECAST	16.7	0	0
JJ	1020	WASHINGTON STREET	LINED	12.8	0	0
JJ	1030	WASHINGTON STREET	LINED	12.4	864	0
JJ	1040	BOSTON-PROVIDENCE HIGHWAY	LINED	11.4	864	0
JJ	1060	BOSTON-PROVIDENCE HIGHWAY	LINED	9.1	0	0
JJ	1070	BOSTON-PROVIDENCE HIGHWAY	LINED	9.3	576	0
JJ	1080	BOSTON-PROVIDENCE HIGHWAY	LINED	6.5	144	0
JJ	1090	ORCHARD STREET	LINED	5.6	0	0
JJ	1100	BOSTON-PROVIDENCE HIGHWAY	LINED	8.9	432	0
JJ	1105	BOSTON-PROVIDENCE HIGHWAY	PRECAST	6.7	0	0
JJ	1111	BOSTON-PROVIDENCE HIGHWAY	PRECAST	4.1	0	0
JJ	1112	BOSTON-PROVIDENCE HIGHWAY	PRECAST	3.8	0	0
JJ	1120	BOSTON-PROVIDENCE HIGHWAY	BRICK	4.4	0	0
JJ	1130	COURT STREET	PRECAST	8.8	0	0
JJ	1150	SYLVIA LANE	BRICK	6.1	0	0
JJ	1160	SYLVIA LANE	PRECAST	9.4	0	0
JJ	1170	SYLVIA LANE	BRICK	5.8	0	0
JJ	1200	POTTERY LANE	PRECAST	9	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
JJ	1210	POTTERY LANE	PRECAST	4.3	0	0
JJ	1220	POTTERY LANE	PRECAST	5	0	0
JJ	1225	POTTERY LANE	PRECAST	6.5	0	0
JJ	1230	POTTERY LANE	PRECAST	6.3	0	0
LL	010	DEDHAM BOULEVARD	LINED	17.8	0	0
LL	020	DEDHAM BOULEVARD	BRICK	6.8	0	0
LL	030	OAKLAND STREET	BRICK	8.9	0	0
LL	040	OAKLAND STREET	LINED	8.6	0	0
LL	050	OAKLAND STREET	LINED	9.4	0	0
LL	060	OAKLAND STREET	LINED	10	0	0
LL	070	OAKLAND STREET	LINED	8.6	0	0
LL	080	OAKLAND STREET	LINED	8.3	0	0
LL	090	OAKLAND STREET	BRICK	5.9	0	0
LL	100	LEWIS FARM ROAD	BRICK	6.1	0	0
LL	110	LEWIS FARM ROAD	BRICK	6	0	0
LL	120	SHERWOOD STREET	BRICK	9.1	0	0
LL	130	SHERWOOD STREET	BRICK	8.9	0	0
LL	140	SHERWOOD STREET	LINED	8.1	0	0
LL	145	SHERWOOD STREET	LINED	8.1	0	0
LL	150	SHERWOOD STREET	LINED	8.6	0	0
LL	160	SHERWOOD STREET	LINED	8.7	0	0
LL	170	SHERWOOD STREET	BRICK	8.9	0	0
LL	180	STORMY HILL	LINED	8.2	0	0
LL	190	STORMY HILL	BRICK	7.3	0	0
LL	200	STORMY HILL	LINED	5.9	0	0
LL	210	CENTRAL AVENUE	LINED	8.5	0	0
LL	220	CENTRAL AVENUE	LINED	9.1	0	0
LL	223	CENTRAL AVENUE	LINED	8.2	0	0
LL	225	DEDHAM BOULEVARD	PRECAST	2.7	0	0
LL	226	DEDHAM BOULEVARD	PRECAST	2.8	0	0
LL	227	DEDHAM BOULEVARD	PRECAST	2.5	0	0
LL	230	BIRCH STREET	LINED	9.6	0	0
LL	240	BIRCH STREET	LINED	11	0	0
LL	250	LEONARD STREET	LINED	11.6	0	0
LL	260	BIRCH STREET	LINED	11.6	0	0
LL	270	BIRCH STREET	BRICK	7.4	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
LL	275	BIRCH STREET	BRICK	3.5	0	0
LL	280	LEONARD STREET	BRICK	3.9	0	0
LL	290	LEONARD STREET	LINED	8.3	0	0
LL	300	LEONARD STREET	BRICK	8.9	0	0
LL	310	CLEVELAND STREET	BRICK	8.6	0	0
LL	312	FLEMING STREET	PRECAST	6.2	0	0
LL	320	CLEVELAND STREET	LINED	9	0	0
LL	330	ALICE WAY	LINED	4.5	0	0
LL	350	EMMETT AVENUE	LINED	9.3	0	0
LL	355	EMMETT AVENUE	LINED	6.7	0	0
LL	357	ODYSSEY LANE	LINED	9.1	0	0
LL	359	ODYSSEY LANE	LINED	9	0	0
LL	360	EMMETT AVENUE	BRICK	7.9	0	0
LL	367	BUSSEY STREET	LINED	7.5	0	0
LL	368	BUSSEY STREET	BRICK	13.8	0	0
LL	370	BUSSEY STREET	LINED	9.5	0	0
LL	380	BUSSEY STREET	LINED	8.2	0	0
LL	390	AIELLO WAY	PRECAST	2.6	0	0
LL	400	AIELLO WAY	PRECAST	6.7	0	0
LL	410	BUSSEY STREET	LINED	7.7	0	0
LL	430	COLBURN STREET	LINED	10.2	0	0
LL	440	COLBURN STREET	PRECAST	9.6	0	0
LL	450	COLBURN STREET	BRICK	7.6	0	0
LL	470	BUSSEY STREET	LINED	17.3	288	0
LL	480	BUSSEY STREET	PRECAST	8.6	144	0
LL	485	COLBURN STREET	LINED	7.5	0	0
LL	500	BUSSEY STREET	LINED	7.8	0	0
LL	510	BUSSEY STREET	BRICK	7.3	0	0
LL	520	BUSSEY STREET	BRICK	8.3	0	0
LL	530	BUSSEY STREET	BRICK	9.4	0	0
LL	540	BUSSEY STREET	LINED	12.1	0	0
LL	550	BUSSEY STREET	LINED	8.1	0	0
LL	552	TRAIN PLACE	BRICK	8.2	0	0
LL	555	TRAIN PLACE	BRICK	10	0	0
LL	560	BUSSEY STREET	BRICK	8	0	0
LL	570	BUSSEY STREET	BRICK	10.1	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
LL	580	BUSSEY STREET	LINED	10.6	0	0
LL	590	BUSSEY STREET	LINED	8	0	0
LL	593	BUSSEY STREET	LINED	6.2	0	0
LL	595	LIBERTY LANE	BRICK	6.1	0	0
LL	600	LIBERTY LANE	BRICK	3.1	0	0
LL	610	ROCKLAND STREET	LINED	10.9	0	0
LL	620	ROCKLAND STREET	BRICK	8.7	0	0
LL	630	GLANCY LANE	BRICK	11	0	0
LL	640	GLANCY LANE	LINED	9.7	0	0
LL	650	GLANCY LANE	PRECAST	4.5	0	0
LL	660	CLISBY AVENUE	LINED	7.2	0	0
LL	663	CLISBY AVENUE	LINED	5.8	0	0
LL	665	CLISBY AVENUE	LINED	5.8	0	0
LL	670	CLISBY AVENUE	LINED	6	0	0
LL	675	CLISBY AVENUE	BRICK	6.2	0	0
LL	680	CLISBY AVENUE	BRICK	7.6	0	0
LL	690	THOMAS STREET	LINED	7.6	0	0
LL	700	THOMAS STREET	LINED	6.8	0	0
LL	710	THOMAS STREET	BRICK	4.7	0	0
LL	720	COLONIAL DRIVE	LINED	9.5	0	0
LL	730	COLONIAL DRIVE	LINED	9.8	0	0
LL	735	BELKNAP STREET	LAMPHOLE	8.2	0	0
LL	740	BELKNAP STREET	LINED	8	0	0
LL	750	CONGRESS PLACE	BRICK	8.1	0	0
LL	760	CONGRESS PLACE	BRICK	8.7	0	0
LL	770	CONGRESS PLACE	LINED	9	0	0
LL	780	CONGRESS PLACE	BRICK	7.6	0	0
LL	795	VETERAN'S ROAD	BRICK	6.1	0	0
LL	800	VETERAN'S ROAD	BRICK	8	0	0
LL	810	VETERAN'S ROAD	BRICK	5.4	0	0
LL	815	VETERAN'S ROAD	BRICK	5.2	0	0
LL	820	VETERAN'S ROAD	BRICK	5.6	0	1,000
LL	830	VETERAN'S ROAD	BRICK	6.5	0	0
LL	840	VETERAN'S ROAD	LINED	7.6	0	0
LL	850	VETERAN'S ROAD	LINED	5.7	0	0
LL	860	VETERAN'S ROAD	LINED	6.5	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
LL	870	VETERAN'S ROAD	LINED	5.6	0	0
MM	010	DEDHAM BOULEVARD	LINED	16.6	0	0
MM	020	DEDHAM BOULEVARD	LINED	12.6	144	0
MM	025	SAWMILL LANE	PRECAST	10.9	0	0
MM	030	BUSSEY STREET	LINED	11.8	0	0
MM	040	MILTON STREET	BRICK	10.4	0	0
MM	050	HIGH STREET	LINED	10.8	144	0
MM	060	HIGH STREET	LINED	10.4	0	0
MM	065	O'BRIEN WAY	PRECAST	3.6	0	1,000
MM	070	HIGH STREET	LINED	9.3	0	0
MM	080	HIGH STREET	BRICK	9.3	144	0
MM	090	HIGH STREET	LINED	9.7	0	0
MM	100	HILL AVENUE	BRICK	8.8	0	0
MM	110	HILL AVENUE	BRICK	9.4	0	0
MM	120	MILTON STREET	LINED	10.2	0	0
MM	130	MILTON STREET	BRICK	10.2	0	0
MM	140	MILTON STREET	BRICK	7.4	0	0
MM	150	WALNUT STREET	LINED	8.4	0	0
MM	160	WALNUT STREET	PRECAST	11	0	0
MM	170	CASS AVENUE	BRICK	7.7	0	0
MM	180	CASS AVENUE	BRICK	7	0	0
MM	190	CASS AVENUE	BRICK	8.6	0	0
MM	200	CASS AVENUE	BRICK	8.1	0	0
MM	210	WALNUT STREET	BRICK	17.3	0	0
MM	220	WALNUT STREET	LINED	19.4	0	0
MM	230	WALNUT STREET	LINED	22.8	0	0
MM	240	WALNUT STREET	BRICK	9.1	0	0
MM	250	MYRTLE STREET	BRICK	7.7	0	0
MM	260	VICTORIA TERRACE	LINED	5.3	0	0
MM	261	VICTORIA TERRACE	LINED	4.8	0	0
MM	270	BUSSEY STREET	BRICK	9.5	0	0
MM	280	BUSSEY STREET	BRICK	10.3	0	0
MM	290	BUSSEY STREET	BRICK	8.1	0	0
MM	300	CHAUNCY STREET	BRICK	9.2	0	0
MM	310	CHAUNCY STREET	BRICK	8.7	0	0
MM	320	CHAUNCY STREET	BRICK	7.7	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
MM	330	WATERVIEW PLACE	BRICK	6.2	0	0
MM	340	HAZELNUT PLACE	LINED	18.4	144	0
MM	350	HAZELNUT PLACE	BRICK	10.1	288	0
MM	351	VICTORY LANE	BRICK	10.4	0	0
MM	352	VICTORY LANE	BRICK	9.1	0	0
MM	360	CASS AVENUE	BRICK	9.5	720	0
MM	361	HAZELNUT PLACE	BRICK	8	0	0
MM	370	WHITING AVENUE	LINED	15	288	0
MM	380	WHITING AVENUE	LINED	19.1	0	0
MM	381	WALNUT STREET	LINED	6.9	0	0
MM	390	WHITING AVENUE	LINED	8.3	0	0
MM	400	WHITING AVENUE	PRECAST	5.6	0	0
MM	410	WHITING AVENUE	PRECAST	8.4	0	0
MM	420	WHITING AVENUE	PRECAST	7.4	0	0
MM	430	OAKDALE AVENUE	PRECAST	6.9	0	0
MM	440	WHITING AVENUE	LINED	15.7	0	0
MM	450	WHITING AVENUE	BRICK	8.5	0	0
MM	460	WHITING AVENUE	BRICK	9.7	0	0
MM	470	WHITING AVENUE	BRICK	12.2	0	0
MM	480	WHITING AVENUE	BRICK	8.8	0	0
MM	485	WHITING AVENUE	PRECAST	6.7	0	0
MM	490	FULTON STREET	BRICK	9.5	144	0
MM	500	FULTON STREET	BRICK	7.7	144	0
MM	510	FULTON STREET	BRICK	9.9	0	0
MM	520	MORSE AVENUE	BRICK	10.2	0	0
MM	530	MORSE AVENUE	BRICK	11.7	0	0
MM	531	MORSE AVENUE	LINED	6.5	0	0
MM	532	MORSE AVENUE	LINED	6.1	0	0
MM	540	MORSE AVENUE	BRICK	8.6	0	0
MM	541	MORSE AVENUE	BRICK	10.6	0	0
MM	550	MORSE AVENUE	BRICK	8.2	0	0
MM	560	EDISON AVENUE	BRICK	8.7	0	0
MM	570	EDISON AVENUE	BRICK	8.7	0	0
MM	580	EDISON AVENUE	BRICK	8.5	0	0
MM	590	EDISON AVENUE	BRICK	7	0	0
MM	600	EDISON AVENUE	BRICK	7.7	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
MM	601	EDISON AVENUE	BRICK	7.4	0	0
MM	602	EDISON AVENUE	BRICK	7.6	0	0
MM	610	WOODLEIGH ROAD	BRICK	8.9	0	0
MM	620	WOODLEIGH ROAD	BRICK	7.9	0	0
MM	630	WOODLEIGH ROAD	BRICK	9.6	0	0
MM	640	WOODLEIGH ROAD	BRICK	8.2	0	0
MM	650	WOODLEIGH ROAD	BRICK	9.2	0	0
MM	660	WOODLEIGH ROAD	PRECAST	3.5	0	0
MM	670	BAILEY LANE	BRICK	10.7	0	0
MM	671	BAILEY LANE	LINED	14	0	0
MM	680	CHERRY LANE	BRICK	7.8	0	0
MM	690	CHERRY LANE	BRICK	9.4	0	0
MM	700	CHERRY LANE	BRICK	6	288	0
MM	710	WALNUT STREET	LINED	12.7	0	0
MM	712	BABCOCK PLACE	PRECAST	5	0	0
MM	714	BABCOCK PLACE	PRECAST	5.5	0	0
MM	720	WALNUT STREET	BRICK	10.9	0	0
MM	730	WALNUT STREET	BRICK	11.1	288	0
MM	740	WALNUT STREET	BRICK	9.5	288	0
MM	741	WALNUT STREET	BRICK	9.4	0	0
MM	750	WALNUT STREET	BRICK	8.4	0	0
MM	760	WALNUT STREET	BRICK	8.7	0	0
MM	770	WALNUT STREET	LINED	10.7	0	0
MM	780	WALNUT STREET	LINED	8.9	0	0
MM	781	WALNUT STREET	BRICK	8.5	0	0
MM	790	QUAKER LANE	BRICK	7.4	0	0
MM	800	QUAKER LANE	BRICK	6.5	0	0
MM	810	NORWELL ROAD	BRICK	8.7	0	0
MM	811	NORWELL ROAD	BRICK	10.8	0	0
MM	820	NORWELL ROAD	BRICK	8.8	0	0
MM	823	NORWELL ROAD	BRICK	7.4	0	0
MM	825	NORWELL ROAD	PRECAST	5.2	0	1,000
MM	830	NAY CIRCLE	BRICK	8.3	0	0
MM	840	OAKDALE AVENUE	BRICK	9	144	0
MM	850	OAKDALE AVENUE	BRICK	7.8	288	0
MM	860	OAKDALE AVENUE	LINED	7.8	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
MM	870	OAKDALE AVENUE	BRICK	7.8	0	0
MM	880	FAIRVIEW STREET	BRICK	7	0	0
MM	890	FAIRVIEW STREET	BRICK	7.8	0	0
RR	010	RIVER STREET	BRICK	9.3	0	0
RR	020	RIVER STREET	BRICK	8.7	0	0
RR	030	RIVER STREET	BRICK	9.1	0	0
RR	040	PREVETT TERRACE	PRECAST	8.7	0	0
RR	045	PREVETT TERRACE	PRECAST	5.4	0	0
RR	050	RIVER STREET	LINED	8.7	0	0
RR	060	RIVER STREET	LINED	11.6	0	0
RR	070	RIVER STREET	LINED	11.9	0	0
RR	080	CEDAR STREET	BRICK	12.6	0	0
RR	090	SANDERSON AVENUE	BRICK	7.9	432	0
RR	100	SANDERSON AVENUE	BRICK	8.8	288	0
RR	110	SANDERSON AVENUE	LINED	9.8	0	0
RR	120	SANDERSON AVENUE	BRICK	10.2	0	0
RR	140	SANDERSON AVENUE	LINED	10.2	0	0
RR	145	SANDERSON AVENUE	LINED	7.9	0	0
RR	150	MT. VERNON STREET	BRICK	7.8	0	0
RR	155	SANDERSON AVENUE	PRECAST	8.9	0	0
RR	160	SANDERSON AVENUE	PRECAST	8	0	0
RR	170	MT. VERNON STREET	BRICK	7	0	0
RR	180	CEDAR STREET	BRICK	11.8	0	0
RR	190	CEDAR STREET	BRICK	7.3	0	0
RR	200	CEDAR STREET	LINED	7.7	0	0
RR	210	CEDAR STREET	BRICK	8.3	0	0
RR	220	CEDAR STREET	BRICK	8.6	0	0
RR	230	DARTMOUTH AVENUE	PRECAST	8.4	0	0
RR	240	DARTMOUTH AVENUE	BRICK	8	0	0
RR	250	DARTMOUTH AVENUE	BRICK	7.8	0	0
RR	260	DARTMOUTH AVENUE	LINED	8.4	0	0
RR	270	DARTMOUTH AVENUE	LINED	7.9	0	0
RR	280	CEDAR STREET	BRICK	9.7	144	0
RR	290	LINCOLN STREET	PRECAST	6.6	432	0
RR	300	LINCOLN STREET	PRECAST	11	288	0
RR	310	LINCOLN STREET	BRICK	13.1	0	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
RR	320	LINCOLN STREET	BRICK	9.9	0	0
RR	330	LINCOLN STREET	PRECAST	7	0	0
RR	340	LINCOLN STREET	BRICK	7.6	0	0
RR	350	CEDAR STREET	BRICK	7.2	144	0
RR	360	CEDAR STREET	LINED	7.6	0	0
RR	370	CEDAR STREET	BRICK	8	0	0
RR	380	CEDAR STREET	BRICK	7.6	0	0
RR	390	WINTHROP STREET	BRICK	11.1	0	0
RR	400	WINTHROP STREET	LINED	8.8	0	0
RR	410	WINTHROP STREET	LINED	8.2	144	0
RR	420	OAKDALE AVENUE	LINED	7.2	288	0
RR	430	OAKDALE AVENUE	BRICK	7.1	0	0
RR	440	OAKDALE AVENUE	BRICK	7.4	0	0
RR	450	OAKDALE AVENUE	BRICK	8.6	0	0
RR	460	OAKDALE AVENUE	BRICK	6.9	0	0
RR	470	DALE STREET	BRICK	7.6	0	0
RR	480	DALE STREET	BRICK	8.5	0	0
RR	490	DALE STREET	BRICK	8.8	0	0
RR	500	DALE STREET	BRICK	9.4	0	0
RR	510	DALE STREET	BRICK	16.8	0	0
RR	520	DALE STREET	PRECAST	10.5	576	0
RR	530	QUINCY AVENUE	PRECAST	8.3	0	0
RR	540	QUINCY AVENUE	BRICK	10.3	432	0
RR	550	QUINCY AVENUE	BRICK	8.1	1,440	0
RR	560	PRATT AVENUE	LINED	7	0	0
RR	570	PRATT AVENUE	LINED	7.6	144	0
RR	580	PRATT AVENUE	BRICK	6.5	0	0
RR	590	YOUNGS ROAD	BRICK	8.5	0	0
RR	600	YOUNGS ROAD	LINED	9.9	0	0
RR	610	PRATT AVENUE	BRICK	6.8	0	0
RR	620	REED STREET	LINED	20.6	0	0
RR	630	WILLIAMS AVENUE	PRECAST	16.1	144	0
RR	631	REED STREET	LINED	14.1	1,008	0
RR	640	BORDER STREET	LINED	11.8	0	0
RR	650	BORDER STREET	BRICK	11	0	0
RR	660	BORDER STREET	BRICK	6	144	0

Subarea	MH #	Street Name	Material	Manhole Depth (ft)	Infiltration (gpd)	Inflow (gpd)
RR	670	CEDAR STREET	BRICK	10.6	0	0
RR	680	CIRCUIT ROAD	BRICK	9.4	0	0
RR	690	CIRCUIT ROAD	BRICK	9.8	0	0
RR	700	CIRCUIT ROAD	PRECAST	9.5	0	0
RR	710	RUSSELL ROAD	PRECAST	9	144	0
RR	720	CEDAR STREET	BRICK	11.7	288	0
RR	730	CEDAR STREET	LINED	10.7	0	0
RR	740	ASH STREET	LINED	9.9	144	0
RR	750	ASH STREET	BRICK	7.4	0	0
RR	760	CEDAR STREET	BRICK	8.2	0	0
RR	780	DALE STREET	LINED	8	0	0
RR	790	DALE STREET	LINED	7.9	0	0
RR	800	WILLIAMS AVENUE	BRICK	6.1	0	0
RR	810	BENJAMIN STREET	BRICK	5.9	0	0
RR	820	BENJAMIN STREET	PRECAST	3.6	0	0
RR	830	MADISON STREET	BRICK	8.5	144	0
RR	840	MADISON STREET	BRICK	7.4	144	0
TOTAL MANHOLE INFILTRATION					36,144	5,000
TOTAL NUMBER OF MANHOLES					553	
TOTAL NUMBER OF MANHOLES INSPECTED					542	

TABLE 3
MANHOLE STRUCTURAL DEFECTS
DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

Subarea	Manhole #	Street Name	Rehabilitation	Rehabilitation Cost
DD	060	VIOLET AVENUE	REPLACE FRAME AND COVER	$1,500
DD	430	MULBERRY LANE	REPLACE FRAME AND COVER	$1,500
DD	1400	CAMPUS DRIVE	REPLACE FRAME AND COVER	$1,500
JJ	260	CHURCHILL PLACE	REPLACE FRAME AND COVER	$1,500
JJ	470	EAST STREET	REPLACE FRAME AND COVER	$1,500
JJ	570	CECIL PLACE	REPLACE FRAME AND COVER	$1,500
JJ	752	BOSTON-PROVIDENCE HIGHWAY	REPAIR BENCH/INVERT	$500
JJ	1070	BOSTON-PROVIDENCE HIGHWAY	REPLACE FRAME AND COVER	$1,500
LL	090	OAKLAND STREET	REPAIR BENCH/INVERT	$500
LL	350	EMMETT AVENUE	REPLACE FRAME AND COVER	$1,500
LL	485	COLBURN STREET	REPLACE FRAME AND COVER	$1,500
LL	740	BELKNAP STREET	BUILD BENCH AND INVERT	$750
LL	795	VETERAN'S ROAD	BUILD BENCH AND INVERT	$750
LL	870	VETERAN'S ROAD	REPAIR BENCH/INVERT	$500
MM	090	HIGH STREET	REPLACE FRAME AND COVER	$1,500
MM	140	MILTON STREET	REPLACE FRAME AND COVER	$1,500
MM	160	WALNUT STREET	REPLACE FRAME AND COVER	$1,500
MM	190	CASS AVENUE	REPAIR CHIMNEY	$250
MM	361	HAZELNUT PLACE	REPAIR WALL	$500

Subarea	Manhole #	Street Name	Rehabilitation	Rehabilitation Cost
MM	480	WHITING AVENUE	REPLACE FRAME AND COVER	$1,500
MM	670	BAILEY LANE	REPLACE FRAME AND COVER	$1,500
MM	800	QUAKER LANE	REPAIR CHIMNEY	$250
RR	100	SANDERSON AVENUE	REPLACE FRAME AND COVER	$1,500
RR	370	CEDAR STREET	REPAIR BENCH/INVERT	$500
RR	670	CEDAR STREET	REPAIR BENCH/INVERT	$500
TOTAL REHABILITATION COST				$27,500
TOTAL NUMBER OF MANHOLES				25

TABLE 4
MANHOLE INSPECTION STATUS

DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

Subarea	MH #	Street Name	Inspection Status
DD	1060	GLEASON ROAD	CNL
DD	1110	PINE STREET	CNL
DD	1120	PINE STREET	CNL
DD	1130	PINE STREET	CNL
DD	1140	PUTNAM ROAD	CNL
DD	1250	PUTNAM ROAD	CNL
DD	1270	PINE STREET	CNL
DD	1330	CAMPUS DRIVE	CNL
DD	1350	CAMPUS DRIVE	CNL
DD	1380	POOL DRIVE	CNL
JJ	711	BOSTON-PROVIDENCE HIGHWAY	CNL
TOTAL NUMBER OF MANHOLES			11

TABLE 5
MWRA COST EFFECTIVE ANALYSIS FOR INFILTRATION

DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
DD	085	VIOLET AVENUE	11.9	288	144	$3,164	Cementitious Lining	$2,083	EXCESSIVE RECOMMENDED
DD	087	PINE STREET	13.3	144	72	$1,582	Cementitious Lining	$2,328	NON-EXCESSIVE
DD	110	VIOLET AVENUE	9.9	432	216	$4,746	Cementitious Lining	$1,733	EXCESSIVE RECOMMENDED
DD	115	VIOLET AVENUE	9.7	144	72	$1,582	Cementitious Lining	$1,698	VALUE-EFFECTIVE RECOMMENDED
DD	160	STIVALETTA DRIVE	11.8	2,880	1,440	$31,637	Cementitious Lining	$2,065	EXCESSIVE RECOMMENDED
DD	190	VOLK ROAD	5.5	144	72	$1,582	Cementitious Lining	$963	EXCESSIVE RECOMMENDED
DD	195	VOLK ROAD	8.5	0	0	$0	Root Treatment, Cementitious Lining	$1,738	NON-EXCESSIVE
DD	200	VOLK ROAD	6.1	288	144	$3,164	Cementitious Lining	$1,068	EXCESSIVE RECOMMENDED
DD	210	STIVALETTA DRIVE	6.7	288	144	$3,164	Cementitious Lining	$1,173	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
DD	365	EGAN TERRACE	7.4	0	0	$0	Root Treatment, Cementitious Lining	$1,545	NON-EXCESSIVE
DD	470	ASPEN COURT	10.4	0	0	$0	Root Treatment, Cementitious Lining	$2,070	NON-EXCESSIVE
DD	510	VIOLET AVENUE	11	288	144	$3,164	Cementitious Lining	$1,925	EXCESSIVE RECOMMENDED
DD	520	VIOLET AVENUE	8.6	144	72	$1,582	Cementitious Lining	$1,505	EXCESSIVE RECOMMENDED
DD	560	HILLCREST AVENUE	5.7	144	72	$1,582	Cementitious Lining	$998	EXCESSIVE RECOMMENDED
DD	570	KIELY ROAD	7.8	144	72	$1,582	Cementitious Lining	$1,365	EXCESSIVE RECOMMENDED
DD	600	ZOAR AVENUE	6.6	144	72	$1,582	Root Treatment, Cementitious Lining	$1,405	EXCESSIVE RECOMMENDED
DD	620	ZOAR AVENUE	6.1	144	72	$1,582	Cementitious Lining	$1,068	EXCESSIVE RECOMMENDED
DD	660	ARCADIA AVENUE	4.4	288	144	$3,164	Cementitious Lining	$770	EXCESSIVE RECOMMENDED
DD	1040	GLEASON ROAD	4.8	0	0	$0	Root Treatment, Cementitious Lining	$1,090	NON-EXCESSIVE
DD	1240	PUTNAM ROAD	6.3	0	0	$0	Root Treatment, Cementitious Lining	$1,353	NON-EXCESSIVE

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
DD	1280	CAMPUS DRIVE	6.4	1,440	720	$15,818	Cementitious Lining	$1,120	EXCESSIVE RECOMMENDED
DD	1390	CAMPUS DRIVE	6.5	144	72	$1,582	Root Treatment, Cementitious Lining	$1,388	EXCESSIVE RECOMMENDED
DD	1400	CAMPUS DRIVE	7.5	0	0	$0	Root Treatment, Cementitious Lining	$1,563	NON-EXCESSIVE
JJ	010	MAVERICK STREET	13.3	144	72	$1,582	Cementitious Lining	$2,328	NON-EXCESSIVE
JJ	120	BERRY LANE	18.6	144	72	$1,582	Cementitious Lining	$3,255	NON-EXCESSIVE
JJ	200	O'NEIL DRIVE	18.1	432	216	$4,746	Cementitious Lining	$3,168	EXCESSIVE RECOMMENDED
JJ	210	DOMINIC COURT	19.7	288	144	$3,164	Cementitious Lining	$3,448	VALUE-EFFECTIVE RECOMMENDED
JJ	230	ALLEN LANE	19.6	720	360	$7,909	Cementitious Lining	$3,430	EXCESSIVE RECOMMENDED
JJ	270	CHURCHILL PLACE	18.4	144	72	$1,582	Cementitious Lining	$3,220	NON-EXCESSIVE
JJ	320	HIGH STREET	8.6	144	72	$1,582	Cementitious Lining	$1,505	EXCESSIVE RECOMMENDED
JJ	512	EAST STREET	11.2	864	432	$9,491	Cementitious Lining	$1,960	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
JJ	550	CLARK STREET	10.6	144	72	$1,582	Cementitious Lining	$1,855	VALUE-EFFECTIVE RECOMMENDED
JJ	560	CLARK STREET	7.2	0	0	$0	Root Treatment, Cementitious Lining	$1,510	NON-EXCESSIVE
JJ	570	CECIL PLACE	15.6	144	72	$1,582	Cementitious Lining	$2,730	NON-EXCESSIVE
JJ	580	CECIL PLACE	12.3	288	144	$3,164	Cementitious Lining	$2,153	EXCESSIVE RECOMMENDED
JJ	590	CECIL PLACE	11.5	144	72	$1,582	Cementitious Lining	$2,013	NON-EXCESSIVE
JJ	620	EASTERN AVENUE	12	144	72	$1,582	Cementitious Lining	$2,100	NON-EXCESSIVE
JJ	630	EASTERN AVENUE	11.3	432	216	$4,746	Cementitious Lining	$1,978	EXCESSIVE RECOMMENDED
JJ	670	EASTERN AVENUE	11.8	432	216	$4,746	Cementitious Lining	$2,065	EXCESSIVE RECOMMENDED
JJ	680	EASTERN AVENUE	10.4	288	144	$3,164	Cementitious Lining	$1,820	EXCESSIVE RECOMMENDED
JJ	700	EASTERN AVENUE	14.1	288	144	$3,164	Cementitious Lining	$2,468	EXCESSIVE RECOMMENDED
JJ	703	BOSTON-PROVIDENCE HIGHWAY	15.6	288	144	$3,164	Cementitious Lining	$2,730	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
JJ	704	BOSTON-PROVIDENCE HIGHWAY	13.8	864	432	$9,491	Cementitious Lining	$2,415	EXCESSIVE RECOMMENDED
JJ	710	BOSTON-PROVIDENCE HIGHWAY	13.4	288	144	$3,164	Cementitious Lining	$2,345	EXCESSIVE RECOMMENDED
JJ	712	BOSTON-PROVIDENCE HIGHWAY	15	288	144	$3,164	Cementitious Lining	$2,625	EXCESSIVE RECOMMENDED
JJ	720	BOSTON-PROVIDENCE HIGHWAY	15.6	576	288	$6,327	Cementitious Lining	$2,730	EXCESSIVE RECOMMENDED
JJ	770	WILLOW STREET	11.1	288	144	$3,164	Cementitious Lining	$1,943	EXCESSIVE RECOMMENDED
JJ	850	WASHINGTON STREET	11.7	864	432	$9,491	Root Treatment, Cementitious Lining	$2,298	EXCESSIVE RECOMMENDED
JJ	860	WASHINGTON STREET	12.6	144	72	$1,582	Cementitious Lining	$2,205	NON-EXCESSIVE
JJ	865	WASHINGTON STREET	9.9	144	72	$1,582	Cementitious Lining	$1,733	VALUE-EFFECTIVE RECOMMENDED
JJ	920	WASHINGTON STREET	11.2	720	360	$7,909	Cementitious Lining	$1,960	EXCESSIVE RECOMMENDED
JJ	950	WASHINGTON STREET	17.5	4,320	2,160	$47,455	Cementitious Lining	$3,063	EXCESSIVE RECOMMENDED
JJ	970	WASHINGTON STREET	11.5	720	360	$7,909	Cementitious Lining	$2,013	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
JJ	990	WASHINGTON STREET	11.8	288	144	$3,164	Cementitious Lining	$2,065	EXCESSIVE RECOMMENDED
JJ	1030	WASHINGTON STREET	12.4	864	432	$9,491	Cementitious Lining	$2,170	EXCESSIVE RECOMMENDED
JJ	1040	BOSTON-PROVIDENCE HIGHWAY	11.4	864	432	$9,491	Cementitious Lining	$1,995	EXCESSIVE RECOMMENDED
JJ	1070	BOSTON-PROVIDENCE HIGHWAY	9.3	576	288	$6,327	Cementitious Lining	$1,628	EXCESSIVE RECOMMENDED
JJ	1080	BOSTON-PROVIDENCE HIGHWAY	6.5	144	72	$1,582	Cementitious Lining	$1,138	EXCESSIVE RECOMMENDED
JJ	1100	BOSTON-PROVIDENCE HIGHWAY	8.9	432	216	$4,746	Cementitious Lining	$1,558	EXCESSIVE RECOMMENDED
LL	225	DEDHAM BOULEVARD	2.7	0	0	$0	Root Treatment, Cementitious Lining	$723	NON-EXCESSIVE
LL	275	BIRCH STREET	3.5	0	0	$0	Root Treatment, Cementitious Lining	$863	NON-EXCESSIVE
LL	370	BUSSEY STREET	9.5	0	0	$0	Root Treatment, Cementitious Lining	$1,913	NON-EXCESSIVE
LL	470	BUSSEY STREET	17.3	288	144	$3,164	Cementitious Lining	$3,028	EXCESSIVE RECOMMENDED
LL	480	BUSSEY STREET	8.6	144	72	$1,582	Cementitious Lining	$1,505	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
LL	552	TRAIN PLACE	8.2	0	0	$0	Root Treatment, Cementitious Lining	$1,685	NON-EXCESSIVE
LL	555	TRAIN PLACE	10	0	0	$0	Root Treatment, Cementitious Lining	$2,000	NON-EXCESSIVE
LL	680	CLISBY AVENUE	7.6	0	0	$0	Root Treatment, Cementitious Lining	$1,580	NON-EXCESSIVE
LL	795	VETERAN'S ROAD	6.1	0	0	$0	Root Treatment, Cementitious Lining	$1,318	NON-EXCESSIVE
MM	020	DEDHAM BOULEVARD	12.6	144	72	$1,582	Cementitious Lining	$2,205	NON-EXCESSIVE
MM	050	HIGH STREET	10.8	144	72	$1,582	Cementitious Lining	$1,890	VALUE-EFFECTIVE RECOMMENDED
MM	080	HIGH STREET	9.3	144	72	$1,582	Cementitious Lining	$1,628	VALUE-EFFECTIVE RECOMMENDED
MM	261	VICTORIA TERRACE	4.8	0	0	$0	Root Treatment, Cementitious Lining	$1,090	NON-EXCESSIVE
MM	340	HAZELNUT PLACE	18.4	144	72	$1,582	Cementitious Lining	$3,220	NON-EXCESSIVE
MM	350	HAZELNUT PLACE	10.1	288	144	$3,164	Cementitious Lining	$1,768	EXCESSIVE RECOMMENDED
MM	351	VICTORY LANE	10.4	0	0	$0	Root Treatment, Cementitious Lining	$2,070	NON-EXCESSIVE

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
MM	360	CASS AVENUE	9.5	720	360	$7,909	Cementitious Lining	$1,663	EXCESSIVE RECOMMENDED
MM	370	WHITING AVENUE	15	288	144	$3,164	Cementitious Lining	$2,625	EXCESSIVE RECOMMENDED
MM	490	FULTON STREET	9.5	144	72	$1,582	Cementitious Lining	$1,663	VALUE-EFFECTIVE RECOMMENDED
MM	500	FULTON STREET	7.7	144	72	$1,582	Cementitious Lining	$1,348	EXCESSIVE RECOMMENDED
MM	570	EDISON AVENUE	8.7	0	0	$0	Root Treatment, Cementitious Lining	$1,773	NON-EXCESSIVE
MM	602	EDISON AVENUE	7.6	0	0	$0	Root Treatment, Cementitious Lining	$1,580	NON-EXCESSIVE
MM	700	CHERRY LANE	6	288	144	$3,164	Cementitious Lining	$1,050	EXCESSIVE RECOMMENDED
MM	730	WALNUT STREET	11.1	288	144	$3,164	Cementitious Lining	$1,943	EXCESSIVE RECOMMENDED
MM	740	WALNUT STREET	9.5	288	144	$3,164	Cementitious Lining	$1,663	EXCESSIVE RECOMMENDED
MM	840	OAKDALE AVENUE	9	144	72	$1,582	Cementitious Lining	$1,575	EXCESSIVE RECOMMENDED
MM	850	OAKDALE AVENUE	7.8	288	144	$3,164	Cementitious Lining	$1,365	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
RR	090	SANDERSON AVENUE	7.9	432	216	$4,746	Cementitious Lining	$1,383	EXCESSIVE RECOMMENDED
RR	100	SANDERSON AVENUE	8.8	288	144	$3,164	Cementitious Lining	$1,540	EXCESSIVE RECOMMENDED
RR	220	CEDAR STREET	8.6	0	0	$0	Root Treatment, Cementitious Lining	$1,755	NON-EXCESSIVE
RR	280	CEDAR STREET	9.7	144	72	$1,582	Cementitious Lining	$1,698	VALUE-EFFECTIVE RECOMMENDED
RR	290	LINCOLN STREET	6.6	432	216	$4,746	Cementitious Lining	$1,155	EXCESSIVE RECOMMENDED
RR	300	LINCOLN STREET	11	288	144	$3,164	Cementitious Lining	$1,925	EXCESSIVE RECOMMENDED
RR	350	CEDAR STREET	7.2	144	72	$1,582	Cementitious Lining	$1,260	EXCESSIVE RECOMMENDED
RR	410	WINTHROP STREET	8.2	144	72	$1,582	Cementitious Lining	$1,435	EXCESSIVE RECOMMENDED
RR	420	OAKDALE AVENUE	7.2	288	144	$3,164	Cementitious Lining	$1,260	EXCESSIVE RECOMMENDED
RR	520	DALE STREET	10.5	576	288	$6,327	Cementitious Lining	$1,838	EXCESSIVE RECOMMENDED
RR	540	QUINCY AVENUE	10.3	432	216	$4,746	Cementitious Lining	$1,803	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
RR	550	QUINCY AVENUE	8.1	1,440	720	$15,818	Cementitious Lining	$1,418	EXCESSIVE RECOMMENDED
RR	570	PRATT AVENUE	7.6	144	72	$1,582	Cementitious Lining	$1,330	EXCESSIVE RECOMMENDED
RR	630	WILLIAMS AVENUE	16.1	144	72	$1,582	Cementitious Lining	$2,818	NON-EXCESSIVE
RR	631	REED STREET	14.1	1,008	504	$11,073	Cementitious Lining	$2,468	EXCESSIVE RECOMMENDED
RR	660	BORDER STREET	6	144	72	$1,582	Cementitious Lining	$1,050	EXCESSIVE RECOMMENDED
RR	710	RUSSELL ROAD	9	144	72	$1,582	Cementitious Lining	$1,575	EXCESSIVE RECOMMENDED
RR	720	CEDAR STREET	11.7	288	144	$3,164	Cementitious Lining	$2,048	EXCESSIVE RECOMMENDED
RR	740	ASH STREET	9.9	144	72	$1,582	Cementitious Lining	$1,733	VALUE-EFFECTIVE RECOMMENDED
RR	830	MADISON STREET	8.5	144	72	$1,582	Cementitious Lining	$1,488	EXCESSIVE RECOMMENDED
RR	840	MADISON STREET	7.4	144	72	$1,582	Cementitious Lining	$1,295	EXCESSIVE RECOMMENDED

Subarea	MH #	Street Name	Manhole Depth (ft)	Infiltration (gpd)	Removable Infiltration (gpd)	MWRA T+T Cost	Rehabilitation	Rehabilitation Cost	Cost-Effectiveness
TOTAL				36,144	18,072	$397,042		$196,618	
TOTAL NON-EXCESSIVE				1,584	792	$17,400		$57,635	
TOTAL EXCESSIVE RECOMMENDED				33,120	16,560	$363,823		$121,640	
TOTAL VALUE-EFFECTIVE RECOMMENDED				1,440	720	$15,818		$17,343	
TOTAL NON-EXCESSIVE RECOMMENDED				0	0	$0		$0	
TOTAL RECOMMENDED				34,560	17,280	$379,642		$138,983	
TOTAL RECOMMENDED MANHOLES								77	

TABLE 6

MWRA COST EFFECTIVE ANALYSIS FOR INFLOW

DEDHAM, MASSACHUSETTS
2020 SEWER MANHOLE INVESTIGATION

Subarea	MH #	Street Name	Inflow (gpd)	Rehabilitation
JJ	704	BOSTON-PROVIDENCE HIGHWAY	1,000	Install Inflow Dish
JJ	850	WASHINGTON STREET	1,000	Install Inflow Dish
LL	820	VETERAN'S ROAD	1,000	Install Inflow Dish
MM	065	O'BRIEN WAY	1,000	Install Inflow Dish
MM	825	NORWELL ROAD	1,000	Install Inflow Dish
TOTAL			5,000	
TOTAL NUMBER OF MANHOLES			5	
TOTAL ESTIMATED COST			$750	

NOTES:
1. Manholes located in an easement will have a "Street Name" designation of an adjacent street.
2. The estimated cost to install an inflow dish is $150 per manhole.

APPENDIX A

AS-BID UNIT COSTS

MWRA CUSTOMER SERVICE REPORT

MWRA T&T COST CALCULATION

Town of Dedham
Engineering Department
55 River Street
Dedham, MA

Bid Comparison
2018 Sewer On-Call Services
Dedham, Massachusetts
December 21, 2017

				Engineer's Estimate		Rapid Flow, Inc.		National Water Main		Diverisified Infrastructure Services		Municipal Sales, Inc.	
ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
1			*Hourly Rate for Emergency Cleaning*										
1a	20	wo	Emergency Cleaning of Sewers	$ 800.00	$ 16,000.00	$ 500.00	$ 10,000.00	$ 1,200.00	$ 24,000.00	nb	No Bid	nb	No Bid
1b	20	hr	Emergency Cleaning of Sewers	$ 275.00	$ 5,500.00	$ 100.00	$ 2,000.00	$ 175.00	$ 3,500.00	nb	No Bid	nb	No Bid
1c	30	tn	Storage, Testing, and Disposal of Sewer Debris	$ 1.00	$ 30.00	$ 0.01	$ 0.30	$ 0.01	$ 0.30	nb	No Bid	nb	No Bid
			Total Contract #1		**$ 21,530.00**		**$ 12,000.30**		**$ 27,500.30**		**No Bid**		**No Bid**
2			*Hourly Rate for Cleaning & Inspection*										
2a	30	wo	Cleaning & Inspection of Sewers	$ 3,200.00	$ 96,000.00	$ 2,600.00	$ 78,000.00	$ 2,600.00	$ 78,000.00	nb	No Bid	nb	No Bid
2b	40	hr	Cleaning & Inspection of Sewers	$ 50.00	$ 2,000.00	$ 100.00	$ 4,000.00	$ 0.01	$ 0.40	nb	No Bid	nb	No Bid
2c	30	tn	Storage, Testing, and Disposal of Sewer Debris	$ 1.00	$ 30.00	$ 0.01	$ 0.30	$ 120.00	$ 3,600.00	nb	No Bid	nb	No Bid
			Total Contract #2		**$ 98,030.00**		**$ 82,000.30**		**$ 81,600.40**		**No Bid**		**No Bid**
3			*Heavy Cleaning of Sewers*										
3a	600	lf	Heavy Cleaning of 6-inch sewers	$ 1.50	$ 900.00	$ 0.50	$ 300.00	$ 0.01	$ 6.00	$ 2.50	$ 1,500.00	nb	No Bid
3b	7000	lf	Heavy Cleaning of 8-inch sewers	$ 1.00	$ 7,000.00	$ 0.50	$ 3,500.00	$ 0.75	$ 5,250.00	$ 2.50	$ 17,500.00	nb	No Bid
3c	1000	lf	Heavy Cleaning of 10-inch sewers	$ 1.50	$ 1,500.00	$ 0.50	$ 500.00	$ 0.25	$ 250.00	$ 3.00	$ 3,000.00	nb	No Bid
3d	4000	lf	Heavy Cleaning of 12-inch sewers	$ 1.50	$ 6,000.00	$ 1.00	$ 4,000.00	$ 0.25	$ 1,000.00	$ 3.50	$ 14,000.00	nb	No Bid
3e	1000	lf	Heavy Cleaning of 15-inch sewers	$ 3.00	$ 3,000.00	$ 2.00	$ 2,000.00	$ 5.25	$ 5,250.00	$ 6.00	$ 6,000.00	nb	No Bid
3f	500	lf	Heavy Cleaning of 18-inch sewers	$ 3.00	$ 1,500.00	$ 2.00	$ 1,000.00	$ 0.75	$ 375.00	$ 10.00	$ 5,000.00	nb	No Bid
3g	250	lf	Heavy Cleaning of 20-inch sewers	$ 3.00	$ 750.00	$ 4.00	$ 1,000.00	$ 0.75	$ 187.50	$ 15.00	$ 3,750.00	nb	No Bid
3h	250	lf	Heavy Cleaning of 21-inch sewers	$ 3.00	$ 750.00	$ 4.00	$ 1,000.00	$ 5.25	$ 1,312.50	$ 15.00	$ 3,750.00	nb	No Bid
3i	250	lf	Heavy Cleaning of 22-inch sewers	$ 3.00	$ 750.00	$ 4.00	$ 1,000.00	$ 0.75	$ 187.50	$ 15.00	$ 3,750.00	nb	No Bid
3j	500	lf	Heavy Cleaning of 24-inch sewers	$ 3.00	$ 1,500.00	$ 4.00	$ 2,000.00	$ 5.25	$ 2,625.00	$ 18.50	$ 9,250.00	nb	No Bid
4			*Inspection of Sewers*										
4a	1600	lf	Inspection of 6-inch sewers	$ 1.60	$ 2,560.00	$ 0.75	$ 1,200.00	$ 1.20	$ 1,920.00	$ 1.75	$ 2,800.00	nb	No Bid
4b	80000	lf	Inspection of 8-inch sewers	$ 1.60	$ 128,000.00	$ 0.75	$ 60,000.00	$ 1.00	$ 80,000.00	$ 1.50	$ 120,000.00	nb	No Bid
4c	4000	lf	Inspection of 10-inch sewers	$ 1.60	$ 6,400.00	$ 0.75	$ 3,000.00	$ 1.00	$ 4,000.00	$ 1.50	$ 6,000.00	nb	No Bid
4d	13000	lf	Inspection of 12-inch sewers	$ 1.60	$ 20,800.00	$ 0.75	$ 9,750.00	$ 1.00	$ 13,000.00	$ 1.50	$ 19,500.00	nb	No Bid
4e	7000	lf	Inspection of 15-inch sewers	$ 1.70	$ 11,900.00	$ 0.75	$ 5,250.00	$ 1.00	$ 7,000.00	$ 1.75	$ 12,250.00	nb	No Bid
4f	3000	lf	Inspection of 18-inch sewers	$ 1.70	$ 5,100.00	$ 0.75	$ 2,250.00	$ 1.00	$ 3,000.00	$ 1.75	$ 5,250.00	nb	No Bid
4g	500	lf	Inspection of 20-inch sewers	$ 1.70	$ 850.00	$ 0.75	$ 375.00	$ 1.00	$ 500.00	$ 2.50	$ 1,250.00	nb	No Bid
4h	2200	lf	Inspection of 21-inch sewers	$ 1.70	$ 3,740.00	$ 0.75	$ 1,650.00	$ 1.00	$ 2,200.00	$ 2.50	$ 5,500.00	nb	No Bid
4i	500	lf	Inspection of 22-inch sewers	$ 1.70	$ 850.00	$ 0.75	$ 375.00	$ 1.00	$ 500.00	$ 2.75	$ 1,375.00	nb	No Bid
4j	7000	lf	Inspection of 24-inch sewers	$ 1.70	$ 11,900.00	$ 0.75	$ 5,250.00	$ 1.00	$ 7,000.00	$ 3.00	$ 21,000.00	nb	No Bid
4k	125	ea	Clean & Inspection of 4 to 6-inch laterals			$ 100.00	$ 12,500.00	$ 250.00	$ 31,250.00	$ 460.00	$ 57,500.00		
5			*Mobilization*										
5a	1	ls	Mobilization for Items 3-4, lump sum (not to exceed 5% of total)	$ 10,787.50	$ 10,787.50	$ 2,500.00	$ 2,500.00	$ 1,000.00	$ 1,000.00	$ 12,617.00	$ 12,617.00	nb	No Bid
			Total Contract #3		**$ 226,537.50**		**$ 120,400.00**		**$ 167,813.50**		**$ 332,542.00**		**No Bid**
6			*On-Call Sewer Repair*										
6a	10	lf	Structural short liners of 6-inch sewers	$ 425.00	$ 4,250.00	$ 350.00	$ 3,500.00	$ 300.00	$ 3,000.00	nb	No Bid	nb	No Bid
6b	50	lf	Structural short liners of 8-inch sewers	$ 425.00	$ 21,250.00	$ 350.00	$ 17,500.00	$ 400.00	$ 20,000.00	nb	No Bid	nb	No Bid
6c	10	lf	Structural short liners of 10-inch sewers	$ 475.00	$ 4,750.00	$ 350.00	$ 3,500.00	$ 450.00	$ 4,500.00	nb	No Bid	nb	No Bid
6d	10	lf	Structural short liners of 12-inch sewers	$ 525.00	$ 5,250.00	$ 350.00	$ 3,500.00	$ 500.00	$ 5,000.00	nb	No Bid	nb	No Bid
6e	10	lf	Structural short liners of 15-inch sewers	$ 625.00	$ 6,250.00	$ 400.00	$ 4,000.00	$ 400.00	$ 4,000.00	nb	No Bid	nb	No Bid
6f	10	lf	Structural short liners of 18-inch sewers	$ 725.00	$ 7,250.00	$ 400.00	$ 4,000.00	$ 300.00	$ 3,000.00	nb	No Bid	nb	No Bid

Town of Dedham
Engineering Department
55 River Street
Dedham, MA

Bid Comparison
2018 Sewer On-Call Services
Dedham, Massachusetts
December 21, 2017

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	Engineer's Estimate		Rapid Flow, Inc.		National Water Main		Diverisified Infrastructure Services		Municipal Sales, Inc.	
				UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
6g	250	lf	Structural line pipe (cured-in-place) of 6-inch sewers	$ 55.00	$ 13,750.00	$ 40.00	$ 10,000.00	$ 35.00	$ 8,750.00	nb	No Bid	nb	No Bid
6h	5500	lf	Structural line pipe (cured-in-place) of 8-inch sewers	$ 45.00	$ 247,500.00	$ 30.00	$ 165,000.00	$ 46.30	$ 254,650.00	nb	No Bid	nb	No Bid
6i	800	lf	Structural line pipe (cured-in-place) of 10-inch sewers	$ 50.00	$ 40,000.00	$ 34.00	$ 27,200.00	$ 49.55	$ 39,640.00	nb	No Bid	nb	No Bid
6j	500	lf	Structural line pipe (cured-in-place) of 12-inch sewers	$ 60.00	$ 30,000.00	$ 44.00	$ 22,000.00	$ 52.75	$ 26,375.00	nb	No Bid	nb	No Bid
6k	250	lf	Structural line pipe (cured-in-place) of 15-inch sewers	$ 70.00	$ 17,500.00	$ 50.00	$ 12,500.00	$ 50.00	$ 12,500.00	nb	No Bid	nb	No Bid
6l	250	lf	Structural line pipe (cured-in-place) of 18-inch sewers	$ 80.00	$ 20,000.00	$ 75.00	$ 18,750.00	$ 80.00	$ 20,000.00	nb	No Bid	nb	No Bid
6m	250	lf	Structural line pipe (cured-in-place) of 20-inch sewers	$ 90.00	$ 22,500.00	$ 85.00	$ 21,250.00	$ 55.00	$ 13,750.00	nb	No Bid	nb	No Bid
6n	300	lf	Structural line pipe (cured-in-place) of 24-inch sewers	$ 200.00	$ 60,000.00	$ 125.00	$ 37,500.00	$ 80.00	$ 24,000.00	nb	No Bid	nb	No Bid
6o	15	ea	Full Wrap Lateral Liner (cured-in-place) of 4 to 6-inch laterals	$ 4,000.00	$ 60,000.00	$ 1,850.00	$ 27,750.00	$ 1,100.00	$ 16,500.00	nb	No Bid	nb	No Bid
6p	15	ea	Clean & Inspection of 4 to 6-inch laterals	$ 1,000.00	$ 15,000.00	$ 500.00	$ 7,500.00	$ 700.00	$ 10,500.00	nb	No Bid	nb	No Bid
7			*Manhole Rehabilitation*										
7a	400	vf	Exterior chemical grouting and interior cementitous	$ 150.00	$ 60,000.00	$ 120.00	$ 48,000.00	$ 130.00	$ 52,000.00	nb	No Bid	nb	No Bid
8			*Mobilization*										
8a	1	ls	Mobilization for Items 6-7, (not to exceed 5% of total)	$ 17,959.37	$ 17,959.37	$ 15,000.00	$ 15,000.00	$ 5,500.00	$ 5,500.00	nb	No Bid	nb	No Bid
9			*Alternate Bid #1*										
9a	1	ls	Structural line pipe (cured-in-place) of 12-inch sewer segment AA10-AA5	$ 25,000.00	$ 25,000.00	$ 75,000.00	$ 75,000.00	$ 44,350.00	$ 44,350.00	nb	No Bid		
10			*Alternate Bid #2*										
10a	1	ls	Structural line pipe (cured-in-place) of 24-inch sewer segment JJ460-JJ370	$ 25,000.00	$ 25,000.00	$ 75,000.00	$ 75,000.00	$ 73,650.00	$ 73,650.00	nb	No Bid		
11			*Alternate Bid #3*										
11a	1	ls	Structural line pipe (cured-in-place) of 8-inch sewer segments HH930-HH920, HH920-HH910 & HH910-HH900	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 44,350.00	$ 44,350.00	nb	No Bid		
			Total Contract #4 BASE BID (Items 6 - 8)		**$ 653,209.37**		**$ 448,450.00**		**$ 523,665.00**		**No Bid**		**No Bid**
			BASE BID plus ALTERNATE BID No. 1 (Items 6 - 9)		**$ 678,209.37**		**$ 523,450.00**		**$ 568,015.00**		**No Bid**		
			BASE BID plus ALTERNATE BID Nos. 1 & 2 (Items 6 - 10)		**$ 703,209.37**		**$ 598,450.00**		**$ 641,665.00**		**No Bid**		
			BASE BID plus ALTERNATE BID Nos. 1, 2 & 3 (Items 6 - 11)		**$ 728,209.37**		**$ 623,450.00**		**$ 686,015.00**		**No Bid**		
12			*Chemical Root Treatment*										
12a	500	lf	Chemical root treatment of 6-inch sewers	$ 1.80	$ 900.00	$ 2.00	$ 1,000.00	$ 1.75	$ 875.00	nb	No Bid	$ 1.20	$ 600.00
12b	25000	lf	Chemical root treatment of 8-inch sewers	$ 1.80	$ 45,000.00	$ 2.00	$ 50,000.00	$ 1.75	$ 43,750.00	nb	No Bid	$ 1.25	$ 31,250.00
12c	1000	lf	Chemical root treatment of 10-inch sewers	$ 2.00	$ 2,000.00	$ 2.00	$ 2,000.00	$ 1.75	$ 1,750.00	nb	No Bid	$ 1.30	$ 1,300.00
12d	1000	lf	Chemical root treatment of 12-inch sewers	$ 2.30	$ 2,300.00	$ 2.00	$ 2,000.00	$ 1.75	$ 1,750.00	nb	No Bid	$ 1.40	$ 1,400.00
12e	300	lf	Chemical root treatment of 15-inch sewers	$ 2.95	$ 885.00	$ 3.00	$ 900.00	$ 2.00	$ 600.00	nb	No Bid	$ 1.55	$ 465.00
12f	300	lf	Chemical root treatment of 18-inch sewers	$ 4.20	$ 1,260.00	$ 3.00	$ 900.00	$ 3.00	$ 900.00	nb	No Bid	$ 1.75	$ 525.00
12g	300	lf	Chemical root treatment of 20-inch sewers	$ 4.20	$ 1,260.00	$ 3.00	$ 900.00	$ 3.00	$ 900.00	nb	No Bid	$ 2.00	$ 600.00
12h	10	ea	Chemical root treatment of manholes	$ 250.00	$ 2,500.00	$ 250.00	$ 2,500.00	$ 250.00	$ 2,500.00	nb	No Bid	$ 150.00	$ 1,500.00
12			*Mobilization*										
12a	1	ea	Mobilization for Item 12, (not to exceed 5% of total)	$ 2,805.25	$ 2,805.25	$ 1,500.00	$ 1,500.00	$ 500.00	$ 500.00	nb	No Bid	$ -	$ -
			Total Contract #5		**$ 58,910.25**		**$ 61,700.00**		**$ 53,525.00**		**No Bid**		**$ 37,640.00**

Town of Dedham
Engineering Department
55 River Street
Dedham, MA

Bid Comparison
2018 Sewer On-Call Services
Dedham, Massachusetts
December 21, 2017

ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	Engineer's Estimate UNIT COST	Engineer's Estimate TOTAL	Rapid Flow, Inc. UNIT COST	Rapid Flow, Inc. TOTAL	National Water Main UNIT COST	National Water Main TOTAL	Diverisified Infrastructure Services UNIT COST	Diverisified Infrastructure Services TOTAL	Municipal Sales, Inc. UNIT COST	Municipal Sales, Inc. TOTAL
			Total Contract #1		$ 21,530.00		$ 12,000.30		$ 27,500.30		No Bid		No Bid
			Total Contract #2		$ 98,030.00		$ 82,000.30		$ 81,600.40		No Bid		No Bid
			Total Contract #3		$ 226,537.50		$ 120,400.00		$ 167,813.50		$ 332,542.00		No Bid
			Total Contract #4 BASE BID (Items 6 - 8)		$ 653,209.37		$ 448,450.00		$ 523,665.00		No Bid		No Bid
			BASE BID plus ALTERNATE BID No. 1 (Items 6-9)		$ 678,209.37		$ 523,450.00		$ 568,015.00		No Bid		No Bid
			BASE BID plus ALTERNATE BID Nos. 1 & 2 (Items 6-10		$ 703,209.37		$ 598,450.00		$ 641,665.00		No Bid		No Bid
			BASE BID plus ALTERNATE BID Nos. 1, 2 & 3 (Items 6-11)		$ 728,209.37		$ 623,450.00		$ 686,015.00		No Bid		No Bid
			Total Contract #5		$ 58,910.25		$ 61,700.00		$ 53,525.00		No Bid		$ 37,640.00
			Total Contract 1-5 BASE BID		$ 1,058,217.12		$ 724,550.60		$ 854,104.20		NA		NA
			BASE BID plus ALTERNATE BID No. 1		$ 1,083,217.12		$ 799,550.60		$ 898,454.20		NA		NA
			BASE BID plus ALTERNATE BID Nos. 1 & 2		$ 1,108,217.12		$ 874,550.60		$ 972,104.20		NA		NA
			BASE BID plus ALTERNATE BID Nos. 1, 2 & 3		$ 1,133,217.12		$ 899,550.60		$ 1,016,454.20		NA		NA

Town of Dedham
Engineering Department
55 River Street
Dedham, MA

Bid Comparison
2020 Sewer On-Call Services
Dedham, Massachusetts
February 6, 2020

				Engineer's Estimate		National Water Main		Green Mountain	
ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
1			*Hourly Rate for Emergency Cleaning*						
1a	20	wo	Emergency Cleaning of Sewers	$ 800.00	$ 16,000.00	$ 800.00	$ 16,000.00	$ 3,000.00	$ 60,000.00
1b	20	hr	Emergency Cleaning of Sewers	$ 275.00	$ 5,500.00	$ 400.00	$ 8,000.00	$ 375.00	$ 7,500.00
1c	30	tn	Storage, Testing, and Disposal of Sewer Debris	$ 1.00	$ 30.00	$ 0.01	$ 0.30	$ 375.00	$ 11,250.00
2			*Hourly Rate for Cleaning & Inspection*						
2a	30	wo	Cleaning & Inspection of Sewers	$ 3,200.00	$ 96,000.00	$ 2,600.00	$ 78,000.00	$ 2,800.00	$ 84,000.00
2b	40	hr	Cleaning & Inspection of Sewers	$ 50.00	$ 2,000.00	$ 0.01	$ 0.40	$ 350.00	$ 14,000.00
2c	30	tn	Storage, Testing, and Disposal of Sewer Debris	$ 1.00	$ 30.00	$ 100.00	$ 3,000.00	$ 375.00	$ 11,250.00
3			*Heavy Cleaning of Sewers*						
3a	250	lf	Heavy Cleaning of 4-inch sewers	$ 1.50	$ 375.00	$ 0.01	$ 2.50	$ 11.00	$ 2,750.00
3b	600	lf	Heavy Cleaning of 6-inch sewers	$ 1.50	$ 900.00	$ 0.01	$ 6.00	$ 2.00	$ 1,200.00
3c	5000	lf	Heavy Cleaning of 8-inch sewers	$ 1.00	$ 5,000.00	$ 0.50	$ 2,500.00	$ 2.00	$ 10,000.00
3d	1000	lf	Heavy Cleaning of 10-inch sewers	$ 1.50	$ 1,500.00	$ 0.25	$ 250.00	$ 2.00	$ 2,000.00
3e	500	lf	Heavy Cleaning of 12-inch sewers	$ 1.50	$ 750.00	$ 5.00	$ 2,500.00	$ 2.50	$ 1,250.00
3f	100	lf	Heavy Cleaning of 15-inch sewers	$ 3.00	$ 300.00	$ 5.00	$ 500.00	$ 5.00	$ 500.00
3g	250	lf	Heavy Cleaning of 18-inch sewers	$ 3.00	$ 750.00	$ 0.50	$ 125.00	$ 6.50	$ 1,625.00
3h	250	lf	Heavy Cleaning of 20-inch sewers	$ 3.00	$ 750.00	$ 0.50	$ 125.00	$ 6.50	$ 1,625.00
3i	250	lf	Heavy Cleaning of 21-inch sewers	$ 3.00	$ 750.00	$ 0.50	$ 125.00	$ 6.50	$ 1,625.00
3j	250	lf	Heavy Cleaning of 22-inch sewers	$ 3.00	$ 750.00	$ 0.50	$ 125.00	$ 7.50	$ 1,875.00
3k	1000	lf	Heavy Cleaning of 24-inch sewers	$ 3.00	$ 3,000.00	$ 5.00	$ 5,000.00	$ 10.00	$ 10,000.00
4			*Inspection of Sewers*						
4a	650	lf	Inspection of 4-inch sewers	$ 1.60	$ 1,040.00	$ 5.00	$ 3,250.00	$ 7.50	$ 4,875.00
4b	9500	lf	Inspection of 6-inch sewers	$ 1.60	$ 15,200.00	$ 1.30	$ 12,350.00	$ 2.75	$ 26,125.00
4c	80000	lf	Inspection of 8-inch sewers	$ 1.60	$ 128,000.00	$ 1.10	$ 88,000.00	$ 2.30	$ 184,000.00
4d	4500	lf	Inspection of 10-inch sewers	$ 1.60	$ 7,200.00	$ 1.10	$ 4,950.00	$ 2.30	$ 10,350.00
4e	16000	lf	Inspection of 12-inch sewers	$ 1.60	$ 25,600.00	$ 1.10	$ 17,600.00	$ 2.50	$ 40,000.00
4f	7000	lf	Inspection of 15-inch sewers	$ 1.70	$ 11,900.00	$ 1.10	$ 7,700.00	$ 2.75	$ 19,250.00
4g	5000	lf	Inspection of 18-inch sewers	$ 1.70	$ 8,500.00	$ 1.10	$ 5,500.00	$ 2.75	$ 13,750.00
4h	3000	lf	Inspection of 20-inch sewers	$ 1.70	$ 5,100.00	$ 1.10	$ 3,300.00	$ 2.75	$ 8,250.00
4i	500	lf	Inspection of 21-inch sewers	$ 1.70	$ 850.00	$ 1.10	$ 550.00	$ 2.75	$ 1,375.00
4j	500	lf	Inspection of 22-inch sewers	$ 1.70	$ 850.00	$ 1.10	$ 550.00	$ 2.75	$ 1,375.00
4k	12000	lf	Inspection of 24-inch sewers	$ 1.70	$ 20,400.00	$ 1.10	$ 13,200.00	$ 3.00	$ 36,000.00
5			*Mobilization*						
5a	1	ls	Mobilization for Items 3-4, lump sum (not to exceed 5% of total)		$ 11,902.50	$ 8,410.43	$ 1,000.00	$ 18,990.00	$ 28,930.00
6			*On-Call Sewer Repair*						
6a	10	lf	Structural short liners of 6-inch sewers	$ 500.00	$ 5,000.00	$ 50.00	$ 500.00	$ 450.00	$ 4,500.00
6b	75	lf	Structural short liners of 8-inch sewers	$ 350.00	$ 26,250.00	$ 350.00	$ 26,250.00	$ 450.00	$ 33,750.00
6c	10	lf	Structural short liners of 10-inch sewers	$ 600.00	$ 6,000.00	$ 50.00	$ 500.00	$ 500.00	$ 5,000.00
6d	50	lf	Structural short liners of 12-inch sewers	$ 700.00	$ 35,000.00	$ 375.00	$ 18,750.00	$ 500.00	$ 25,000.00
6e	10	lf	Structural short liners of 15-inch sewers	$ 750.00	$ 7,500.00	$ 50.00	$ 500.00	$ 800.00	$ 8,000.00
6f	10	lf	Structural short liners of 18-inch sewers	$ 750.00	$ 7,500.00	$ 50.00	$ 500.00	$ 1,000.00	$ 10,000.00
6g	250	lf	Structural line pipe (cured-in-place) of 6-inch sewers	$ 50.00	$ 12,500.00	$ 30.00	$ 7,500.00	$ 45.00	$ 11,250.00
6h	11750	lf	Structural line pipe (cured-in-place) of 8-inch sewers	$ 50.00	$ 587,500.00	$ 46.00	$ 540,500.00	$ 37.00	$ 434,750.00

Town of Dedham
Engineering Department
55 River Street
Dedham, MA

Bid Comparison
2020 Sewer On-Call Services
Dedham, Massachusetts
February 6, 2020

				Engineer's Estimate		National Water Main		Green Mountain	
ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
6i	800	lf	Structural line pipe (cured-in-place) of 10-inch sewers	$ 55.00	$ 44,000.00	$ 46.00	$ 36,800.00	$ 37.50	$ 30,000.00
6j	1000	lf	Structural line pipe (cured-in-place) of 12-inch sewers	$ 65.00	$ 65,000.00	$ 44.00	$ 44,000.00	$ 38.50	$ 38,500.00
6k	250	lf	Structural line pipe (cured-in-place) of 15-inch sewers	$ 75.00	$ 18,750.00	$ 50.00	$ 12,500.00	$ 60.00	$ 15,000.00
6l	250	lf	Structural line pipe (cured-in-place) of 18-inch sewers	$ 85.00	$ 21,250.00	$ 75.00	$ 18,750.00	$ 85.00	$ 21,250.00
6m	250	lf	Structural line pipe (cured-in-place) of 20-inch sewers	$ 90.00	$ 22,500.00	$ 75.00	$ 18,750.00	$ 120.00	$ 30,000.00
6n	300	lf	Structural line pipe (cured-in-place) of 24-inch sewers	$ 150.00	$ 45,000.00	$ 80.00	$ 24,000.00	$ 150.00	$ 45,000.00
7			*Manhole Rehabilitation*						
7a	1700	vf	Exterior chemical grouting and interior cementitous	$ 175.00	$ 297,500.00	$ 150.00	$ 255,000.00	$ 200.00	$ 340,000.00
8			*Mobilization*						
8a	1	ls	Mobilization for Items 6-7, (not to exceed 5% of total)	$ 17,959.37	$ 60,062.50	$ 50,240.00	$ 45,000.00	$ 52,600.00	$ 52,600.00
			Total Contract		**$ 1,632,240.00**		**$ 1,324,009.20**		**$ 1,701,330.00**

Massachusetts Water Resources Authority
Sewer Utility Assessment Model
Community Customer Service Report

Run Version:	FY21 #2.0
Budget Status:	Final
Budget Year:	FY2021

CEB Model No: FY21 #2.0

Run Date:	27-Apr-20
Print Date:	1-Jun-20
Print Time:	10:09 AM

MWRA SYSTEM

	Annual Wastewater Volume			Total Suspended Solids (TSS)		Biochemical Oxygen Demand (BOD)		Maximum Month Flow			Population			
	Rate Basis MG per year	Rate Basis % share of System	Total Volume Charge	Rate Basis 1000 Lbs. per year	Total TSS Charge	Rate Basis 1000 Lbs. per year	Total BOD Charge	Rate Basis Volume MGD	Rate Basis % share of System	Total Max. Month Charge	Rate Basis Population	Rate Basis % share of System	Total Population Charge	Total Assessment
Operation & Maintenance (O&M) Charges														
Average Strength Flow	118,266.884	100%	$122,101,894	200,944.879	$32,571,898	183,847.659	$27,740,238			$0			$0	$182,414,031
High Strength Flow	184.790	100%	190,782	109.000	17,668	3,616.386	545,666			0			0	754,116
Septage Contributions	5.967	100%	6,160	640.059	103,749	322.468	48,656			0			0	158,566
Sub-total	118,457.641	100%	$122,298,837	201,693.937	$32,693,316	187,786.513	$28,334,560			$0			$0	$183,326,713
Basis of O&M Charges		**$1,032.43**	per MG.	**$162.09**	per 1000 Lbs.	**$150.89**	per 1000 Lbs.							
Capital (Debt Service) Charges														
Average Strength Flow			$0	200,944.879	$5,820,952	183,847.659	$3,948,796			$0			$0	$9,769,749
High Strength Flow			0	109.000	3,158	3,616.386	77,675			0			0	80,833
Septage			0	640.059	18,541	322.468	6,926			0			0	25,467
Maximum Month Flow			0		0		0	436.590	100%	69,620,674			0	69,620,674
Sewered Population			0		0		0			0	2,300,115	100%	119,245,084	119,245,084
Census Population			0		0		0			0	2,367,208	100%	119,245,084	119,245,084
Sub-total			$0	201,693.937	$5,842,651	187,786.513	$4,033,398	436.590	100%	$69,620,674		100%	$238,490,167	$317,986,890
Basis of Capital Charges				**$28.97**	per 1000 Lbs.	**$21.48**	per 1000 Lbs.	**Proportional Share**			**Proportional Share**			
Total Rate Revenue														
Average Strength Flow			$122,101,894		$38,392,851		$31,689,034			$0			$0	$192,183,779
High Strength Flow			190,782		20,826		623,341			0			0	834,948.83
Septage Contributions			6,160		122,291		55,582			0			0	184,033
Maximum Month Flow			0		0		0			69,620,674			0	69,620,674
Sewered Population			0		0		0			0			119,245,084	119,245,084
Census Population			0		0		0			0			119,245,084	119,245,084
Total			$122,298,837		$38,535,967		$32,367,958			$69,620,674			$238,490,167	**$501,313,603**

DEDHAM

	Annual Wastewater Volume			Total Suspended Solids (TSS)		Biochemical Oxygen Demand (BOD)		Maximum Month Flow			Population			
	Rate Basis MG per year	Rate Basis % share of System	Total Volume Charge	Rate Basis 1000 Lbs. per year	Total TSS Charge	Rate Basis 1000 Lbs. per year	Total BOD Charge	Rate Basis Volume MGD	Rate Basis % share of System	Total Max. Month Charge	Rate Basis Population	Rate Basis % share of System	Total Population Charge	Total Assessment
Operation & Maintenance (O&M) Charges														
Average Strength Flow	1,460.952	1.24%	$1,508,326	2,482.274	$402,361	2,271.072	$342,675			$0			$0	$2,253,363
High Strength Flow	0.000	0.00%	0	0.000	0	0.000	0			0			0	0
Septage Contributions	0.000	0.00%	0	0.000	0	0.000	0			0			0	0
Sub-total	1,460.952	1.23%	$1,508,326	2,482.274	$402,361	2,271.072	$342,675			$0			$0	$2,253,363
Capital (Debt Service) Charges														
Average Strength Flow			$0	2,482.274	$71,906	2,271.072	$48,780			$0			$0	$120,686
High Strength Flow			0	0.000	0	0.000	0			0			0	0
Septage			0	0.000	0	0.000	0			0			0	0
Maximum Month Flow			0		0		0	5.990	1.37%	955,193			0	955,193
Sewered Population			0		0		0			0	24,528	1.07%	1,271,627	1,271,627
Census Population			0		0		0			0	25,334	1.07%	1,276,168	1,276,168
Sub-total			$0	2,482.274	$71,906	2,271.072	$48,780	5.990	1.37%	$955,193		1.07%	$2,547,795	$3,623,674

* Does not include prior fiscal year assessment adjustments.

Massachusetts Water Resources Authority
Sewer Utility Assessment Model
Community Customer Service Report

Run Version: FY21 #2.0
Budget Status: Final
Budget Year: FY2021

CEB Model No: FY21 #2.0

Run Date: 27-Apr-20
Print Date: 1-Jun-20
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MWRA SYSTEM	Annual Wastewater Volume			Total Suspended Solids (TSS)		Biochemical Oxygen Demand (BOD)		Maximum Month Flow			Population			Total Assessment
	Rate Basis MG per year	Rate Basis % share of System	Total Volume Charge	Rate Basis 1000 Lbs. per year	Total TSS Charge	Rate Basis 1000 Lbs. per year	Total BOD Charge	Rate Basis Volume MGD	Rate Basis % share of System	Total Max. Month Charge	Rate Basis Population	Rate Basis % share of System	Total Population Charge	
Operation & Maintenance (O&M) Charges														
Average Strength Flow	118,266.884	100%	$122,101,894	200,944.879	$32,571,898	183,847.659	$27,740,238			$0			$0	$182,414,031
High Strength Flow	184.790	100%	190,782	109.000	17,668	3,616.386	545,666			0			0	754,116
Septage Contributions	5.967	100%	6,160	640.059	103,749	322.468	48,656			0			0	158,566
Sub-total	118,457.641	100%	$122,298,837	201,693.937	$32,693,316	187,786.513	$28,334,560			$0			$0	$183,326,713
Basis of O&M Charges		**$1,032.43**	per MG.	**$162.09**	per 1000 Lbs.	**$150.89**	per 1000 Lbs.							
Capital (Debt Service) Charges														
Average Strength Flow			$0	200,944.879	$5,820,952	183,847.659	$3,948,796			$0			$0	$9,769,749
High Strength Flow			0	109.000	3,158	3,616.386	77,675			0			0	80,833
Septage			0	640.059	18,541	322.468	6,926			0			0	25,467
Maximum Month Flow			0		0		0	436.590	100%	69,620,674			0	69,620,674
Sewered Population			0		0		0			0	2,300,115	100%	119,245,084	119,245,084
Census Population			0		0		0			0	2,367,208	100%	119,245,084	119,245,084
Sub-total			$0	201,693.937	$5,842,651	187,786.513	$4,033,398	436.590	100%	$69,620,674		100%	$238,490,167	$317,986,890
Basis of Capital Charges				**$28.97**	per 1000 Lbs.	**$21.48**	per 1000 Lbs.	**Proportional Share**			**Proportional Share**			
Total Rate Revenue														
Average Strength Flow			$122,101,894		$38,392,851		$31,689,034			$0			$0	$192,183,779
High Strength Flow			190,782		20,826		623,341			0			0	834,948.83
Septage Contributions			6,160		122,291		55,582			0			0	184,033
Maximum Month Flow			0		0		0			69,620,674			0	69,620,674
Sewered Population			0		0		0			0			119,245,084	119,245,084
Census Population			0		0		0			0			119,245,084	119,245,084
Total			$122,298,837		$38,535,967		$32,367,958			$69,620,674			$238,490,167	**$501,313,603**
Total Rate Revenue														
Average Strength Flow			$1,508,326		$474,267		$391,455			$0			$0	$2,374,049
High Strength Flow			0		0		0			0			0	0
Septage Contributions			0		0		0			0			0	0
Maximum Month Flow			0		0		0			955,193			0	955,193
Sewered Population			0		0		0			0			1,271,627	1,271,627
Census Population			0		0		0			0			1,276,168	1,276,168
Total			$1,508,326		$474,267		$391,455			$955,193			$2,547,795	**$5,877,037**

* Does not include prior fiscal year assessment adjustments.

MEMORANDUM

DATE: August 26, 2020

FROM: Amanda Jett LeBlanc, PE

TO: File

SUBJECT: T&T costs for Dedham, Massachusetts using MWRA methodology

Fiscal year 2020 Transportation & Treatment (T&T) costs for sewerage in the Town of Dedham can be calculated using both the MWRA Operation & Maintenance (O & M) and Capital charges, and the town's O & M and Capital costs. Therefore, MWRA charges are based mainly on sewage flow exiting the Town of Dedham. MWRA's FY21 sewerage charges to the Town of Dedham are shown in Table A, and Table B shows Dedham's FY21 O & M and Capital costs.

TABLE A - MWRA CHARGES TO THE TOWN OF DEDHAM

ITEM	FLOW (gallons/year)	FLOW (gallons/day)	MWRA CHARGE	COST ($/GPD)
Average Strength Flow*				
Annual Wastewater Volume	1,460,952,000	4,002,608	$1,508,326	$0.3768
Total Suspended Solids (O & M and Capital)	1,460,952,000	4,002,608	$474,267	$0.1185
Biochemical Oxygen Demand (O & M and Capital)	1,460,952,000	4,002,608	$391,455	$0.0978
Maximum Monthly Flow	N/A	5,990,000	$955,193	$0.1595
Population **	1,460,952,000	4,002,608	$2,547,795	N/A
TOTAL			**$5,877,037**	**$0.7526**

NOTE:
*MWRA's charges only apply to average strength flow.
**MWRA's population charges are not flow based, so it is not to be included in T & T cost.

TABLE B – TOWN OF DEDHAM SEWERAGE COSTS

ITEM	FLOW (gallons/year)	FLOW (gallons/day)	DEDHAM COST	COST ($/GPD)
Debt Service (Capital Costs)	1,460,952,000	4,002,608	$1,600,000	$0.3997
O & M	1,460,952,000	4,002,608	$1,162,727	$0.2905
TOTAL			**$2,762,727**	**$0.6902**

Therefore, the total FY21 T&T cost for both the MWRA charges and the Town of Dedham's costs are $1.4428/GPD ($0.7526 + $0.6902).

According to the Department of Environmental Protection's (DEP) Guidelines for Performing I/I Analyses and SSES this cost of $1.4428 GPD needs to be extended throughout the life of a rehabilitative measure. The life cycle for a rehabilitative measure can be set by good engineering judgement as well as backup documentation, depending on the type of rehabilitation. For this study, Weston & Sampson will use a life cycle of twenty years.

To find the present worth of a rehabilitative measure over a twenty-year period, a discount rate, or annual percentage rate, is required. According to the DEP, the discount rate for FY20 is 2.75%. To calculate the T&T cost in order to account for this twenty-year period, a present worth analysis must be done. The following formula will calculate the present worth of the T&T cost for the next twenty years:

PRESENT WORTH ANALYSIS:

Discount Rate = 2.75% (DEP FY20 Information)

Present Worth Factor:

$$\frac{(1+i)^n - 1}{i\,(1+i)^n}$$ where: i = discount rate, or interest rate
n = number of years

$$\frac{(1 + 0.0275)^{20} - 1}{0.0275\,(1 + 0.0275)^{20}} = 15.23$$

Present Worth T&T Cost:

(Present Worth Factor) x (FY20 T & T cost)

15.23 x $1.4428/GPD = $21.97/GPD

Therefore, the T&T cost for the Town of Dedham, utilizing a present worth of the rehabilitation for a twenty-year period, with a discount rate of 2.75%, is $21.97/GPD.

Town of Dedham T&T costs were derived using MWRA sewerage costs.