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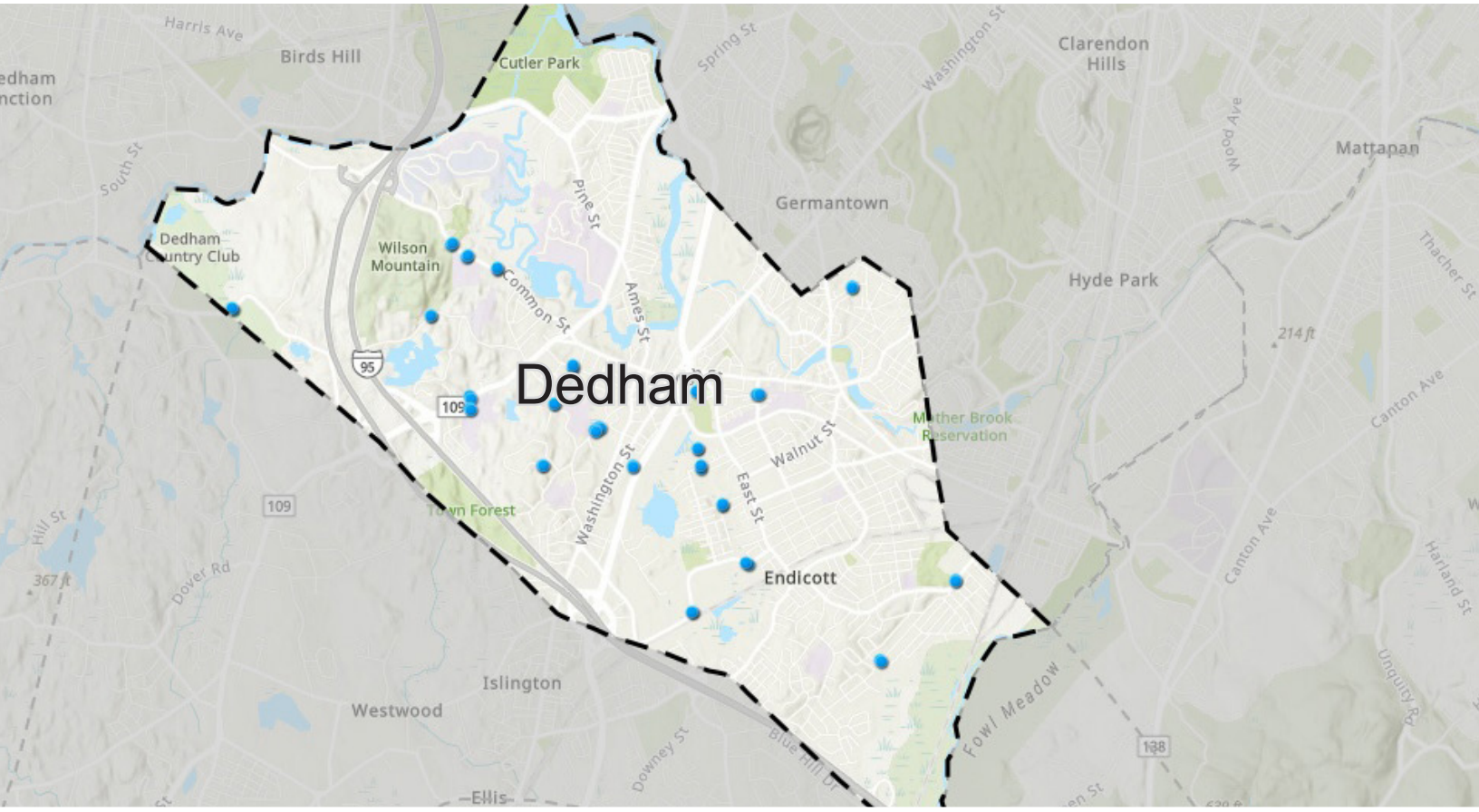





Dedham, Massachusetts

Dedham Culvert & Bridge Asset Management

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April 2022

Executive Summary

The Town of Dedham has retained TEC to provide an asset management report with regards to all town owned culvert and bridges to identify high risk structures and provide analysis and recommendations for replacement. TEC began by reviewing both publicly available online data, as well as crossing locations provided by the Town to produce a comprehensive list of Town-owned structures. Once this list was reviewed and confirmed by the Town, TEC completed an in-depth inspection and assessment of the structures.

In total, nine bridges and 24 culverts were inspected. TEC then conducted an in-depth risk assessment, utilizing a two-tier approach. The findings of this resulted in five 'critical' culverts that TEC recommends be replaced within the next ten years, and one 'critical' bridge that TEC recommends be load tested to determine the severity of the deficiencies. The Capital Investment impact was divided into two time frames, with one culvert recommended to be replaced, one bridge to be load tested, and one bridge to have scheduled maintenance/repairs within the next five years for an estimated $770k, and four culverts recommended to be replaced, and five bridges recommended to be repaired within the next 10 years for $3.86M.

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Introduction and Purpose

The Town of Dedham is heavily forested in the northwest portion of town, with many tributaries, brooks, streams, and general surface water runoff channels carrying water to one of the several ponds of Dedham. The Town has approximately 130 acres of open water body within its borders, and two watersheds leading to the Charles River and Neponset River/Boston Harbor, respectively.

Throughout the 1940s and 1970s, the population of Dedham almost doubled, and has remained at approximately 25,000 residents since the 1970s. As Dedham expanded, and public infrastructure became intertwined with the existing surface water tributaries, culverts and bridges became necessary to allow passage of water and travel, without flooding surrounding areas. With much of Dedham's infrastructure being constructed in the mid-1900s to keep up with the demand of the population increase, many structures are nearing the end of serviceable life by industry standards.

TEC has been retained to perform a town-wide condition assessment of the Town's structures and provide this asset management report to assist with municipal capitol planning and budgeting for the on-going culvert and bridge maintenance and replacement projects.

Desktop Inventory Summary

Means and Methods

The first stage of asset management started with locating all known locations of culverts and bridges throughout Dedham. The Town provided TEC with a list of all known culverts, which was paired with available online resources, including MassDOT website (resources made available through the Municipal Small Bridge Program) to locate and confirm locations of culverts, Town owned bridges, State owned bridges, or other short span structures throughout the Town, and create a 'Desktop Inventory'.

In addition to location data, these resources provided initial information including Bridge Numbers and existing bridge inspection reports that may be on file.

Results

The initial desktop inventory was sent to the Town for review prior to field inspections. In the end, the desktop inventory yielded 24 culvert, and nine bridge locations within Dedham owned by the Town.

The culvert and bridge coordinates, approximate addresses, ownership, waterbody, and any other notes were logged into a comprehensive spreadsheet, and plotted on a GIS map to aid with locating and the inspection of the structures.

Field Inventory Summary

Culverts

Means and Methods

Once the desktop inventory was completed and confirmed by the Town, TEC begin a thorough inspection of the Town's culverts and bridges between November 2021 and January 2022.

Using the locations provided from the desktop inventory, TEC field staff would manually locate and confirm the presence of each structure. Once confirmed, the inspection began. Each culvert received a thorough inspection of both the inlet and outlet, rating roadway, culvert, embankment, and headwall/wingwall conditions and noting any structural deficiencies. Special care was taken to describe the surrounding area, as well as any particular items that may be useful for scoping the potential replacement or rehabilitation of the culvert. The criteria of the inspection is described below

Ratings and Criteria

As mentioned above, culvert inspections consisted of an in-depth visual assessment of the multiple components of the structure at both the inlet and outlet, as well as the structure's surroundings. These components consist of the roadway surface, traffic safety features, culvert structure, embankment, and headwall/wingwall/retaining wall structure (if any). All the components mentioned above were individually rated using a rating system of; Good, Satisfactory, Fair, Poor, or Failing. Additional noteworthy observations were written, when applicable, for the rated components.

Taking into consideration the components, their ratings, and notes, an overall rating for the entire structure was given using the same rating system. Additional noteworthy observations were also written for the entire structure, when applicable. Some culverts were left unrated if observations were hindered due access restrictions. A breakdown of the rating criteria of each component can be found below

Culvert Rating Criteria

Good

Dependent of culvert material, consists of:

- No cracks, dents/spalls, or damage
- No to very minor surface rust
- No scaling due to high water or exposed rebar
- No obstructions around the inverts/within culvert
- No shifts in culvert lengths, separation between joints, or settlement
- No scour

'Good' HDPE

'Good' RC Box

Satisfactory

Consists of one or more of the following, dependent of culvert material:

- No to minor cracks, dents/spalls, minor scaling due to high water, and/or damage
- Minor surface rust and/or exposed rebar
- No to minor obstructions around the inverts/within culvert
- No shifts in culvert lengths or settlement
- No to minor separation between joints and/or scour

Fair

Consists of one or more of the following, dependent of culvert material:

- Minor to moderate cracks, dents/spalls, and/or damage that does not affect the integrity of the culvert
- Moderate surface rust, scaling due to high water and/or exposed rebar
- Minor obstructions around the inverts/within culvert
- Minor to moderate shifts in culvert lengths, settlement or separation between joints
- Minor to moderate scour

Poor

Consists of more than one of the following, dependent of culvert material:

- Moderate cracks, dents/spalls, and/or damage that does affect the integrity of the culvert
- Moderate to severe rust, scaling due to high water and/or exposed rebar
- Moderate obstructions around the inverts/within culvert
- Moderate shifts in culvert lengths, settlement or separation between joints
- Moderate to severe scour

Failing

Consists of more than one of the following:

- Severe cracks, dents/spalls, and/or damage that does affect the integrity of the culvert
- Severe rust/scaling/missing portions of pipe and/or severe exposed rebar
- Severe obstructions around the inverts/within culvert impeding flow
- Severe shifts in culvert lengths, settlement or separation between joints
- Severe scour, leading to structural distress from undermining

'Failing' Dry Laid Stone

Embankment Rating Criteria

Good

Consists of:

- No to very minor erosion
- No vegetation overgrowth
- No tree or root growth affecting the integrity of the structure

Satisfactory

Consists of one or more of the following:

- Minor erosion
- Minor amounts of sediment seeping over and/or through headwall
- Very minor vegetation overgrowth
- Very minor tree and/or root growth that does not affect the integrity of the structure

Fair

Consists of one or more of the following:

- Moderate erosion
- Moderate amounts of sediment seeping over and/or through headwall
- Minor to moderate vegetation overgrowth
- Minor tree and/or root growth affecting the integrity of the structure.

Poor

Consists of more than one of the following:

- Moderate to severe erosion
- Moderate to severe sediment seeping over and/or through headwall
- Moderate vegetation overgrowth
- Moderate tree and/or root growth affecting the integrity of the structure

Failing

Consists of more than one of the following:

- Severe erosion
- Severe sediment seeping over and/or through headwall
- Moderate to severe vegetation overgrowth
- Moderate to severe tree and/or root growth affecting the integrity of the structure

Headwall/Wingwall/Retaining wall Rating Criteria

Good

Dependent of wall material, consists of:

- No to very minor cracks
- No to minor scaling due to water
- No to minor spalling
- No to minor missing mortar/voids between stones/missing stones
- No moss growth
- No signs of rotation

Satisfactory

Consists of one or more of the following, dependent of wall material:

- Sporadic areas of minor cracks/minor spalling
- Minor scaling due to water
- Minor missing mortar/voids between stones
- No to very minor stones missing that does not affect integrity of wall
- Minor moss growth
- No signs of rotation

Fair

Consists of one or more of the following, dependent of wall material:

- Minor to moderate cracks/spalling
- Minor to moderate scaling due to water
- Minor to moderate missing mortar, voids between stones, stones missing that does not affect integrity
- Minor to moderate moss growth
- No to very minor signs of rotation

Poor

Consists of more than one of the following, dependent of wall material:

- Moderate cracks/spalling
- Moderate scaling due to water
- Moderate missing mortar/ voids between stones
- Moderate stones missing/collapsing that does affect the integrity of the wall
- Moderate moss growth
- Minor to moderate signs of rotation

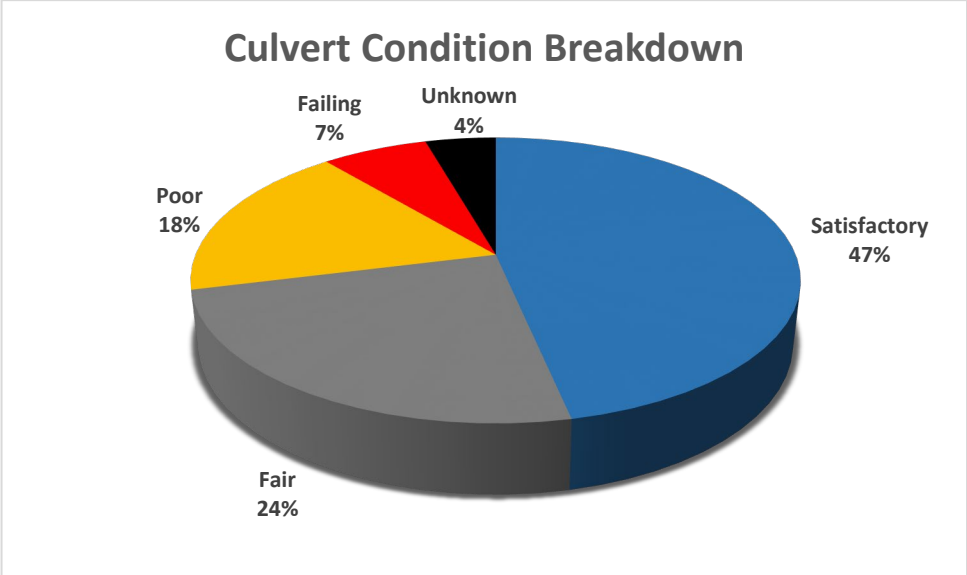
Failing

Consists of more than one of the following, dependent of wall material:

- Severe cracks/spalling
- Severe scaling due to water
- Severe missing mortar/voids between stones
- Severe stones missing/collapsing/collapsed that does affect the integrity of wall and culvert
- Severe moss growth
- Moderate to severe signs of rotation

Summarized Inspection Results

A graphical breakdown of the overall rating of both the inlet and outlet of all inspected culverts can be seen below. As shown, approximately 71% of the Town's culvert openings are rated 'Fair' or better, with 18% rated as 'Poor', 7% rated as 'failing' and 4% unable to be rated/inspected due to field conditions encountered preventing access (CUL-0011 inlet, CUL-0023 inlet).



The inspection results in their entirety can be found in spreadsheet form in the appendix. Additionally, culverts with a 'poor' or worse rating are analyzed in greater detail in subsequent sections of this report.

Bridges

TEC inspected nine town owned bridges as part of this assessment effort. Most of the bridges inspected were rated good to satisfactory, with only one bridge located along Bussey St over Mother Brook was determined to be in poor condition. All of the structures inspected have been previously inspected by MassDOT, with the MassDOT Inspection Reports utilized as a baseline to start the assessments. All assessments were performed on foot and using waders, no scaffolding, boats, or bridge inspection equipment was used to access the bridges.

TEC analyzed the field observations from the inspections, the existing plans, and the historic inspection reports for each of these structures. TEC used this data to generate recommendations for maintenance, repairs, and traffic safety feature upgrades at each bridge location. Based on this data, TEC recommends obtaining a new bridge rating for the Bussey Street Bridge over Mother Brook based on the severity of superstructure deficiencies. Once this load rating is conducted, the recommended replacement of this bridge superstructure is probable. TEC recommends a variety of repairs for the remaining structures.

A full breakdown of the findings and recommendations can be found in Appendix B: Structures Assessment Report.

High Risk Structures

The majority of structures inspected as part of this effort ranked 'fair' or better. The general rating scale is only a portion of how the Town-owned structures were prioritized. Simultaneously to these inspections, TEC looked at the risk associated with the failure of each structure.

To determine the potential risk of the 24 culverts, the three following criterion was applied:

Does the culvert carry a major waterway?

This criteria is to assess the risk of upstream flooding if a failure occurred. A major waterway carries more water, has a larger watershed, and has the potential to flood a large number of properties.

Is the culvert on a major roadway or dead-end?

This criteria is to assess the impact on roadway functionality in the case of a failure. A culvert on a dead end would cut access to the residents who live on that section of road in the event of a failure. Similarly, if a culvert on a major road were to fail, it would cause a severe interruption to traffic flow, and cause congestion and delays throughout the Town.

Is the culvert greater than or equal to 18" in diameter?

This criteria is to assess the roadway severity in the event of a failure under loading, as well as the amount of time/resources needed to apply a temporary fix. It was determined that a smaller culvert (less than an 18" diameter) wouldn't have as severe of an impact on a roadway, nor would it take as much to apply a temporary fix, as an 18" diameter culvert or larger.

For each answered 'yes' given to one of these criteria for a culvert, a point was added to the culvert's Risk Potential Score (RPS). An RPS of 3 is viewed as having the highest impact to the Town upon a complete failure of the culvert and was designated as having a 'High' RPS. An RPS of 2 was designated as 'Medium' and 1 or lower having a 'Low' RSP designation.

Of the 24 culverts, four had a 'High' RPS, 10 had an RPS of 'Medium', with the remainder designated as having a 'Low' RPS.

This two-tiered approach allowed TEC to determine which structurally deficient crossings may not be critical to the Town upon a failure, and which crossings with a high RPS may be in satisfactory condition. Taking this approach TEC narrowed down the list of 'critical' culverts to eight. Further review amongst the team was performed on these structures which included additional photo, feature, and location review, as well as follow-up site visits to determine the most critical structures and recommended courses of action. It is TEC's recommendation that the following culverts be looked at closely by the Town:

The initial eight culverts are as follows:

- CUL-0004 370 Common Street
- CUL-0006 1123 High Street
- CUL-0007 149 Village Avenue
- CUL-0010 108 Highland Street
- CUL-0015 685 Providence Highway
- CUL-0026 294 Westfield Street
- CUL-0050 36 Thomas Street
- CUL-1005 265 Common Street

The additional review confirmed five out of the eight initial 'critical' culverts. The three not considered 'critical' should still be addressed by the town, and are summarized below:

CUL-0004: This crossing is located along Common Street and carries Weld Stream through a 24" RCP inlet to a 36" wide open bottom outlet. While a 'High' risk crossing, the crossing was in satisfactory shape with the only noted deficiency being with the outlet's headwall. TEC's recommendation would be to repair/rebuild the outlet embankment and headwall (with mortar) to prevent future roadway impacts from embankment failure.

CUL-0015: This crossing is located at 694 Providence Highway adjacent to the Dedham Plaza. CUL-0015 carries Lowder Brook which is a direct tributary to the Charles River. The 108 inch CMP arch shows signs of rusting and deterioration throughout. The culvert was assessed as 'poor' for both inlet and outlet. While the condition of the culvert is 'poor' and the risk is rated 'medium, the actual risk to the Town in the event of a failure is low due to the roadway it carries being a closed-off connection between the Dedham Plaza and an adjacent property. Depending on the value of this crossing to the Town, TEC recommends the removal of this culvert all together.

CUL-0050: Crossing CUL-0050 is a 48" open bottom box culvert that carries an unnamed wetland beneath Thomas Street. While carrying relatively low risk to the Town if a failure occurs due to it's location on a side road, as well as it isn't carrying a major water body, the structural deficiencies should be addressed. TEC recommends repair to the embankments to prevent further scour.

The five remaining 'critical' culverts are in poor or failing condition, and detailed one-page summaries are provided in the following pages. These summary pages include a preliminary plan for replacement or rehabilitation, including approximated remaining service life, recommended rehabilitation or replacement method, and approximated cost.

Critical Culvert: CUL–0006

Address:
1133 High Street
Length:
± 48’
Materials:
40”x24” open bottom dry-laid stone box culvert, Mortared (inlet) and dry-laid stone (outlet) headwalls
Waterway:
Westfield Brook

Introduction

CUL-0006 carries Westfield Brook beneath High Street through what appeared to be a 40" wide dry laid stone culvert. The inlet side embankment was retained by a mortared stone headwall and wingwall combination, with the outlet side retained by a dry-laid stone retaining wall that spanned much further than just the crossing. The culvert itself was submerged and the outlet side was noted to have significant sediment buildup. According to Stream Stats, this crossing’s drainage basin is approximately 0.1 square miles, and could see up to 16.5 CFS during a 10-year storm event.

Outlet (Failing): The culvert invert was observed to be significantly lower than sediment surrounding it. The stone headwall had voids and sections of stones missing throughout, with soil washout observed between voids.

Existing Conditions

Inlet (Fair): Culvert inlet was observed to be fully submerged during inspection. No obstructions or scour was felt while probing. Minor erosion was observed along embankment, with deteriorating mortar observed throughout head and wing walls. Wetland flagging was observed with ponding upstream.

Additional Notes, Recommendations, and Cost

Overhead wires are present near the culvert’s outlet, and a wooden guardrail in satisfactory condition is present on both sides. As this crossing carries a high risk score and an outlet that has a large dry-laid stone retaining wall that was ranked as 'failing', TEC recommends the replacement of this culvert. The estimated remaining service life for this culvert is 5 to 10 years. TEC recommends a full culvert replacement with a three-sided box culvert. The estimated cost of replacement is $700,000 to $800,000, depending on the results of the field survey, hydraulic study, and geotechnical investigations.

Critical Culvert: CUL-0007

Address:
149 Village Avenue
Length:
± 65’
Materials:
30” open bottom dry-laid stone, sloped embankment with dry-laid stone headwall
Waterway:
Unnamed Wetland

Introduction

CUL-0007 is located adjacent to 149 Village Avenue and consists of dry-laid stone headwalls on both sides to hold back approximately 10 feet of cover over a dry-laid stone culvert which is 90% obstructed by sediment. While the location dictates a relatively low risk to the town should failure occur, the lack of flow opening combined with the amount of soil retained by dry-laid headwalls in poor condition with stormwater discharges above them creates a higher risk of embankment failure affecting the roadway above it.

Existing Conditions

Inlet (Failing):

The culvert is almost completely filled with sediment, preventing general flow. Voids were observed throughout headwall, with sections of loose stones. Above the headwall is a 12” HPDE drainage outfall which leads to the catch basin approximately seven feet above it. Upgradient is closely abutted by a house.

Outlet (Failing)

The culvert is almost completely filled with sediment, preventing general flow. Embankment consists of slope down to dry laid stone headwall. Voids observed throughout headwall. 12” HDPE drainage outfall at top of headwall. Small irrigation line placed directly above crossing. Fallen trees present downgradient. Erosion observed on the right side of headwall.

Additional Notes, Recommendations, and Cost

Overhead wires, water line (hydrant), and drainage is present on the roadway. Wooden fencing is present on both sides. The estimated remaining service life for this culvert is 5 to 10 years. TEC recommends a full replacement with a three or four sided concrete box culvert. The estimated cost of replacement is $900,000 to $1,000,000, with costs depending on the results of a field survey, hydraulic study, and geotechnical investigations

Critical Culvert: CUL-0010

Address:
108 Highland Street
Length:
± 36'
Materials:
24" Open Bottomed Box Culvert, Concrete and Granite Block (inlet and headwall) and Cast in Place (outlet and headwall).
Waterway:
Lowder Brook

Introduction

CUL-0010 is located along Highland Street and carries Lowder Brook through a 24 inch box culvert. The inlet was in poor condition, and based on field observations, abutter anecdotal comments, and the presence of CUL-0011 as an overflow, CUL-0010 appears to be undersized. This is rebuffed with Stream Stats determination of almost 1.5 square miles of watershed area contributing to a peak flow of 119 CFS during the 10-year storm event.

Existing Conditions

Inlet (Poor): Chipping, spalling, and general deterioration was observed throughout the headwall, with the section of granite blocks severely shifted. The embankment was generally stabilized with asphalt, with the exception of above the headwall where evidence of sheet flow was observed. The culvert wasn't able to be visually inspected as it was fully submerged, however no obstructions or scour was felt while probing.

Outlet (Fair): Minor cracking and chipping of the headwall, with areas of minor erosion along the embankment was observed. Adjacent to the outlet, a 12" HDPE Pipe assumingly tied into the roadway catch basin was observed to also outlet. While the interior of the culvert wasn't able to be visually inspected due to high water, no obstructions or scour was felt during probing.

Additional Notes, Recommendations, and Cost

Overhead wires and the previously mentioned drainage were the only utilities observed, with substandard traffic safety features present. This, combined with the relatively small bankfull widths (10 and 14 ft) coupled with low roadway cover over the culvert lends this crossing to be a good candidate for a precast box culvert replacement to prevent roadway overtopping and abutter flooding during large storm events. The estimated remaining service life for this culvert is 5 to 10 years. It is TEC's recommendation to fully replace the existing culvert with a three-sided concrete box culvert. The estimated cost of replacement is $600,000 to $700,000 depending on the results of the field survey, hydraulic study, and geotechnical investigations.

Critical Culvert: CUL-0026

Address:
294 Westfield Street
Length:
± 30’
Materials:
15” VCP, Dry Laid Stone Headwalls
Waterway:
Weld Stream

Introduction

The crossing is located at 294 Westfield Street and carries Weld Stream through a 15 inch VCP culvert. The inlet and outlet conditions were both poor, as the culvert and dry-laid headwalls were deteriorating. According to StreamStats, this crossing carries the overflow of Weld Pond on it’s way to the Charles River, and can see upwards of 10 CFS during the 10-year design storm. The crossing is also upgradient of CUL-0004. Westfield Street is a dead end and failure of this crossing during large storm events would result in restricted access, as well as potential upstream flooding as both inlet and outlet have approximately 5 feet of cover between roadway elevation and top of pipe.

Existing Conditions

Inlet (Poor): The inlet of the pipe was partially buried, and leaves had to be cleared around the opening. The VCP was noted to be cracked, with sediment within it. The dry-laid headwall was in poor condition, with multiple voids and missing stones observed in the headwall.

Outlet (Poor): The outlet of the pipe was observed to be cracking along the top of the pipe, with leaves and rocks obstructing the opening. The dry-laid headwall observed to be in poor condition, and a 12 inch RCP drainage outfall was noted to be protruding through the right side of the headwall.

Additional Notes, Recommendations, and Cost

Reflectors were observe at both the inlet and outlet, with only overhead wires with utility poles observed for utilities. The estimated remaining service life for this culvert is less than 5 years. It is TEC’s recommendation to complete a full replacement with a four-sided concrete box culvert. The estimated cost of a full replacement is $400,000 to $500,000 depending on the results of the field survey, hydraulic study, and geotechnical investigations.

Critical Culvert: CUL-1005

Address:
269 Common Street
Length:
± 55’
Materials:
18” RCP, Dry-Laid Stone Headwall (Inlet) Mortared Stone Headwall (outlet)
Waterway:
Unnamed Wetland

Introduction

CUL-1005 is located at 265 Common Street, just south of the Dedham Parks and Recreation Complex. The crossing consists of a dry-laid inlet south of the roadway to an 18-inch RCP outlet north of the roadway. The crossing is a direct tributary to the Charles River which is just north of the crossing. Immediately upstream of the inlet is an approximately 6-foot mortared stone wall with an assumed culvert under it feeding CUL-1005. The inlet was noted to be in poor condition with multiple large granite stones covering the top of the inlet spanning between the inlet and the stone wall. The outlet was noted to be in fair condition with scaling and standing water observed within the pipe.

Existing Conditions

Inlet (Poor): The inlet is located between an assumed culvert that runs under a privately owned mortared stone wall and the roadway. The inlet was observed to be at a low point of a roadway swale, and covered by partially buried granite blocks and a log preventing a full inspection of both the inlet and the assumed private culvert outlet. A dry-laid stone headwall was observed to be in fair condition around the inlet.

Outlet (Fair): The outlet is comprised of an 18 RCP with approximately 9 inches of standing water observed at the outfall. Scaling was observed within the pipe, and it was approximately 25% obstructed by leaves. The mortared stone headwall was observed to be in satisfactory condition, and the embankment in fair condition with trees, and general trash observed.

Additional Notes, Recommendations, and Cost

No traffic safety features were observed, however overhead wires, a sewer manhole, and a fire hydrant were all present along the roadway. The estimated remaining service life for this culvert is 5-10 years, with immediate maintenance potentially extending the service life. Estimated cost of replacement with 3 sided box culvert is $550,000 to $650,000.

Below is the Recommended Capital Investment Table broken out into culverts and bridges, and further broken out into time frames based on estimated remaining service life. Priority within the timeframes was determined based on severity of deficiencies, and roadway volume.

Recommended Capital Investment Table (Culverts)

Replacement within 0-5 Years			
	CUL-0026	294 Westfield Street	$500,000
0-5 Years Total Cost (Estimate)			**$500,000**
Replacement within 5-10 Years			
	CUL-0006	1133 High Street	$800,000
	CUL-1005	269 Common Street	$650,000
	CUL-0010	108 Highland Street	$700,000
	CUL-0007	149 Village Avenue	$1,000,000
5-10 Years Total Cost (Estimate)			**$3,150,000**

Recommended Capital Investment Table (Bridges)

Maintenance and Repairs within 1 to 5 years		
	Bussey Street Bridge	$30,000
	Maverick Street over Mother Brook	$240,000
0-5 Years Total Cost (Estimate)		**$270,000**
Maintenance and Repairs within 5 to 10 years		
	Washington Street Bridge	$225,000
	Washington Street Bridge	$80,000
	Eastern Avenue Bridge	$165,000
	Ames Street Bridge	$70,000
	Maverick Street over Water Canal	$165,000
5-10 Years Total Cost (Estimate)		**$705,000**

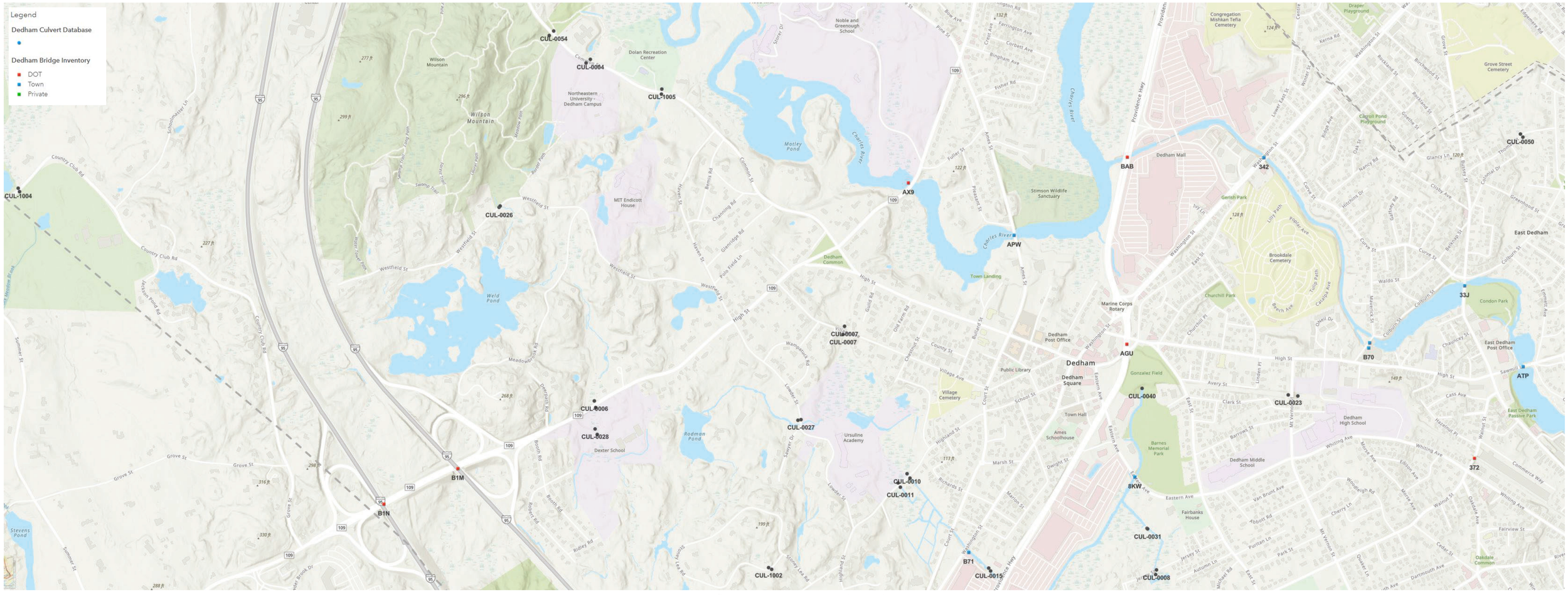
Conclusion

TEC was able to review previous inventory data, and assess the culverts and bridges located within the Town of Dedham from known locations, online resources, and an in-person approach. The majority of structures in Town were given a 'Fair' or better assessment, however the structures on the lower end of the scale were analyzed further for risk based on location and characteristics. Six of these structures (five culverts and one bridge) were deemed to be in 'critical condition' and pose a significant risk to town infrastructure if failure occurred. An in-depth analysis was conducted on these locations, with recommendations to the Town including replacement scoping and estimated structure replacement pricing.

Appendix A
Dedham Structure Map

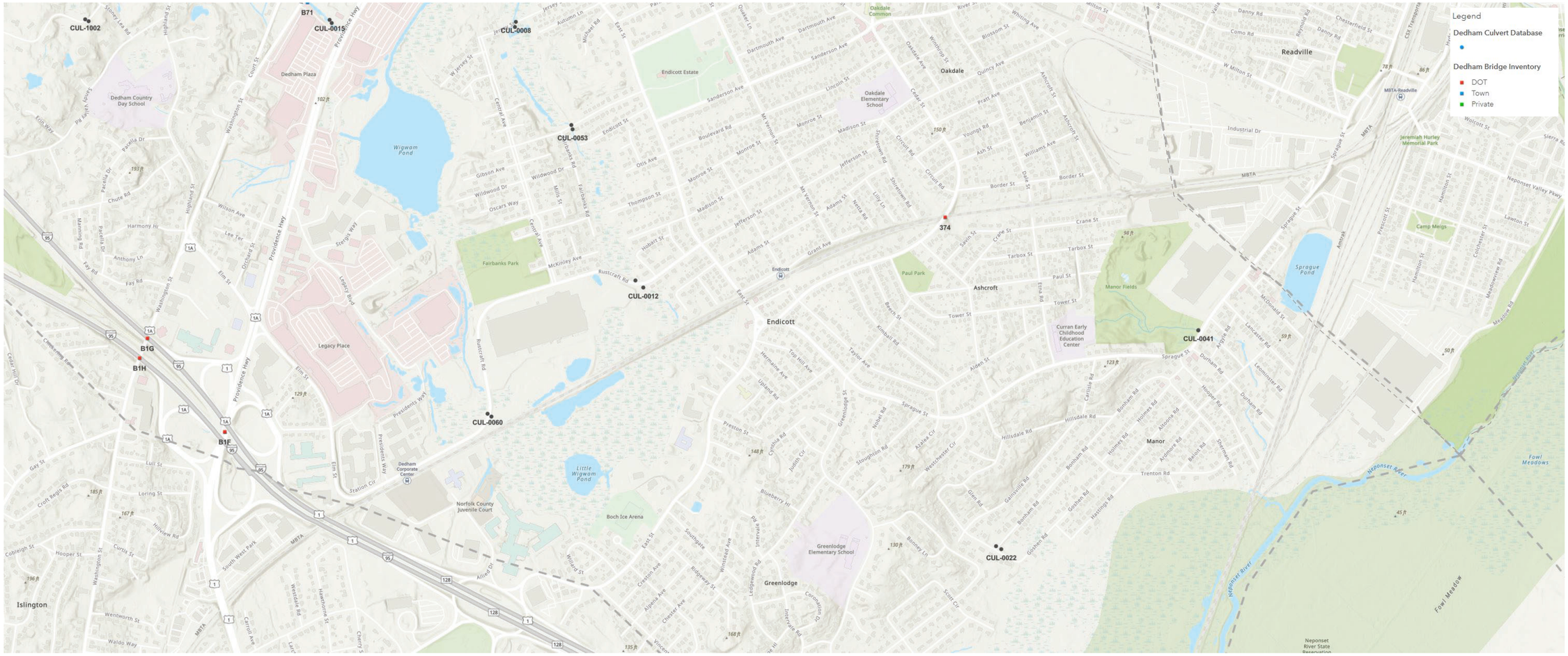
Dedham Structure Map

Dedham Structure Map



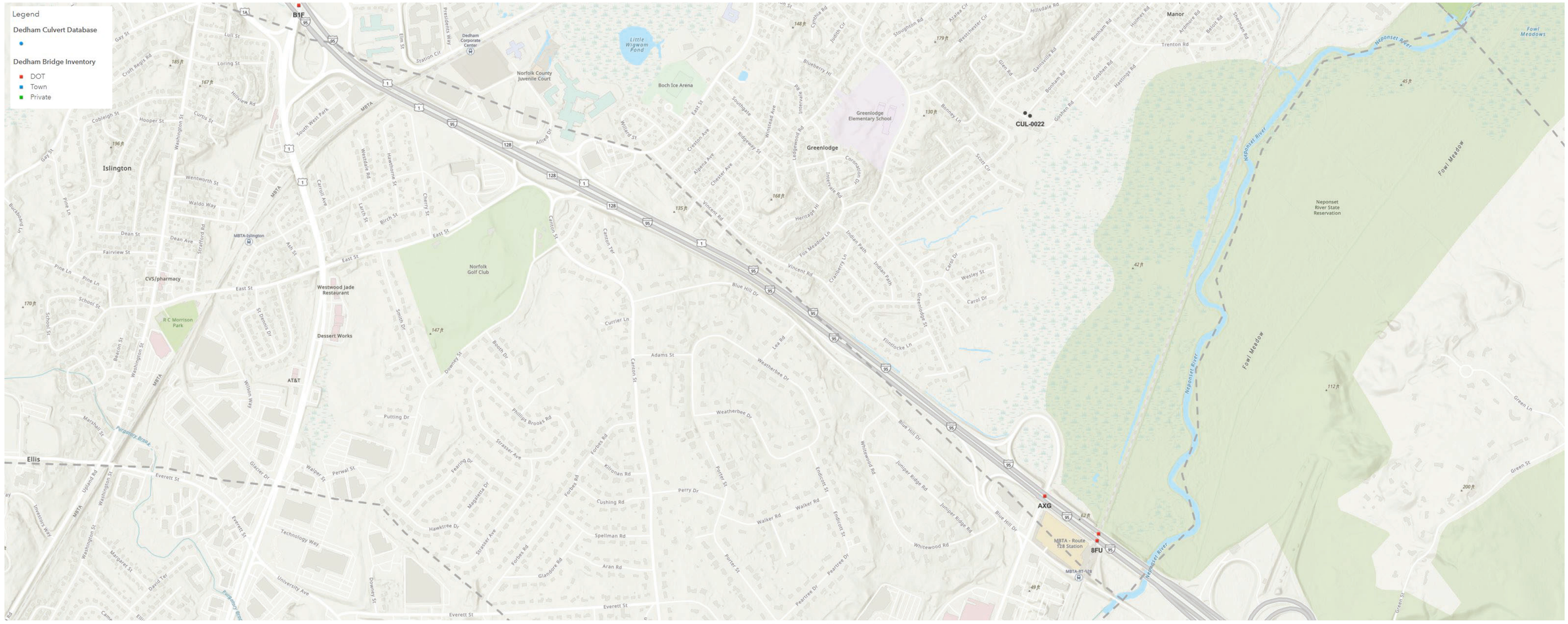
Dedham Mid-North

Dedham Structure Map



Dedham Mid-South

Dedham Structure Map



Appendix B
Culvert Inspection Raw Data

TEC
Dedham Finalized Culvert Inspection
Database
1/14/2022

Facility ID	**CUL-0004**	**CUL-0004**	**CUL-0006**	**CUL-0006**
Inlet/Outlet	**Inlet**	**Outlet**	**Inlet**	**Outlet**
Overall Condition	**Satisfactory**	**Poor**	**Fair**	**Failing**
			West of 1123 High Street.	West of 1123 High Street.
Culvert_Location	Near 370 Common Street. East of Northeastern track field.	Near 370 Common Street, East of The Linden assisted living facility.	Southern side of High Street.	Northern side of High Street.
Waterbody	Weld Stream	Weld Stream	Westfield Brook	Westfield Brook
Roadway_Description				
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Good	Good	Satisfactory	Satisfactory
Inspection_Date	12/20/2021	12/20/2021	1/6/2022	1/6/2022
Roadway_Width_ft	28	28	28	28
Culvert_Length_ft	55	55	48	48
swCul_Align_Road	Road Aligned	Road Aligned	Road Aligned	Road Aligned
swCul_Align_Stream	Stream Aligned	Stream Aligned	Stream Aligned	Skewed (>45)
Traffic_Safety_Feature	Guard Rail	Kneewall	Wooden Guard Rail	Wooden Guard Rail
Traffic_Safety_Feature_Cond	Satisfactory	Satisfactory	Satisfactory	Satisfactory
	Freshly paved pavement.	Freshly paved pavement.		
Gen_Roadway	White and yellow line recently painted.	White and yellow line recently painted.	Traffic sign approximately 7' west of inlet.	
Utilities	OHW, Drainage, and Water line	Drainage	SMH	OHW
swCul_Shape	Round	Open bottom	Open bottom	Open bottom
swCul_Material	RCP	Dry Laid Stone	Dry Laid Stone	Dry Laid Stone
swCul_Width_in	24	36	40	40
swCul_Height_in	24	18	24	24
swCul_Substrate_Width_in	18	36		
swCul_Water_Depth_in	4	17	30	
swCul_Bankfull_Width_ft	4	4	Ponded Upstream	Ponded Downstream
swCul_Obstruction_Percent	25	50		50
swCul_Obstruction_Type	Sticks, Leaves, and Trash	Leaves and Sticks	None	Sediment
swCul_Inv_El	At Stream Grade	Submerged	Submerged	Submerged
swCul_Condition	Satisfactory	Failing	Fair	Poor
	Minor spalling in pipe.	Interior of culvert is fully submerged.		
	Scaling throughout length of pipe.	Interior of culvert consists of dry laid stone.		Culvert invert significantly lower than sediment around it.
swCul_Observations	Drainage manhole placed directly above pipe in roadway.	No scour felt while probing.	Culvert inlet is submerged, no obstructions or scour felt while probing.	No scour felt while probing.
swCul_Emb_Type	Slope and Retaining Structure	Retained	Slope and Retaining Structure	Slope and Retaining Structure
swCul_Emb_Cond	Satisfactory	Fair	Fair	Failing
swCul_Cover_ft	4	4.5	7	7
HeadWingRetainWall_Material	Mortared Stone	Dry Laid Stone	Mortared Stone	Dry Laid Stone
HeadWingRetainWall_Cond	Fair	Fair	Fair	Failing
swCul_Scour_Location	None	None	None	None
swCul_Scour_Condition				
			Minor erosion observed.	
		Moderate vegetation growth with vines.	Wetland Flags observed..	
	Two 6 inch diameter trees directly up above culvert.	Rusted steel beam holding headwall above dry laid stone culvert.	Moderate moss observed on headwall.	Stone headwall observed to have several voids, sections of missing stones, and actively falling.
swCul_Emb_Observations	12 inch PVC pipe coming in on left side of inlet.	8 inch tree directly in front of the embankment/culvert.	Mortar is deteriorating throughout headwall and wingwall.	Embankment soil washout observed between voids.
swCul_Beaver	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No
swCul_Gen_Comment		Headwall is overhanging culvert, approximately 1 foot.	CLF upstream from inlet.	
swCul_Overall_Cond	Satisfactory	Poor	Fair	Failing
UTM 19T_Northing_m	4680787	4680802	4679513	4679488
UTM 19T_Easting_m	318874	318891	318873	318877
y	42.258286	42.258408	42.246806	42.246583
x	-71.195883	-71.195687	-71.195504	-71.195444

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Facility ID	**CUL-0007**	**CUL-0007**	**CUL-0008**	**CUL-0008**	**CUL-0010**	**CUL-0010**
Inlet/Outlet	**Inlet**	**Outlet**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
Overall Condition	**Failing**	**Failing**	**Satisfactory**	**Satisfactory**	**Poor**	**Fair**
Culvert_Location	Near 149 Village Ave.	Near 149 Village Ave.	East of 94 Jersey Street.	East of 93 Jersey Street.	Near 108 Highland Street	Near 108 Highland Street.
Waterbody	Unnamed Wetland	Unnamed Wetland	East Brook	East Brook	Lowder Brook	Lowder Brook
Roadway_Description	Minor cracks and patches.	Minor cracks and patches.			Minor cracking and patching. Asphalt berm on both sides of roadway.	Minor cracking and patching throughout outlet side.
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Fair	Fair
Inspection_Date	12/20/2021	12/20/2021	11/23/2021	11/23/2021	12/20/2021	12/20/2021
Roadway_Width_ft	24	24	24	24	22	22
Culvert_Length_ft	65	65	59	59	36	36
swCul_Align_Road	Aligned	Aligned	Skewed (<45)	Skewed (<45)	Road Aligned	Road Aligned
swCul_Align_Stream	Skewed (<45)	Skewed (<45)	Stream Aligned	Stream Aligned	Stream Aligned	Stream Aligned
Traffic_Safety_Feature	Wooden fence.	Wooden fence	Wooden Guard Rails	Wooden Guard Rails	Wooden Railing	Wooden Railing
Traffic_Safety_Feature_Cond	Poor	Poor	Satisfactory	Satisfactory	Poor	Fair
Gen_Roadway	Two catch basins positioned on either side of roadway.	Two catch basins positioned on either side of roadway.			Cracking and patches along road way.	Catch basin leading directly into outlet side.
Utilities	Potential gas and drainage	OHW and hydrant and drainage	SMH	Utility pole and SMH	Sewer easement adjacent	OHW and Drainage
swCul_Shape	Open Bottom	Open Bottom	Twin Round	Twin Round	Box	Box
swCul_Material	Dry Laid Stone	Dry Laid Stone	RCP & RCP	RCP & RCP	Motared Stone	Reinforced Concrete
swCul_Width_in	30	30	36 (RCP) & 36 (RCP)	36 (RCP) & 36 (RCP)	24	24
swCul_Height_in			36	36		24
swCul_Substrate_Width_in	20	20	36	36		
swCul_Water_Depth_in	0	0	13.5	13.5	32	26
swCul_Bankfull_Width_ft	6	5	15	14	10	14
swCul_Obstruction_Percent	90	90	25	25	0	0
swCul_Obstruction_Type	Sediment	Sediment	Sediment and Sticks	Sediment	None	None
swCul_Inv_El	At Stream Grade	At Stream Grade	At Stream Grade	At Stream Grade	Submerged	Submerged
swCul_Condition	Failing	Failing	Satisfactory	Satisfactory		
swCul_Observations	Culvert inlet is almost completely filled with sediment, inhibiting flow	Culvert is almost completely filled with sediment, inhibiting flow	Minor moss growing on headwall.	Minor spalling along the headwall.	Could not fully inspect culvert due inlet being submerged. No obstructions or scour felt while probing.	Could not fully inspect culvert due inlet being submerged. No obstructions or scour felt while probing. 12 inch HDPE pipe approximately at stream grade.
swCul_Emb_Type	Slope and Retaining Structure	Slope and Retaining Structure	Slope and Retaining Structure	Slope and Retaining Structure	Retained	Retained
swCul_Emb_Cond	Fair	Fair	Satisfactory	Fair	Fair	Fair
swCul_Cover_ft	10	10	1.5	1	3	3
HeadWingRetainWall_Material	Dry laid stone	Dry laid stone	Concrete (pre-cast)	Concrete (pre-cast)	Concrete and Granite Blocks	Concrete (CIP)
HeadWingRetainWall_Cond	Poor	Poor	Satisfactory	Satisfactory	Poor	Fair
swCul_Scour_Location	None	None	None	None	None	None
swCul_Scour_Condition						
swCul_Emb_Observations	Embankment consists of slope down to dry laid stone headwall. Large voids observed throughout headwall. Moderate vegetation observed. Drainage outfall consisting of 12 inch HDPE flared end section at top of headwall. Riprap observed above outlet.	Embankment consists of slope down to dry laid stone headwall. Voids observed throughout headwall. Drainage outfall consisting of 12 inch HDPE flared end section at top of headwall. Small irrigation line place directly above Culvert. Fallen trees present throughout. Signs of erosion on the right side of headwall.	Additional 12 inch RCP drainage east of culvert observed.	Red hose observed in embankment.	Chipping and spalling throughout headwall. Portion of headwall cracked. Noticable shift in granite blocks observed. Pavement surrounding top and sides of headwall.	Minor cracks in mortared stone. Minor erosion along embankment sides.
swCul_Beaver	No	No	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No	No	No
swCul_Gen_Comment		Fallen tree approximately 10 feet of outlet. Trash and vegetation debris also blocking direct route to stream.	Abutter comment: Beavers and obstruction was removed recently.	Wetland flags observed.		
swCul_Overall_Cond	Failing	Failing	Satisfactory	Satisfactory	Poor	Fair
UTM 19T_Northing_m	4679738	4679769	4678804	4678820	4679208	4679192
UTM 19T_Easting_m	319819	319827	320981	320984	320049	320060
y	42.249066	42.249342	42.24091	42.241066	42.244334	42.244184
x	-71.184098	-71.184027	-71.169759	-71.16972	-71.181159	-71.181025

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Facility ID	**CUL-0011**	**CUL-0011**	**CUL-0012**	**CUL-0012**	**CUL-0015**	**CUL-0015**
Inlet/Outlet	**Inlet**	**Outlet**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
Overall Condition	**Unknown**	**Satisfactory**	**Satisfactory**	**Satisfactory**	**Poor**	**Poor**
Culvert_Location	Near 108 Highland Street. Inlet was located behind large mortared stone wall. Beyond stone wall, floodwaters prevented direct access.	Located across from mortared stone wall. Northwest from 108 Highland Street.	Near southern side of 58 Rustcraft Road.	Near Northern Side of 58 Rustcraft Road.	Near 685 Providence Highway	Near 685 Providence Highway
Waterbody	Lowder Brook Overflow	Lowder Brook Overflow	East Brook	East Brook	Lowder Brook	Lowder Brook
Roadway_Description	Minor cracks and patches were observed along the roadway.	Minor cracks and patches were observed along the roadway.				
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Fair	Fair	Satisfactory	Satisfactory	Fair	Fair
Inspection_Date	12/20/2021	12/20/2021	11/23/2021	11/23/2021	11/24/2021	11/24/2021
Roadway_Width_ft	22	22	32	32	19.5	19.5
Culvert_Length_ft	44	44	84	84	34.5	34.5
swCul_Align_Road		Road Aligned	Road Aligned	Road Aligned	Road Aligned	Road Aligned
swCul_Align_Stream		Stream Aligned	Skewed (>45)	Skewed (>45)	Stream Aligned	Stream Aligned
Traffic_Safety_Feature		Wooden Fence	Guard Rail	Guard Rail	Guard Rail & Fence	Guard Rail & Fence
Traffic_Safety_Feature_Cond		Fair	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Gen_Roadway	Two catch basins positioned on either side of roadway.	Two catch basins positioned on either side of roadway.			Roadway fenced off from Dedham Plaza to Mechanic Shop	Roadway fenced off from Dedham Plaza to Mechanic Shop
Utilities	Drainage	Drainage and OHW	Utility pole, CB, DMH, & SMH	Utility pole, CB, DMH, & SMH		
swCul_Shape		Twin Round	Twin Round	Twin Round	Round	Round
swCul_Material		HDPE & HDPE	RCP	RCP	CMP Arch	CMP Arch
swCul_Width_in		24 (HDPE) & 24 (HDPE)	12	12	108	108
swCul_Height_in		24	12	12	108	108
swCul_Substrate_Width_in		24			9	9
swCul_Water_Depth_in		12	36	36	24	24
swCul_Bankfull_Width_ft		10	10	18	20	20
swCul_Obstruction_Percent					25	25
swCul_Obstruction_Type		None	None	None	Tree Limbs	Trees and Plants hanging into the stream
swCul_Inv_El		At Stream Grade	Submerged	Submerged	At Stream Grade	At Stream Grade
swCul_Condition		Good			Poor	Poor
swCul_Observations		The culvert pipes appear to be in satsifactory condition. Culvert is twin 24 inch HDPE pipes.	Could not fully inspect culvert due to invert elevation being submerged. Minor scour observed and no obstructions when probing.	Could not fully inspect culvert due to invert elevation being submerged. Minor scour observed and no obstructions when probing.	Rusting to high water.	Rusting to high water.
swCul_Emb_Type		Retained	Slope and Retaining Structure	Slope and Retaining Structure	Slope	Slope
swCul_Emb_Cond		Satisfactory	Satisfactory	Satisfactory	Fair	Fair
swCul_Cover_ft		2.5	4	4	4	4
HeadWingRetainWall_Material		Concrete (CIP)	Concrete (pre-cast)	Concrete (pre-cast)	None	None
HeadWingRetainWall_Cond		Satisfactory	Satisfactory	Satisfactory		
swCul_Scour_Location		None	Under Culvert.	Under Culvert.	Culvert	None
swCul_Scour_Condition			Minor	Minor	Minor	
swCul_Emb_Observations		Embankment partially covered with pavement. Vegetation and vine growth throughout embankment. Thorns present throughout. Popcorning along headwall and wingwalls.	Black tarp was observed draped over headwall.	Wetlands Flag present.	Wetland Flags observed. A drainage outfall present, adjacent to headwall. Moderate vegetation and large rocks along embankment. Minor amount of fallen trees along embankment.	Wetland Flags observed. Moderate Vegatation present. Two discharge RCP observed along the embankment. 8" diameter tree growing near the end of the outlet.
swCul_Beaver		No	No	No	No	No
swCul_Discharge_Illicit		No	No	No	No	No
swCul_Gen_Comment	Culvert was inaccessible due to large mortared stone wall and heavy vegetation throughout flooded area.	12 inch HDPE pipe coming out of left wing wall; HDPE pipe connected to catch basin.	Historic notes provided by Town dictating this was installed in the late 1990's early 2000's	Discharge pipe observed adjacent to outlet. Historic notes provided by Town dictating this was installed in the late 1990's early 2000's	Multiple drainage outlets observed on bank to development.	
swCul_Overall_Cond	Unknown	Satisfactory	Satisfactory	Satisfactory	Poor	Poor
UTM 19T_Northing_m	4679175	4679159	4677908	4677933	4678845	4678833
UTM 19T_Easting_m	320014	320022	321396	321370	320349	320356
y	42.244022	42.243876	42.23294	42.233156	42.241128	42.24103
x	-71.181572	-71.181467	-71.164456	-71.16478	-71.177416	-71.177328

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Facility ID	**CUL-0022**	**CUL-0022**	**CUL-0023**	**CUL-0023**	**CUL-0026**
Inlet/Outlet	**Inlet**	**Outlet**	**Inlet**	**Outlet**	**Inlet**
Overall Condition	**Satisfactory**	**Satisfactory**	**Unknown**	**Satisfactory**	**Poor**
	Northern side of Bonham Road.	Southern side of Bonham Road.	Western Side of Mt Vernon Street.	Eastern side of Mt Vernon Street.	Near 294 Westfield Street. Northern side of Westfield
Culvert_Location	Near the corner of Bonham Rd & Greensboro Rd.	Near the corner of Bonham Rd & Greensboro Rd.	South of 29 Mt Vernon Street. Could not access due to CLF.	South of the tennis court.	Street.
Waterbody	Wetlands	Wetlands	Wetland	Wetland	Weld Stream
Roadway_Description			Moderate amount of patching on roadway.	Moderate amount of patching on roadway.	
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Satisfactory	Satisfactory	Poor	Poor	Satisfactory
Inspection_Date	1/6/2022	11/23/2021	1/6/2022	1/6/2022	11/24/2021
Roadway_Width_ft	24	24	28	28	16
Culvert_Length_ft	55	55			29
swCul_Align_Road	Road Aligned	Road Aligned	Road Aligned	Road Aligned	Road Aligned
swCul_Align_Stream	Stream Aligned	Stream Aligned	Skewed (<45)	Skewed (<45)	Skewed (>45)
Traffic_Safety_Feature	None	None	Guard Rail	Guard Rail	Reflectors
Traffic_Safety_Feature_Cond			Satisfactory	Satisfactory	Fair
Gen_Roadway		OHW			
Utilities	Utility pole and OHW.	Fire hydrant observed, roughly 100' east of culvert.	OHW	Utility pole & SMH	Utility pole
swCul_Shape	Round	Round	Round	Round	Round
swCul_Material	RCP	RCP	RCP	RCP	VCP
swCul_Width_in	24	24	30	30	15
swCul_Height_in	24	24	30	30	15
swCul_Substrate_Width_in	24	24	30	30	10
swCul_Water_Depth_in	0.5	7		8	6
swCul_Bankfull_Width_ft	5	15		10	1
swCul_Obstruction_Percent	25	25		25	25
swCul_Obstruction_Type	Leaves, Riprap, and Branches	Sediment	None	Leaves & Branches	Leaves
swCul_Inv_El	At Stream Grade	At Stream Grade	At Stream Grade	At Stream Grade	Partially Buried
swCul_Condition	Satisfactory	Satisfactory	Unknown	Satisfactory	Poor
swCul_Observations	Inlet comprised of RCP flared end section with three 0.25" rebar gating the inlet opening. Riprap has fallen into culvert. Inlet is a flared end section. Minor spalling at the top of the culvert opening.	Minor spalling observed at the top of culvert.	Inlet is a flared end section.	Outlet is a flared end section. Minor spalling atround at the rim.	Cracking observed along the pipe.
swCul_Emb_Type	Slope	Slope	Slope (>2:1)	Slope (>2:1)	Slope and Retaining Structure
swCul_Emb_Cond	Fair	Satisfactory	Satisfactory	Satisfactory	Poor
swCul_Cover_ft	3.5	4		20	5
HeadWingRetainWall_Material	None	None	None	None	Dry Laid Stone
HeadWingRetainWall_Cond					Poor
swCul_Scour_Location	None	None	None	None	None
swCul_Scour_Condition					
swCul_Emb_Observations	Covered in leaves and tree limbs. Riprap has fallen over into culvert. 1" diameter tree located near the right flared end section.			8" diameter tree to the left of flared end section. Few 1" trees growing around outlet. Moderate amount of fallen trees downstream.	Voids and missing stones in headwall
swCul_Beaver	No	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No	No
swCul_Gen_Comment	24" RCP section located upstream, about 15' away.		Could only visually inspect due to CLF preventing access.	24" HDPE culvert downstream, about 30' away.	Culvert is partially buried under leaves and silt
swCul_Overall_Cond	Satisfactory	Satisfactory	Unknown	Satisfactory	Poor
UTM 19T_Northing_m	4676998	4676989	4679467	4679463	4680256
UTM 19T_Easting_m	322575	322594	321500	321535	318535
y	42.225028	42.224937	42.247011	42.246974	42.253428
x	-71.14988	-71.149666	-71.163678	-71.163237	-71.199824

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Facility ID	**CUL-0026**	**CUL-0027**	**CUL-0027**	**CUL-0028**
Inlet/Outlet	**Outlet**	**Inlet**	**Outlet**	**Inlet**
Overall Condition	**Poor**	**Satisfactory**	**Satisfactory**	**Satisfactory**
Culvert_Location	Near 294 Westfield Street. Southern side of Westfield Street.	Western side of Lowder Street.	Eastern side of Lowder Street.	Near 1100 High Street. Northern side of roadway. Located on driveway for Capen Preschool.
Waterbody	Weld Stream	Lowder Brook	Lowder Brook	Westfield Brook
Roadway_Description		Minor amount of patching along roadway.	Broken wooden guard rail section. Minor amount of patching along roadway.	
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Inspection_Date	11/24/2021	11/24/2021	11/24/2021	12/20/2021
Roadway_Width_ft	16	18	18	24
Culvert_Length_ft	29	39	39	65
swCul_Align_Road	Road Aligned	Road Aligned	Road Aligned	Skewed (>45)
swCul_Align_Stream	Stream Aligned	Stream Aligned	Skewed (<45)	Skewed (<45)
Traffic_Safety_Feature	Reflectors	Wooden Guard Rail	Wooden Guard Rail	None
Traffic_Safety_Feature_Cond	Fair	Fair	Failing	
Gen_Roadway		Utility pole near inlet is damaged.		
Utilities	Utility pole	Gas, Water, DMH, and Utility Pole	Gas, Water, and DMH	Drainage
swCul_Shape	Round	Elliptical	Elliptical	Round
swCul_Material	VCP	RCP	RCP	HDPE
swCul_Width_in	15	65	65	30
swCul_Height_in	15	43	43	30
swCul_Substrate_Width_in	10	64	64	22
swCul_Water_Depth_in	6	12	12	28
swCul_Bankfull_Width_ft	3	12	10	50
swCul_Obstruction_Percent	50	0	0	25
swCul_Obstruction_Type	Large Rocks & Leaves	None	None	Sediment
swCul_Inv_El	At Stream Grade	At Stream Grade	At Stream Grade	At Stream Grade
swCul_Condition	Poor	Satisfactory	Satisfactory	Good
swCul_Observations	Cracking observed along the pipe.	Fallen tree nearby inlet. Minor patching on headwall.	Patching around culvert and headwall	Pipe sticking out approximately 18 inches past head wall. Culvert appears to be in working condition. No damage present.
swCul_Emb_Type	Slope and Retaining Structure	Slope and Retaining Structure	Slope and Retaining Structure	Retained
swCul_Emb_Cond	Poor	Satisfactory	Fair	Satisfactory
swCul_Cover_ft	5	3	3.5	2.5
HeadWingRetainWall_Material	Dry Laid Stone	Concrete (pre-cast)	Concrete (pre-cast)	Concrete (precast)
HeadWingRetainWall_Cond	Fair	Satisfactory	Satisfactory	Satisfactory
swCul_Scour_Location	None	None	None	None
swCul_Scour_Condition				
swCul_Emb_Observations	12" RCP drainage outlet observed adjacent to culvert	Mortar between head and wing wall observed to be deteriorating.	Wetland flags observed. Areas of riprap appear unstable.	Moderate vegetation throughout embankment. 4 foot chain-link fence placed around headwall. Vegetation growing between fence and head wall.
swCul_Beaver	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No
swCul_Gen_Comment		24 inch HDPE drainage outfall observed in embankment adjacent to wingwall. Historic notes from town that this crossing was replaced in 2011	Historic notes from town that this crossing was replaced in 2011	Ice present throughout. Moss on top of headwall.
swCul_Overall_Cond	Poor	Satisfactory	Satisfactory	Satisfactory
UTM 19T_Northing_m	4680253	4679419	4679422	4679408
UTM 19T_Easting_m	318532	319642	319653	318873
y	42.253385	42.246151	42.246171	42.245855
x	-71.199873	-71.186165	-71.186026	-71.195471

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Facility ID	**CUL-0028**	**CUL-0031**	**CUL-0031**	**CUL-0040**
Inlet/Outlet	**Outlet**	**Inlet**	**Outlet**	**Inlet**
Overall Condition	**Satisfactory**	**Satisfactory**	**Fair**	**Fair**
Culvert_Location	Near 1100 High Street. Southern side of roadway. Located on driveway for Capen Preschool.	Near 155 Eastern Avenue. South from the American Legion.	Near 155 Eastern Avenue. South from the American Legion.	Near 420 Providence Highway. South of Gonzalez Field. Inlet Only
Waterbody	Westfield Brook	East Brook	East Brook	Wigwam
Roadway_Description				
Surface_Type	Asphalt	Gravel	Gravel	Dirt & Asphalt
Surface_Condition	Satisfactory	Fair	Fair	Satisfactory
Inspection_Date	12/20/2021	11/23/2021	11/23/2021	11/24/2021
Roadway_Width_ft	24			
Culvert_Length_ft	65	19	19	
swCul_Align_Road	Skewed (>45)	Path Aligned	Path Aligned	Road Aligned
swCul_Align_Stream	Stream Aligned	Stream Aligned	Stream Aligned	Stream Aligned
Traffic_Safety_Feature	None	None	None	Fence
Traffic_Safety_Feature_Cond				Satisfactory
Gen_Roadway				
Utilities	Electric, Drainage, and Sewer			
swCul_Shape	Round	Round	Round	Twin Box
swCul_Material	HDPE	RCP	RCP	Reinforced Concrete & Reinforced Concrete
swCul_Width_in	30	36	36	84 (Reinforced Concrete) & 84 (Reinforced Concrete)
swCul_Height_in	30	36	36	96
swCul_Substrate_Width_in	22	36	36	84
swCul_Water_Depth_in	28	18	18	27
swCul_Bankfull_Width_ft	20	20	20	20
swCul_Obstruction_Percent	25	0	0	50
swCul_Obstruction_Type	Sediment	None	None	Debris, Branches, and Leaves
swCul_Inv_El	At Stream Grade	At Stream Grade	At Stream Grade	At Stream Grade
swCul_Condition	Good	Satisfactory	Fair	Satisfactory
swCul_Observations	Pipe sticking out approximately 18 inches past head wall. Culvert appears to be in working condition. No damage present.			Twin Box - each culvert 84 inch wide. Debris observed to be caught on metal grate.
swCul_Emb_Type	Retained	Slope	Slope	Slope and Retaining Structure
swCul_Emb_Cond	Satisfactory	Fair	Poor	Fair
swCul_Cover_ft	2.5	1	1	15
HeadWingRetainWall_Material	Concrete (precast)	None	None	Metal sheet pile
HeadWingRetainWall_Cond	Satisfactory			Fair
swCul_Scour_Location	None	None	None	None
swCul_Scour_Condition				
swCul_Emb_Observations	Minor vegetation throughout embankment. 4 foot chain-link fence placed around headwall and extending pass wing walls. Vegetation growing between chain-link fence and headwall.	Moderate erosion observed.	Moderate erosion observed.	CLF around culvert. Rusting on wingwall due to high water. Wetland Flags observed.
swCul_Beaver	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No
swCul_Gen_Comment	Some sections of ice present. Small portions of moss growing on top of headwall. Mortar around culvert is deteriorating.	Wetland flags observed.	Wetland flags observed.	Abandoned box culvert of similar construction observed behind sheet pile wingwall. Culvert extends from inlet to Charles River, carrying water from the Wigwam pond under the intersection of High, Harris, and East Street, as well as private property. Inlet is confirmed to be owned by town. Deed Book 1354 Page 523
swCul_Overall_Cond	Satisfactory	Satisfactory	Fair	Fair
UTM 19T_Northing_m	4679386	4678978	4678978	4679506
UTM 19T_Easting_m	318882	320953	320951	320946
y	42.245668	42.24246	42.242478	42.247233
x	-71.19537	-71.170126	-71.170155	-71.17038

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Facility ID	**CUL-0041**	**CUL-0042**	**CUL-0050**	**CUL-0050**	**CUL-0053**
Inlet/Outlet	**Inlet**	**Inlet**	**Inlet**	**Outlet**	**Inlet**
Overall Condition	**Satisfactory**	**Satisfactory**	**Poor**	**Fair**	**Satisfactory**
Culvert_Location	Northern side of Sprague Street. Across the street from 447 Sprague Street.	Northern side of Sprague Street. Across the street from 447 Sprague Street.	Near 36 Thomas Street. Northern side of Thomas Street.	Near 36 Thomas Street. Southern side of Thomas Street.	Near 73 Wentworth Street. Southern side of Wentworth Street.
Waterbody	Unnamed Stream	Unnamed Stream	Wetland	Wetland	East Brook
Roadway_Description					
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Inspection_Date	1/6/2022	1/6/2022	11/23/2021	11/23/2021	11/23/2021
Roadway_Width_ft	38	38	23.5	23.5	23
Culvert_Length_ft			42	42	37
swCul_Align_Road	Road Aligned	Skewed (<45)	Road Aligned	Road Aligned	Road Aligned
swCul_Align_Stream	Stream Aligned	Stream Aligned	Skewed (>45)	Skewed (>45)	Stream Aligned
Traffic_Safety_Feature	None	None	Guard Rail	Guard Rail	Guard Rail
Traffic_Safety_Feature_Cond			Satisfactory	Satisfactory	Good
Gen_Roadway					
Utilities	CB, SMH, OHW, & Utility Pole	CB, SMH, OHW, & Utility Pole	CB	Utility pole and CB	CB, SMH, DMH, Utility pole, & OHW
swCul_Shape	Round	Round	Box	Box	Box
swCul_Material	VCP	RCP	Reinforced Concrete	Reinforced Concrete	Reinforced Concrete
swCul_Width_in	24	18	48	48	114
swCul_Height_in	24	18	44	38	30
swCul_Substrate_Width_in			48	48	114
swCul_Water_Depth_in	18	18	6	5	24
swCul_Bankfull_Width_ft	15	15	7	6	15
swCul_Obstruction_Percent	25	25	25	0	0
swCul_Obstruction_Type	Sediment and Trash	Sediment and Trash	Sediment and Sticks	None	None
swCul_Inv_El	Submerged	Submerged	At Stream Grade	At Stream Grade	At Stream Grade
swCul_Condition	Fair	Fair	Fair	Satisfactory	Good
swCul_Observations	Could not fully inspect culvert since inlet is submerged. No scour felt while probing.	Could not fully inspect culvert since inlet is submerged. No scour felt while probing.	Four 7" abrasions in the concrete. Cracking & spalling observed.	Half inch shift above culvert. Minor cracks observed. Moderate size stone missing bottom right side headwall.	No cracks or spalling observed.
swCul_Emb_Type	Headwall	Headwall	Retained	Retained	Retained
swCul_Emb_Cond	Satisfactory	Satisfactory	Poor	Poor	Satisfactory
swCul_Cover_ft			1.5	2	2
HeadWingRetainWall_Material	Mortared stone	Mortared stone	Mortared Stone & Concrete	Mortared Stone & Concrete	Granite Stone
HeadWingRetainWall_Cond	Satisfactory	Satisfactory	Failing	Poor	Satisfactory
swCul_Scour_Location	None	None	Beneath right side of culvert	Left embankment	None
swCul_Scour_Condition			Moderate	Moderate	
swCul_Emb_Observations		Wetland Flags observed.	Overturning due to erosion.	10" DIP observed in headwall.	Minor Erosion observed.
swCul_Beaver	No	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No	No
swCul_Gen_Comment	Inlet is lower than CUL-42 (RCP), abutting to the east of CUL-42 Wetland Flags observed..	Inlet appears to have debris flowing from inlet to CUL-41 inlet (VCP)	Remnants of old traffic features.	Tree growing to the right of headwall.	Wetland Flags observed. Historic note from town that crossing was installed in 2008.
swCul_Overall_Cond	Satisfactory	Satisfactory	Poor	Fair	Satisfactory
UTM 19T_Northing_m	4677715	4677715	4680429	4680419	4678451
UTM 19T_Easting_m	323284	323284	322403	322412	321167
y	42.23164	42.23163	42.255872	42.255766	42.237779
x	-71.141519	-71.141529	-71.153027	-71.152913	-71.167376

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Facility ID	**CUL-0053**	**CUL-0054**	**CUL-0054**	**CUL-0060**	**CUL-0060**
Inlet/Outlet	**Outlet**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
Overall Condition	**Satisfactory**	**Satisfactory**	**Fair**	**Fair**	**Fair**
Culvert_Location	Near 73 Wentworth Street. Northern side of Wentworth Street.	Located near 423 Common Street, Northwest from the parking area for Wilson Mountain.	Located near 423 Common Street north from the trail.	Southeast side of Rustcraft Road.	Northwest of Rustcraft Road.
Waterbody	East Brook	County Jail Brook	Country Jail Brook	Little Wigwam Stream	Little Wigwam Stream
Roadway_Description					
Surface_Type	Asphalt	Asphalt	Dirt & Asphalt	Asphalt	Asphalt
Surface_Condition	Satisfactory	Satisfactory	Satisfactory	Fair	Fair
Inspection_Date	11/23/2021	11/24/2021	11/24/2021	1/6/2022	1/6/2022
Roadway_Width_ft	23	44	44	30	30
Culvert_Length_ft	37	114	114	65	65
swCul_Align_Road	Road Aligned	Skewed (>45)	Road Aligned	Road Aligned	Road Aligned
swCul_Align_Stream	Stream Aligned	Stream Aligned	Stream Aligned	Stream Aligned	Skewed (>45)
Traffic_Safety_Feature	Guard Rail	Guard Rail	Stone Wall	None	None
Traffic_Safety_Feature_Cond	Good	Poor	Satisfactory		
Gen_Roadway				Erosion control and silt sack in CB observed. Moderate patching along roadway.	Erosion control and silt sack in CB observed. Moderate patching along roadway.
Utilities	CB, SMH, & DMH	Utility pole		CB, DMH, OHW, Utility Pole, Fire Hydrant, Sewer Gate, Water Gate, & SMH	CB, DMH, Utility Pole, Fire Hydrant, Sewer Gate, Water Gate, & SMH
swCul_Shape	Box	Round	Dry Laid Stone	Round	Round
swCul_Material	Reinforced Concrete	RCP	Dry Laid Stone	RCP	RCP
swCul_Width_in	114	24	30	36	36
swCul_Height_in	32	24	30	36	36
swCul_Substrate_Width_in	114	24	30		
swCul_Water_Depth_in	24	6	6	40	36
swCul_Bankfull_Width_ft	15	10	9	10	15
swCul_Obstruction_Percent	25	50	0	0	25
swCul_Obstruction_Type	Leaves	Leaves & Branches	None	None	Sediment
swCul_Inv_El	At Stream Grade	At Stream Grade	At Stream Grade	Submerged	Submerged
swCul_Condition	Good	Satisfactory	Satisfactory	Poor	Fair
swCul_Observations	Minor spalling observed.			Could not fully inspect inlet due to it being submerged. No obstructions felt while probing.	Exposed rebar observed around the rim of outlet.
swCul_Emb_Type	Retained	Slope and Retaining Structure	Slope and Retaining Structure	Slope (<2:1)	Slope (<2:1)
swCul_Emb_Cond	Satisfactory	Satisfactory	Fair	Fair	Satisfactory
swCul_Cover_ft	2	10	15	4	3
HeadWingRetainWall_Material	Granite Stone	Mortared Stone	Stacked Stone	None	None
HeadWingRetainWall_Cond	Satisfactory	Poor	Poor		
swCul_Scour_Location	None	None	None	Under culvert	Under culvert
swCul_Scour_Condition				Severe	Moderate
swCul_Emb_Observations	Abutting CLF east of outlet.	Sections of wing and head wall showing signs of deterioration 12" RCP discharge observed.	Voids observed throughout headwall	Wetland Flags observed. Minor erosion observed northwest of inlet. Silt sock present. Riprap fallen into ponding area.	Heavy vegetation oberserved downstream. Silt sock observed on embankment, approximately 5' from the outlet.
swCul_Beaver	No	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No	No
swCul_Gen_Comment	Historic note from town that crossing was installed in 2008.		Two large stones 10' downstream	Ponding observed downstream.	Ponding observed upstream.
swCul_Overall_Cond	Satisfactory	Satisfactory	Fair	Fair	Fair
UTM 19T_Northing_m	4678466	4680896	4680911	4677483	4677493
UTM 19T_Easting_m	321165	318737	318756	320867	320854
y	42.23791	42.259218	42.259372	42.228992	42.22908
x	-71.167427	-71.197572	-71.197369	-71.170729	-71.170887

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Facility ID	**CUL-1002**	**CUL-1002**	**CUL-1004**	**CUL-1004**	**CUL-1005**
Inlet/Outlet	**Inlet**	**Outlet**	**Inlet**	**Outlet**	**Inlet**
Overall Condition	**Fair**	**Fair**	**Fair**	**Fair**	**Poor**
Culvert_Location	Near 296 Stoney Lea Road. Northern side of Stoney Lea Road.	Near 296 Stoney Lea Road. Southern side of Stoney Lea Road.	Southern side of Country Club Road. Near 255 Country Club Road	Northern side of Country Club Road. Near 255 Country Club Road.	Near 269 Common Street. Southern side of Common Street Opposite side of road of Dedham parks and recreation complex.
Waterbody	Wetland	Wetland	Rock Meadow Brook	Rock Meadow Brook	Wetland
Roadway_Description	Cracking, small potholes, and patching along roadway.	Cracking, small potholes, and patching along roadway.			
Surface_Type	Asphalt	Asphalt	Asphalt	Asphalt	Asphalt
Surface_Condition	Fair	Fair	Satisfactory	Satisfactory	Good
Inspection_Date	12/20/2021	12/20/2021	11/24/2021	11/24/2021	12/20/2021
Roadway_Width_ft	24	24	28	28	28
Culvert_Length_ft	40	40	60	60	53
swCul_Align_Road	Skewed (<45)	Skewed (<45)	Road Aligned	Road Aligned	Road Aligned
swCul_Align_Stream	Skewed (<45)	Skewed (>45)	Stream Aligned	Stream Aligned	Stream Aligned
Traffic_Safety_Feature	None	None	Wooden Guard Rail	None	None
Traffic_Safety_Feature_Cond			Satisfactory		
Gen_Roadway	Cracking and patches throughout roadway.	Cracking and patches throughout roadway.			Small berm placed on both sides of road.
Utilities	OHW	OHW		Utility pole and OHW	Fire Hydrant
swCul_Shape	Round	Round	Triple Round	Triple Round	
swCul_Material	RCP	RCP	RCP, RCP, & RCP	RCP, RCP, & RCP	Dry Laid Stone
swCul_Width_in	12	12	24 (RCP), 24 (RCP), & 24 (RCP)	24 (RCP), 24 (RCP), & 24 (RCP)	
swCul_Height_in	12	12	24	24	
swCul_Substrate_Width_in	11	12	24	24	
swCul_Water_Depth_in	3	5	2.5	2.5	
swCul_Bankfull_Width_ft	2	2	15	15	5
swCul_Obstruction_Percent	0	50	25	25	95%
swCul_Obstruction_Type	None	Leaves and branches	Large Rocks & Leaves	Leaves & Golf balls	Granite Blocks
swCul_Inv_El	At Stream Grade	At Stream Grade	At Stream Grade	At Stream Grade	Buried
swCul_Condition	Fair	Fair	Fair	Fair	Poor
swCul_Observations	Scaling at water level.	Minor scour observed. Moderate scaling throughout pipe.	Minor Spalling observed.	Minor Spalling observed.	Large granite blocks placed above dry laid stone face culvert.
swCul_Emb_Type	Slope and Retaining Structure	Slope and Retaining Structure	Slope and Retaining Structure	Slope and Retaining Structure	Slope and Retaining Structure
swCul_Emb_Cond	Fair	Satisfactory	Poor	Fair	Fair
swCul_Cover_ft	2	2.5	4.5	2.5	3.5
HeadWingRetainWall_Material	Dry Laid Stone	Dry Laid Stone	Concrete (pre-cast)	Concrete (pre-cast)	Dry Laid Stone
HeadWingRetainWall_Cond	Poor	Fair			Fair
swCul_Scour_Location	Left of culvert.	Both sides of culvert.	None	None	
swCul_Scour_Condition	Minor	Minor			
swCul_Emb_Observations	Thorns observed above headwall. Scattered stones throughout from headwall.	12 inch tree directly above outlet. Stones in headwall look sporadically placed and are loose. Thorns and heavy vegetation present throughout.	Riprap observed in downstream.	Erosion at water level along bank Moderate vegatation observed.	Minor erosion leading to culvert. Moderate thorn vegetation throughout.
swCul_Beaver	No	No	No	No	No
swCul_Discharge_Illicit	No	No	No	No	No
swCul_Gen_Comment		Culvert outlets directly into 12 inch RCP located on private property; privately owned RCP acts as inlet for stream.	Large stone observed upstream.	Back of headwall exposed.	Could not fully inspect culvert due to culvert being buried by granite stone. Top of culvert covered with large granite stones and dead tree. Direct inlet for culvert located behind large wall on private property.
swCul_Overall_Cond	Fair	Fair	Fair	Fair	Poor
UTM 19T_Northing_m	4678866	4678860	4680359	4680371	4680663
UTM 19T_Easting_m	319517	319529	316719	316713	319158
y	42.241144	42.241087	42.253915	42.254031	42.257227
x	-71.187511	-71.187369	-71.221869	-71.22193	-71.192428

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Facility ID	**CUL-1005**
Inlet/Outlet	**Outlet**
Overall Condition	**Fair**
	Near 269 Common Street. Northern side of Common Street.
Culvert_Location	East of Dedham parks and recreation complex.
Waterbody	Wetland
Roadway_Description	
Surface_Type	Asphalt
Surface_Condition	Good
Inspection_Date	12/20/2021
Roadway_Width_ft	28
Culvert_Length_ft	53
swCul_Align_Road	Road Aligned
swCul_Align_Stream	Skewed (<45)
Traffic_Safety_Feature	None
Traffic_Safety_Feature_Cond	
Gen_Roadway	Small berm placed on both sides of road.
Utilities	Sewer and OHW
swCul_Shape	Round
swCul_Material	RCP
swCul_Width_in	18
swCul_Height_in	18
swCul_Substrate_Width_in	16
swCul_Water_Depth_in	9
swCul_Bankfull_Width_ft	4
swCul_Obstruction_Percent	25
swCul_Obstruction_Type	Leaves
swCul_Inv_El	At Stream Grade
swCul_Condition	Fair
	Scaling observed in pipe.
swCul_Observations	Majority of pipe filled with water.
swCul_Emb_Type	Slope and Retaining Structure
swCul_Emb_Cond	Fair
swCul_Cover_ft	7.5
HeadWingRetainWall_Material	Mortared stone
HeadWingRetainWall_Cond	Satisfactory
swCul_Scour_Location	None
swCul_Scour_Condition	
	Several trees along embankment.
	Multiple trees have tops cut off due to OHW.
swCul_Emb_Observations	Miscellaneous trash along in embankment.
swCul_Beaver	No
swCul_Discharge_Illicit	No
	Wetland Flags obeserved.
swCul_Gen_Comment	Remnants of concrete and cable guard rail along roadside.
swCul_Overall_Cond	Fair
UTM 19T_Northing_m	4680681
UTM 19T_Easting_m	319158
y	42.257398
x	-71.192409