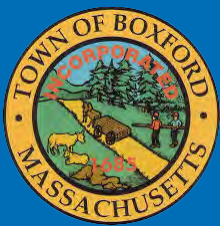
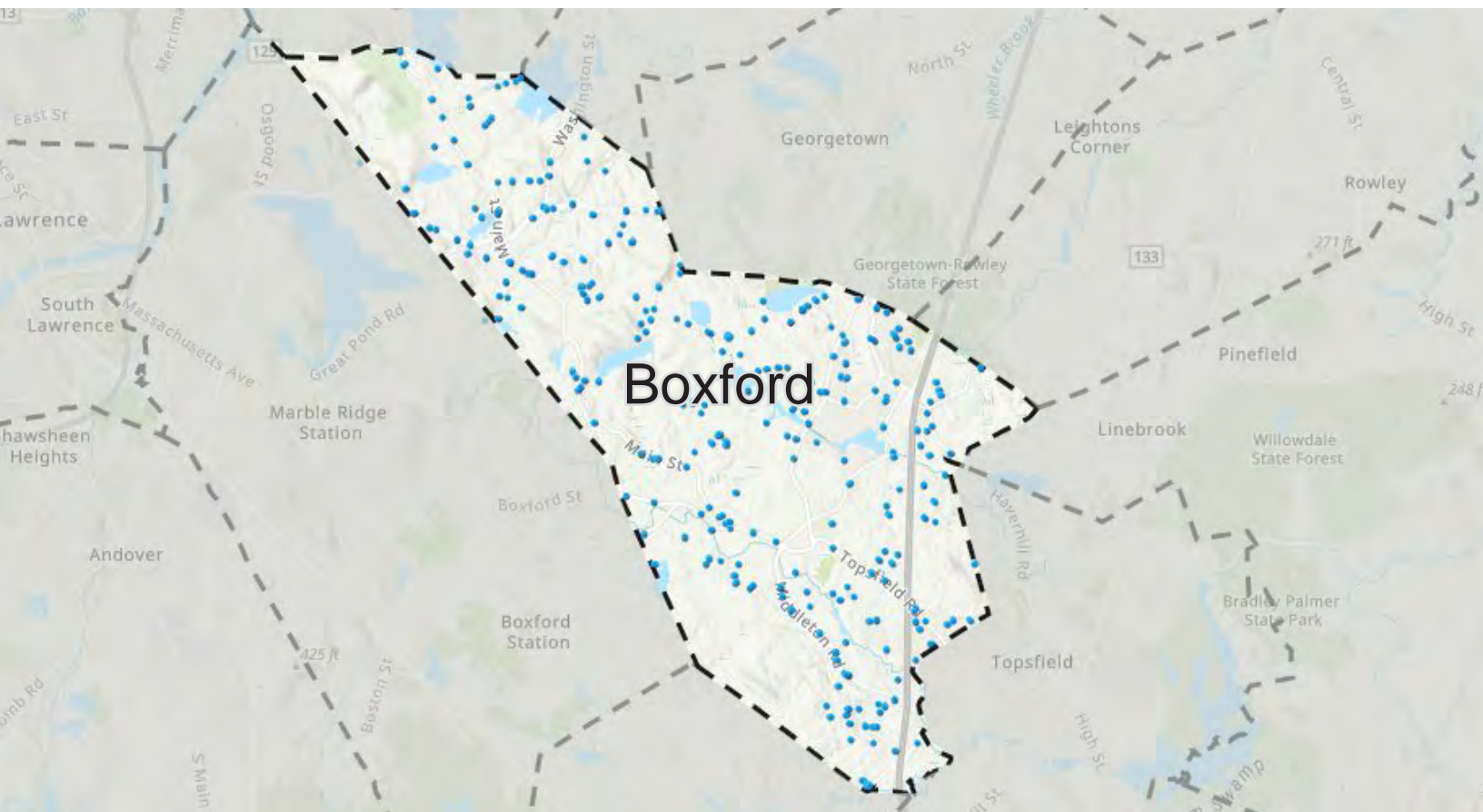


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Boxford, Massachusetts

# Boxford Culvert & Bridge Asset Management

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July 26, 2021

# Executive Summary

The Town of Boxford had retained TEC to conduct a comprehensive culvert and bridge inventory, as well as structural assessment complete with replacement scoping recommendations, and compile this asset management report. TEC began by completing a comprehensive desktop inventory utilizing available online and town-provided resources. Once this initial inventory was completed, TEC performed a town-wide inspection and assessment of the Town-owned structures and searched for additional structures while performing the field work. In total, an inspection and report was completed on six bridges and 231 culverts. TEC then conducted an in-depth risk assessment, utilizing a two-tier approach. The findings of this resulted in seven Critical structures that TEC recommends be replaced within the next ten years. The Capital Investment impact was divided into two time frames, with two culverts to be replaced within the next five years for an estimated \$700k, and five culverts to be replaced within the next 10 years for \$2.8 million.

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## Introduction and Purpose

The Town of Boxford is heavily forested, with many tributaries, brooks, streams, and general surface water runoff channels carrying water to one of the several ponds of Boxford. The Town has approximately 540 acres of open water body within its borders, and three watersheds leading to the Ipswich River, Parker River, and Merrimack River respectively.

Throughout the 1960s and 1970s, the population of Boxford more than doubled, and has steadily increased. As Boxford 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 Boxford's infrastructure** being constructed in the 1960s and 1970s to keep up with the demand of the population increase, many structures are nearing their end of serviceable life, and starting to deteriorate.

With this understanding, the Town of Boxford Department of Public Works saw necessary to create a comprehensive inventory of the Town culverts, including a structural assessment of each one. TEC has been retained to perform a town-wide inventory and condition assessment **of the Town's structures and provide this asset management report to assist with municipal** capitol planning and budgeting for the ongoing culvert and bridge maintenance and replacement projects.

## Desktop Inventory Summary

### Means and Methods

The first stage of asset management started with locating all known and potential locations of **culverts and bridges throughout Boxford. To do this efficiently, a "Desktop Inventory" was created** using GIS software to pinpoint each location for field investigation.

This Inventory was made using a variety of resources. Each culvert/bridge location was marked **as either "Known" or "Potential" based on the source and/or availability of visual confirmation of** the culvert/bridge.

**To create an initial list of "Known" culverts, prior Inspection Reports provided by the Town were** reviewed and logged. These Inspection Reports were completed by Haley and Ward, Inc. between July and November of 2011. These Inspection Reports included two binders: one with Culvert Inspections and the other with Catch Basin Inspections. The Catch Basin Inspection binder included sketches of drainage systems that included multiple catch basins positioned over a culvert, or sketches that showed nearby culverts. Several of the culverts listed in the Catch Basin binder were not part of the Culvert Inspection binder, and these additional culvert locations were added to the GIS map.

Satellite imagery provided by Google Maps, Google Earth, MassGIS, and Bing were used as visual confirmation for several culvert/bridge locations. Many of these locations were not part of either Inventory Binder mentioned previously. Google Street View also aided in this confirmation



process. Many headwalls, guardrail lengths, street signs, streams, and rivers could be seen only using street view which made visual confirmation possible.

Various other resources, including the ones mentioned above, were used to find potential culvert locations. Historic satellite imagery allowed us to view Boxford during the change of seasons, making multiple streams and wetland areas visible in densely forested or overgrown areas. This imagery combined with topographic and waterway mapping on onlineGIS sites, as well as StreamStats, aided in pinpointing several potential locations that were not visible by other online means.

Online GIS maps available on the MassDOT website (resources made available through the Municipal Small Bridge Program) were used to locate and confirm potential locations of culverts, Town owned bridges, State owned bridges, or other short span structures throughout the Town. In addition to location data, these resources provided us Bridge Numbers which allowed us to search online databases for any existing bridge inspection reports that may be on file. This additional information on the existing condition of the structures assisted us in prioritizing the various culvert/bridge inspections.

## Results

The desktop inventory yielded 237 culverts, and 20 bridge locations across Boxford. The culvert and bridge coordinates, approximate addresses, ownership, and source were logged into a comprehensive spreadsheet, and plotted on a GIS map.

The locations were color coded by owner, to aid in determining which locations are Town owned, and therefore to be inspected. **Locations denoted as "Private", are denoted** as such as the culvert/bridge was potentially located on private property. The locations **designed as "State" locations were** culvert/bridges whose ownership was confirmed as the State within the MassDOT GIS Maps / Bridge Inventory. All culverts and bridges were field located, to confirm location and ownership. If the culvert or bridge was determined to be owned by the Town, it was inspected.





# Field Inventory Summary

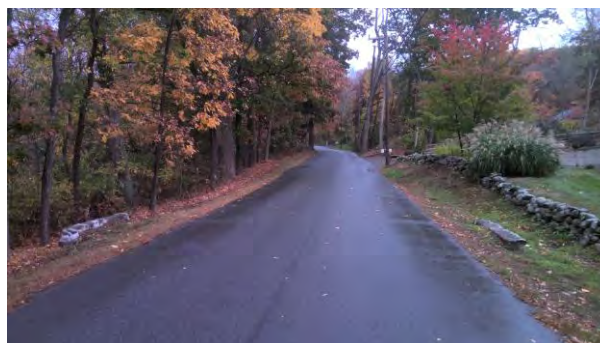
## Culverts

### Means and Methods

Once the Desktop Inventory was completed, TEC was able to begin a thorough inspection of the **Town's culverts and bridges. Using the locations determined by the desktop inventory, TEC began** at the northern most culvert locations, and worked south. Each location was first confirmed, and then ownership of the culverts was determined based on Town property and parcel lines, prior to the inspection.

In addition to the pre-**determined culvert locations, 62 culverts were found by a 'boots on the ground' method, where** TEC would scour roadways between the mapped locations to create the most comprehensive inventory possible. TEC would look for specific features such as large topographic depressions on both sides of the roadway, pooling water, traffic safety features, and visible embankment erosion among others indicative features.

Once located and ownership confirmed, each culvert received a thorough inspection of both the inlet and outlet, as well as the roadway, embankment, and headwall/wingwall (if any). 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 structures 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 to high water within and/or around the culvert, the culvert being buried by sediment, and/or inaccessible due to severe vegetation overgrowth. A breakdown of the rating criteria of each component can be found below

## Culvert Rating Criteria

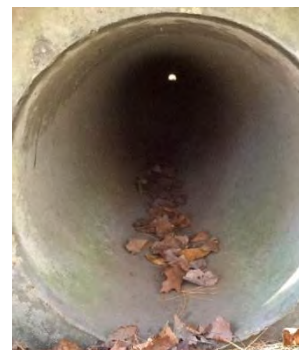
### Good

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' CMP



'Good' RCP

### 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



## 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

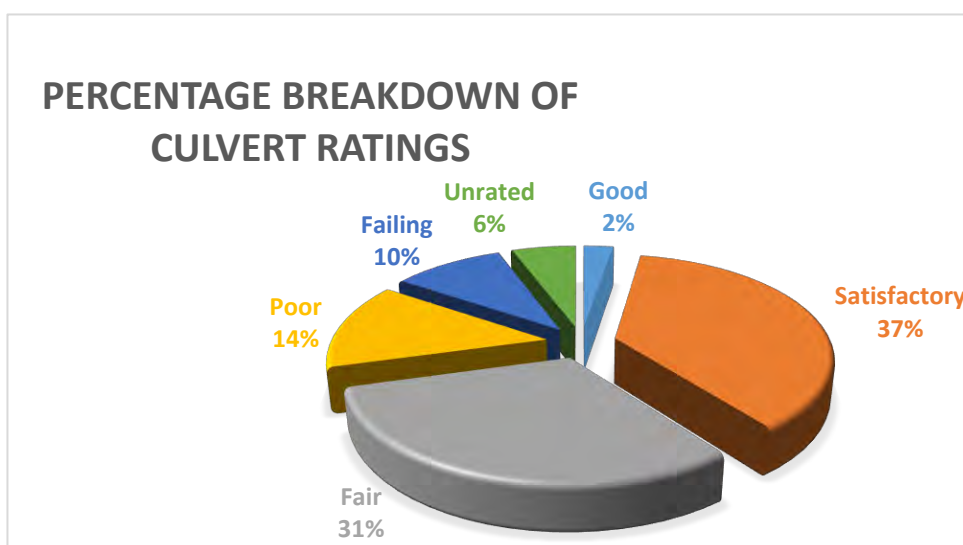
Consists of more than one of the following, dependent of wall material:

- 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

Through the Desktop Inventory a total of 237 culverts were mapped. Once in the field, 30 of these were not locatable/did not exist, but an additional 62 culverts were found and inspected, totaling 269 locations visited. Of the 269 locations, 14 were on private land, 4 were over the town line, 13 were state owned, and 7 were part of closed drainage systems/determined not to be culverts. These types of locations were not inspected, leaving a total of 231 culverts with full inspection reports and ratings.

A graphical breakdown of the overall rating of both the inlet and outlet of all inspected culverts can be seen below. As shown, approximately 70% of the Town's culvert openings are rated 'Fair' or better, with 14% rated as 'Poor', 10% rated as 'failing' and 6% unable to be rated/inspected due to field conditions encountered.



## Bridges

TEC inspected the 6 town owned bridges as part of this assessment effort. All six of these town owned structures cross the Fish Brook. Five of these structures have been previously inspected by MassDOT. At these locations, the MassDOT Inspection Reports were used as a baseline to start the assessments. All assessments were performed on foot and using waders, no scaffolding or bridge inspection equipment was used to access the bridges.

TEC analyzed the field observations, the existing plans and existing 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. These repairs were itemized using MassDOT standard nomenclature and MassDOT standard bid prices. A full breakdown of the findings and recommendations can be found in the Appendix.

## High Risk Structures

Out of the 231 culverts and six bridges assessed in the field, the majority of structures ranked **'fair' or better**. **This general rating is used** to describe the condition of the overall structure. Using this rating, TEC was able to make an initial determination of condition, by segregating all **78 culverts with a general rating of 'poor' or worse on at least one side of the culvert**. Included in the 78 are the four **'double unrated'** culverts which could not be inspected at either end due to inaccessibility.

To determine the potential risk of these 78 culverts, the three following criterion was applied to each culvert:

### *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. Major roadways used for this criteria include: Barehill Road, Brook View Road, Depot Road, Endicott Road, Georgetown Road, Herrick Road, Ipswich Road, Kelsey Road, Killam Hill Road, Lawrence Road, Lockwood Lane, Main Street, Middleton Road, Pye Brook Lane, Topsfield Road, Washington Street, and Willow Road.

### ***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 critical area value (CAV). A CAV of 3 is viewed as having the highest impact to the Town upon a complete failure of the culvert.

Of the 78 culverts with at least one side having a 'poor' or worse rating, 13 had a CAV of 3, 23 had a CAV of 2, and 42 had a CAV of 1. The complete Critical Area Value breakdown can be found in the Appendix.

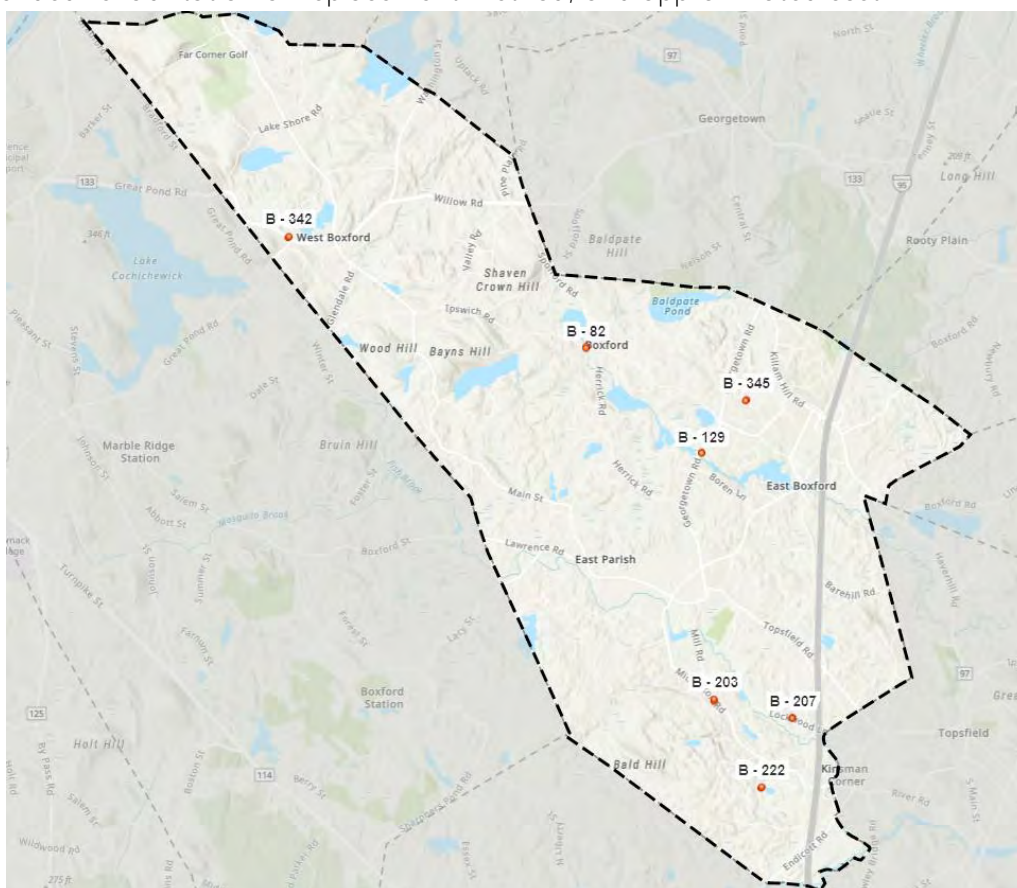


This two-tiered approach allowed TEC to narrow down the list of 'high risk' culverts to 36. Further review amongst the team was performed on these structures which included photo, feature, and location review, as well as follow-up site visits to determine the most critical structures to be replaced.

The additional review resulted in seven out of the 36 marked as 'high risk' to be flagged as **being in 'critical condition'**. These seven culverts are in poor or failing condition, and pose a high risk to the town if a failure occurs. It is TEC's recommendation that the following culverts be looked at closely by the Town:

- B – 82                316 Ipswich Road
- B – 129            105 Georgetown Road
- B – 203            166 Middleton Road
- B – 207            66 Lockwood Lane
- B – 222            21 Wildmeadow Road
- B – 342            Washington Street/Essex Street Intersection
- B – 345            34 Woodcrest Road

Each of these seven critical culverts are described individually on the following pages, and a preliminary plan for replacement or rehabilitation, including approximated remaining service life, recommended rehabilitation or replacement method, and approximated cost.



## Critical Culvert B – 82

Address:

316 Ipswich Road

Length:

± 65'

Materials:

**60" RCP, Precast Concrete Headwall** and Wingwalls

Waterway:

Pye Brook; downgradient of Spofford Pond



### Introduction

Culvert B – 82 carries major water way Pye Brook under major roadway Ipswich Road, through a 60 inch reinforced concrete pipe, resulting in a CAV score of 3. The culvert received a Poor assessment of the inlet and Failing assessment of the outlet, resulting in a high risk of failure. Culvert B-82 is considered a Critical Culvert due to the risk of failure, and resultant upstream flooding and severe traffic disruptions if the structure were to fail



### Existing Conditions

Inlet (Poor): Moderate scaling throughout the pipe due to water, and sporadic spalls and missing concrete was observed. The embankment shows moderate erosion around the headwall, with a crack observed in the middle of the headwall and scaling to high water.

Outlet (Failing): Moderate scaling throughout pipe due to water, and sporadic patches of exposed rebar was observed. The embankment was observed to have severe erosion with sediment and tree growth seeping over the headwall. The headwall itself was observed to have severe deterioration with moderate scaling on the bottom 1' of wingwalls.



### Additional Notes, Recommendations, and Cost

**Overhead wires are present near the culvert's outlet, and a guardrail in fair condition is present near the inlet.** Conversations with an abutting neighbor revealed beaver activity observed within and outside of the 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 \$600,000 to \$750,000, depending on the results of the field survey, hydraulic study, and geotechnical investigations.



## Critical Culvert B – 203

Address:

166 Middleton Road

Length:

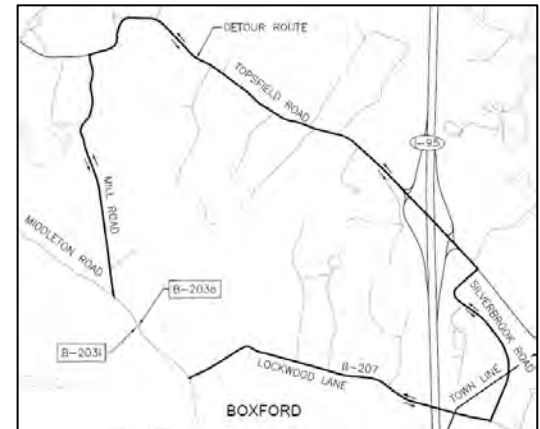
± 80'

Materials:

**24" CMP, Mortared Stone Headwall**

Waterway:

Hydraulic connection between large wetland to Fish Brook



### Introduction

Culvert B - 203 provides a hydraulic connection between a large wetland to Fish Brook and can see up to a flow of 38.8 cfs during a 10-year storm event according to StreamStats. Above the 24 inch corrugated metal pipe, major roadway Middleton Road is carried. Considering this information and the Poor and Failing condition of the inlet and outlet respectively, this culvert is high risk, due to the risk of upstream flooding and severe traffic disruptions if the structure were to fail.



### Existing Conditions

Inlet (Poor): The pipe inlet was observed to be obstructed by sediment and leaf/branch buildup, with moderate to severe erosion on the embankment and the headwall was observed to be actively overturning. Upstream a beaver structure was noted, as well as an oil sheen on top of water near the inlet.

Outlet (Failing): Sides of the pipe have rusted away, dropping the bottom into the substrate. Severe rust and patches of pipe were observe to be missing throughout the pipe. The embankment shows moderate erosion, with **the headwall actively overturning and the bottom 6" of mortar is missing.**



### Additional Notes, Recommendations, and Cost

Overhead wires and traffic safety features are present, with the guard rail observed to be in fair condition. 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 \$400,000 to \$500,000, with costs depending on the results of a field survey, hydraulic study, and geotechnical investigations



## Critical Culvert B – 207

Address:

66 Lockwood Lane

Length:

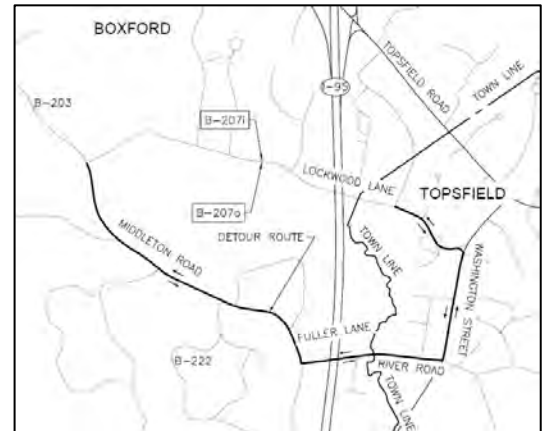
± 45'

Materials:

**32" CMP, Mortared Stone Headwall**

Waterway:

Tributary to Fish Brook



## Introduction

Culvert B – 207 was assessed to have a Failing inlet and an outlet in Poor condition. It is located along major roadway Lockwood Lane, and carries an unnamed tributary to Fish Brook through a 32 inch corrugated metal pipe that can see up to a 51.8 cfs flow during a 10-year storm event according to StreamStats. This earns the culvert a CAV score of 3, and poses a high risk of upstream flooding and severe traffic disruptions if the structure were to fail. Culvert B – 207 is considered critical due to the CAV score, and its assessed condition..



## Existing Conditions

Inlet (Failing): The bottom of the pipe has rusted away, and moderate to severe rusting was observed throughout the rest of the pipe. The embankment shows severe erosion, and the headwall is completely separated from culvert, indicating pipe settlement. In **addition, the bottom 6" of mortar is missing from the headwall.**

Outlet (Poor): Severe rust was observed throughout the culvert. The embankment shows minor to moderate erosion with sediment seeping over the headwall.



## Additional Notes, Recommendations, and Cost

No traffic safety features were present at either inlet or outlet, however an aboveground water connection was present indicating water utilities near the inlet. Overhead wires were observed near the outlet. 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 or four-sided concrete box culvert. The estimated cost of replacement is \$400,000 to \$500,000 depending on the results of the field survey, hydraulic study, and geotechnical investigations.

## Critical Culvert B – 342

Address:

LOT 5 Washington Street

Length:

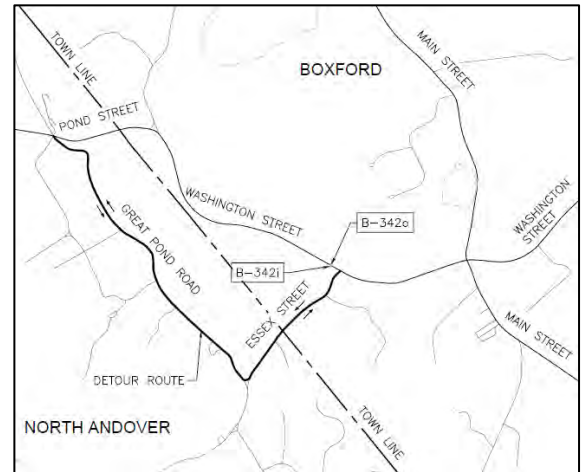
± 53'

Materials:

**24" CMP, Mortared Stone(inlet)/Dry Laid Stone(outlet)**

Waterway:

Hydraulic Connection to the Parker River  
(upgradient of Sperrys Pond)



## Introduction

Culvert B – 342 is a 24-inch corrugated metal pipe providing a hydraulic connection south of Washington Street/Rt 133 to the Parker River (upgradient of Sperrys Pond). The condition of the inlet was assessed to be Poor, and the outlet assessed to be Failing. The culvert is considered to be critical due to the condition of the pipe, and the severe traffic disruption it would cause if it were to fail.



## Existing Conditions

Inlet (Poor): The first approximately 2 feet of pipe bottom is rusted away, and severe rust and patches of pipe were observed to be missing throughout the length of pipe. The embankment was observed to have moderate to severe erosion and sediment seeping over the headwall, with loose stones observed at the top of the headwall.

Outlet (Failing): The first approximately 1 foot of the bottom of pipe is rusted away, with severe rust and patches of pipe observed to be missing throughout the length of pipe. The embankment was observed to have severe erosion with sediment seeping through the headwall. The headwall itself is failing, as the majority of stones are either missing or collapsing..



## Additional Notes, Recommendations, and Cost

At both the inlet and outlet, guard rail was observed to be present and in satisfactory to fair condition. Overhead wires were observe above the outlet. The estimated remaining service life for this culvert is 5 to 10 years. It is **TEC's recommendation to complete a full replacement with a three or four-sided concrete box culvert**. The estimated cost of a full replacement is \$450,000 to \$600,000 depending on the results of the field survey, hydraulic study, and geotechnical investigations.

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## Critical Culvert B – 129

Address:

105 Georgetown Road

Length:

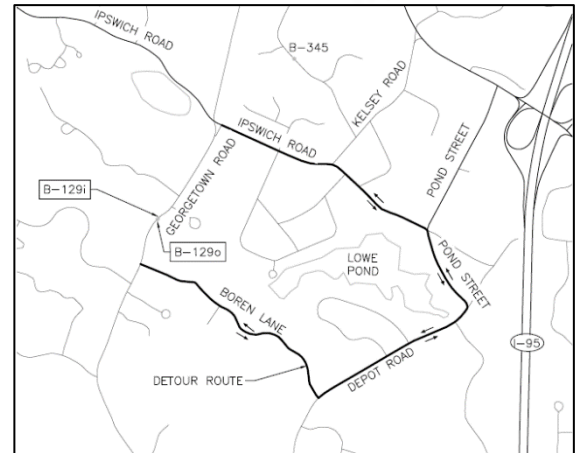
± 55'

Materials:

**54" Three-Sided Mortared Stone Box Culvert,**  
Mortared Stone and Poured Concrete Headwalls and  
Wingwalls

Waterway:

Pye Brook; Between Four Mile Pond and Lowe Pond



### Introduction

Culvert B – 129 carries Pye Brook, through a large 54-inch box culvert beneath major roadway, Georgetown Road, giving Culvert B – 129 a CAV score of 3, and the high risk of upstream flooding and severe traffic disruptions if the culvert were to fail. The culvert is considered critical due to this, and the Failing assessment of its outlet.



### Existing Conditions

Inlet (Fair): The inlet was observed to be missing mortar from the bottom 2' of the structure, and the embankment was observed to have minor to moderate erosion. The headwall and wingwalls had severe scaling and minor scour observed at the bottom of the wingwalls.

Outlet (Failing): The bottom 2'-3' of stones lining the culvert were observed to have collapsed into Pye Brook. The embankment was observed to be moderately eroded, with the headwall and wingwalls showed signs of moderate scour. Additionally, stones from the wingwall were observed to have collapsed at the bottom, and a large settlement crack was observed in the concrete.



### Additional Notes, Recommendations, and Cost

Guardrails from satisfactory to poor condition were present near both the inlet and outlet, and overhead wires were present near the inlet. The estimated remaining service life for this culvert is less than 5 years, with immediate maintenance potentially extending the service life. Immediate maintenance would include the repair of the undermined headwall/wingwalls with new stones and mortar. Estimated cost of maintenance repair is \$50,000 to \$100,000.

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## Critical Culvert B – 222

Address:

21 Wildmeadow Road

Length:

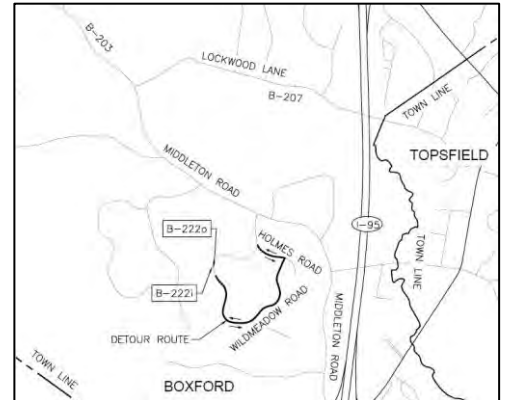
± 32'

Materials:

± 33" CMP, Mortared Stone Headwall

Waterway:

Tributary to Fish Brook



## Introduction

Culvert B – 222 carries a tributary to Fish Brook through an approximately 33-inch corrugated metal pipe that according to StreamStats can see up to a 21.8 cfs flow during a 10-year storm. The condition of the culvert was assessed to be Fair at the inlet and Poor at the outlet, with a large indent approximately 5 feet into the culvert from the inlet causing a significant hydraulic restriction. The culvert is considered critical based on the condition of the pipe, and the risk of flooding upstream if the structure were to fail.



## Existing Conditions

Inlet (Fair): A large dent was observed at the top of the pipe at approximately 5' from the mouth of the inlet.

This dent significantly restricts the hydraulic capacity, and poses a threat for surficial failure on the roadway due to a potential void. A moderate amount of rust was observed on all sides of the pipe, and severe scour was present. The embankment was observed to have minor to moderate erosion, with vegetation growth growing through the headwall. The headwall was observed to have sporadic patches of missing mortar.

Outlet (Poor): Moderate surface rust was observed at the bottom and sides of the pipe due to water, and moderate scour was also observed. The embankment was observed to have a severe washout on the right side of the headwall, and vegetation growth through the headwall was also observed. The headwall showed sporadic patches of missing mortar and stones were missing throughout the headwall.



## Additional Notes, Recommendations, and Cost

An electrical box was observed near the culvert, with assumed underground wire utilities being present. There were no traffic safety features observed near the culvert at either the inlet or outlet. 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 \$350,000 to \$450,000, depending on the results of the field survey, hydraulic study, and geotechnical investigations.

## Critical Culvert B – 345

Address:

34 Woodcrest Road

Length:

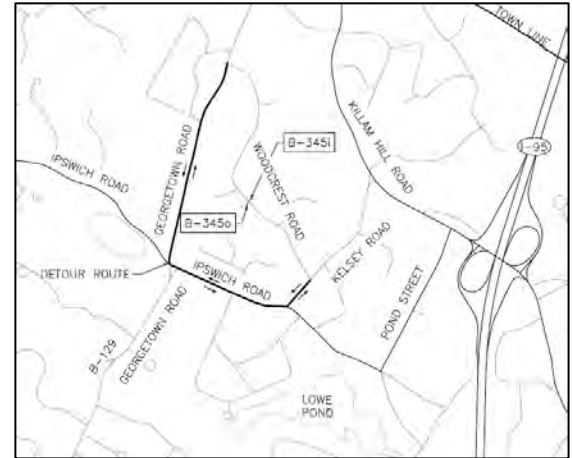
± 65'

Materials:

**18" CMP with a Poured Concrete Headwall/ 12"**

HDPE Waterway:

Hydraulic connection for a tributary to Penn Brook



## Introduction

This culvert carries a hydraulic connection with potential for dual-flow for a tributary to Penn Brook, and is comprised of an 18 inch diameter corrugated metal pipe on the northern side, and a 12 inch diameter HDPE pipe on the southern side. According to StreamStats, this culvert can see up to 8.34 cfs flows during a 10-year storm. The northern side was given a Failing assessment, and the southern side a Poor rating. Due to the condition of the culvert, and the risk of upstream flooding if a failure were to occur, B – 345 is considered a critical culvert.



## Existing Conditions

Northern side (Failing): The majority of the pipe was observed to have rusted away with severe rust throughout the remaining pipe also observed. The embankment was noted to have severe erosion, and the headwall is actively overturning. It was observed that a large tree trunk may be what is supporting the headwall.

Southern Side (Poor): The observed pipe is a 12 inch diameter HDPE which either joins the 18 inch CMP on the north mid-span, or was slid through **the 18" due to failure. It was noted that the bottom** of the pipe is completely missing from the first approximately 12 inches. The embankment was observed to have minor to moderate erosion.



## Additional Notes, Recommendations, and Cost

A guardrail and steel cable were in failing condition at both the southern and northern openings, with overhead wires observed above the southern opening. The estimated remaining service life for this culvert is less than 5 years. TEC recommends a full replacement with a three-sided concrete box culvert. The estimated cost of replacement is \$400,000 to \$600,000, depending on the results of the field survey, hydraulic study, and geotechnical investigations.

## Recommended Capital Investment Table (Culverts)

### 0-5 Years

B-129	105 Georgetown Road	\$100,000
B-345	34 Woodcrest Road	\$600,000

0-5 Years Total Cost (Estimate) \$700,000

### 5-10 Years

B-82	316 Ipswich Road	\$750,000
B-203	166 Middleton Road	\$500,000
B-207	66 Lockwood Lane	\$500,000
B-342	LOT 5 Washington Street	\$600,000
B-222	21 Wildmeadow Road	\$450,000

5-10 Years Total Cost (Estimate) \$2,800,000

## Recommended Capital Investment Table (Bridges)

### Maintenance and Repairs

B-19-001 (899)	Middleton Road over Fish Brook	\$158,000
B-19-002 (8RE)	Mill Road over Fish Brook	\$0
B-19-003 (2R3)	Lockwood Lane over Fish Brook	\$128,000
B-19-004 (89A)	Fuller Lane over Fish Brook	\$185,000
B-19-005 (89B)	Endicott Road over Fish Brook	\$135,000
B-19-018 (C68)	Brookview Road over Fish Brook	\$211,500

Maintenance and Repair Cost (Estimate) \$817,500

## Conclusion

TEC was able to inventory and assess the culverts and bridges located within the Town of Boxford from known locations, online resources, and an in-person approach. The majority of structures 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. Seven of these structures 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 seven locations, with recommendations to the town including replacement scoping and estimated structure replacement pricing.



# Appendix A

## Culvert Inspection Raw Data

Culvert ID	Culvert Location outlet to minimum 3 drop inlets along mainstreet	Date and Time	Weather	Inspector	Located Culvert	Culvert Inspectable	Surface type	Surface Condition	Roadway Width (ft)	Total Culvert Length (ft)	Utilities Present	Utility Type	Traffic Safety Features	Traffic Safety Feature	Traffic Safety Feature	General Roadway Observations	Culvert Shape	Culvert Alignment to Roadway	Culvert Alignment to Stream	Water in Culvert	Culvert Obstructed	Obstruction Location	Obstruction Type	Culvert Invert Elevation	Culvert Material	Culvert Width (in)	Effective Culvert Opening	Substrate or Water Width (in)	Water Depth in Culvert (in)	Pipe/ Culvert Condition	Scour Observed	Location of Scour	Bankfull Width (ft)	General Culvert Observations	Embankment Type	Cover above Culvert (ft)	Overall Embankment Condition	Headwall/Wingwall/ Retaining Wall Material	Headwall/Wingwall/ Retaining Wall Condition	General Embankment/Headwall Observations	Evidence of Beaver Activity	Evidence of Illicit Discharge	General Comments	Overall Rating	x	y
B-12a		10/27/2020 12:06	overcast	ajp	yes	yes	paved	good	24	35	no		no				round	skewed_45°	stream_aligned	no_moist_bottom	no			perched	corrugated_metal_pipe	36	36	0	0	good	none		minor surficial rut in bottom half 13 of pipe	slope_flatter_than_2:1_hea	5.5	poor	concrete_poured_	satisfactory	severe washout behind left no	no	severe bank erosion downstream. bank cuts up to 6 ft	satisfactory	-71.0753	42.7264		
B-17f		10/27/2020 12:50	overcast	ajp	yes	yes	paved	good	24	41	no		no				round	roadway_aligned	skewed_45°	no_dry_bottom	yes_<25%		within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	12	0	0	good	none		sporadic rock/sediment within 4 pipe	headwall_retaining_wall,alo	2.5	good	dry_laid_stone_brick	satisfactory	material spilling through he no	no	vegetation growth immediately downstream	satisfactory	-71.0728	42.72273	
B-17e		10/27/2020 13:05	overcast	ajp	yes	yes	paved	good	24	41	yes	overhead_wires	no				round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%		within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	7	12	0	satisfactory	none		surface rusting throughout interior	headwall_retaining_wall,alo	4	satisfactory	dry_laid_stone_brick	fair	headwall appears to be missi no	no		satisfactory	-71.0729	42.72272	
B-18i		10/27/2020 13:26	overcast	ajp	yes	yes	paved				yes	overhead_wires	no				round	skewed_45°	no_discernable_stream_channel	no_moist_bottom	yes_<25%		upstream	branches vegetation_growt h,branches	at_stream_grade	corrugated_metal_pipe	18	12	0	0	fair	minor	headwall	first 10ftches of protruding inlet is deformed and torn. inside pipe appears to be in good condition	headwall_retaining_wall,alo	4	poor	dry_laid_stone_brick	satisfactory	embankment erosion on bo no	no	heavy branch buildup upstream, utility pole adjacent to culvert unable to inspect culvert due to heavy thorns/brush	fair	-71.0771	42.72175	
B-18a		10/27/2020 13:37	overcast	ajp	yes	no	paved	satisfactory	20	41	no		no			minor transverse cracking not above culvert	round	skewed_45°	no_discernable_stream_channel	no_moist_bottom	yes_50_75%		upstream		corrugated_metal_pipe	18							headwall_retaining_wall,alo	5	satisfactory	dry_laid_stone_brick		heavy thorns/branches/limb no	no		-71.077	42.72168				
B-28i		10/27/2020 13:54	overcast	ewm	yes	yes	paved	satisfactory	21	41	yes	overhead_wires	no			minor edge and transverse cracking	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			inlet_drop	corrugated_metal_pipe	12	9	0	0	good	none		minor surface rusting at bottom, sediment buildup at pipe opening	headwall_retaining_wall	4.5	fair	dry_laid_stone_brick	satisfactory	minor material spilling thro no	no		satisfactory	-71.0832	42.71525		
B-28a		10/27/2020 14:08	overcast	ewm	yes	yes	paved	satisfactory	21	41	yes	overhead_wires	no				round	roadway_aligned	skewed_45°	no_dry_bottom	no			perched	corrugated_metal_pipe	12	12	0	0	good	moderate	culvert	minor rusting on bottom, up to 2.5 ft of scour beneath pipe, 2 ft 20 of water freefall	headwall_retaining_wall,alo	4.5	fair	dry_laid_stone_brick	fair	irregular stones with voids, no	no	stonewall and stacked branches 5ft from outlet. 12in dia tree adjacent to outlet, large birds nest atop of pipe	fair	-71.083	42.71521		
B-23i		10/27/2020 14:29	overcast	ewm	yes	yes	paved	good	23	40	yes	overhead_wires	no				elliptical	skewed_45°	no_discernable_stream_channel	flowing	no			at_stream_grade	corrugated_metal_pipe	46	36	36	2	good	none		minor surface rusting inside pipe, minor tear at top of pipe,	headwall_retaining_wall,alo	3.5	fair	dry_laid_stone_brick	fair	severe erosion due to missi no	no	large metal wire cage at mouth of inlet	fair	-71.0701	42.71907		
B-23a		10/27/2020 14:45	overcast	ewm	yes	yes	paved	good	21	40	no		no				elliptical	skewed_45°	skewed_45°	flowing	no			at_stream_grade	corrugated_metal_pipe	46	36	36	6	good	minor	culvert,he adwall	minor surace rusting inside pipe, 2 minor sediment buildup at outlet minor surface rust, sporadic rocks	headwall_retaining_wall	2.5	satisfactory	dry_laid_stone_brick	fair	moderate material spilling tno	no	heavy vegetation downstream	satisfactory	-71.07	42.71907		
B-39i		10/27/2020 15:04	overcast	ewm	yes	yes	paved	poor	25	62			yes	Guardrail	satisfactory		round	roadway_aligned	stream_aligned	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	18	18	0	0	satisfactory	minor	culvert	20 in pipe	headwall_retaining_wall,alo	6	good	mortared_stone_brick	satisfactory	all mortar missing for botto no	no		satisfactory	-71.0671	42.71087		
B-39a		10/27/2020 15:25	overcast	ewm	yes	yes	paved	poor	25	62			yes	guardrail	fair	fatigue cracking and patching	round	roadway_aligned	stream_aligned	no_moist_bottom	yes_<25%		within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	19	13	18	0	fair	minor	culvert	slight deformation at left side of culvert outlet, moderate interior 20 surface rust	headwall_retaining_wall,alo	7.5	satisfactory	mortared_stone_brick	fair	mortar missing from botton no	no	general tree growth adjacent to embankment	satisfactory	-71.067	42.71076	
B-33i		10/27/2020 15:47	overcast	ewm	yes	yes	paved	fair	25	75			yes	guardrail	fair		round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	18	18	0	0	good	minor	culvert	minor surficial interior rusting, sporadic rocks within culvert span	headwall_retaining_wall,alo	7	good	mortared_stone_brick	satisfactory	mortar separation from sto no	no	growth in embankment, large tree down upstream	satisfactory	-71.0686	42.71223		
B-33a		10/27/2020 15:59	overcast	ewm	yes	yes	paved	fair	25	75			yes	guardrail	fair		round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	18	18	0	0	good	none		minor surficial interior rust,	headwall_retaining_wall,alo	9	good	mortared_stone_brick	satisfactory	large fallen tree downstream potential illicit discharge in midspan	no		satisfactory	-71.0687	42.71222		
B-37a	culvert bends mid span at manhole in West	10/27/2020 16:19	partly_cloudy	ewm	yes	yes	paved	good	25	130	yes	overhead_wires	yes	guardrail	good		round	skewed_45°		flowing	no			at_stream_grade	hdpe	36	30	14	8	good	none		36 inch concrete box header, other	other	1	poor	concrete_pre_cast	fair	concrete box header, erisic no	no	severe undercutting of upstream banks, 6 in rcp observed adjacent to culvert,	satisfactory	-71.0638	42.71118		
B-37f		10/27/2020 16:35	partly_cloudy	ewm	yes	yes	paved	good	25	130	yes	water_line	no				round	skewed_45°	no_discernable_stream_channel	flowing	no			perched	hdpe	36	36	29	7	good	moderate	culvert		slope_flatter_than_2:1_	2	fair			bank armoring with large st no	yes		satisfactory	-71.0636	42.71143		
B-36		10/27/2020 16:48	partly_cloudy	ewm	yes	yes	paved	good	25	130	yes	water_line	no				round	skewed_45°	no_discernable_stream_channel	flowing	no			perched	hdpe	36	36	29	7	good	moderate	culvert		slope_flatter_than_2:1_	2	fair			bank armoring with large st no	yes		satisfactory	-71.0638	42.71163		
B-27	twin outlets for two	10/28/2020 11:52	rain	ewm	yes	yes	paved	good	23	70	yes	overhead_wires,drainage_system	no				round	skewed_45°	stream_aligned	no_moist_bottom	no			at_stream_grade	hdpe	16	16	0	0	good	none		6 Bends midspan.	slope_steeper_than_2:1_	5.5	satisfactory			Area of minor erosion on er no	no	Minor vegetation around streambed and embankment.	satisfactory	-71.0607	42.71643		
B-26i		10/28/2020 12:02	rain	ewm	yes	yes	paved	good	23	70	yes	overhead_wires,drainage_system	no				round	skewed_45°	stream_aligned	no_moist_bottom	no			at_stream_grade	hdpe	16	16	0	0	good	none			slope_steeper_than_2:1_	5.5	satisfactory			Area of minor erosion on er no	no	Minor vegetation around streambed and embankment.	satisfactory	-71.0607	42.71643		
B-26a	Extending out of catch basin	10/28/2020 12:19	rain	ewm	yes	yes	paved	good	23	70	yes	drainage_system	yes	bollard	fair	Exposed Rebar on concrete bollards	round	roadway_aligned	skewed_45°		stagnant	no			at_stream_grade	reinforced_concrete_pipe	18	16	18	6	satisfactory	minor	culvert	2 Minor scour on sides of culvert. Scour on right side of culvert. Soil is starting to erode from drop	slope_steeper_than_2:1_	5	satisfactory			Minor vegetation on embar no	no	Minor vegetation on the stream. Discharges to wetland area.	satisfactory	-71.0606	42.71635	
B-25i	Part of closed drainage system	10/28/2020 12:44	rain	ewm	yes	yes	paved	good	30	65	yes	overhead_wires,drainage_system	no				round	roadway_aligned	stream_aligned		yes_<25%		within_culvert,up stream	leaves,branches	inlet_drop	reinforced_concrete_pipe	12	9	9	1	satisfactory	none	culvert	9.5 inlet.	slope_steeper_than_2:1_,ht	7	satisfactory	dry_laid_stone_brick	satisfactory	Headwall has voids between no	no	General tree growth in embankment.	fair	-71.0571	42.71649	
B-25a	Closed drainage system.	10/28/2020 13:07	rain	ewm	yes	yes	paved	good	30	65	yes	drainage_system	no				round	roadway_aligned	skewed_45°	no_moist_bottom	yes_<25%		within_culvert	leaves	at_stream_grade	reinforced_concrete_pipe	12	8	12	0	fair	none	culvert	14 Scaling to high water.	headwall_retaining_wall,alo	6.5	fair	dry_laid_stone_brick	satisfactory	Embankment has moderate no	no	abutment requested dead tree limb removal adjacent to culvert. Limbs present in streambed. Minor erosion on stream bank.	fair	-71.057	42.71647	
B-24i		10/28/2020 13:32	rain	ewm	yes	yes	paved	good	23	66	yes	overhead_wires	no				round	roadway_aligned	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%		within_culvert	leaves	at_stream_grade	reinforced_concrete_pipe	12	10	12	0	satisfactory	minor	culvert	last section of rcp appears to have separated, forming a sinkhole/washout approx 8ft upgradient from outlet.	headwall_retaining_wall,alo	4.5	fair	dry_laid_stone_brick	satisfactory	Embankment has minor ero no	no		satisfactory	-71.0548	42.71645
B-24a		10/28/2020 13:48	rain	ewm	yes	yes	paved	good	23	66	no		yes	guardrail	fair		round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%		within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	12	7	12	0	good	none		Minor Surface rut at bottom of the pipe. Tent at top right side 8 feet inside the culvert.	headwall_retaining_wall,alo	6	fair	mortared_stone_brick	falling	2 ft diameter Sinkhole 6 fee no	no	General tree growth. 2 foot diameter sinkhole.	poor	-71.0548	42.7166	
B-23i		10/28/2020 14:23	rain	ewm	yes	yes	paved	good	26	76	yes	overhead_wires	yes	guardrail	falling		round	skewed_45°	stream_aligned	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	12	12	5	0	fair	minor	culvert	Minor Surface rut at bottom of the pipe. Tent at top right side 8 feet inside the culvert.	headwall_retaining_wall,alo	7.5	fair	mortared_stone_brick	poor	Large settlement crack, larg no	no	Wetland flags adjacent to inlet. Fallen tree limbs near inlet. 2 foot diameter hole near end of guardrail. fair	satisfactory	-71.0528	42.71717		
B-23a		10/28/2020 14:45	rain	ewm	yes	yes	paved	good	23	76	yes	drainage_system	no			Closed drainage system outleting approximately 100 feet away from outlet.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_<25%		within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	11	8	0	satisfactory	minor	culvert	Minor surface rust.	headwall_retaining_wall,alo	7	satisfactory	mortared_stone_brick	fair	Embankment has minor ero no	no	Sporadic stones around headwall and culvert outlet. Nearby wetland flags.	satisfactory	-71.053	42.71718	
B-32i		10/28/2020 15:10	rain	ewm	yes	yes	paved	good	25	72	yes	overhead_wires	no				round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	12	12	0	0	satisfactory	none		Interior pipe separation 3 feet in.	headwall_retaining_wall,alo	5	satisfactory	mortared_stone_brick	fair	Embankment has minor erosion on right side of hea	no	Wetland Flag 6A adjacent to headwall. Sporadic stones at inlet.	satisfactory	-71.0541	42.71242		
B-32a		10/28/2020 15:33	rain	ewm	yes	yes	paved	good	25	72	yes	gas_line,drainage_system	yes	bollard	falling		round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no			perched	reinforced_concrete_pipe	12	12	0	0	satisfactory	none		Aggregate on bottom of pipe is showing through.	headwall_retaining_wall,alo	6.5	satisfactory	mortared_stone_brick	satisfactory	Embankment has minor ero no	no	Outlet from nearby catch basin present in wingwall. Depression approximately 2 feet from pipe outlet. Small tree 5 feet from outlet in outfall area. Nearby wetland flag B4	satisfactory	-71.0542	42.71234		
B-33i		10/28/2020 16:01	rain	ewm	yes	yes	paved	good	27	54	no						round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	15	15	0	0	satisfactory	none		Minor aggregate showing through bottom of pipe.	headwall_retaining_wall,alo	5.5	fair	mortared_stone_brick	satisfactory	Embankment has minor ero no	no		satisfactory	-71.0535	42.71211		
B-33a		10/28/2020 16:16	rain	ewm	yes	yes	paved	good	27	54	yes	overhead_wires	yes	guardrail	good		round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			perched	reinforced_concrete_pipe	15	15	0	0	satisfactory	none		The second pipe length is shifted to the left. Scaling to high water.	headwall_retaining_wall,alo	6	fair	mortared_stone_brick	satisfactory	Embankment has minor ero no	no	Wetland flagging nearby. Fallen tree limbs in drainage outlet.	satisfactory	-71.0535	42.71203		
B-30i		10/28/2020 16:37	rain	ewm	yes	yes	paved	fair	27	40	no						round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	12	12	0	0	satisfactory	none		Minor surface rust in pipe.	headwall_retaining_wall,alo	2.5	satisfactory	dry_laid_stone_brick	satisfactory	Soil coming through voids i no	no	Tree limbs down in inlet area.	satisfactory	-71.0521	42.71233		
B-30a		10/28/2020 16:47	rain	ewm	yes	yes	paved	fair	27	40	yes	overhead_wires	no				round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%		within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	9	11	0	satisfactory	none		Minor surface rust throughout pipe.	headwall_retaining_wall,alo	2	satisfactory	dry_laid_stone_brick	satisfactory	Minor erosion on embankm no	no	Moderate present at outfall.	satisfactory	-71.0519	42.71219	
B-40i		10/29/2020 11:48	rain	ewm	yes	yes	paved	fair	22	90	yes	drainage_system	no				round	roadway_aligned	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	12	12	0	0	good	none			headwall_retaining_wall,alo	4	satisfactory	mortared_stone_brick	good	Minor erosion around head no	no	Forest debris around inlet. Wetland marker above outlet pipe. 12 in. RCP pipe from closed drainage system above culvert outlet pipe				





B-306a B-16 B-19 B-22	11/2/2020 17:53 clear 11/2/2020 18:15 clear 11/2/2020 18:17 clear 11/2/2020 18:19 clear	ewm wmb wmb wmb	yes culvert_was_not_located_d no culvert_was_not_located_d no culvert_was_not_located_d no	yes yes yes yes	paved good	25	52 yes	overhead_wires	no	Roadway pavement appears to be less than a few years old.	round	roadway_aligned	no_discernable_stream_channel	stagnant	yes_25_50%	within_culvert,up stream,downstre am	sediment,leaves	submerged	corrugated_metal_pipe	12	7	10	3.5 fair	none	Culvert is ponding at outlet. Upland area outside of outlet is close to 6 inches higher causing ponding. Culvert to submerged close to 75% restricting inspection within culvert.	headwall_retaining_wall,alo	5 fair	mortared_stone_brick	satisfactory	Embankment has moderate	no	Culvert may not be capable of handling a heavy rain storm event. 12 inch CMP culvert located approximately 15 feet away from outlet, likely privately owned. If streambed outside of outlet is excavated slightly it will function much better. Located on private property. Located on private property. No culvert present.	fair	-71.0526 42.71937 -71.0454 42.7322 -71.0449 42.71961 -71.0411 42.71792																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
B-51 B-53	11/2/2020 18:54 clear 11/2/2020 19:04 clear	wmb wmb	culvert_was_not_located_does_no culvert_was_not_located_does_no																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									

0-970	11/4/2020 16:38	clear	other	yes	yes	paved	satisfactory	22.5	40.5	yes	overhead_wires	no	Minor cracking seen along roadway. Minor cracking seen along pipe length.	round	roadway_aligned	stream_aligned	no_dry_bottom	no	at_stream_grade	hdpe	12	12	0	0	good	none	4	Channel lined with rocks. Ruckure located at segment joint and edge of roadway.	headwall_retaining_wall,alo	3	satisfactory	dry_laid_stone,brick	fair	Rock lined embankment si	no	no	Small downed trees just above streambed. General vegetation growth.	good	-71.0045	42.68755		
0-980	11/4/2020 16:55	clear	other	yes	yes	paved	satisfactory	24	38	no		no	Minor cracking/dips seen on roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	at_stream_grade	corrugated_metal_pipe	16	16	0	0	fair	none	3.5	satisfactory	dry_laid_stone,brick	fair	General vegetation growth	no	no	Culvert inlet has an adjacent driveway culvert approximately 2 feet away. Adjacent parallel roadway shoulder culvert located approximately 15 feet away from pipe inlet. Better likely acting as a beaver fence.	good	-71.0027	42.68738					
0-981	11/4/2020 17:10	clear	other	yes	yes	paved	satisfactory	24	38	yes	overhead_wires	no	Cracking and dip seen along roadway.	round	roadway_aligned	skewed_45°	no_dry_bottom	no	at_stream_grade	corrugated_metal_pipe	16	16	0	0	good	none	5	Small puncture located near 5 outlet side. Two pieces of steel rebar 7 partially blocking pipe outlet.	headwall_retaining_wall,alo	2	satisfactory	dry_laid_stone,brick	satisfactory	Stone placed overhanging no	no	no		good	-71.0026	42.68749		
0-1100	11/4/2020 17:32	clear	other	yes	yes	paved	satisfactory	25	45	no		no	General cracking along roadway.	round	roadway_aligned	stream_aligned	no_dry_bottom	no	at_stream_grade	smooth_metal_pipe	15	15	0	0	good	minor	4	Sediment buildup halfway within the culvert. Slight bend in middle 7 of pipe. Minor rusting at joints.	headwall_retaining_wall,alo	4	satisfactory	mortared_stone,brick	satisfactory	Minor undermining of ston	no	no	Large beaver fence on outside of pipe preventing direct measurements.	good	-70.9977	42.68513		
0-1101	11/4/2020 18:00	clear	other	yes	yes	paved	satisfactory	25	45	yes	overhead_wires	no	Minor cracking seen along roadway.	round	roadway_aligned	skewed_45°	no_dry_bottom	no	at_stream_grade	smooth_metal_pipe	18	18	0	0	good	none	2.5	satisfactory	mortared_stone,brick	satisfactory	Minor voids between stone	yes	yes		satisfactory	-70.9975	42.68516					
0-1151	11/4/2020 18:34	clear	other	yes	yes	paved	good	25	50	yes	overhead_wires	no	General cracking along roadway.	round	roadway_aligned	stream_aligned	flowing	no	perched	hdpe	12	12	0	0	satisfactory	moderate	culvert,the adwall	Inlet has bottom of pipe missing approximately 5' inward. Signs of potential beaver fence at one point. Pipe is elevated 20 approximately 5 feet in the air. Pipe is submerged and cannot be inspected inside. Bottom half of pipe entrance appears to be missing. Scour appears to be around the culvert pipe and 30 along ditch.	other,slope_steeper_than_2,1	4	fair	dry_laid_stone,brick	satisfactory	Embankment is reinforced	yes	no	Potential beaver den located directly next to culvert inlet.	fair	-70.9953	42.68369		
0-1150	11/4/2020 18:51	clear	other	yes	yes	paved	satisfactory	25	50	yes	water_line	no	General cracking along the roadway.	round	roadway_aligned	stream_aligned	stagnant	no	submerged	hdpe	12	12	12	24	fair	severe	culvert,ot her	Scour is located at base of inlet. Cascading slope at end of 8 culvert. Moderate rusting at water level. Tar lining has worn away at water level. Minor section lost near 6 pipe inlet.	slope_steeper_than_2,1	4.5	poor			Embankment lined with mi	yes	yes	Culvert outlet connects into pond. Evidence of a former beaver fence. Black blankets laid over former beaver fence area. Potential evidence of former beaver fence.	fair	-70.9956	42.68359		
0-1141	11/4/2020 19:13	clear	other	yes	yes	paved	satisfactory	24	55	no		yes	Guard rail has minor surface rust. Visible patch along roadway and along pipe length. General cracking and patches long roadway. Patch along pipe length.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no	perched	hdpe	15	15	0	0	good	minor	culvert	Scour is located at base of inlet. Cascading slope at end of 8 culvert. Moderate rusting at water level. Tar lining has worn away at water level. Minor section lost near 6 pipe inlet.	slope_steeper_than_2,1	4	satisfactory			General vegetation growth	yes	no		satisfactory	-70.9945	42.6838		
0-1140	11/4/2020 19:29	clear	other	yes	yes	paved	satisfactory	24	55	yes	overhead_wires	no		round	skewed_45°	skewed_45°	no_dry_bottom	no	at_stream_grade	hdpe	15	15	0	0	good	none	2	satisfactory			Minor erosion on sides of p	yes	no		good	-70.9947	42.68377					
0-961	11/4/2020 19:48	clear	other	yes	yes	paved	satisfactory	25	45	yes	overhead_wires	yes	Minor patches along roadway. Surface rust satisfaction along guard rail.	round	roadway_aligned	skewed_45°	no_moist_bottom	no	at_stream_grade	corrugated_metal_pipe	18	18	8	0	fair	none	7	Ruston present at waterline. Tar lining has worn away at waterline. Minor rusting at joint.	slope_steeper_than_2,1	7	fair			Potential headwall may ha	no	no	Streambed lined with miscellaneous stones.	fair	-70.993	42.68913		
0-960 0-79 0-84	11/4/2020 20:08 11/4/2020 20:31 11/5/2020 13:17	clear clear clear	other web web	yes yes yes	yes yes yes	paved paved paved	satisfactory satisfactory satisfactory	25	45	yes	overhead_wires	yes	Patches along roadway. Minor surface rust on satisfaction,guard rail.	round	roadway_aligned	no_discernable_stream_channel	no_moist_bottom	yes,<25%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	18	18	12	0	fair	none	6.5	satisfactory	mortared_stone,brick	poor	Major spalling in headwall	no	no	18 inch fallen tree approximately 5 feet away from outlet. Initial streambed lined with stone. Culvert does not exist. Culvert was not present.	fair	-70.9928	42.68914			
0-651	11/5/2020 13:33	clear	exam	yes	yes	paved	satisfactory	22	45	yes	water_line	no	Minor cracks and patches and roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes,<25%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	18	12	17	0	poor	minor	culvert	Moderate surface rust throughout pipe. Pipe lined with an asphalt/tar mix. Approximately 12 inches of right side of pipe is missing. Moderate to severe surface rust throughout pipe.	headwall_retaining_wall,alo	6	satisfactory	mortared_stone,brick	fair	Minor vegetation growth. h	no	no	Minor vegetation growth at inlet. 12 inch RCP privately owned culvert approximately 30 feet away. Culvert located on Buford-Georgetown line, most likely with in Buford. General tree growth. Headwall appears to be in decent condition but pipe is in major disrepair. Culvert located next to Buford-Georgetown line, most likely with in Buford.	fair	-70.9876	42.69799
0-650	11/5/2020 13:53	clear	exam	yes	yes	paved	satisfactory	22	45	yes	overhead_wires,water_line	no	Minor cracking and patches in roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	18	11	20	0	failing	moderate	headwall	Bottom and sides of pipe missing from outlet to more than halfway. Top pipe pipe is lined with tar/asphalt mix. Severe corrosion. Minor cracking forming on right side of pipe. Second length of pipe has shifted approximately 2 inches outward from inlet.	headwall_retaining_wall,alo	6	fair	mortared_stone,brick	fair	Embankment shows moden	no	no		poor	-70.9877	42.69806
0-611	11/5/2020 14:22	clear	exam	yes	yes	paved	good	22	60	yes	drainage_system	no		round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	at_stream_grade	reinforced_concrete_pipe	12	12	0	0	satisfactory	none		On left side of pipe there are four strips of rebar showing through. Minor cracking forming on right side of pipe. Second length of pipe has shifted approximately 2 inches outward from inlet.	slope_steeper_than_2,1	4.5	satisfactory			Moderate tree growth. Mir	no	no	Pipe opening is a flared end section.	satisfactory	-70.9947	42.69848		
0-610	11/5/2020 14:42	clear	exam	yes	yes	paved	satisfactory	22	60	no		no		round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	at_stream_grade	reinforced_concrete_pipe	12	12	0	0	satisfactory	none		Left side opening has a sizable crack. Second length of pipe is shifted up and to the right. Minor moss growth. Opening of pipe 4 has a flared end section.	slope_flatter_than_2,1	3	satisfactory			Minor vegetation growth	a	no	Streambed is lined with rocks, and likely man-made.	fair	-70.9983	42.6971		
0-681	11/5/2020 15:12	clear	exam	yes	yes	paved	good	22	60	yes	other,water_line,gas_line	no		round	roadway_aligned	skewed_45°	no_dry_bottom	yes,<25%	within_culvert,up stream	leaves,other	at_stream_grade	reinforced_concrete_pipe	16	16	27	0	fair	none		Scour located underneath ending of pipe. Roots growing over entrance. Inside the second length of pipe is shifted up and to the left.	slope_steeper_than_2,1	4	fair			Embankment is comprited	no	no	End of pipe is made of a flared end section. Steep drop off directly after outlet.	satisfactory	-70.9984	42.69711
0-680	11/5/2020 15:25	clear	exam	yes	yes	paved	good	22	60	yes	gas_line,water_line,other	no		round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	perched	reinforced_concrete_pipe	16	16	0	0	satisfactory	moderate	culvert	Top section of culvert is cracked and slightly shifted at opening. That second length of pipe there is approximately 2 1/2 inch opening and it just shifted slightly to the right. Minor scaling along bottom and sides.	slope_steeper_than_2,1	4	fair			Embankment shows moden	no	no	General tree growth directly outside of culvert pipe.	poor	-70.9995	42.69647		
0-3121	11/5/2020 15:54	clear	exam	yes	yes	paved	satisfactory	20	35	yes	other,water_line	no	Minor cracking along roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	upstream	other,leaves,sedi ment	at_stream_grade	reinforced_concrete_pipe	12	12	0	3	fair	none	3.5	poor	dry_laid_stone,brick	failing	Embankment shows moden	no	no		poor	-70.9995	42.69647			
0-3120	11/5/2020 16:13	clear	exam	yes	yes	paved	satisfactory	20	35	yes	gas_line	no	Minor cracking along roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes,<25%	within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	12	9.5	11	0	satisfactory	none	4	fair	dry_laid_stone,brick	poor	Embankment shows moden	no	no		fair	-70.9995	42.69647			
0-3130	11/5/2020 16:26	clear	exam	yes	yes	paved	satisfactory	20	40	yes	other,water_line	no	Minor cracking along roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	12	8	12	0	satisfactory	minor	headwall	Second length of pipe there is approximately 2 1/2 inch opening and it just shifted slightly to the right. Minor scaling along bottom and sides.	headwall_retaining_wall,alo	3.5	fair	dry_laid_stone,brick	failing	Embankment shows moden	no	no	General tree growth directly outside of culvert pipe.	fair	-70.9994	42.69652
0-3131	11/5/2020 16:46	clear	exam	yes	yes	paved	satisfactory	20	40	yes	other,water_line	no	Minor cracking along roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no	at_stream_grade	reinforced_concrete_pipe	12	12	0	0	fair	none	3.5	fair	other	fair	Embankment is covered wi	no	no		fair	-70.9994	42.69658					
0-3141	11/5/2020 16:58	clear	exam	yes	yes	paved	satisfactory	20	37	yes	other,water_line	no	Minor cracking along roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	stream	sediment	at_stream_grade	reinforced_concrete_pipe	12	6.5	11.5	0	satisfactory	none	3	fair	dry_laid_stone,brick	poor	Embankment shows minor	no	no		satisfactory	-70.9993	42.69644			
0-3140	11/5/2020 17:08	clear	exam	yes	yes	paved	satisfactory	20	37	yes	water_line,other	no	Minor cracking along roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	12	8	12	0	satisfactory	none	3	fair	dry_laid_stone,brick	poor	Headwall has sporadically	no	no	General tree growth.	satisfactory	-70.9994	42.69666			
0-3151	11/5/2020 17:33	clear	exam	yes	yes	paved	satisfactory	22	30	yes	other,water_line	no	Minor cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	at_stream_grade	reinforced_concrete_pipe	12	12	0	0	satisfactory	none		Suck length of pipe is slightly shifted out, with a miscellaneous stone in the middle.	slope_flatter_than_2,1	1.5	satisfactory			Minor vegetation growth.	no	no		satisfactory	-71.0019	42.6945		
0-3150	11/5/2020 17:42	clear	exam	yes	yes	paved	satisfactory	22	30	yes	other,water_line	no	Minor cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	completely_obstructe	downstream,with growth,sediment,] eaves	buried,clogged_col	reinforced_concrete_pipe	12	4	12	0	failing	none	3	fair	dry_laid_stone,brick	failing	Embankment shows minor	no	no	Moderate vegetation growth and thorn bushes directly after outlet. Culvert likely in OK condition but headwall drastically needs repairs. Inside of culvert looks satisfactory but headwall and outfall area are failing.	failing	-71.002	42.69455				
0-3160	11/5/2020 18:04	clear	exam	yes	yes	paved	satisfactory	22	30	yes	water_line,other	no	Minor cracking along roadway way.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	completely_obstructe	within_culvert,do sediment,other,le aves	at_stream_grade	reinforced_concrete_pipe	12	4	12	0	fair	none	2.5	satisfactory	dry_laid_stone,brick	failing	Headwall stones are active	no	no	Culvert pipe and headwall are completely buried by rocks and landscaping. Could not inspect headwall and culvert properly due to obstruction.	failing	-71.002	42.69459				
0-3161	11/5/2020 18:23	clear	exam	yes	no	paved	satisfactory	22	30	yes	other,water_line	no	Minor cracking along roadway.	round				completely_obstructe	upstream	other,sediment	reinforced_concrete_pipe	12	0						Inlet opening has exposed rebar and several chunks of concrete missing, with rebar falling into the culvert.	slope_flatter_than_2,1	fair		Embankment made up of li	no	no			-71.002	42.69445			
0-3171	11/5/2020 18:32	clear	exam	yes	yes	paved	satisfactory	22	30	yes	water_line,other	no	Minor cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_75_100%	upstream,within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	12	5.5	12	0	poor	none	1.5	satisfactory			Minor erosion leading to in	no	no	Inlet opening was almost 100% covered upon arrival.	poor	-71.0019	42.69452			
0-3170	11/5/2020 18:50	clear	exam	yes	yes	paved	satisfactory	22	30	yes	other,water_line	no	Minor cracking along roadway	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	completely_obstructe	within_culvert,do sediment,other	at_stream_grade	reinforced_concrete_pipe	12	0	12	0	failing	none	2.5	satisfactory	dry_laid_stone,brick	failing	Headwall stones are active	no	no	Upon arrival headwall stones completely covered and obstructed outlet.	failing	-71.0019	42.69454				
0-720	11/5/2020 19:34	clear	exam	yes	yes	paved	satisfactory	18	28	yes	drainage_system,water_line,gas_line	yes	bolard failing	round	roadway_aligned	stream_aligned	no_moist_bottom	yes,<25%	within_culvert	other	perched	corrugated_metal_pipe	24	24	0	0	satisfactory	none	3	fair	dry_laid_stone,brick	fair	Moderate erosion of emba	no	no	Large overgrowth of thorn bushes at outlet opening and embankment.	fair	-71.0073	42.69512			
0-721	11/5/2020 19:48	clear	exam	yes	no	paved	satisfactory	18	28	yes	drainage_system,gas_line,water_line,mo	no	Minor cracking along roadway.	round	roadway_aligned	stream_aligned	completely_obstructe	upstream	other	corrugated_metal_pipe	24							Culvert opening is blocked by large stone preventing 4 inspection. Minor moss growth. Minor scaling a bottom of pipe. Covert opening appeared to be purposefully obstructed with rocks. 1 inch diameter blue pipe coming out of and through culvert. Culvert length measurement is an 2.5 approximation.	headwall_retaining_wall,alo	3	poor	dry_laid_stone,brick	poor	Stone covering inlet appea	no	no	Embankment headwall were observable upon inspection. Culvert pipe was unexpectable due to large stone fallen from headwall. Stream lined with general vegetation growth and thorns.	failing	-71.0073	42.69509		
0-1021	11/6/2020 13:01	clear	exam	yes	yes	paved	fair	23	50	yes	overhead_wires	no	Roadway shows moderate cracking in minor potholes.	round	roadway_aligned	skewed_45°	no_moist_bottom	no	at_stream_grade	reinforced_concrete_pipe	15	15	0	0	satisfactory	moderate	culvert,the adwall	Small 2 inch tear on bottom left side of culvert inlet. Rubber O ring at the base of pipe has fallen 3 off and is laying on base. Minor scaling at bottom of pipe. Slight cracking on outside edge of 8 pipe.	headwall_retaining_wall,alo	4	satisfactory	mortared_stone,brick	fair	Minor vegetation growth	a	yes	6 inch concrete area drain located approximately 2 feet away from culvert. Culvert appeared to be purposefully covered along with 6 inch area drain. 1 inch blue pipe appears to be placed purposefully.	fair	-71.0478	42.68694		
0-1020	11/6/2020 13:42	clear	exam	yes	no	paved	fair	23	50	no		no	Moderate cracking and potholes along roadway.	round					reinforced_concrete_pipe	15							1 inch diameter blue pipe sticking out of where culvert may be.					Embankment shows moden	yes	yes	Culvert and headwall were uninspectable due to large pile of debris likely placed by owner of property. 1 inch diameter pipe was visible outside of debris pile. Downstream approximately 80 feet away there's a private culvert crossing a driveway.	satisfactory	-71.0473	42.68585				
0-1061	11/6/2020 14:17	clear	exam	yes	yes	paved	satisfactory	19	55	yes	overhead_wires,gas_line,drainage_s	yes	Cracking along pipe length. Manhole on side of roadway connecting culvert pipes.	round	roadway_aligned	stream_aligned	stagnant	no	at_stream_grade	hdpe	15	15	9	1	satisfactory	none	4	satisfactory	dry_laid_stone,brick	satisfactory	Minor erosion along embar	no	no	Streambed appears to be partially filled in likely by owner. Private culvert approximately 50 feet away from stream appears to be filled in by owner.	satisfactory	-71.0474	42.68602					
0-1131	11/6/2020 14:45	clear	exam	yes	yes	paved	satisfactory	21	35	yes	overhead_wires	no	Minor cracking along roadway.	round	roadway_aligned	skewed_45°																										

<b>B - 360a</b>	11/6/2020 15:22	clear	ewm	yes	yes	paved	satisfactory	21	11/6/2020 15:22	clear	ewm	yes	yes	paved	satisfactory	21	29	no	no	Minor cracking along roadway. Small crack along entire length of pipe.	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	leaves,sediment	at_stream_grade	ductile_iron_pipe	8	7.5	4	0	satisfactory	none	Minor surface rust on pipe.	slope_flatter_than_2:1_	1	satisfactory	Minor erosion on embankment	no	no	satisfactory	-71.0463	42.68439			
<b>B - 360b</b>	11/6/2020 15:39	clear	ewm	yes	yes	paved	satisfactory	21	29	yes	overhead_wires	no	no	no	no	no	29	yes	overhead_wires	no	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves	at_stream_grade	ductile_iron_pipe	8	6	6.5	0	good	none	Minor surface rust on bottom of pipe. Inlet has a flared end section.	slope_flatter_than_2:1_	1	satisfactory	Embankment is comprised of	no	no	good	-71.0463	42.68445			
<b>B - 107a</b>	11/6/2020 15:52	clear	ewm	yes	yes	paved	satisfactory	23	58	yes	overhead_wires	no	no	no	no	no	58	yes	overhead_wires	no	round	roadway_aligned	stream_aligned	no_moist_bottom	yes_<25%	within_culvert	sediment,vegetat	on_growth	perched	corrugated_metal_pipe	24	21	18	0	satisfactory	none	Minor surface rust on bottom of pipe. Inlet has a flared end section.	headwall_retaining_wall,alo	3.5	fair	dry_laid_stone_brick	satisfactory	Embankment has minor erosion	no	no	satisfactory	-71.0452	42.68537
<b>B - 107b</b>	11/6/2020 16:08	clear	ewm	yes	yes	paved	satisfactory	23	58	yes	overhead_wires	no	no	no	no	no	58	yes	overhead_wires	no	round	skewed_<45°	no_discernable_stream_channel	stagnant	yes_<25%	upstream	leaves,other	at_stream_grade	corrugated_metal_pipe	24	24	13	2	satisfactory	none	Culvert made up of 4 corrugated metal pipes each 18 inches in diameter. Span of culvert is approximately 10 feet. Moderate surface rust. Moderate moss growth.	headwall_retaining_wall,alo	3	fair	dry_laid_stone_brick	fair	Embankment has minor erosion	no	no	satisfactory	-71.0453	42.68548	
<b>B - 108b</b>	11/6/2020 16:51	clear	ewm	yes	yes	paved	fair	14	22	no	no	no	no	no	no	no	22	no	no	Moderate cracking along length of roadway with small potholes.	round	roadway_aligned	stream_aligned	no_moist_bottom	no	no	no	at_stream_grade	corrugated_metal_pipe	18	18	11	0	fair	minor	Culvert has an inlet on top.	headwall_retaining_wall,alo	2.5	poor	dry_laid_stone_brick	fair	Embankment has moderate erosion	no	no	fair	-71.0424	42.68536	
<b>B - 108a</b>	11/6/2020 17:07	clear	ewm	yes	yes	paved	fair	14	22	no	no	no	no	no	no	no	22	no	no	Moderate cracking along roadway with small sized potholes.	round	roadway_aligned	stream_aligned	no_moist_bottom	yes_<25%	within_culvert	branches	perched	corrugated_metal_pipe	18	18	15	0	falling	minor	Culvert made up of 4 corrugated metal pipes each 18 inches in diameter. Span of culvert is approximately 10 feet. Facing the pond, the two culvert pipes on the left have rusted out bottoms and are failing. Other two have 8 moderate surface rust.	headwall_retaining_wall,alo	2	fair	dry_laid_stone_brick	falling	Embankment has a composition of	no	no	falling	-71.0425	42.68552	
<b>B - 113</b>	11/6/2020 17:39	clear	wmb	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	round	roadway_aligned	stream_aligned	no_moist_bottom	yes_<25%	within_culvert	branches	perched	corrugated_metal_pipe	18	18	15	0	falling	minor	Culvert made up of 2 - 36 inch corrugated metal pipe, approximate span is 15 feet. Facing down stream the left pipe currently has water flowing through it while the right is completely dry. Minor surface rust throughout pipe. More in 15 general notes.	headwall_retaining_wall,alo	42.5	fair	dry_laid_stone_brick	fair	Embankment shows minor erosion	yes	no	fair	-71.036	42.68377	
<b>B - 128b</b>	11/6/2020 17:53	clear	ewm	yes	yes	paved	good	22	36	no	no	no	no	no	no	no	36	no	no	no	round	roadway_aligned	stream_aligned	flowing	yes_<25%	upstream	other,leaves	at_stream_grade	corrugated_metal_pipe	36	31	28	4	fair	none	Culvert is comprised of 2 - 36 inch CMP pipes. Span between pipes is 12.5 feet. Facing down stream left pipe has water flowing through it, while right is dry. Minor surface rust. Dry pipe has an indent on top.	headwall_retaining_wall,alo	42.5	fair	dry_laid_stone_brick	fair	Embankment shows minor erosion	yes	no	fair	-71.0432	42.67892	
<b>B - 128a</b>	11/6/2020 18:14	clear	ewm	yes	yes	paved	good	22	36	yes	overhead_wires	yes	guardrail	satisfactory	Minor dents in guard rail.	round	roadway_aligned	stream_aligned	flowing	no	no	round	roadway_aligned	stream_aligned	flowing	no	no	no	at_stream_grade	corrugated_metal_pipe	36	36	18	3	fair	minor	General tree growth and limbs down within stream. No culvert was found.	headwall_retaining_wall,alo	4	fair	dry_laid_stone_brick	poor	Minor erosion present on embankment	no	no	fair	-71.0434	42.67881
<b>B - 145</b>	11/6/2020 18:37	clear	ewm	yes	yes	paved	good	22	37	no	no	no	no	no	no	no	37	no	no	no	round	skewed_>45°	skewed_<45°	flowing	no	no	no	perched	hdpe	15	15	12	3	poor	minor	Pipe appears to be relatively new but still has large puncture a top of pipe.	headwall_retaining_wall,alo	2.5	fair	dry_laid_stone_brick	poor	Moderate erosion of embankment	no	no	poor	-71.0303	42.67331	
<b>B - 361b</b>	11/6/2020 18:43	clear	ewm	yes	yes	paved	good	22	37	no	no	no	no	no	no	no	37	no	no	no	round	skewed_>45°	skewed_<45°	flowing	no	no	no	perched	hdpe	15	15	12	3	poor	minor	Pipe appears to be new but headwall stone has punctured the top of culvert.	headwall_retaining_wall,alo	2.5	fair	dry_laid_stone_brick	poor	Moderate erosion of embankment	no	no	poor	-71.0303	42.67331	
<b>B - 361a</b>	11/6/2020 18:59	clear	wmb	yes	yes	paved	good	22	37	yes	overhead_wires,gas_line	no	no	no	no	no	37	yes	overhead_wires,gas_line	no	round	skewed_>45°	stream_aligned	flowing	no	no	no	perched	hdpe	15	15	5	0.5	poor	minor	Headwall wall stone has punctured the top of culvert.	headwall_retaining_wall,alo	3	satisfactory	dry_laid_stone_brick	fair	Headwall has minor voids in	no	no	poor	-71.0302	42.67327	
<b>B - 141b</b>	11/6/2020 19:25	clear	ewm	yes	yes	paved	good	21	41	no	no	no	no	no	no	no	41	no	no	no	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	no	no	at_stream_grade	corrugated_metal_pipe	15	15	10	0	satisfactory	none	On- of the pipe is lined with an asphalt/tar mix. Minor surface rust throughout pipe.	slope_flatter_than_2:1_	2	fair	Minor erosion along embankment	no	no	satisfactory	-71.0335	42.67421			
<b>B - 141a</b>	11/6/2020 19:41	clear	ewm	yes	yes	paved	good	21	41	yes	overhead_wires,gas_line	no	no	no	no	no	41	yes	overhead_wires,gas_line	no	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	15	11	13	0	fair	none	Moderate surface rust throughout pipe.	headwall_retaining_wall,alo	3	satisfactory	dry_laid_stone_brick	fair	Embankment shows general erosion	no	no	fair	-71.0335	42.67414	
<b>B - 147b</b>	11/6/2020 19:54	clear	ewm	yes	yes	paved	good	21	35	no	no	no	no	no	no	no	35	no	no	no	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	12	11	9	0	satisfactory	none	Minor surface rust at bottom of pipe.	slope_steeper_than_2:1_	3	fair	Moderate erosion of embankment	no	no	satisfactory	-71.0297	42.67332			
<b>B - 147a</b>	11/6/2020 20:11	clear	ewm	yes	yes	paved	good	21	35	yes	overhead_wires,gas_line	no	no	no	no	no	35	yes	overhead_wires,gas_line	no	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	no	no	perched	corrugated_metal_pipe	12	12	0	0	satisfactory	minor	Minor surface rust at bottom of pipe.	slope_steeper_than_2:1_	3	poor	Moderate to severe erosion on embankment	no	no	fair	-71.0297	42.6733			
<b>B - 93b</b>	11/9/2020 13:03	clear	ewm	yes	yes	paved	good	24	40	no	no	no	no	no	no	no	40	no	no	no	round	skewed_<45°	no_discernable_stream_channel	stagnant	yes_25_50%	upstream	leaves,sediment,other	at_stream_grade	corrugated_metal_pipe	36	36	20	2.5	fair	minor	Beaver grate placed in front of inlet. Moderate surface rust throughout pipe.	headwall_retaining_wall,alo	4	poor	dry_laid_stone_brick	poor	Embankment shows moderate erosion	no	no	poor	-71.0164	42.68994	
<b>B - 93a</b>	11/9/2020 13:03	clear	ewm	yes	yes	paved	good	24	40	no	no	no	no	no	no	no	40	no	no	no	round	skewed_<45°	no_discernable_stream_channel	stagnant	yes_25_50%	upstream	leaves,sediment,other	at_stream_grade	corrugated_metal_pipe	36	36	20	2.5	fair	minor	Beaver grate placed in front of inlet. Moderate surface rust throughout pipe.	headwall_retaining_wall,alo	4	poor	dry_laid_stone_brick	poor	Embankment shows moderate erosion	no	no	poor	-71.0164	42.68994	
<b>B - 99a</b>	11/9/2020 13:39	clear	ewm	yes	yes	paved	good	24	40	yes	overhead_wires	evidence_iguardrail	Former guard rail with only one metal post left. Post is actively overturning without any remaining guard rail sections.	round	roadway_aligned	stream_aligned	stagnant	yes_<25%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	36	36	24	4	fair	minor	One of the headwall stones punctured the top of pipe leading to cracking along the side.	headwall_retaining_wall,alo	3.5	fair	dry_laid_stone_brick	fair	Embankment shows minor erosion	yes	no	fair	-71.0163	42.68993								
<b>B - 103</b>	11/9/2020 14:16	clear	wmb	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	round	skewed_>45°	skewed_<45°	flowing	no	no	no	perched	hdpe	15	15	12	3	poor	minor	Culvert does not exist.	headwall_retaining_wall,alo	2.5	fair	dry_laid_stone_brick	poor	Moderate erosion of embankment	no	no	poor	-71.0303	42.67331	
<b>B - 112</b>	11/9/2020 14:50	clear	wmb	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	round	skewed_>45°	skewed_<45°	flowing	no	no	no	perched	hdpe	15	15	12	3	poor	minor	Culvert does not exist.	headwall_retaining_wall,alo	2.5	fair	dry_laid_stone_brick	poor	Moderate erosion of embankment	no	no	poor	-71.0303	42.67331	
<b>B - 120a</b>	11/9/2020 14:54	clear	ewm	yes	yes	paved	satisfactory	22	80	no	no	no	no	no	no	no	80	no	no	no	round	skewed_<45°	skewed_<45°	no_dry_bottom	yes_<25%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	18	14	16	0	satisfactory	none	Second length of pipe in is slightly bent inward in bottom 6 left corner. Minor surface rust.	headwall_retaining_wall,alo	4.5	satisfactory	mortared_stone_brick	fair	Minor erosion along embankment	no	no	satisfactory	-71.0225	42.68192	
<b>B - 120b</b>	11/9/2020 15:19	clear	ewm	yes	yes	paved	satisfactory	22	80	yes	overhead_wires	no	no	no	no	no	80	yes	overhead_wires	no	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	no	no	no	at_stream_grade	corrugated_metal_pipe	18	18	0	0	satisfactory	minor	Second length of pipe on the bottom right side is slightly bent upward.	headwall_retaining_wall,alo	2.5	satisfactory	mortared_stone_brick	fair	Embankment shows minor erosion	no	no	fair	-71.0226	42.68207	
<b>B - 121</b>	11/9/2020 15:49	clear	ewm	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	no	no	no	at_stream_grade	corrugated_metal_pipe	18	18	0	0	satisfactory	minor	Minor surface rust at bottom of pipe.	headwall_retaining_wall,alo	3	satisfactory	mortared_stone_brick	satisfactory	Embankment shows minor erosion	no	no	satisfactory	-71.0168	42.67689	
<b>B - 125</b>	11/9/2020 16:04	clear	wmb	yes	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	no	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	no	no	no	at_stream_grade	corrugated_metal_pipe	12	12	0	0	satisfactory	moderate	Minor surface rust at bottom of pipe.	headwall_retaining_wall,alo	3	satisfactory	mortared_stone_brick	satisfactory	Embankment shows minor erosion	no	no	satisfactory	-71.0168	42.67689	
<b>B - 132b</b>	11/9/2020 16:14	clear	ewm	yes	yes	paved	fair	22	60	yes	gas_line	no	no	no	no	no	60	yes	gas_line	no	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	no	no	at_stream_grade	corrugated_metal_pipe	12	12	0	0	satisfactory	moderate	Minor surface rust at bottom of pipe.	headwall_retaining_wall,alo	3	satisfactory	mortared_stone_brick	satisfactory	Embankment shows minor erosion	no	no	satisfactory	-71.0168	42.67689	
<b>B - 132a</b>	11/9/2020 16:27	clear	ewm	yes	yes	paved	fair	22	60	yes	gas_line,overhead_wires,other	no	no	no	no	no	60	yes	gas_line,overhead_wires,other	no	round	roadway_aligned	stream_aligned	no_dry_bottom	yes_<25%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	10	9.5	0	satisfactory	minor	Minor surface routes throughout 10 pipe.	slope_flatter_than_2:1_hea	3.5	fair	mortared_stone_brick	satisfactory	Embankment shows minor erosion	no	no	satisfactory	-71.0167	42.67708	
<b>B - 131b</b>	11/9/2020 16:39	clear	ewm	yes	yes	paved	fair	24	64	yes	gas_line	no	no	no	no	no	64	yes	gas_line	no	elliptical	skewed_>45°	skewed_<45°	no_moist_bottom	yes_<25%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	30	16	25	0	satisfactory	minor	Surface rust at bottom and sides 8 of pipe.	slope_flatter_than_2:1_hea	2.5	satisfactory	mortared_stone_brick	fair	Embankment shows minor erosion	no	no	satisfactory	-71.0173	42.67696	
<b>B - 131a</b>	11/9/2020 17:02	clear	ewm	yes	yes	paved	fair	24	64	yes	overhead_wires,gas_line	no	no	no	no	no	64	yes	overhead_wires,gas_line	no	elliptical	skewed_>45°	stream_aligned	no_dry_bottom	yes_<25%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	30	17	22	0	satisfactory	minor	Minor surface rust throughout 7 pipe.	headwall_retaining_wall,alo	2.5	satisfactory	dry_laid_stone_brick	satisfactory	General vegetation growth on embankment	no	no	satisfactory	-71.017	42.67703	
<b>B - 318b</b>	11/9/2020 17:27	clear	ewm	yes	yes	paved	satisfactory	28	80	yes	overhead_wires	no	no	no	no	no	80	yes	overhead_wires	no	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	sediment,leaves	inlet_drop	corrugated_metal_pipe	12	11	10	0	satisfactory	none	Minor surface rust throughout pipe. Outlet side of pipe is comprised of a 12 inch HDPE pipe.	headwall_retaining_wall,alo	2	good	dry_laid_stone_brick	satisfactory	Top of headwall has a half inch	no	no	satisfactory	-71.0156	42.67525	
<b>B - 318a</b>	11/9/2020 17:48	clear	ewm	yes	yes	paved	satisfactory	28	80	yes	overhead_wires,gas_line	no	no	no	no	no	80	yes	overhead_wires,gas_line	no	round	skewed_<45°	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	sediment,leaves	at_stream_grade	hdpe	12	11	9	0	poor	none	Head wall stone has settled causing top of culvert to crack along pipe width. Pipe is comprised of an inlet made of CMP and an outlet made of HDPE.	headwall_retaining_wall,alo	3	satisfactory	dry_laid_stone_brick	fair	Headwall has voids between stones	no	no	fair	-71.0152</		



Minor cracking within 1st foot of pipe. Moss growth on outside of pipe.

Moderate scaling throughout pipe. Second length of pipe shifted back approximately 6 inches.

Moderate scaling throughout pipe. Second length of pipe is separated from outlet and approximately 3 inches. Large pile of sediment has come through 3 inch separation.

Second length of pipe has separated approximately 3 inches. Large build up of sediment in the middle of pipe likely from separation of pipes.

Second length of pipe separated approximately 2 inches. Small amount of sediment seeping through. Minor moss growth on outside of pipe.

Large stones at outlet opening impeding flow.

Stones lining culvert approximately 2 to 3 feet from bottom have collapsed in to natural streambed. Top of culvert is comprised of a concrete slab, 7 white walls are mortar and stone.

Bottom 2 feet of stones are missing mortar. Top of culvert and wing walls are comprised of 12 cast in place concrete.

Minor scaling a bottom pipe. Top of inlet opening has small amount of rebar showing 7 through.

Minor scaling within pipe. Minor moss growth. Pipe inlet is a flared end section. On left side rebar is showing 5 through.

Pipe outlet is a flared end section. Moderate scaling throughout pipe. On top and left side of culvert rebar is showing through.

Minor scaling forming at bottom of pipe. Two small chips taken 9 out of the top of inlet.

Minor scaling starting to form. Black tar/jughalt mix ring along 6 outside of culvert.

Moderate surface rust throughout.

Minor surface rust throughout 4 pipe.

Minor scaling at bottom of pipe. Small surface cracks at top of inlet.

Minor scaling at bottom of pipe. Obstruction located within in flared end section, but not within pipe. Minor chips and concrete missing within flared end section.

Minor chipping on outside of inlet.

Outlet is a flared end section. On the right side of flared end section there is rebar showing through. Minor chips and flared end section opening.

1: obstructed approximately 50% while the rest are less than 25%. 1 & 4: Large chips missing from culvert opening. 2: concrete separating from culvert at bottom right. 3: minor chips at 11 opening. All: Moderate scaling.

2: moderate amount of rebar showing through. 3: 1 inch chip in concrete on left side. 4: exposed rebar within pipe. All: separation of culverts from surrounding concrete. Moderate scaling at 8 bottom and sides of pipes.

Minor surface rust at bottom of pipe. Large chip missing from left side of culvert, approximately 5 12 inches deep.

Minor surface rust at bottom of pipe. Large tear at top of culvert approximately 3 inches deep with 4 metal bent over to one side.

Minor surface rust at bottom of pipe. 8 feet into pipe there are two bars on the top left and right sides. Tears appear to be 7 caused by a rock.

Moderate scaling throughout pipe. Large chip missing from left side of culvert, approximately 5 12 inches deep.

Moderate scaling throughout pipe. Pipes is nearly filled with water. At outlet opening, some rebar is showing through.

Moderate to severe scaling at bottom of pipe. Minor surface cracks throughout pipe. Algae 7 growth throughout pipe. Minor to moderate scaling along pipe.

Minor surface rust on pipe. Approximately 3 feet and words moderately sized dent on right side.

Minor surface rust at bottom of pipe. Approximately 5 feet into pipe small indent on top left, likely from headwall.

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Minor erosion and general

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Wetland flag seen directly outside of outlet. General tree growth and fallen limbs at outlet.

Large pile of sediment where pipes have separated within culvert. Outlet outfalls into detention pond.

Large buildup of sediment within pipe, possibly from pipe separation.

Pipe changes direction at halfway point approximately just before roadway.

Inside of outlet there are two large stones partially impeding flow. If stones are removed, rating of culvert would go to satisfactory.

Moderate erosion of streambed. Essex County bound located approximately 8 feet away from outlet along streambed.

Fallen trees and limbs within stream bed. Inlet of pipe was found but part of closed drainage system. Drainage system likely outlets behind abutting property.

Culvert outlets into small pond. Starting at each side of wing walls in going around pond there is a small wire fence. Minor vegetation growth at outlet.

Pipe inlet is a flared end section.

General tree growth at outlet opening. Fallen tree limb at outlet opening.

Moderate vegetation overgrowth at inlet opening.

Vegetation overgrowth at outlet.

Small tree located approximately 3 feet away from inlet.

General tree growth directly next to headwall. Fallen limbs and branches on embankment and streambed.

General tree growth.

1 inch thick iron rod located approximately 8 feet away from outlet. Culvert does not exist.

Culvert inlet is part of an inlet control structure surrounded by stones and a corrugated metal pipe.

Small tree growing at base of flared end section.

Culvert does not exist.

Culvert comprised of four identical RCP pipes. Pipes are numbered one through four with one being closest to Main Street. Span is 10 feet.

Culvert comprised of four identical RCP pipes. Pipes are numbered one through four with one being closest to Main Street. Span is 11 feet.

General tree growth at inlet.

General vegetation and tree growth directly outside of outlet.

Moderate thorn growth directly next to culvert.

Outlet leads into private culvert approximately 15 feet away.

Small beaver dam located on the left side of headwall.

Small oil slick visible on top of water. Culvert outlets into a marsh.

General tree growth throughout stream. Large amount of fallen branches and twigs at outlet.

Thorn bush directly next to culvert.

General tree growth.

General tree growth.

General tree growth.

General tree growth.

General tree growth.

General tree growth.

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General tree growth.

0-180i	11/12/2020 13:25	clear	ewm	yes		yes	paved	satisfactory	21	87	yes	other,drainage_system	no	Minor cracking along roadway. Electric boxes seen along roadway.	round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves,other	at_stream_grade	reinforced_concrete_pipe	12	9	12	0	satisfactory	none	Pipe was completely buried upon arrival. Three large stones were in inlet opening.	slope_steeper_than_2_1_1	3	falling	dry_laid_stone_brick	falling	Severe erosion throughout no	no	Culvert connection to close drainage system that outlets to nearby pond. Culvert was unexpectable directly due to a vegetation overgrowth with thorns. Outlet is part of clothes drainage system that connects to inlet.	falling	-71.0306	42.65706			
0-180o	11/12/2020 13:44	clear	ewm	yes		no	paved	satisfactory	21	87	yes	drainage_system,other	no	Minor cracking along roadway. Electric boxes seen along roadway.	round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_<25%	downstream,in_culvert	vegetation_growt,h,branches,se,diment,leaves	at_stream_grade	reinforced_concrete_pipe	12			0			Culvert was unapproachable due to thick vine and thorn growth over embankment and outlet area.	slope_flatter_than_2_1_1	3	poor			Minor to moderate erosion no	no			-71.0303	42.65691			
0-315o	11/12/2020 14:27	clear	exam	yes		yes	paved	fair	22	65	yes	drainage_system,gas,other	no	Moderate cracks and small potholes in roadway. Electrical boxes seen down roadway.	round	roadway_aligned	stream_aligned	stagnant	yes_25_50%	within_culvert	sediment,other	at_stream_grade	corrugated_metal_pipe	9	6	10	0.5	falling	severe	Severe rust throughout pipe. On both bottom and sides of pipe it is completely rusted away. Culvert is completely buried likely under sediment rocks and leaves.	headwall_retaining_wall,alo	2.5	satisfactory	dry_laid_stone_brick	poor	Embankment shows minor no	no	Culvert connects through a close drainage system. Culvert inlet cannot be found due to being buried by sediment, rocks and leaves.	falling	-71.0243	42.66305			
0-315i	11/12/2020 14:44	clear	ewm	yes		no	paved	fair	22	65	yes	other,drainage_system,gas	no	Moderate cracks and small potholes in roadway. Electrical boxes seen down roadway.	round				completely_obstructe	culvert,within_culvert	other,leaves,se,diment	buried_clagged_coil	corrugated_metal_pipe							Inlet is a flared end section. Flared end section length has separated from second section approximately 1 inch. Outlet is a flare end section. General moss growth. Flared end section length is shifted 1 inch upwards compared to other lengths.	slope_steeper_than_2_1_1_headwall_retaining_wall			dry_laid_stone_brick		Dried laid stone retaining a no	no			-71.0243	42.66116			
0-179i	11/12/2020 15:17	clear	ewm	yes		yes	paved	satisfactory	21	80	yes	other	no	Minor cracks along roadway. Electrical boxes seen up street.	round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	12	12	0	0	satisfactory	minor						Embankment is reinforced no	no	General vegetation growth at inlet opening.	satisfactory	-71.0198	42.65704				
0-179o	11/12/2020 15:35	clear	ewm	yes		yes	paved	satisfactory	21	80	yes	other,drainage_system	no	Minor cracks along roadway. Electrical boxes seen up street. Closed drainage system seen up street.	round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	12	12	0	0	satisfactory	moderate						Minor erosion on embank no	no	General tree growth.	satisfactory	-71.0198	42.65689				
0-320i	11/12/2020 15:56	clear	exam	yes		yes	paved	good	21	65	yes	other	no	Electrical box seen up street.	round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	leaves,se,diment,other	at_stream_grade	reinforced_concrete_pipe	12	10	21	0	satisfactory	severe	Inlet is a flared end section. On right side of flared end section, approximately 9 inches of concrete is missing with exposed rebar. Obstruction is in flared end section but not throughout pipe.	slope_steeper_than_2_1_1	3	fair			Moderat Erosion along emb no	no	Inlet has severe scour underneath culvert. Inlet is placed within a basin.	fair	-71.0191	42.65794			
0-320o	11/12/2020 16:13	clear	ewm	yes		yes	paved	good	21	65	yes	other	no	Electrical box seen up street.	round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	ther	at_stream_grade	reinforced_concrete_pipe	12	12	23	0	satisfactory	none	Outlet is a flared end section.	slope_steeper_than_2_1_1	4.5	satisfactory			Embankment is comprised no	no			-71.019	42.65737			
0-177	11/12/2020 16:30	clear	wmb			culvert_was_not_located_d	no																																	-71.0166	42.65739			
0-184i	11/12/2020 16:46	rain	ewm	yes		yes	paved	fair	19	53	yes	other,gas_line,drainage_system	yes	guardrail	satisfactory	Moderate cracks and small potholes with patches within roadway. Electrical boxes seen down the street. Closed drainage system located next to culvert.	round	roadway_aligned	stream_aligned	flowing	yes_<25%	upstream	leaves	at_stream_grade	reinforced_concrete_pipe	482	48	172	1	satisfactory	minor	Culvert is comprised of 2 - 48 inch RCP pipes. Pipes are numbered 1 through 2 with 1 being closer to Perley Lane. Span of pipes is 10 feet. 2. exposed rebar on right side. 1 & 2. 30 General scaling and moss growth.	headwall_retaining_wall,alo	2.5	satisfactory	concrete_poured_	satisfactory	Embankment has general t no	no	Fallen limbs in stream bed.	satisfactory	-71.0138	42.65511	
0-184o	11/12/2020 17:01	rain	ewm	yes		yes	paved	fair	19	53	yes	gas_line,drainage_system,other	yes	guardrail	satisfactory	Moderate cracks and small potholes with patches within roadway. Electrical boxes seen down the street. Closed drainage system located next to culvert.	round	roadway_aligned	stream_aligned	flowing	yes_<25%	downstream	branches,leaves,s ediment	at_stream_grade	reinforced_concrete_pipe	482	48	272	4	satisfactory	none	Culvert is comprised of 2 - 48 inch RCP pipes. Pipes are numbered 1 through 2 with 1 being closer to Perley Lane. Span of pipes is 10. 1 & 2. Minor scaling 12 and moss growth. Minor scaling at bottom of pipe. Exposed rebar on inlet opening. Concrete appears to be 7 resurfaced.	headwall_retaining_wall,alo	3	satisfactory	concrete_poured_	poor	Embankment has general v no	no	General vegetation, vine, and tree growth within stream.	fair	-71.0136	42.65509	
0-186i	11/12/2020 17:21	clear	ewm	yes		yes	paved	fair	20	53	yes	other,gas_line	no	Minor to moderate cracking along roadway. Minor to moderate cracking along roadway.	round	roadway_aligned	stream_aligned	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	30	30	0	0	satisfactory	none						Minor erosion of embankm no	no	General tree and vegetation growth at inlet opening.	satisfactory	-71.0135	42.65391				
0-186o	11/12/2020 17:38	clear	ewm	yes		yes	paved	fair	20	53	yes	gas_line,other	yes	guardrail	satisfactory	Minor to moderate cracking along roadway. Minor to moderate cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	downstream	branches,leaves	perched	reinforced_concrete_pipe	30	30	0	0	satisfactory	minor	Headwall					Embankment shows minor no	no			-71.0133	42.65405		
0-321i	11/12/2020 17:54	clear	ewm	yes		yes	paved	fair	20	70	yes	other	yes	guardrail	satisfactory	Moderat cracking along roadway. Sides of roadway are starting to crumble. Electrical boxes seen along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	upstream,within_culvert	other,leaves,se,diment	at_stream_grade	reinforced_concrete_pipe	12	8.5	24	0	satisfactory	none	Culvert inlet is a flared end section. Obstructions are upstream and within flared end section. Obstructions within culvert are less than 25%.	slope_steeper_than_2_1_1	5	poor	dry_laid_stone_brick	falling	Embankment shows moden no	no			-71.0104	42.65307	
0-321o	11/12/2020 18:10	clear	ewm	yes		yes	paved	fair	20	70	yes	other	yes	guardrail	satisfactory	Moderate cracking along road way. Edge of roadway starting to crumble over. Electrical boxes seen in along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	within_culvert,do wnstream	sediment,leaves,b ranches	at_stream_grade	reinforced_concrete_pipe	12	12	12	0	poor	minor	Outlet is a flared end section. Flared end section length separated from second length approximately 6 inches allowing a significant amount of sediment to pile up. Flared end section right side has exposed rebar in a small sized crack.	slope_steeper_than_2_1_1	5.5	fair			General tree growth. Emban no	no			-71.0104	42.65309	
0-187i	11/12/2020 18:33	clear	ewm	yes		yes	paved	fair	20	48	yes	other	yes	guardrail	satisfactory	Moderate cracking along roadway. Electrical boxes seen up street.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	leaves,se,diment	inlet_drip	reinforced_concrete_pipe	12	12	11	0	satisfactory	none	Inlet is a flared end section.	slope_steeper_than_2_1_1	4	fair			Minor erosion along embas no	no			-71.0098	42.65356	
0-187o	11/12/2020 18:48	clear	ewm	yes		yes	paved	fair	20	48	yes	other,water_line	yes	guardrail	poor	Moderate cracking along roadway. Electrical boxes seen up street. Fire hydrant located approximately 25 feet away from culvert. Guard rail has significant cracks and breaks, is actively overturning.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_75_100%	downstream,with in_culvert	sediment,leaves	at_stream_grade	reinforced_concrete_pipe	12	5.5	14	0	poor	none	Outlet is a flared end section. Top of flare end section has a small chip in concrete. Inside of culvert looks satisfactory but is unable to pass water due to sediment buildup. Minor surface rust throughout pipe.	slope_steeper_than_2_1_1	4.5	poor			Moderate erosion along emb no	no	General tree growth at outlet opening. General tree growth and fallen limbs at and around culvert.	poor	-71.0099	42.65363	
0-188i	11/12/2020 19:28	clear	ewm	yes		yes	paved	good	23	51	no		no				round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	no		at_stream_grade	corrugated_metal_pipe	12	12	0	0	satisfactory	moderate						Minor erosion and General no	no			-71.004	42.65335			
0-188o	11/12/2020 19:41	clear	ewm	yes		yes	paved	good	23	51	yes	overhead_wires	no				round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_<25%	downstream,with in_culvert	sediment,other,le aves	at_stream_grade	corrugated_metal_pipe	12	9.5	8	0	satisfactory	minor	Minor surface rust throughout pipe.	headwall_retaining_wall,alo	4.5	poor	dry_laid_stone_brick	poor	Embankment has moderatno	no	General thorn growth. Nearby RCP pipe outlets to same location.	poor	-71.0039	42.65324	
0-322o	11/12/2020 19:52	clear	ewm	yes		yes	paved	good	23		yes	overhead_wires	no				round	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves	at_stream_grade	reinforced_concrete_pipe	18	11	30	0	satisfactory	none	Outlet is a flared end section. Minor chipping of concrete at flared end section opening.	slope_steeper_than_2_1_1	3	poor	dry_laid_stone_brick	poor	Moderate erosion and gens no	no	Could not see through other side of pipe. No nearby closed drainage system. Inlet was not locatable.	poor	-71.0039	42.65326	
0-322i	11/12/2020 20:18	clear	ewm	yes		yes	paved	good	23		yes	overhead_wires	no							completely_obstructe	stream		reinforced_concrete_pipe	18																		-71.004	42.65343	
0-92o	11/13/2020 13:13	clear	ewm	yes		yes	paved	satisfactory	22	47	no		yes	guardrail	satisfactory	Patches along roadway.	round	roadway_aligned	skewed_45'	stagnant	yes_25_50%	upstream,within_culvert	sediment,other,le aves	at_stream_grade	corrugated_metal_pipe	18	15	18	9.5	poor	none	Severe surface rust throughout pipe. Close to 2 feet of its top 5 arch is missing from the opening.	headwall_retaining_wall,alo	5.5	poor	dry_laid_stone_brick	falling	Moderate to severe erosio yes	yes	General tree growth. Erosion on right side of stream. Inspection of culvert is on unexpectable due to collapsed headwall.	falling	-70.9763	42.69003	
0-92i	11/13/2020 13:36	clear	ewm	yes		yes	paved	satisfactory	22	47	yes	overhead_wires	no				round	roadway_aligned	stream_aligned	flowing	completely_obstructe	culvert		corrugated_metal_pipe	185				falling		Culvert is completely obstructed 5 and uninspectable.	headwall_retaining_wall,slope_steeper_1_falling			dry_laid_stone_brick	falling	Embankment has severe er no	no			-70.9766	42.69016		
0-90i	11/13/2020 13:57	clear	ewm	yes		yes	paved	satisfactory	23	47	no		no				round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert,do wnstream	sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	6	12	0	poor	none	Severe surface rust throughout pipe. On left side of culvert approximately 6 inches of pipe missing.	headwall_retaining_wall,alo	3	fair	mortared_stone_brick	falling	Embankment has minor emb no	no	Outlet located on private property. 3 gallon bucket located at mid span of pipe completely buried with sediment. Culvert length is distance from inlet to 5 gallon bucket, distance from 5 gallon bucket to outlet unknown due to private property.	poor	-70.977	42.69153	
0-90o	11/13/2020 14:11	clear	ewm	yes		yes	paved	satisfactory	23	47	yes	overhead_wires	no				round	skewed_45'	no_discernable_stream_channel				unknown	corrugated_metal_pipe	12																		-70.9768	42.69162
0-91i	11/13/2020 14:56	rain	ewm	yes		yes	paved	satisfactory	23	45	no		no				round	roadway_aligned	skewed_45'	no_dry_bottom	yes_<25%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	18	13	18	0	falling	none	Severe rust throughout pipe. Bottom 3 to 6 inches of bottom of pipe missing on both sides. Large puncture and indent on the right side of culvert. Large dent 7 inwards at top face of culvert. Severe rust throughout pipe. Approximately 1 foot on right side missing. Large dent approximately 4 feet inward at 5 top of pipe.	headwall_retaining_wall,alo	4	falling	mortared_stone_brick	satisfactory	Severe erosion directly beh no	no	Fallen trees and limbs from headwall and throughout stream.	falling	-70.979	42.69065	
0-91o	11/13/2020 15:21	rain	ewm	yes		yes	paved	satisfactory	23	45	yes	overhead_wires	no				round	roadway_aligned	stream_aligned	no_dry_bottom	yes_25_50%	within_culvert	vegetation_growt h,se,diment,leaves	at_stream_grade	corrugated_metal_pipe	18	11	18	0	poor	minor	Severe rust throughout pipe. Approximately 1 foot on right side missing. Large dent approximately 4 feet inward at 5 top of pipe.	headwall_retaining_wall,alo	4	satisfactory	mortared_stone_brick	satisfactory	Embankment has minor emb no	no	General tree growth throughout stream. Utility pole directly behind wing wall.	poor	-70.9789	42.69049	
0-89o	11/13/2020 15:45	clear	ewm	yes		yes	paved	fair	23	51	yes	overhead_wires	no				elliptical	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	sediment,leaves,o ther	at_stream_grade	corrugated_metal_pipe	18	11.5	18	0	falling	moderate	headwall,c ulvert						Embankment has general v no	no			-70.9796	42.69199	
0-89i	11/13/2020 16:00	clear	ewm	yes		yes	paved	fair	23	51	no		no				elliptical	skewed_45'	no_discernable_stream_channel	no_dry_bottom	yes_75_100%	within_culvert	leaves,se,diment,other	at_stream_grade	corrugated_metal_pipe	18	10	18	0	falling	moderate						Embankment has moderatno	no	Headwall is attached to an inlet control structure made of mortared stone. Inlet control structure is failing and has multiple voids throughout.	falling	-70.9797	42.69207		
0-83i	11/13/2020 16:22	rain	ewm	yes		yes	paved	fair	23	52	yes	overhead_wires	no				round	skewed_45'	stream_aligned	no_dry_bottom	yes_<25%	within_culvert	sediment,branch es	inlet_drip	corrugated_metal_pipe	18	20	22	0	falling	severe	Bottom and sides of pipe missing for approximately 3 feet. Severe rust throughout pipe. Sporadic 6 patches of missing metal. Severe rust throughout. Sporadic patches of missing metal. Large tree and rust obstructing outlet 5 opening. Pipe has asphalt/tar mix along top and bottom of pipe. Moderate surface rust throughout pipe. Along bottom left side minor deterioration of 4 metal.	headwall_retaining_wall,alo	3.5	satisfactory	mortared_stone_brick	fair	Minor erosion on embank no	no	General tree growth. Drop inlet created by a piece of plywood.	falling	-70.9801	42.69269	
0-83o	11/13/2020 16:35	rain	ewm	yes		yes	paved	fair	23	52	no		no				round	skewed_45'	stream_aligned	no_dry_bottom	yes_25_50%	within_culvert,do wnstream	vegetation_growt h,se,diment,leaves, other	at_stream_grade	corrugated_metal_pipe	18	12	17	0	poor	minor	Severe rust throughout pipe. Approximately 1 foot on right side missing. Large dent approximately 4 feet inward at 5 top of pipe. Moderate surface rust throughout pipe. Along bottom left side minor deterioration of 4 metal. Moderate rust throughout pipe. Pipe has asphalt/tar mix at top of 5 pipe.	headwall_retaining_wall,alo	3.5	poor	dry_laid_stone_brick	poor	Embankment has moderatno	no	48 inch diameter tree directly after culvert, with headwall and wing wall surrounding it.	poor	-70.98	42.69257	
0-362i	11/13/2020 16:59	rain	ewm	yes		yes	paved	satisfactory	22	50	no		no				round	skewed_45'	stream_aligned	no_dry_bottom	yes_<25%	within_culvert	leaves,se,diment	at_stream_grade	corrugated_metal_pipe	15	14.5	11	0	fair	minor						Embankment has minor to no	no	General tree growth.	fair	-70.9842	42.69164		
0-362o	11/13/2020 17:11	rain	ewm	yes		yes	paved	satisfactory	22	50	yes	overhead_wires	evidence_IGuard rail	falling			round	skewed_45'	stream_aligned	no_dry_bottom	yes_50_75%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	15	6.5	15	0	fair	none						Embankment has moderatno	no	General thorn growth. Culvert does not exist.	poor	-70.9842	42.6918		
0-88	11/13/2020 17:25	rain	ewm			culvert_was_not_located																																						

0-323o	11/13/2020 18:08	rain	ewm	yes		yes	paved	satisfactory	23	58	yes	gas_line,overhead_wires	no		Patches along roadway.	round	skewed_445'	no_discernable_stream_channel	no_moist_bottom	yes_50_75%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	4	12	0	fair	minor	culvert,headwall	Severe rust throughout pipe. 1 inch of metal on bottom right side is missing.	headwall_retaining_wall,alo	3.5	fair	mortared_stone_brick	fair	Embankment shows moderate	no	no	Fallen trees throughout outfall area.	fair	-70.9836	42.69683	
0-324i	11/13/2020 18:35	rain	ewm	yes		yes	paved	satisfactory	23	50	yes	gas_line	no		Patches along roadway.q	round	skewed_445'	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	15	9	18	0	poor	minor	headwall	Severe rust throughout pipe. On bottom right side approximately 2 feet of metal is missing.	headwall_retaining_wall,alo	2.5	poor	mortared_stone_brick	falling	Moderate to severe erosion	no	no	General vegetation growth. Fallen limbs throughout inlet area.	poor	-70.9817	42.69604	
0-324o	11/13/2020 18:55	rain	ewm	yes		yes	paved	satisfactory	23	50	yes	gas_line,overhead_wires	no		Patches along roadway.	round	skewed_445'	no_discernable_stream_channel	no_dry_bottom	yes_75_100%	downstream,with sediment,leaves,other	at_stream_grade	corrugated_metal_pipe	15	8	18	0	falling	minor	headwall	Severe rust throughout pipe. Headwall has collapsed in front of pipe hindering full inspection of pipe. Metal missing on both sides of outlet.	headwall_retaining_wall,alo	2	fair	mortared_stone_brick	falling	Embankment has general	no	no	General vegetation and tree growth. Fallen tree limbs.	falling	-70.9817	42.69611		
0-325o	11/13/2020 19:17	rain	ewm	yes		yes	paved	satisfactory	21	58	yes	gas_line	no		Patches along road way.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves,other	at_stream_grade	corrugated_metal_pipe	12	9	12	0	falling	moderate	headwall	Severe rust throughout. On both right and left sides approximately 3 feet of metal is missing. Sporadic patches of missing metal throughout.	headwall_retaining_wall,alo	5	poor	mortared_stone_brick	fair	Moderate to severe erosion	no	no	Trees growing into headwall.	poor	-70.9789	42.69363	
0-325i 0-195	11/13/2020 19:32	rain	ewm	yes	culvert_was_not_located_d	no	paved	satisfactory	21	58	yes	overhead_wires,gas_line	no		Patches along roadway.	round	roadway_aligned	stream_aligned	no_dry_bottom	yes_50_75%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	8.5	15	0	falling	minor	headwall	Minor to moderate surface rust on sides of pipe. On left side of pipe, bolts are separating along 3 side.	headwall_retaining_wall,alo	5.5	poor	mortared_stone_brick	poor	Embankment has moderate	no	no	Right side of headwall is actively overturning. General moss growth on headwall. Moderate to severe erosion on right side of streambed. Culvert does not exist.	falling	-70.9791	42.69354	
0-190i	11/16/2020 13:25	partly_cloudy	ewm	yes		yes	paved	satisfactory	17	31	no		no		Minor to moderate cracks along roadway.	round	skewed_445'	stream_aligned	flowing	yes_<25%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	18	18	14	4	fair	moderate	headwall	Minor to moderate surface rust on sides of pipe. On left side of pipe, bolts are separating along 3 side.	headwall_retaining_wall,alo	3	fair	dry_laid_stone_brick	fair	Embankment shows moderate	no	no		fair	-70.9984	42.65266	
0-190o	11/16/2020 13:39	partly_cloudy	ewm	yes		yes	paved	satisfactory	17	31	no		no		Minor to moderate cracking along roadway.	round	skewed_445'	skewed_445'	flowing	no			perched	corrugated_metal_pipe	18	18	11	2	satisfactory	minor	headwall	Minor surface rust at bottom and sides of pipe. General moss 6 growth at outlet opening.	headwall_retaining_wall,alo	3	fair	dry_laid_stone_brick	fair	Moderate erosion along emb	no	no	15 inch tree directly in the middle of stream. Stream drops down multiple levels after outlet. Minor foam build up approximately 8 feet away from outlet. Invisible dog fence located approximately 10 feet away from inlet.	fair	-70.9983	42.65272	
0-326i	11/16/2020 14:14	partly_cloudy	ewm	yes		yes	paved	satisfactory	23	41	yes	other	no		Minor cracking along edges of roadway. Electrical boxes seen up streets. Minor cracking along edges of roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	18	10.5	18	0	satisfactory	none		Asphalt/far mix throughout pipe. Asphalt/far mix throughout. Approximately 5 feet into pipe, there is a small dent on the top left side.	headwall_retaining_wall,alo	2.5	satisfactory	mortared_stone_brick	satisfactory	Embankment has minor	no	no		satisfactory	-71.001	42.65573	
0-326o	11/16/2020 14:27	partly_cloudy	ewm	yes		yes	paved	satisfactory	23	41	yes	other	yes	other	poor	Minor cracking along edges of roadway. Electrical boxes seen up streets. Wooden posts used as traffic safety. Certain pipes or rotting and/or actively overturning.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	18	10	18	0	satisfactory	none		Pipe material unknown, possibly clay. At outlet opening, sporadic chips of material missing. Second and third lengths of pipe are shifted down and to the left 6 approximately 1 inch.	headwall_retaining_wall,alo	3	fair	mortared_stone_brick	poor	Minor erosion throughout	no	no	Culvert outlets into Howes pond.	fair	-71.001	42.65559
0-327o	11/16/2020 14:51	clear	ewm	yes		yes	paved	satisfactory	23	58	yes	overhead_wires	no		Minor cracking along roadway/pipeline length.	round	roadway_aligned	stream_aligned	no_dry_bottom	yes_<25%	within_culvert,downstream	leaves,sediment,leaves	at_stream_grade	other	18	16	13	0	fair	minor	headwall		headwall_retaining_wall,alo	3	fair	dry_laid_stone_brick	poor	Embankment shows moderate	no	no	General vegetation and thorn growth. Culvert ties in to catch basin along roadway.	poor	-71.005	42.6604	
0-327i	11/16/2020 15:11	clear	ewm	yes		yes	paved	satisfactory	23	58	no		no		Minor cracking along roadway/pipeline length.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	other,leaves	at_stream_grade	dry_laid_stone	22	24	22	0	fair	none		Inlet is comprised of a dried lead stone culvert, connecting to a catch basin which outlets out of a clay pipe. Some stones are falling in within culvert. 1 foot hole at top of culvert approximately 15 feet away from CB.	headwall_retaining_wall,alo	1	fair	dry_laid_stone_brick	satisfactory	Embankment shows minor	no	no	Culvert is made up of dried laid stone a catch basin and a clay pipe. Hole on top of culvert is allowing sediment and leaves to come through, and pile up within. General vegetation and tree growth.	fair	-71.005	42.66048	
0-172i	11/16/2020 15:49	clear	ewm	yes		yes	paved	satisfactory	24	47	no		no		Minor cracking along roadway.	round	roadway_aligned	stream_aligned	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	30	30	0	0	satisfactory	none		Minor surface rust throughout. Half inch diameter tube going through culvert and exiting to 7 unknown location.	headwall_retaining_wall,alo	3.5	satisfactory	mortared_stone_brick	satisfactory	Sporadic separation of mor	no	yes	1 foot diameter tree located approximately 3 feet away from inlet. Wetland flags marked along stream.	satisfactory	-71.0096	42.66194	
0-172o	11/16/2020 16:12	clear	ewm	yes	culvert_was_not_located_d	yes	paved	satisfactory	24	47	yes	overhead_wires	no		Minor cracking along roadway.	round	roadway_aligned	stream_aligned	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	30	30	0	0	fair	moderate	culvert	Minor surface rust throughout. Approximately 4 feet into the pipe there is a moderate dent on the top right side. Second length of pipe has separated from first length. Half inch diameter plastic 9 tube going through culvert.	headwall_retaining_wall,alo	3.5	satisfactory	dry_laid_stone_brick	satisfactory	Embankment has minor	no	yes	Half inch diameter plastic tube going through culvert. End of tube is unknown. Moderate to severe erosion of streambed. Culvert does not exist.	satisfactory	-71.0097	42.6628	
0-192i	11/16/2020 17:26	clear	ewm	yes		yes	paved	satisfactory	24	50	yes	overhead_wires	no		Minor cracking along edges of roadway.	round	skewed_445'	no_discernable_stream_channel	no_dry_bottom	yes_<25%	upstream	leaves,sediment,other	at_stream_grade	corrugated_metal_pipe	12	9.5	12	0	satisfactory	minor	headwall	Minor surface rust throughout pipe. Approximately 6 feet into the pipe there is a large sediment buildup. Minor surface rust 6 throughout pipe.	headwall_retaining_wall,alo	2.5	fair	dry_laid_stone_brick	fair	Minor erosion of embankmen	no	no	General vegetation growth.	fair	-71.0037	42.65196	
0-192o	11/16/2020 17:40	clear	ewm	yes		yes	paved	satisfactory	24	50	no		no		Minor cracking along edges of roadway.	round	skewed_445'	skewed_445'	no_dry_bottom	yes_25_50%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	7	12	0	fair	none		Outlet was covered in forest debris upon arrival.	headwall_retaining_wall,alo	3	fair			Minor to moderate erosion	no	no		fair	-71.0037	42.65196	
0-197i	11/16/2020 18:05	clear	ewm	yes		yes	paved	satisfactory	22	40	yes	overhead_wires	no		Minor scaling at top of roadway.	round	skewed_445'	stream_aligned	no_dry_bottom	yes_25_50%	within_culvert	leaves,sediment	at_stream_grade	corrugated_metal_pipe	12	6	11	0	satisfactory	minor	culvert	Scour underneath culvert is 2" x 2".	headwall_retaining_wall,alo	2.5	fair	dry_laid_stone_brick	poor	Embankment has minor	no	no	General vegetation growth.	fair	-71.0018	42.64973	
0-197o	11/16/2020 18:25	clear	ewm	yes		yes	paved	satisfactory	22	40	no		no		Minor cracks along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	downstream,with sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	11	10	0	satisfactory	minor	culvert	Sides of pipe have rusted away, dropping bottom on to stream. Severe rust throughout pipe. Sporadic patches of missing 7 metal.	headwall_retaining_wall,alo	2.5	satisfactory		slope_steeper_than_2_1_1	Minor erosion along embankment	no	no	General vegetation growth.	satisfactory	-71.0016	42.64978		
0-203o	11/16/2020 18:45	clear	ewm	yes		yes	paved	good	24	80	no		yes	guardrail	fair	Guard rail shows minor cracking and rot.	round	roadway_aligned	skewed_445'	stagnant	yes_<25%	within_culvert	branches	at_stream_grade	corrugated_metal_pipe	24	28	35	6.5	falling	severe	culvert,headwall	Severe rust throughout pipe. 7 metal.	headwall_retaining_wall,alo	10	fair	mortared_stone_brick	poor	Embankment shows moderate	no	no	General tree and vegetation growth throughout stream.	falling	-70.9958	42.64626
0-203i	11/16/2020 19:06	clear	ewm	yes		yes	paved	good	24	80	yes	overhead_wires	yes	guardrail	fair	Guard rail shows minor cracking and rot.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves,branches	at_stream_grade	corrugated_metal_pipe	24	11	24	0	fair	none		Pipe has black asphalt/far mix at bottom of pipe. Sporadic patches of rust throughout. Minor surface rust throughout.	headwall_retaining_wall,alo	9	poor	mortared_stone_brick	poor	Embankment has moderate	yes	yes	Visible oil on top of water near inlet. Evidence of beaver structure located approximately 50 feet away from inlet.	poor	-70.9958	42.64601
0-208i	11/16/2020 19:30	clear	ewm	yes		yes	paved	good	25	60	no		no		Minor oil stains on roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			inlet_drop	corrugated_metal_pipe	12	12	0	0	fair	moderate	headwall	Minor surface rust at bottom of pipe. Approximately midway into the pipe, the top of the pipe has been slightly crushed downward.	headwall_retaining_wall,alo	3	satisfactory	mortared_stone_brick	satisfactory	Embankment has minor	no	no	General tree growth surrounding inlet area.	fair	-70.9925	42.64332	
0-208o	11/16/2020 19:44	clear	ewm	yes		yes	paved	good	25	60	yes	overhead_wires	no		Minor oil stains on roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	8	12	0	falling	moderate	culvert	Severe rust throughout. Approximately 3 feet of metal missing from right side of opening. Top opening of pipe is crushed inward. Sporadic patches of metal missing throughout.	headwall_retaining_wall,alo	4.5	fair		slope_steeper_than_2_1_1	Embankment shows minor	no	no	General tree and vegetation growth.	falling	-70.9924	42.6434	
0-207i	11/16/2020 20:11	clear	ewm	yes		yes	paved	poor	21	45	yes	water_line	no		Moderate cracking along roadway. Large cracks and dips along edge of roadway. Hydrant located approximately 30 feet up street.	round	roadway_aligned	stream_aligned	stagnant	yes_<25%	within_culvert	sediment,leaves,other,branches	at_stream_grade	corrugated_metal_pipe	32	32	33	10	falling	none		Moderate to severe rust on bottom and sides of pipe. Bottom of culvert has rusted away. Flow does not appear to be obstructed 6 by missing bottom.	headwall_retaining_wall,alo	2	falling	mortared_stone_brick	fair	Embankment shows severe	no	no	Wetland flag located nearby. General tree and vegetation growth.	falling	-70.9817	42.64378	
0-207o	11/16/2020 20:39	clear	ewm	yes		yes	paved	poor	21	45	yes	overhead_wires	no		Moderate cracking along roadway. Large cracks and dips along edge of roadway.	round	roadway_aligned	stream_aligned	stagnant	yes_<25%	within_culvert	sediment,leaves,branches	at_stream_grade	corrugated_metal_pipe	32	30	35	11	fair	moderate	headwall	Severe rust throughout pipe. 7 Asphalt/far mix on top of pipe.	headwall_retaining_wall,alo	2.5	poor	mortared_stone_brick	fair	Embankment shows minor	no	no	Wetland flags located throughout stream. General tree growth. Wire mesh fence located approximately 5 feet away from the outlet.	poor	-70.9817	42.64368	
0-199o	11/17/2020 13:14	clear	ewm	yes		yes	paved	satisfactory	20	61	yes	other,drainage_system	no		Minor cracking along edges of roadway. Electrical boxes seen up and down the street.	box	roadway_aligned	skewed_445'	no_dry_bottom	yes_<25%	downstream	leaves,sediment	at_stream_grade	reinforced_concrete_pipe	48	36	0	0	satisfactory	none		Minor cracking throughout pipe.	headwall_retaining_wall,alo	3	satisfactory	concrete_poured	fair	General tree growth. Moderate	no	no	General tree growth in and around stream bed.	satisfactory	-70.9837	42.64822	
0-199i	11/17/2020 13:28	partly_cloudy	ewm	yes		yes	paved	satisfactory	20	61	yes	drainage_system,other	no		Minor cracking along edges of roadway. Electrical boxes seen up and down the street.	box	roadway_aligned	stream_aligned	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	48	36	0	0	satisfactory	none		Minor scaling at bottom of pipe.	headwall_retaining_wall,alo	2	satisfactory	concrete_poured	satisfactory	Moderate vegetation and	no	no	General tree growth in and around stream bed.	satisfactory	-70.9838	42.64828	
0-328i	11/17/2020 13:51	clear	ewm	yes		yes	paved	satisfactory	20	53	yes	other,drainage_system	no		Minor cracking along edges of roadway. Electrical boxes seen up and down the street.	round	roadway_aligned	skewed_445'	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	48	36	0	0	satisfactory	none		Minor surface cracking.	headwall_retaining_wall,alo	1	satisfactory	concrete_poured	satisfactory	General tree growth on embankment	no	no	General tree and vegetation growth at inlet and streambed.	satisfactory	-70.9855	42.64802	
0-328o 0-212	11/17/2020 14:13	clear	ewm	yes	culvert_was_not_located_d	yes	paved	satisfactory	20	53	yes	other	no		Minor cracking along edges of roadway. Electrical boxes seen up and down the street.	round	roadway_aligned	stream_aligned	no_dry_bottom	no			perched	reinforced_concrete_pipe	48	36	0	0	good	none		Minor surface cracking.	headwall_retaining_wall,alo	2	satisfactory	concrete_poured	fair	Embankment has general	no	no	General tree growth at outlet and stream bed. Culvert does not exist.	satisfactory	-70.9852	42.64803	
0-214i 0-214o 0-213o	11/17/2020 14:55	clear	ewm	yes		yes	paved	good	25	52	yes	overhead_wires	no			round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	corrugated_metal_pipe	12	12	0	0	fair	none		Minor surface rust at bottom of pipe. Approximately midway into the pipe, the top of the pipe has been slightly crushed downward.	headwall_retaining_wall,alo	1.5	satisfactory	mortared_stone_brick	fair	Headwall has sporadic seeps	no	no	General vegetation growth and stumps.	fair	-70.9897	42.63959	
0-213i	11/17/2020 15:07	clear	ewm	yes		yes	paved	good	25	52	no		no			round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment	at_stream_grade	corrugated_metal_pipe	12	9	12	0	satisfactory	none		Moderate to severe rust on bottom and sides of pipe. Bottom of culvert has rusted away. Flow does not appear to be obstructed 6 by missing bottom.	headwall_retaining_wall,alo	3.5	poor	mortared_stone_brick	fair	Embankment is reinforced	no	no	General tree growth in and around streambed. Fallen tree limbs in streambed.	poor	-70.9896	42.6397	
0-213o	11/17/2020 15:23	clear	ewm	yes		yes	paved	good	25	145	no		no			round	skewed_445'	no_discernable_stream_channel	no_dry_bottom	no			perched	hdp	12	12	0	0	satisfactory	minor	culvert	Slope is steeper than 2:1.	headwall_retaining_wall,alo	3	satisfactory		slope_steeper_than_2_1_1	Embankment shows moderate	no	no	4 - 12 inch RCP driveway culverts outfall into pipe inlet.	fair	-70.9902	42.63984	
0-216i	11/17/2020 16:10	clear	ewm	yes		yes	paved	satisfactory	26	57	yes	overhead_wires	no		Minor cracking on edge of roadway.	round	skewed_445'	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	7.5	10	0	fair	none		Inlet opening of pipe is partially crushed and mangled. Minor surface rust throughout pipe. Headwall has collapsed in front of culvert.	headwall_retaining_wall,alo	2.5	satisfactory	dry_laid_stone_brick	fair	Headwall has 2 inch layer of	no	no	Culvert was unexpectable due to collapse headwall.	fair	-70.9918	42.63807	
0-216o	11/17/2020 16:24	clear	ewm	yes		yes	paved	satisfactory	26	57	no		no		Minor cracking on edge of roadway.	round	sk																												

0-225o	11/17/2020 18:56 partly_cloudy	ewm	yes	yes	paved	poor	25		yes	other	no	Electrical box seen near culvert. Moderate to severe cracking along roadway. Large depression with pooling water along edge of roadway.	round	skewed_45°	no_discernable_stream_channel	no_moist_bottom	no		at_stream_grade	corrugated_metal_pipe	12	11	6	0.25	satisfactory	severe	headwall,c	Minor surface rust at bottom of pipe. Minor dents at top of culvert.	headwall_retaining_wall,alo	3.5	satisfactory	mortared_stone_brick	satisfactory	Moderate vegetation grow no	no	General tree and thorn growth. Inlet of culvert is unknown. Inlet is either buried and/or part of closed drainage system. Inlet of culvert is unknown. Inlet is either buried and/or part of closed drainage system. Pinned location is approximate.	satisfactory	-70.9899	42.63364				
0-225i	11/17/2020 19:16 partly_cloudy	ewm	culvert_was_not_located_d	no	paved	poor	25		yes	overhead_wires	no	Moderate to severe cracking along roadway. Large depression along edge of roadway with pooling water.	round	skewed_45°	no_discernable_stream_channel	completely_obstructed	upstream	sediment,leaves	unknown	corrugated_metal_pipe	12							Minor surface rust throughout 4 pipe.	Greater than 2 to 1.	7	fair	dry_laid_stone_brick	fair	Embankment shows minor	no	Wetland flags located along stream. Pipe length is approximate and was paced out.	fair	-70.9899	42.63362				
0-331o	11/17/2020 19:20 partly_cloudy	ewm	yes	yes	paved	poor	25	400	yes	overhead_wires	yes	Guard rail satisfaction	round	skewed_45°	stream_aligned		no		at_stream_grade	corrugated_metal_pipe	12	12	10	2.5	satisfactory	minor	Culvert	Minor surface rust throughout 4 pipe.	Greater than 2 to 1.	7	fair	dry_laid_stone_brick	fair	Embankment shows minor	no	Pipe length was approximate and was paced out.	fair	-70.9896	42.63446				
0-331i	11/17/2020 19:29 partly_cloudy	ewm	yes	yes	paved	poor	25	400	yes	overhead_wires	no	Moderate to severe cracking along roadway. Large depression at edge of roadway with pooling water.	round	skewed_45°	no_discernable_stream_channel	stagnant	yes_25_50%	within_culvert	sediment,other	at_stream_grade	corrugated_metal_pipe	12	8	12	3	satisfactory	minor	headwall	Minor surface rust at bottom of pipe. Small tear at top of pipe 7 approximately 1 foot in.	headwall_retaining_wall,alo	3	poor	dry_laid_stone_brick	fair	Embankment has two area no	no	Pipe length was approximate and was paced out. Headwall has large voids between stones with sediment seeping through. 18 inch tree directly in front of headwall.	fair	-70.9901	42.63335			
0-223i	11/17/2020 19:52 partly_cloudy	ewm	yes	yes	paved	fair	21	85	no		no	Minor to moderate cracking along roadway.	round	skewed_45°	stream_aligned	flowing	yes_<25%	within_culvert,up	sediment,leaves,o	ther	at_stream_grade	corrugated_metal_pipe	36	34	27	1	satisfactory	none		Small slip and pipe approximately 20 feet inwards. Minor surface 4 rust at bottom of pipe.	slope_steeper_than_2_1_	8	fair	dry_laid_stone_brick	fair	Embankment has moderatio	no		fair	-70.9888	42.63457		
0-223o	11/17/2020 20:05 partly_cloudy	ewm	yes	yes	paved	fair	21	85	yes	overhead_wires	yes	guardrail	satisfactory	Minor to moderate cracking along roadway.	round	skewed_45°	stream_aligned	flowing	no		perched	corrugated_metal_pipe	36	36	8	1	satisfactory	none		Minor scaling at bottom inside the pipe. Minor moss growth at 11 opening.	headwall_retaining_wall,alo	3.5	satisfactory	dry_laid_stone_brick	satisfactory	Embankment has minor en	no	18 inch RCP close drainage system outlet located directly next to culvert opening. Oil stains seen around culvert opening.	satisfactory	-70.9819	42.63489		
0-221o	11/18/2020 13:19 clear	ewm	yes	yes	paved	satisfactory	18	50	yes	other,drainage_system	no	Minor cracking along roadway. Electrical boxes seen up street.	round	roadway_aligned	stream_aligned	stagnant	yes_<25%	within_culvert	sediment,leaves	at_stream_grade	reinforced_concrete_pipe	36	36	26	6	satisfactory	severe	headwall	Minor scaling at bottom of pipe. Minor moss growth at opening.	headwall_retaining_wall,alo	2.5	satisfactory	mortared_stone_brick	satisfactory	Embankment has minor en	yes	Large beaver cage in front of inlet.	satisfactory	-70.9821	42.63476			
0-221i	11/18/2020 13:38 clear	ewm	yes	yes	paved	satisfactory	18	50	yes	drainage_system,other	no	Minor cracking along roadway. Electrical boxes seen up street.	round	roadway_aligned	stream_aligned	flowing	yes_<25%	upstream	leaves,other	at_stream_grade	reinforced_concrete_pipe	36	36	11	1	satisfactory	minor	headwall	Moderate surface rust throughout pipe. Approximately 6 inches into pipe on the right 4 side there is a small sized tear. Moderate surface rust throughout. Outlet is more 7 crushed than inlet.	slope_flatter_than_2_1_hea	2	poor	dry_laid_stone_brick	fair	Embankment shows moderatio	yes	Fallen tree and limbs in stream bed. Oil stains in water.	fair	-70.9831	42.634			
0-224i	11/18/2020 13:57 clear	ewm	yes	yes	paved	satisfactory	20	29	yes	other	no	Minor cracking along roadway. Electrical boxes seen up street.	elliptical	roadway_aligned	stream_aligned	stagnant	yes_<25%	within_culvert,up	stream	sediment,leaves	at_stream_grade	corrugated_metal_pipe	32	24	21	1	fair	moderate	headwall,c	Minor scaling at bottom of pipe. Minor moss growth at opening.	headwall_retaining_wall,alo	2.5	fair	mortared_stone_brick	satisfactory	Moderate to severe erosio	no	Fallen trees and limbs in stream bed. Oil stains in water.	fair	-70.9831	42.634		
0-224o	11/18/2020 14:12 clear	ajp	yes	yes	paved	satisfactory	20	29	yes	other	no	Minor cracks along roadway. Electrical boxes seen up street.	elliptical	roadway_aligned	stream_aligned	stagnant	yes_25_50%	within_culvert	other	perched	corrugated_metal_pipe	36	19	18	1.5	fair	moderate	headwall,c	Minor scaling at bottom of pipe. Minor scaling at bottom and sides of pipe. On left side of outlet opening there is a moderate slip with rear showing through.	slope_flatter_than_2_1_hea	2	poor	dry_laid_stone_brick	fair	Embankment shows moderatio	yes	General thorn bush growth. Oil stains in water.	fair	-70.983	42.634			
0-227i	11/18/2020 14:33 clear	ewm	yes	yes	paved	satisfactory	21	73	yes	other,drainage_system	no	Minor cracking along roadway. Electrical boxes seen up street.	round	skewed_45°	stream_aligned	flowing	yes_<25%	upstream	sediment,leaves,b	ranches	at_stream_grade	reinforced_concrete_pipe	18	18	9	1	satisfactory	none		Minor scaling at bottom of pipe. 3 General moss growth. Minor scaling at bottom and sides of pipe. On left side of outlet opening there is a moderate slip with rear showing through.	headwall_retaining_wall,alo	1.5	satisfactory	dry_laid_stone_brick	satisfactory	Minor erosion on embank	no	General tree growth throughout stream. Culvert slightly goes under abutting driveway.	satisfactory	-70.9847	42.63177		
0-227o	11/18/2020 14:45 clear	ewm	yes	yes	paved	satisfactory	21	73	yes	other,drainage_system	no	Minor cracks along roadway. Electrical boxes seen up street.	round	skewed_45°	stream_aligned	flowing	yes_<25%	downstream,with	in_culvert	sediment,leaves	at_stream_grade	reinforced_concrete_pipe	18	15	16	2	satisfactory	minor	headwall	Minor to moderate surface rust throughout. Approximately 5 feet 3 in, large indent on top of pipe.	headwall_retaining_wall,alo	2.5	poor	mortared_stone_brick	satisfactory	Moderate to severe erosio	no	18 inch RCP outlet located directly next to culvert outlet. General tree and limbs falling into stream bed.	fair	-70.9844	42.63178		
0-228i	11/18/2020 15:02 clear	ewm	yes	yes	paved	satisfactory	21	40	yes	other	no	Minor cracks along roadway. Electrical boxes seen up street.	elliptical	roadway_aligned	skewed_45°	stagnant	yes_<25%	within_culvert,up	sediment,leaves,o	ther	at_stream_grade	corrugated_metal_pipe	26	19	20	1	poor	minor	headwall	Moderate surface rust at bottom and sides of pipe. Approximately 25 feet into pipe large indent on 7 top of pipe.	headwall_retaining_wall,alo	2	poor	dry_laid_stone_brick	poor	Embankment shows moderatio	no	General tree and vegetation growth.	poor	-70.9861	42.63187		
0-228o	11/18/2020 15:15 clear	ewm	yes	yes	paved	satisfactory	21	40	yes	other	no	Minor cracks along roadway. Electrical boxes seen next to culvert.	elliptical	roadway_aligned	skewed_45°	stagnant	yes_<25%	within_culvert,do	sediment,leaves,o	wnstream	ther,branches	at_stream_grade	corrugated_metal_pipe	26	21	20	1	fair	minor	headwall	Minor to moderate scaling on bottom and sides of pipe. Minor 4 surface cracking throughout.	headwall_retaining_wall,alo	1.5	poor	mortared_stone_brick	poor	Embankment shows moderatio	no	General trees and limbs fall into stream bed. Electrical boxes and two steel rods directly adjacent to head wall.	poor	-70.9862	42.63178	
0-229i	11/18/2020 15:55 clear	ewm	yes	yes	paved	satisfactory	21	33	yes	other,gas_line	no	Minor cracks along roadway. Electrical box seen up street.	round	skewed_45°	skewed_45°	no_dry_bottom	yes_<25%	within_culvert	leaves, sediment,b	ranches	at_stream_grade	reinforced_concrete_pipe	18	13	17	0	satisfactory	minor	headwall	Minor scaling at bottom and sides of pipe. Second length of pipe is slightly shifted backwards with a small amount of sediment 4 seeping through.	headwall_retaining_wall,alo	1.5	poor	mortared_stone_brick	poor	Embankment shows moderatio	no	General vegetation and fallen tree limbs in stream bed.	fair	-70.9838	42.63157		
0-229o	11/18/2020 16:13 clear	ewm	yes	yes	paved	satisfactory	21	33	yes	other	no	Minor cracking along roadway. Electrical boxes seen up the street.	round	skewed_45°	skewed_45°	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves,o	ther	at_stream_grade	reinforced_concrete_pipe	18	12	17	0	satisfactory	minor	headwall	Minor scaling at bottom and sides of pipe. Second length of pipe is slightly shifted backwards with a small amount of sediment 4 seeping through.	headwall_retaining_wall,alo	1.5	fair	mortared_stone_brick	poor	Embankment shows moderatio	no	General vegetation growth throughout stream. Two nearby private drainage outlets letting out to the same stream.	fair	-70.9837	42.63171		
0-219	11/18/2020 16:42 clear	wmb	culvert_was_not_located_d	no																						Culvert was not found. 18 inch corrugated metal pipe found nearby in the woods, possibly dug up.										-70.9834	42.63514						
0-215o	11/18/2020 16:43 clear	ewm	yes	yes	paved	satisfactory	22	60	yes	overhead_wires	no		round			no_dry_bottom	yes_50_75%	within_culvert	sediment	at_stream_grade	ductile_iron_pipe	8	4	8	0	satisfactory	none		Culvert was covered in obstructed upon arrival.	slope_flatter_than_2_1_	1.5	fair			Moderate erosion. General no	no	Four inch PVC private drainage outlet located approximately 10 feet away from inlet. Private drainage outlet leads into inlet.	fair	-70.9791	42.63903			
0-215i	11/18/2020 17:06 clear	ewm	yes	yes	paved	satisfactory	22	60	yes	overhead_wires	no	Minor cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	leaves, sediment	at_stream_grade	ductile_iron_pipe	8	8	6	0	satisfactory	none		Minor scaling at bottom of pipe. General moss growth at first 3 6 feet of culvert.	slope_flatter_than_2_1_	1.5	satisfactory			Minor erosion around emb	no		satisfactory	-70.9793	42.63904			
0-218i	11/18/2020 17:24 clear	ewm	yes	yes	paved	good	24	50	yes	overhead_wires	yes	guardrail,b	satisfactory	Wooden guard rail placed in front of previously existing concrete bollards.	round	roadway_aligned	stream_aligned	flowing	no		at_stream_grade	reinforced_concrete_pipe	36	36	11	1	satisfactory	none		Minor scaling at bottom of pipe. Due to downstream obstruction water is slightly pooling within 8 culvert.	headwall_retaining_wall,alo	3	poor	dry_laid_stone_brick	fair	Moderate Erosion through	no	Folded over chain-link fence impeding down stream flow. Branches, sediment, and leaves caught within France. Culvert does not exist, closed drainage system.	fair	-70.9801	42.63575		
0-218o	11/18/2020 17:35 clear	ewm	yes	yes	paved	good	24	50	yes	overhead_wires	yes	guardrail	satisfactory	Wooden guard rail placed in front of previously existing concrete bollards.	round	roadway_aligned	stream_aligned	flowing	yes_25_50%	downstream	sediment,leaves,b	ranches,other	at_stream_grade	reinforced_concrete_pipe	36	36	21	3	satisfactory	minor	headwall,c	Minor scaling at bottom of pipe. Due to downstream obstruction water is slightly pooling within 8 culvert.	headwall_retaining_wall,alo	4.5	fair	dry_laid_stone_brick	fair	Embankment shows minor	no		fair	-70.9799	42.63589
0-232	11/18/2020 18:12 clear	ewm	culvert_was_not_located_d	no																																			-70.9845	42.6291			
0-332i	11/18/2020 18:24 clear	ewm	yes	yes	paved	satisfactory	21	47	no		yes	guardrail	satisfactory	Guard rail ends directly before culvert.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	7.5	12	0	poor	none		Severe rust at bottom and sides of pipe.	headwall_retaining_wall,alo	5	poor	mortared_stone_brick	good	Embankment has moderatio	no	Wetlands/survey flags located next to culvert. General tree growth.	poor	-70.9891	42.62966	
0-332o	11/18/2020 18:41 clear	ewm	yes	yes	paved	satisfactory	21	47	yes	overhead_wires	no	Minor cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_75_100%	within_culvert	sediment,leaves	buried_clogged_col	corrugated_metal_pipe	12	3	8	0	falling	none		Unable to inspect inside of pipe due to sediment buildup.	headwall_retaining_wall,alo	5.5	poor	mortared_stone_brick	satisfactory	Embankment has moderatio	no	Utility pole and guy wire directly above and below headwall. Fallen limbs throughout outlet area. General vegetation and tree growth.	falling	-70.9892	42.62958			
0-235o	11/18/2020 19:03 clear	ewm	yes	yes	paved	satisfactory	21	42			yes	guardrail	satisfactory	Minor cracks and potholes in roadway.	round	skewed_45°	stream_aligned	stagnant	yes_<25%	leaves, sediment	at_stream_grade	corrugated_metal_pipe	24	18	23	2	satisfactory	none		Minor surface rust on bottom 9 and sides of pipe.	headwall_retaining_wall,alo	4.5	poor	dry_laid_stone_brick	poor	Moderate to severe erosio	no	Private corrugated metal culvert located approximately 20 feet away from inlet. Wetland flags located around stream. Large amount of fallen trees and limbs.	fair	-70.9797	42.62799		
0-235i	11/18/2020 19:16 clear	ewm	yes	yes	paved	satisfactory	21	42	yes	overhead_wires	yes	guardrail	satisfactory	Minor cracks and potholes in roadway.	round	skewed_45°	skewed_45°	stagnant	yes_<25%	within_culvert	sediment,leaves,d	ebm, trash	at_stream_grade	corrugated_metal_pipe	24	20	22	1.5	satisfactory	none		Minor surface rust at bottom 7 and sides of pipe. Culvert opening is a flared end section. Moderate chip missing from concrete with rebar showing through.	headwall_retaining_wall,alo	4	poor			Severe erosion on right sid	no		fair	-70.9798	42.62798
0-333i	11/18/2020 19:47 clear	ewm	yes	yes	paved	good	21	50	yes	other	no	Electrical box seen up street.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no			at_stream_grade	reinforced_concrete_pipe	18	18	0	0	satisfactory	minor	headwall	Outlet is a flared end section. Moderate thorn growth prevented in-depth observations.	headwall_retaining_wall,alo	3	satisfactory	dry_laid_stone_brick	good	Minor erosion on right side	no		satisfactory	-70.9866	42.62334			
0-333o	11/18/2020 19:55 clear	ewm	yes	yes	paved	good	21	50	yes	sewer_line,other	yes	guardrail	good	Electrical box seen up street.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	within_culvert	leaves	at_stream_grade	reinforced_concrete_pipe	18	16	40	0	satisfactory	none		Minor scaling at bottom of pipe. Minor surface rust on bottom 9 and sides of pipe.	headwall_retaining_wall,alo	2.5	satisfactory			Embankment is reinforced	no	Outlet is part of a basin and is elevated above the bottom line. General tree growth/fallen limbs in stream bed	satisfactory	-70.9867	42.62326	
0-185i	11/19/2020 13:15 clear	ewm	yes	yes	paved	satisfactory	20	41	no		no									sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	10	0	0	good	none		Flared end section	slope_steeper_than_2_1_	3	fair			Minor erosion left of culve	yes	General tree growth along stream bank, minor erosion/cutting of banks	satisfactory	-70.9819	42.65432		
0-185o	11/19/2020 13:25 clear	ewm	yes	yes	paved	satisfactory	20	41	no		no									sediment,leaves	at_stream_grade	corrugated_metal_pipe	12	7	0	0	satisfactory	none		Flared end section, top right side 4 of connection is slightly bent	slope_steeper_than_2_1_	3.5	fair			Minor to moderate erosion	no		satisfactory	-70.982	42.65436		
0-181o	Approximately 100 feet off road	11/19/2020 13:43 clear	ewm	yes	yes	paved	fair	24	120	no										sediment,leaves,o	ther	at_stream_grade	reinforced_concrete_pipe	12	9.5	0	0	fair	none		Minor surface rust at bottom 7 and sides of pipe. Culvert opening is a flared end section. Moderate chip missing from concrete with rebar showing through.	headwall_retaining_wall,alo	3	satisfactory			General tree and vegetation	no		fair	-70.9805	42.65709	
0-181i	11/19/2020 13:55 clear	ewm	yes	yes	paved	fair	24	120	yes	overhead_wires,drainage_system	no									upstream,within_culvert	leaves, sediment, vegetation_growth	inlet_dip	reinforced_concrete_pipe	12	9.5	0	0	satisfactory	none		Minor scaling at bottom of pipe, minor chips missing at inlet 5 opening	slope_steeper_than_2_1_ah	2	satisfactory			Misc. placed rocks around end	no	Roots of abutting tree in stream bed, shutter noted high amounts of flow to to culvert in times of heavy rainfall	satisfactory	-70.9803	42.65684	
0-175i	11/19/2020 14:13 clear	ewm	yes	yes	paved	satisfactory	23	32	yes	overhead_wires,drainage_system	no									within_culvert,up	other,leaves, sediment	at_stream_grade	reinforced_concrete_pipe	36	28.5	33	3	satisfactory	minor	headwall	Minor scaling to high water, CB cored through first section of 5 pipe, Exposed rebar on right side	headwall_retaining_wall	2.5	fair	mortared_stone_brick	satisfactory	Minor To moderate Erosion	no	Catch basin connected through core in top of pipe	satisfactory	-70.9792	42.65846	
0-175o	11/19/2020 14:29 clear	ewm	yes	yes	paved	satisfactory	23	32	yes	drainage_system	no									within_culvert,up	stream	leaves, sediment	at_stream_grade	reinforced_concrete_pipe	36	28	33	3	satisfactory	none		Minor to moderate chipping in culvert opening with exposed rebar, minor scaling at bottom of pipe, first and second length of pipe shifted apart, CB cored through top of pipe	slope_steeper_than_2_1_	2</									



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8-354o		11/25/2020 15:41	overcast	ewm	yes		yes	paved	satisfactory	24	61	yes	overhead_wires	no		round	roadway_aligned	stream_aligned	no_dry_bottom	yes,<25%	within_culvert	sediment,leaves	at_stream_grade	reinforced_concrete_pipe	18	17	8	0	fair	none	Second length of pipe is shifted off center by approximately 3 13 inches	headwall_retaining_wall,alo	5	poor	dry_laid_stone_brick	fair	Moderate to severe erosion	no	no	Fallen trees and limbs downstream	fair	-70.9721	42.67837						
8-355i	Adjacent to Perkins Woods entrance, drop inlet structure	11/25/2020 15:53	overcast	ewm	yes		yes	paved	satisfactory	24	38	yes	overhead_wires	no		round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	within_culvertUp stream	other,sediment,leaves,branches,vegetation_growth	inlet_drop	ductile_iron_pipe	12				none			slope_flatter_than_2_1_	1.5	fair		Minor to moderate Erosion	no	no	Drop inlet to pipe, pipe visible but not accessible to inspect, general fallen trees and limbs		-70.968	42.67409							
8-355o		11/25/2020 16:01	overcast	ewm	yes		no	paved	satisfactory	24	38	no		no	guardrail	fair	roadway_aligned	no_discernable_stream_channel	flowing			buried_clogged_collapsed	submerged					46			Bricks laid in front of assumed pipe	headwall_retaining_wall	3	poor	dry_laid_stone_brick	mortared_stone_brick	falling	Precast headwall under dry	no	no	Unable to inspect, submerged with sediment and brick stacked above opening	falling	-70.9682	42.67399					
8-158o		11/25/2020 16:18	overcast	ewm	yes		no	paved	satisfactory	21	40	no		yes	guardrail	fair												54			Completely submerged	headwall_retaining_wall,slope_flatter_th,fa			mortared_stone_brick		Submerged and unable to inspect	no	no	Private 12inch CMP adjacent to outlet south of culvert, fallen trees and limbs	fair	-70.9694	42.67092						
8-158o		11/25/2020 16:23	overcast	ewm	yes		no	paved	fair	21	40	no		yes	guardrail	fair	roadway_aligned		flowing												Submerged and unable to inspect	headwall_retaining_wall,slope_steeper_1	fair		mortared_stone_brick		Submerged and unable to inspect	no	no	Private 12inch CMP adjacent to outlet south of culvert, fallen trees and limbs	fair	-70.9692	42.67085						
8-153o		11/25/2020 16:34	partly_cloudy	ewm	yes	culvert_was_not_located_does_no	yes	paved	fair	21				no			Minor pothole above potential culvert location	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves,vegetation_growth	at_stream_grade	reinforced_concrete_pipe	12	9	11	0	satisfactory	none	General moss Growth	headwall_retaining_wall,alo	2.5	satisfactory	dry_laid_stone_brick	fair	General vegetation growth	no	no		fair	-70.9737	42.66918				
8-153i		11/25/2020 16:43	overcast	ewm																										Approximately 10 feet into pipe, pipe separation and disformation, minor surface rust at bottom of pipe	headwall_retaining_wall,alo	10	fair	mortared_stone_brick	satisfactory	Minor to moderate Erosion	no	no	General tree growth and fallen limbs	fair	-70.9736	42.66929							
8-158i		11/25/2020 16:54	overcast	ewm	yes		yes	paved		24	100	yes	other	no			Underground electrical	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no	downstream,with in_culvert	sediment,leaves	at_stream_grade	corrugated_metal_pipe	18	18	0	0	fair	minor	headwall					Minor to moderate Erosion	no	no	General vegetation growth throughout outlet area	satisfactory	-70.9717	42.66673					
8-158o		11/25/2020 17:04	overcast	ewm	yes		yes	paved	satisfactory	24	100	no		no				round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes,<25%			at_stream_grade	corrugated_metal_pipe	18	18	9	0	satisfactory	minor	headwall					Minor to moderate Erosion	no	no		satisfactory	-70.9712	42.66652					
8-165o		11/25/2020 17:19	overcast	ewm	yes		yes	paved	satisfactory	23	90	no		no				round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_75_100%	upstream	vegetation_growt h,other,debrin_trash	at_stream_grade	corrugated_metal_pipe	15	6		0	poor	none	Sand bags placed in culvert opening to prevent flow, sediment buildup behind sandbags, 4 ft into pipe, large deformation on top side with possible hole, separation 10 ft into pipe with sediment observed	headwall_retaining_wall,alo	7	satisfactory	mortared_stone_brick	satisfactory	Heavily vegetated, sporadic no	no	Sand bags placed to stop flow from outlet	poor	-70.9733	42.66411					
8-165i		11/25/2020 17:31	overcast	ewm	yes	culvert_was_not_located_does_no	yes	paved	satisfactory	23	90	yes	other	no			Underground electrical utilities	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	upstream,within_culvert	sediment,leaves,other,branches	at_stream_grade	corrugated_metal_pipe	15	7	14	0	satisfactory	none	Large sediment buildup at inlet	headwall_retaining_wall,alo	8	poor	mortared_stone_brick	satisfactory	Severe erosion of embankment	no	no	Electrical boxes immediately adjacent to headwall	fair	-70.9736	42.66436				
8-169		11/25/2020 18:08	overcast	djn																																					-70.9713	42.66357							
8-200i		11/30/2020 13:24	overcast	ewm	yes		yes	paved	fair	24	125	yes	drainage_system,other	no			Minor to moderate cracking along roadway. Electrical boxes seen up street. Two catch basins connecting culvert from inlet to outlet.	round	skewed_45°	skewed_45°	no_dry_bottom	yes_25_50%	within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	18	12	18	0	fair	none	Moderate scaling at bottom and sides of pipe due to water. Minor 4 moss growth outside of pipe. Small pieces of plywood propped up in front of outlet by a rock. Small hole, likely created by animals, at top of plywood. Minor to moderate scaling at bottom of pipe.	headwall_retaining_wall,alo	2	satisfactory	dry_laid_stone_brick	fair	Embankment shows minor no	no	Inlet connects as part of a closed drainage system. General tree growth.	fair	-70.964	42.64836					
8-200o		11/30/2020 13:42	overcast	ewm	yes		yes	paved	fair	24	125	yes	drainage_system,other	no			Minor to moderate cracking along roadway. Electrical box of seen up street. Two catch basins connecting inlet to outlet.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	downstream	other	at_stream_grade	reinforced_concrete_pipe	12	4	0	0	fair	none	Pipe lengths are shifted away from each other and upwards and downwards in certain locations. Between first and second lengths there is a moderate amount of sediment buildup at base of pipe. Minor 3 scaling throughout pipe.	headwall_retaining_wall,alo	1.5	satisfactory	dry_laid_stone_brick	fair	Moderate tree growth and no	no	Outlet is part of a closed drainage system. Outlet is boarded up by a sheet of plywood propped up by a rock.	fair	-70.9638	42.64802					
8-356i		11/30/2020 14:13	overcast	ewm	yes		yes	paved	fair	21	65	yes	overhead_wires	no			Moderate cracking and small potholes throughout roadway.	round	skewed_45°	skewed_45°	no_dry_bottom	yes,<25%	within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	12	11	6	0	poor	none	Minor scaling at bottom of pipe. Fallen tree limb lag directly in front of culvert impeding direct inspection of pipe.	slope_steeper_than_2_1_	5.5	fair			Moderate erosion of embankment	no		poor	-70.9629	42.6573					
8-356o		11/30/2020 14:28	overcast	ewm	yes		yes	paved	fair	21	65	yes	overhead_wires	no			Moderate cracking and potholes and roadway.	round	skewed_45°	stream_aligned	no_dry_bottom	yes_50_75%	downstream	vegetation_growt h,sediment,leaves,other	at_stream_grade	reinforced_concrete_pipe	12	12	0	0	fair	moderate	culvert	5	slope_steeper_than_2_1_	5	poor		Moderate to severe erosion	no	no	Driveway culvert outlets the same area. Essex County bound located directly in front of outlet. Culvert pipe length goes directly under a utility pole.	poor	-70.9631	42.65706				
8-198o		11/30/2020 15:08	overcast	ewm	yes		yes	paved	satisfactory	21	55			no			Minor cracking long edges of roadway. Gas regulator seen up beginning of roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_50_75%	within_culvert	sediment,leaves,b ranches	at_stream_grade	reinforced_concrete_pipe	18	9	17	0	satisfactory	none	Minor scaling at bottom sides of pipe due to water. On top left side of opening there is exposed rebar. Minor moss growth outside of pipe.	slope_steeper_than_2_1_	5	poor			Moderate to severe erosion	no	Culvert is part of a close drainage system that's connected by two catch basins.	fair	-70.9677	42.64829					
8-198i		11/30/2020 15:20	overcast	ewm	yes		yes	paved	satisfactory	21	55	yes	overhead_wires,drainage_system,gas,	no			Minor cracking long edges of roadway. Gas regulator seen up beginning of roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	within_culvert	sediment,leaves,b ranches	at_stream_grade	reinforced_concrete_pipe	18	14	16	0	poor	none	Second length of pipe is shifted downwards and away approximately 3 inches with sediment seeping through.	headwall_retaining_wall,alo	3.5	poor	mortared_stone_brick	poor	Embankment shows moden	no	no	Fallen trees and limbs throughout inlet area. Culvert is part of a close drainage system connected by two catch basins.	poor	-70.9676	42.64815				
8-357o		11/30/2020 15:44	rain	ewm	yes		yes	paved	satisfactory	22	60	yes	overhead_wires	no			Minor cracking along edges of roadway.	round	roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes,<25%	within_culvert	leaves,sediment	at_stream_grade	reinforced_concrete_pipe	12	12	8	0	poor	minor	headwall					Moderate erosion with sev	no	no	Culvert as part of a closed drainage system connected by two catch basins. Culvert is part of a closed drainage system connected by to catch basins. Inside of culvert is unsupportable due to collapse headwall directly in front of opening.	falling	-70.9688	42.64767					
8-357i		11/30/2020 15:57	rain	ewm	yes		no	paved	satisfactory	22	60	yes	drainage_system,overhead_wires	no			Minor cracking along edges of roadway.	round	skewed_45°	no_discernable_stream_channel		completely_obstructe	upstream	sediment,leaves,other	buried_clogged_col	corrugated_metal_pipe	12						Second length of pipe shifted approximately 2 inches downward. Moderate scaling on bottom of pipe. Sporadic patches of missing concrete.	headwall_retaining_wall,slope_steeper_1	fair		dry_laid_stone_brick	falling	Embankment shows minor	no	no	CMP drainage outlet located directly next to inlet. General fallen trees and limbs.	fair	-70.9687	42.64767				
8-196i		11/30/2020 16:32	rain	ewm	yes		yes	paved	satisfactory			yes	drainage_system,gas_line	yes	guardrail	satisfactory to heavy traffic.		round	skewed_45°	stream_aligned	flowing	yes,<25%	within_culvert	sediment	at_stream_grade	reinforced_concrete_pipe	30	29	20	3	fair	none	Opening is a flared end section. Large amount of water and sediment obstructed full observation of culvert. Minor 8 chips in concrete at opening.	slope_steeper_than_2_1_1/4	10	fair	concrete_poured_	poor	Moderate erosion along en	no	no		fair	-70.9754	42.65017				
8-196o		11/30/2020 16:46	rain	ewm	yes	gas_line,drainage_system	yes	paved	satisfactory		yes			yes	guardrail	satisfactory to heavy traffic.		round	skewed_45°	stream_aligned	flowing	yes_50_75%	within_culvert	sediment,leaves	at_stream_grade	reinforced_concrete_pipe	30	12	30	7	fair	none	Minor scaling at bottom of pipe. Minor 8 chips in concrete at opening.	slope_steeper_than_2_1_	10	poor			Moderate to severe erosion	no	no	RCF drainage outlet located approximately 5 feet away from culvert opening. Culvert does not exist.	fair	-70.9757	42.6496				
8-201		11/30/2020 17:07	rain	ewm	wmb	yes	yes	paved	satisfactory	22	35	yes	overhead_wires	no				round	roadway_aligned	skewed_45°	flowing	yes,<25%	upstream	branches,leaves	at_stream_grade	reinforced_concrete_pipe	36	36	20	3	satisfactory	none		headwall_retaining_wall,alo	1.5	fair	concrete_poured_	satisfactory	Minor to moderate erosion	no	no		satisfactory	-70.9735	42.6482				
8-358i		11/30/2020 17:11	rain	ewm	yes		yes	paved	satisfactory					no				round																							-70.9756	42.64787							
8-358o		11/30/2020 17:34	rain	ewm	yes		no	paved	satisfactory	20	35	no		no				round	roadway_aligned	stream_aligned	flowing	no		branches,leaves,	perched	reinforced_concrete_pipe	30	30	20	3	satisfactory	none	10 Minor scaling at bottom of pipe. Minor scaling at bottom of pipe 7 due to water.	headwall_retaining_wall,alo	2	falling	concrete_poured_	fair	Severe erosion throughout no	no	no	General fallen trees and limbs route stream bed. Severe cutting along bank. Direct inspection of culvert was inaccessible due to steep, eroded embankment. Large pile up of branches at inlet obstructing flow.	poor	-70.9753	42.64798				
8-202i		11/30/2020 17:41	rain	ewm	yes		yes	paved	satisfactory	24	55	yes	overhead_wires,sewer_line	no				round	skewed_45°	stream_aligned	flowing	yes_25_50%	upstream	ediment	at_stream_grade	reinforced_concrete_pipe	36	36	17	2	satisfactory	none		headwall_retaining_wall,alo	2	fair	concrete_poured_	good	Embankment shows minor	no	no		satisfactory	-70.9746	42.64688				
8-202o		11/30/2020 17:51	rain	ewm	yes		yes	paved	satisfactory	24	55	yes	overhead_wires,sewer_line	no			Sewer manhole seen on roadway, possibly closed drainage system.	round	skewed_45°	skewed_45°	flowing	no		perched	reinforced_concrete_pipe	36	36	12	1	satisfactory	none	Discoloration of concrete 8 throughout pipe. Bottom opening of pipe is bent and raised up 6 inches. Approximately 2 feet into the pipe large tear on left side allowing sediment to seep through. Approximately 5 feet of the pipe is going in upward angle while the rest is downwards. 14 r mix.	headwall_retaining_wall,alo	2	falling	dry_laid_stone_brick	falling	Severe erosion on embankment	no	no	RCF drainage outlet located approximately 1 foot away from culvert. Likely connected to sewer manhole on roadway and closed drainage. Electric dog fence crosses under stream.	poor	-70.9746	42.64679					
8-358i		11/30/2020 18:12	rain	ewm	yes		yes	paved	satisfactory	24	52	yes	overhead_wires,drainage_system	no			Minor cracking on roadway.	round	skewed_45°	no_discernable_stream_channel	no_dry_bottom	no		perched	corrugated_metal_pipe	12	7	0	0	falling	none		slope_flatter_than_2_1_	1.5	poor			Moderate to severe erosion	no	no	Pipe is part of closed drainage system connected by a singular catch basin. Small 4 inch privately owned outlet located approximately 5 feet away and downgrading from opening. RCF culvert located directly next opening. Privately owned close drainage outlet located nearby. Corrugated metal pipe opening located approximately 6 feet away from culvert opening. Wetland flag located nearby.	falling	-70.9722	42.64455					
8-206i		11/30/2020 18:23	rain	ewm	yes		yes	paved	satisfactory	24	50	yes	overhead_wires,drainage_system	no			Minor cracks along roadway.	round	skewed_45°	no_discernable_stream_channel	stagnant	yes,<25%	within_culvert	branches,sediment,other	at_stream_grade	reinforced_concrete_pipe	10	9	8	0.5	fair	minor	culvert			slope_steeper_than_2_1_	4	poor			Moderate to severe erosion	no	no	Culvert is completely submerged of water making internal inspection inaccessible.	fair	-70.9722	42.64456		
8-206o		11/30/2020 18:39	rain	ewm	yes		yes	paved	satisfactory	24	50	yes	drainage_system	no			Minor cracks along roadway.	round	skewed_45°	stream_aligned	stagnant	yes_25_50%	downstream,with in_culvert	sediment,branches	submerged	reinforced_concrete_pipe	10	9	10	8		none		slope_flatter_than_2_1_1/4	4	poor	dry_laid_stone_brick	falling	Moderate to severe erosion	no	no	Culvert is completely submerged of water making internal inspection inaccessible.	falling	-70.9723	42.64448				
8-359o		11/30/2020 18:50	rain	ewm	yes	culvert_was_not_located_does_no	no	paved	satisfactory	24	52	yes	drainage_system	no			Minor cracking on roadway.	round	roadway_aligned	stream_aligned	no_dry_bottom	no		perched	corrugated_metal_pipe	16	18	0	0	falling	severe	culvert					Entire pipe length has bottom completely rusted away. Remnants of black asphalt/tar 8 mix throughout.	headwall_retaining_wall,alo	2.5	falling	dry_laid_stone_brick	falling	Embankment shows severe	no	no	Wetland flag located nearby. Outlet is part of a closed drainage system connected by singular catch basin. 10 inch RCF culvert located approximately 5 feet away. Culvert does not exist. Culvert comprised of two pipes with pipe 1 being closest to Perley Lane.	falling	-70.9723	42.64447
8-178i		12/1/2020 13:12	overcast	ewm	yes		yes	paved	satisfactory	20	55	yes	drainage_system,other	yes	guardrail	satisfactory	Minor to moderate cracking along roadway.	round	roadway_aligned	no_discernable_stream_channel	flowing	yes,<25%	within_culvert	branches,leaves	at_stream_grade	reinforced_concrete_pipe	602	59	482	14	satisfactory	none	2- Location of obstruction. All: minor scaling at bottom of pipes. 1- obstructions are close to 50%. 2- obstructions are less than 25%. All minor scaling at bottom of 10 pipes.	slope_flatter_than_2_1_1/4	3	satisfactory	concrete_poured_	satisfactory	General vegetation and tre	no	no	Culvert comprised of two pipes with pipe one being closest to Perley Lane. General tree growth along stream.	satisfactory	-71.0128	42.65688				
8-178o		12/1/2020 13:32	overcast	ewm	yes		yes	paved	satisfactory	20	55	yes	drainage_system,other	yes	guardrail	satisfactory	Minor to moderate cracking along roadway. Electrical boxes seen up street.	round	roadway_aligned	stream_aligned	flowing	yes_25_50%	within_culvert	branches,leaves	at_stream_grade	reinforced_concrete_pipe	602	4553	552	14	satisfactory	none		headwall_retaining_wall,alo	3.5	fair	concrete_poured_	satisfactory	Minor scaling at bottom of	no	no		satisfactory	-71.0129	42.65694				
8-171i</																																																	

B - 209a		12/1/2020 15:30 overcast	ewm	yes	yes	paved	good	24	52 no		yes	guardrail	satisfactory	open_bottskewed_+45'	stream_aligned	flowing	no	at_stream_grade	reinforced_concrete_pipe	162	55	162	12 good	none	8 Date stamp on concrete is 9-6-18 headwall_retaining_wallalo	3 satisfactory	concrete_prcast	good	General vegetation growth no	no	Wetland flag located nearby. Fallen trees and limbs in stream.	good	-70.9521	42.64213				
B - 222f		12/1/2020 15:53 overcast	ewm	yes	yes	paved	satisfactory	20	32 yes other		no		Electrical box seen up street. Minor cracking along roadway.	elliptical skewed_+45'	no_discernable_stream_channel	flowing	no	at_stream_grade	corrugated_metal_pipe	33	27	32	9 poor	severe	culvert	Approximately 5 feet into the pipe there's a large dent inward. Moderate amount of rust on sides of pipe due to water.	headwall_retaining_wallalo	1 fair	mortared_stone_brick	fair	Embankment shows minor yes	no	Rusted great directly next to culvert, possibly beaver grate.	fair	-70.9874	42.63452		
B - 222o		12/1/2020 16:05 overcast	ewm	yes	yes	paved	satisfactory	20	32 yes other		no		Electrical box seen up roadway. Minor cracking along roadway.	elliptical skewed_+45'	no_discernable_stream_channel	flowing	no	at_stream_grade	corrugated_metal_pipe	35	25	34	12 satisfactory	moderate	culvert	Moderate surface rust at bottom and sides of pipe due to water.	headwall_retaining_wallalo	1.5 failing	mortared_stone_brick	poor	Severe washout on right si yes	no		poor	-70.9873	42.63457		
B - 205o		12/1/2020 16:37 overcast	ewm	yes	yes	paved	satisfactory	22	30 no		yes	guardrail	fair	Minor to moderate cracking along roadway. Minor chips taken out of guard rail.	round roadway_aligned	stream_aligned	flowing	no	at_stream_grade	corrugated_metal_pipe	1202	60	1202	24 good	none	22	headwall_retaining_wallalo	2 satisfactory	concrete_poured	satisfactory	Embankment shows gener yes	no	Culvert comprised of 2 - 10 foot wide corrugated metal pipes with a span of 24 feet. Pipe number one is closest to Middleton Road. Large 6 foot trail culvert outlets to same stream.	satisfactory	-70.9901	42.64477		
B - 205f		12/1/2020 17:01 overcast	ewm	yes	yes	paved	satisfactory	20	30 yes overhead_wires		yes	guardrail	fair	Minor to moderate cracking on roadway. Small chips along guard rail.	round roadway_aligned	skewed_+45'	flowing	no	at_stream_grade	corrugated_metal_pipe	1202	60	1202	36 good	none	2: small lip in top of pipe 16 opening.	headwall_retaining_wallalo	2 fair	concrete_poured	satisfactory	Embankment shows minor yes	no	Culvert is comprised of 2 - 10 foot wide corrugated metal pipes with a span of 24 feet. Pipe one is closest to Middleton Road. Small area foam accumulation on right side of headwall.	satisfactory	-70.9902	42.64489		
B - 14	Location not found/does not exist.	12/7/2020 13:30 rain	djn																																-71.0058	42.72546		
B - 15o		12/7/2020 13:46 rain	ajs	yes	no	paved	satisfactory	20	60 yes overhead_wires		no			round skewed_+45'	stream_aligned	no_moist_bottom	yes_<25%	within_culvert do sediment,vegetati on,growth,leaves	at_stream_grade	corrugated_metal_pipe	18				none	13 Culvert could not be fully inspected due to heavy vegetation with thorns.	headwall_retaining_wallalo	6 satisfactory	mortared_stone_brick		Concrete bollard at top of h no	no	Abutment noted sinkhole above culvert filled several years ago.		-71.0663	42.72501		
B - 15f		12/7/2020 14:27 clear	ajs	yes	yes	paved	satisfactory	20	60 no		no			round skewed_+45'	stream_aligned	no_dry_bottom	yes_25_50%	within_culvert	leaves,sediment,d ebris_trash	at_stream_grade	corrugated_metal_pipe	18	13	18	0 satisfactory	none	13 Rusting to high water mark. 100% section loss at first 3 feet of bottom half of pipe. No flow. Low point on roadway swale. Minor surface rusting, and asphalt coating still present on bottom of pipe.	slope_flatter_than_2:1_he	1 satisfactory	mortared_stone_brick	satisfactory	Sporadic areas of missing m no	no		satisfactory	-71.0665	42.72508	
B - 13f		12/7/2020 14:43 rain	ajs	yes	yes	paved	satisfactory	20	33 yes overhead_wires		no		Minor edge failure and transverse cracking about pipe.	round roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no		at_stream_grade	corrugated_metal_pipe	12	12	0	0 good	none		slope_flatter_than_2:1_he	1 satisfactory	mortared_stone_brick	satisfactory	Transverse crack in headwa no	no		satisfactory	-71.0651	42.72633		
B - 13o		12/7/2020 14:53 rain	ajs	yes	yes	paved	poor	20	33 no		no		Minor edge failure and transverse cracking about pipe.	round roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_<25%	downstream	leaves,sediment	perched	corrugated_metal_pipe	12	12	0	0 good	none		slope_flatter_than_2:1_he	1.5 poor	mortared_stone_brick	satisfactory	Evidence of mortar repair t no	no	4 to 8 inch diameter trees growing within outlet channel.	fair	-71.0651	42.72604	
B - 6	Drainage outlet Located over town line.	12/7/2020 15:08																																	-71.0598	42.73194		
B - 5	Located on private	12/7/2020 15:09																																	-71.0599	42.73292		
B - 7	Located on private	12/7/2020 15:13																																	-71.0621	42.73167		
B - 8	Located on private	12/7/2020 15:13																																	-71.0637	42.73121		
B - 11ob		12/7/2020 15:18 rain	ajs	yes	yes	paved	poor	17	35 no		no		Rutting and fatigue cracking, transverse cracking over pipe.	round roadway_aligned	skewed_+45'	flowing	yes_75_100%	within_culvert	branches	perched	corrugated_metal_pipe	24	21	8	1 poor	severe	culvert,he adwall	15 midpipe.	slope_steeper_than_2:1_h	3 failing	dry_laid_stone_brick	failing	Stone missing between pipes yes	no	Erosion of downstream banks. Heavy vegetation/branches downstream.	failing	-71.0695	42.72814
B - 11oa		12/7/2020 15:47 rain	ajs	yes	yes	paved	poor	17	35 no		no		Rutting and fatigue cracking, transverse cracking over pipe.	round roadway_aligned	skewed_+45'	stagnant	yes_75_100%	within_culvert do sediment,leaves,b ranches	perched	corrugated_metal_pipe	24	18	19	0 satisfactory	severe	culvert,he adwall	13 Minor surface rusting throughout. Dammed mid pipe. 13 Minor pipe flattening.	headwall_retaining_wallalo	3 poor	dry_laid_stone_brick	poor	Stones missing between pig yes	no	3 ft fence between outlets.	poor	-71.0695	42.72822	
B - 11ia		12/7/2020 15:59 rain	ajs	yes	yes	paved	poor	17	35 yes overhead_wires		no		Rutting and fatigue cracking, transverse cracking over pipe.	round roadway_aligned	no_discernable_stream_channel	stagnant	yes_75_100%	within_culvert	sediment,branch es	at_stream_grade	corrugated_metal_pipe	24	24	23	10 poor	minor	culvert,at her	Buckling/crimping at end of protruded pipe. Minor interior surface rust. Minor flattening. Appears to be dam within pipe. Minor surface rusting, minor tear in top of pipe, evidence of damming within pipe.	slope_flatter_than_2:1_	2.5 poor	Washout between pipes. M yes	no	Beaver screen present but not functioning.	poor	-71.0697	42.72822		
B - 11ib		12/7/2020 16:10 rain	ajs	yes	yes	paved	poor	17	35 yes overhead_wires		no		Rutting and fatigue cracking, transverse cracking over pipe.	round roadway_aligned	no_discernable_stream_channel	stagnant	yes_75_100%	within_culvert	sediment,leaves,b ranches	at_stream_grade	corrugated_metal_pipe	24	24	22	16 satisfactory	minor	culvert		slope_flatter_than_2:1_	3 satisfactory	Erosion between pipes. 4.3 yes	no	Some dry stone surrounding pipe.	satisfactory	-71.0697	42.72813		
B - 9	Could not locate culvert on either side of road. Evidence of potential	12/7/2020 16:22	djn	culvert_was_not_located_does_no																															-71.0699	42.72937		
B - 4i		12/7/2020 16:27 overcast	ajs	yes	yes	paved	good	20	28 no		no			round roadway_aligned	no_discernable_stream_channel	no_dry_bottom	no		at_stream_grade	ductile_iron_pipe	12	12	0	0 good	none		Culvert protrudes approximately 2ft from bank.	slope_steeper_than_2:1_	1 satisfactory		Minor erosion on side of pig no	no	Minor vegetation surrounding pipe. Vegetation and trees surrounding outlet.	satisfactory	-71.0765	42.73389		
B - 4o		12/7/2020 16:41 overcast	ajs	yes	yes	paved	good	20	28 yes overhead_wires		no			round roadway_aligned	no_discernable_stream_channel	no_dry_bottom	yes_25_50%	downstream	vegetation_growt h	at_stream_grade	ductile_iron_pipe	12	12	0	0 good	none		Outlets into protected wetland.	slope_steeper_than_2:1_	1 satisfactory	Minor roadway washout. Ri no	no	Minor roadway washout. Ri no	satisfactory	-71.0765	42.73384		
B - 3f	Next to failed 12 inch RCP.	12/7/2020 16:49 rain	ajs	yes	yes	paved	satisfactory	20	28 no		no		Depression noted over failed RCP.	round skewed_+45'	no_discernable_stream_channel	no_dry_bottom	no	within_culvert	sediment	perched	ductile_iron_pipe	12	12	0	0 good	none		Protruding pipe.	slope_flatter_than_2:1_	1 satisfactory	Moderate vegetation grow no	no		satisfactory	-71.074	42.73451		
B - 3o		12/7/2020 16:56 overcast	ajs	yes	yes	paved	satisfactory	20	28 no		no		Depression noted over failed RCP.	round skewed_+45'	skewed_+45'	no_dry_bottom	yes_<25%	within_culvert do sediment,leaves,v wstream	egitation_growth	at_stream_grade	ductile_iron_pipe	12	12	0	0 good	none		Surface rusting.	slope_flatter_than_2:1_	1 satisfactory	Minor vegetation, rrip in no	no		satisfactory	-71.0739	42.73448		
B - 1	Located over town line. Potentially buried/removed culvert.	12/7/2020 17:08 overcast	djn																																-71.0841	42.73489		
B - 2o		12/7/2020 17:15 rain	djn	culvert_was_not_located_does_no																															-71.0832	42.7346		
B - 2f		12/7/2020 17:18 rain	djn	culvert_was_not_located_does_no																															-71.0836	42.73429		
B - 10f		12/7/2020 17:49 overcast	ajs	yes	yes	paved	good	24	35 no		yes	guardrail	good	box skewed_+45'	skewed_+45'	stagnant	yes_25_50%	within_culvert	sediment,leaves,b ranches	at_stream_grade	other	36	25	36	11 poor	none			slope_steeper_than_2:1_	4 poor	Erosion down embankment no	no	Beaver screen present but not attached.	poor	-71.0776	42.72917		
B - 10o		12/7/2020 18:08 overcast	ajs	yes	yes	paved	good	24	35 yes overhead_wires		yes	guardrail	satisfactory	open_bottskewed_+45'	stream_aligned	flowing	no		at_stream_grade	dry_laid_stone	36	24	36	3 poor	minor	culvert	36 inch concrete box header, 5 foot extension from clapper. Clapper and concrete have separation between them. Concrete extension undermining on both sidewalks. Scaling to high water in concrete extension.	slope_steeper_than_2:1_	4 poor	Significant erosion in embai no	no	Vegetation/overgrowth downstream. Sealed rrip armorng downstream.	poor	-71.0775	42.72924			



# Appendix B

## Structures Assessment Report

# **STRUCTURES ASSESSMENT REPORT**

## **BRIDGES:**

**B-19-001 (899) – Middleton Road over Fish Brook**

**B-19-002 (8RE) – Mill Road over Fish Brook**

**B-19-003 (2R3) – Lockwood Lane over Fish Brook**

**B-19-004 (89A) – Fuller Lane over Fish Brook**

**B-19-005 (89B) – Endicott Road over Fish Brook**

**B-19-018 (C68) – Brookview Road over Fish Brook**

**IN**

**BOXFORD, MA**

**DATE OF INSPECTIONS: NOVEMBER 2020 & FEBRUARY 2021**

**PREPARED FOR:**

**TOWN OF BOXFORD**

**PREPARED BY:**



**TEC, INC.**

**146 DASCOMB ROAD**

**ANDOVER, MA 01810**

**BRIDGE NO. B-19-001 (899) – MIDDLETON ROAD OVER FISH BROOK****General**

The bridge carries Middleton Road over Fish Brook and is located just south of the intersection at Middleton Road and Main Street (Figure 1). The bridge is situated on an S-shape curve. The superstructure is comprised of prestressed concrete beams, a cast in place concrete deck slab, and a hot mixed asphalt (HMA) wearing surface. The abutments appear to be dry-laid stones with a cast in place concrete beam seat, bearing on the dry-laid stones. (Figure 2). Based on 2019 data, this bridge is not listed on the National Bridge Inventory (NBI) in Massachusetts, however there is routine underwater inspection report that was performed at this location by MassDOT on December 28, 2018 (provided in Attachment A).



**Figure 1: South bridge roadway approach (looking north) - B-19-001 (899)**

**Observations**

The wearing surface on the bridge and at both bridge approaches appears to be sound. The edge of pavement to edge of pavement was measured to be approximately 21 feet wide with two, 10-foot-wide travel lanes. The out to out was measured as approximately 25.25 feet. Membrane waterproofing is present under HMA wearing surface and exposed at both fascia. There is no curb present.

The guardrail is a non-standard steel W-beam guardrail located on the west and east sides of the bridge. There is no approach guardrail transition nor an end-treatment. On both fascia's, there is one guardrail post that is embedded into the bridge. There appears to be impact damage, scuffs and rusting on the eastern guardrail. The western guardrail has minor scuffs and rusting (Figure 3).

There is severe embankment erosion covered by leaves at all four corners of the bridge. The northwestern embankment has an exposed gas line, just behind the guardrail. Overhead wires are located above the western embankment. Vegetation growth/overgrowth is present at the upstream (east) and the downstream (west) channel (Figure 4).

The prestressed concrete beams are labeled 1-4 ranging east to west. Beams 1 and 4 overhang the abutments at all four corners. The overhang varies anywhere from approximately 5-20 inches. The underside of beam 1 is wet. The east fascia of beam 4 has a small wet spot, surrounded by minor efflorescence and punky concrete. The wet spots are likely due to leakage from the roadway surface above. There is minor, sporadic rust staining throughout the entire underside of the beams. Generally, the beams appear to be in fair condition, equating to a 5 per the MassDOT bridge inspection condition rating guide ranging from 0-9.

The freeboard at the midspan of the bridge is approximately 30". The water depth at the upstream east fascia was about chest height (channel inspection inaccessible with waders only). The downstream (west) channel was the access point for a wader only inspection by TEC. The Fish Brook flows east to west with a moderate flow velocity.

The abutments consist of dry-laid fieldstones with a cast in place concrete beam seat that bears on the stones. The breastwalls and wingwalls consist of dry-laid, irregular fieldstones. There appears



to be several voids between dry-laid fieldstones throughout. At the west fascia of the north abutment (corner of breastwall and wingwall) there is a void beneath beam 1 that is up to approximately 3 feet deep. There is moderate to severe erosion/washout behind both abutments ranging from 9-20 inches, at all four corners (Figure 5). There is fill spilling through voids and missing chinking stones at the northwest wingwall. Generally, the substructure elements appear to be in fair condition, equating to a 5 per the MassDOT bridge inspection condition rating guide. Refer to Attachment A in the appendix for additional information on the substructure, provided in MassDOT's routine underwater inspection report.

### **Recommendations**

To improve motorist safety, TEC recommends that standard guardrail should be installed to replace the non-standard, damaged guardrail in place currently on both sides.

All embankment slopes should be treated, to replace the eroded material and for preventative maintenance.

Minor repairs should be made to the abutments and wingwalls including readjusting/adding field stones and filling any voids with mortar.

TEC concurs with the condition ratings from MassDOT routine underwater inspection report from December 2018.

The following estimate includes construction costs for recommended repairs noted above (See Table 1 (pg. 4) for costing breakdown; quantities are approximate):

- Embankment Slope Repairs
  - MassDOT Item 151.3 – GRAVEL BORROW FOR SLOPE TREATMENT (30cy)
- Guardrail Replacement
  - MassDOT Item 620.13 – GUARDRAIL, TL-3 (SINGLE FACED) (300ft)
  - MassDOT Item 627.73 – GUARDRAIL TANGENT END TREATMENT, TL-3 (2 each)
- Wingwall/Abutment Repairs
  - MassDOT Item 692 – BALANCE STONE WALL (100ft)
  - MassDOT Item 106.251 – CEMENT MORTAR FOR PATCHING (50cy)

**Cost Estimate****Table 1: Cost estimate for repairs – B-19-001**

<b>Middleton Road over Fish Brook (B-19-001)</b>	
<b>Cost Estimate</b>	
<b>Construction Costs</b>	\$113,000
Safety Improvements (guardrail replacement)	\$90,000
Maintenance (embankment slope and field stone repairs)	\$23,000
Engineering Cost (survey, design, permitting, const. oversight)	\$45,000
<b>Total</b>	<b>\$158,000</b>



**Figure 2: Bearing at the southwest corner - B-19-001**



**Figure 3: Impact damage to guardrail at northeast corner - B-19-001**





**Figure 4: Typical vegetation growth at northwest corner - B-19-001**



**Figure 5: Erosion/washout behind the north abutment (west fascia) - B-19-001**



**BRIDGE NO. B-19-002 (8RE) – MILL ROAD OVER FISH BROOK****General**

The bridge carries Mill Road over Fish Brook and is located just south of the intersection at Mill Road and Mill Run Road (Figure 6). Generally, the topside and the underside of the bridge had minor deficiencies but was in overall good condition. This bridge was built in 2004 and is listed on NBI in Massachusetts as of 2019 data. A routine bridge inspection report was performed at this location by MassDOT on May 16, 2019 (provided in Attachment B).



**Figure 6: Bridge roadway approach- B-19-002**

**Observations.**

There are leaves accumulated along both gutter lines for the length of the bridge. An area at the southeast corner of the roadway has material accumulation and appears to be a spot for water to puddle. There is vegetation growth present on the bridge rail, wingwalls, and under all approach guardrail (Figure 7). There is debris/ potential tree growth directly upstream of bridge, at the midspan of the channel mouth.

Generally, the HMA wearing surface is in good condition, equating to a 7 per the MassDOT bridge inspection condition rating guide. There are transverse cracks in the wearing surface (up to  $\sim 3/4$ " wide) at what appears to be the north and south abutment deck joints.

The bridge rail is an S3-TL4 type bridge railing with concrete transitions. There is three beam transition guardrail connected to all four concrete transitions as well as approach guardrail with ends buried. The S3-TL4 bridge railing has minor sporadic scrapes to the paint full length, both sides (Figure 8). The northwest approach guardrail end treatment has impact damage and is detached from one of the timber posts (Figure 9).

TEC field measured the curb reveal as approximately 7" (west) and 7 1/2" (east), which is consistent with the design plans. There is minor sporadic spalling along both curbs. There is a spall in the roadway face of the east curb measuring ( $\sim 18'' \times 3'' \times 1/2''$ ) with minor sporadic honeycombing along the top surface. There is similarly sized spalling at the top of the southeast and northwest concrete transitions ( $\sim 10'' \times 4'' \times 2''$ ) (Figure 10).

The breastwalls and wingwalls are precast concrete. All four wingwalls are U-wingwalls and contain some vegetation growth. Generally, the breastwalls and wingwalls are in good condition, equating to a 7 per the MassDOT bridge inspection condition rating guide. There is water staining on the breastwalls at both abutments beneath the east and west fascia girders.

TEC concurs with the condition ratings from the routine bridge inspection report performed by MassDOT in May 2019.

**Recommendations.**

Reattach the approach guardrail to the timber posts at the northwest corner. Repair and/or replace the northwest corner approach guardrail.

Perform minor concrete patch repairs to the spalls at the concrete transitions and both curbs using a concrete patching material.

Clear the roadway surface, bridge railing, and guardrail of any vegetation growth/debris buildup (typical bridge maintenance)

All these repairs are minor and can be readily made by the Town of Boxford DPW. Therefore, no cost estimate was prepared.





**Figure 7: Typical leaf accumulation and vegetation growth under all four guardrail approaches and transitions- B-19-002**



**Figure 8: Typical minor sporadic scrapes to S3-TL4 bridge railing - B-19-002**





**Figure 9: Impact damage to northwest approach guardrail - B-19-002**



**Figure 10: Spalling on southeast concrete transition - B-19-002**



**BRIDGE NO. B-19-003 (2R3) – LOCKWOOD LANE OVER FISH BROOK****General**

The bridge carries Lockwood Lane over Fish Brook and is located east of the intersection at Lockwood Lane and Middleton Road. This bridge was built in 1988 and is a box culvert consisting of two corrugated aluminum arches, two cast in place concrete headwalls, and four stone wingwalls. There are timber bridge railings traveling the bridge on both sides (Figure 11). The Fish Brook flows north to south under the roadway. This bridge is not listed on the NBI in Massachusetts as of 2019 data, but there was a routine bridge inspection report performed at this location by MassDOT on January 11, 2019 (provided in Attachment C).



**Figure 11: Bridge roadway approach (looking west) - B-19-003**

**Observations.**

There is a parking area near the southeast bridge approach and a pedestrian bridge at the southwest bridge approach. There is some minor longitudinal pavement cracking for the length of the bridge and transverse pavement cracking at the east and west bridge joints (Figure 12). The curbs were inaccessible as there was snow build up at the north/south gutter lines, and under the timber bridge rail. After a follow-up visit, it was determined that there are no curbs present along the bridge on either side. The pavement appeared to be in fair condition, equating to a 5 per the MassDOT bridge inspection condition rating guide.

There is no approach guardrail nor end treatments at any of the four corners of the bridge. The timber bridge railing and timber posts exhibit minor wood checking throughout (Figure 13). There are overhead wires on the north embankment and there is a utility pole located at the northwest side near the bridge rail. The entire structure is surrounded by vegetation with some embankment erosion upstream (north) and downstream (south).

Generally, both headwalls look sound from a visual inspection (Figure 14). The four wingwalls appear to be stacked stones with some minor voids and misalignment (Figure 15). Due to the water depth/stream flow rate, the corrugated aluminum arches were unable to be inspected by TEC.

For a condition assessment of this culvert, please refer to Attachment C of this report.

TEC concurs with the condition ratings from the culvert inspection report performed by MassDOT in Jan 2019.

### **Recommendations.**

To improve motorist safety, replace the timber bridge rail with standard guardrail and end-treatments.

To improve the structural integrity of bridge, realign wingwall stones and treat the north/south embankment slopes with rip rap.

Monitor the vegetation surrounding the bridge and the channel mouths. At the time of the inspection, the vegetation was not restricting the flow of water, but as growth continues, preventative maintenance measures may be necessary.

The following estimate includes construction costs for recommended repairs noted above (See Table 3 below for costing breakdown; quantities are approximate):

- Guardrail Replacement
  - MassDOT Item 620.13 – GUARDRAIL, TL-3 (SINGLE FACED) (250 ft)
  - MassDOT Item 627.73 – GUARDRAIL TANGENT END TREATMENT, TL-3 (2 each)
- Wingwall Repairs
  - MassDOT Item 983.1 - RIPRAP (10 TON)
  - MassDOT Item 692 – BALANCE STONE WALL (100 ft)

### **Cost Estimate**

**Table 3: Cost estimate for repairs – B-19-003**

<b>Lockwood Lane over Fish Brook (B-19-003)</b>	
<b>Cost Estimate</b>	
<b>Construction Costs</b>	<b>\$120,000</b>
<b>Safety Improvements (guardrail replacement)</b>	<b>\$90,000</b>
<b>Maintenance (wingwall repairs)</b>	<b>\$30,000</b>
<b>Engineering Cost</b>	<b>\$8,000</b>
<b>Total</b>	<b>\$128,000</b>





**Figure 12: Transverse pavement cracking at west bridge joint (looking south) - B-19-003**



**Figure 13: Typical wood checking in timber bridge railing (looking south) - B-19-003**





**Figure 14: Southern head wall and channel mouth (looking north) - B-19-003**



**Figure 15: Typical stone wingwall - B-19-003**

**BRIDGE NO. B-19-004 (89A) – FULLER LANE OVER FISH BROOK****General**

The bridge carries Fuller Lane over Fish Brook and is located east of the I95 underpass that spans Fuller Lane. The bridge is situated on the Topsfield/Boxford town line (Figure 16). When traveling east, Fuller lane turns into River Road. This bridge was built in 1985 and is precast concrete culvert consisting of six adjacent precast concrete beams and cast in place concrete headwalls. The west breastwall appears to be concrete and the east breastwall appears to be a cast in place concrete slab atop stone masonry. The Fish Brook flows North to South. There is W-beam guardrail over the bridge and at approaches both sides, with no defined transitions or end-treatments. This bridge is not listed on the NBI in Massachusetts as of 2019 data, but there was a routine bridge inspection report performed recently at this location by MassDOT on May 11, 2020 (provided in Attachment D).



**Figure 16: West bridge approach (looking east) – B-19-004**



**Observations**

There are overhead wires and utility poles on the southern embankment slope. There is a utility gas line spanning the bridge east to west at the north bridge fascia. At the east end of the gas line there is a utility support. This was the only utility support in place at the time of inspection (Figure 17).

There is new pavement that begins at the east approach near the Topsfield/Boxford town line. The adjacent, older pavement has random longitudinal cracking, predominantly at the gutter lines. A small pothole is present near the center of the roadway and connects to smaller longitudinal cracks. There is some minor transverse cracking. Generally, the wearing surface was in satisfactory condition (Figure 18), equating to a 6 per the MassDOT bridge inspection condition rating guide.

The guardrail is bolted to the concrete headwall over the bridge, on both sides. There is typical cracking, delamination, and sporadic areas of spalled concrete surrounding the guardrail baseplates. There is minor rust staining and impact damage to both guardrails. The south guardrail appears to be missing a post (Figure 19).

The south headwall was measured to be approximately, ~17" wide by ~21'-4" long. There are minor sporadic areas of spalls, cracks, and efflorescence along both headwalls. There is a spall in the south headwall that measures to be ~ (4' long by 4" wide by 2" deep). There is a horizontal crack at the north headwall fascia measuring ~ (5' long by 1/4" wide). On the south headwall, there is a concrete spall and exposed rusted rebar at the west fascia (Figure 20).

A south channel inspection was inaccessible with waders due to the water depth. A north channel inspection was limited due to the water depth. There was apparent undermining at the southwest wingwall adjacent to the west abutment (~3' wide by 1' tall by 2' deep).

Please refer to the May 2020 MassDOT routine inspection report provided in Attachment D, for additional information.

TEC concurs with the condition ratings from the routine inspection report performed by MassDOT in May 2020.

**Recommendations**

Remove and replace the top 7 inches of the headwall on both sides with cast in place concrete. Much of the repair areas are within the top 7 inches of the headwall. This repair would need to in conjunction with the traffic safety feature improvements.

To improve motorist safety, remove and replace the existing guardrail with a standard guardrail and proper end-treatments.

Ensure the utility gas line is properly supported and install additional supports if needed.

The following estimate includes construction costs for recommended repairs noted above (See Table 4 below for costing breakdown; quantities are approximate):

- Guardrail Replacement
  - MassDOT Item 620.13 – GUARDRAIL, TL-3 (SINGLE FACED) (350 ft)
  - MassDOT Item 627.73 – GUARDRAIL TANGENT END TREATMENT, TL-3 (2 each)
- Concrete Headwall Replacement
  - MassDOT Item 904.3 – 5000 PSI, ¾”, 685 HP CEMENT CONCRETE (2 cy)

**Cost Estimate**

Table 4: Cost estimate for repairs – B-19-004

Fuller Lane over Fish Brook (B-19-004)	
Cost Estimate	
Construction Costs	\$140,000
Safety Improvements (guardrail replacement)	\$90,000
Maintenance (headwall Replacement)	\$50,000
Engineering Cost (survey, design, permitting, const. oversight)	\$45,000
<i>Total</i>	\$185,000





**Figure 17: Utility gas line spanning the north bridge fascia – B-19-004**



**Figure 18: Typical wearing surface – B-19-004**





**Figure 19: Typical rust staining and impact damage to guardrail – B-19-004**



**Figure 20: Typical horizontal crack on headwall at guardrail baseplates – B-19-004**



**BRIDGE NO. B-19-005 (89B) – ENDICOTT ROAD OVER FISH BROOK****General**

The bridge carries Endicott Road over Fish Brook and is located just north of the Masconomet Regional High School and Middle School. This bridge was built in 1850 and rebuilt in 1900. There are timber bridge railings traveling the bridge on both sides (Figure 21). This bridge is not listed on the NBI in Massachusetts as of 2019 data, but there was a routine bridge inspection report performed at this location by MassDOT on May 7, 2020 (provided in Attachment E).



**Figure 21: North bridge approach (looking south) – B-19-005**

**Observations**

The pavement is in fair condition with minor sporadic cracking. There appears to be more significant wear towards both gutter lines, though it was covered in snow. There are fire hydrants present at the north and south bridge approaches on the east embankment. There are overhead wires present on the east embankment. The sidewalks were covered in snow during the preliminary inspection but were uncovered during follow-up visit (Figure 22). TEC measured the curb reveal to be approximately 5½”.

The east and west bridge railings consist of concrete posts with timber railings. Generally, there is heavy spalling all on all posts with exposed rusted rebar. The timber railings are not attached to the approach guardrail (concrete posts with wire rail). The approach guardrail has heavy spalling and exposed rusted rebar on the concrete posts with some missing posts. The wire rail is disconnected from the concrete posts and broken in some areas (Figure 23).

The west bridge elevation has heavy spalling with exposed rusted rebar along the full length of the west fascia and was covered in snow. There is a gas line spanning the west bridge fascia, but not connected to bridge. The east bridge elevation has a utility spanning the east fascia, above the wingwalls (Figure 24).

The Fish Brook was frozen over, and a wader inspection was inaccessible.

Please refer to the May 2020 MassDOT culvert inspection report provided in Attachment E, for additional information.

TEC concurs with the condition ratings from the routine inspection report performed by MassDOT in May 2020.

### **Recommendations**

To improve motorist safety, remove and replace the existing guardrail with a standard guardrail (approaches, transitions, and end-treatments).

Ensure the utilities spanning the east and west bridge fasciae are properly supported. Provide any additional support if needed.

The following estimate includes construction costs for recommended repairs noted above (See Table 5 below for costing breakdown; quantities are approximate):

- Guardrail Replacement
  - MassDOT Item 620.13 – GUARDRAIL, TL-3 (SINGLE FACED) (300ft)
  - MassDOT Item 627.73 – GUARDRAIL TANGENT END TREATMENT, TL-3 (2 each)



**Cost Estimate****Table 5: Cost estimate for repairs – B-19-005**

<b>Endicott Road over Fish Brook (B-19-005)</b>	
<b>Cost Estimate</b>	
<b>Construction Costs</b>	<b>\$90,000</b>
<b>Safety Improvements (guardrail replacement)</b>	<b>\$90,000</b>
<b>Engineering Cost (survey, design, permitting, const. oversight)</b>	<b>\$45,000</b>
<b>Total</b>	<b>\$135,000</b>

**Figure 22: Pavement condition along west gutter line – B-19-005**



**Figure 23: Typical condition of concrete posts at bridge approaches - B-19-005**



**Figure 24: Utility gas line spanning the west bridge fascia - B-19-005**



**BRIDGE NO. B-19-018 (C68) – BROOKVIEW ROAD OVER FISH BROOK****General**

The bridge carries Brookview Road over Fish Brook and is located south of the intersection at Brookview Road and Lawrence Road (Figure 25). The bridge is situated on a severe skew in relation to the roadway. The bridge appears to be comprised of precast concrete deck panels, a prestressed concrete deck slab, and a hot mixed asphalt (HMA) wearing surface. The abutments appear to be dry-laid stones. The Fish Brook flows west to east. Based on 2019 data, this bridge is not listed on the National Bridge Inventory (NBI) in Massachusetts, however MassDOT has performed multiple inspections on this bridge including: a routine and special member inspection in 2019, a special member inspection in early 2020, and a routine underwater inspection in late 2020. The corresponding inspection reports are provided in Attachment F.

The special member inspections were required due to an undermining failure at the north and south breastwalls (Figures 30 & 31). These deficiencies were repaired shortly after the 2019 and 2020 special member inspections performed by MassDOT.



**Figure 25: General bridge approach (looking north) – B-19-018**

**Observations**

Generally, the wearing surface is sound and appears to be placed directly on top of the prestressed concrete slab. There is minor sporadic cracking in the wearing surface along the length of the bridge. There is embankment erosion at all four corners of the bridge, exhibiting the prestressed concrete slab ends to be visible (Figure 26).

The guardrail traveling the bridge is a steel W-beam guardrail embedded into the concrete slab. Both guardrails are non-standard. The approach guardrail is loose and can be moved with foot pressure (Figure 27).

The abutments and U-wingwalls consist of dry-laid stones with evidence of concrete repairs on both breastwalls. The repairs are irregular in nature and are bulged to form around stones. The U-wingwalls are irregular with multiple areas of fill spilling through stones. There are voids present between all dry-laid stones up to ~3" deep at abutments. The northwest wingwall is bulging ~2' out of plane (Figure 28). There is undermining at the northwest breastwall/wingwall measuring ~ (18" deep by 7' long). From foot probing, there appears to be multiple areas of scour present along both abutments. The Fish Brook is traveling with moderate velocity and the stream appears to get deeper as you move downstream.

There is debris build-up in the upstream (west) channel ~ (7' long by 2' tall by 2' wide) consisting of sticks, leaves, brush, etc. Generally, the underside of the beams is sound, and each beam is ~5' wide. The two fascia beams overhang the abutments at all four corners (up to ~20") (Figure 29). There is minor longitudinal cracking and delamination throughout the underside of the beams.

Please refer to Attachment F for more information on this bridge provided in MassDOT inspection reports.

TEC concurs with the condition ratings from the inspection reports performed by MassDOT in 2019 and 2020.



### **Recommendations**

To improve motorist safety, TEC recommends removing and replacing the existing guardrail with standard guardrail (proper approaches, transitions, and end treatments).

Perform substructure/embankment repairs including realigning wingwalls, patching voids in stones, riprap treatment adjacent to channel mouths, and undermining repairs.

The following estimate includes construction costs for recommended repairs noted above (See Table 6 below for costing breakdown; quantities are approximate):

- Guardrail Replacement
  - MassDOT Item 620.13 – GUARDRAIL, TL-3 (SINGLE FACED) (300ft)
  - MassDOT Item 627.73 – GUARDRAIL TANGENT END TREATMENT, TL-3 (2 each)
- Substructure/embankment Repairs
  - MassDOT Item 692 – BALANCE STONE WALL (100ft)
  - MassDOT Item 151.3 – GRAVEL BORROW FOR SLOPE TREATMENT (50cy)
  - MassDOT Item 106.251 – CEMENT MORTAR FOR PATCHING (50cy)
  - MassDOT Item 983.1 - RIPRAP (15 TON)

### **Cost Estimate**

**Table 6: Cost estimate for repairs – B-19-018**

<b>Brookview Road over Fish Brook (B-19-018)</b>	
<b>Cost Estimate</b>	
<b>Construction Costs</b>	\$146,500
<b>Safety Improvements (guardrail replacement)</b>	\$90,000
<b>Maintenance (substructure/embankment repairs)</b>	\$56,500
<b>Engineering Cost (survey, design, permitting, const. oversight)</b>	\$65,000
<b>Total</b>	<b>\$211,500</b>



**Figure 26: Typical exposed prestressed slab at northeast corner – B-19-018**



**Figure 27: Typical guardrail over bridge (looking south) – B-19-018**





**Figure 28: Northwest wingwall bulging out of plane – B-19-018**



**Figure 29: Beam overhang at north abutment – B-19-018**





**Figure 30: Typical breastwall undermining repair – B-19-018**



**Figure 31: Typical breastwall undermining repair – B-19-018**

## **CONCLUSIONS**

Overall, the bridges in Boxford are in fair condition. Most of the bridges do not have traffic safety features that meet the current crash-tested standards. TEC recommends continued routine maintenance and inspection at these bridges. Below, TEC has outlined approximate programmatic costs for the maintenance repairs of these structures. The traffic safety feature improvements are not considered below but should be pursued at the Town's discretion.

<b>Boxford Bridge Asset Management</b>	
<b>Construction Cost Estimate</b>	
<b>Repairs within the next 5 years</b>	<b>\$53,000</b>
Middleton Road Maintenance Repairs	\$23,000
Brookview Road Maintenance Repairs	\$30,000
<b>Repairs within 5-10 years</b>	<b>\$175,000</b>
Lockwood Lane Maintenance Repairs	\$30,000
Fuller Lane Repairs and Traffic Safety Features	\$140,000
<b>Repairs within 15-20 years</b>	
Replacement of Brookview Rd over Fish Brook	<b>\$1,500,000</b>

**ATTACHMENT A: MIDDLETON ROAD OVER FISH BROOK (B-19-001)**

- ROUTINE UNDERWATER INSPECTION REPORT PERFORMED BY MASSDOT  
ON DECEMBER 28, 2018



2-DIST  
**04**B.I.N.  
**899****UNDERWATER OPERATIONS TEAM**  
**ROUTINE UNDERWATER INSPECTION REPORT**BR. DEPT. NO.  
**B-19-001**

CITY/TOWN <b>BOXFORD</b>		8-STRUCTURE NO. <b>B19001-899-MUN-CUL</b>		LEVEL OF INSPECTION <b>II</b>	93B-DATE INSPECTED <b>DEC 28, 2018</b>
07-FACILITY CARRIED <b>HWY MIDDLETON RD</b>		ACCESS TO BRIDGE <b>EMBANKMENT</b>		UNDERWATER OPERATIONS ENGINEER <b>RANDI E. BONICA</b>	
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>		DEPTH <b>1.2 m</b>	VISIBILITY <b>1 m</b>	TEAM LEADER (DIVE MASTER) <b>WILLIAM J. COLLERAN</b>	Report submitted by:
BOTTOM CONDITION <b>GRAVEL, COBBLES, BOULDERS</b>		CURRENT <b>MODERATE</b>	TEAM MEMBERS <b>R. E. BONICA, K. CARR</b>		

ITEM 60		5	ITEM 61		5	ITEM 62		N
SUBSTRUCTURE		DEF	CHANNEL & CHANNEL PROTECTION		DEF	CULVERTS		DEF
<b>1. Abutments</b>	5		<b>1. Channel Scour</b>	5	-	<b>1. Roof</b>	N	-
a. Pedestals	N	-	<b>2. Embankment Erosion</b>	5	-	<b>2. Floor</b>	N	-
b. Bridge Seats	N	-	<b>3. Debris</b>	5	M-P	<b>3. Walls</b>	N	-
c. Backwalls	N	-	<b>4. Vegetation</b>	6	M-P	<b>4. Headwall</b>	N	-
d. Breastwalls	5	M-P	<b>5. Utilities</b>	7	-	<b>5. Wingwall</b>	N	-
e. Wingwalls	6	-	<b>6. Rip-Rap/Slope Protection</b>	N	-	<b>6. Pipe</b>	N	-
f. Slope Paving/Rip-Rap	N	-	<b>7. Aggradation</b>	7	-	<b>7. Protective Coating</b>	N	-
g. Pointing	N	-	<b>8. Fender System</b>	N	-	<b>8. Embankment</b>	N	-
h. Footings/Cribbing	7	-	a. Piles	N	-	<b>9. Wearing Surface</b>	N	-
i. Piles	X	-	b. Diagonal Bracing	N	-	<b>10. Railing</b>	N	-
j. Scour	5	-	c. Horizontal Bracing	N	-	<b>11. Sidewalks</b>	N	-
k. Settlement	5	M-P	d. Wales	N	-	<b>12. Utilities</b>	N	-
l.	N	-	e. Fasteners	N	-	<b>13. Member Alignment</b>	N	-
<b>2. Piers or Bents</b>	N		f. Ladders	N	-	<b>14. Deformation</b>	N	-
a. Pedestals	N	-	<b>9.</b>	N	-	<b>15. Scour</b>	N	-
b. Caps	N	-	<b>ITEM 59 SUPERSTRUCTURE</b>			<b>16. Settlement</b>	N	-
c. Columns	N	-		N	DEF	<b>17.</b>	N	-
d. Stems/Webs/Pierwalls	N	-		N	-	<b>18.</b>	N	-
e. Pointing	N	-		N	-	<b>UNDERMINING (Y/N)</b>		
f. Footing	N	-		N	-	<b>N</b>		
g. Piles	N	-	<b>DEFICIENCY REPORTING GUIDE</b>					
h. Scour	N	-	<b>DEFICIENCY:</b> A defect in a structure that requires corrective action.					
i. Settlement	N	-	<b>CATEGORIES OF DEFICIENCIES:</b>					
j.	N	-	<b>M= Minor Deficiency-</b> Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.					
k.	N	-	<b>S= Severe/Major Deficiency-</b> Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.					
<b>3. Pile Bents</b>	N		<b>C-S= Critical Structural Deficiency-</b> A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.					
a. Pile Caps	N	-	<b>C-H= Critical Hazard Deficiency-</b> A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.					
b. Piles	N	-	<b>URGENCY OF REPAIR:</b>					
c. Diagonal Bracing	N	-	<b>I=Immediate-</b> [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]					
d. Horizontal Bracing	N	-	<b>A=ASAP-</b> [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]					
e. Fasteners	N	-	<b>P=Prioritize-</b> [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]					
<b>UNDERMINING (Y/N)</b>		<b>N</b>						

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>899</b>	BR. DEPT. NO. <b>B-19-001</b>	8.-STRUCTURE NO. <b>B19001-899-MUN-CUL</b>	INSPECTION DATE <b>DEC 28, 2018</b>
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## REMARKS

### **GENERAL REMARKS**

This bridge is a single span structure with dry-laid fieldstone abutments with concrete caps for bridge seats and concrete deck beams for a bridge deck.

#### **Orientation:**

Abutments are labeled left and right when facing downstream. Sta 10+00 is at the downstream end. The upstream end is Sta 10+27.

### **ITEM 60 - SUBSTRUCTURE**

#### **Item 60.1 - Abutments**

##### **Item 60.1.d - Breastwalls**

**Left Abutment:** The breastwall consists of dry-laid, irregular fieldstones. There are random loose and missing chinking stones in the breastwall. Maximum penetration into open joints is 3'+. There are random cracked stones in the breastwall.

There is an area of bulging stones at the approximate mid-length of the breastwall. The area is approximately 8' long and extends from the mudline to the concrete bridge seat. The stones are bulging approximately 1'. This condition is probably from the original construction.

There is a void at Sta 10+25 to 10+27 at the top of the breastwall measuring 2.0' long, 1.0' high and 3.0' penetration.

**Right Abutment:** The breastwall consists of dry-laid, irregular fieldstones. There are random loose and missing chinking stones in the breastwall. Maximum penetration into open joints is 3'+.

There is a 1/2" wide crack at Sta 10+06 in the stone 2.5' below the deck. There are random cracked stones up to 1/8" wide in the breastwall.

There is an area of bulging stones at the approximate mid-length of the breastwall. The area is approximately 6' long and 3' high and begins approximately 3' below the top of the breastwall. The stones are bulging approximately 1'. This condition is probably from the original construction.

##### **Item 60.1.e - Wingwalls**

Wingwalls have random cracked stones. Maximum penetration is 3' between stones.

**Left Abutment:** The downstream left wingwall, approximately 3' downstream of the bridge, has an area of collapsed fieldstones measuring 4' long, 2' high and 2' penetration. This condition appears to be caused by roadway runoff.

##### **Item 60.1.h - Footings/Cribbing**

**Right Abutment:** Timber cribbing is exposed from Sta 10+16 to 10+28. Height of timber is 1'. There are isolated penetrations under the timber of 0.5'.

##### **Item 60.1.j - Scour**

**Right Abutment:** Timber cribbing is exposed from Sta 10+16 to 10+28. Height of timber is 1'. There are isolated penetrations under the timber of 0.5'.

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>899</b>	BR. DEPT. NO. <b>B-19-001</b>	8.-STRUCTURE NO. <b>B19001-899-MUN-CUL</b>	INSPECTION DATE <b>DEC 28, 2018</b>
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## REMARKS

### **Item 60.1.k - Settlement**

**Left Abutment:** The breastwall consists of dry-laid, irregular fieldstones. There are random loose and missing chinking stones in the breastwall. Maximum penetration into open joints is 3'+. There are random cracked stones in the breastwall.

There is an area of bulging stones at the approximate mid-length of the breastwall. The area is approximately 8' long and extends from the mudline to the concrete bridge seat. The stones are bulging approximately 1'. This condition is probably from the original construction.

There is a void at Sta 10+25 to 10+27 at the top of the breastwall measuring 2.0' long, 1.0' high and 3.0' penetration.

**Right Abutment:** The breastwall consists of dry-laid, irregular fieldstones. There are random loose and missing chinking stones in the breastwall. Maximum penetration into open joints is 3'+.

There is a 1/2" wide crack at Sta 10+06 in the stone 2.5' below the deck. There are random cracked stones up to 1/8" wide in the breastwall.

There is an area of bulging stones at the approximate mid-length of the breastwall. The area is approximately 6' long and 3' high and begins approximately 3' below the top of the breastwall. The stones are bulging approximately 1'. This condition is probably from the original construction.

**Left Abutment Wingwall:** The downstream left wingwall, approximately 3' downstream of the bridge, has an area of collapsed fieldstones measuring 4' long, 2' high and 2' penetration. This condition appears to be caused by roadway runoff.

### **ITEM 61 - CHANNEL AND CHANNEL PROTECTION**

#### **Item 61.1 - Channel Scour**

**Right Abutment:** Timber cribbing is exposed from Sta 10+16 to 10+28. Height of timber is 1'. There are isolated penetrations under the timber of 0.5'.

#### **Item 61.2 - Embankment Erosion**

The upstream and downstream embankments are eroded.

#### **Item 61.3 - Debris**

There are several trees up to 1.5' in diameter across the channel at the upstream end. There is recent beaver activity at the bridge.

#### **Item 61.4 - Vegetation**

There are vines at the upstream end hanging into the water.

#### **Item 61.5 - Utilities**

There is a 6" diameter Boxford Fire Department intake pipe which extends into the center of the stream at the downstream left embankment. The end of the pipe is free of debris.

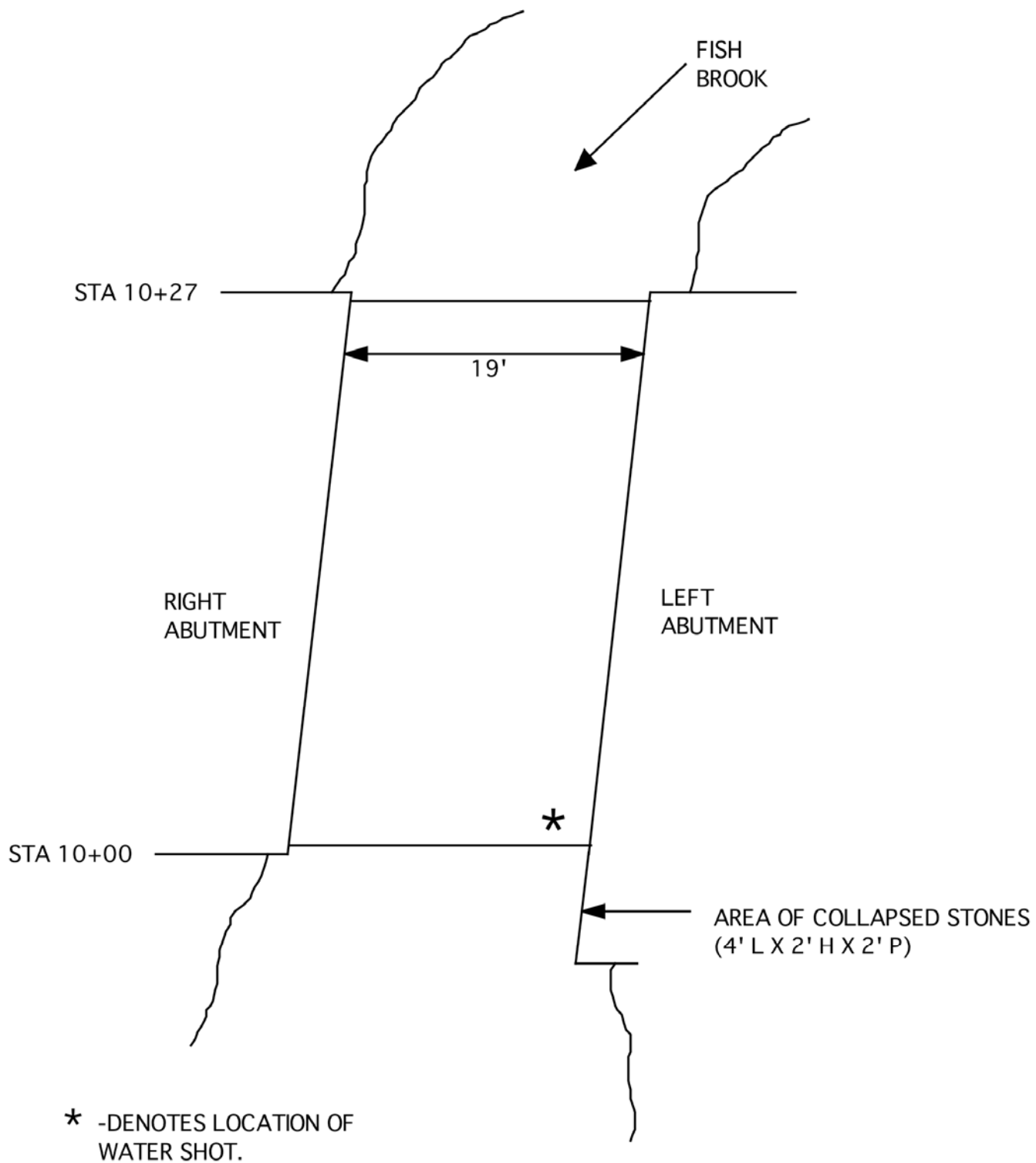
#### **Sketch / Chart Log**

Sketch 1 : PLAN VIEW - NOT TO SCALE

Chart 1 : SCOUR MONITORING CHART AT DOWNSTREAM END



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>899</b>	BR. DEPT. NO. <b>B-19-001</b>	8.-STRUCTURE NO. <b>B19001-899-MUN-CUL</b>	INSPECTION DATE <b>DEC 28, 2018</b>
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**SKETCHES****Sketch 1: PLAN VIEW - NOT TO SCALE**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>899</b>	BR. DEPT. NO. <b>B-19-001</b>	8.-STRUCTURE NO. <b>B19001-899-MUN-CUL</b>	INSPECTION DATE <b>DEC 28, 2018</b>
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## CHARTS

	3/11/03	3/10/06	5/6/09	12/28/12	12/15/15	12/28/18	
LEFT ABUTMENT	2.3'	2.8'	3.1'	3.1'	3.1'	3.1	
C/L SPAN	3.6'	3.8'	3.8'	3.7'	3.7'	3.9	
RIGHT ABUTMENT	2.3'	2.9'	3.4'	3.0'	3.0'	3.1	
Y	2.6'	3.7'	3.3'	2.0'	4.0'	3.2	
CORRECTION FACTOR	---	+1.1'	+0.7'	-0.6'	+1.4'	+0.6'	

**NOTES:**

1. Y =WATERLINE TO BOTTOM OF BRIDGE DECK AT DOWNSTREAM END, LEFT ABUTMENT.
2. SOUNDINGS ADJUSTED TO 3/11/03 WATERLINE WITH CORRECTION FACTOR.
3. STA 10+00 IS AT THE DOWNSTREAM END.

**Chart 1: SCOUR MONITORING CHART AT DOWNSTREAM END**

Report Date: November 20, 2020

State Information				Classification				Code				
<b>BDEPT#= B19001</b>				Agency Br.No.				(112) NBIS Bridge Length				N
<b>Town= Boxford</b>				L.O.				(104) Highway System				N
<b>B.I.N= 899</b>				AASHTO= 029.0				(26) Functional Class - Urban Local				19
RANK= 0 H.I.= 0				FHWA Select List= N (6/21/2017)				(100) Defense Highway				1
(8) Structure Number				B19001899MUNCUL				(101) Parallel Structure				?
(5) Inventory Route								(102) Direction of Traffic -				?
(2) State Highway Department District				04				(103) Temporary Structure				N
(3) County Code 009 (4) Place code				07420				(105) Federal Lands Highways				0
(6) Features Intersected				<b>WATER FISH BROOK</b>				(110) Designated National Network				N
(7) Facility Carried				<b>HWY MIDDLETON RD</b>				(20) Toll -				
(9) Location								(21) Maintain - Town Agency				03
(11) Kilometerpoint				0000.000				(22) Owner - Town Agency				03
(12) Base Highway Network				N				(37) Historical Significance				undetermined
(13) LRS Inventory Route & Subroute				000000000000				<b>Condition</b>				<b>Code</b>
(16) Latitude				42 DEG 38 MIN 46.44 SEC				(58) Deck				N
(17) Longitude				70 DEG 59 MIN 45.60 SEC				(59) Superstructure				N
(98) Border Bridge State Code				Share %				(60) Substructure				5
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				5
								(62) Culverts				N
<b>Structure Type and Material</b>								<b>Load Rating and Posting</b>				<b>Code</b>
(43) Structure Type Main:				Code ???				(31) Design Load -				?
				Jointless bridge type: Not applicable				(63) Operating Rating Method - Allowable Stress (AS)				2
(44) Structure Type Appr:				Code ???				(64) Operating Rating				00.0
(45) Number of spans in main unit				001				(65) Inventory Rating Method - Allowable Stress (AS)				2
(46) Number of approach spans				0000				(66) Inventory Rating				00.0
(107) Deck Structure Type -				Code ?				(70) Bridge Posting				0
(108) Wearing Surface / Protective System:								(41) Structure - Open				A
A) Type of wearing surface -				Code ?				<b>Appraisal</b>				<b>Code</b>
B) Type of membrane -				Code ?				(67) Structural Evaluation				2
C) Type of deck protection -				Code ?				(68) Deck Geometry				N
								(69) Underclearances, vert. and horiz.				N
								(71) Waterway adequacy				
<b>Age and Service</b>								(72) Approach Roadway Alignment				
(27) Year Built				1850				(36) Traffic Safety Features				
(106) Year Reconstructed				1900				(113) Scour Critical Bridges				N
(42) Type of Service: On -								<b>Inspections</b>				
Under -				Code				(90) Inspection Date 00/00/00				(91) Frequency 24 MO
(28) Lanes: On Structure 00				Under structure 00				(92) Critical Feature Inspection:				(93) CFI DATE
(29) Average Daily Traffic				000000				(A) Fracture Critical Detail				N 00 MO A) 00/00/00
(30) Year of ADT 2000 (109) Truck ADT				00 %				(B) Underwater Inspection				Y 36 MO B) 12/28/18
(19) Bypass, detour length				000 KM				(C) Other Special Inspection				N 00 MO C) 00/00/00
<b>Geometric Data</b>								(*) Other Inspection ( )				N 00 MO *) 00/00/00
(48) Length of maximum span				0001.2 M				(*) Closed Bridge				N 00 MO *) 00/00/00
(49) Structure Length				00004.9 M				(*) UW Special Inspection				N 00 MO *) 00/00/00
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M								(*) Damage Inspection				MO *) 00/00/00
(51) Bridge Roadway Width Curb to Curb				000.0 M				<b>Rating Loads</b>				
(52) Deck Width Out to Out				000.0 M				Report Date 00/00/00				H20 Type 3 Type 3S2 Type HS
(32) Approach Roadway Width (w/shoulders)				000.0 M				Operating				0.0 0.0 0.0 0.0
(33) Bridge Median -				Code ?				Inventory				0.0 0.0 0.0 0.0
(34) Skew 00 DEG (35) Structure Flared				N				<b>Field Posting</b>				
(10) Inventory Route MIN Vert Clear				00.00 M				Status				Posting Date 00/00/00
(47) Inventory Route Total Horiz Clear				00.0 M				2 Axle 3 Axle 5 Axle Single				
(53) Min Vert Clear Over Bridge Rdwy				00.00 M				Actual				
(54) Min Vert Underclear ref				H 00.00 M				Recommended				
(55) Min Lat Underclear RT ref				H 00.0 M				Missing Signs N				
(56) Min Lat Underclear LT				00.0 M				<b>Misc.</b>				
<b>Navigation Data</b>								Bridge Name				
(38) Navigation Control -				Code ?				N Anti-missile fence N Acrow Panel N Jointless Bridge				
(111) Pier Protection				Code ?				Freeze/Thaw N : Not Applicable				
(39) Navigation Vertical Clearance				000.0 M				<b>Accessibility (Needed/Used)</b>				
(116) Vert-lift Bridge Nav Min Vert Clear				M				N / N Liftbucket N / N Rigging N / N Other				
(40) Navigation Horizontal Clearance				0000.0 M				N / N Ladder N / N Staging				
								N / N Boat N / N Traffic Control				
								N / N Wader N / N RR Flagperson				Inspection
								N / N Inspector 50 N / N Police				Hours: 006



## **ATTACHMENT B: MILL ROAD OVER FISH BROOK (B-19-002)**

- ROUTINE BRIDGE INSPECTION REPORT PERFORMED BY MASSDOT ON MAY 16, 2019
- EXISTING BRIDGE PLANS, DATED: APRIL 2002

## STRUCTURES INSPECTION FIELD REPORT

BR. DEPT. NO.

B-19-002

2-DIST

04

B.I.N.

8RE

## ROUTINE INSPECTION

CITY/TOWN <b>BOXFORD</b>	8-STRUCTURE NO. <b>B19002-8RE-MUN-NBI</b>	11-Kilo. POINT <b>000.660</b>	41-STATUS <b>A:OPEN</b>	90-ROUTINE INSP. DATE <b>MAY 16, 2019</b>
07-FACILITY CARRIED <b>HWY MILL ROAD</b>	MEMORIAL NAME/LOCAL NAME	27-YR BUILT <b>2004</b>	106-YR REBUILT <b>0000</b>	YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>	26-FUNCTIONAL CLASS <b>Rural Local</b>	DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>501 : Prestressed Concrete Slab</b>	22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER <b>P. Burke</b>	
107-DECK TYPE <b>2 : Concrete Precast Panels</b>	WEATHER <b>Clear</b>	TEMP. (air) <b>13°C</b>	TEAM MEMBERS <b>O. MOUSTAFA</b>	

<b>ITEM 58</b> <b>DECK</b> <table border="1"> <tr> <td></td> <td><b>7</b></td> <td>DEF</td> </tr> <tr><td>1. Wearing surface</td><td>7</td><td>M-P</td></tr> <tr><td>2. Deck Condition</td><td>7</td><td>-</td></tr> <tr><td>3. Stay in Place Forms</td><td>N</td><td>-</td></tr> <tr><td>4. Curbs</td><td>7</td><td>-</td></tr> <tr><td>5. Median</td><td>N</td><td>-</td></tr> <tr><td>6. Sidewalks</td><td>N</td><td>-</td></tr> <tr><td>7. Parapets</td><td>7</td><td>-</td></tr> <tr><td>8. Railing</td><td>7</td><td>-</td></tr> <tr><td>9. Anti Missile Fence</td><td>N</td><td>-</td></tr> <tr><td>10. Drainage System</td><td>N</td><td>-</td></tr> <tr><td>11. Lighting Standards</td><td>N</td><td>-</td></tr> <tr><td>12. Utilities</td><td>N</td><td>-</td></tr> <tr><td>13. Deck Joints</td><td>7</td><td>M-P</td></tr> <tr><td>14.</td><td>N</td><td>-</td></tr> <tr><td>15.</td><td>N</td><td>-</td></tr> <tr><td>16.</td><td>N</td><td>-</td></tr> </table> CURB REVEAL (In millimeters) <table border="1"> <tr> <td>E</td> <td>W</td> </tr> <tr> <td>250</td> <td>250</td> </tr> </table> <b>APPROACHES</b> <table border="1"> <tr> <td></td> <td>DEF</td> </tr> <tr><td>a. Appr. pavement condition</td><td>7</td></tr> <tr><td>b. Appr. Roadway Settlement</td><td>8</td></tr> <tr><td>c. Appr. Sidewalk Settlement</td><td>N</td></tr> <tr><td>d.</td><td>N</td></tr> </table> <b>OVERHEAD SIGNS</b> (Y/N) <b>N</b> <table border="1"> <tr> <td></td> <td>DEF</td> </tr> <tr><td>a. Condition of Welds</td><td>N</td></tr> <tr><td>b. Condition of Bolts</td><td>N</td></tr> <tr><td>c. Condition of Signs</td><td>N</td></tr> </table>		<b>7</b>	DEF	1. Wearing surface	7	M-P	2. Deck Condition	7	-	3. Stay in Place Forms	N	-	4. Curbs	7	-	5. Median	N	-	6. Sidewalks	N	-	7. Parapets	7	-	8. Railing	7	-	9. Anti Missile Fence	N	-	10. Drainage System	N	-	11. Lighting Standards	N	-	12. Utilities	N	-	13. Deck Joints	7	M-P	14.	N	-	15.	N	-	16.	N	-	E	W	250	250		DEF	a. Appr. pavement condition	7	b. Appr. Roadway Settlement	8	c. Appr. Sidewalk Settlement	N	d.	N		DEF	a. Condition of Welds	N	b. Condition of Bolts	N	c. Condition of Signs	N	<b>ITEM 59</b> <b>SUPERSTRUCTURE</b> <table border="1"> <tr> <td></td> <td><b>7</b></td> <td>DEF</td> </tr> <tr><td>1. Stringers</td><td>N</td><td>-</td></tr> <tr><td>2. Floorbeams</td><td>N</td><td>-</td></tr> <tr><td>3. Floor System Bracing</td><td>N</td><td>-</td></tr> <tr><td>4. Girders or Beams</td><td>7</td><td>-</td></tr> <tr><td>5. Trusses - General</td><td>N</td><td>-</td></tr> <tr><td>    a. Upper Chords</td><td>N</td><td>-</td></tr> <tr><td>    b. Lower Chords</td><td>N</td><td>-</td></tr> <tr><td>    c. Web Members</td><td>N</td><td>-</td></tr> <tr><td>    d. Lateral Bracing</td><td>N</td><td>-</td></tr> <tr><td>    e. Sway Bracings</td><td>N</td><td>-</td></tr> <tr><td>    f. Portals</td><td>N</td><td>-</td></tr> <tr><td>    g. End Posts</td><td>N</td><td>-</td></tr> <tr><td>6. Pin &amp; Hangers</td><td>N</td><td>-</td></tr> <tr><td>7. Conn Plt's, Gussets &amp; Angles</td><td>N</td><td>-</td></tr> <tr><td>8. Cover Plates</td><td>N</td><td>-</td></tr> <tr><td>9. Bearing Devices</td><td>H</td><td>-</td></tr> <tr><td>10. Diaphragms/Cross Frames</td><td>N</td><td>-</td></tr> <tr><td>11. Rivets &amp; Bolts</td><td>N</td><td>-</td></tr> <tr><td>12. Welds</td><td>N</td><td>-</td></tr> <tr><td>13. Member Alignment</td><td>8</td><td>-</td></tr> <tr><td>14. Paint/Coating</td><td>N</td><td>-</td></tr> <tr><td>15.</td><td>N</td><td>-</td></tr> </table> Year Painted <b>N</b>  COLLISION DAMAGE: Please explain None (X) Minor ( ) Moderate ( ) Severe ( ) LOAD DEFLECTION: Please explain None (X) Minor ( ) Moderate ( ) Severe ( ) LOAD VIBRATION: Please explain None (X) Minor ( ) Moderate ( ) Severe ( )  Any Fracture Critical Member: (Y/N) <b>N</b> Any Cracks: (Y/N) <b>N</b>		<b>7</b>	DEF	1. Stringers	N	-	2. Floorbeams	N	-	3. Floor System Bracing	N	-	4. Girders or Beams	7	-	5. Trusses - General	N	-	a. Upper Chords	N	-	b. Lower Chords	N	-	c. Web Members	N	-	d. Lateral Bracing	N	-	e. Sway Bracings	N	-	f. Portals	N	-	g. End Posts	N	-	6. Pin & Hangers	N	-	7. Conn Plt's, Gussets & Angles	N	-	8. Cover Plates	N	-	9. Bearing Devices	H	-	10. Diaphragms/Cross Frames	N	-	11. Rivets & Bolts	N	-	12. Welds	N	-	13. Member Alignment	8	-	14. Paint/Coating	N	-	15.	N	-	<b>ITEM 60</b> <b>SUBSTRUCTURE</b> <table border="1"> <tr> <td></td> <td><b>8</b></td> <td>DEF</td> </tr> <tr><td>1. Abutments</td><td>8</td><td>-</td></tr> <tr><td>    a. Pedestals</td><td>N</td><td>N</td></tr> <tr><td>    b. Bridge Seats</td><td>N</td><td>H</td></tr> <tr><td>    c. Backwalls</td><td>N</td><td>H</td></tr> <tr><td>    d. Breastwalls</td><td>N</td><td>8</td></tr> <tr><td>    e. Wingwalls</td><td>N</td><td>7</td></tr> <tr><td>    f. Slope Paving/Rip-Rap</td><td>N</td><td>8</td></tr> <tr><td>    g. Pointing</td><td>N</td><td>N</td></tr> <tr><td>    h. Footings</td><td>N</td><td>N</td></tr> <tr><td>    i. Piles</td><td>N</td><td>H</td></tr> <tr><td>    j. Scour</td><td>N</td><td>8</td></tr> <tr><td>    k. Settlement</td><td>N</td><td>8</td></tr> <tr><td>    l.</td><td>N</td><td>N</td></tr> <tr><td>    m.</td><td>N</td><td>N</td></tr> <tr><td>2. Piers or Bents</td><td>N</td><td>-</td></tr> <tr><td>    a. Pedestals</td><td>N</td><td>N</td></tr> <tr><td>    b. Caps</td><td>N</td><td>N</td></tr> <tr><td>    c. Columns</td><td>N</td><td>N</td></tr> <tr><td>    d. Stems/Webs/Pierwalls</td><td>N</td><td>N</td></tr> <tr><td>    e. Pointing</td><td>N</td><td>N</td></tr> <tr><td>    f. Footing</td><td>N</td><td>N</td></tr> <tr><td>    g. Piles</td><td>N</td><td>N</td></tr> <tr><td>    h. Scour</td><td>N</td><td>N</td></tr> <tr><td>    i. Settlement</td><td>N</td><td>N</td></tr> <tr><td>    j.</td><td>N</td><td>N</td></tr> <tr><td>    k.</td><td>N</td><td>N</td></tr> <tr><td>3. Pile Bents</td><td>N</td><td>-</td></tr> <tr><td>    a. Pile Caps</td><td>N</td><td>N</td></tr> <tr><td>    b. Piles</td><td>N</td><td>N</td></tr> <tr><td>    c. Diagonal Bracing</td><td>N</td><td>N</td></tr> <tr><td>    d. Horizontal Bracing</td><td>N</td><td>N</td></tr> <tr><td>    e. Fasteners</td><td>N</td><td>N</td></tr> </table> UNDERMINING (Y/N) If YES please explain <b>N</b>  COLLISION DAMAGE: None (X) Minor ( ) Moderate ( ) Severe ( ) SCOUR: Please explain None (X) Minor ( ) Moderate ( ) Severe ( )  I-60 (Dive Report): <b>N</b> I-60 (This Report): <b>8</b> 93B-U/W (DIVE) Insp <b>00/00/0000</b>		<b>8</b>	DEF	1. Abutments	8	-	a. Pedestals	N	N	b. Bridge Seats	N	H	c. Backwalls	N	H	d. Breastwalls	N	8	e. Wingwalls	N	7	f. Slope Paving/Rip-Rap	N	8	g. Pointing	N	N	h. Footings	N	N	i. Piles	N	H	j. Scour	N	8	k. Settlement	N	8	l.	N	N	m.	N	N	2. Piers or Bents	N	-	a. Pedestals	N	N	b. Caps	N	N	c. Columns	N	N	d. Stems/Webs/Pierwalls	N	N	e. Pointing	N	N	f. Footing	N	N	g. Piles	N	N	h. Scour	N	N	i. Settlement	N	N	j.	N	N	k.	N	N	3. Pile Bents	N	-	a. Pile Caps	N	N	b. Piles	N	N	c. Diagonal Bracing	N	N	d. Horizontal Bracing	N	N	e. Fasteners	N	N
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	<b>7</b>	DEF																																																																																																																																																																																																																																																	
1. Stringers	N	-																																																																																																																																																																																																																																																	
2. Floorbeams	N	-																																																																																																																																																																																																																																																	
3. Floor System Bracing	N	-																																																																																																																																																																																																																																																	
4. Girders or Beams	7	-																																																																																																																																																																																																																																																	
5. Trusses - General	N	-																																																																																																																																																																																																																																																	
a. Upper Chords	N	-																																																																																																																																																																																																																																																	
b. Lower Chords	N	-																																																																																																																																																																																																																																																	
c. Web Members	N	-																																																																																																																																																																																																																																																	
d. Lateral Bracing	N	-																																																																																																																																																																																																																																																	
e. Sway Bracings	N	-																																																																																																																																																																																																																																																	
f. Portals	N	-																																																																																																																																																																																																																																																	
g. End Posts	N	-																																																																																																																																																																																																																																																	
6. Pin & Hangers	N	-																																																																																																																																																																																																																																																	
7. Conn Plt's, Gussets & Angles	N	-																																																																																																																																																																																																																																																	
8. Cover Plates	N	-																																																																																																																																																																																																																																																	
9. Bearing Devices	H	-																																																																																																																																																																																																																																																	
10. Diaphragms/Cross Frames	N	-																																																																																																																																																																																																																																																	
11. Rivets & Bolts	N	-																																																																																																																																																																																																																																																	
12. Welds	N	-																																																																																																																																																																																																																																																	
13. Member Alignment	8	-																																																																																																																																																																																																																																																	
14. Paint/Coating	N	-																																																																																																																																																																																																																																																	
15.	N	-																																																																																																																																																																																																																																																	
	<b>8</b>	DEF																																																																																																																																																																																																																																																	
1. Abutments	8	-																																																																																																																																																																																																																																																	
a. Pedestals	N	N																																																																																																																																																																																																																																																	
b. Bridge Seats	N	H																																																																																																																																																																																																																																																	
c. Backwalls	N	H																																																																																																																																																																																																																																																	
d. Breastwalls	N	8																																																																																																																																																																																																																																																	
e. Wingwalls	N	7																																																																																																																																																																																																																																																	
f. Slope Paving/Rip-Rap	N	8																																																																																																																																																																																																																																																	
g. Pointing	N	N																																																																																																																																																																																																																																																	
h. Footings	N	N																																																																																																																																																																																																																																																	
i. Piles	N	H																																																																																																																																																																																																																																																	
j. Scour	N	8																																																																																																																																																																																																																																																	
k. Settlement	N	8																																																																																																																																																																																																																																																	
l.	N	N																																																																																																																																																																																																																																																	
m.	N	N																																																																																																																																																																																																																																																	
2. Piers or Bents	N	-																																																																																																																																																																																																																																																	
a. Pedestals	N	N																																																																																																																																																																																																																																																	
b. Caps	N	N																																																																																																																																																																																																																																																	
c. Columns	N	N																																																																																																																																																																																																																																																	
d. Stems/Webs/Pierwalls	N	N																																																																																																																																																																																																																																																	
e. Pointing	N	N																																																																																																																																																																																																																																																	
f. Footing	N	N																																																																																																																																																																																																																																																	
g. Piles	N	N																																																																																																																																																																																																																																																	
h. Scour	N	N																																																																																																																																																																																																																																																	
i. Settlement	N	N																																																																																																																																																																																																																																																	
j.	N	N																																																																																																																																																																																																																																																	
k.	N	N																																																																																																																																																																																																																																																	
3. Pile Bents	N	-																																																																																																																																																																																																																																																	
a. Pile Caps	N	N																																																																																																																																																																																																																																																	
b. Piles	N	N																																																																																																																																																																																																																																																	
c. Diagonal Bracing	N	N																																																																																																																																																																																																																																																	
d. Horizontal Bracing	N	N																																																																																																																																																																																																																																																	
e. Fasteners	N	N																																																																																																																																																																																																																																																	

X=UNKNOWN

N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE

R=REMOVED

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**ITEM 61**  
**CHANNEL & CHANNEL PROTECTION**

	Dive	Cur	DEF
1.Channel Scour	N	7	-
2.Embankment Erosion	N	7	-
3.Debris	N	8	-
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	8	-
7.Aggradation	N	8	-
8.Fender System	N	N	-

**STREAM FLOW VELOCITY:**  
Tidal ( ) High ( ) Moderate ( ) Low (X) None ( )

ITEM 61 (Dive Report): ☐ N    ITEM 61 (This Report): ☐ 7

93b-U/W INSP. DATE:

**ITEM 36 TRAFFIC SAFETY**

	36	COND	DEF
A. Bridge Railing	1	7	-
B. Transitions	1	8	-
C. Approach Guardrail	1	6	M-P
D. Approach Guardrail Ends	0	6	M-P

**WEIGHT POSTING**    *Not Applicable*    ☒ X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date:     EJDMT Date:

	At bridge	Other Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)	N    S	N    S
Legibility/Visibility	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>

**CLEARANCE POSTING**    ☒ X

	E	W
Actual Field Measurement	ft    in    0    0	ft    in    0    0
Posted Clearance	ft    in    0    0	ft    in    0    0

At bridge    Advance

	E	W
Signs In Place (Y=Yes, N=No, NR=Not Required)	E    W	E    W
Legibility/Visibility	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>

**ACCESSIBILITY (Y/N/P)**

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		
	N	N

**TOTAL HOURS**

**PLANS (Y/N):**    ☐ Y

**(V.C.R.) (Y/N):**    ☐ N

**TAPE#:** \_\_\_\_\_

**List of field tests performed:**

**RATING**  
Rating Report (Y/N): ☐ Y  
Date:   
Inspection data at time of existing rating  
I 58: 9 I 59: 9 I 60: 9 Date : 05/05/2005

**Recommend for Rating or Rerating (Y/N):**    ☐ N

**REASON:** \_\_\_\_\_

**If YES please give priority:**  
HIGH ( ) MEDIUM ( ) LOW ( )

**CONDITION RATING GUIDE**

(For Items 58, 59, 60 and 61)

CODE	CONDITION	DEFECTS
N	NOT APPLICABLE	
G 9	EXCELLENT	Excellent condition.
G 8	VERY GOOD	No problem noted.
G 7	GOOD	Some minor problems.
F 6	SATISFACTORY	Structural elements show some minor deterioration.
F 5	FAIR	All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.
P 4	POOR	Advanced section loss, deterioration, spalling or scour.
P 3	SERIOUS	Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
C 2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C 1	"IMMINENT" FAILURE	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may put it back in light service.
0	FAILED	Out of service - beyond corrective action.

**DEFICIENCY REPORTING GUIDE**

**DEFICIENCY:**    A defect in a structure that requires corrective action.

**CATEGORIES OF DEFICIENCIES:**  
**M= Minor Deficiency** - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.  
**S= Severe/Major Deficiency** - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.  
**C-S= Critical Structural Deficiency** - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.  
**C-H= Critical Hazard Deficiency** - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

**URGENCY OF REPAIR:**  
**I = Immediate-** [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].  
**A = ASAP-** [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].  
**P = Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].



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## REMARKS

### **BRIDGE ORIENTATION**

Boxford Bridge B-19-002 carries Mill Road over Fish Brook. The approaches and abutments are labeled north and south according to the bridge plans. Fish Brook flows from west to east.

### **ITEM 58 - DECK**

#### **Item 58.1 - Wearing surface**

Near mid-span there is a 5' long hairline longitudinal crack at the crown of the roadway. **See Photo 1.**

#### **Item 58.2 - Deck Condition**

This item is rated based on the condition of prestressed deck units. See item 59.4, "Girders or Beams".

#### **Item 58.7 - Parapets**

The east bridge railing base has a vertical hairline crack at post # 6, from the south.

#### **Item 58.8 - Railing**

Type S3-TL4 bridge railing.

The southeast concrete end post has honeycombing or minor collision damage to the top edge. **See Photo 2.**

There are scrapes to the coating system of the horizontal railing components on both bridge railings. **See Photo 3.**

#### **Item 58.13 - Deck Joints**

According to the design plans, the joints should be a saw-cut pavement with pourable joint sealer, however, the joints in the field are paved over.

At both north and south abutment joints the pavement is cracked, up to 3/4" wide at the north abutment. **See Photos 4 and 5.**

### **ITEM 59 - SUPERSTRUCTURE**

#### **Item 59.4 - Girders or Beams**

Girder 1 has isolated vertical hairline cracks adjacent to the south abutment up to 12 inches high with light efflorescence. **See Photo 6.**

#### **Item 59.13 - Member Alignment**

See item 59.4, Girders or Beams."

### **ITEM 60 - SUBSTRUCTURE**

#### **Item 60.1 - Abutments**

##### **Item 60.1.e - Wingwalls**

The wingwalls have isolated vertical hairline cracks up to full height.

### **ITEM 61 - CHANNEL AND CHANNEL PROTECTION**

#### **Item 61.1 - Channel Scour**

The channel consists of cobbles and large 4-8 inch diameter stones.

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## REMARKS

### Item 61.2 - Embankment Erosion

There are spotty areas of vegetation along the shore with exposed roots.

### Item 61.4 - Vegetation

There is light vegetation located at the upstream and downstream.

### TRAFFIC SAFETY

#### Item 36a - Bridge Railing

See Item 58.8

#### Item 36b - Transitions

Thrie beam guardrail at all four transitions attached to end posts. Post spacing is properly spaced.

#### Item 36c - Approach Guardrail

Both Southwest & Northwest approach guardrail have minor collision damage to the guardrail. At the southwest approach, two spacer blocks are displaced and one spacer block is missing at post 2. **See photos 7 and 8.**

#### Item 36d - Approach Guardrail Ends

Approach guardrail ends are buried but are not flared away from bridge.

The northwest guardrail end has collision damage adjacent to the buried end. **See Photo 8.**

#### Photo Log

- Photo 1 : Wearing surface has hairline crack near mid-span at the crown of the roadway
- Photo 2 : Southeast end-post has minor honeycombing or collision damage.
- Photo 3 : East bridge railing has minor scrapes (typical at the west bridge railing).
- Photo 4 : South deck end has a minor crack in the pavement at the joint.
- Photo 5 : North deck end has a full length transverse crack, up to 3/4" wide.
- Photo 6 : Beam 1, west face near the south abutment has a 12" vertical hairline crack.
- Photo 7 : Northwest approach guardrail has collision damage and displaced or missing spacer blocks.
- Photo 8 : Northwest approach guardrail-Minor collision damage.

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**PHOTOS**

**Photo 1:     Wearing surface has hairline crack near mid-span at the crown of the roadway**



**Photo 2:     Southeast end-post has minor honeycombing or collision damage.**



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**PHOTOS**

**Photo 3:** East bridge railing has minor scrapes (typical at the west bridge railing).



**Photo 4:** South deck end has a minor crack in the pavement at the joint.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>8RE</b>	BR. DEPT. NO. <b>B-19-002</b>	8.-STRUCTURE NO. <b>B19002-8RE-MUN-NBI</b>	INSPECTION DATE <b>MAY 16, 2019</b>
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**PHOTOS**

**Photo 5:** North deck end has a full length transverse crack, up to 3/4" wide.



**Photo 6:** Beam 1, west face near the south abutment has a 12" vertical hairline crack.

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>8RE</b>	BR. DEPT. NO. <b>B-19-002</b>	8-STRUCTURE NO. <b>B19002-8RE-MUN-NBI</b>	INSPECTION DATE <b>MAY 16, 2019</b>
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**PHOTOS**

**Photo 7: Northwest approach guardrail has collision damage and displaced or missing spacer blocks.**



**Photo 8: Northwest approach guardrail-Minor collision damage.**



Report Date: November 20, 2020

State Information				Classification				Code			
<b>BDEPT#= B19002</b>				Agency Br.No.				(112) NBIS Bridge Length Y			
<b>Town= Boxford</b>				L.O.				(104) Highway System N			
<b>B.I.N= 8RE</b>				AASHTO= 078.8				(26) Functional Class - Rural Local 09			
RANK= 4467 H.I.= 99.9 %				FHWA Select List= Y (6/21/2017)				(100) Defense Highway 0			
(8) Structure Number				B190028REMUNNBI				(101) Parallel Structure N			
(5) Inventory Route				151000000				(102) Direction of Traffic - 2-way traffic 2			
(2) State Highway Department District				04				(103) Temporary Structure N			
(3) County Code 009 (4) Place code				07420				(105) Federal Lands Highways 0			
(6) Features Intersected				<b>WATER FISH BROOK</b>				(110) Designated National Network N			
(7) Facility Carried				<b>HWY MILL ROAD</b>				(20) Toll - On free road 3			
(9) Location				1.1 MILE WEST OF I 95				(21) Maintain - Town Agency 03			
(11) Kilometerpoint				0000.660				(22) Owner - Town Agency 03			
(12) Base Highway Network				N				(37) Historical Significance undetermined			
(13) LRS Inventory Route & Subroute				000000000000				<b>Condition</b>			
(16) Latitude				42 DEG 39 MIN 18.77 SEC				(58) Deck 7			
(17) Longitude				70 DEG 59 MIN 57.92 SEC				(59) Superstructure 7			
(98) Border Bridge State Code				Share %				(60) Substructure 8			
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection 7			
								(62) Culverts N			
<b>Structure Type and Material</b>								<b>Load Rating and Posting</b>			
(43) Structure Type Main: Prestressed Concrete				Code 501				(31) Design Load - HS 20=MS 18 5			
Slab				Jointless bridge type: Not applicable				(63) Operating Rating Method - Load Factor (LF) 1			
(44) Structure Type Appr:								(64) Operating Rating 81.7			
Other				Code 000				(65) Inventory Rating Method - Load Factor (LF) 1			
(45) Number of spans in main unit				001				(66) Inventory Rating 48.9			
(46) Number of approach spans				0000				(70) Bridge Posting 5			
(107) Deck Structure Type - Concrete Precast Panels				Code 2				(41) Structure - Open A			
(108) Wearing Surface / Protective System:								<b>Appraisal</b>			
A) Type of wearing surface - Bituminous				Code 6				(67) Structural Evaluation 7			
B) Type of membrane - Built-up				Code 1				(68) Deck Geometry 2			
C) Type of deck protection - Epoxy Coated Reinforcing				Code 1				(69) Underclearances, vert. and horiz. N			
								(71) Waterway adequacy 9			
								(72) Approach Roadway Alignment 4			
								(36) Traffic Safety Features 1 1 1 0			
								(113) Scour Critical Bridges 8			
<b>Age and Service</b>								<b>Inspections</b>			
(27) Year Built				2004				(90) Inspection Date 05/16/19 (91) Frequency 24 MO			
(106) Year Reconstructed				0000				(92) Critical Feature Inspection: (93) CFI DATE			
(42) Type of Service: On - Highway								(A) Fracture Critical Detail N 00 MO A) 00/00/00			
Under - Waterway				Code 15				(B) Underwater Inspection N 00 MO B) 00/00/00			
(28) Lanes: On Structure 02 Under structure				00				(C) Other Special Inspection N 00 MO C) 00/00/00			
(29) Average Daily Traffic				001200				(*) Other Inspection (FLOOD) N 00 MO *) 05/23/06			
(30) Year of ADT 2017 (109) Truck ADT				11 %				(*) Closed Bridge N 00 MO *) 00/00/00			
(19) Bypass, detour length				003 KM				(*) UW Special Inspection N 00 MO *) 00/00/00			
								(*) Damage Inspection MO *) 00/00/00			
<b>Geometric Data</b>								<b>Rating Loads</b>			
(48) Length of maximum span				0014.3 M				Report Date 12/01/05 H20 Type 3 Type 3S2 Type HS			
(49) Structure Length				00015.2 M				Operating 70.0 81.0 99.0 90.0			
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M								Inventory 42.0 50.0 78.0 54.0			
(51) Bridge Roadway Width Curb to Curb				006.4 M				<b>Field Posting</b>			
(52) Deck Width Out to Out				007.6 M				Status LEGAL Posting Date 03/21/06			
(32) Approach Roadway Width (w/shoulders)				006.8 M				2 Axle 3 Axle 5 Axle Single			
(33) Bridge Median - No median				Code 0				Actual			
(34) Skew 09 DEG (35) Structure Flared				N				Recommended			
(10) Inventory Route MIN Vert Clear				99.99 M				Missing Signs N			
(47) Inventory Route Total Horiz Clear				06.6 M				<b>Misc.</b>			
(53) Min Vert Clear Over Bridge Rdwy				99.99 M				Bridge Name			
(54) Min Vert Underclear ref N				00.00 M				N Anti-missile fence N Acrow Panel N Jointless Bridge			
(55) Min Lat Underclear RT ref N				00.00 M				Freeze/Thaw N : Not Applicable			
(56) Min Lat Underclear LT				00.00 M				Accessibility (Needed/Used)			
<b>Navigation Data</b>											
(38) Navigation Control - No navigation control on waterway				Code 0				N / N Liftbucket N / N Rigging N / N Other			
(111) Pier Protection				Code 1				N / N Ladder N / N Staging			
(39) Navigation Vertical Clearance				000.0 M				N / N Boat N / N Traffic Control			
(116) Vert-lift Bridge Nav Min Vert Clear				M				Y / Y Wader N / N RR Flagperson Inspection			
(40) Navigation Horizontal Clearance				0000.0 M				N / N Inspector 50 N / N Police Hours: 008			

# National Bridge Element Inspection

BDEPT# **B-19-002**

Date **05/16/2019**

B.I.N. **8RE**

District Bridge Inspection Eng'r **Joseph Dideo**

Item 8 **B19002-8RE-MUN-NBI**

Inspecting Agency **Mass. Highway Dept.**

Span Group **1**

Team Leader **Patrick Burke**

Town **Boxford**

Team **Osama Moustafa**

District **4**

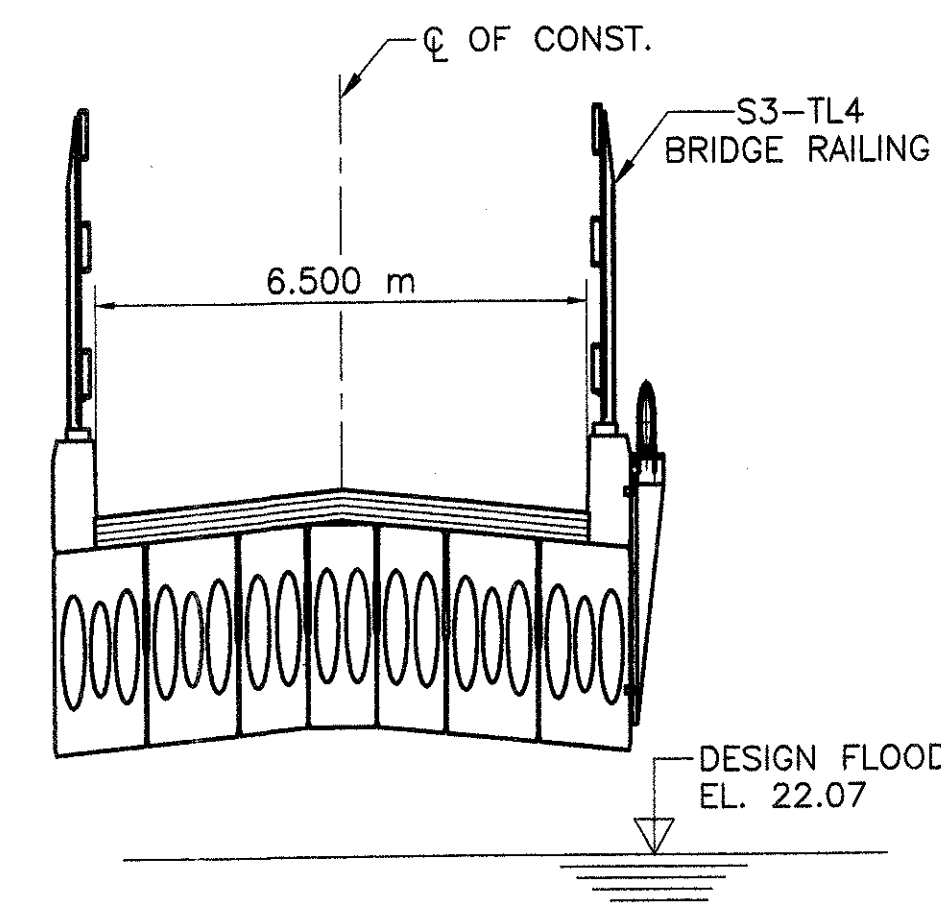
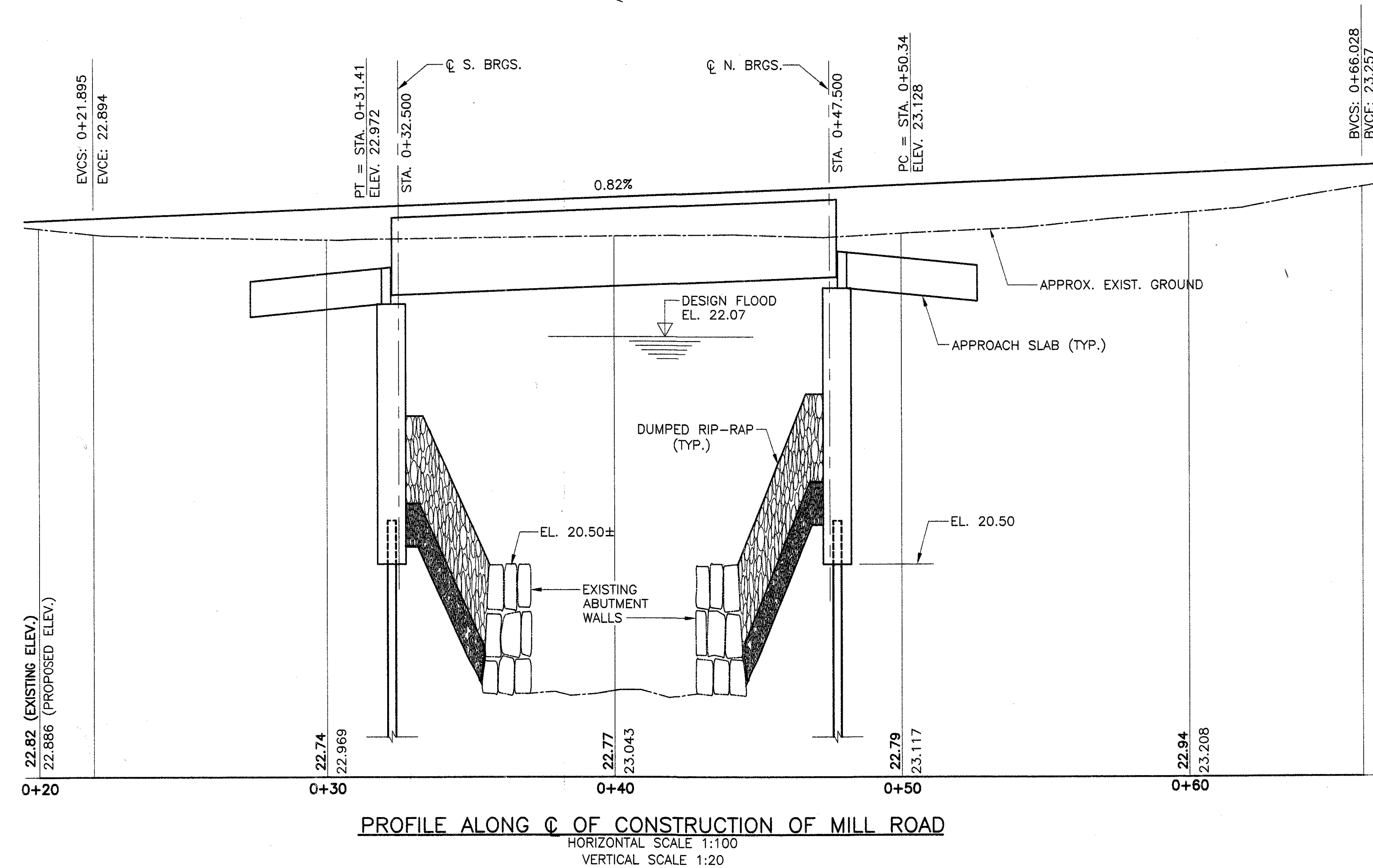
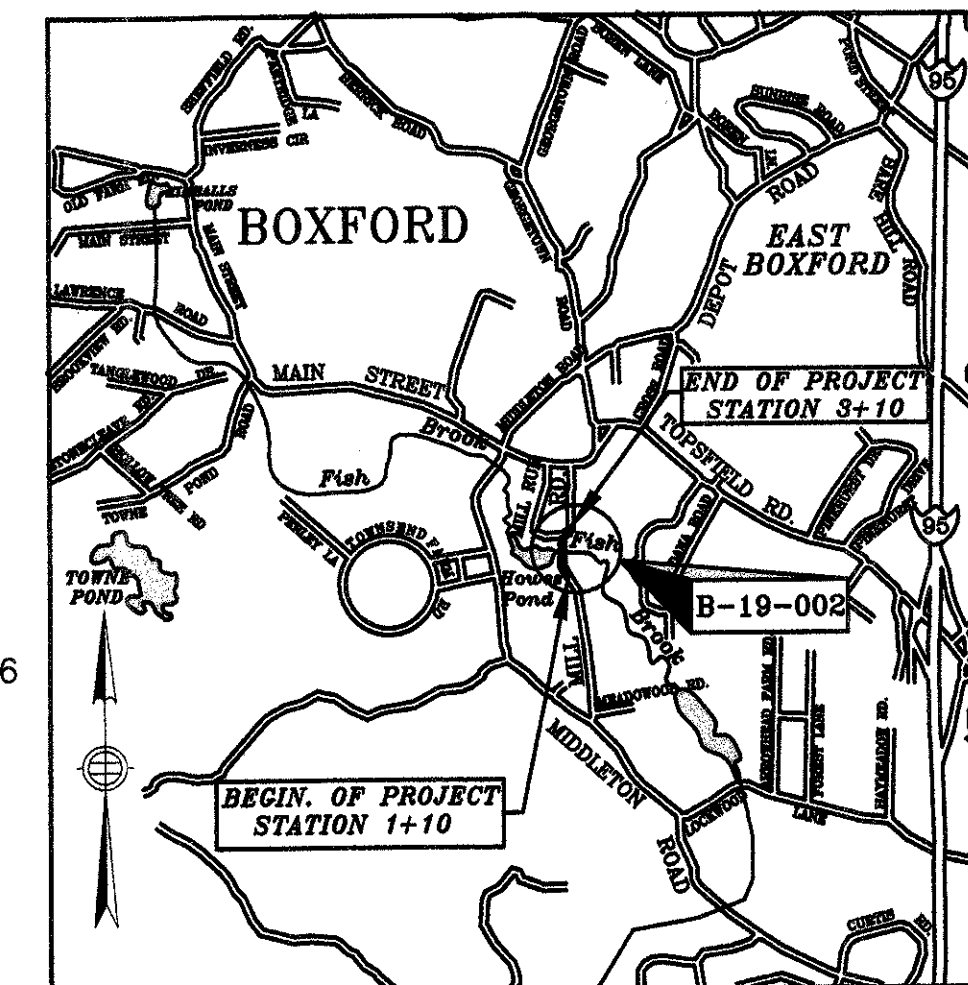
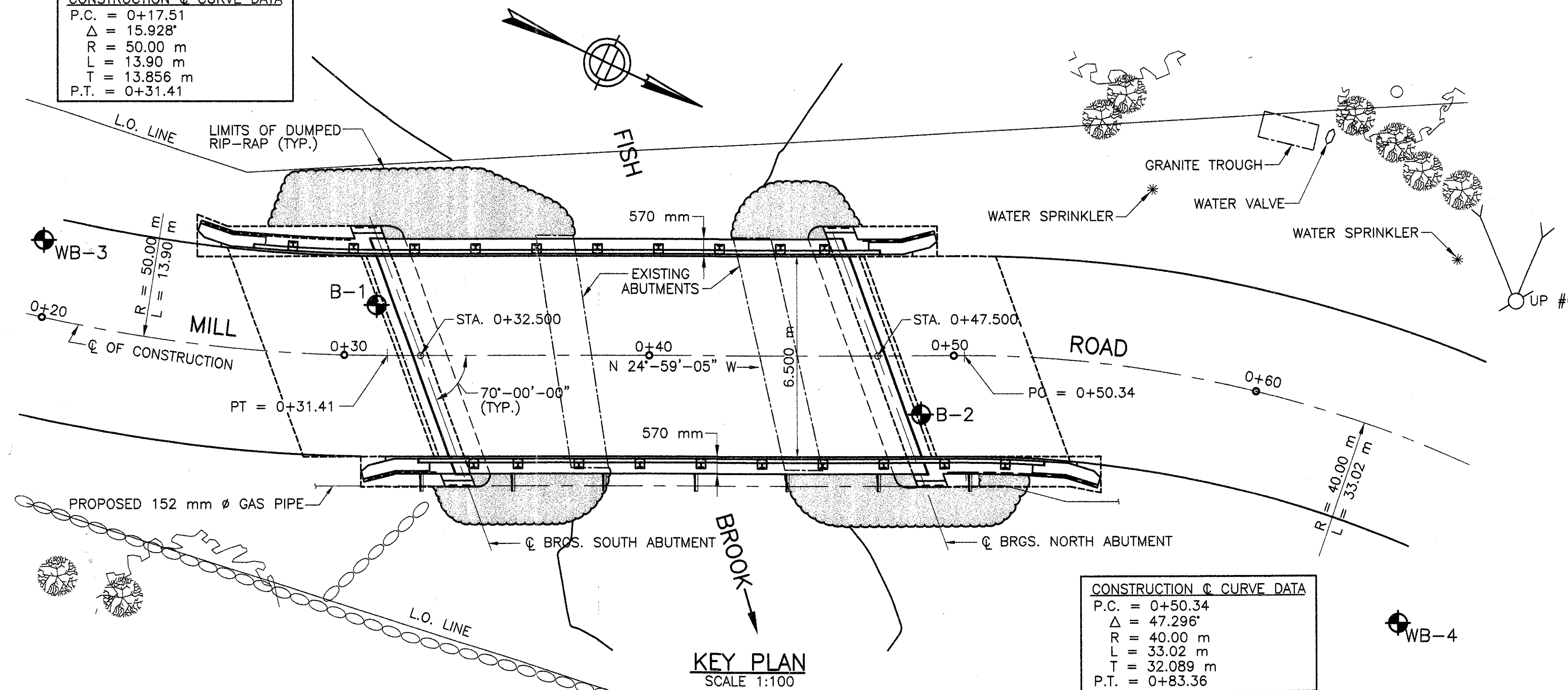
Member(s)

El #	Element Name	Units	Env.	Total Q.	% or Q	State 1	State 2	State 3	State 4
<b>12</b>	<b>Re Concrete Deck</b>	sq feet	2	1,232.910	<input type="checkbox"/> %	1,232.910			
Notes :									
> 510	Wearing Surfaces	sq feet	2	1,048.940	<input type="checkbox"/> %	1,027.940	21.000		
Notes :									
> > 3220	Crack (Wearing Surface)	sq feet	2	21.000	<input type="checkbox"/> %		21.000		
Notes :									
<b>104</b>	<b>Pre Clsd Box Girder</b>	feet	2	285.420	<input type="checkbox"/> %	285.420			
Notes :									
<b>104</b>	<b>Pre Clsd Box Girder</b>	feet	3	70.000	<input type="checkbox"/> %	70.000			
Notes :									
<b>215</b>	<b>Re Conc Abutment</b>	feet	2	123.200	<input type="checkbox"/> %	123.200			
Notes :									
<b>301</b>	<b>Pourable Joint Seal</b>	feet	2	64.800	<input type="checkbox"/> %	64.800			
Notes :									
<b>330</b>	<b>Metal Bridge Railing</b>	feet	2	129.910	<input type="checkbox"/> %	118.910	11.000		
Notes :									
> 1900	Distortion	feet	2	11.000	<input type="checkbox"/> %		11.000		
Notes :									
> 7000	Damage	feet	2	11.000	<input type="checkbox"/> %		11.000		
Notes :									
> 515	Steel Protective Coating	sq feet	2	454.680	<input type="checkbox"/> %	416.180	38.500		
Notes :									
> > 3440	Eff (Stl Protect Coat)	sq feet	2	38.500	<input type="checkbox"/> %		38.500		
Notes :									



CONSTRUCTION & CURVE DATA	
P.C.	= 0+17.51
$\Delta$	= 15.928°
R	= 50.00 m
L	= 13.90 m
T	= 13.856 m
P.T.	= 0+31.41

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	6	23
PROJECT FILE NO. 602550				



DESIGNED BY W. F. BROWN C. M. RUSSELL	April 6, 2002	ISSUED FOR CONSTRUCTION
DRAWN BY W. F. BROWN C. M. RUSSELL	<b>MASS HIGHWAY</b> <b>PROPOSED BRIDGE</b> <b>BOXFORD</b> MILL ROAD OVER FISH BROOK THE COMMONWEALTH OF MASSACHUSETTS MASSACHUSETTS HIGHWAY DEPARTMENT 10 PARK PLAZA BOSTON, MASS	
CHECKED BY E. H. NEWTON		
SPECS BY D. S. CROVO	APPROVED FOR DESIGN D. S. CROVO	BRIDGE ENGINEER CHIEF ENGINEER

GENERAL NOTES

DESIGN:

IN ACCORDANCE WITH THE 1996 STANDARD SPECIFICATIONS OF THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS WITH INTERIM SPECIFICATIONS THROUGH 1998, FOR MS22.5 LOADING.

EXISTING CONDITIONS:

DIMENSIONS AND DETAILS SHOWN FOR THE EXISTING STRUCTURES ARE NOT GUARANTEED. THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND DETAILS NECESSARY FOR COMPLETION OF ALL WORK BY FIELD MEASUREMENTS AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND ACCURACY THEREOF, AND SHALL NOT ORDER ANY MATERIAL OR COMMENCE ANY FABRICATION UNTIL HE/SHE HAS MADE THE REQUIRED MEASUREMENTS ON THE ACTUAL STRUCTURE AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER. EXISTING STRUCTURE IS SHOWN THUS: ----- EXCEPT AS NOTED.

DATE:

DATE TO BE PLACED ON THE THE INSIDE FACE OF THE NORTHWESTERLY AND SOUTHEASTERLY TRANSITIONS AS SHOWN ON THE PLANS. THE YEAR USED SHALL BE THE LATEST CONTRACT COMPLETION DATE IN EFFECT WHEN THE FIRST TRANSITION IS CAST. BOTH TRANSITIONS SHALL FEATURE THE SAME DATE.

SURVEY NOTEBOOKS:

NOTE BOOK No. : 28690

ELEVATIONS & BENCH MARK DATUM:

ALL ELEVATIONS BASED ON THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988, UNLESS OTHERWISE NOTED.

GPS #2  
N933991.740, E241033.138  
ELEV. = 23.181

GPS #3  
N933942.953, E241055.031  
ELEV. = 22.980

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS, DIVIDE SCALES BY 2 FOR HALF-SIZE PRINTS.

UNSUITABLE MATERIAL:

ALL UNSUITABLE MATERIAL SHALL BE REMOVED WITHIN THE LIMITS OF THE FOUNDATIONS OF THE STRUCTURE, AS DIRECTED BY THE ENGINEER.

UTILITIES:

THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES DURING DEMOLITION AND CONSTRUCTION.

REINFORCEMENT:

ALL REINFORCING STEEL SHALL BE COATED DEFORMED BARS CONFORMING TO THE REQUIREMENTS OF AASHTO M31M GRADE 420. UNLESS OTHERWISE NOTED ON PLANS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

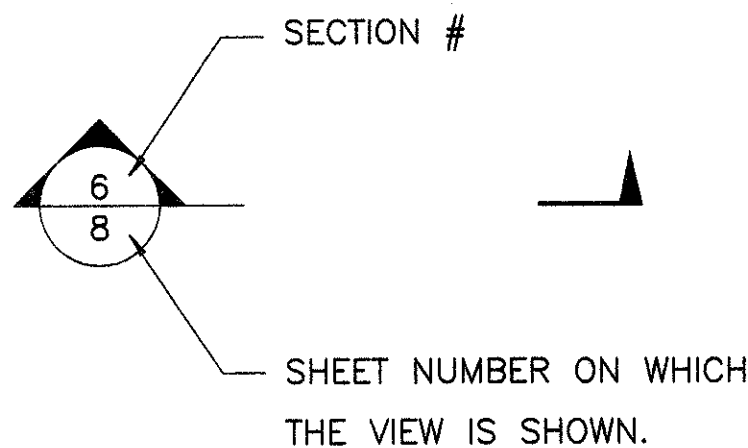
MODIFICATION CONDITION	#13 BARS	#16 BARS
1. COATED BARS.	610 mm	760 mm
2. 300 mm OF CONC. BELOW BAR	850 mm	1070 mm
3. COATED BARS, COVER < 3d <sub>b</sub> , OR CLEAR SPACING < 6d <sub>b</sub>	790 mm	990 mm
4. CONDITION 3 WITH 300 mm OF CONC. BELOW BAR	900 mm	1120 mm

IF THE ABOVE BARS ARE SPACED 150 MILLIMETERS OR MORE ON CENTER, THE LAP LENGTH SHALL BE 80% OF THE LAP LENGTH GIVEN ABOVE. ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE PLANS.

FOUNDATIONS

FOUNDATIONS MAY BE ALTERED, IF NECESSARY TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.

SECTION MARK



CAST-IN-PLACE CONCRETE

1. CONCRETE FOR THE ABUTMENTS AND WINGWALLS BELOW THE BRIDGE SEAT CONSTRUCTION JOINT AND THE APPROACH SLAB SHALL BE 30 MPa- 40 mm- 335 kg CEMENT CONCRETE MASONRY.
2. CONCRETE FOR THE ABUTMENTS AND WINGWALLS ABOVE THE BRIDGE SEAT CONSTRUCTION JOINT AND THE HIGHWAY GUARDRAIL TRANSITIONS SHALL BE 35 MPa- 20 mm- 405 kg SILICA FUME MODIFIED CEMENT CONCRETE MASONRY AND SHALL BE PLACED AFTER ALL BEAMS HAVE BEEN ERECTED.
3. CONCRETE FOR THE BACKWALL SHALL BE 30 MPa- 20 mm- 390 kg CEMENT CONCRETE MASONRY (UNLESS PLACED AS PART OF THE APPROACH SLAB).

STRUCTURAL STEEL

ALL STRUCTURAL STEEL FOR THE UTILITY SUPPORTS SHALL CONFORM TO AASHTO M270 GRADE 250, AND SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 AND M232.

ESTIMATED QUANTITIES:

(NOT GUARANTEED)

DEMOLITION OF SUPERSTRUCTURE OF BRIDGE NO. B-19-002	1	LS
BRIDGE EXCAVATION	305	CM
CLASS B ROCK EXCAVATION	72	CM
GRAVEL BORROW FOR BACKFILLING STRUCTURES AND PIPES	24	CM
CRUSHED STONE FOR DRAINAGE, REVETMENT, AND/OR WATERWORKS FOUNDATIONS	90	MG
CLASS I BITUMINOUS CONCRETE PAVEMENT TYPE I-1	10	MG
CLASS I DENSE BINDER COURSE FOR BRIDGES	10	MG
GEOTEXTILE FABRIC FOR PERMANENT EROSION CONTROL	150	SM
STEEL PILE HP 310 x 94	90	M
PRE-DRILLING FOR PILES	90	M
PILE SHOES	18	EA.
DUMPED RIPRAP	140	MG
CONTROL OF WATER - STRUCTURE NO. B-19-002	1	LS
BRIDGE STRUCTURE, BRIDGE NO. B-19-002	1	LS

HYDRAULIC DATA

DRAINAGE AREA:	33.05 SQUARE KILOMETERS
DESIGN DISCHARGE:	12.744 CUBIC METERS PER SECOND
DESIGN FREQUENCY:	10 YEARS
DESIGN FLOOD STAGE:	22.07 METERS (NAVD)
DESIGN VELOCITY:	0.40 METERS PER SECOND

BASIC FLOOD DATA

100 YEAR FLOOD DISCHARGE:	23.51 CUBIC METERS PER SECOND
100 YEAR FLOOD STAGE:	22.52 METERS (NAVD)

FLOOD OF RECORD

DISCHARGE:	UNKNOWN
STAGE:	UNKNOWN
DATE:	1976, 1979, 1987

HISTORY OF ICE FLOES: NONE DOCUMENTED IN NBIS FILES

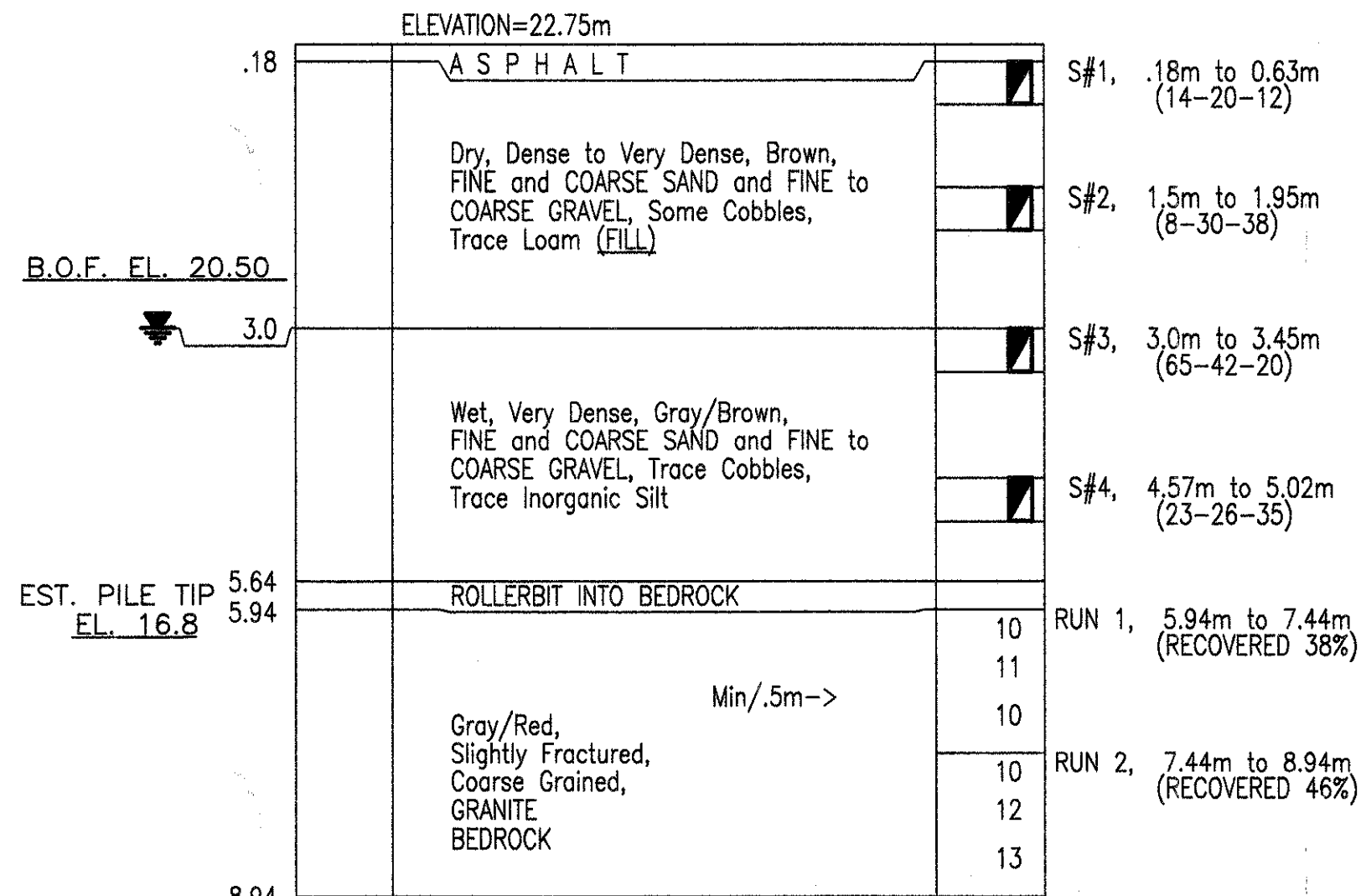
EVIDENCE OF SCOUR OR EROSION: THE USGS REPORTS OF OCTOBER 1994 INDICATES THAT THE CHANNEL IS VERTICALLY AND Laterally UNSTABLE DUE TO SCOUR, MEANDER IMPACTS, AND HEAVY BANK EROSION. THE CENTER CHANNEL DEEPENS FROM 0.61 METERS TO 0.914 METERS UNDER THE BRIDGE.

April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	



## CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500  
To: MASS. HIGHWAY DEPT. 10 PARK PLAZA, BOSTON, MA Date: 6-23-99 Job No.: 98120Q  
Location: BOXFORD-MILL RD/FISH BROOK, BRIDGE B-19-2

**BORING 1** \* STATION 0+31.1, OFFSET 1.7 m LT.

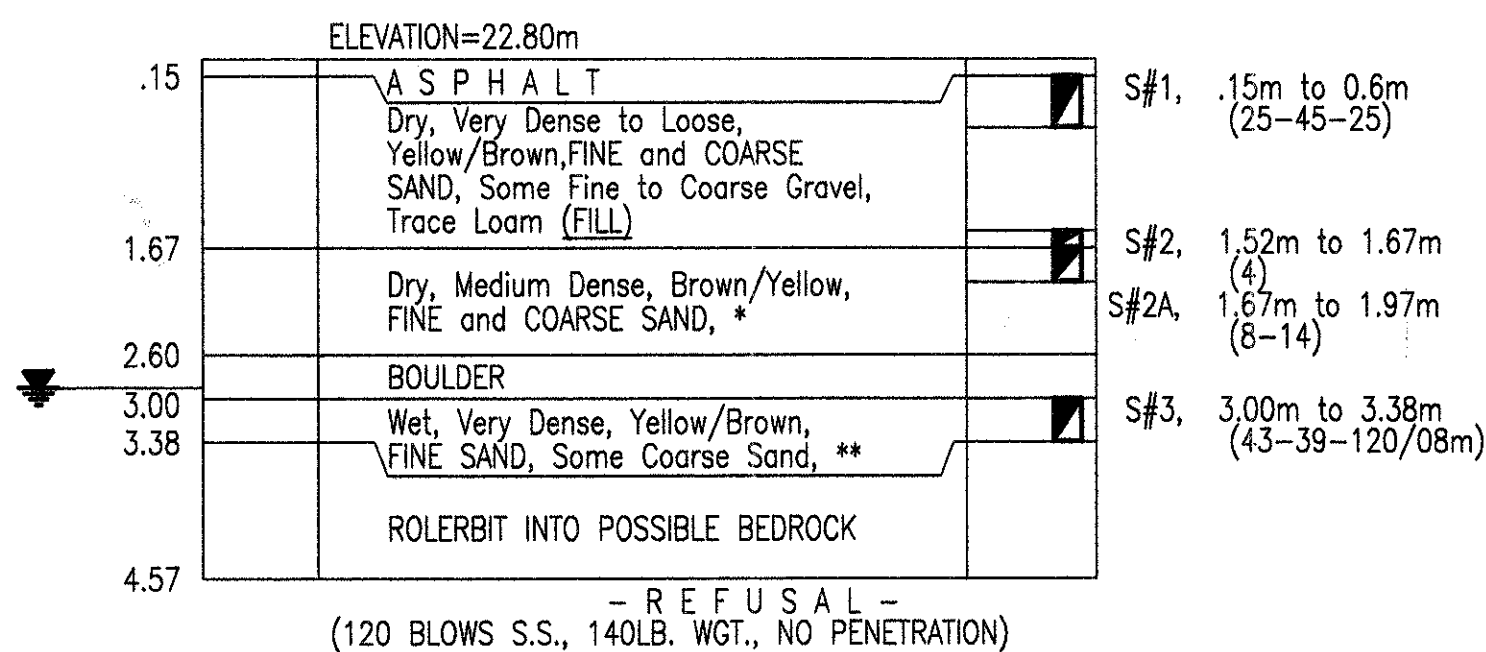
WATER LEVEL 3 m.  
SIZE OF CASING HW, LENGTH 5.64m  
SIZE OF ROCK CORE NX, LENGTH DRILLED: 3.0m  
DRILLER: R. DESIMONE, INSPECTOR: CRAIG BATCHELDER  
DATE STARTED & COMPLETED: 6-16-99(8:00am)-6-17-99(8:00am)  
TOTAL HOURS WORKED: 8 HOURS

NOTE: "CHANGED LOCATION" FROM STATION 1+72>8, OFFSET 0.4m LT. TO STATION 1+74.3, OFFSET 0.4m LT. AS DIRECTED BY ENGINEER.

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive 5 cm. Split Sampler 15 cms. using 64 kg. weight falling 76 cms.(±). Figures in column to left (if noted) indicate number of blows to drive casing 15 cms., using 137 kg. weight falling 61 cms.(±).

## CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500  
To: MASS. HIGHWAY DEPT. 10 PARK PLAZA, BOSTON, MA Date: 6-23-99 Job No.: 98120Q  
Location: BOXFORD-MILL RD/FISH BROOK, BRIDGE B-19-2

**BORING WB-3** \* STATION 0+19.5, OFFSET 2.5 m LT.

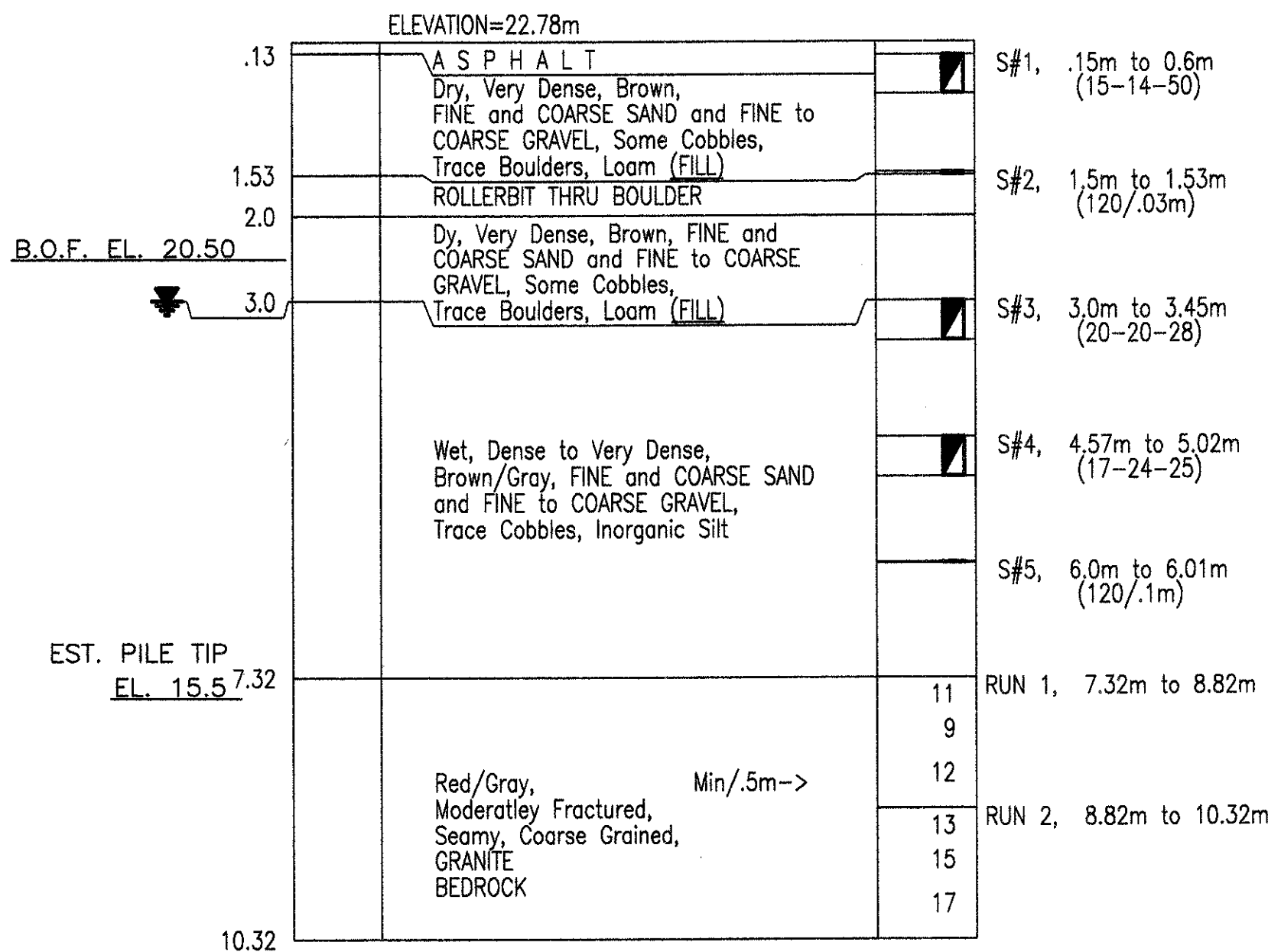
WATER LEVEL 2.9m m.  
SIZE OF CASING NW, LENGTH 3.3m  
DRILLER: R. DESIMONE, INSPECTOR: CRAIG BATCHELDER  
DATE STARTED & COMPLETED: 6-21-99(7:30am-11:30am)  
TOTAL HOURS WORKED: 4 HOURS

\* Some Fine and Medium Gravel, Trace Inorganic Silt  
\*\* Fine to Coarse Gravel, Some Inorganic Silt  
NOTE: "CHANGED LOCATION" FROM STA. 1+63.2, OFFSET 1.4m LT. TO STA. 1+63.2, OFFSET .03m LT. DUE TO OVERHEAD BRANCHES.

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive 5 cm. Split Sampler 15 cms. using 64 kg. weight falling 76 cms.(±). Figures in column to left (if noted) indicate number of blows to drive casing 15 cms., using 137 kg. weight falling 61 cms.(±).

## CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500  
To: MASS. HIGHWAY DEPT. 10 PARK PLAZA, BOSTON, MA Date: 6-23-99 Job No.: 98120Q  
Location: BOXFORD-MILL RD/FISH BROOK, BRIDGE B-19-2

**BORING 2** \* STATION 0+48.9, OFFSET 1.9 m RT.

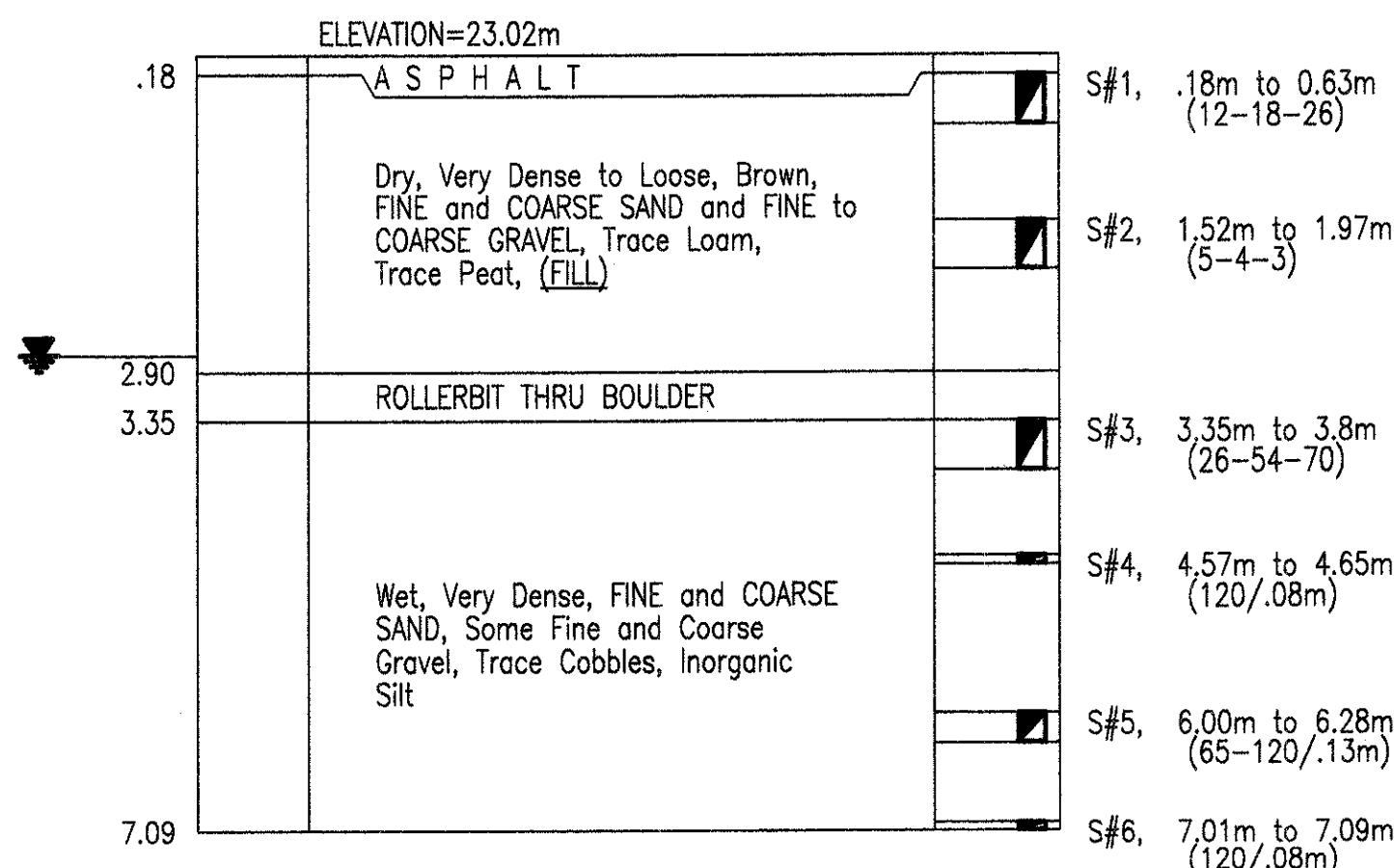
WATER LEVEL 3 m.  
SIZE OF CASING HW, LENGTH 7.32m  
SIZE OF ROCK CORE NX, LENGTH DRILLED: 3m  
DRILLER: R. DESIMONE, INSPECTOR: CRAIG BATCHELDER  
DATE STARTED & COMPLETED: 6-17-99(8:30am), 6-18-99(10:00am)  
TOTAL HOURS WORKED: 7.5 HOURS

NOTE: "CHANGED LOCATION" FROM STATION 1+95.5, OFFSET 0.4m LT. TO STATION 1+92.5, OFFSET 0.4m LT. AS DIRECTED BY ENGINEER.

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive 5 cm. Split Sampler 15 cms. using 64 kg. weight falling 76 cms.(±). Figures in column to left (if noted) indicate number of blows to drive casing 15 cms., using 137 kg. weight falling 61 cms.(±).

## CARR-DEE CORP.

37 LINDEN STREET P.O. BOX 67 MEDFORD, MA 02155-0001 Telephone (617) 391-4500  
To: MASS. HIGHWAY DEPT. 10 PARK PLAZA, BOSTON, MA Date: 6-23-99 Job No.: 98120Q  
Location: BOXFORD-MILL RD/FISH BROOK, BRIDGE B-19-2

**BORING WB-4** \* STATION 0+67.4, OFFSET 5.7 m RT.


WATER LEVEL 2.74 m.  
SIZE OF CASING HW, LENGTH 4.57m  
DRILLER: R. DESIMONE, INSPECTOR: CRAIG BATCHELDER  
DATE STARTED & COMPLETED: 6-18-99(10:00am-2:00pm)  
TOTAL HOURS WORKED: 3.5 HOURS

NOTE: "CHANGED LOCATION" FROM STA. 2+09.7, OFFSET 0.7m RT. TO STA. 2+09.7, OFFSET 1.9m LT. DUE TO STEEP SLOPING CONDITION.

All samples have been visually classified by DRILLER. Unless otherwise specified, water levels noted were observed at completion of borings, and do not necessarily represent permanent ground water levels. Figures in parenthesis indicate the number of blows required to drive 5 cm. Split Sampler 15 cms. using 64 kg. weight falling 76 cms.(±). Figures in column to left (if noted) indicate number of blows to drive casing 15 cms., using 137 kg. weight falling 61 cms.(±).

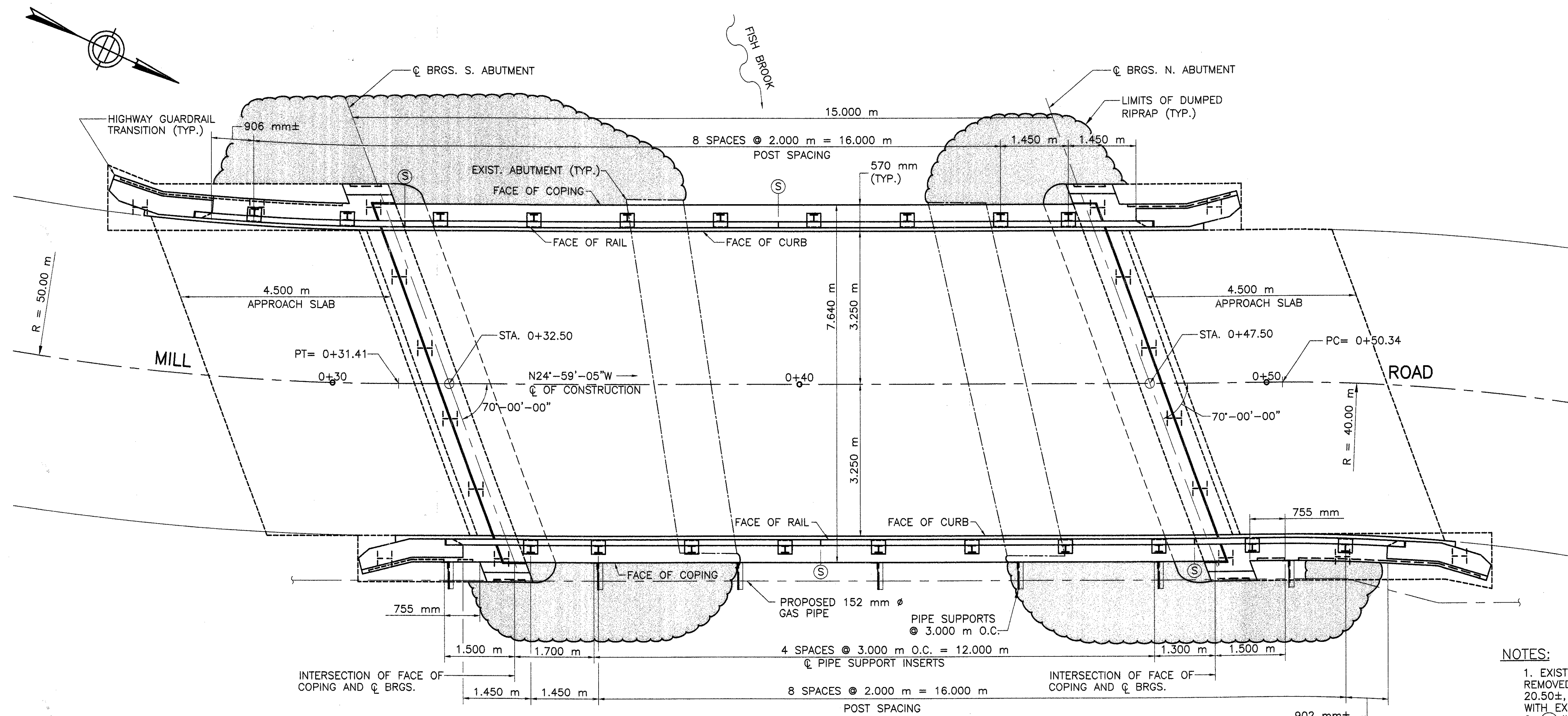
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	8	23
PROJECT FILE NO.				602550

**BORING NOTES:**

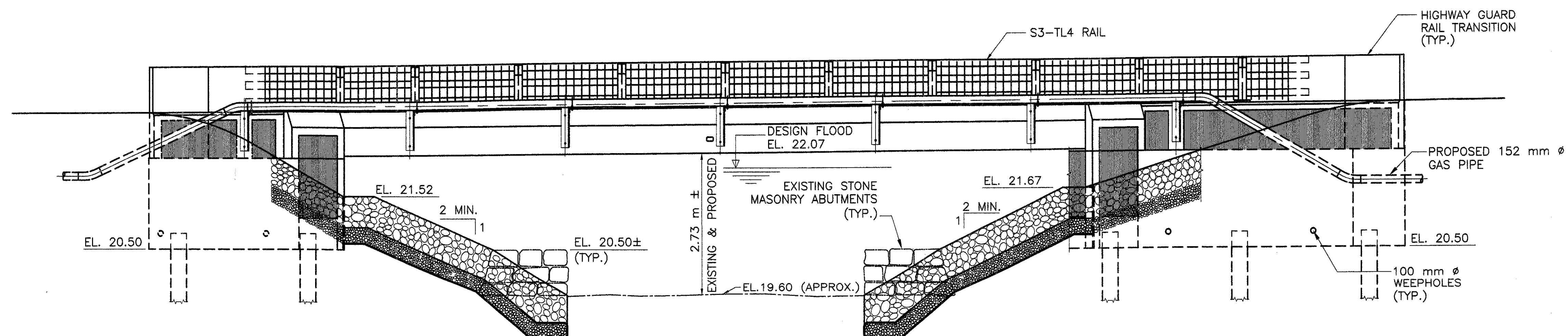
1. LOCATION OF BORINGS ON KEY PLAN ARE SHOWN THUS:  B-1, ON SHEET 1.
2. BORINGS ARE TAKEN FOR THE PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
3. WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
4. BORINGS WERE MADE BY CARR-DEE CO., 37 LINDEN ST., P.O. BOX 67, MEDFORD MA. 02155-0001.
5. BORINGS SAMPLES ARE STORED AT A STORAGE FACILITY LOCATED ON ROUTE 114 IN LAWRENCE, MA.. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE MASSACHUSETTS HIGHWAY DEPARTMENT, GEOTECHNICAL SECTION AT 10 PARK PLAZA, ROOM 6210, BOSTON, MA. 02116 TELEPHONE (617)-973-8836.
6. ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD-88).
7. LOCATION OF BORINGS ARE BASED ON THE TOPOGRAPHIC BASE PLAN DATED AUGUST 1998. LOCATIONS MARKED THUS: (\*) HAVE BEEN PROVIDED BY THE ENGINEER AND INDICATE STATIONS AND OFFSETS BASED ON THE PROPOSED ALIGNMENT.

April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	9	23
PROJECT FILE NO. 602550				



**PROPOSED PLAN**  
SCALE 1:50



**ELEVATION - LOOKING WEST**  
SCALE 1:50

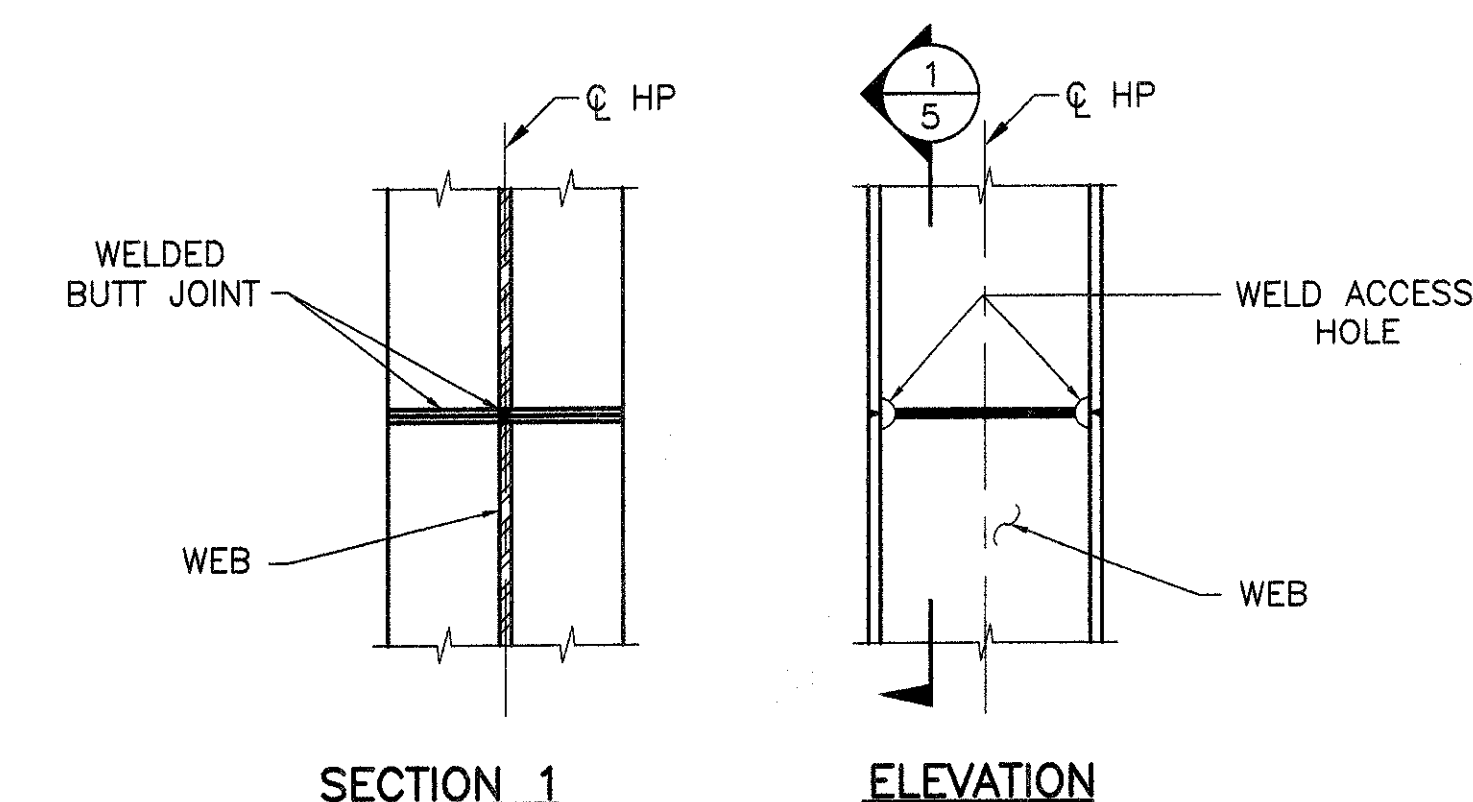
April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	



STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	10	23
PROJECT FILE NO. 602550				

# PILE NOTES:

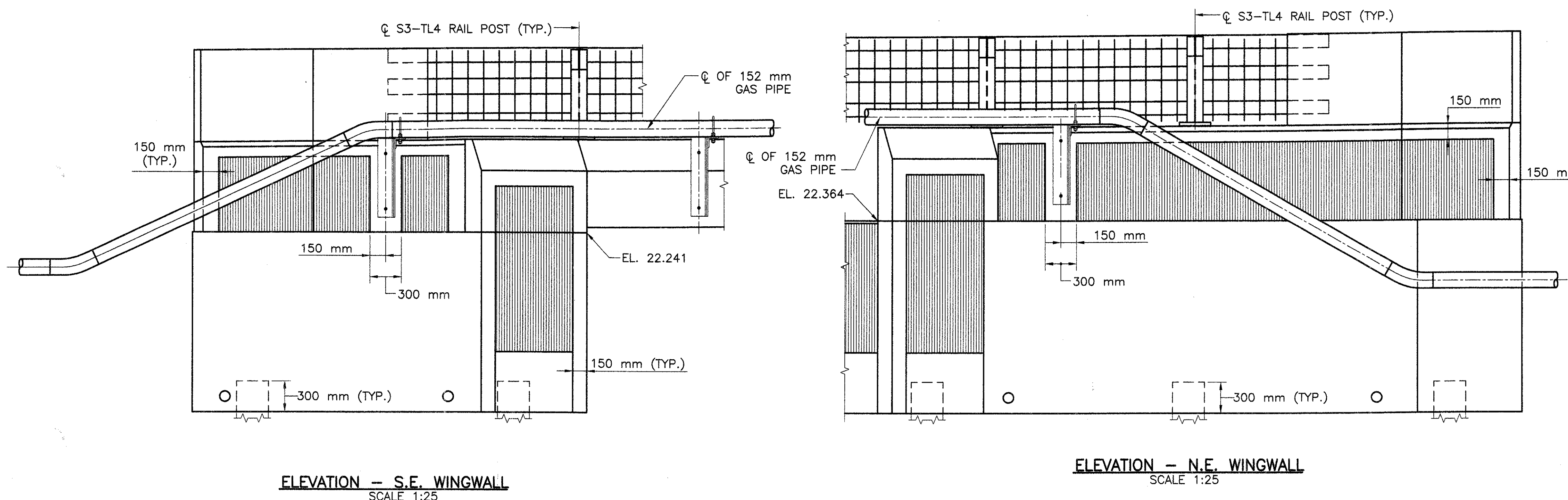
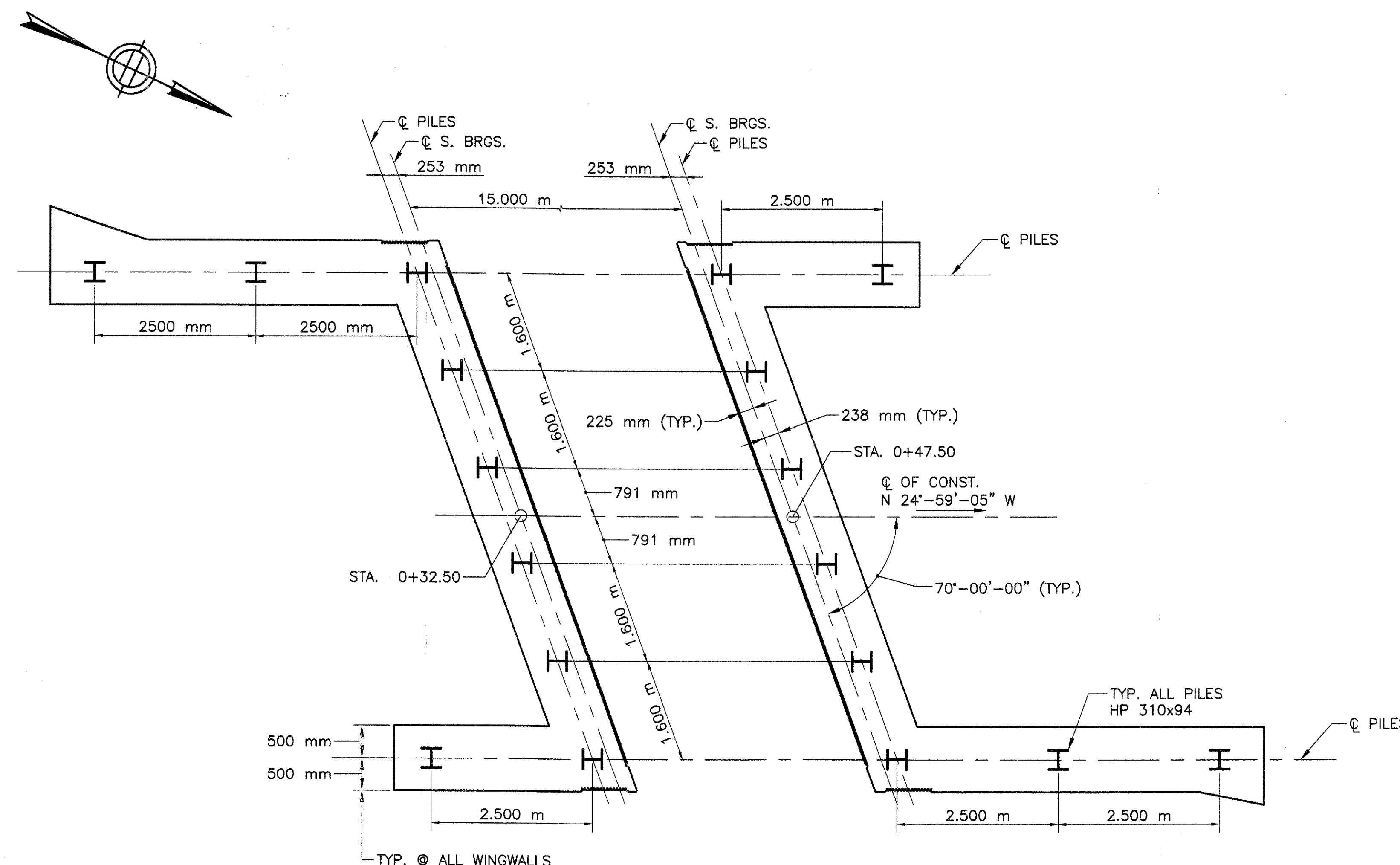
- PILES SHALL BE DRIVEN TO PRACTICAL REFUSAL AT THE TOP OF BEDROCK. THE APPROXIMATE ELEVATION AT BEDROCK IS ELEV. 16.8 METERS AT THE SOUTH ABUTMENT AND ELEV. 15.5 METERS AT THE NORTH ABUTMENT.
- a. THE FACTORED AXIAL DESIGN LOAD PER PILE IS 517 kN (GROUP I LOAD)  
b. THE STRUCTURAL CAPACITY PER PILE IS 1972 kN
- THE MINIMUM NOMINAL AXIAL RESISTANCE TO BE USED IN THE WEAP ANALYSIS IS 862 kN (517 kN/0.6).
- HEAVY DUTY PILE SHOES SHALL BE INSTALLED ON THE TIPS OF ALL PILES. DETAILS OF THE PREFABRICATED PILE SHOES AND THE REQUIRED WELDING PROCEDURES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.



## NOTES:

- ALL WELDS SHALL BE COMPLETE PENETRATION AND SHALL CONFORM TO THE AASHTO/AWS BRIDGE WELDING CODE.
- WELDING PROCEDURES MUST BE APPROVED BY THE ENGINEER PRIOR TO WELDING.
- WHENEVER POSSIBLE ALL PILES SHALL BE SPLICED ON THE GROUND IN THE FLAT POSITION.
- WEB SHALL BE COPE TO ALLOW FOR COMPLETE PENETRATION WELDING OF FLANGES.

## H-PILE SPLICE DETAILS SCALE 1: 10

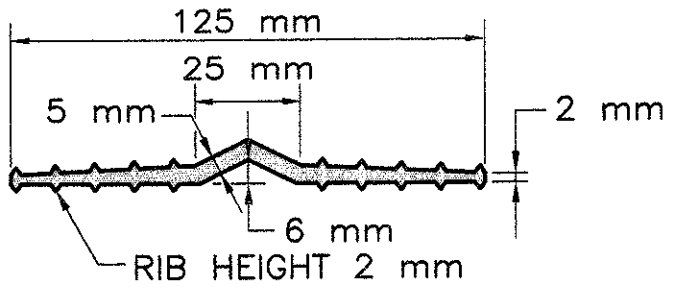
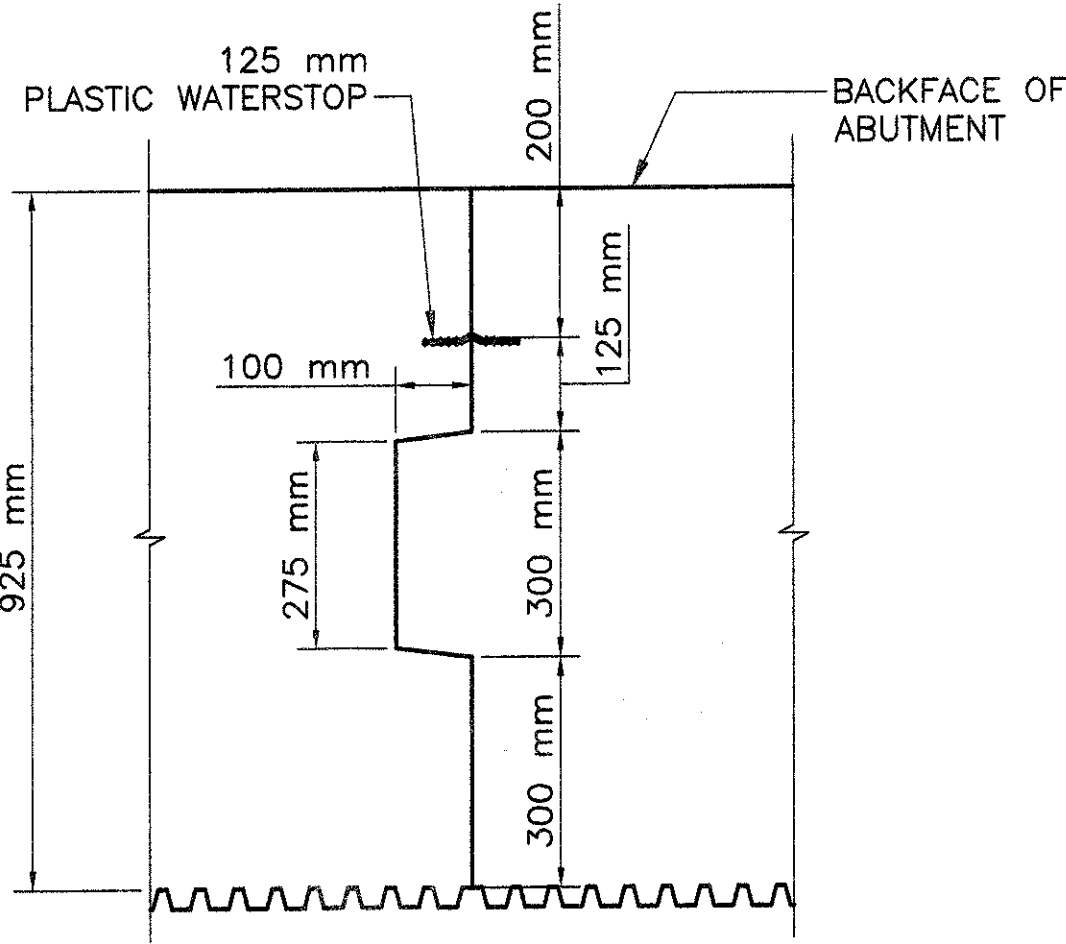
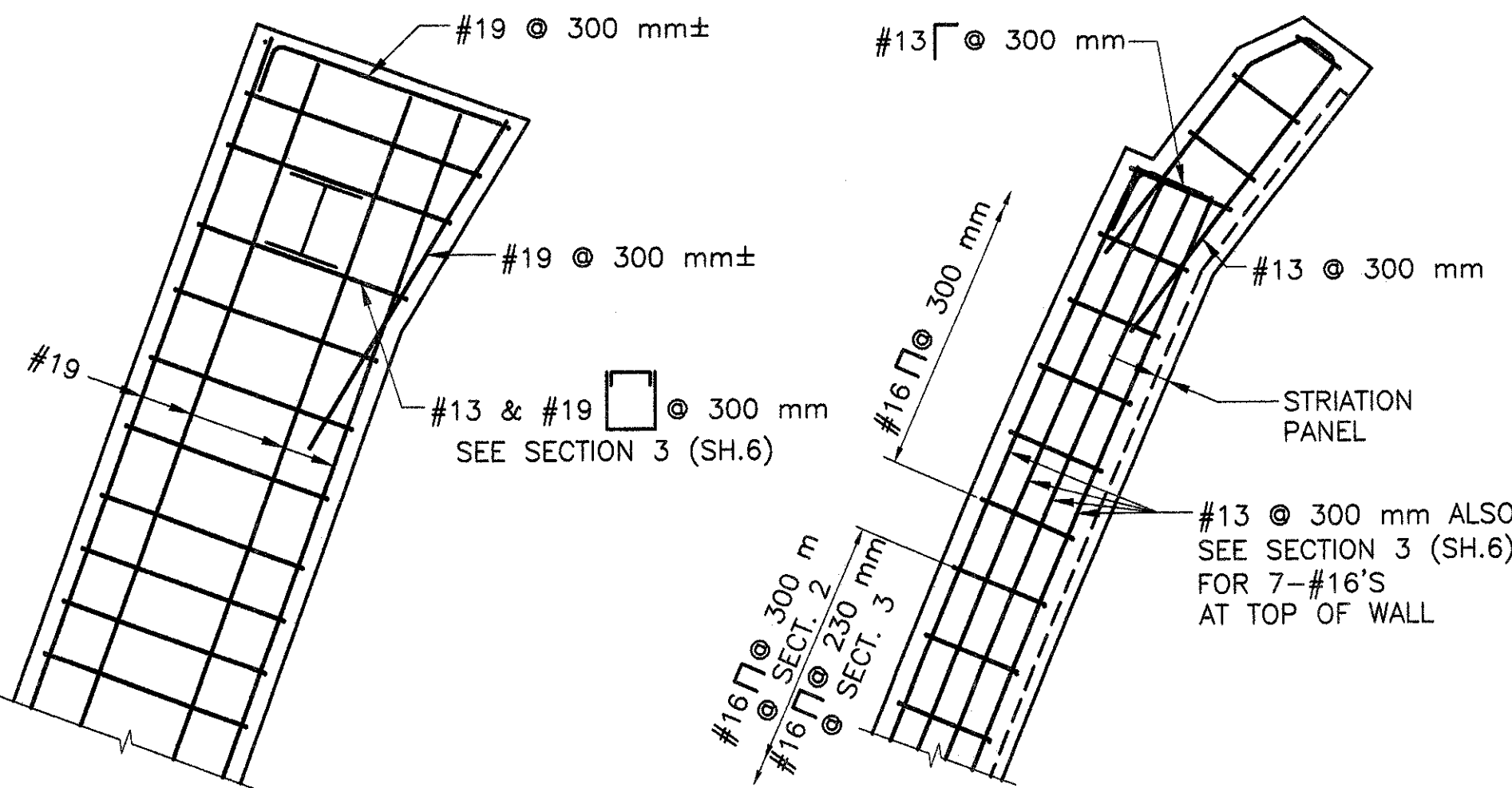
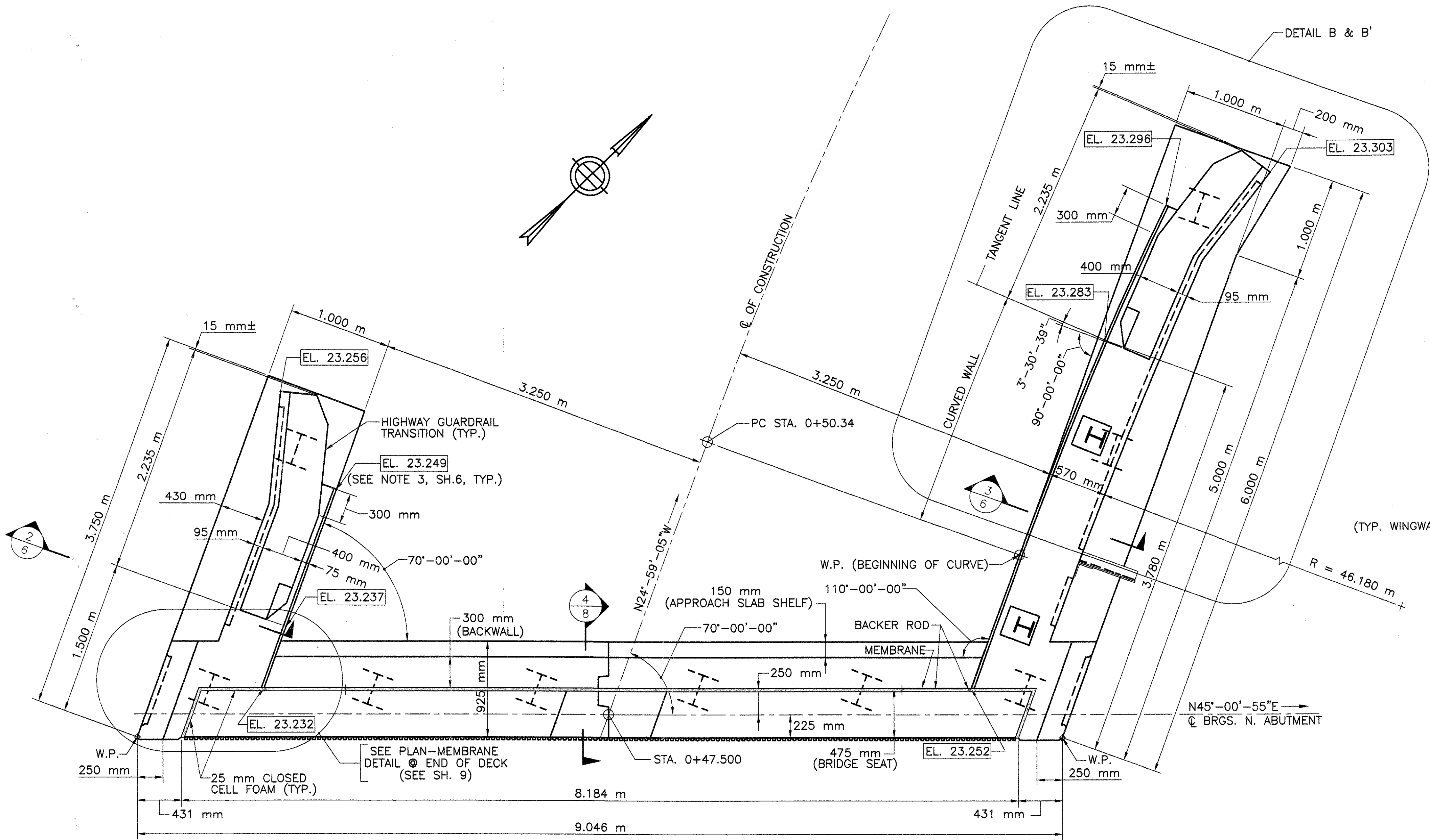


April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	



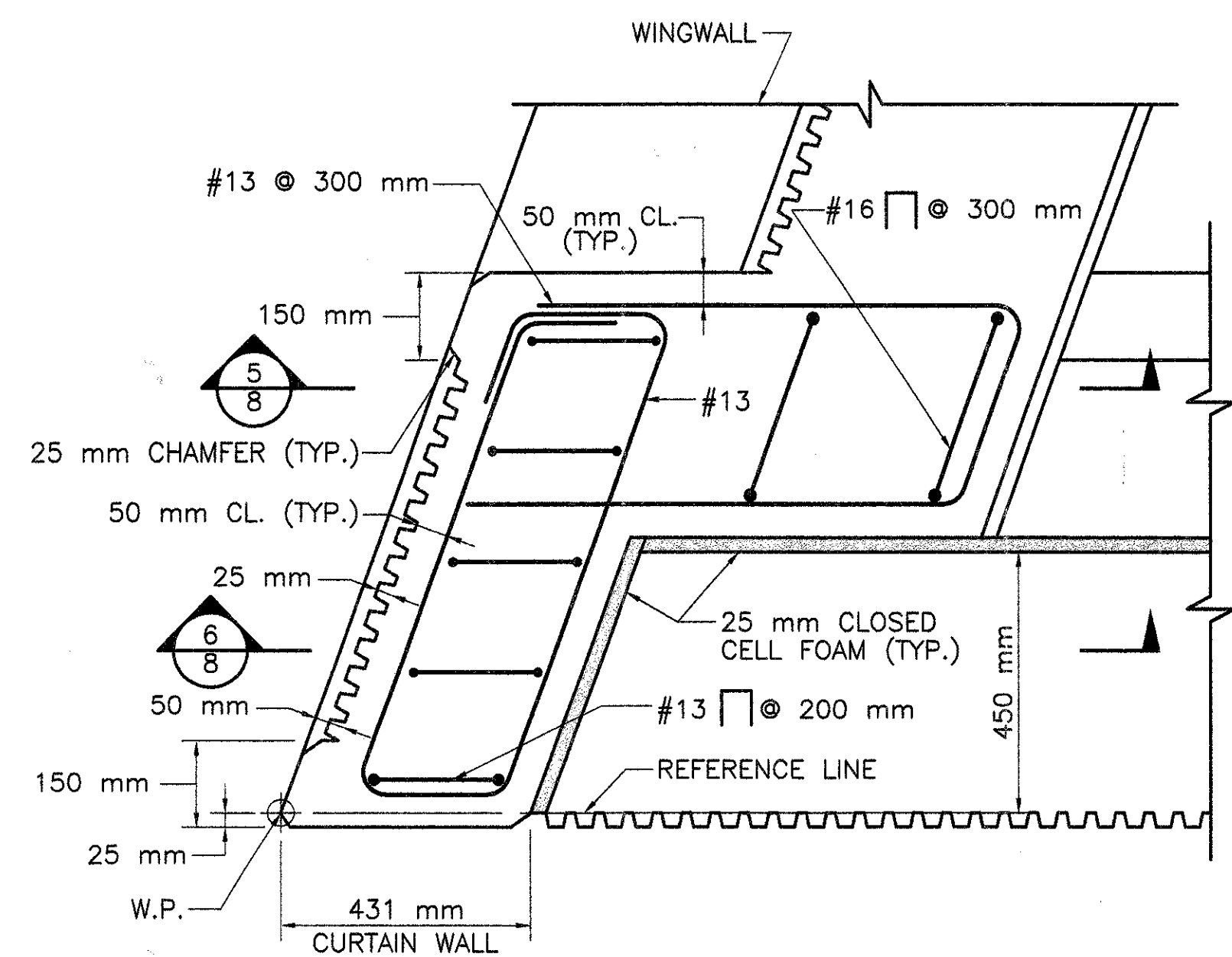


STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	12	23
PROJECT FILE NO. 602550				



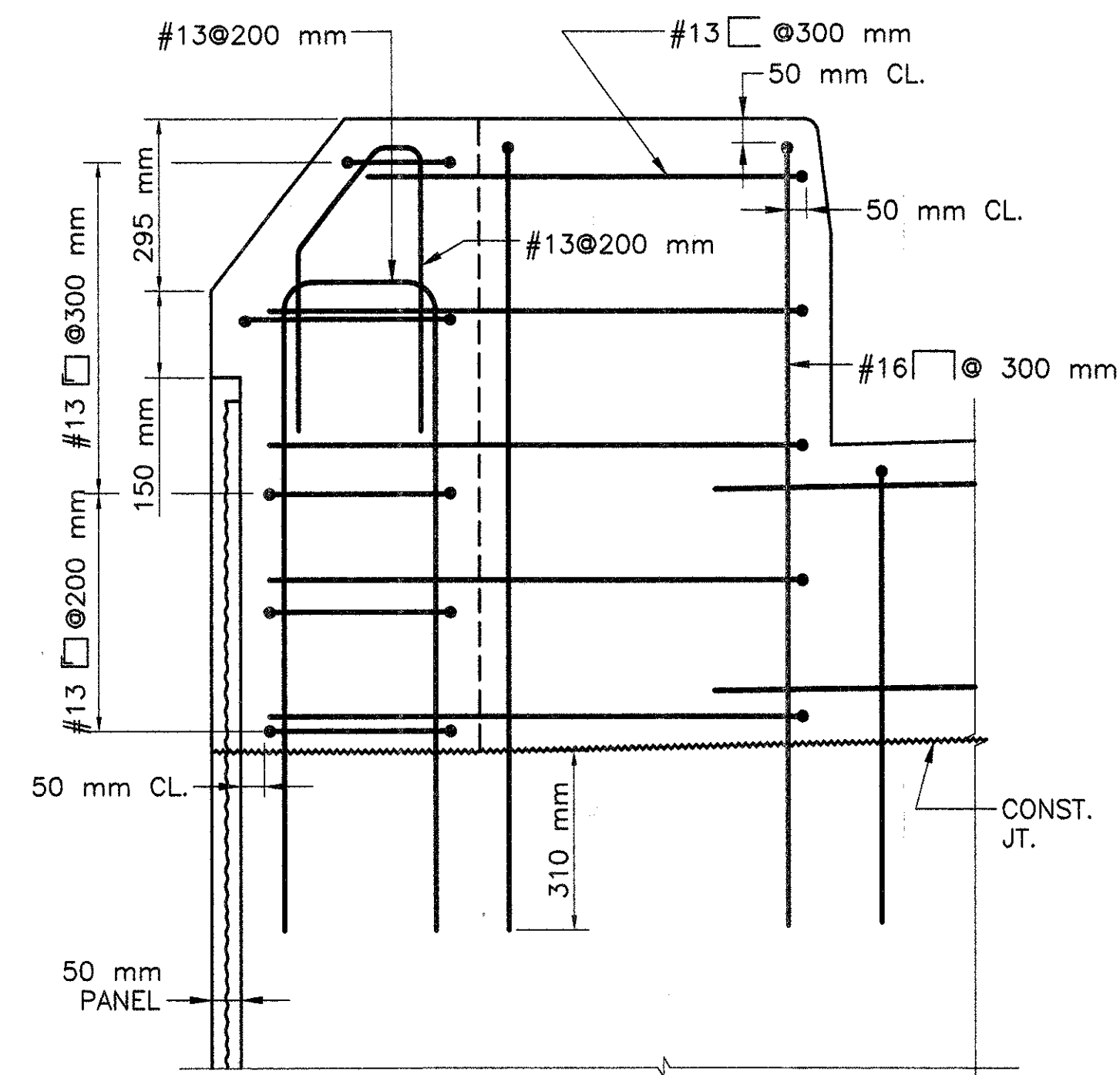
April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	

STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N.F.A.	2002	13	23
PROJECT FILE NO. 602550				



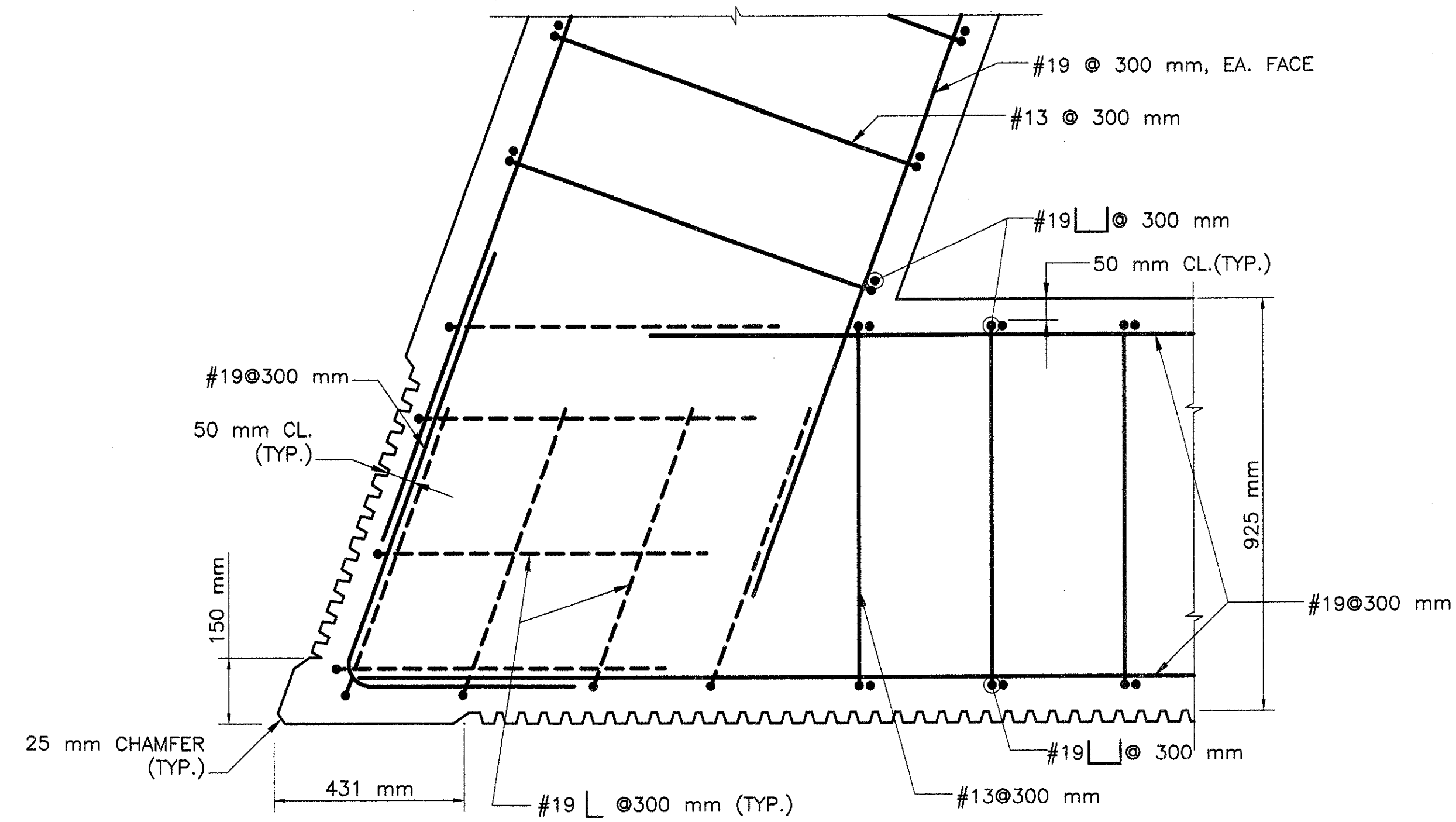
NOTE:  
ATTACH CLOSED CELL FOAM TO THE BACK AND SIDE OF THE EXTERIOR PRECAST BEAM PRIOR TO PLACING THE CONCRETE FOR THE BACKWALL AND CURTAIN WALL.

DETAIL A  
SCALE 1:10

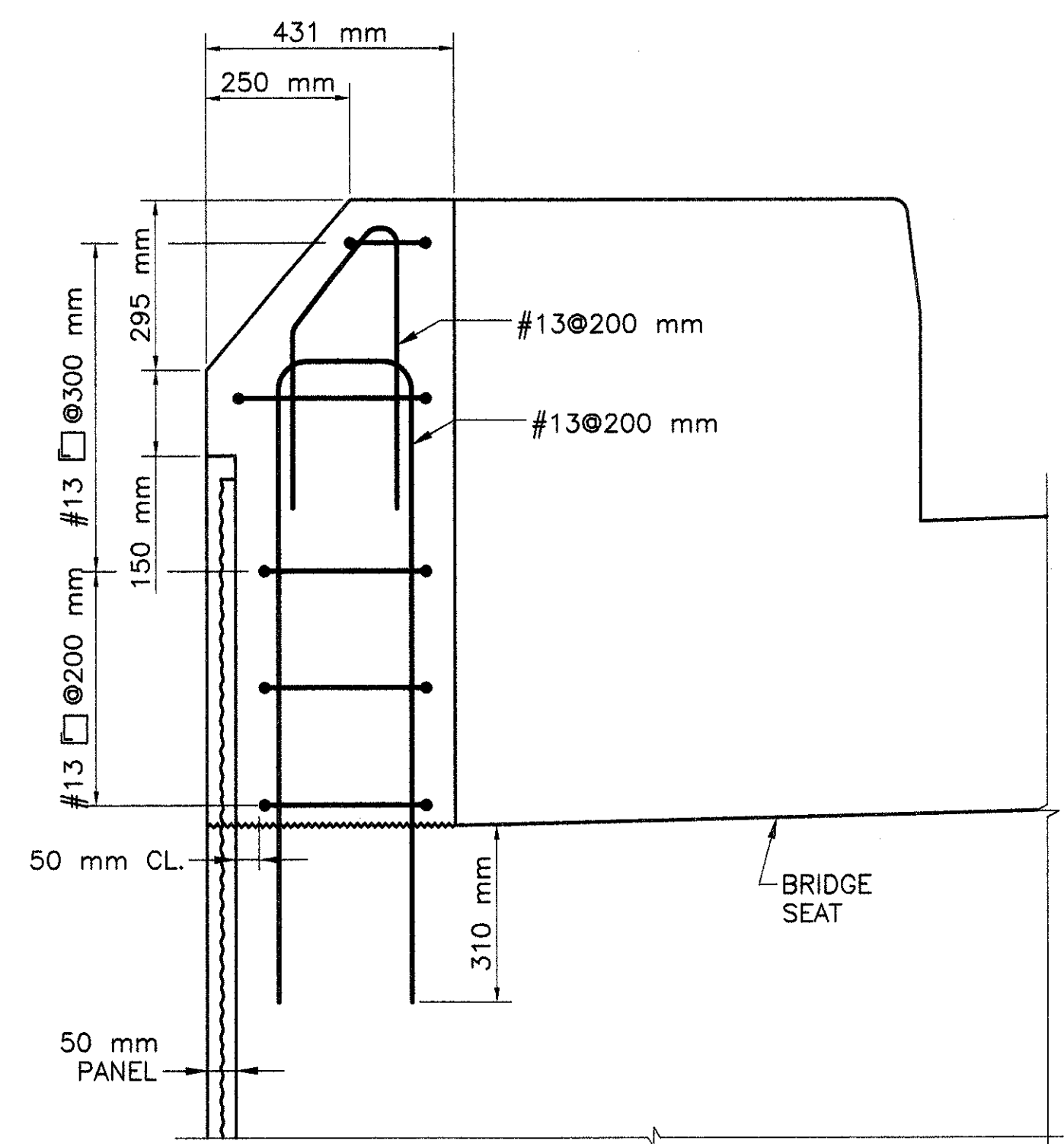


NOTE:  
REINFORCEMENT BELOW CONSTRUCTION JOINT HAS BEEN OMITTED FOR CLARITY.

SECTION 5  
SCALE 1:10

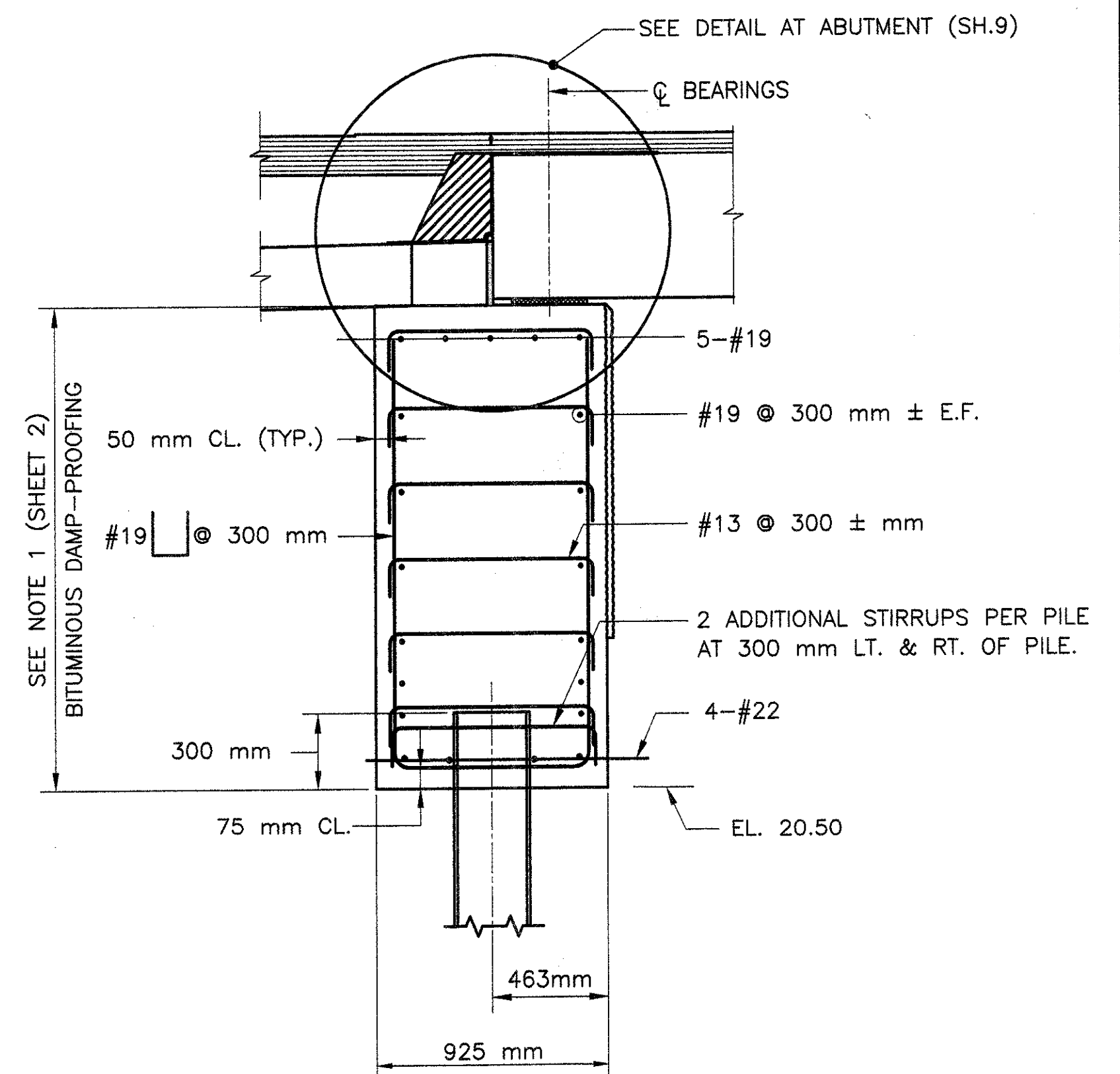


DETAIL A'  
(BELOW CONST. JOINT)  
SCALE 1:10

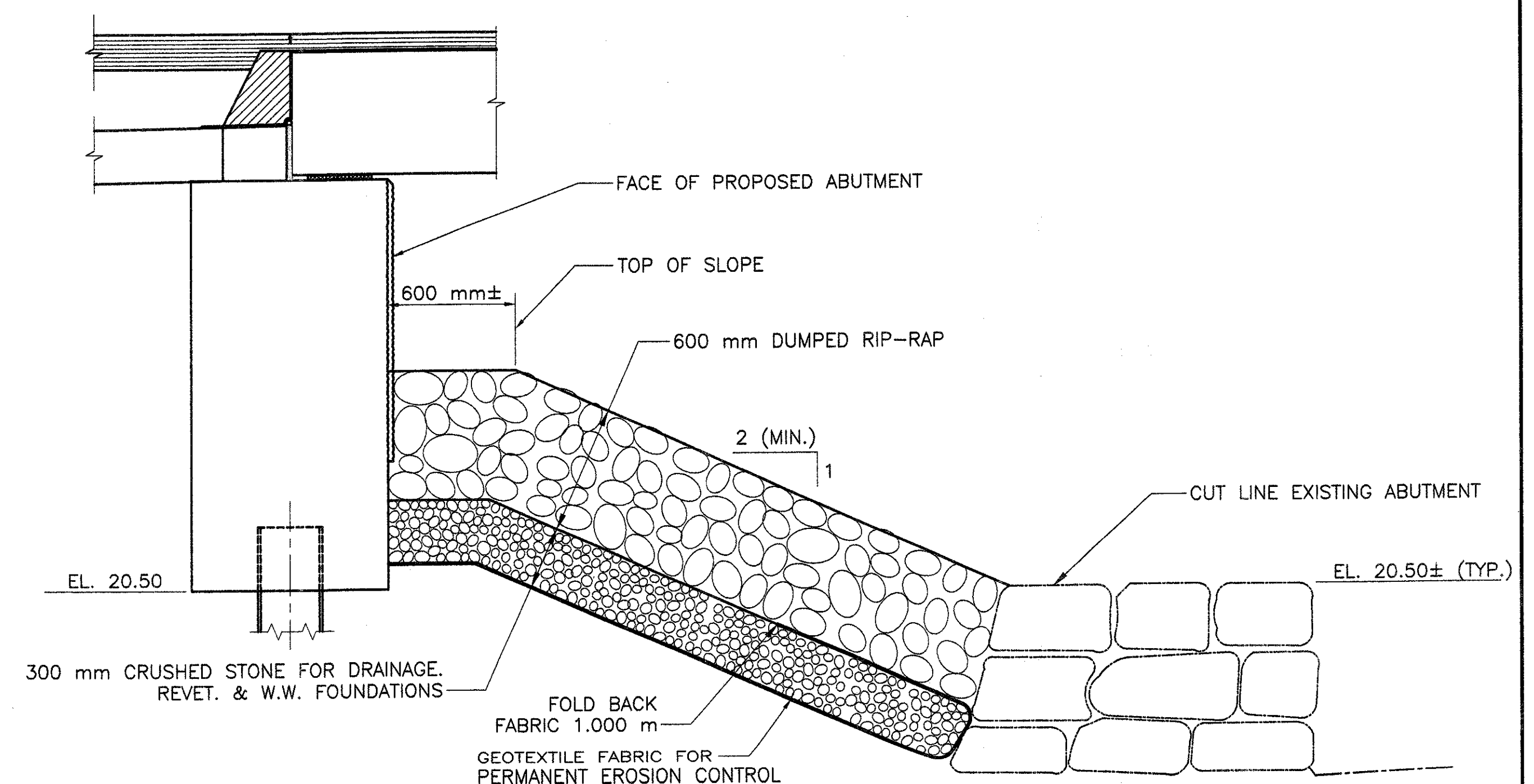


NOTE:  
REINFORCEMENT BELOW CONSTRUCTION JOINT HAS BEEN OMITTED FOR CLARITY.

SECTION 6  
SCALE 1:10



TYPICAL ABUTMENT-SECTION 4  
SCALE 1:20

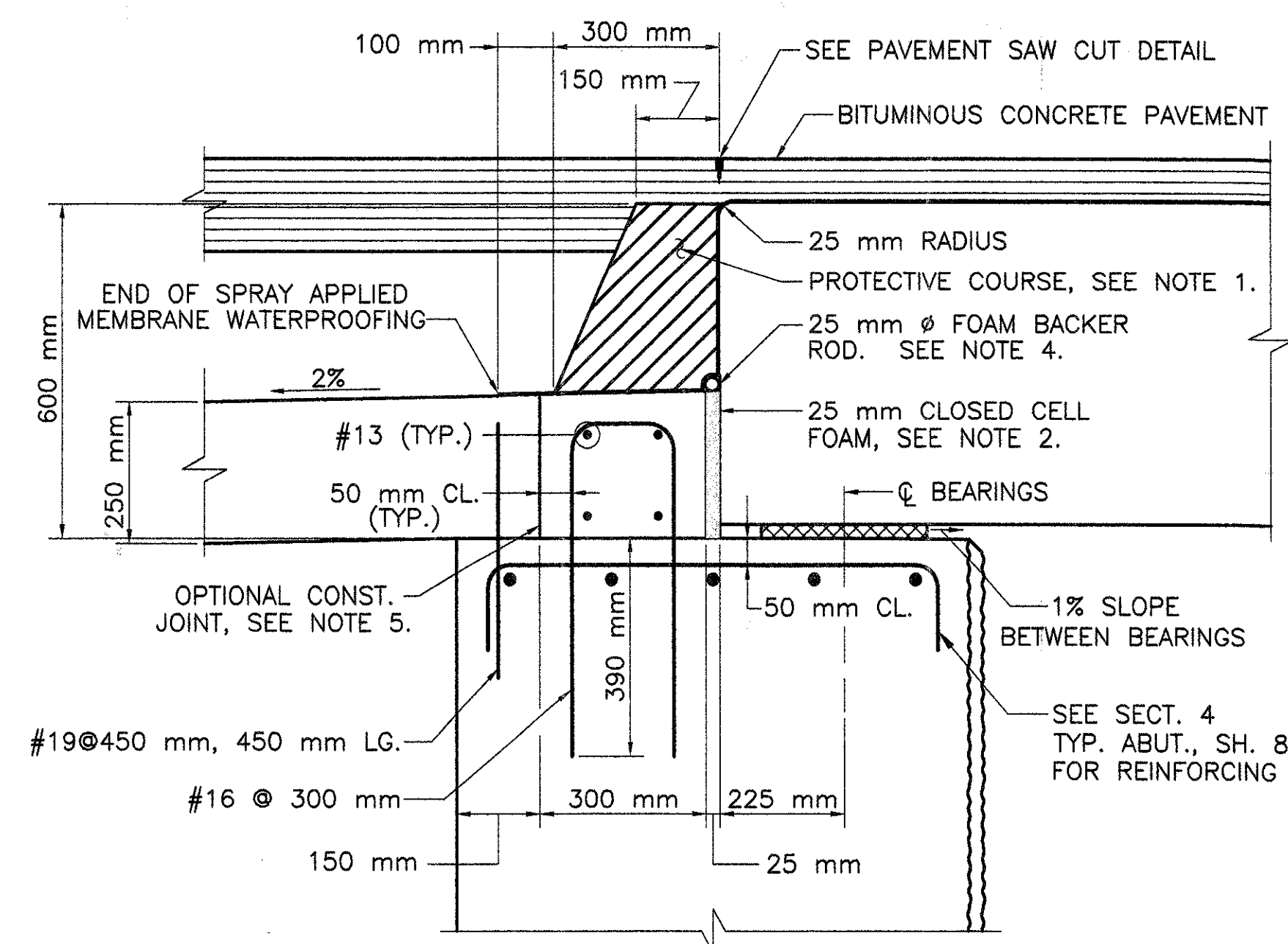


RIP-RAP DETAIL  
SCALE 1:20

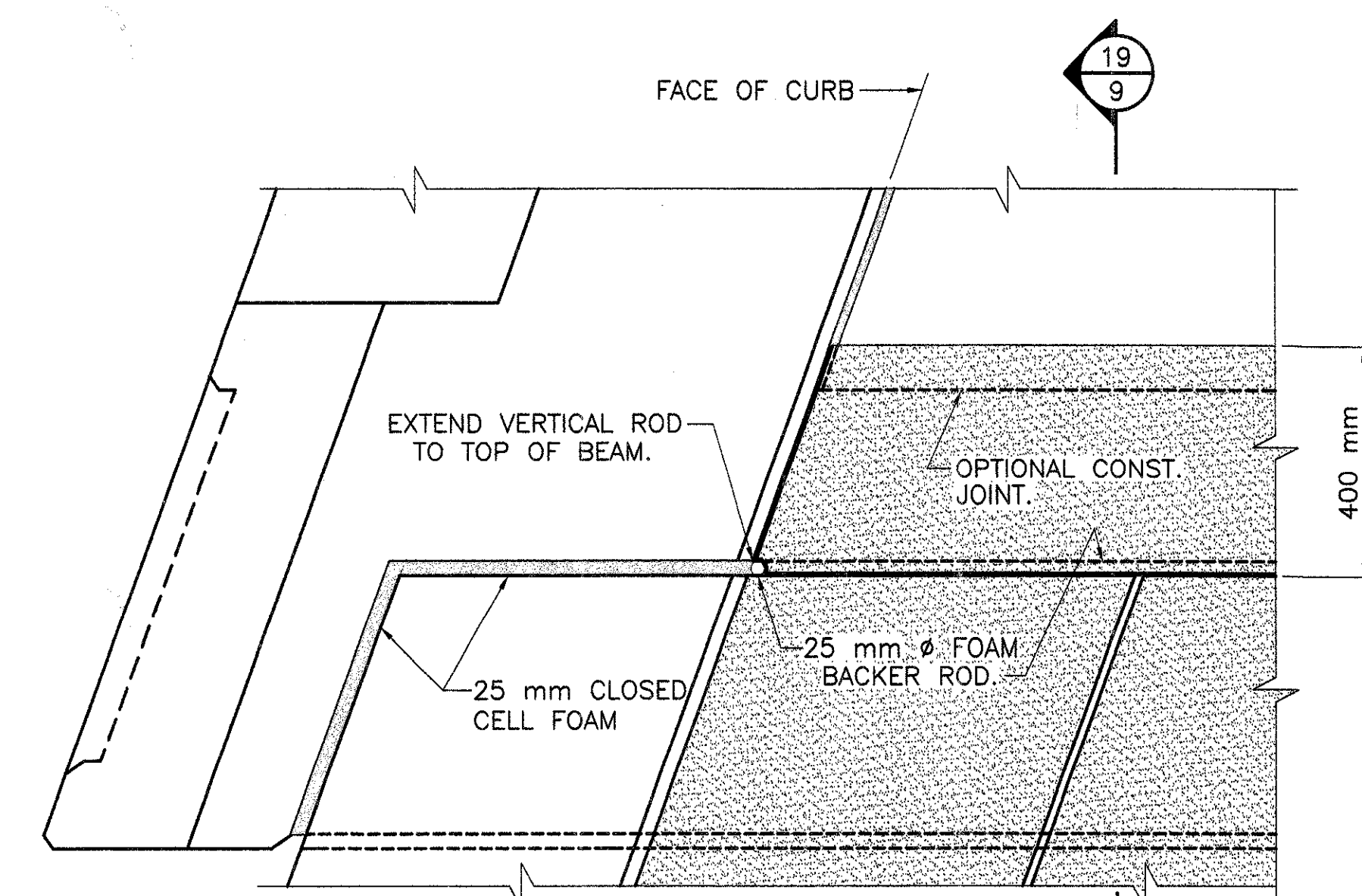
April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	



STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	14	23

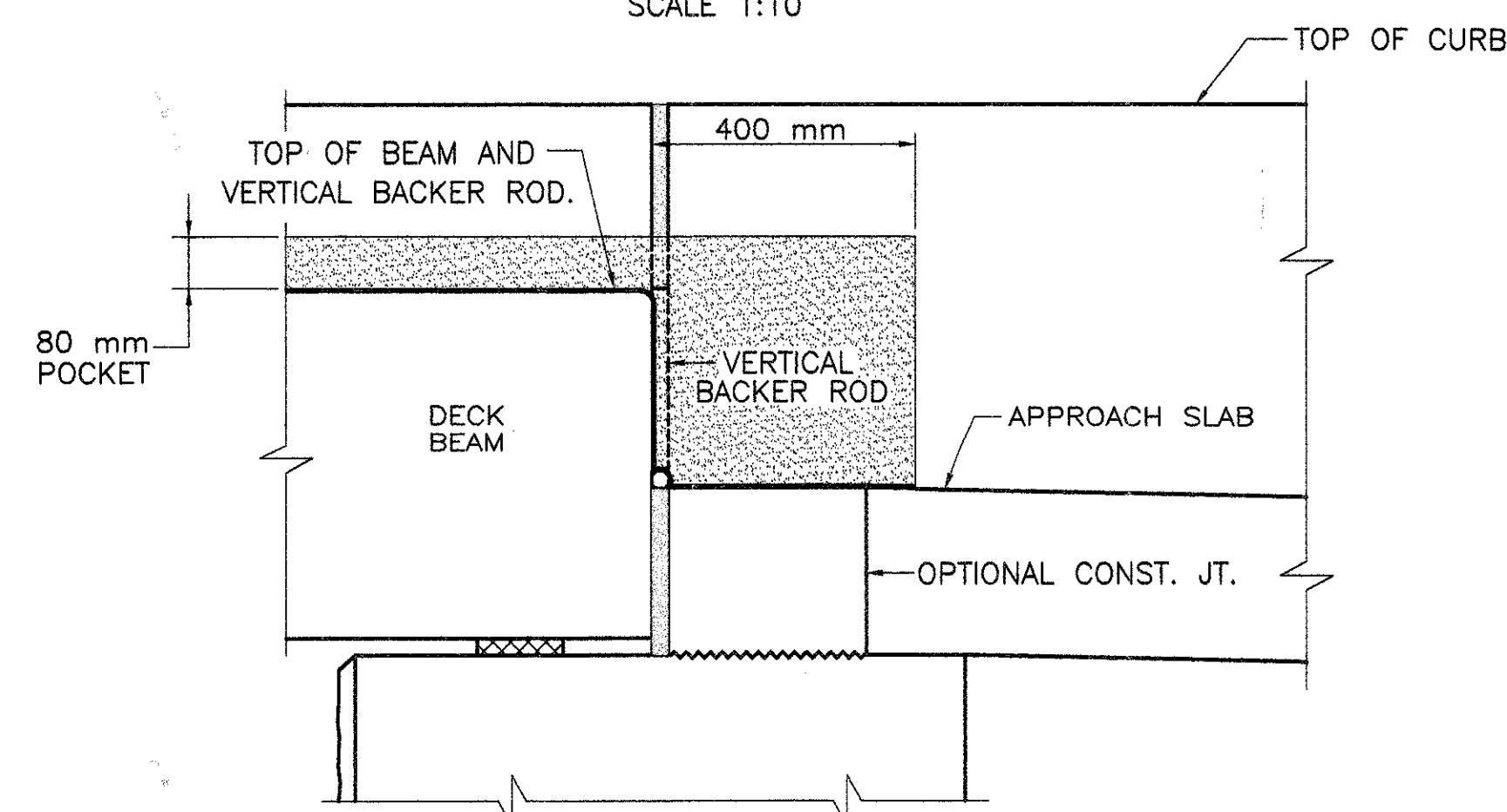


DETAIL AT ABUTMENT  
SCALE 1:10

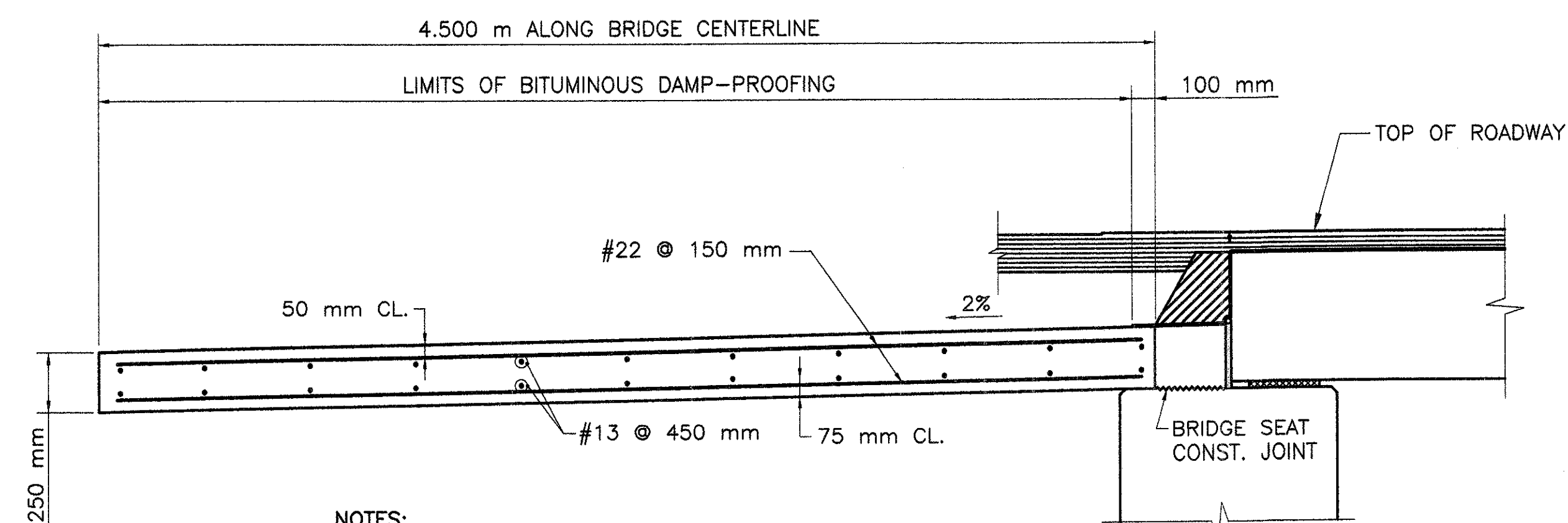


**NOTE:**  
SPRAY APPLIED MEMBRANE WATERPROOFING SHOWN THUS: 

SPRAY APPLIED MEMBRANE DETAIL @ END OF DECK  
SCALE 1:10

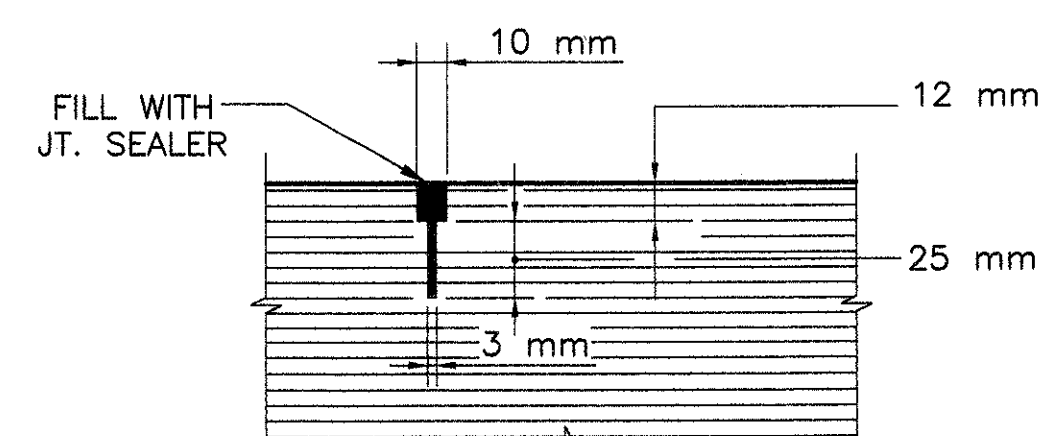


SECTION 19  
SCALE 1:10

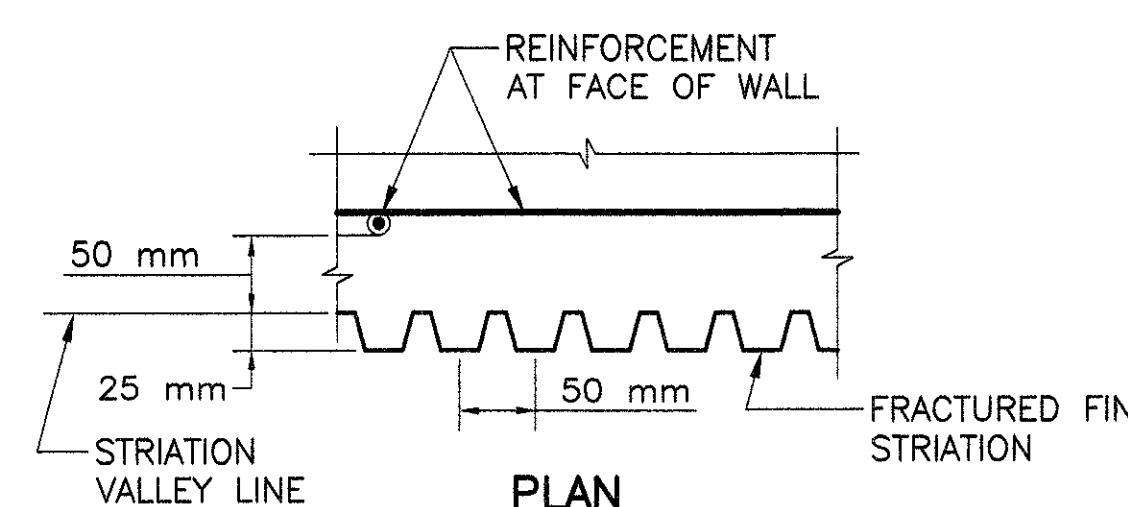


- NOTES:
1. APPROACH SLAB TO BE 30 MPa-40 mm-335 kg CEMENT CONCRETE MASONRY.
  2. PLACE LONGITUDINAL REINFORCEMENT PARALLEL TO CENTERLINE OF CONSTRUCTION.  
PLACE TRANSVERSE REINFORCEMENT PARALLEL TO ABUTMENT.
  3. APPLY BITUMINOUS DAMP-PROOFING TO TOP SIDE OF SLAB.

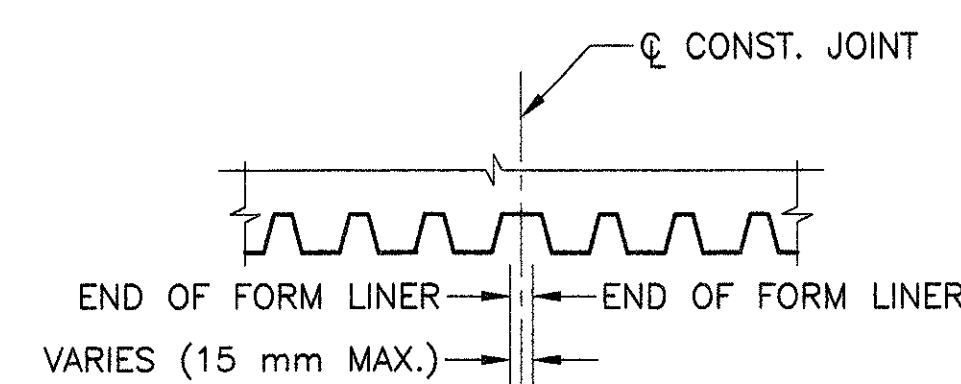
TYPICAL APPROACH SLAB SECTION  
SCALE 1: 20



PAVEMENT SAWCUT DETAIL  
SCALE 1:2.5

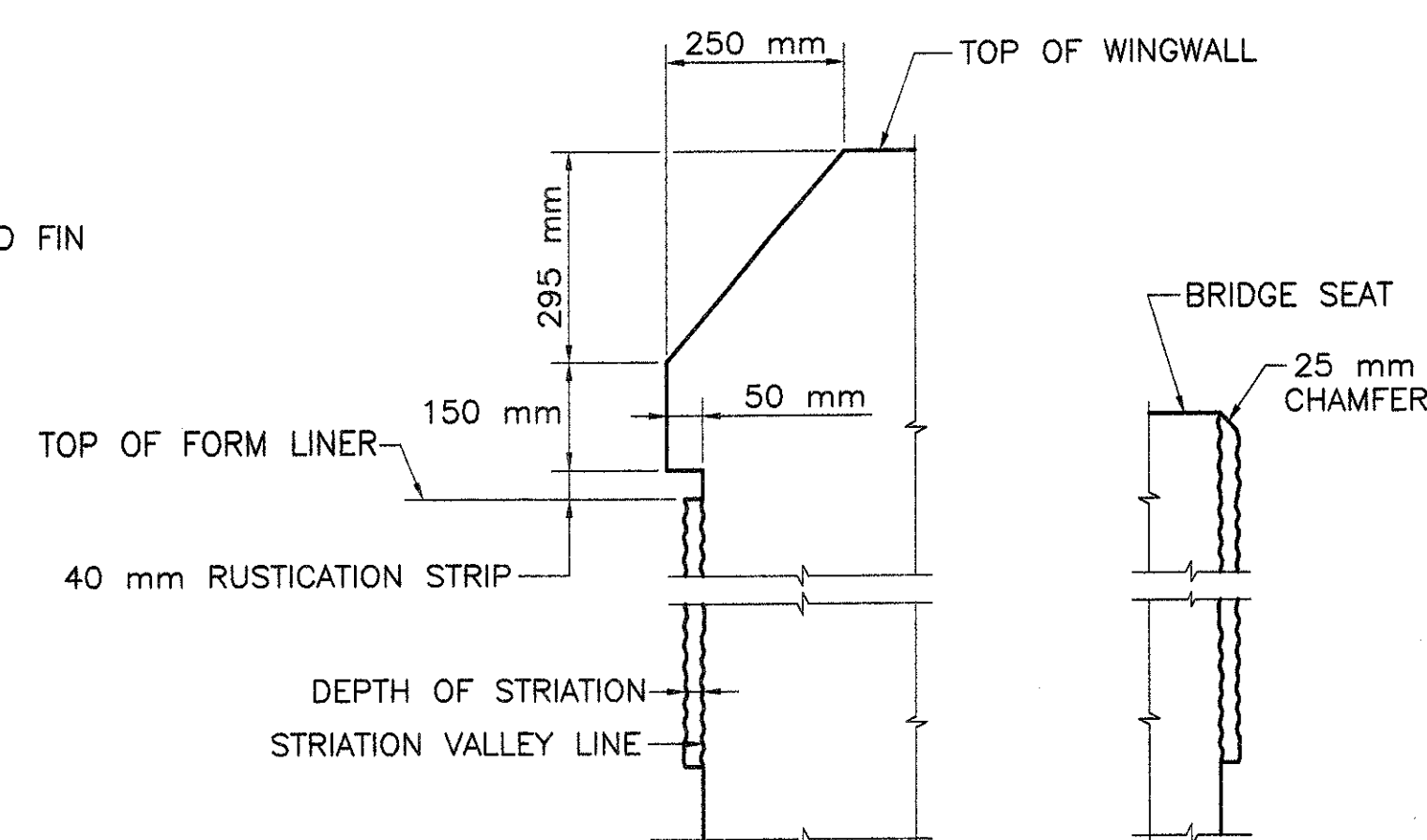


PLAN  
SCALE 1:5



CONSTRUCTION JOINT  
SCALE 1:5

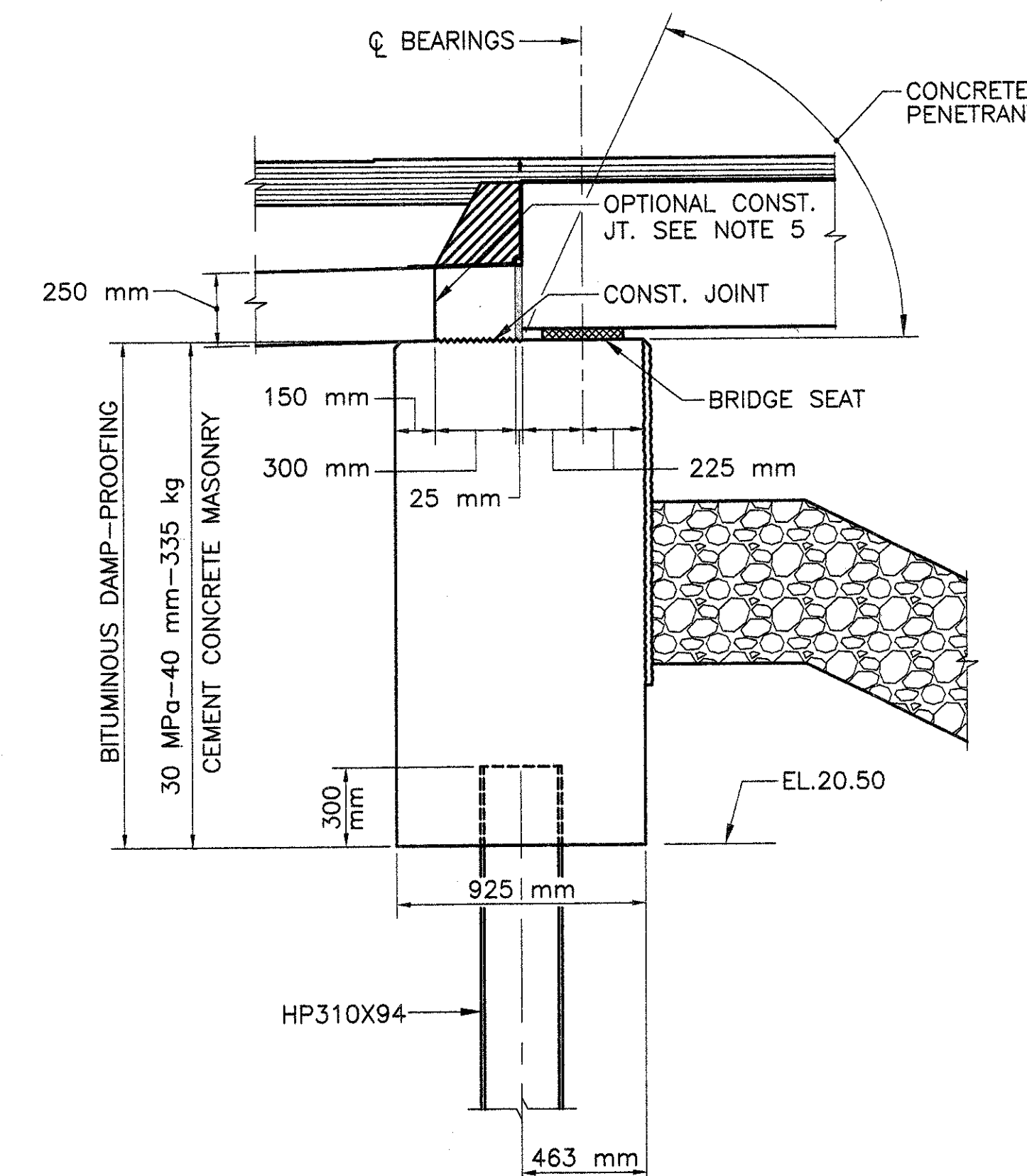
- NOTES:**
1. THE CONTRACTOR SHALL MAKE SURE THAT THE STRIATION FINS ARE PLUMB AND THAT THE FINS LINE UP VERTICALLY FOR THE FULL HEIGHT.
  2. HORIZONTAL JOINTS SHALL NOT BE PERMITTED.



SECTION  
@ CURTAIN WALL  
SCALE 1:10

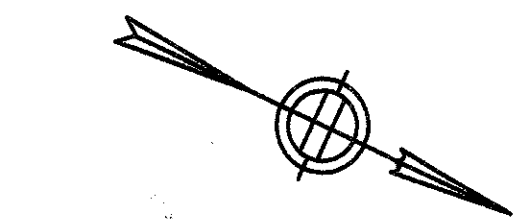
SECTION  
@ ABUTMENT  
SCALE 1:10

- ## NOTES:
1. PROTECTIVE COURSE TO BE CLASS I DENSE BINDER COURSE FOR BRIDGES, PLACED IN 50 mm LAYERS AND COMPACTED WITH A MECHANICAL HAND-GUIDED TAMPER WITHIN 12 HOURS AFTER PLACING MEMBRANE WATERPROOFING.
  2. ATTACH CLOSED CELL FOAM TO BACK OF PRECAST BEAM WITH ADHESIVE.
  3. ALL CONCRETE ABOVE THE CONSTRUCTION JOINT LOCATED AT THE BRIDGE SEAT SHALL BE PLACED AFTER BEAMS HAVE BEEN ERECTED. THE CONCRETE BELOW THE BACKWALL SHALL BE FINISHED WITH A ROUGHENED SURFACE OF 6 mm AMPLITUDE.
  4. SPRAY APPLY MEMBRANE WATERPROOFING OVER CLOSED CELL FOAM BACKER ROD.
  5. IF THE APPROACH SLAB IS POURED MONOLITHICALLY WITH THE BACKWALLS, MAKE A 50 mm DEEP BY 3 mm WIDE SAWCUT IN THE TOP OF THE SLAB AT THE OPTIONAL CONSTRUCTION JOINT LOCATION. FILL SAWCUT WITH CONCRETE JOINT SEALER.



TYPICAL ABUTMENT SECTION  
SCALE 1:20

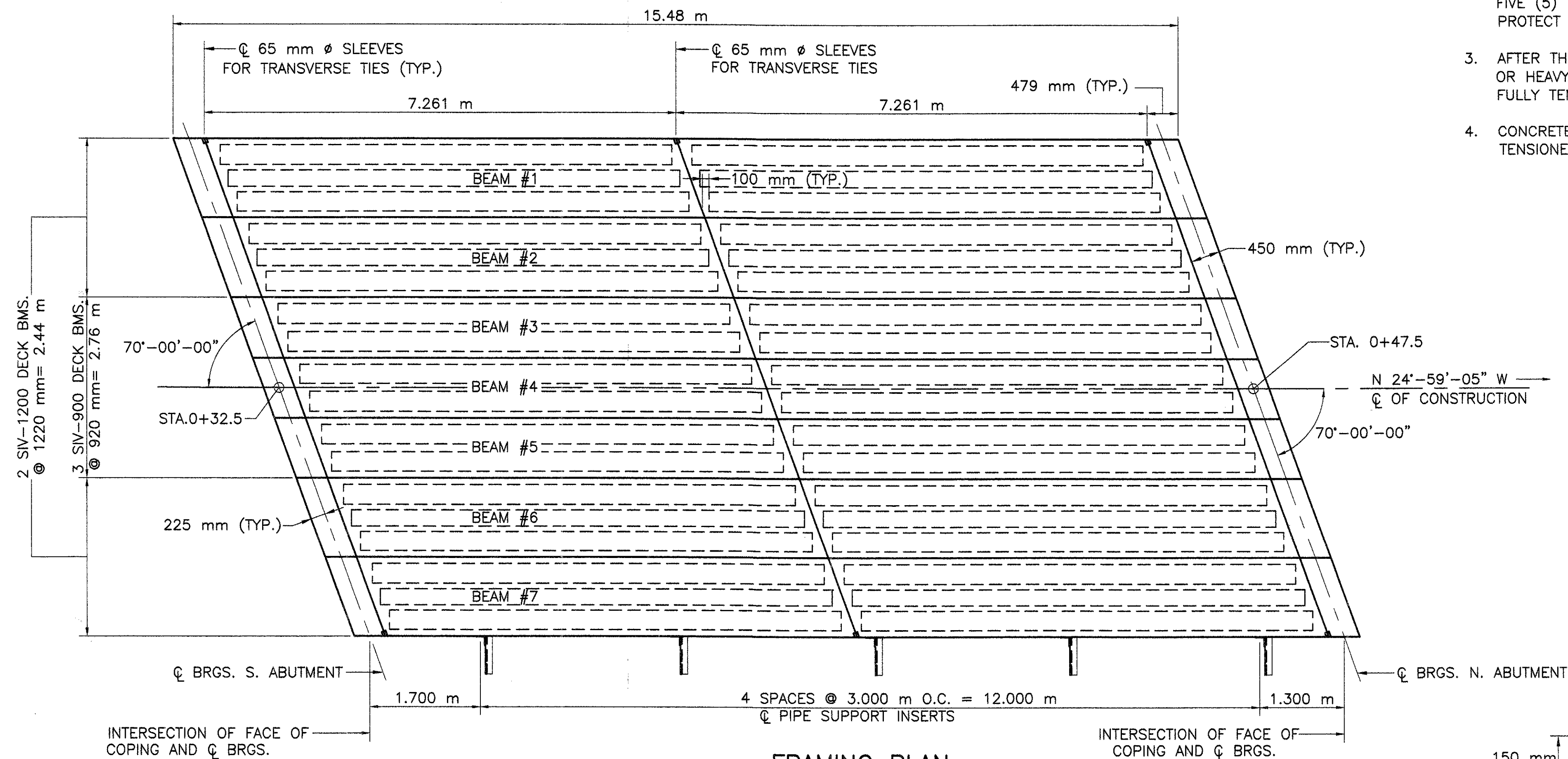
April 6, 2002	ISSUED FOR CONSTRUCTION
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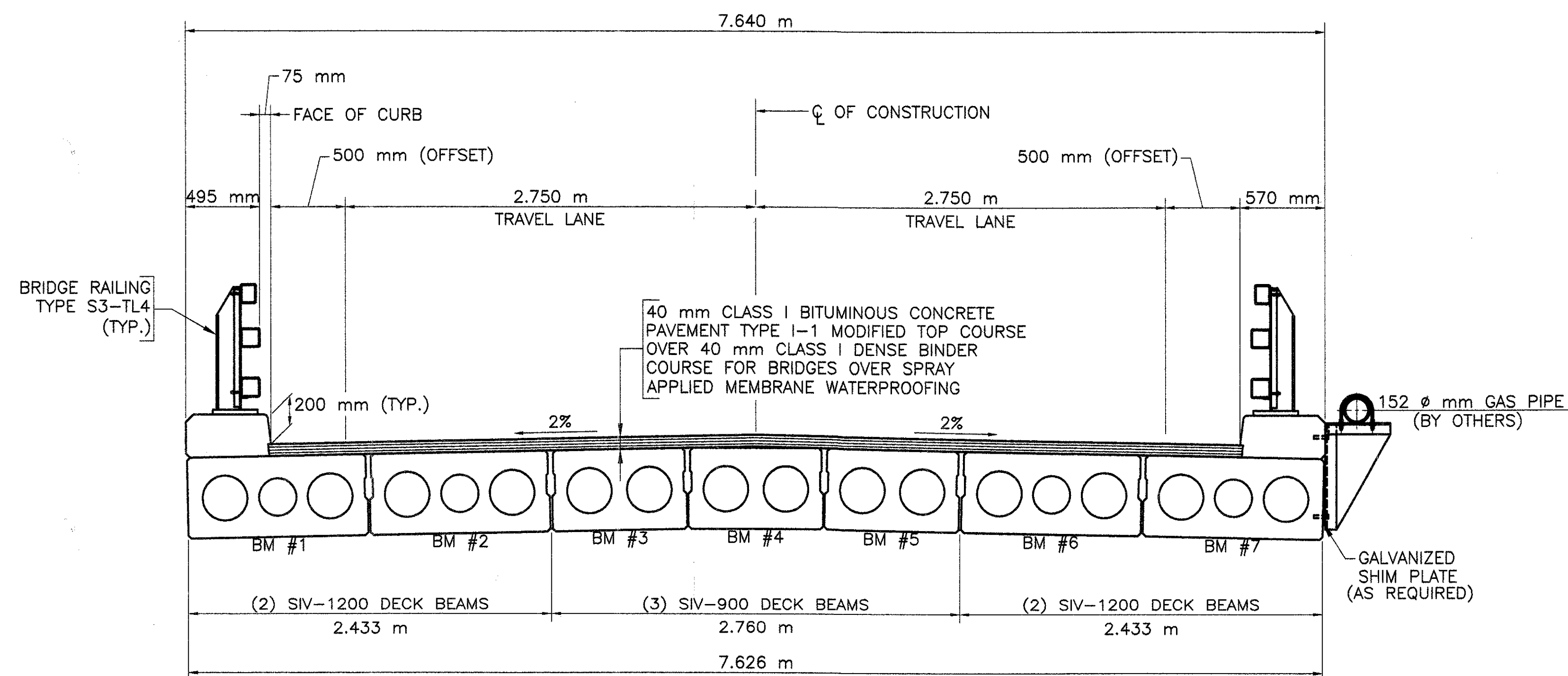
## TRANSVERSE TIE TENSIONING NOTES:

1. AFTER ALL BEAMS HAVE BEEN ERECTED, TENSION EACH TRANSVERSE TIE TO 22 KN.
2. FILL ALL KEYWAYS WITH MORTAR (M4.04.0). IF THE KEYWAYS ARE NOT FILLED WITHIN FIVE (5) DAYS AFTER THE BEAMS ARE ERECTED, THE CONTRACTOR SHALL COVER AND PROTECT THE KEYWAYS FROM THE WEATHER AND DEBRIS UNTIL THEY ARE FILLED.
3. AFTER THE MORTAR HAS CURED, TENSION EACH TRANSVERSE TIE TO 135 KN. NO TRAFFIC OR HEAVY EQUIPMENT SHALL BE PERMITTED ON THE BEAMS UNTIL ALL TIES HAVE BEEN FULLY TENSIONED.
4. CONCRETE FOR CURBS SHALL BE PLACED AFTER THE TRANSVERSE TIES HAVE BEEN FULLY TENSIONED.

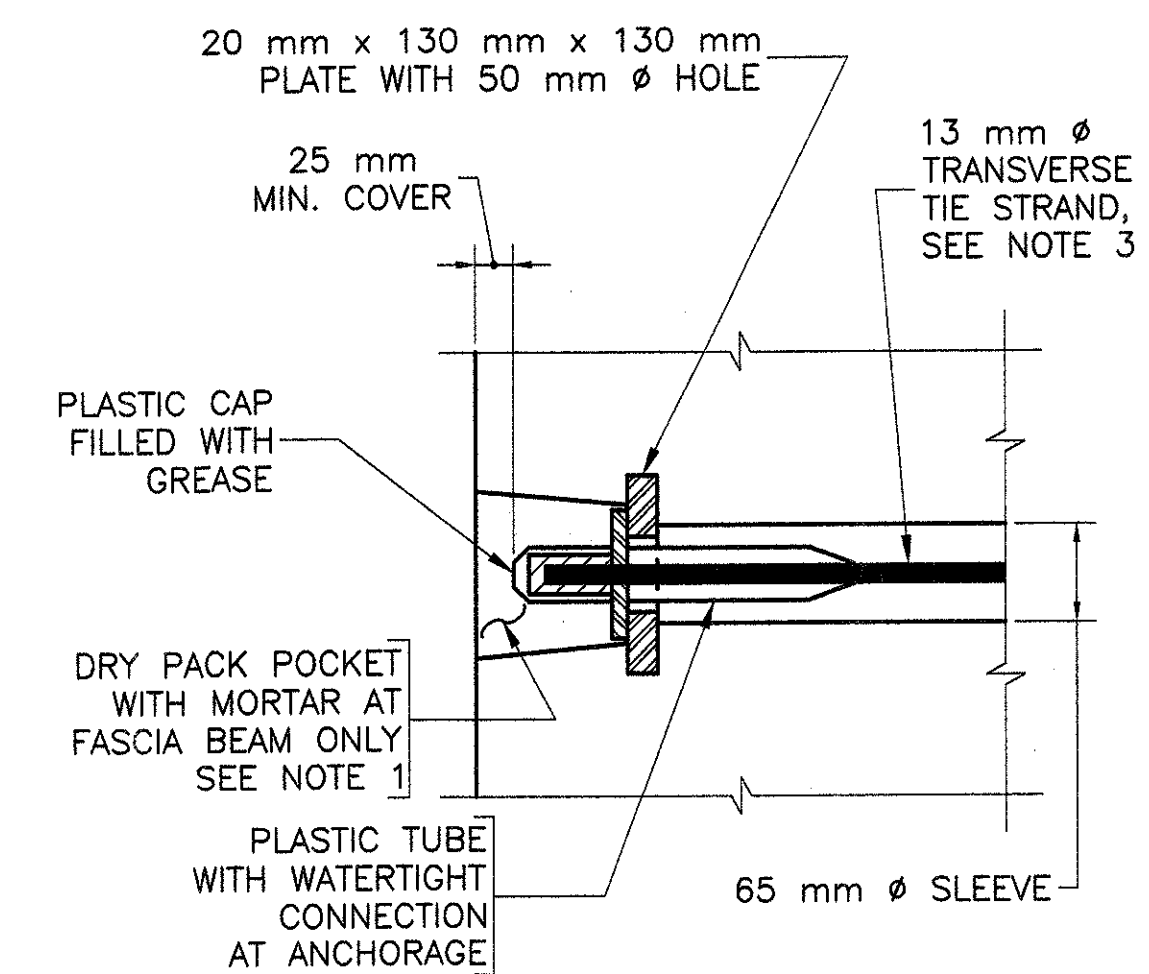
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	15	23
PROJECT FILE NO. 602550				



**FRAMING PLAN**  
SCALE 1:50



**TYPICAL CROSS SECTION**  
SCALE 1:25

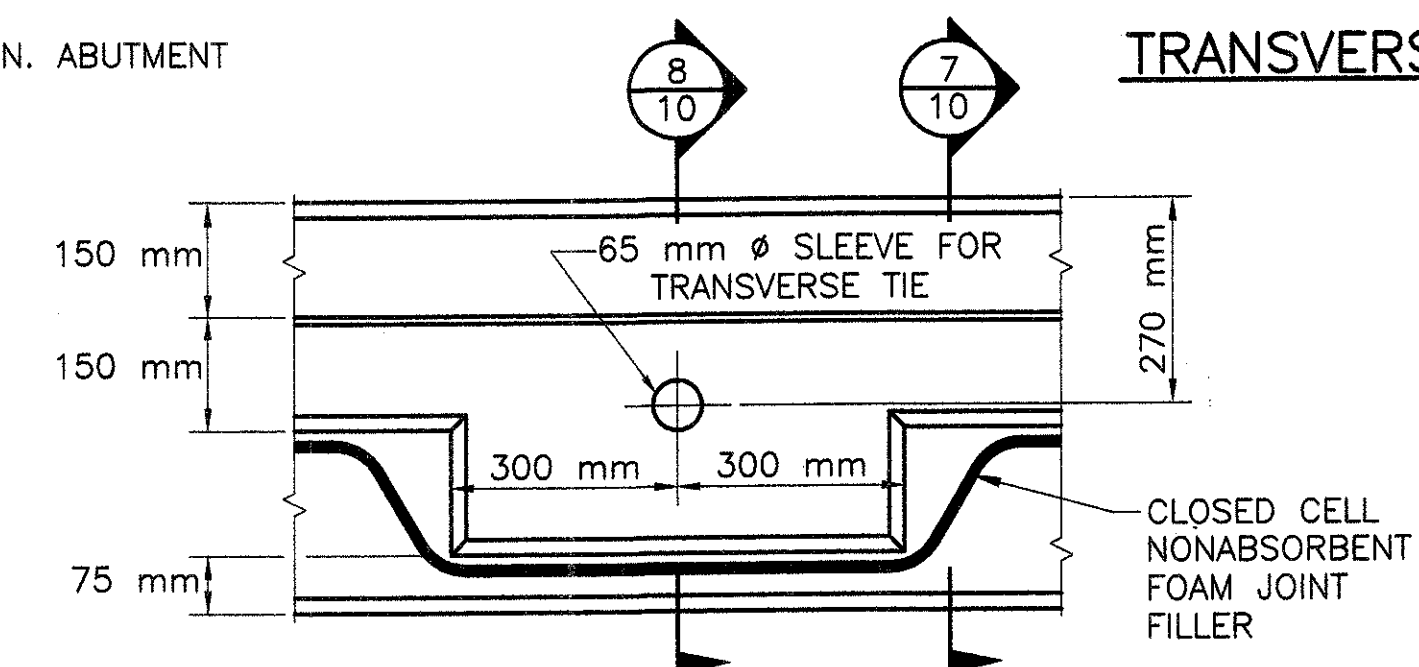


### NOTES:

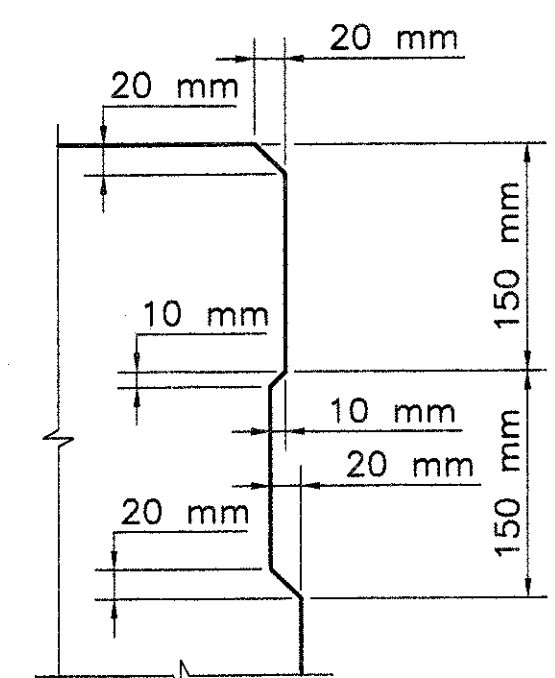
1. MORTAR FOR EXTERIOR POCKETS SHALL CONFORM TO M4.02.15 AND SHALL BE THE SAME COLOR AND TEXTURE AS THE BEAM CONCRETE.
2. OTHER ANCHORAGE SYSTEMS MAY BE SUBSTITUTED WITH THE APPROVAL OF THE ENGINEER. ALTERNATE ANCHORAGE SYSTEMS SHALL BE WATERTIGHT AND CORROSION PROOF.
3. TRANSVERSE TIES SHALL BE COVERED BY A SEAMLESS POLYPROPYLENE SHEATH (WITH CORROSION INHIBITING GREASE BETWEEN THE STRAND AND THE SHEATH) FOR THE FULL LENGTH OF THE STRAND EXCEPT AT THE ANCHORAGE LOCATION.

## TRANSVERSE TIE POCKET DETAIL

SCALE 1:5



**TYPICAL BEAM ELEVATION AT TRANSVERSE TIE LOCATIONS**  
SCALE 1:10

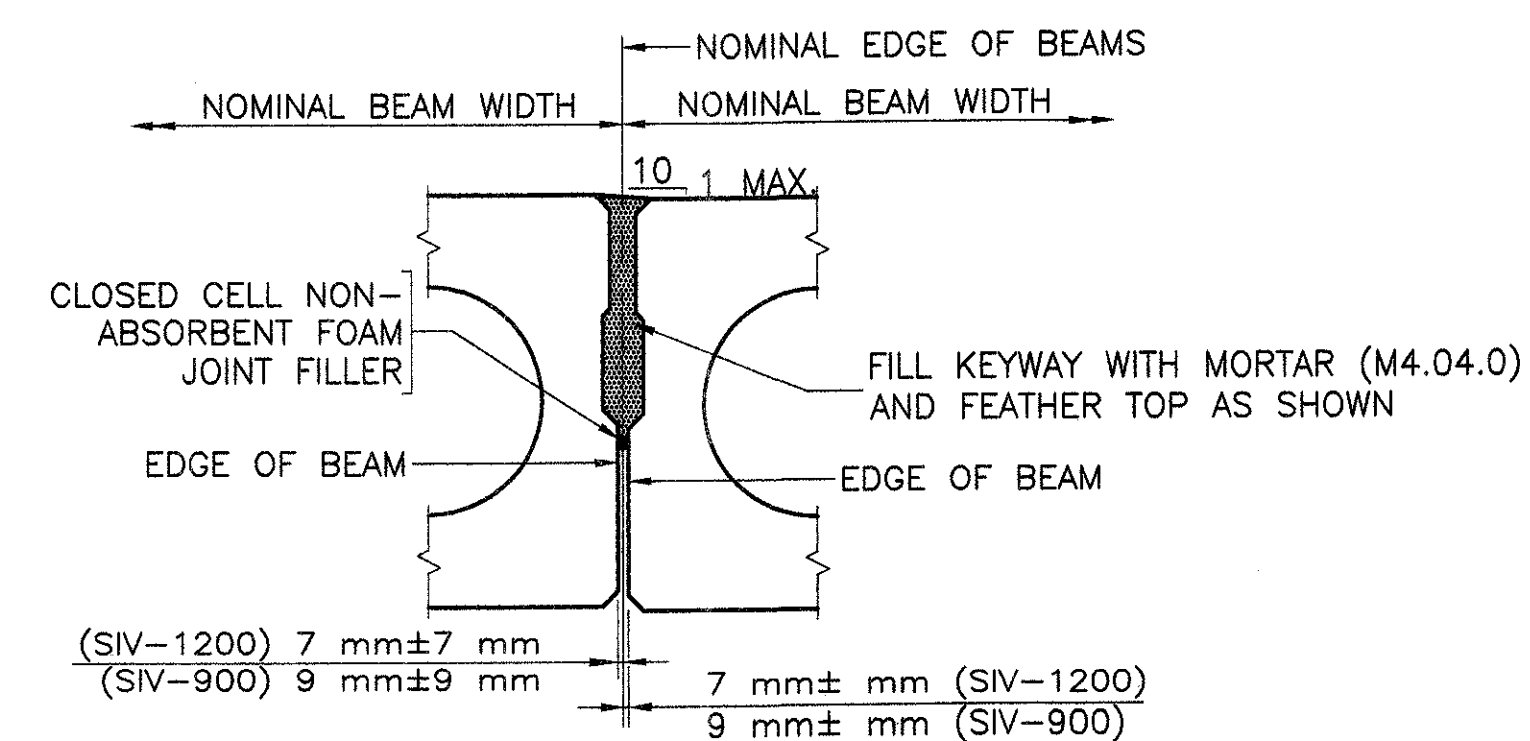


NOTE:

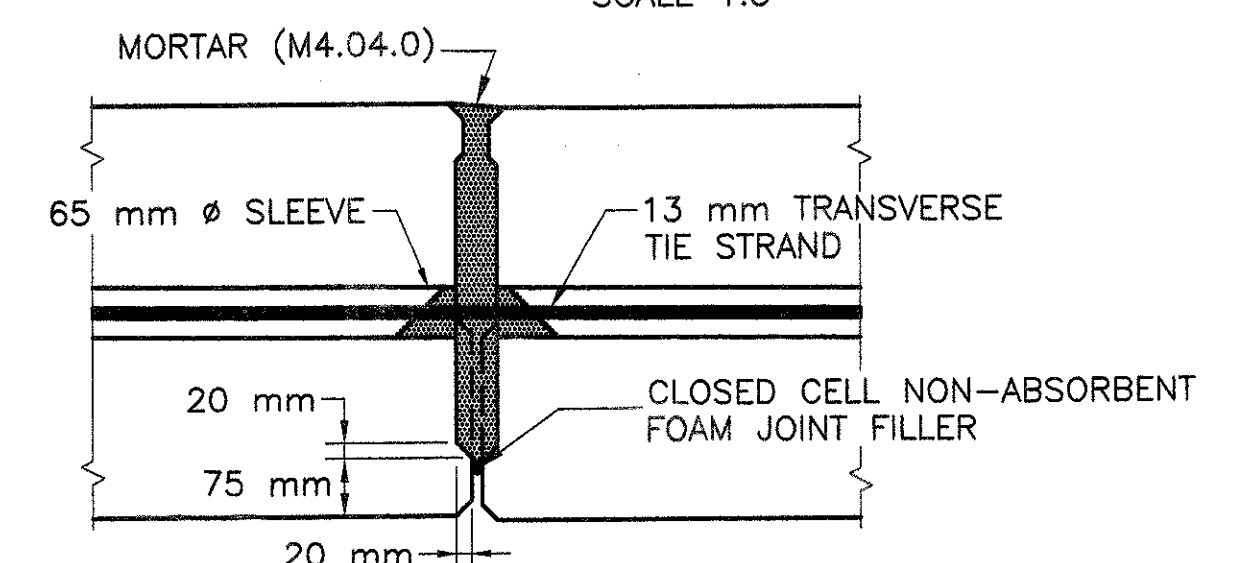
DEPTH OF SHEAR KEY VARIES AT TRANSVERSE TIE LOCATIONS.

## SHEAR KEY DETAIL

SCALE 1:5



**SECTION 7**  
SCALE 1:10

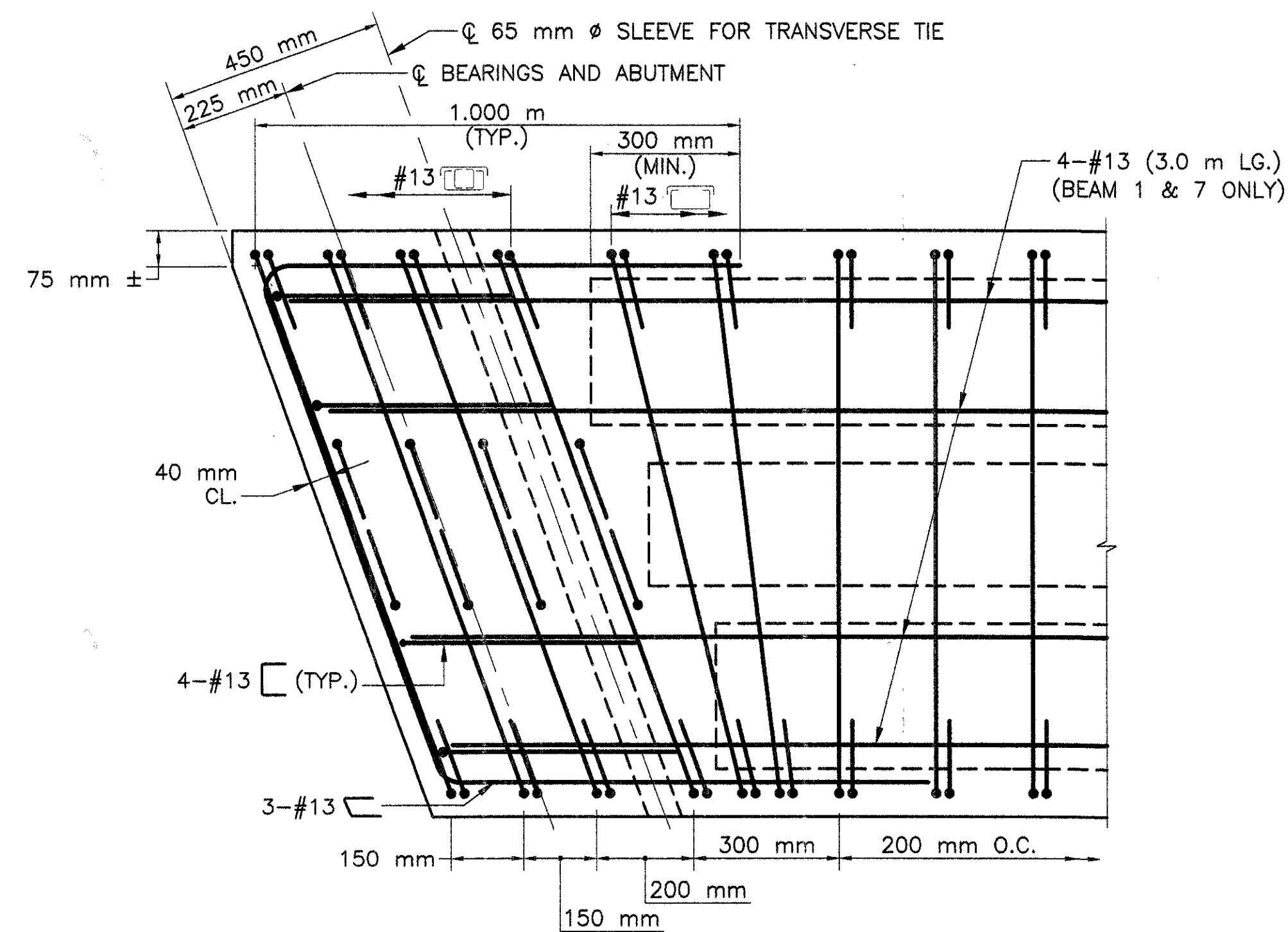


**SECTION 8**  
SCALE 1:10

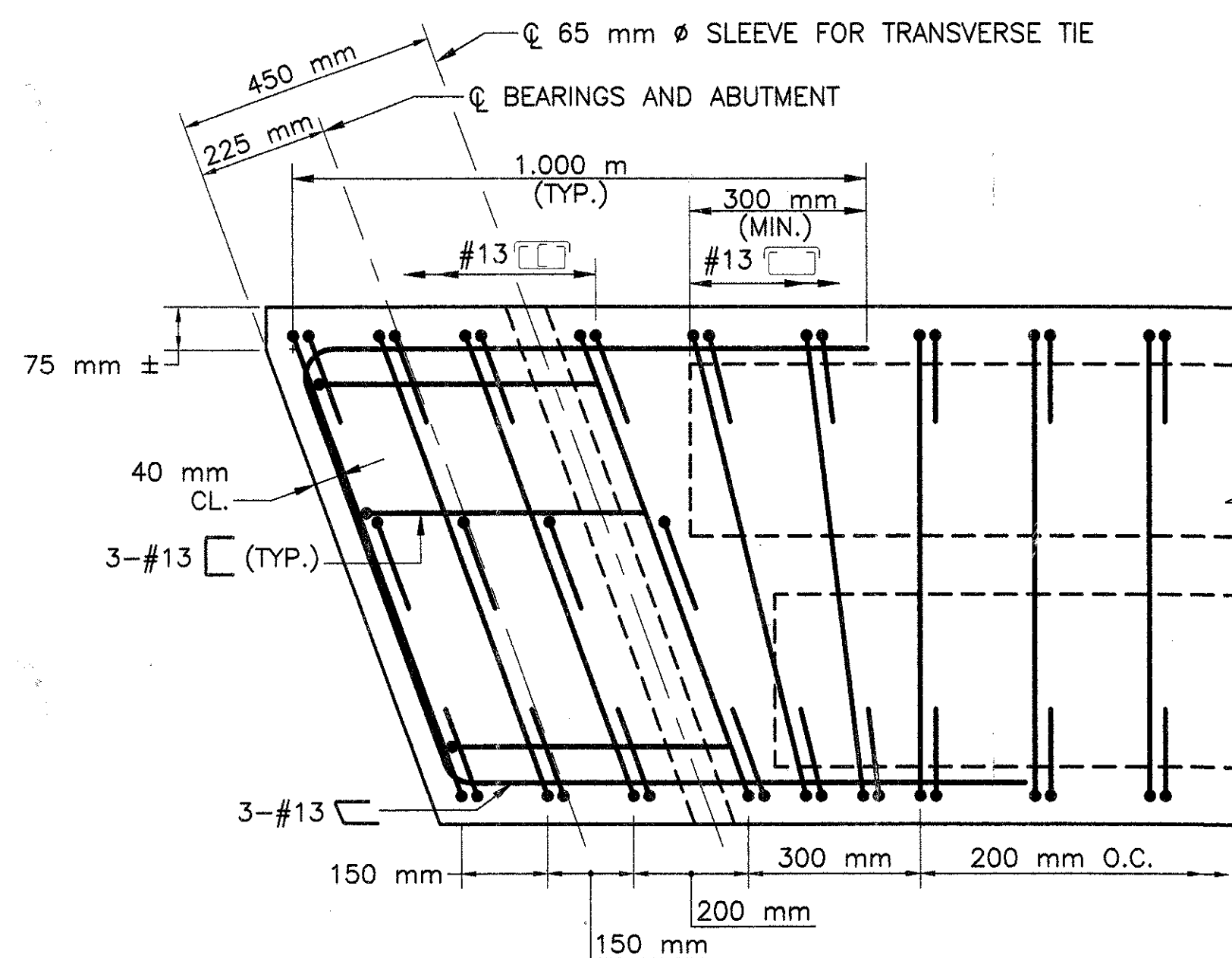
April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
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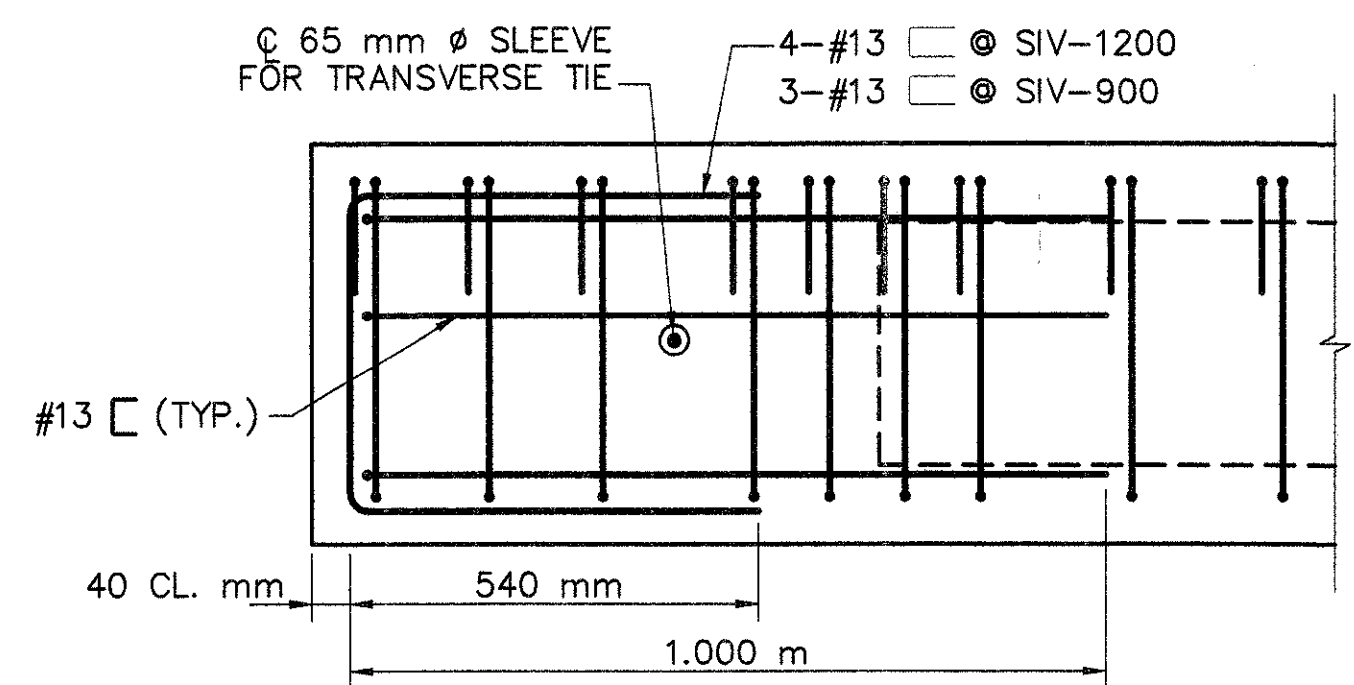
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	16	23
PROJECT FILE NO. 602550				



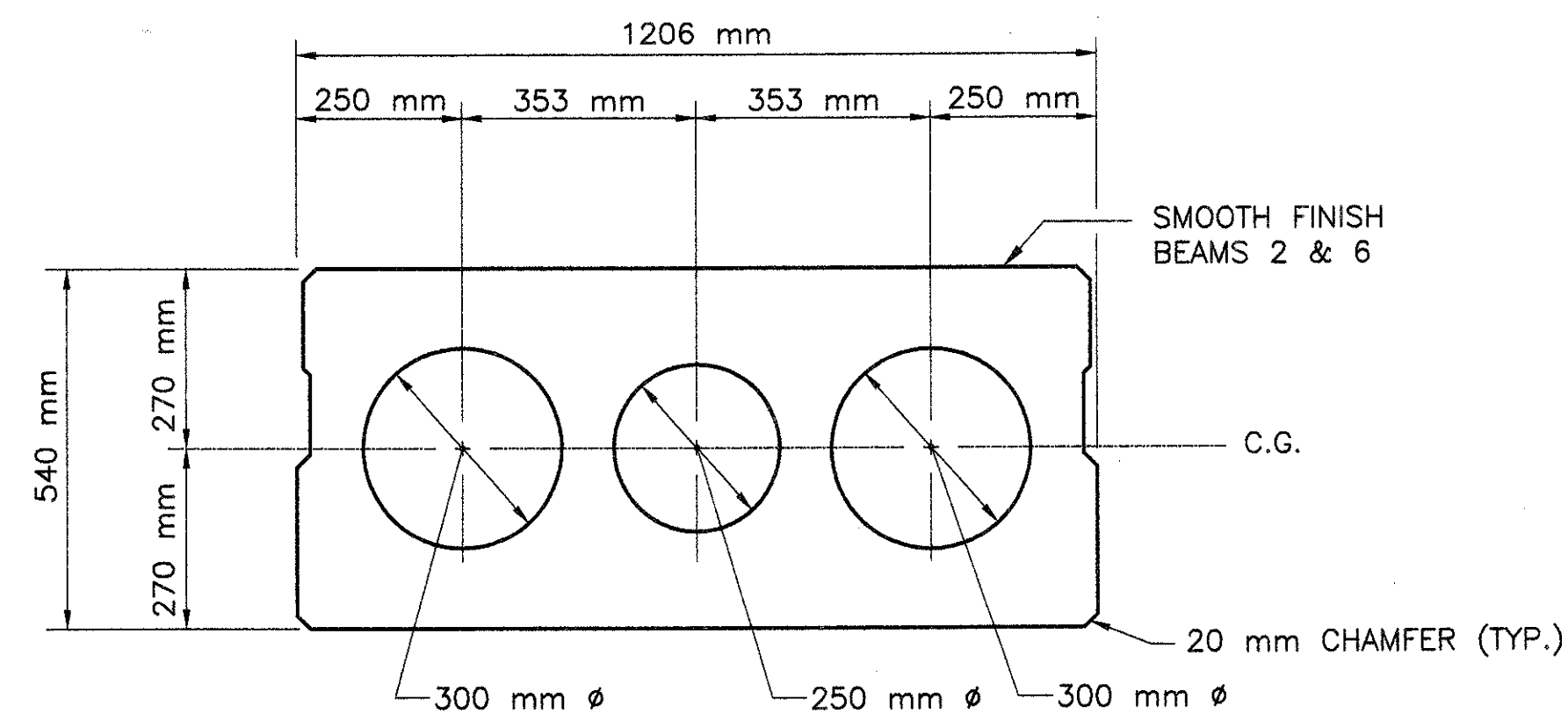
TYPICAL END OF BEAM PLAN - SIV-1200  
SCALE 1:10



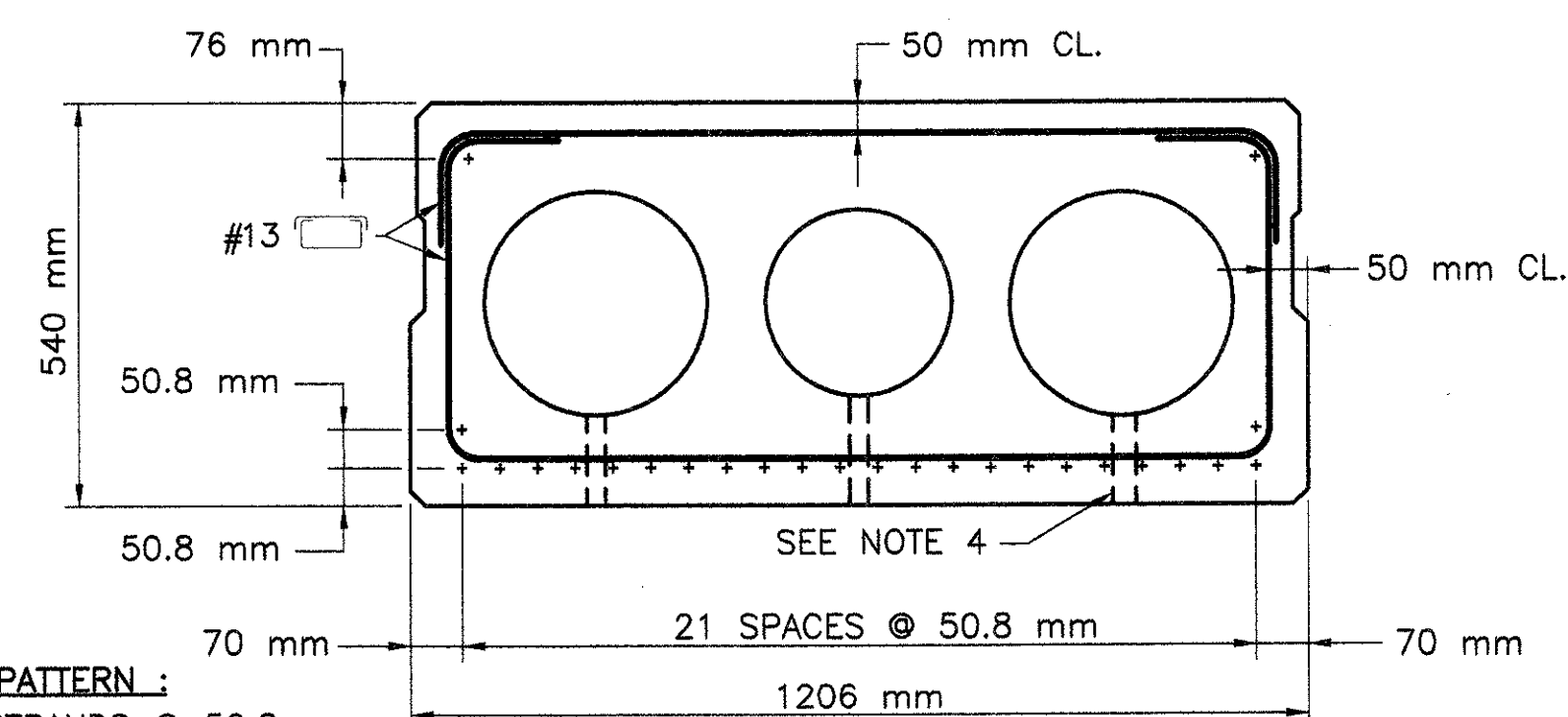
TYPICAL END OF BEAM PLAN - SIV-900  
SCALE 1:10



TYPICAL END OF BEAM SECTION  
SCALE 1:10



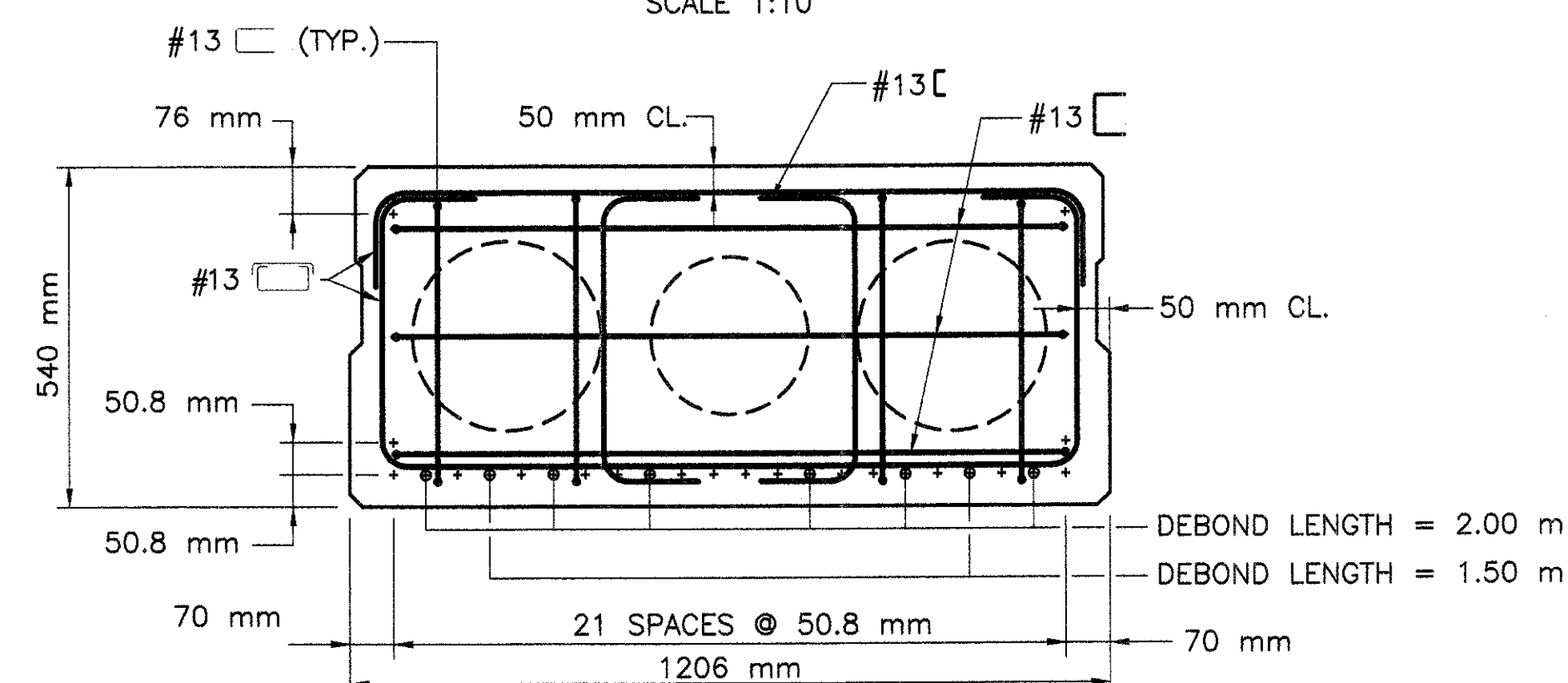
BEAM #2 & 6 - SIV-1200  
SCALE 1:10



STRAND PATTERN:

- \* 22 STRANDS @ 50.8 mm
- \* 2 STRANDS @ 101.6 mm
- \* 2 STRANDS @ 464 mm

BEAM #2 & 6 - SECTION AT MIDSPAN - SIV-1200  
SCALE 1:10



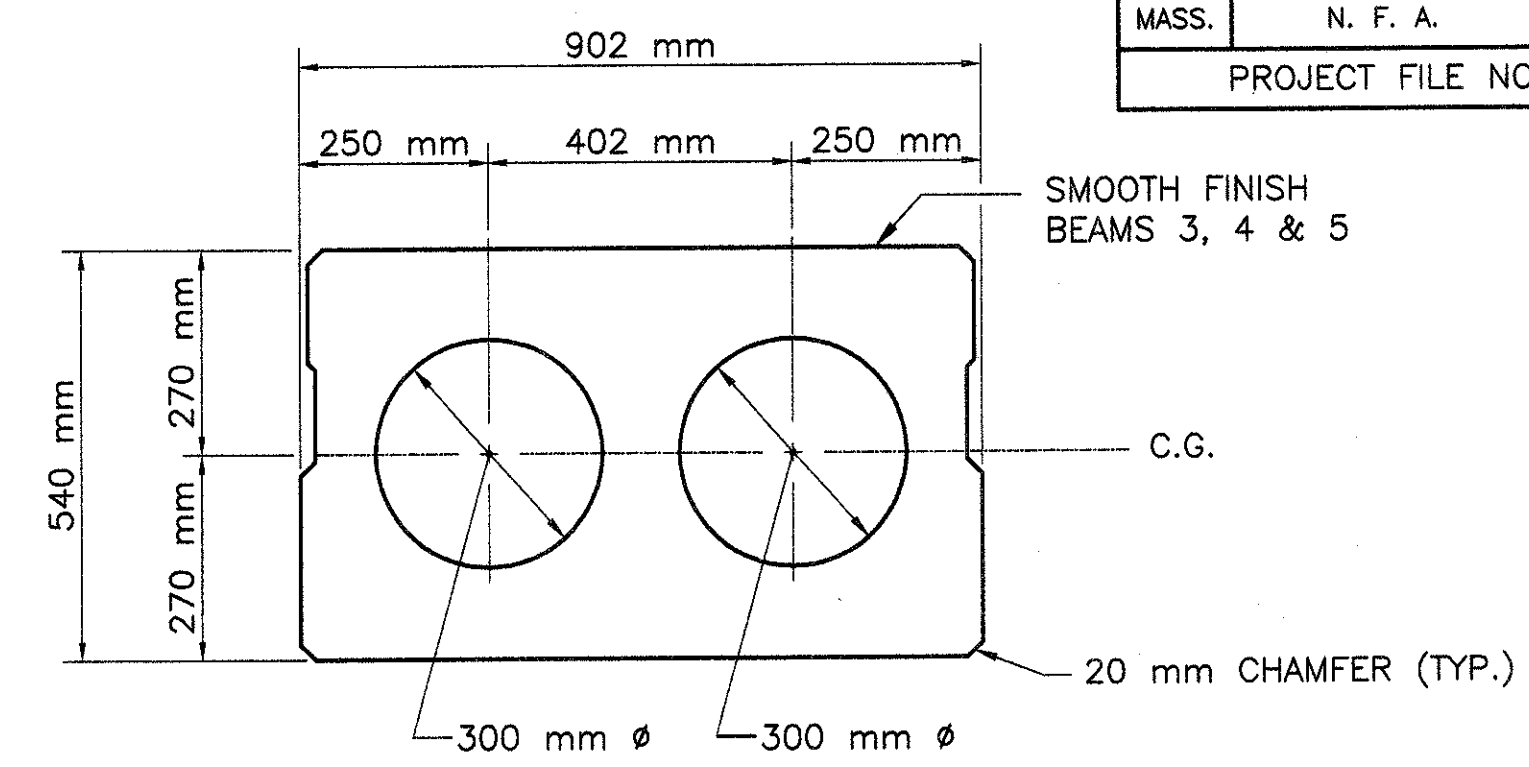
NOTE:

- (8) - STRANDS DEBONDED IN BEAMS 2 & 6.

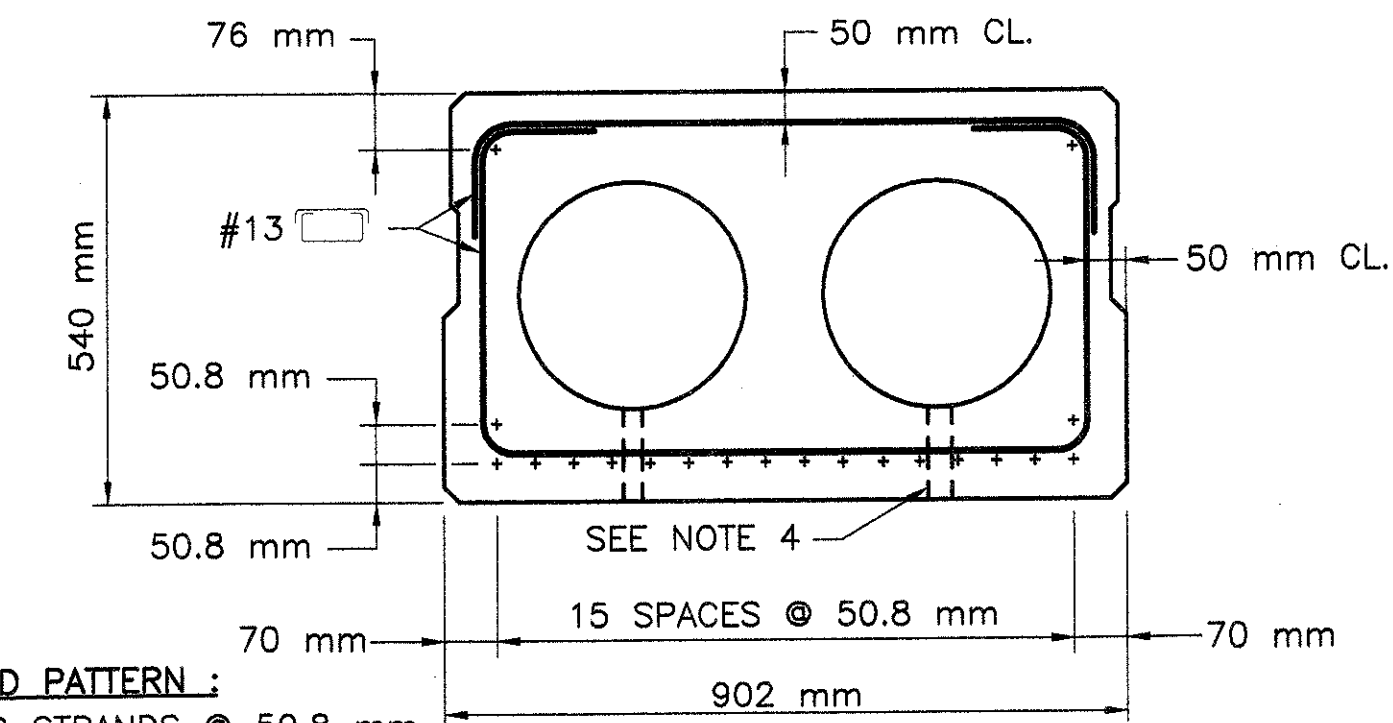
BEAM #2 & 6 - SECTION AT ENDS - SIV-1200  
SCALE 1:10

PRESTRESS NOTES:

1. ALL PRETENSIONING ELEMENTS SHALL BE 13 mm  $\phi$ , UNCOATED, SEVEN-WIRE, LOW RELAXATION STEEL STRANDS AND SHALL CONFORM TO AASHTO M203.
2. THE MINIMUM ULTIMATE TENSILE STRENGTH OF THE PRETENSIONING STRANDS SHALL BE 1860 MPa.
3. THE INITIAL TENSION PER 13 mm  $\phi$  STRAND SHALL BE 137.7 kN
4. THE MINIMUM 28 DAY COMPRESSIVE STRENGTH SHALL BE 45 MPa.
5. NO PRESTRESS SHALL BE TRANSFERRED TO THE CONCRETE UNTIL IT HAS ATTAINED A COMPRESSIVE STRENGTH, AS SHOWN BY CYLINDER TEST, OF AT LEAST 27 MPa.
6. THE TOP OF ALL BEAMS SHALL BE GIVEN A SMOOTH FINISH, EXCEPT AS NOTED ON PLANS.
7. THE FABRICATOR IS FULLY RESPONSIBLE FOR THE DESIGN OF THE LIFTING DEVICES WHICH SHALL BE ADEQUATE FOR THE SAFETY FACTORS REQUIRED BY THE ERECTION PROCEDURE.
8. ALL REINFORCING EXCEPT PRETENSIONING STRANDS SHALL BE COATED.



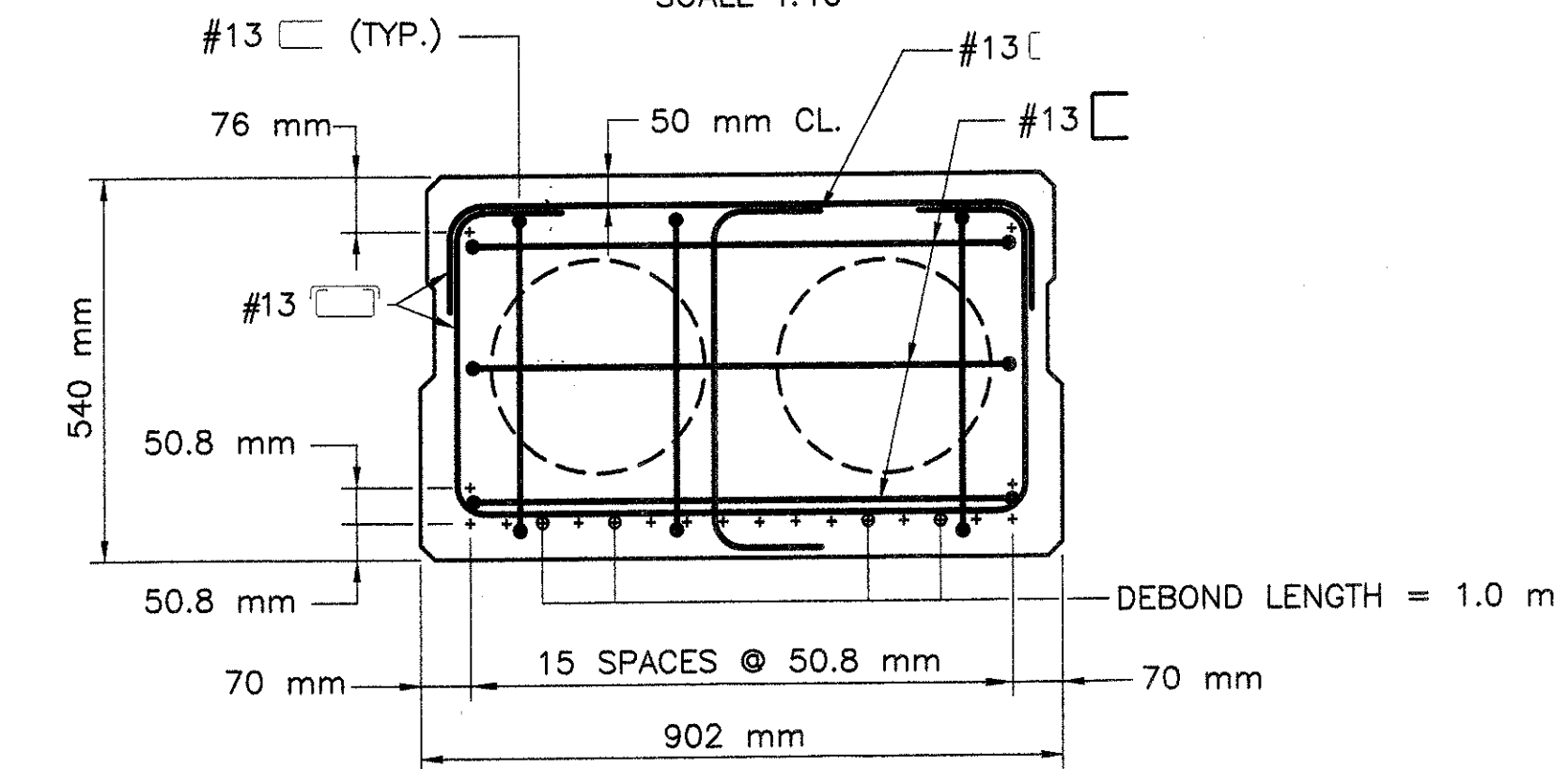
BEAM #3, 4 & 5 - SIV-900  
SCALE 1:10



STRAND PATTERN:

- \* 16 STRANDS @ 50.8 mm
- \* 2 STRANDS @ 101.6 mm
- \* 2 STRANDS @ 464 mm

BEAMS #3, 4 & 5 SECTION AT MIDSPAN - SIV-900  
SCALE 1:10



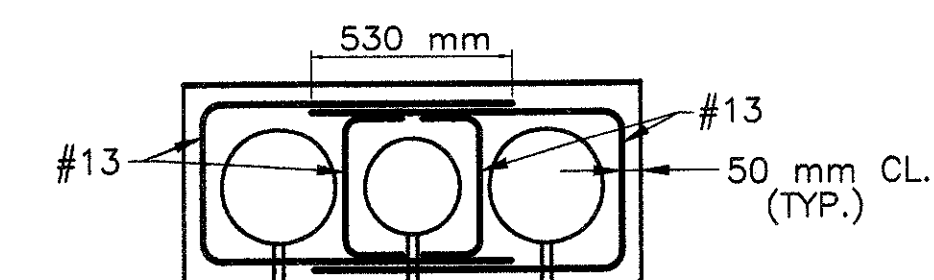
NOTE:

- (4) - STRANDS DEBONDED IN BEAMS 3, 4 & 5.

BEAMS #3, 4 & 5 SECTION AT ENDS - SIV-900  
SCALE 1:10

NOTES:

1. + DENOTES STRAIGHT STRANDS.
2.  $\oplus$  DENOTES DEBONDED STRANDS.
3. SEE TYPICAL END OF BEAM PLAN FOR STIRRUP SPACING.
4. PLACE 25 mm  $\phi$  DRAIN AT EACH END OF EACH VOID.

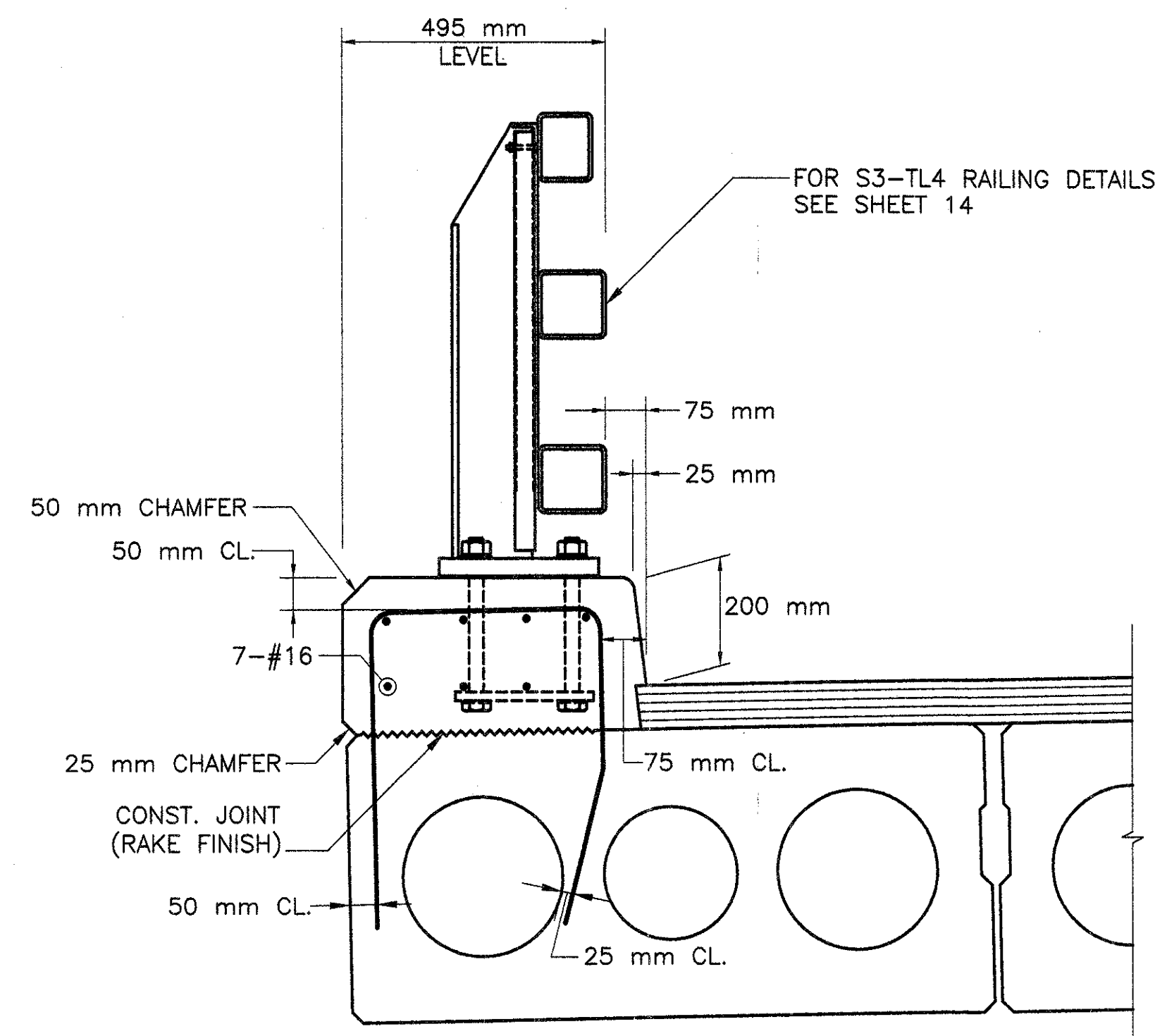


ALTERNATE STIRRUP PATTERN  
SCALE 1:20

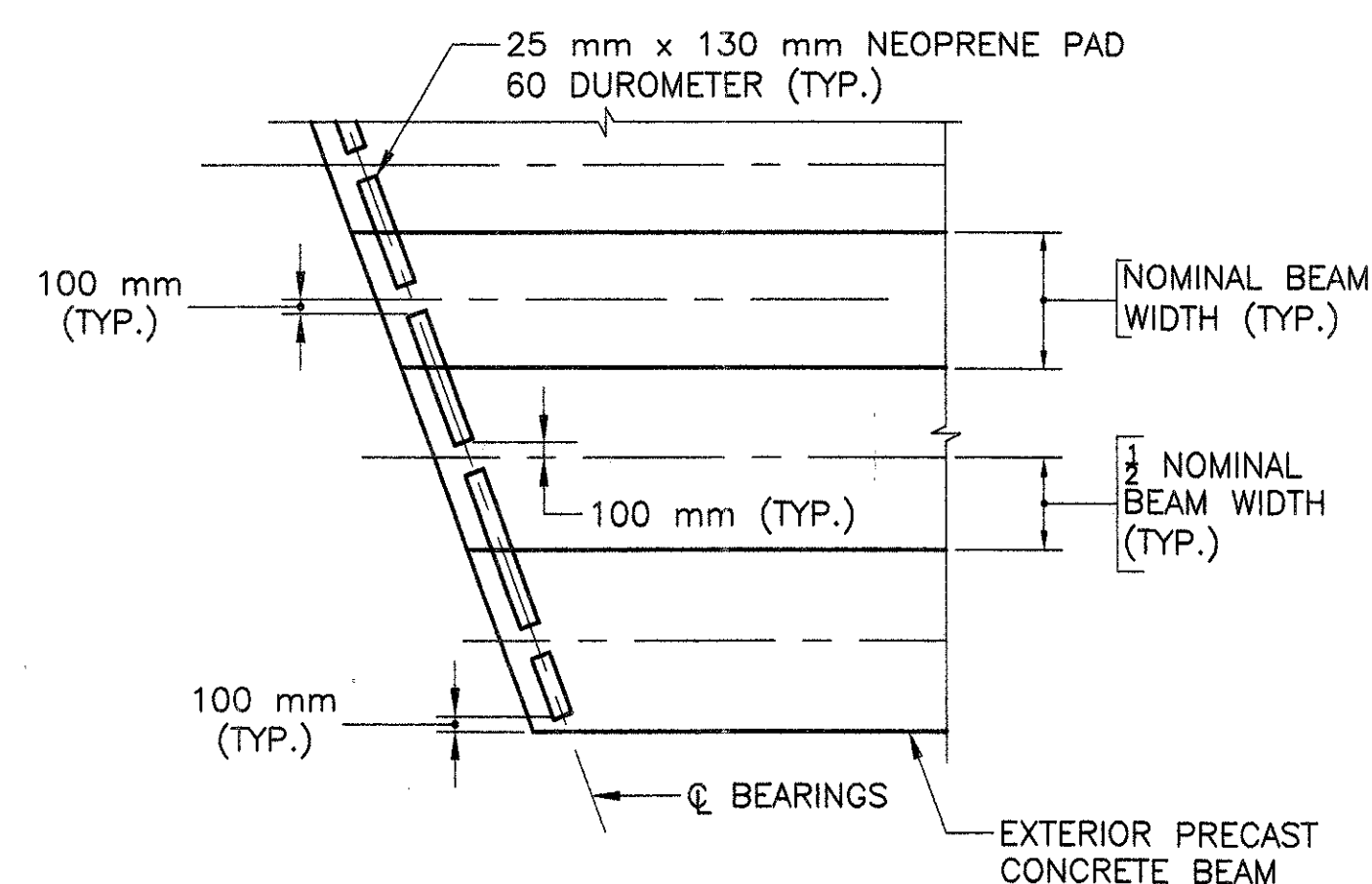
April 6, 2002	ISSUED FOR CONSTRUCTION
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STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N.F.A.	2002	17	23
PROJECT FILE NO. 602550				

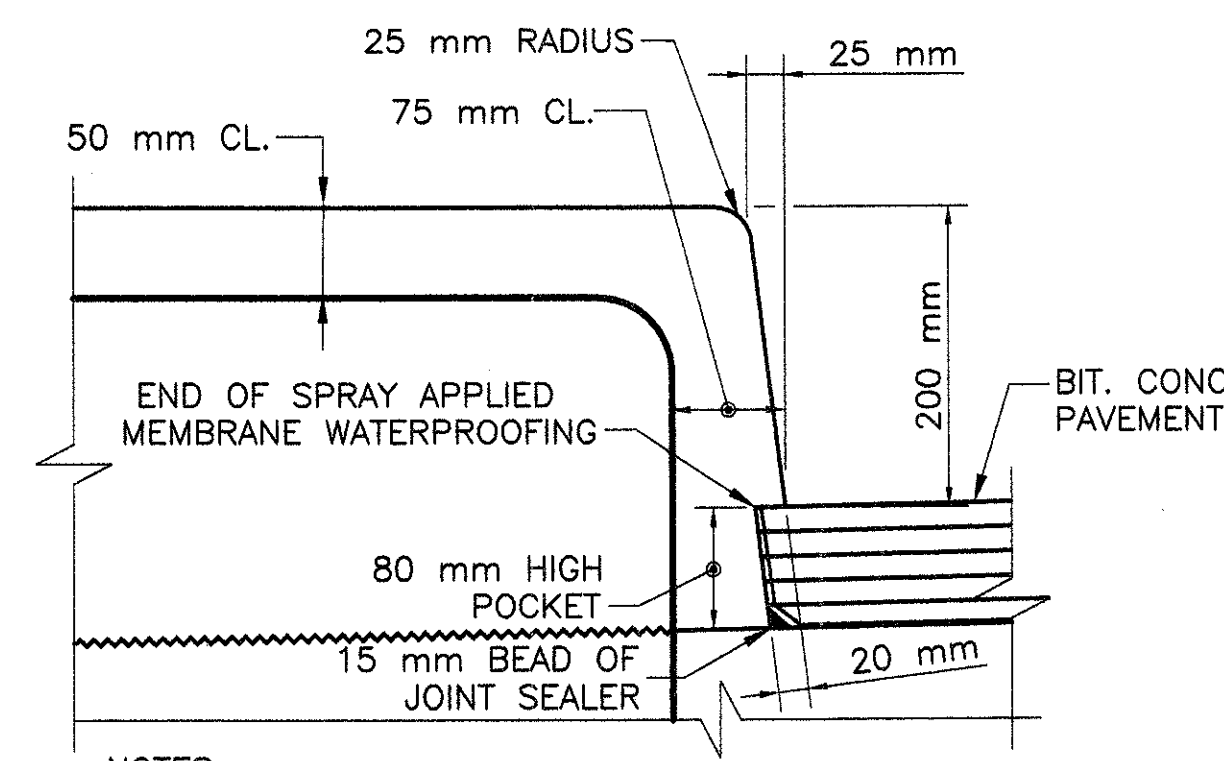


**SECTION THRU SAFETY CURB**  
SCALE 1:10



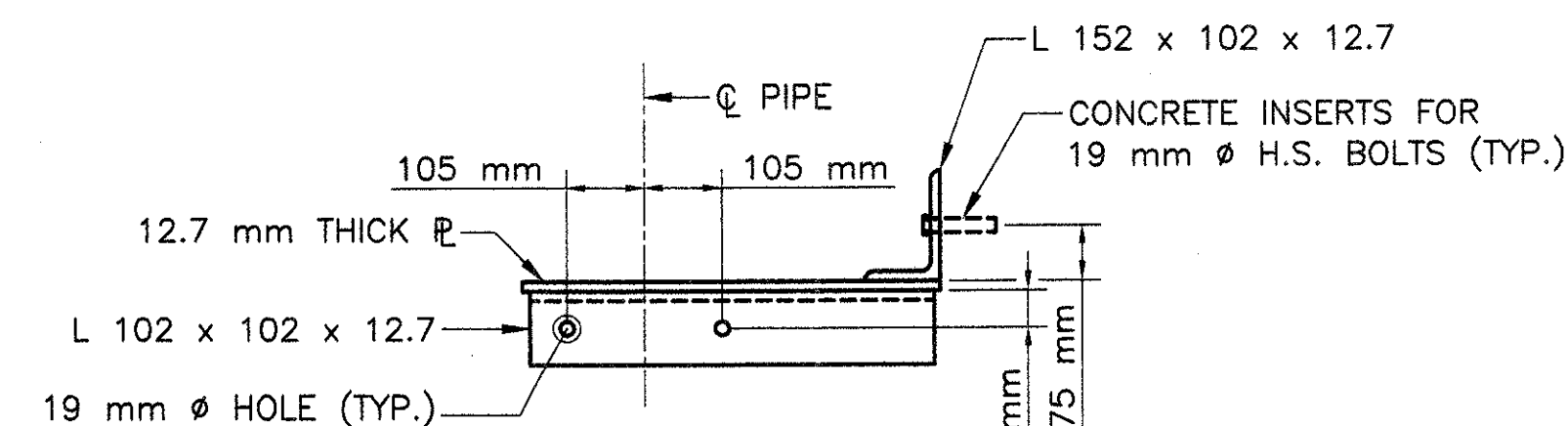
- ELASTOMERIC NOTES:**
1. ALL ELASTOMERIC BEARINGS SHALL BE 60 DUROMETER HARDNESS.
  2. AVERAGE BEARING PRESSURE 4,130 kPa. (BASED ON FACTORED LOADS) BEARINGS ARE SUBJECT TO SHEAR DEFORMATION.

**LAYOUT OF BEARINGS**  
SCALE 1:50

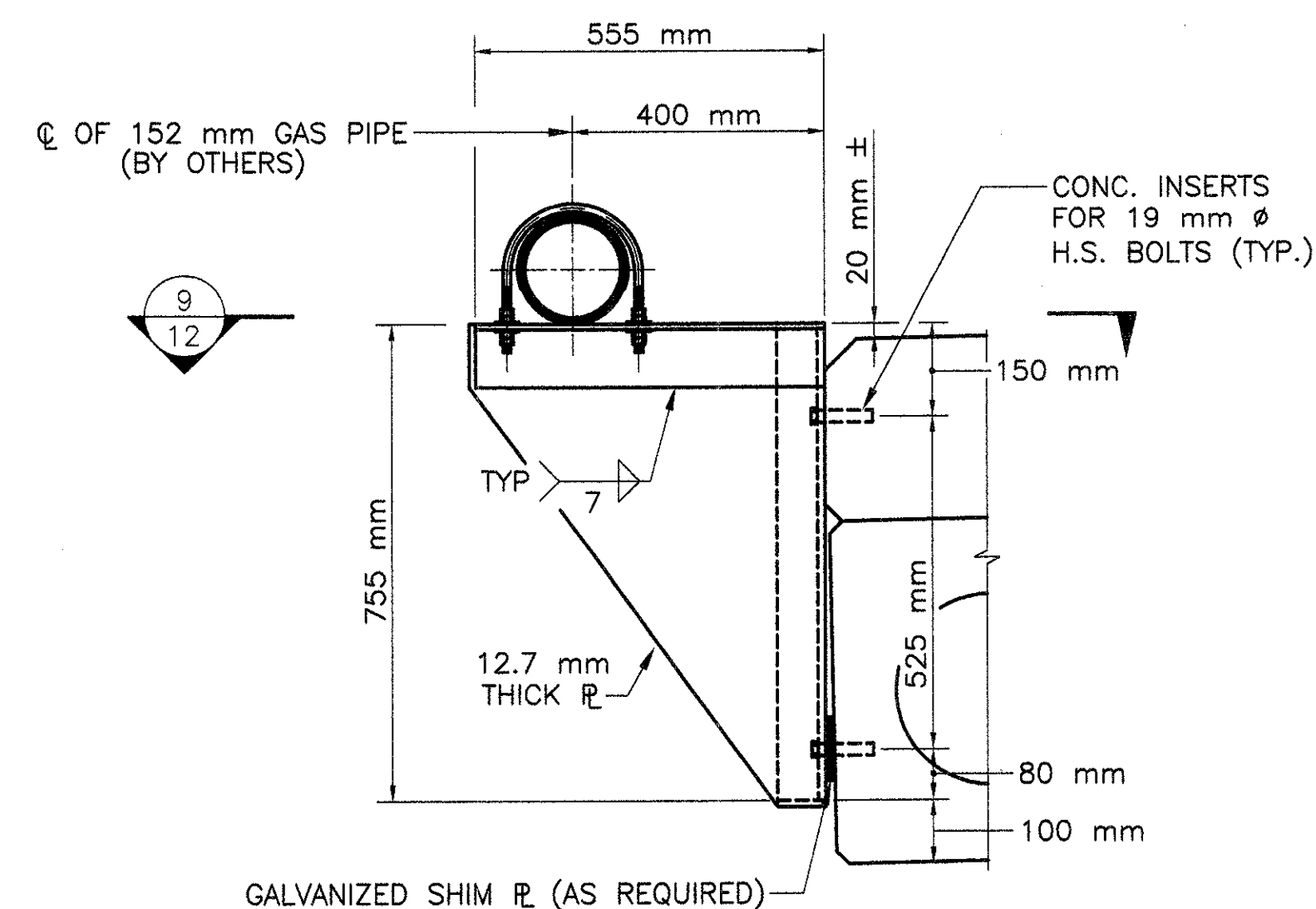


- NOTES:**
1. SPRAY APPLY MEMBRANE UP INTO 80 mm HIGH POCKET.

**CURB DETAIL**  
SCALE 1:5

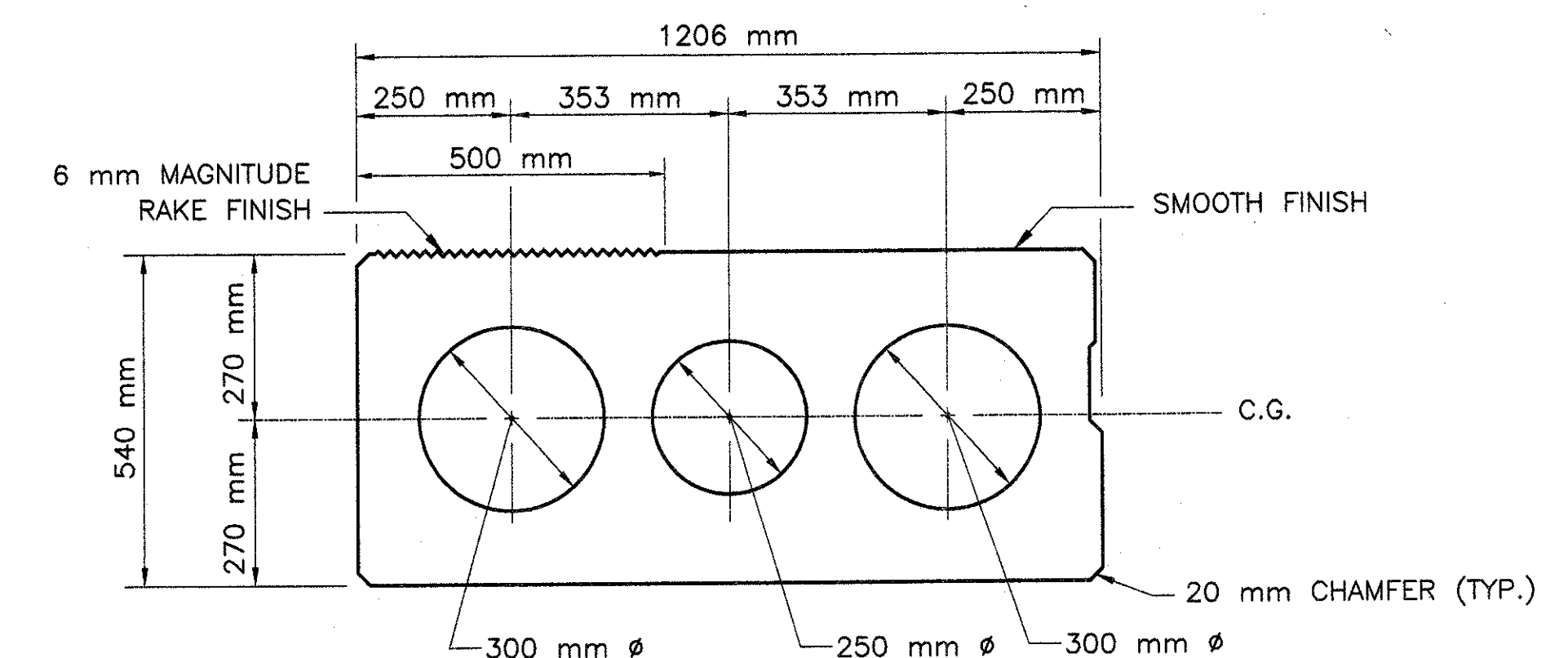


**SECTION 9**  
SCALE 1:10

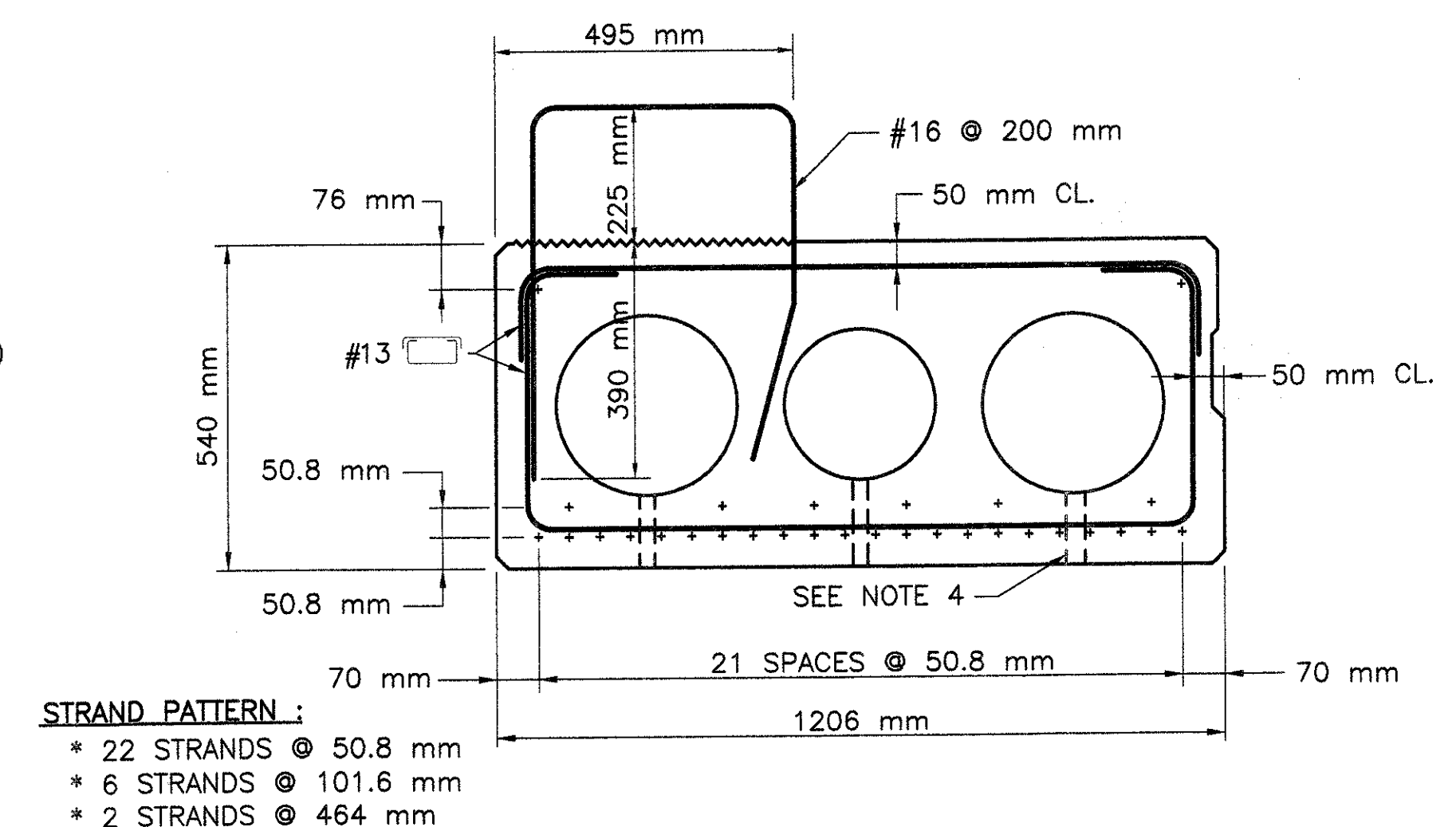


- NOTES:**
1. ALL STEEL SHALL CONFORM TO AASHTO M270 GR.250.
  2. ALL STEEL AND FASTENERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M111 AND M232.
  3. INSERTS FOR 19 mm  $\phi$  H.S. SHALL BE CAST-IN-PLACE. THE 19 mm  $\phi$  H.S. BOLT INSERTS SHALL PROVIDE A MINIMUM ULTIMATE TENSILE CAPACITY 5 kN AND A MINIMUM ULTIMATE SHEAR CAPACITY OF 18.4 kN IN 20 MPa CONCRETE.

**UTILITY SUPPORT DETAILS**  
SCALE 1:10

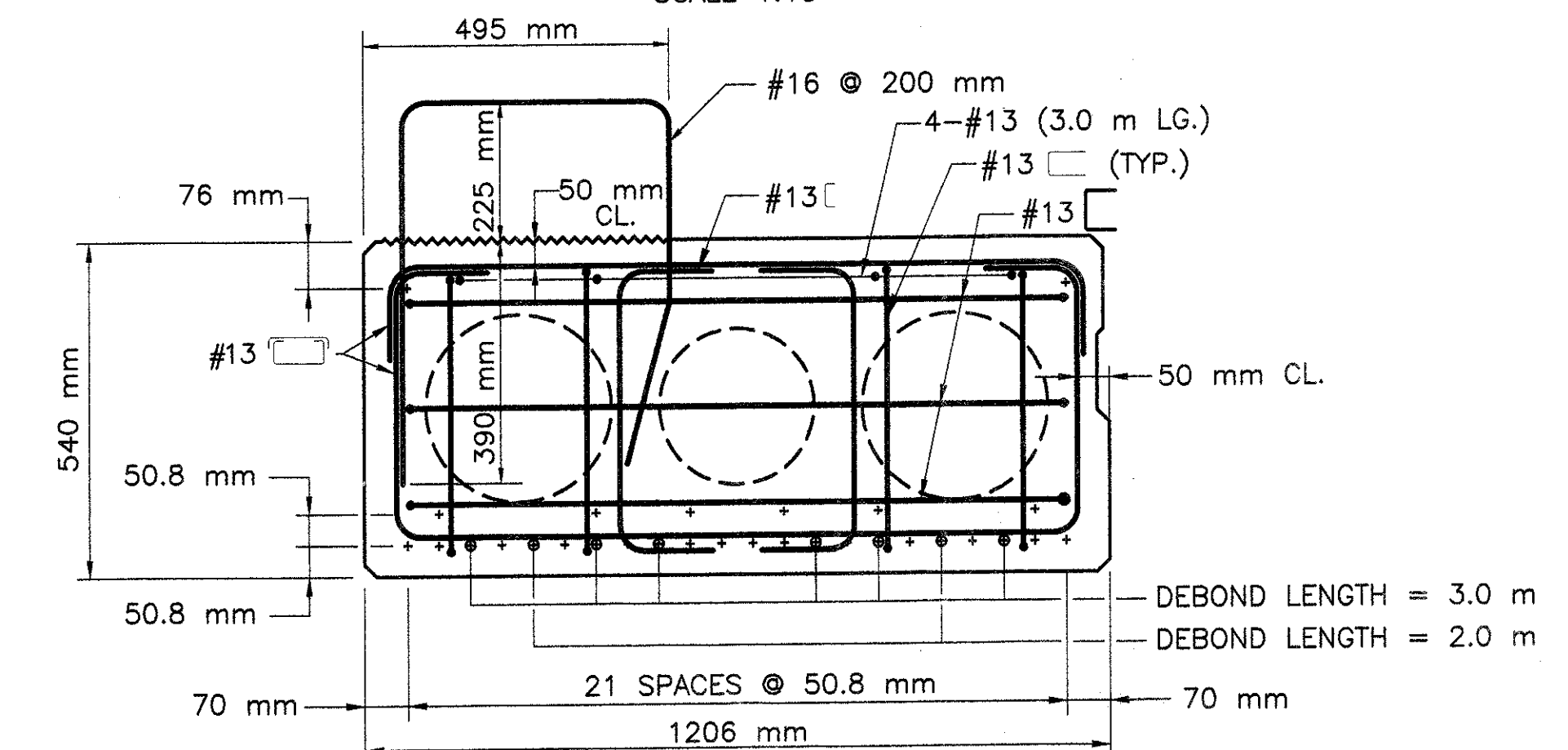


**BEAM #1 & 7 - SIV-1200**  
SCALE 1:10



- STRAND PATTERN:**
- \* 22 STRANDS  $\phi$  50.8 mm
  - \* 6 STRANDS  $\phi$  101.6 mm
  - \* 2 STRANDS  $\phi$  464 mm

**BEAM #1 & 7 - SECTION AT MIDSPAN - SIV-1200**  
SCALE 1:10



- NOTE:**
- (8) - STRANDS DEBONDED IN BEAMS 1 & 7.

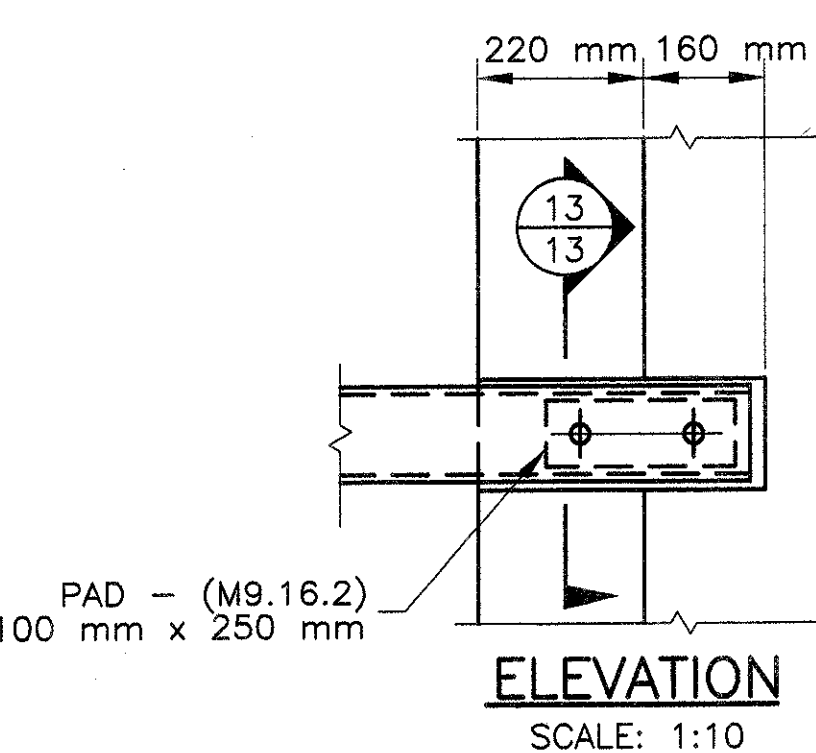
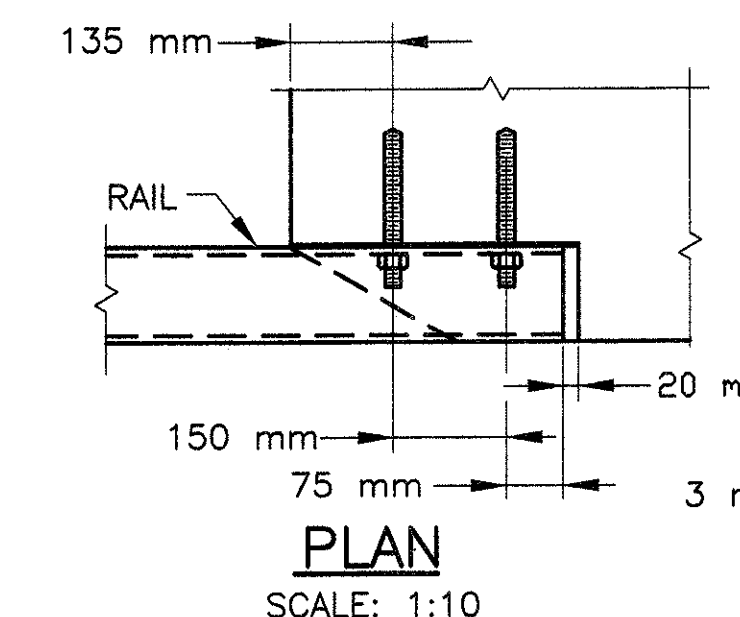
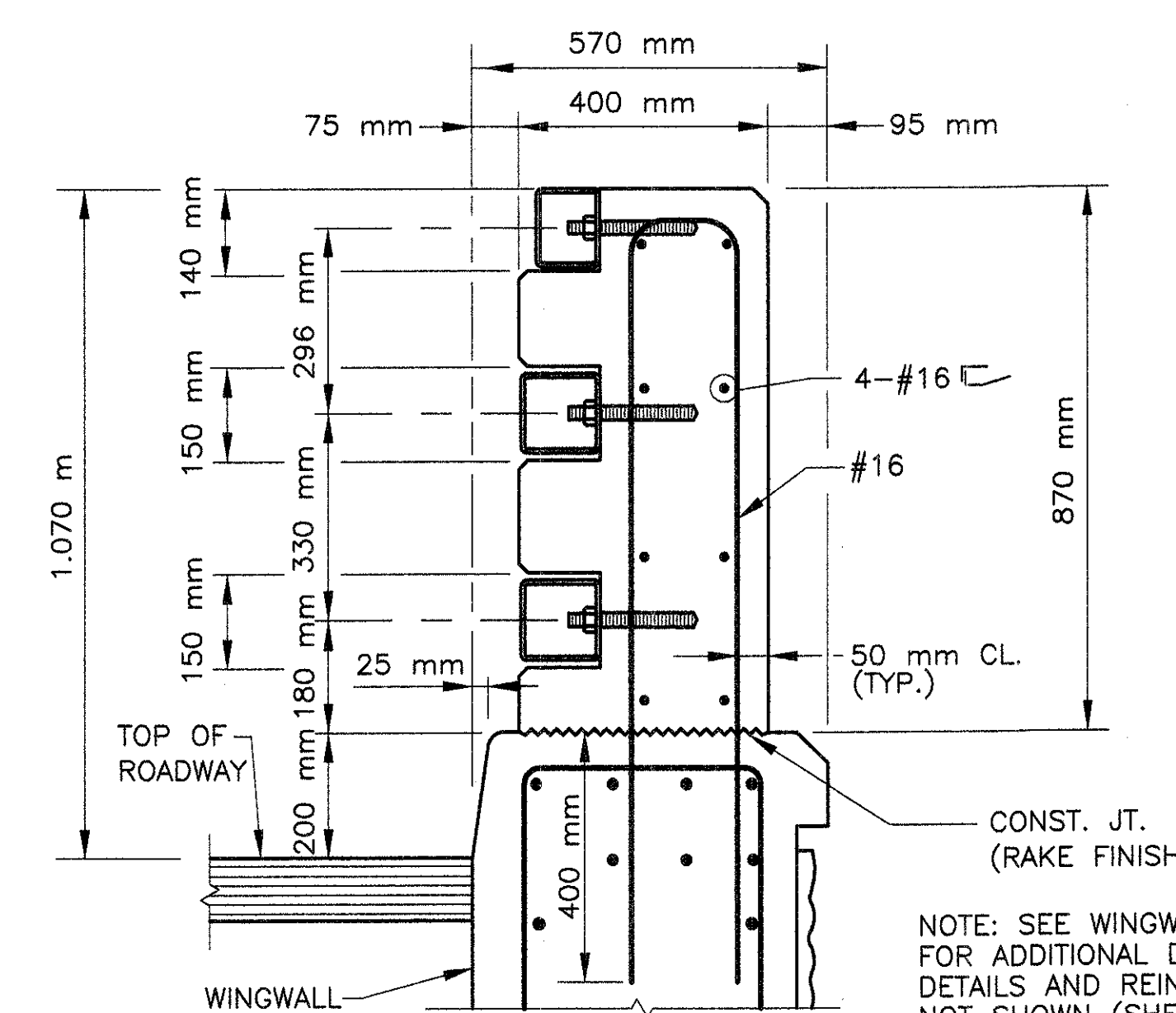
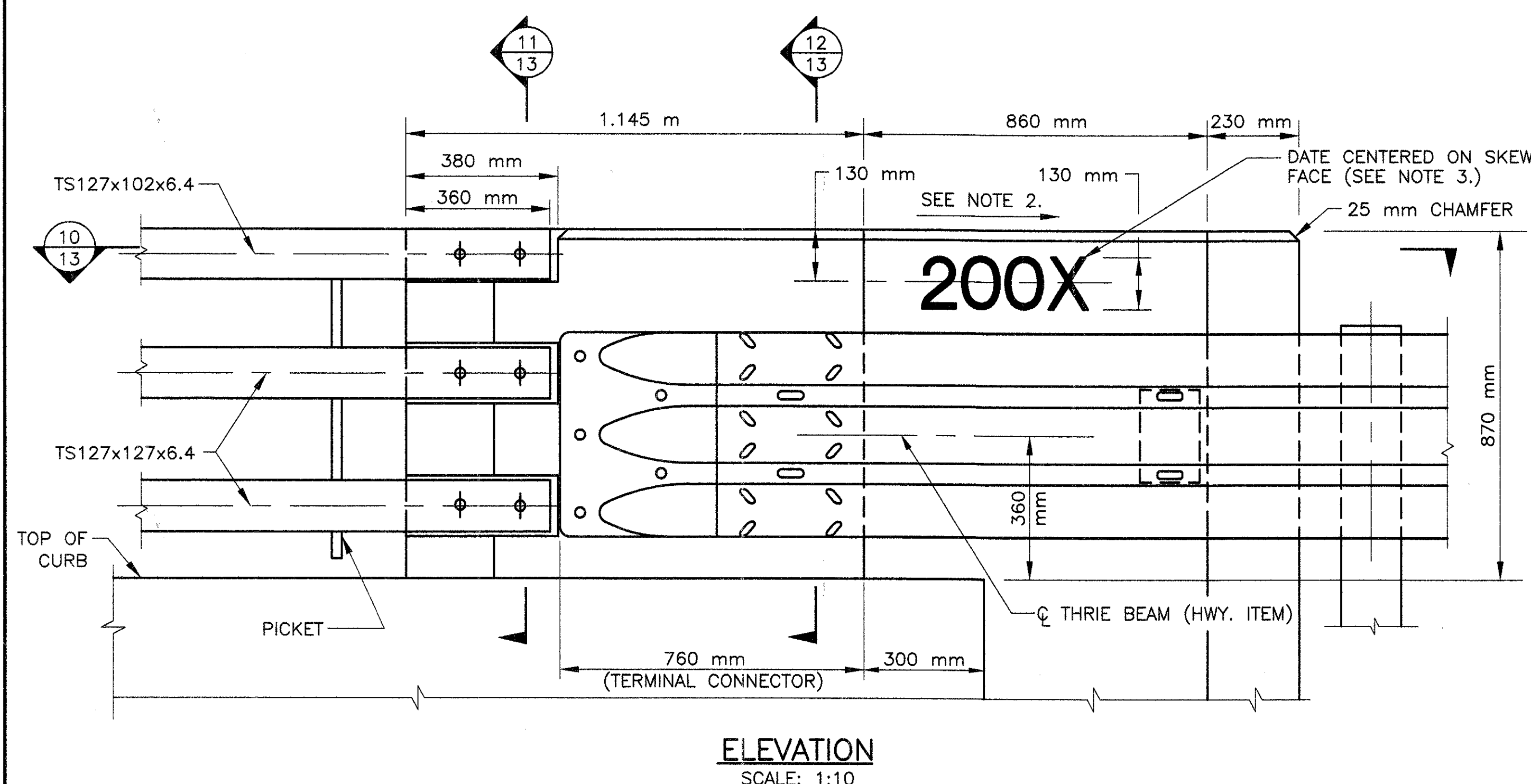
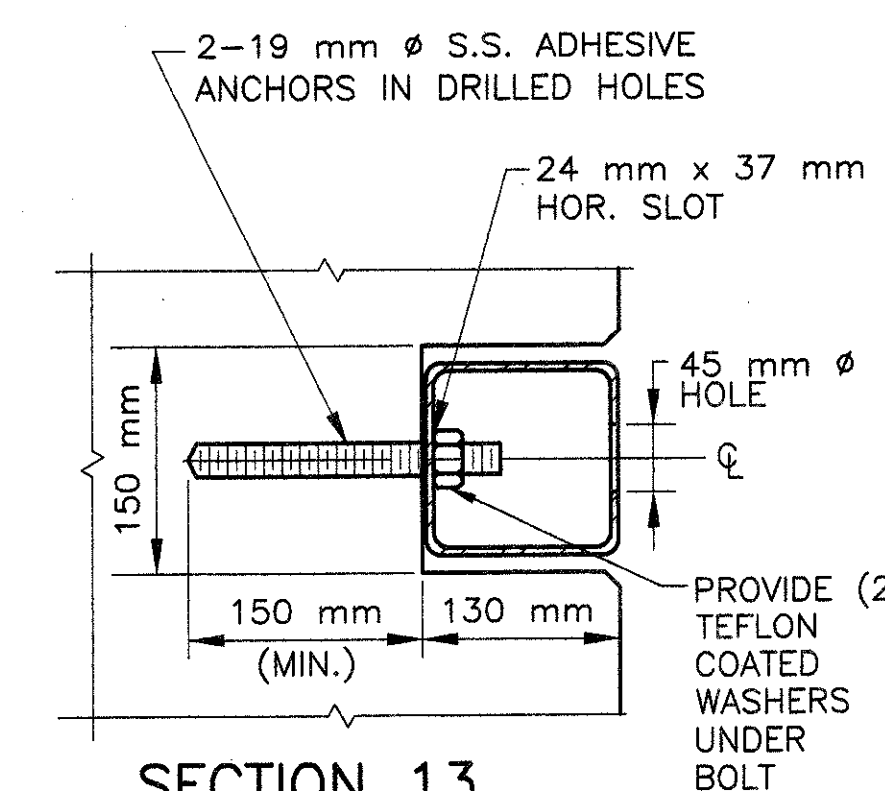
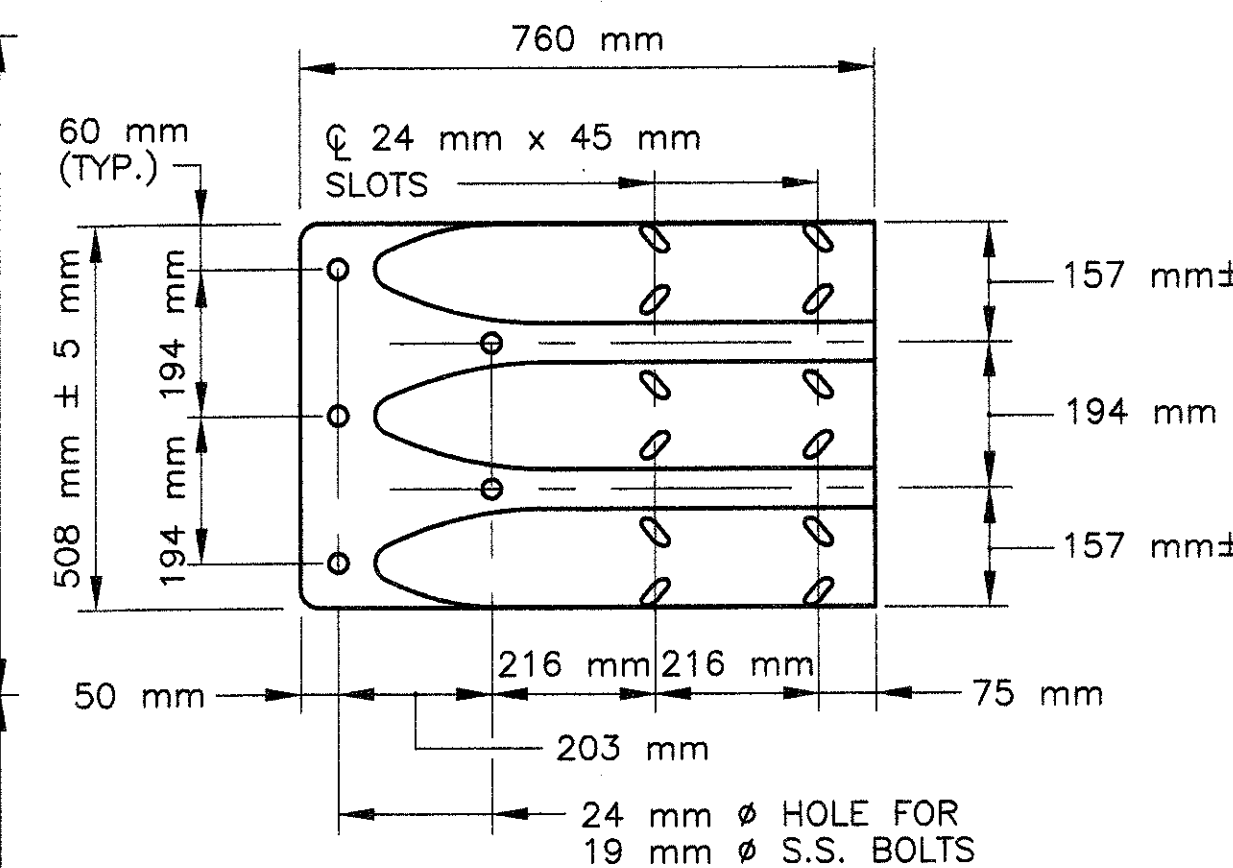
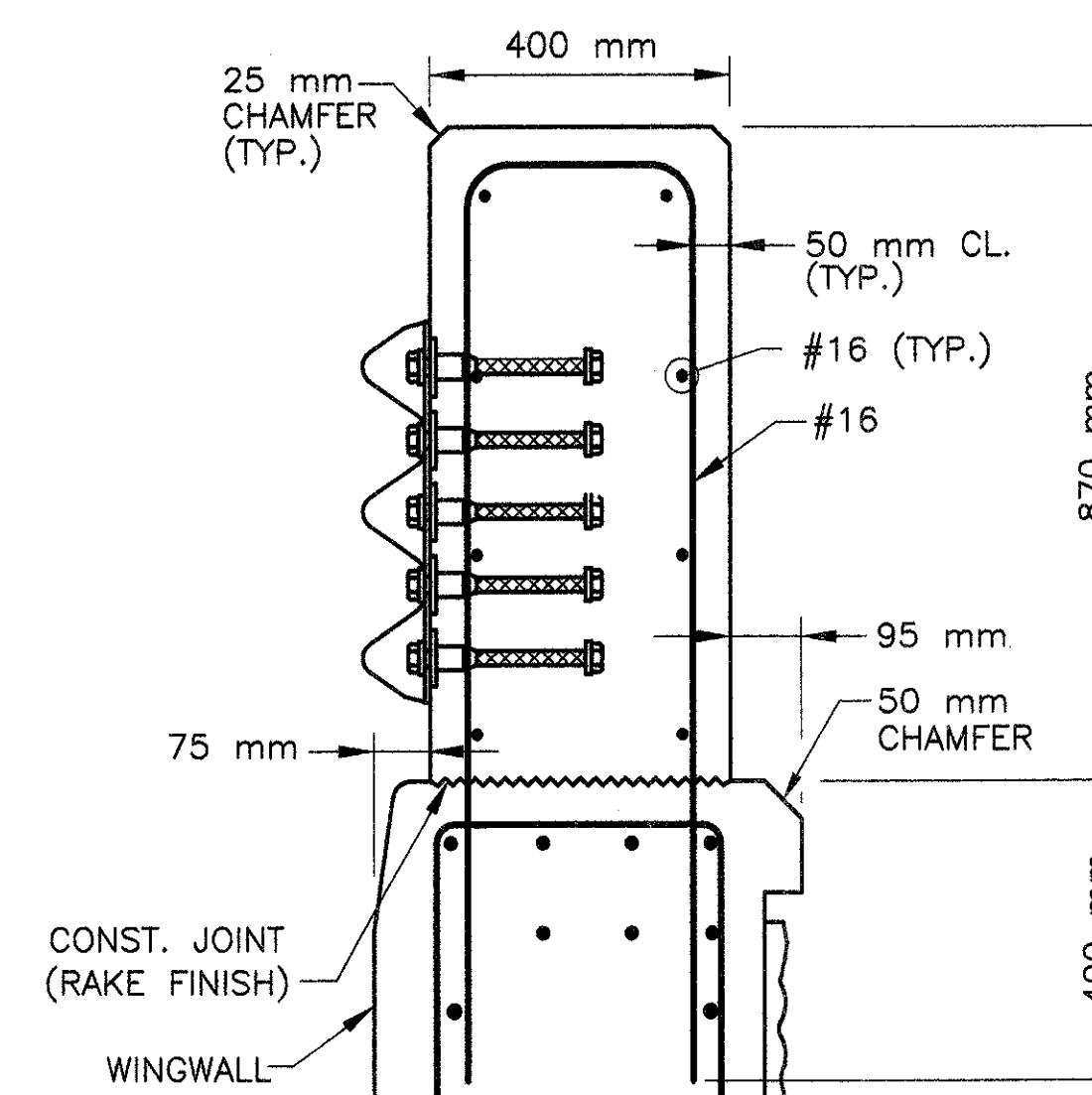
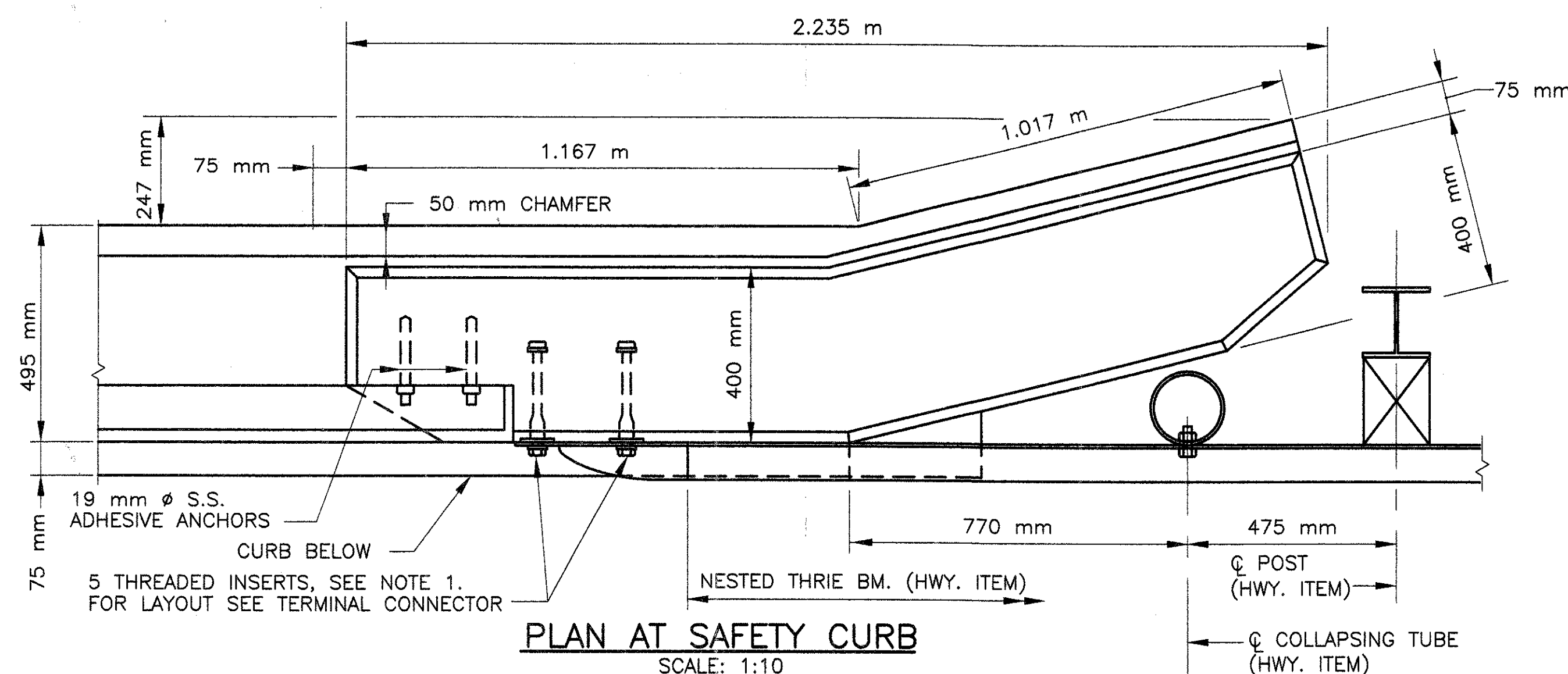
**BEAM #1 & 7 - SECTION AT ENDS - SIV-1200**  
SCALE 1:10

**NOTES:**

1. + DENOTES STRAIGHT STRANDS.
2.  $\oplus$  DENOTES DEBONDED STRANDS.
3. SEE TYPICAL END OF BEAM PLAN FOR STIRRUP SPACING.
4. PLACE 25 mm  $\phi$  DRAIN AT EACH END OF EACH VOID.

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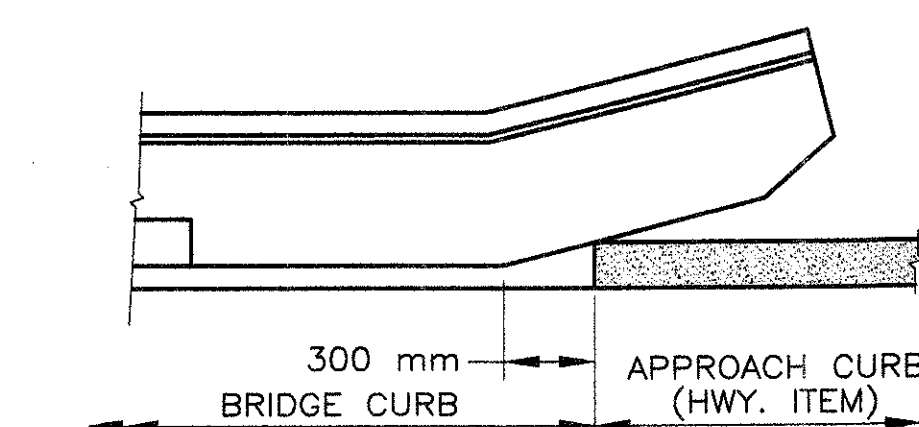
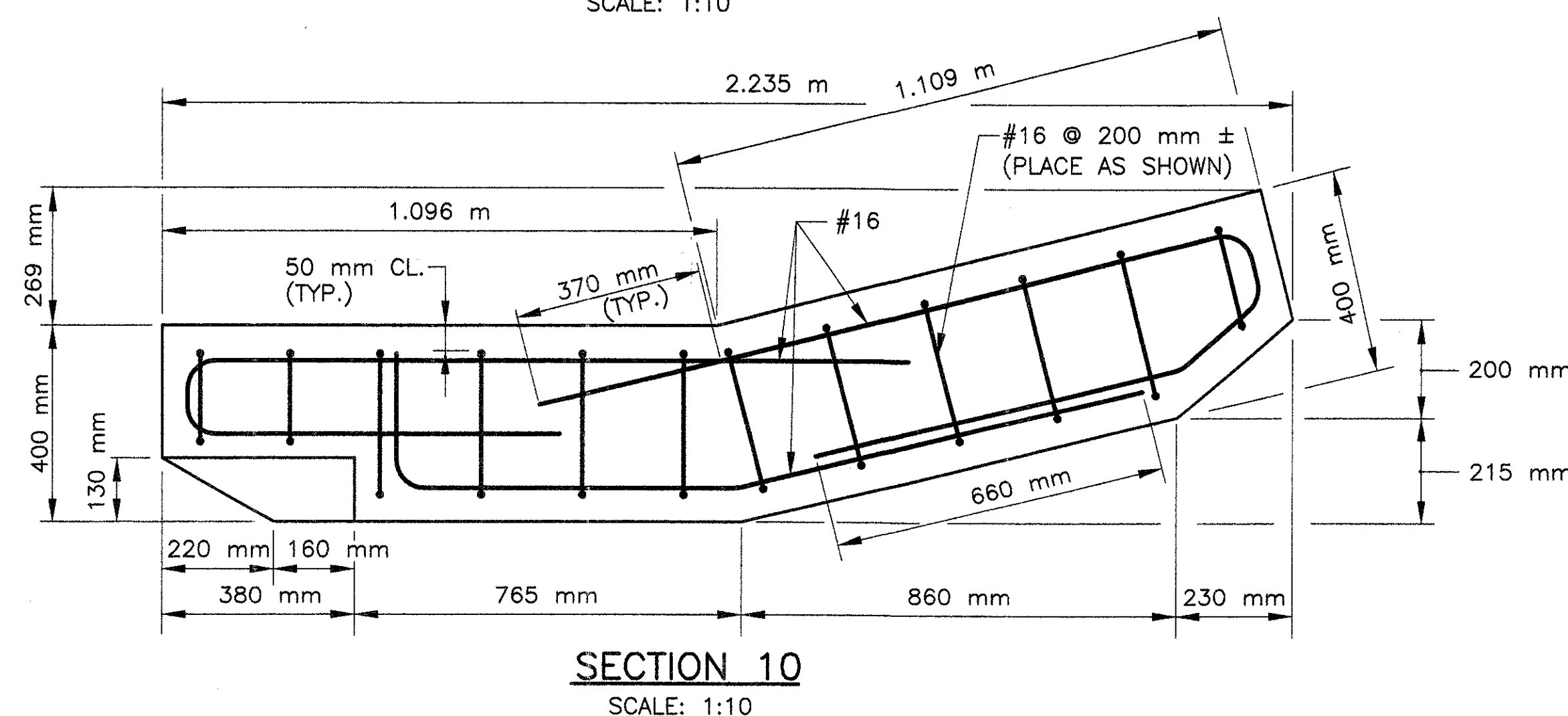
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	18	23
PROJECT FILE NO. 602550				



## RAIL ATTACHMENT

### NOTES:

1. THREADED INSERTS SHALL BE PREQUALIFIED BY THE MANUFACTURER AS BEING CAPABLE OF DEVELOPING AN ULTIMATE SHEAR CAPACITY OF 91 kN PER 22 mm  $\phi$  S.S. BOLT. S.S. BOLTS SHALL BE 22 mm  $\phi$  x 38 mm LONG FULLY THREADED AISI TYPE 304N STAINLESS STEEL. INSERTS FOR 22 mm  $\phi$  S.S. BOLTS SHALL BE CAST-IN-PLACE AND GALVANIZED.
2. TOP OF GUARDRAIL TRANSITION AND RAIL POCKETS SHALL BE SLOPED TO MATCH THE PROFILE GRADE.
3. USE LATEST CONTRACT COMPLETION DATE IN EFFECT WHEN THE FIRST GUARDRAIL TRANSITION IS CAST. USE THIS DATE FOR BOTH GUARDRAIL TRANSITIONS.
4. ALL CONCRETE FOR THE HIGHWAY GUARDRAIL TRANSITION SHALL BE 35 MPa, 20 mm, 405 Kg SILICA FUME MODIFIED CEMENT CONCRETE MASONRY.
5. TERMINAL CONNECTOR MAY HAVE ADDITIONAL UNUSED BOLT HOLES.



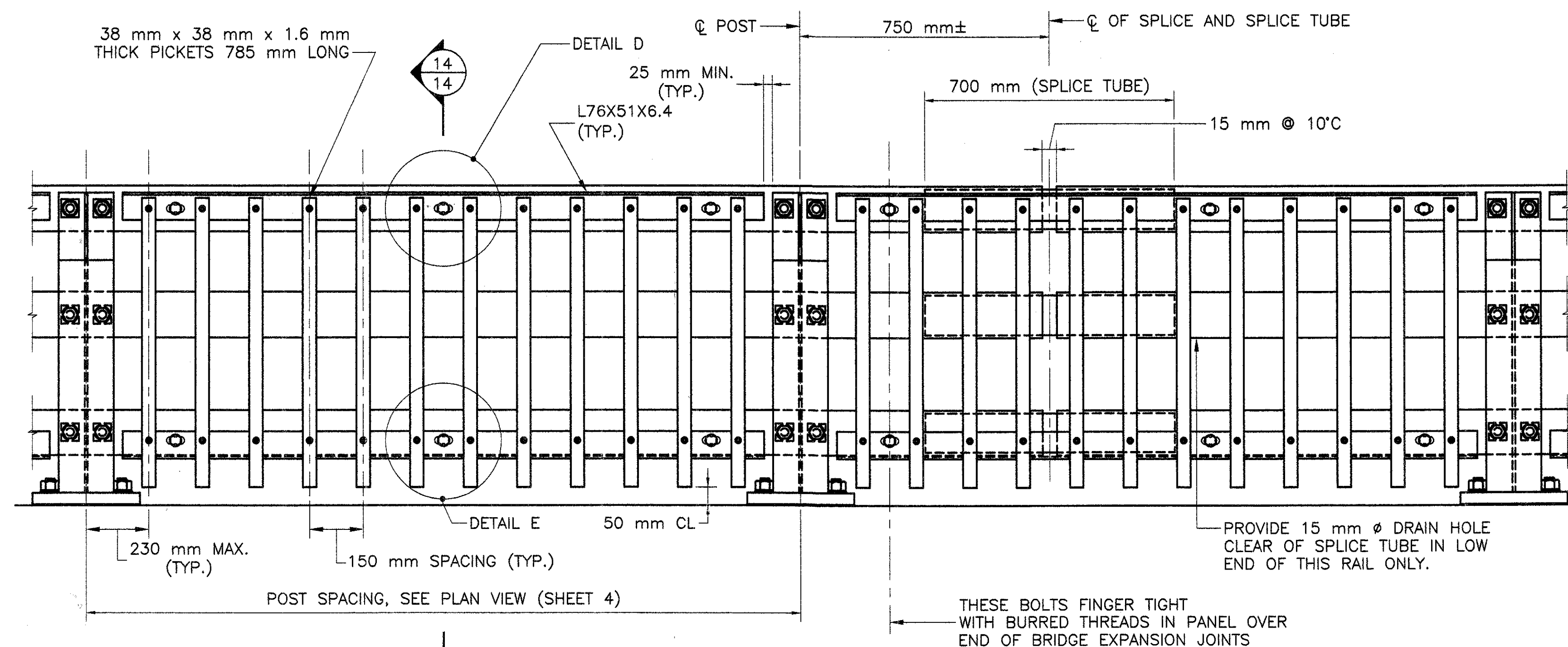
## DETAILS AT SAFETY CURB

## HIGHWAY GUARDRAIL TRANSITION - S3-TL4 RAILING

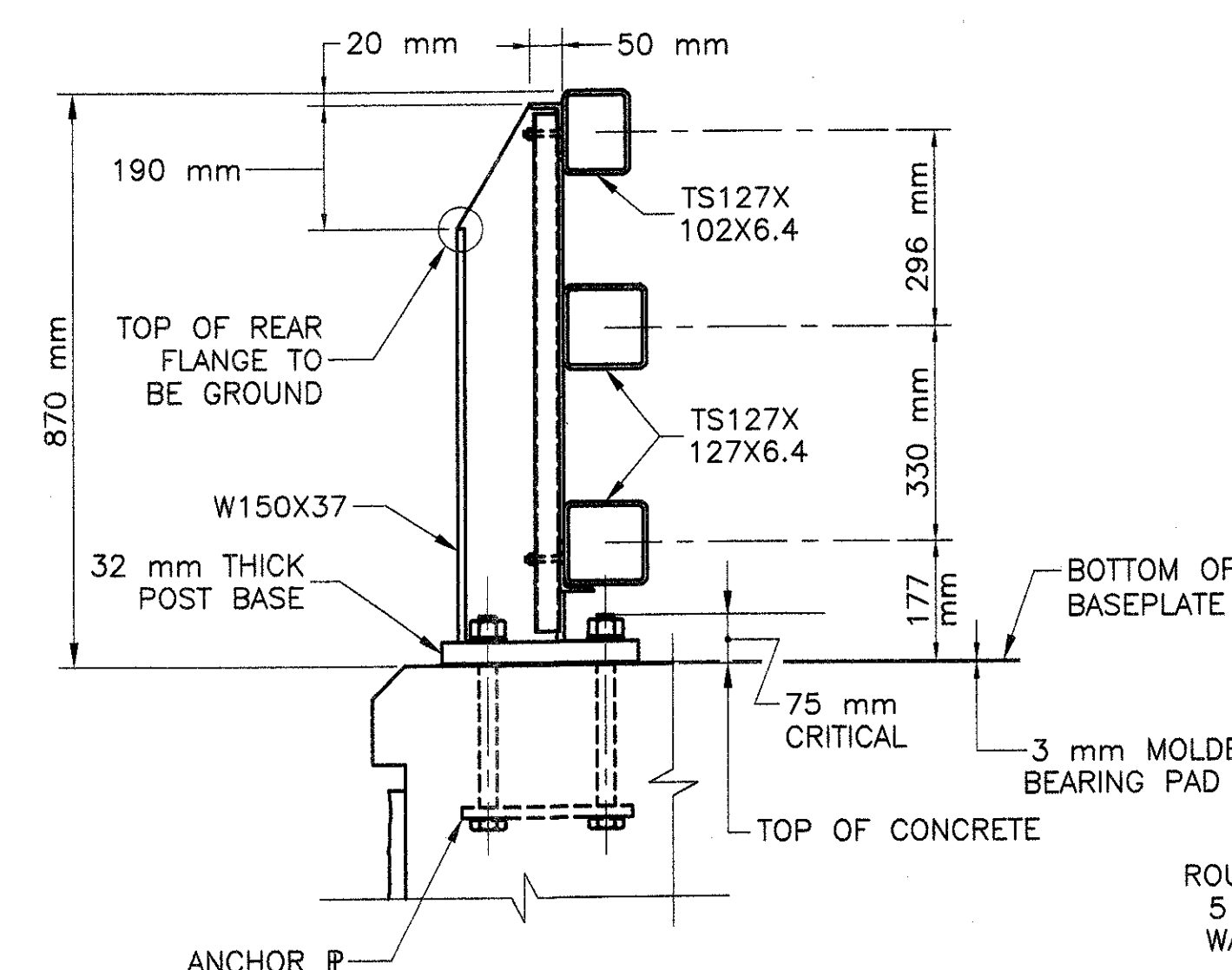
April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	



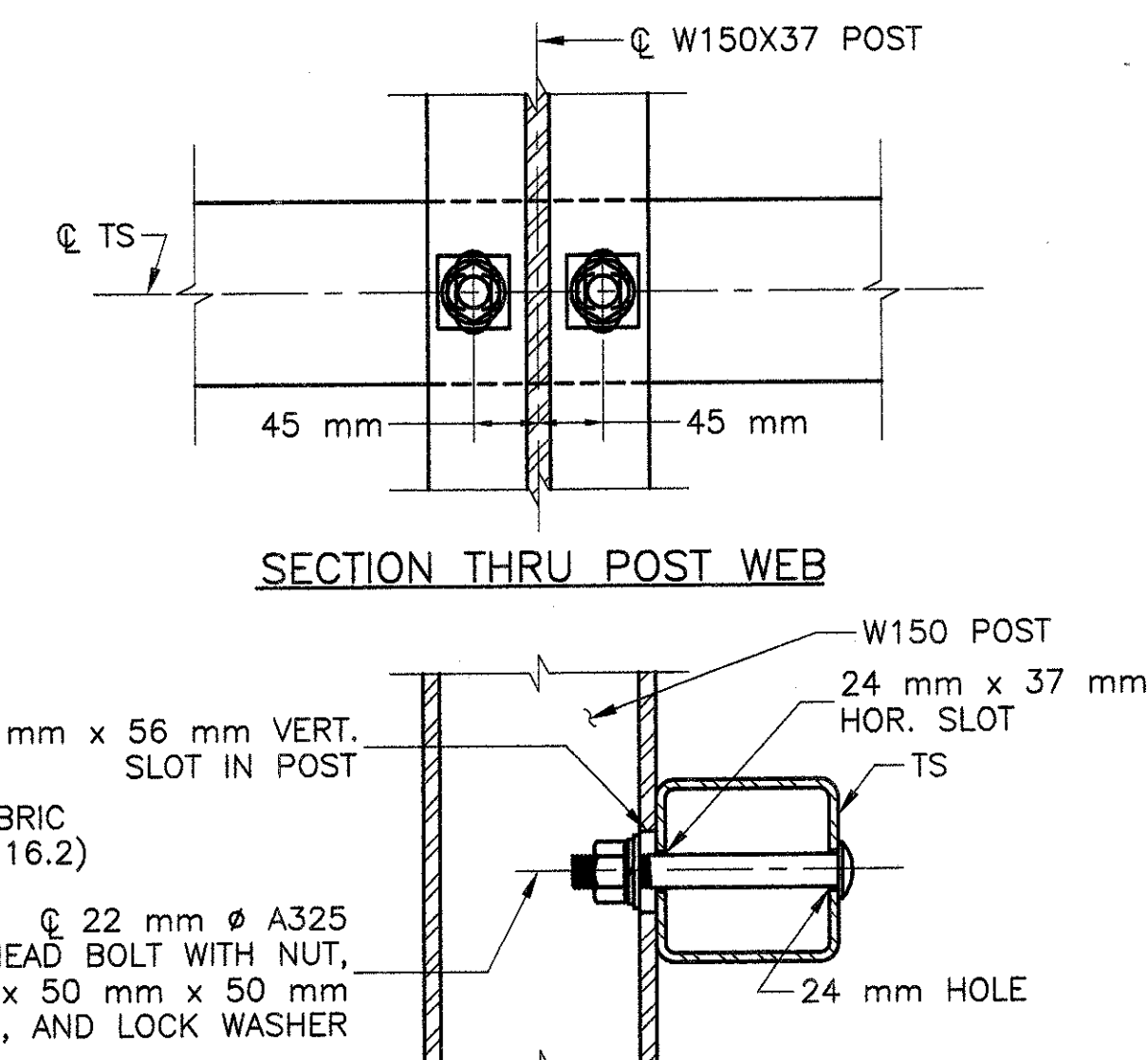
STATE	FED. AID PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
MASS.	N. F. A.	2002	19	23
PROJECT FILE NO. 602550				



**BRIDGE RAILING ELEVATION**  
SCALE 1:10

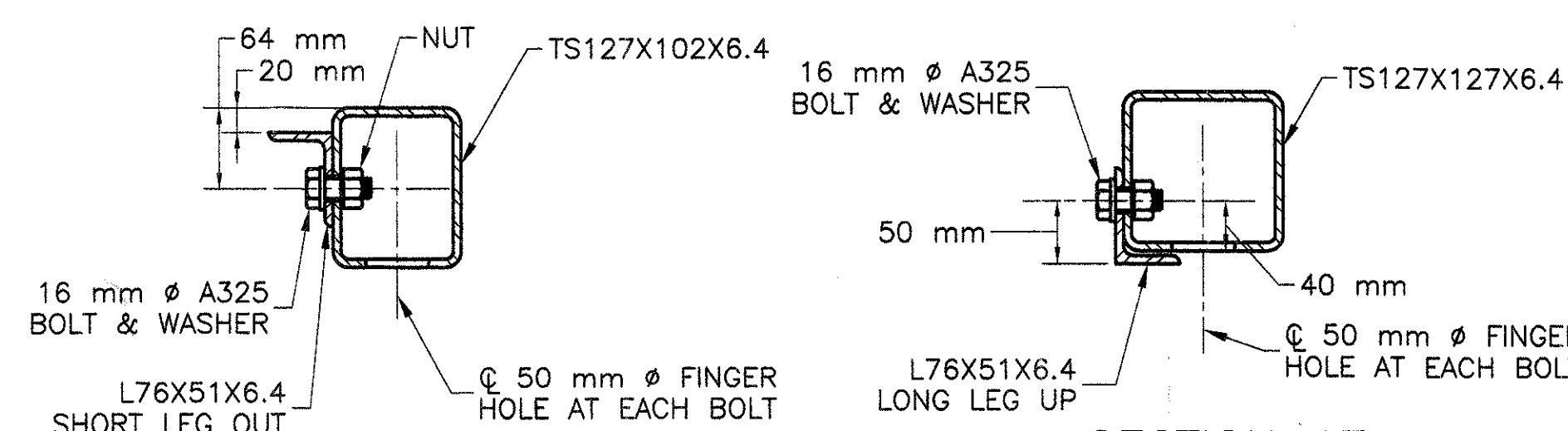


**SECTION 14**  
SCALE 1:10



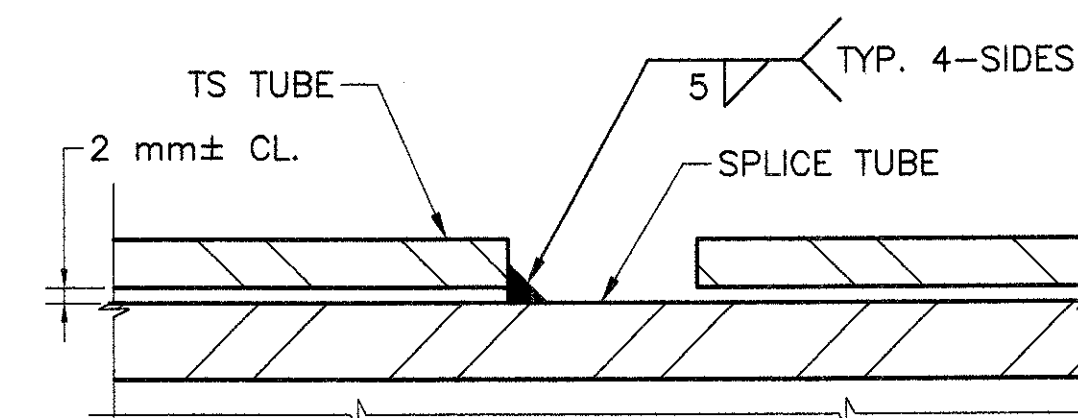
**SECTION THRU RAIL**  
NOTE: CONNECTIONS AT LOWER RAILS SHOWN. CONNECTIONS AT TOP RAIL SIMILAR.

**TYPICAL RAIL TO POST CONNECTIONS**  
SCALE 1:5

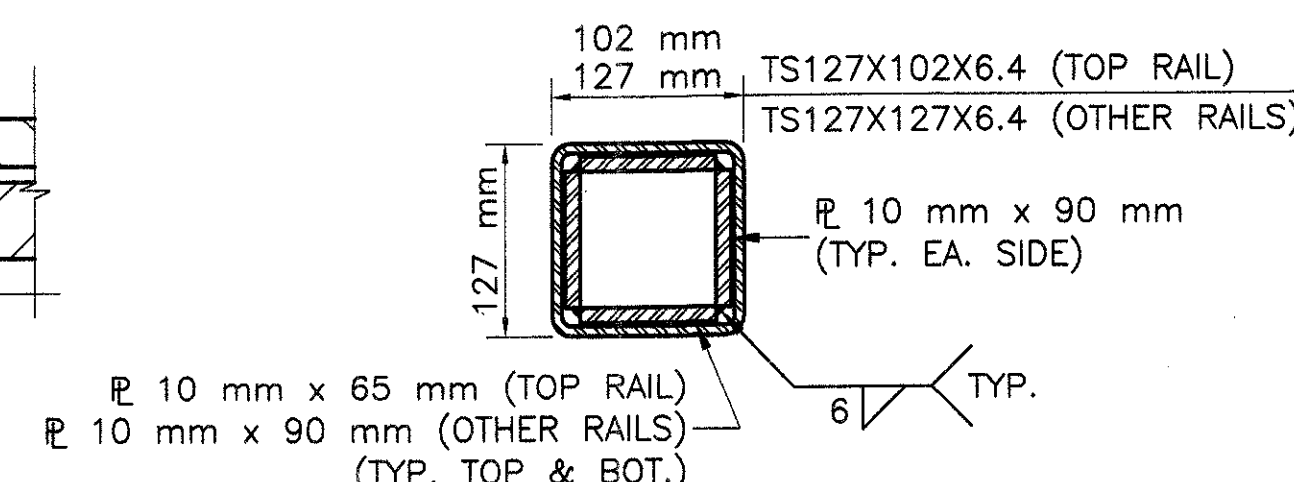


**SECTION 15**

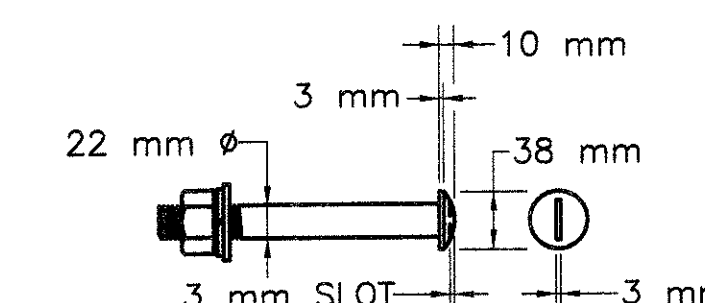
**SECTION 17**



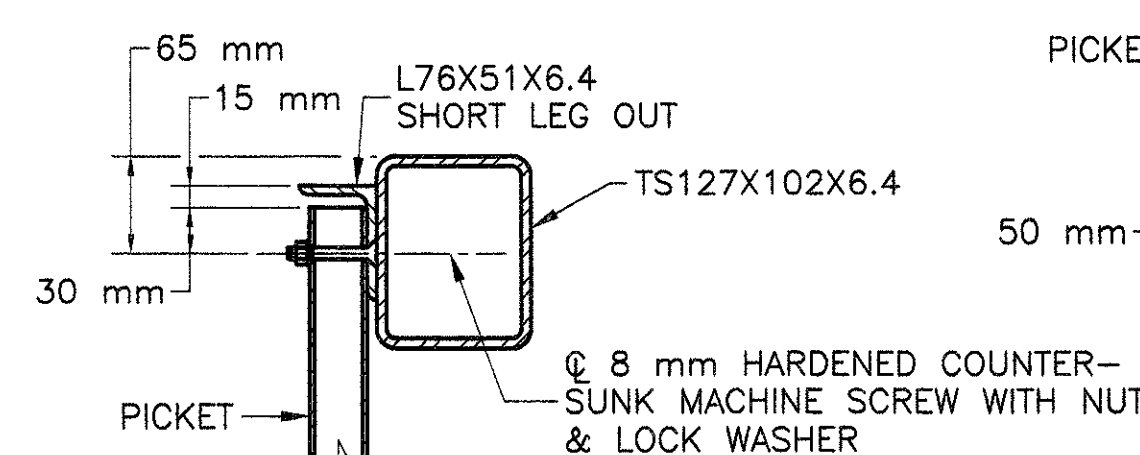
**SPICE DETAIL**  
SCALE 1:1



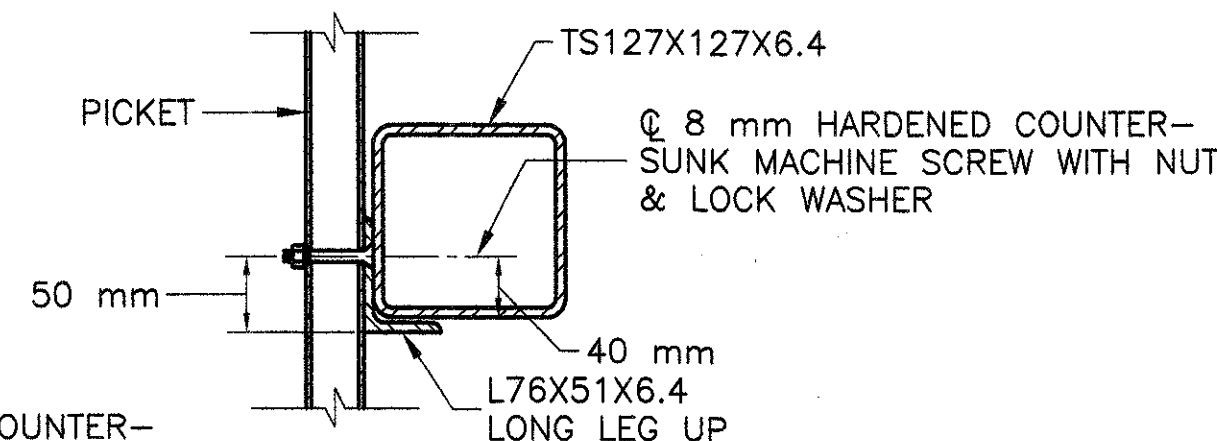
**SPICE TUBE DETAILS**  
SCALE 1:5



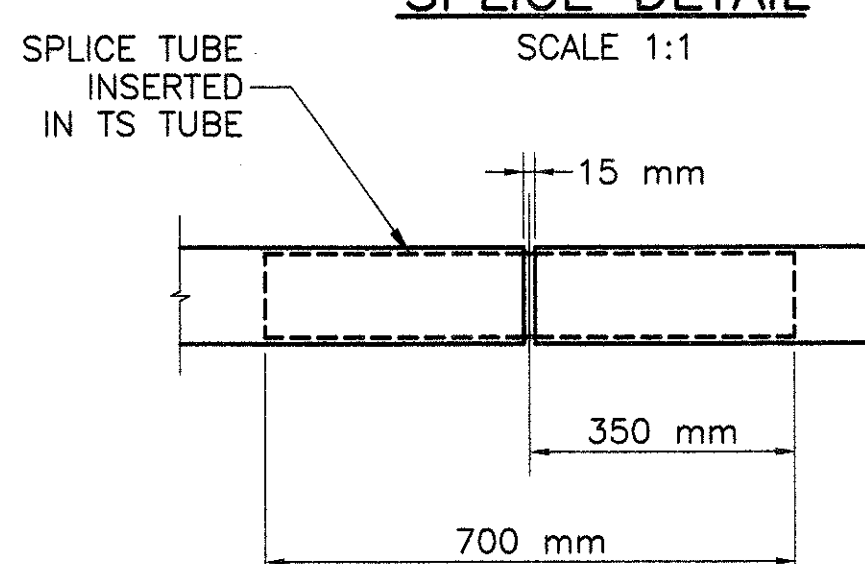
**22 mm Ø A325 ROUND HEAD BOLT**  
SCALE 1:5



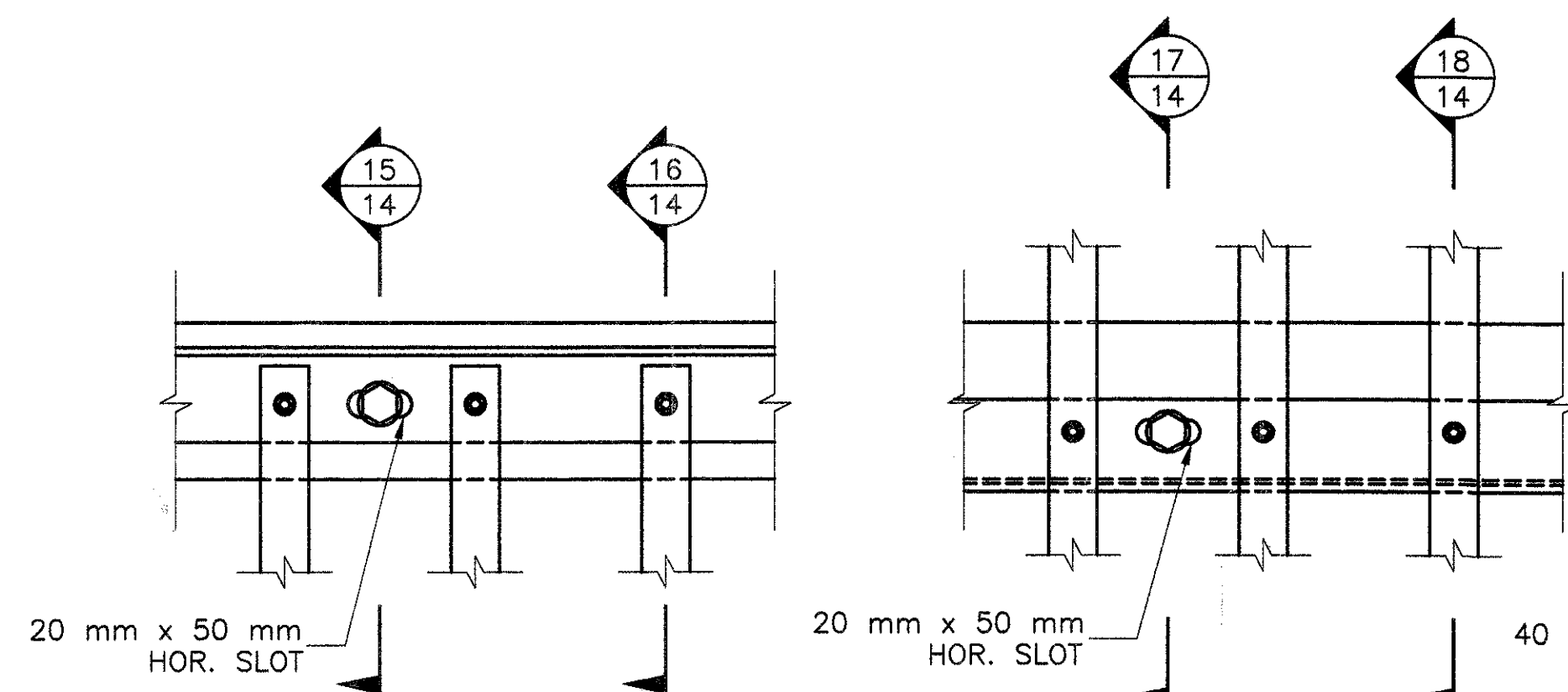
**SECTION 16**



**SECTION 18**

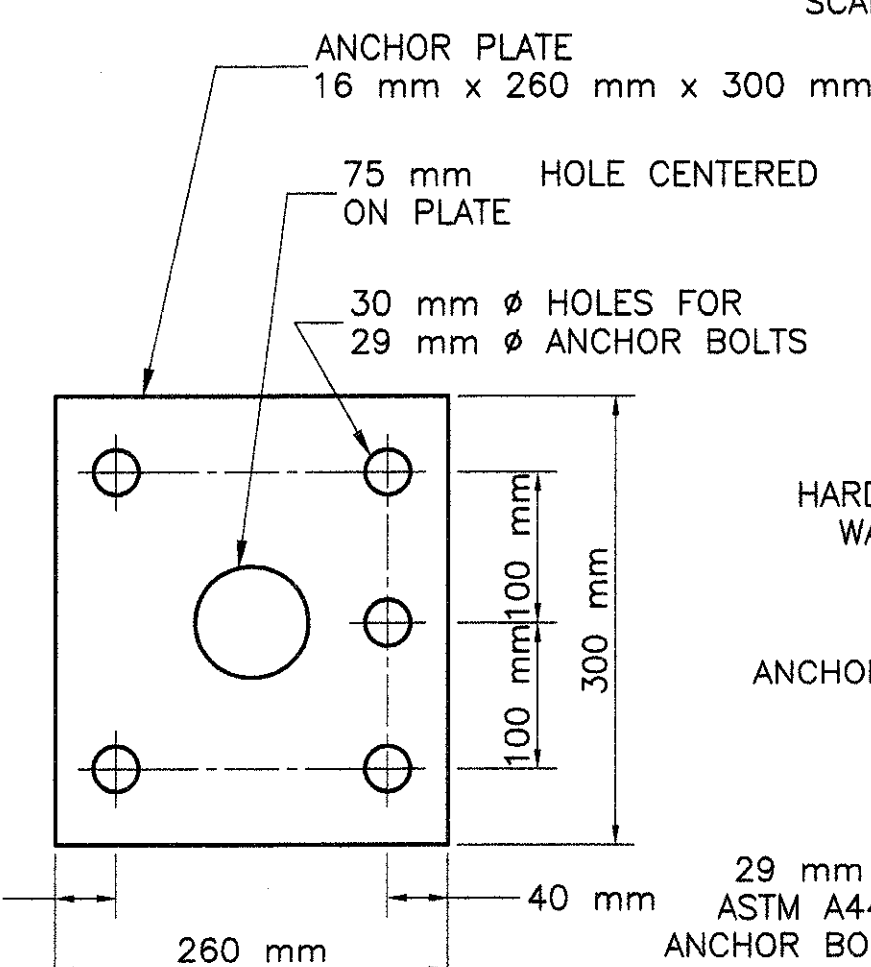


**TYPICAL SPLICE**  
SCALE 1:10

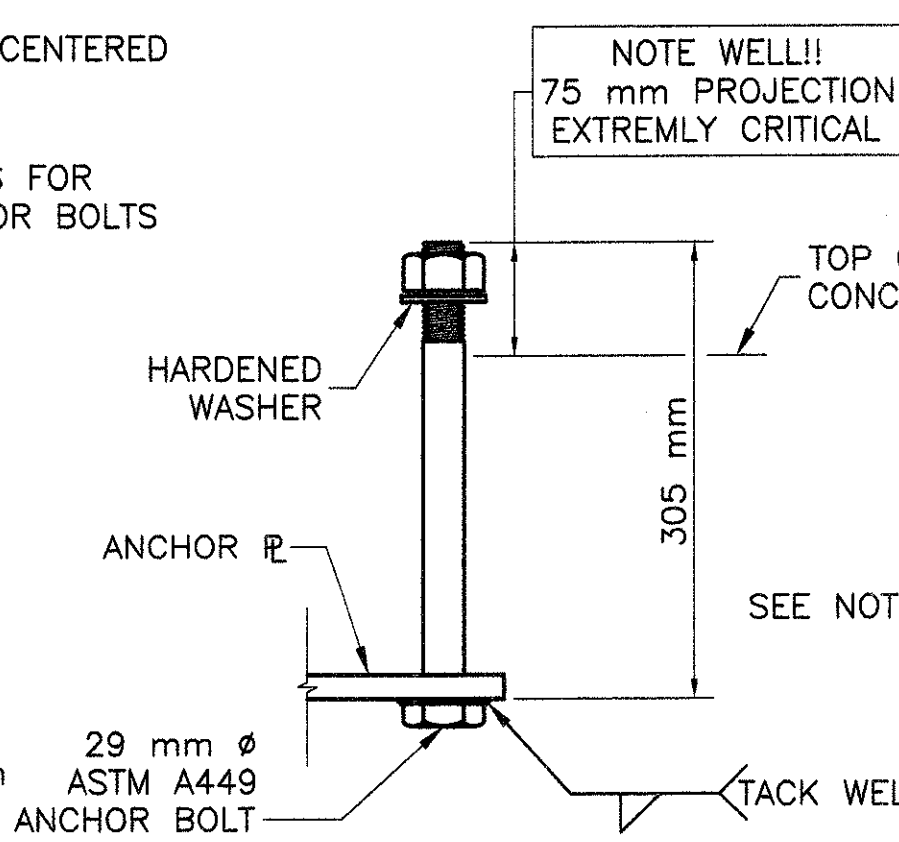


**DETAIL D**  
**TYPICAL PICKET TO RAIL DETAILS**  
SCALE 1:5

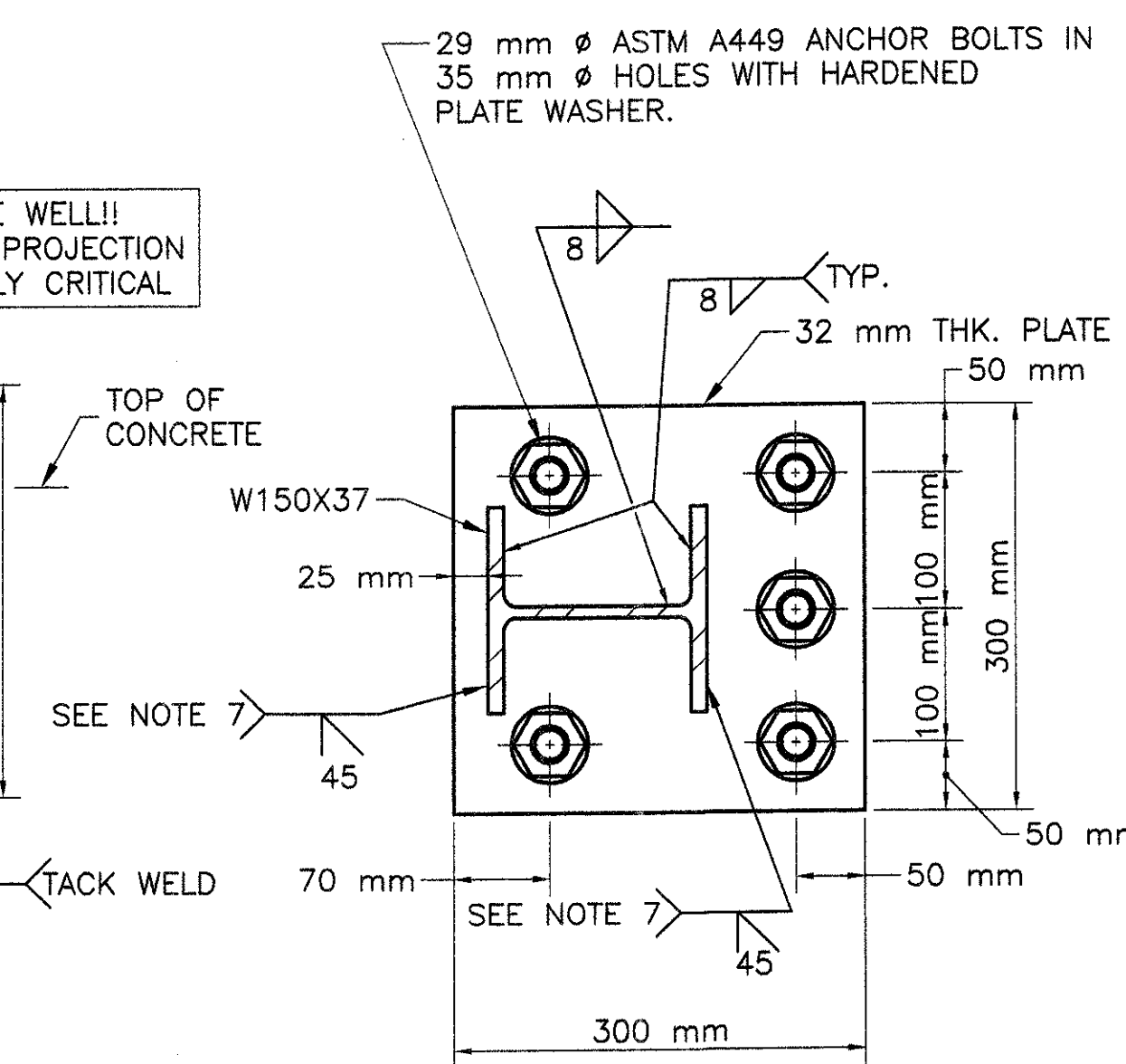
**DETAIL E**



**ANCHOR PLATE**  
SCALE 1:5



**ANCHOR BOLTS**  
SCALE 1:5



**BASE PLATE**  
SCALE 1:5

## RAILING NOTES

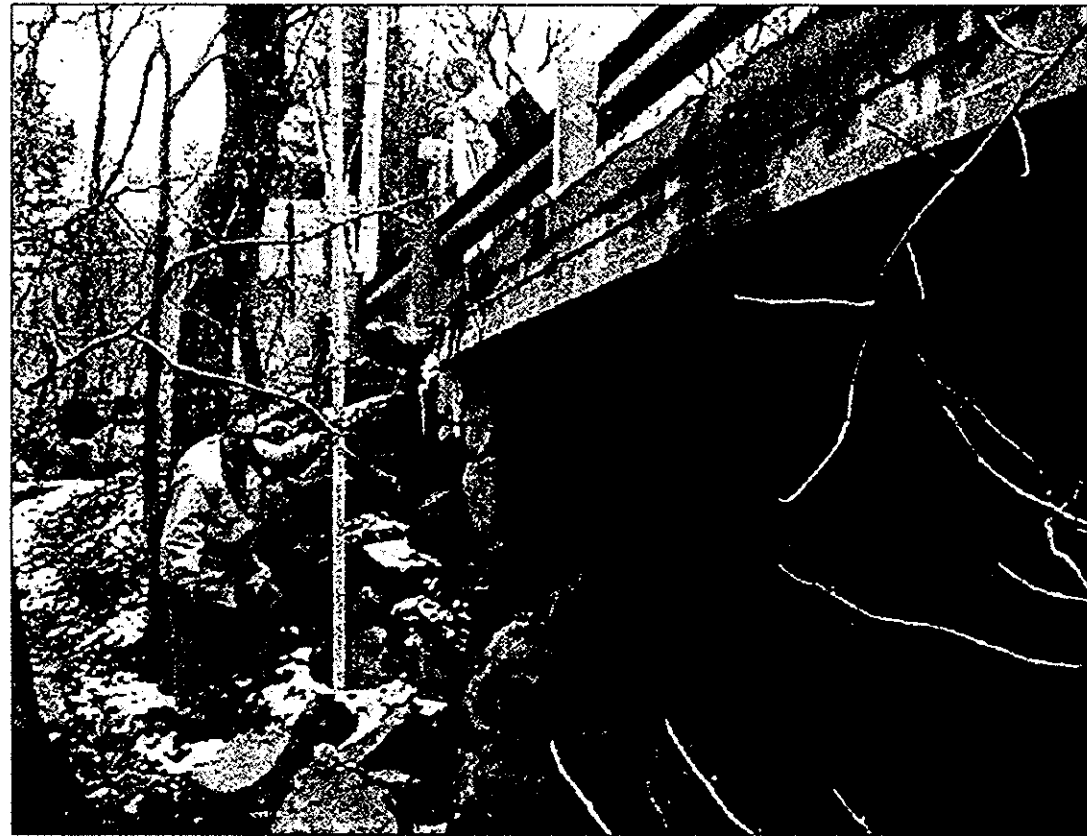
1. RAIL POST AND BASE PLATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M270/M270M GRADE 345. HOLLOW RAILING STRUCTURAL TUBING SHALL CONFORM TO THE REQUIREMENTS OF ASTM A500M WITH A CERTIFIED  $F_y = 345 \text{ MPa}$  MIN. PICKET CARRIER ANGLES, ANCHOR PLATES, AND SPLICE TUBE PLATES SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M270/M270M GRADE 250. PICKET TUBING SHALL CONFORM TO ASTM A513M WITH  $F_y = 250 \text{ MPa}$  MIN. OR A500M GRADE B.
2. ALL STEEL (EXCEPT THE 16 mm ANCHOR PLATE) SHALL BE GALVANIZED AND PAINTED DARK BRONZE (FEDERAL STD. 595B COLOR NO. 10045).
3. ANCHOR BOLTS SHALL BE SET WITH TEMPLATES. THE NUT SECURING THE POST BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL  $1/8$  TURN AFTER STEEL IS IN PLACE.
4. RAILS SHALL BE CONTINUOUS OVER A MINIMUM OF FOUR (4) POSTS WITHOUT SPLICES WHERE POSSIBLE. RAILS SHALL BE SPLICED IN A PANEL OVER EXPANSION JOINTS.
5. ENDS OF TUBE SECTIONS SHALL BE SAWED. GRIND SMOOTH EXPOSED EDGES. ALL CUT ENDS SHALL BE TRUE AND SMOOTH.
6. POSTS SHALL BE SET PERPENDICULAR TO GRADE.
7. POST FLANGE WELD DOES NOT REQUIRE MAGNETIC PARTICLE TESTING. WELD SHALL BE BACK-GROUGED ON BACK SIDE EXCEPT AT WEB. WELD IS THE SAME ON BOTH FLANGES.

April 6, 2002	ISSUED FOR CONSTRUCTION
DATE	DESCRIPTION
USE ONLY PRINTS OF LATEST DATE	





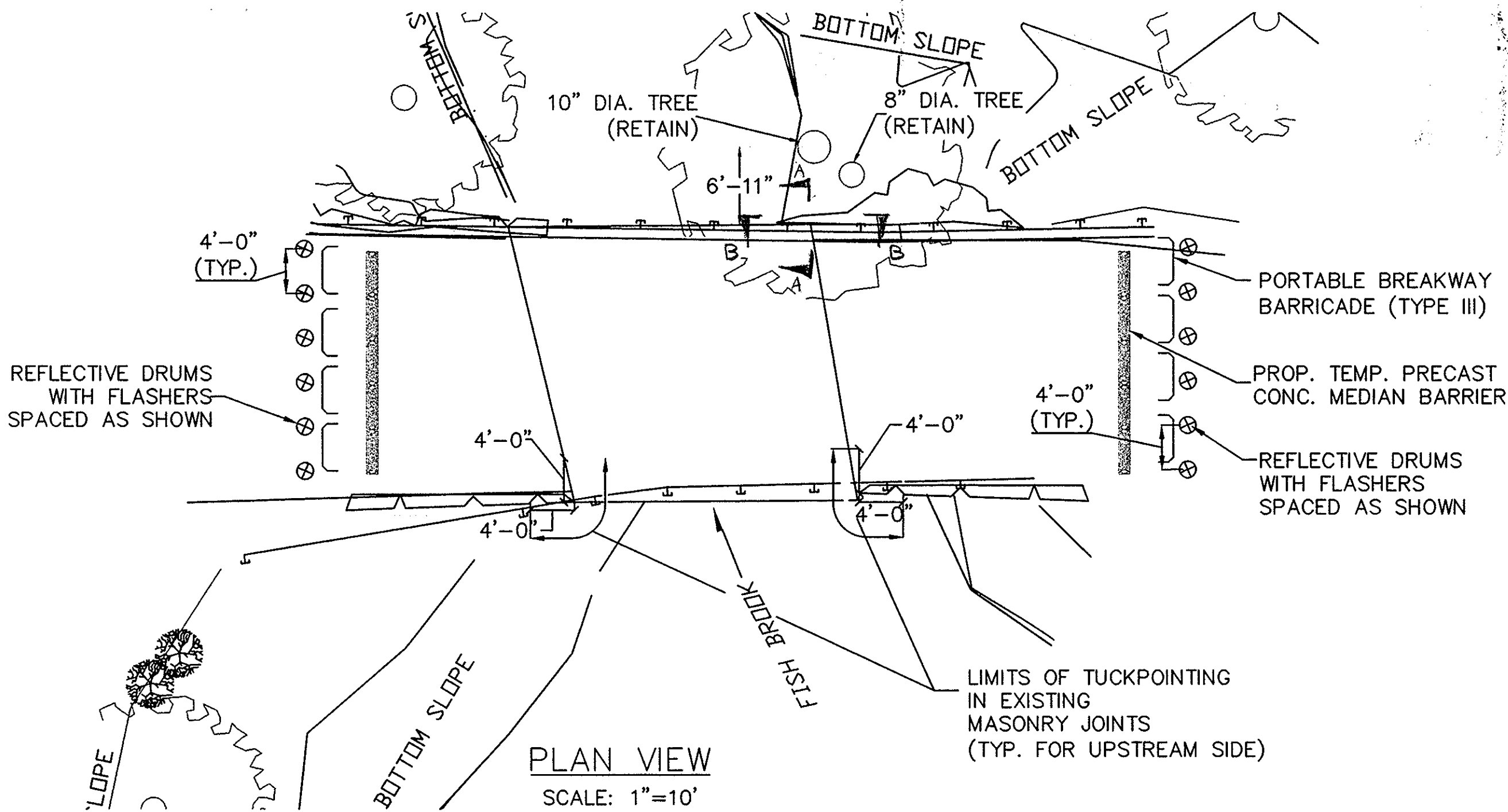
SOUTH ABUTMENT,  
SOUTHWEST CORNER



SOUTH ABUTMENT,  
SOUTHEAST CORNER

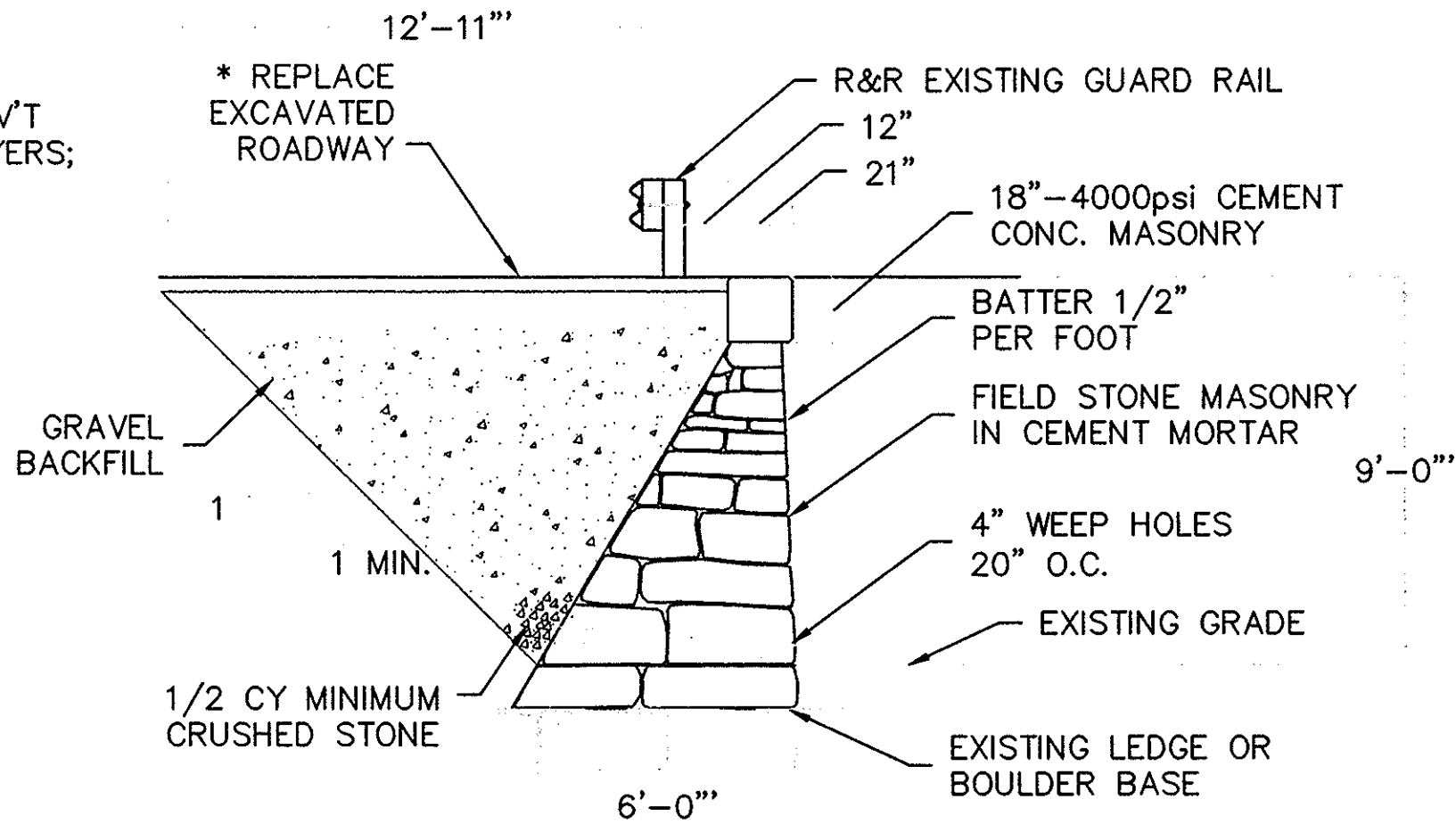


ELEVATION OF SOUTH  
ABUTMENT, EAST END

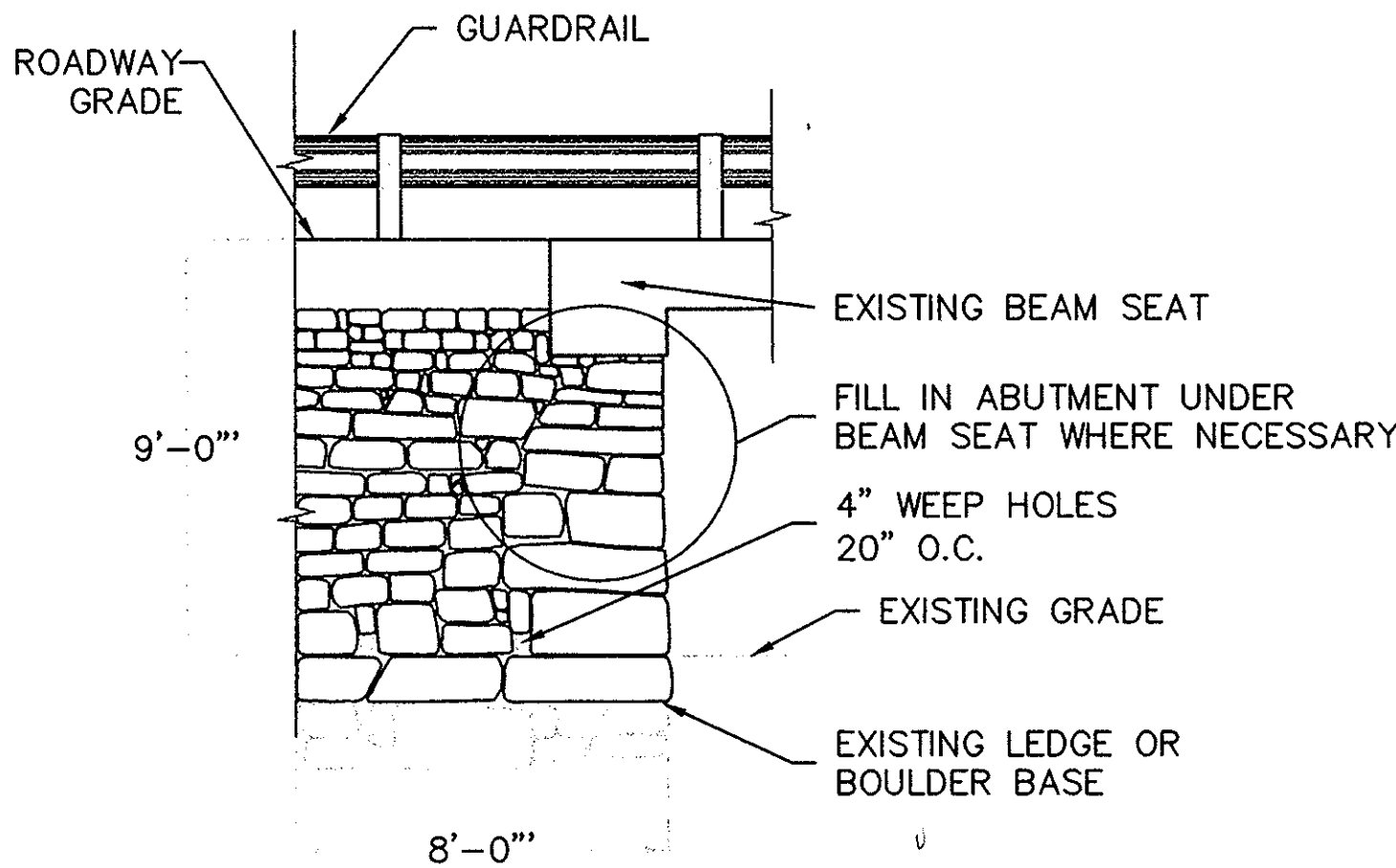


\* NOTE:

4" BITUMINOUS CONCRETE PAV'T  
TYPE I-1 PLACED IN TWO LAYERS;  
1 1/2" TOP COAT,  
2 1/2" BINDER COURSE  
8" DENSE GRADED CRUSHED  
STONE  
12" GRAVEL BASE



SECTION A-A  
SCALE: 1/4"=1'



SECTION B-B  
SCALE: 1/4"=1'

GENERAL NOTES:

1. Install and/or relocate temporary drums, and other traffic maintenance devices as required for closed roadway condition.
2. All construction drums and other traffic maintenance devices shall conform with the 1988 MUTCD as amended.
3. Remove all temporary signs, drums and other traffic maintenance devices on completion of the work and upon approval of the town.
4. Roadway will be closed while wingwall is being repaired.
5. All distances may be adjusted to fit field conditions, as directed by the Engineer.

MATERIALS

690.40 General.  
The stone shall consist of those in the present wall and its foundation and such new stones as may be required.

904. Concrete  
Concrete shall be 4000 psi, 3/4 inch, 610 cement concrete masonry.

CONSTRUCTION METHODS

All fallen stones from the present walls to be rebuilt, shall be used to rebuild the new wall in addition to furnishing such new stones as may be necessary to provide rebuilt walls of uniform appearances and cross sectional dimensions throughout their length. The open spaces about the base of the wall shall be filled with the materials excavated from the trench and all surplus excavation shall be used as directed on the slopes of the new embankment.

B. Concrete  
Method of concrete placement shall be the responsibility of the contractor.

COMPENSATION

690.131 Basis of Payment.  
Stone Masonry Walls, Removed and Rebuilt will be paid for at the contract unit price per lump sum for the wall rebuilt, complete in place.

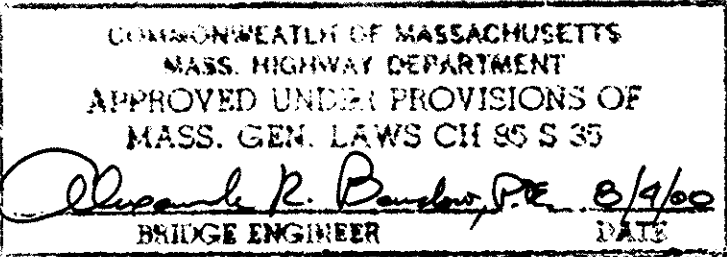
Excavation at the new location will be included under the lump sum Item 685.

Payment Items:

106.25	Tuckpointing Existing Masonry Joints	LINEAR FOOT
151.	Gravel Borrow	CUBIC YARD
156.1	Crushed Stone for Bridge Foundation (Optional)	TON
402.	Dense Graded Crushed Stone	CUBIC YARD
460.	Bituminous Concrete Pavement (Type I-1)	CUBIC YARD
482.3	Saw Cutting Bituminous Concrete	LINEAR FOOT
685.	Field Stone Masonry in Cement Mortar	CUBIC YARD
852.	Safety Signing for Construction Operation	SQUARE FOOT
853.	Portable Barricade (Type III)	EACH
853.2	Temporary Precast Concrete Median Barrier	LINEAR FOOT
859.1	Reflectorized Drum with Flasher (Type A)	DRUM - DAY
859.2	Reflectorized Drum with Light (Type C)	DRUM - DAY
904.	4000 psi. 3/4" 610 Cement Concrete Masonry	CUBIC YARD



PROJECT LOCUS



JUL 05 2000

MASSACHUSETTS HIGHWAY DEPARTMENT				BOXFORD B-19-002 (2R2)	
COVER SHEET AND LOCUS				MILL STREET / FISH BROOK	
BAYSIDE ENGINEERING, INC. 5 MIDDLESEX AVENUE SOMERVILLE, MA 02145	DES BY FXM	DR BY WF	CHK BY FXM	SCALE: AS NOTED	SHEET 1 OF 1

### **ATTACHMENT C: LOCKWOOD LANE OVER FISH BROOK (B-19-003)**

- CULVERT INSPECTION REPORT PERFORMED BY MASSDOT ON JANUARY 11, 2019
- EXISTING BRIDGE PLANS, DATED: OCTOBER 1986
- BRIDGE REPAIR DRAWINGS, DATED: MAY 2020

2-DIST  
04B.I.N.  
2R3

## STRUCTURES INSPECTION FIELD REPORT

BR. DEPT. NO.

B-19-003

## CULVERT INSPECTION

CITY/TOWN <b>BOXFORD</b>	8-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	11-Kilo. POINT <b>000.193</b>	41-STATUS <b>A:OPEN</b>	90-ROUTINE INSP. DATE <b>JAN 11, 2019</b>
07-FACILITY CARRIED <b>HWY LOCKWOOD LN</b>	MEMORIAL NAME/LOCAL NAME	27-YR BUILT <b>1988</b>	106-YR REBUILT <b>0000</b>	YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>	26-FUNCTIONAL CLASS <b>Urban Local</b>	DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>919 : Iron or Aluminum Culvert</b>	22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER <b>J. Rosatone, P.E.</b>	PROJ MGR <b>Green International</b>
107-DECK TYPE <b>N : Not applicable</b>	WEATHER <b>Clear</b>	TEMP. (air) <b>-1°C</b>	TEAM MEMBERS <b>N. K. KADRA</b>	

## TYPE OF CULVERT:

SHAPE:	BOX
MATERIAL:	ALUMINUM
COATING:	NONE

## BARRELS: (In Meters)

SIZE:	3.00Wx2.00H	NUMBER:	2
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## DEPTH OF COVER

(To the nearest tenth of a meter)

N	S
0.6	0.6

## CURB REVEAL

(In millimeters)

N	N
---	---

## ITEM 62 CULVERT &amp; RETAINING WALLS

6

I62 (Dive Report):

6

I62 (This Report):

6

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		Dive This Rpt.	DEF		Dive This Rpt.	DEF
1. Roof	N	N	-	7. Protective Coating	N	N	-	13. Member Alignment	N	7	-
2. Floor	N	N	-	8. Embankment	7	6	M-P	14. Deformation	6	6	M-P
3. Walls	N	N	-	9. Wearing Surface	N	6	M-P	15. Scour	6	6	S-P
4. Headwall	7	6	M-P	10. Railing	N	6	M-P	16. Settlement	7	7	-
5. Wingwall	N	5	M-P	11. Sidewalks	N	N	-	17.	N	N	-
6. Pipe	6	6	M-P	12. Utilities	N	N	-	18.	N	N	-

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE: **Please explain**  
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: **Please explain**  
None (X) Minor ( ) Moderate ( ) Severe ( )

## ITEM 61 CHANNEL &amp; CHANNEL PROTECTION

6

## STREAM FLOW VELOCITY:

Tidal ( ) High (X) Moderate ( ) Low ( )

## APPROACH CONDITION

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		
1. Channel Scour	6	6	S-P	5. Utilities	N	N	-
2. Embankment Erosion	7	7	-	6. Rip-Rap/Slope Protection	6	6	M-P
3. Debris	7	6	M-P	7. Aggradation	7	7	-
4. Vegetation	7	7	-				

ITEM 61 (Dive Report): 6

ITEM 61 (This Report): 6

93b- U/W INSP DATE: 03/10/2016

	DEF
a. Appr. pavement condition	5
b. Appr. Roadway Settlement	7
c. Appr. Sidewalk Settlement	N
d.	N

## WEIGHT POSTING

Not Applicable X

## Actual Posting

H	3	3S2	Single
N	N	N	N

## Recommended Posting

N	N	N	N
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Waived Date:

00/00/0000

EJDMT Date:

00/00/0000

Signs In Place  
(Y=Yes, N=No,  
NR=Not Required)

Legibility/  
Visibility

## At bridge

E	W

## Advance

E	W

## ITEM 36 TRAFFIC SAFETY

## ACCESSIBILITY (Y/N/P):

TOTAL HOURS 60

	36	COND	DEF		Needed	Used		Needed	Used
A. Bridge Railing	0	6	M-P	Ladder	N	N	Other:		
B. Transitions	0	N	-	Boat	N	N		N	N
C. Approach Guardrail	0	N	-	Waders	Y	Y			
D. Approach Guardrail Ends	0	N	-						

PLANS (Y/N): N

(V.C.R.) (Y/N): N

TAPE#:

## RATING

Rating Report (Y/N): Y

Date: 07/01/2011

Inspection data at time of existing rating  
I 62: 6 Date: 01/05/2009

Recommend for Rating or Rerating (Y/N): N

REASON:

If YES please give priority:

HIGH ( ) MEDIUM ( ) LOW ( )

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>2R3</b>	BR. DEPT. NO. <b>B-19-003</b>	8.-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	INSPECTION DATE <b>JAN 11, 2019</b>
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### REMARKS, PHOTOS & SKETCHES

#### BRIDGE ORIENTATION

Bridge No. B-19-003 (2R3) carries Lockwood Lane over Fish Brook in the town of Boxford. In this report, the approaches are labeled west and east. There are two barrels; Barrel 1 is the west barrel and Barrel 2 is the east barrel. The Fish Brook flows from north (upstream) to south (downstream).

For the framing plan, see **Sketch 1**; for the approaches, see **Photo 1** and **Photo 2**.

#### GENERAL REMARKS

The box culvert consists of two (2) corrugated aluminum barrels, (2) reinforced concrete headwalls, and four (4) granite stone wingwalls. There are two (2) timber bridge railings and an asphalt wearing surface on the top of culvert.

#### ACCESS

During this inspection, access to Lockwood Lane was only possible via Middleton Road (west entrance) because the bridge to the east of Bridge No. B-19-003 (2R3) was closed.

To inspect the underside of the culvert, waist high waders and a depth probe were used.

### CONDITION RATING GUIDE

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	Use if structure is not a culvert.
G	9	EXCELLENT	No deficiencies.
G	8	VERY GOOD	No noticeable or noteworthy differences which affect the condition of the culvert. Insignificant scrape marks caused by drift.
G	7	GOOD	Shrinkage cracks, light scaling, and insignificant spalling, which does not expose reinforcing steel. Insignificant damage caused by drift with not misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
F	6	SATISFACTORY	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
F	5	FAIR	Moderate to major deterioration, or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
P	4	POOR	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joints permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
P	3	SERIOUS	Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls, nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls, or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Bridge closed. Corrective action may put back in light service.
	0	FAILED	Bridge closed. Replacement necessary.

### DEFICIENCY REPORTING GUIDE

**DEFICIENCY:** A defect in a structure that requires corrective action.

#### CATEGORIES OF DEFICIENCIES:

**M= Minor Deficiency -** (Examples include but are not limited to: Spalled concrete, minor to moderate corrosion to steel culverts, minor settlement or misalignment, minor scouring, minor damage to guardrail, etc.)

**S= Severe/Major Deficiency -** (Examples include but are not limited to: Large spalls, wide cracks, moderate to major deterioration in concrete, considerable settlement, considerable scouring or undermining, extensive corrosion and deflection in steel culverts, etc.)

**C-S= Critical Deficiency -** A deficiency in a structural component or element of a bridge that poses an extreme hazard or unsafe condition to the public. (Follow-up Critical Deficiency Report must be submitted separately)

#### URGENCY OF REPAIR:

**I = Immediate-** [Inspector(s) stay at the bridge until the District Maintenance crew or the responsible Agency crew(if not a State bridge) show up and corrective action is taken.]

**A = ASAP-** [Action will be taken by the District Maintenance Engineer or the Responsible Agency (if not a State owned bridge) upon receipt of the Inspection Report].

**P = Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

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## REMARKS

### ITEM 62 - CULVERT

#### Item 62.4 - Headwall

##### North Headwall

Moderate scaling at the north face of the wall (**see Photo 3**). Moss growing at the top of the wall.

##### South Headwall

Moderate scaling at the south face of the wall. Moss growing at the top of the wall.

For underwater details, refer to the Routine Underwater Inspection Report dated 03/10/2016.

#### Item 62.5 - Wingwall

##### Northwest Wingwall

Dry laid granite blocks misaligned vertically up to 5".

##### Northeast Wingwall

Dry laid granite blocks misaligned vertically up to 4". The bottom stone of the wingwall is displaced 7" and falling out (**see Photo 4**).

##### Southwest Wingwall

Dry laid granite blocks misaligned vertically up to 3". There is a 1'-10" deep x 11" high void at the bottom of the wingwall.

##### Southeast Wingwall

Dry laid granite blocks misaligned vertically up to 6".

#### Item 62.6 - Pipe

##### Barrel 1

There is a 5'-0" long x 2" deep deformation (dent) starting 10' from the south headwall and 2' east of the crown (**see Photo 5**). There is minor surface corrosion along the water-line for the entire length of the aluminum barrel and the bottom two bolts at the splices exhibit light rust.

##### Barrel 2

There is a minor dent at the crown of the barrel at the north headwall (**see Photo 6**). The aluminum at the floor of the barrel at the north end of the culvert is bent up 6" high, exposing the crushed stone under the culvert to potential scour (**see Photo 7**). There is minor surface corrosion along the water-line for the entire length of the barrel (**see Photo 8**).

For underwater details, refer to the Routine Underwater Inspection Report dated 03/10/2016.

#### Item 62.8 - Embankment

The trees growing on the riverbank are being undercut by flowing water, which is eroding the bank and exposing the roots, causing the trees to grow/tilt inward (**see Photo 9**). The upstream end has several trees growing on the west embankment displacing the stone riprap wall (**see Photo 10**).

#### Item 62.9 - Wearing Surface

The wearing surface exhibits 11 LF of longitudinal cracks and 15 LF of transverse cracks up to 1/2" wide. There is a heavy buildup of leaves and vegetation at the north and south curblines.

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## REMARKS

### **Item 62.14 - Deformation**

See Item 62.6 - Pipe.

For underwater details, refer to the Routine Underwater Inspection Report dated 03/10/2016.

### **Item 62.15 - Scour**

There is moderate scour 2'-0" deep below the streambed between Barrel 1 and Barrel 2 at the north headwall.

For underwater details, refer to the Routine Underwater Inspection Report dated 03/10/2016.

## **ITEM 61 - CHANNEL AND CHANNEL PROTECTION**

### **Item 61.1 - Channel Scour**

For underwater details, refer to the Routine Underwater Inspection Report dated 03/10/2016.

### **Item 61.3 - Debris**

Culvert

Barrel 2 has a buildup of branches, leaves, and brush 2'-0" high starting from the south end of the culvert and extending three-quarters the length of the barrel (**see Photo 11**).

### **Item 61.6 - Rip-Rap/Slope Protection**

For underwater details, refer to the Routine Underwater Inspection Report dated 03/10/2016.

## **APPROACHES**

### **Approaches a - Appr. pavement condition**

West Approach

Moderate to heavy transverse, longitudinal, and map cracking up to 1" wide (**see Photo 12**).

East Approach

Moderate to heavy transverse and longitudinal cracking up to 1" wide.

## **TRAFFIC SAFETY**

### **Item 36a - Bridge Railing**

Both bridge rails consist of a timber beam mounted to timber posts. Both timber beams exhibit minor checking of the wood (**see Photo 13**).

### **Item 36b - Transitions**

There are no transition rails.

### **Item 36c - Approach Guardrail**

There are no approach guardrails.

### **Item 36d - Approach Guardrail Ends**

There are no approach guardrail ends.



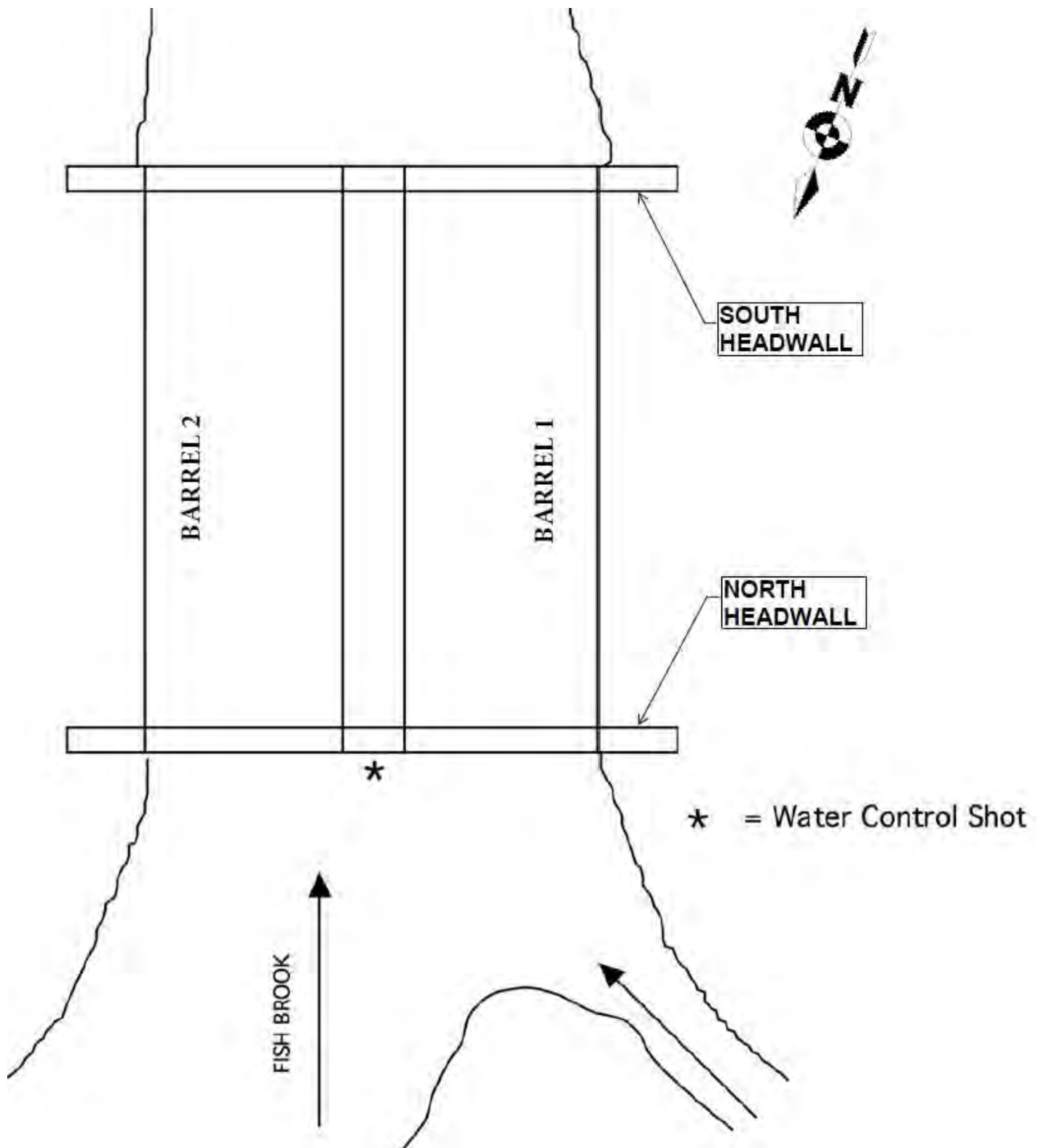
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## REMARKS

### **Sketch / Photo Log**

- Sketch 1 : Framing Plan
- Photo 1 : West Approach
- Photo 2 : East Approach
- Photo 3 : Moderate Scaling to the North Headwall at the West End of the Culvert
- Photo 4 : Bottom Stone at the Northeast Wingwall Dislodged and Falling Out
- Photo 5 : Barrel 1, 5'-0" Long Deformation Starting 10' away from the South Headwall and 2' East of the Crown
- Photo 6 : Barrel 2, Dent at the Crown of the Barrel at the North Headwall
- Photo 7 : Barrel 2, Aluminum Bent up 6" High at the Floor of the Barrel at the North End of the Culvert
- Photo 8 : Barrel 2, Typical Surface Corrosion along the Waterline
- Photo 9 : Minor Erosion, Exposed Roots, and Trees Tilting Towards the Water at the Southeast Embankment
- Photo 10 : Trees Tilting Towards the Water Displacing the Northwest Stone Embankment
- Photo 11 : Barrel 2, 2'-0" High Buildup of Branches, Leaves, and Brush Starting from the South End of the Culvert and Extending Three-Quarters the Length of the Barrel
- Photo 12 : Heavy Map Cracking in the Westbound (North) Lane at the West Approach
- Photo 13 : Bridge Railing, Minor Checking to the Upper Portion of the Timber Beams

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**SKETCHES****Sketch 1: Framing Plan**

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**PHOTOS****Photo 1: West Approach****Photo 2: East Approach**



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**PHOTOS**

**Photo 3: Moderate Scaling to the North Headwall at the West End of the Culvert**



**Photo 4: Bottom Stone at the Northeast Wingwall Dislodged and Falling Out**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>2R3</b>	BR. DEPT. NO. <b>B-19-003</b>	8.-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	INSPECTION DATE <b>JAN 11, 2019</b>
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**PHOTOS**

**Photo 5: Barrel 1, 5'-0" Long Deformation Starting 10' away from the South Headwall and 2' East of the Crown**



**Photo 6: Barrel 2, Dent at the Crown of the Barrel at the North Headwall**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>2R3</b>	BR. DEPT. NO. <b>B-19-003</b>	8.-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	INSPECTION DATE <b>JAN 11, 2019</b>
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**PHOTOS**

**Photo 7: Barrel 2, Aluminum Bent up 6" High at the Floor of the Barrel at the North End of the Culvert**



**Photo 8: Barrel 2, Typical Surface Corrosion along the Waterline**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>2R3</b>	BR. DEPT. NO. <b>B-19-003</b>	8.-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	INSPECTION DATE <b>JAN 11, 2019</b>
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**PHOTOS**

**Photo 9: Minor Erosion, Exposed Roots, and Trees Tilting Towards the Water at the Southeast Embankment**



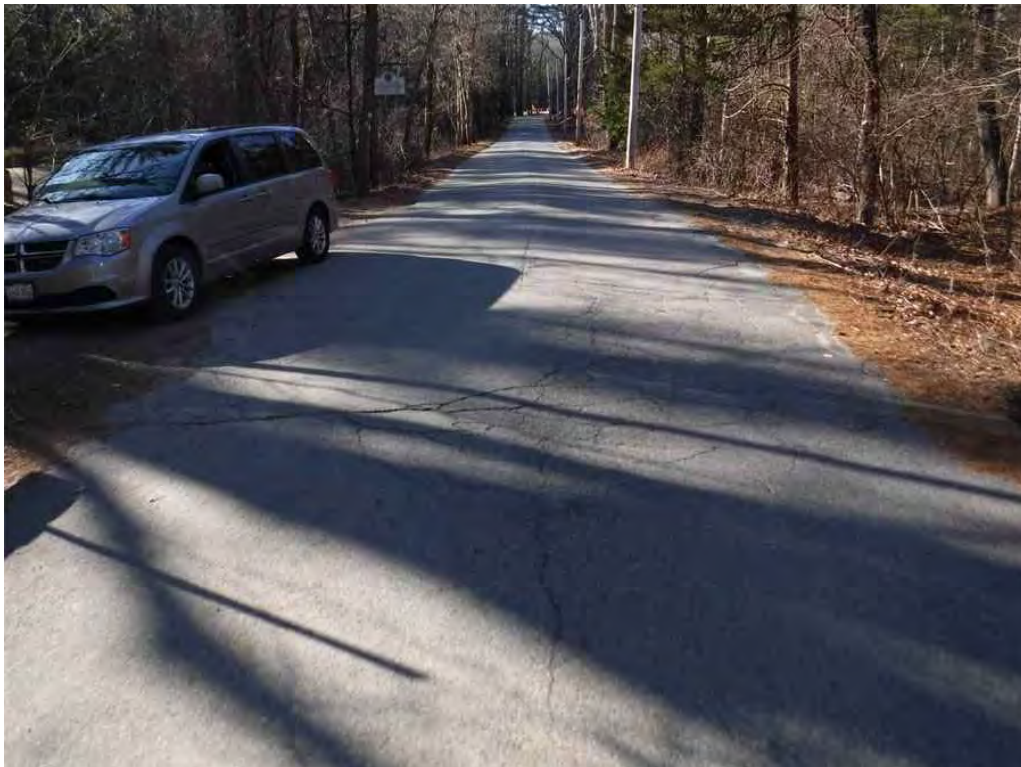
**Photo 10: Trees Tilting Towards the Water Displacing the Northwest Stone Embankment**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>2R3</b>	BR. DEPT. NO. <b>B-19-003</b>	8.-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	INSPECTION DATE <b>JAN 11, 2019</b>
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**PHOTOS**

**Photo 11: Barrel 2, 2'-0" High Buildup of Branches, Leaves, and Brush Starting from the South End of the Culvert and Extending Three-Quarters the Length of the Barrel**



**Photo 12: Heavy Map Cracking in the Westbound (North) Lane at the West Approach**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>2R3</b>	BR. DEPT. NO. <b>B-19-003</b>	8.-STRUCTURE NO. <b>B19003-2R3-MUN-NBI</b>	INSPECTION DATE <b>JAN 11, 2019</b>
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**PHOTOS**

**Photo 13: Bridge Railing, Minor Checking to the Upper Portion of the Timber Beams**

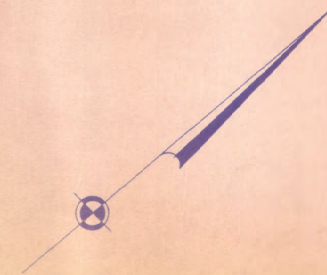
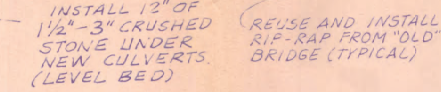


Report Date: February 11, 2021

State Information										Classification										Code																			
<b>BDEPT#= B19003</b>										Agency Br.No.										(112) NBIS Bridge Length										Y									
<b>Town= Boxford</b>										L.O.										(104) Highway System										N									
<b>B.I.N= 2R3</b>										AASHTO= 079.9										(26) Functional Class - Urban Local										19									
RANK= 4218 H.I.= 88.5 %										FHWA Select List= N (6/21/2017)										(100) Defense Highway										0									
(8) Structure Number										B190032R3MUNNBI										(101) Parallel Structure										N									
(5) Inventory Route										151000000										(102) Direction of Traffic - 2-way traffic										2									
(2) State Highway Department District										04										(103) Temporary Structure										N									
(3) County Code 009 (4) Place code										07420										(105) Federal Lands Highways										0									
(6) Features Intersected										<b>WATER FISH BROOK</b>										(110) Designated National Network										N									
(7) Facility Carried										<b>HWY LOCKWOOD LN</b>										(20) Toll - On free road										3									
(9) Location										MILE WEST I 95										(21) Maintain - Town Agency										03									
(11) Kilometerpoint										0000.193										(22) Owner - Town Agency										03									
(12) Base Highway Network										N										(37) Historical Significance built after 1949 presumed to be not eligi										Z									
(13) LRS Inventory Route & Subroute										000000000000																													
(16) Latitude										42DEG 38MIN 40.80 SEC										(58) Deck										N									
(17) Longitude										70DEG 59MIN 24.20 SEC										(59) Superstructure										N									
(98) Border Bridge State Code										Share %										(60) Substructure										N									
(99) Border Bridge Structure No. #																				(61) Channel & Channel Protection										6									
																				(62) Culverts										6									
Structure Type and Material																				Load Rating and Posting										Code									
(43) Structure Type Main: Iron or Aluminum										Code 919										(31) Design Load - H 20=M 18										4									
Culvert										Jointless bridge type: Not applicable										(63) Operating Rating Method - Load Factor (LF)										1									
(44) Structure Type Appr:																				(64) Operating Rating										56.5									
Other										Code 000										(65) Inventory Rating Method - Load Factor (LF)										1									
(45) Number of spans in main unit										002										(66) Inventory Rating										33.8									
(46) Number of approach spans										0000										(70) Bridge Posting										5									
(107) Deck Structure Type - Not applicable										Code N										(41) Structure - Open										A									
(108) Wearing Surface / Protective System:																				Appraisal										Code									
A) Type of wearing surface - Not applicable=no deck										Code N										(67) Structural Evaluation										6									
B) Type of membrane - Not applicable=no deck										Code N										(68) Deck Geometry										4									
C) Type of deck protection - Not applicable=no deck										Code N										(69) Underclearances, vert. and horiz.										N									
																				(71) Waterway adequacy										8									
																				(72) Approach Roadway Alignment										8									
(27) Year Built										1988										(36) Traffic Safety Features										0 0 0 0									
(106) Year Reconstructed										0000										(113) Scour Critical Bridges										8									
(42) Type of Service: On - Highway																				Inspections																			
Under - Waterway										Code 15										(90) Inspection Date 01/07/21										(91) Frequency 24 MO									
(28) Lanes: On Structure 02 Under structure										00										(92) Critical Feature Inspection:										(93) CFI DATE									
(29) Average Daily Traffic										000300										(A) Fracture Critical Detail N 00 MO A)										00/00/00									
(30) Year of ADT 2017 (109) Truck ADT										05 %										(B) Underwater Inspection Y 36 MO B)										03/15/19									
(19) Bypass, detour length										005 KM										(C) Other Special Inspection N 00 MO C)										00/00/00									
																				(*) Other Inspection (FLOOD) N 00 MO *)										05/23/06									
																				(*) Closed Bridge N 00 MO *)										00/00/00									
																				(*) UW Special Inspection N 00 MO *)										00/00/00									
																				(*) Damage Inspection MO *)										00/00/00									
Geometric Data																				Rating Loads																			
(48) Length of maximum span										0003.0 M										Report Date 07/01/11										H20 Type 3 Type 3S2 Type HS									
(49) Structure Length										00006.4 M										Operating										35.0 58.0 92.0 63.0									
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M																				Inventory										21.0 35.0 55.0 38.0									
(51) Bridge Roadway Width Curb to Curb										006.3 M																													
(52) Deck Width Out to Out										009.1 M																													
(32) Approach Roadway Width (w/shoulders)										006.1 M																													
(33) Bridge Median - No median										Code 0																													
(34) Skew 08 DEG (35) Structure Flared										N										Status LEGAL										Posting Date 12/20/11									
(10) Inventory Route MIN Vert Clear										99.99 M										2 Axle 3 Axle 5 Axle										Single									
(47) Inventory Route Total Horiz Clear										07.5 M																													
(53) Min Vert Clear Over Bridge Rdwy										99.99 M																													
(54) Min Vert Underclear ref N										00.00 M																													
(55) Min Lat Underclear RT ref N										00.0 M																													
(56) Min Lat Underclear LT										00.0 M																													
Navigation Data																				Bridge Name																			
(38) Navigation Control - No navigation control on waterway										Code 0										N Anti-missile fence N Acrow Panel N Jointless Bridge																			
(111) Pier Protection										Code										Freeze/Thaw N : Not Applicable																			
(39) Navigation Vertical Clearance										000.0 M										Accessibility (Needed/Used)																			
(116) Vert-lift Bridge Nav Min Vert Clear										M										N / N Liftbucket N / N Rigging N / N Other																			
(40) Navigation Horizontal Clearance										0000.0 M										N / N Ladder N / N Staging																			
																				N / N Boat N / N Traffic Control																			
																				Y / Y Wader N / N RR Flagperson										Inspection									
																				N / N Inspector 50 N / N Police										Hours: 060									

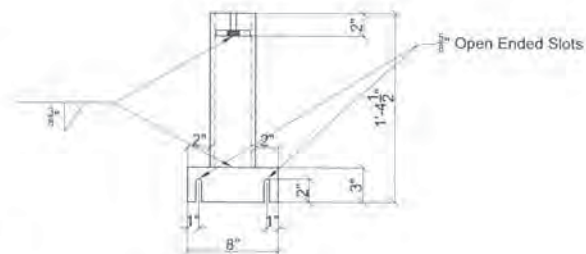


SCALE 1" = 10' OCT. 15, 1986



THOMAS E. NEVE ASSOCIATES, INC.  
ENGINEERS~SURVEYORS~LAND USE PLANNERS  
447 OLD BOSTON ROAD~ROUTE #1.  
TOPSFIELD, MASSACHUSETTS





BAYSIDE ENGINEERING, INC.  
600 UNION PARK DRIVE  
WOBURN, MA 01801

<input type="checkbox"/> APPROVED  <input type="checkbox"/> REJECTED  <input type="checkbox"/> SUBMIT SPECIFIED ITEM	<input checked="" type="checkbox"/> APPROVED AS NOTED  <input type="checkbox"/> REVISE AND RESUBMIT
--	---

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REVIEWED BY: John Kellech

5-18-2020

DATE:



(5) 1-1/2" Ø Threaded Rods 13" Long

Mark	Qty.	Description	Feet	Inches	Rmk's	Mark	Qty.	Description	Feet	Inches	Rmk's	Notes:	 <div>Shawmut Metal Products, Inc. 1914 G.A.R. Hwy P.O. Box 543 Swansea, Massachusetts 02777</div>					
C1	5	HSS4x4x3/8	1	4 1/2		5	1 1/8"Ø Threaded Rods w/ Nut & Washer	1	1			<b>Material:</b> Tubes A500 Gr. C - 50ksi Steel A392 50ksi Pipe Sch. 40 U.N. A53 All other steel A36 All bolts A325 U.N. E70XX electrodes						
A5	5	PL 1/2 Gusset				10	1/2"Ø Threaded Rods w/ Nut & Washer	0	7					<b>Project:</b> Lockwood Lane Bridge Parts				
A6	5	PL 1/2x3	0	9 1/2											<b>Drawn By:</b> T. Mitchell	<b>Checked By:</b> Job Number: 20-052	<b>Revisions</b>	<b>Drawing #</b> P1
C1a	5	PL 1/2x3	0	8														

For Approval: 05-06-2020



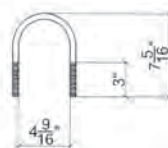
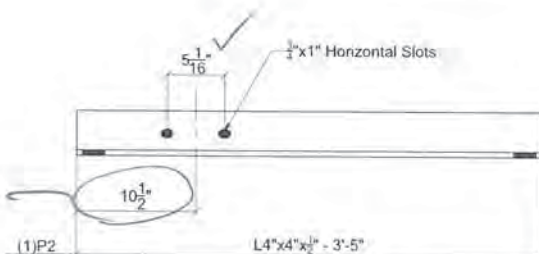
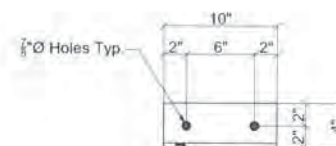
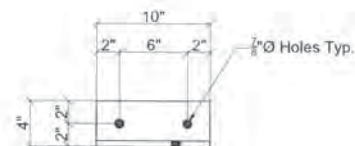
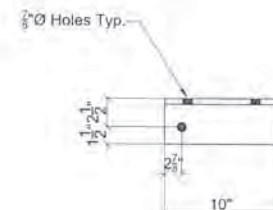
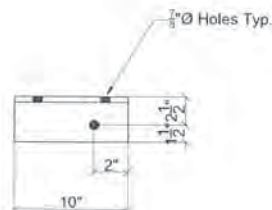
**Shawmut Metal Products, Inc.**  
1914 G.A.R. Hwy P.O. Box 543  
Swansea, Massachusetts 02777

Project: Lockwood Lane Bridge Parts

Drawn By: T. Mitchell	Checked By:	Job Number: 20-052	Revisions	Drawing #  P1
Paint: Galv.	Holes: 13/16"Ø U.N.	Date: 05-06-2020		



Hand-drawn diagram of a 3'5" x 2" plate. The plate is 3'5" long and 2" wide. It features two 1/8" x 2" slots at each end, positioned 1 1/2" from the ends. The distance between the centers of the slots is 20.5". There are also two 'X' marks on the plate, one on each side of the central slot area.



(4)  $\frac{1}{2}$ "  $\varnothing$  U Bolts as shown w/  $\frac{1}{2}$ "  $\varnothing$  nuts

BAYSIDE ENGINEERING, INC.  
800 UNION PARK DRIVE  
WOBLURN, MA 01801

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☐ REJECTED ☐ REVISE AND RESUBMIT

☐ SUBMIT SPECIFIED ITEM

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REVIEWED BY: *John Kellech*


DATE: 5-18-2020

(8) P3 - L4"x4"x $\frac{1}{2}$ " Clips - 10" Long

(8)P4 - L4"x4"x $\frac{1}{2}$ " Clips - 10" Long

For Approval: 05-06-2020

[illegible]

7/31/2020 Approved: 05-06-2020																	
Mark	Qty.	Description	Feet	Inches	Rmk's	Mark	Qty.	Description	Feet	Inches	Rmk's	Notes:	<div> Shawmut Metal Products, Inc. 1914 G.A.R. Hwy P.O. Box 543 Swansea, Massachusetts 02777</div>				
P1	12	PL3/8x2 1/2	12	3								<b>Material:</b>  Tubes A500 Gr. C - 50ksi Steel A992 50ksi Pipe Sch. 40 U.N. A53 All other steel A36 All bolts A325 U.N. E70XX electrodes	<b>Project:</b>  Lockwood Lane Bridge Parts				
													Drawn By:	Checked By:	Job Number:	Revisions	Drawing #
													T. Mitchell		20-052		P3
													Paint:	Holes:	Date:		
													Galv	13/16"Ø U.N.	05-06-2020		

BAYSIDE ENGINEERING, INC.  
600 UNICORN PARK DRIVE  
WOBURN, MA 01801

- ☐ APPROVED ☒ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

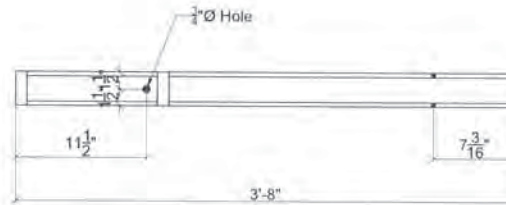
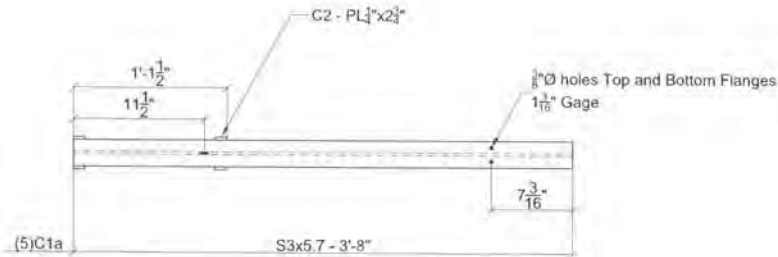
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REVIEWED BY:

*John Kelleh*

DATE:

5-18-2020



Wingwall Posts



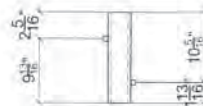
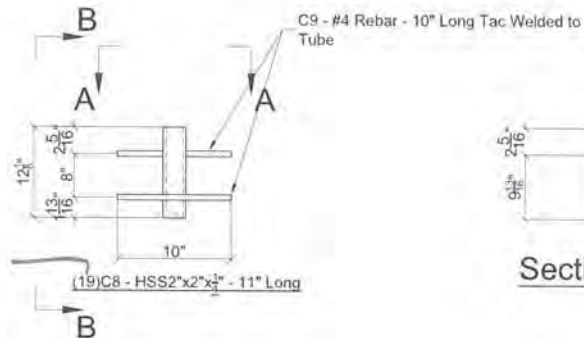
C2 - PL 1/4" x 1" - 2 3/4" Long

For Approval: 05-06-2020

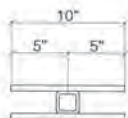
Mark	Qty.	Description	Feet	Inches	Rmk's	Mark	Qty.	Description	Feet	Inches	Rmk's	Notes:	Shawmut Metal Products, Inc. 1914 G.A.R. Hwy P.O. Box 543 Swansea, Massachusetts 02777				
C1a	5	S3x5.7	3	8								<div>Material:</div> <div>Tubes A500 Gr. C - 50ksi Steel A992 50ksi Pipe Sch. 40 U.N. A53 All other steel A36 All bolts A325 U.N. E70XX electrodes</div>	Project: Lockwood Lane Bridge Parts				
C2	20	PL 1/4x1	0	2 3/4													
													Drawn By: T. Mitchell	Checked By:	Job Number: 20-052	Revisions	Drawing #
												Paint: Galv	Holes: 13/16"Ø U.N.	Date: 05-06-2020			P4



2



Section B-B



Section A-A

BAYSIDE ENGINEERING, INC.  
800 UNICORN PARK DRIVE  
WOBURN, MA 01801

☐ APPROVED ☒ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

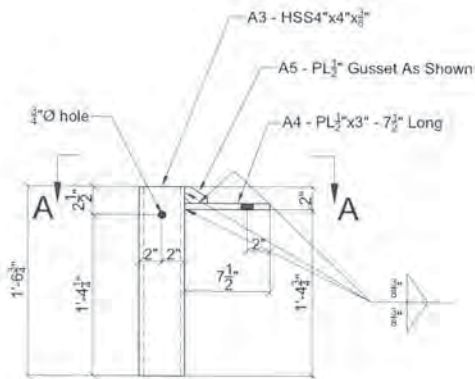
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REVIEWED BY: *John Kelleh*  
DATE: 5-18-2020

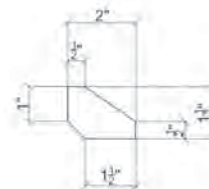
Adjust QTY's 14 C8  
28-C9

For Approval: 05-06-2020

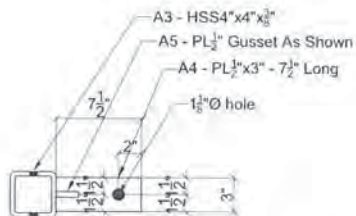
Mark	Qty.	Description	Feet	Inches	Rmk's	Mark	Qty.	Description	Feet	Inches	Rmk's	Notes:	Shawmut Metal Products, Inc. 1914 G.A.R. Hwy P.O. Box 543 Swansea, Massachusetts 02777				
C8	19	HSS2"x2"x1/4"	1	0 1/8		19	1"Ø Hex Bolt F436 GR. 1 Galv.	1	3 1/4			Material: Tubes A500 Gr. C - 50ksi Steel A992 50ksi Pipe Sch. 40 U.N. A53 All other steel A36 All bolts A325 U.N. E70XX electrodes	Project: Lockwood Lane Bridge Parts				
C9	38	#4 Rebar	0	10									Drawn By: T. Mitchell	Checked By:	Job Number: 20-052	Revisions	Drawing #
												Paint: Galv	Holes: 13/16"Ø U.N.	Date: 05-06-2020			P6



(15)A3 Post Mounting Bracket Assemblies



A5 - PL  $\frac{1}{2}$ " Gusset



Section A-A

AD1. QTY 14 EACH

BAYSIDE ENGINEERING, INC.  
600 UNICORN PARK DRIVE  
WOBURN, MA 01801

☐ APPROVED ☒ APPROVED AS NOTED  
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☐ SUBMIT SPECIFIED ITEM

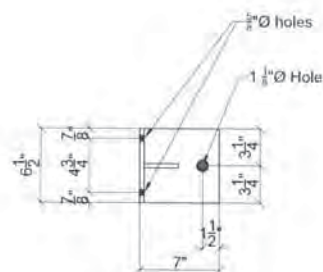
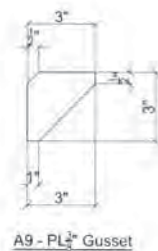
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REVIEWED BY: *John Kelleh*  
DATE: 5-18-2020

For Approval: 05-06-2020

Mark	Qty.	Description	Feet	Inches	Rmk's	Mark	Qty.	Description	Feet	Inches	Rmk's	Notes:	Shawmut Metal Products, Inc. 1914 G.A.R. Hwy P.O. Box 543 Swansea, Massachusetts 02777			
A3	15	HSS4x4x3/8	1	6 3/4									Project: Lockwood Lane Bridge Parts			
A4	15	PL 1/2x3	0	7 1/2												
A5	15	PL 1/2 Gusset											Material:			
													Tubes A500 Gr. C - 50ksi			
													Steel A992 50ksi			
													Pipe Sch. 40 U.N. A53			
													All other steel A36			
													All bolts A325 U.N.			
													E70XX electrodes			
													Paint:			
													Galv.			
													Holes:			
													13/16"Ø U.N.			
													Date:			
													05-06-2020			
													Revisions			
													Drawing #			
													P7			

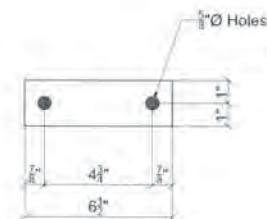




☐ APPROVED
 ☒ APPROVED AS NOTED  
☐ REJECTED
 ☐ REVISE AND RESUBMIT  
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REVIEWED BY: *John Kelleher*  
 DATE: 5-18-2020



A10 - PL<sub>2</sub><sup>14</sup> Retainer Bracket

ADJUST QTY 14 EACH

For Approval: 05-06-2020

Mark	Qty.	Description	Feet	Inches	Rmk's	Mark	Qty.	Description	Feet	Inches	Rmk's	Notes:	Shawmut Metal Products, Inc. 1914 G.A.R. Hwy P.O. Box 543 Swansea, Massachusetts 02777				
A8	15	L7x4x3/8	0	6 1/2								<b>Material:</b> Tubes A500 Gr. C - 50ksi Steel A992 50ksi Pipe Sch. 40 U.N. A53 All other steel A36 All bolts A325 U.N. E70XX electrodes	<b>Project:</b> Lockwood Lane Bridge Parts				
A9	15	PL3/8 Gusset											Drawn By <b>T. Mitchell</b>	Checked By _____	Job Number <b>20-052</b>	Revisions _____	Drawing # <b>P8</b>
A10	15	PL3/8x2	0	6 1/2									Paint Galv	Holes <b>13/16" Ø U.N.</b>	Date <b>05-06-2020</b>		

TOLERANCE TABLE	
DESCRIPTION	TOLERANCE (INCHES U.N.O.)
OVERALL HEIGHT	-0.000, +0.250
OVERALL PLAN DIMENSIONS	-0.000, +0.063
URETHANE DISC THICKNESS	-0.000, +0.063
URETHANE DISC PLAN DIMENSIONS ≤ 20"	-0.000, +0.125
URETHANE DISC PLAN DIMENSIONS > 20"	-0.000, +0.125
URETHANE DISC FLATNESS	0.002 X NOM. DIMENSION
STEEL PLATE THICKNESS	±0.063
STEEL PLATE PLAN DIMENSIONS ≤ 30"	±0.250
STEEL PLATE PLAN DIMENSIONS > 30"	±0.250
STEEL PLATE FLATNESS IN CONTACT WITH BEARING	0.001 X NOM. DIMENSION
STEEL PLATE FLATNESS: GROUT OR CONCRETE SIDE	0.005 X NOM. DIMENSION
STEEL PLATE FLATNESS: STEEL GIRDER SIDE	0.002 X NOM. DIMENSION
STEEL PLATE FLATNESS: STEEL PLATE SIDE	0.001 X NOM. DIMENSION
STEEL PLATE SURFACE FINISH IN CONTACT WITH BEARING	125 μ RMS
BEVEL SLOPE	±0.002 RAD
ANCHOR HOLE OR SLOT SIZE	±1/8
ANCHOR HOLE OR SLOT LOCATION	±1/8
GUIDE BAR CONTACT SURFACE: DIMENSION	-0.000, +0.125
GUIDE BAR CONTACT SURFACE: FLATNESS	0.001 X NOM. DIMENSION
GUIDE BAR CONTACT SURFACE: SURFACE FINISH	32 μ RMS
GUIDE BAR PARALLELISM	±0.005 RAD
DISTANCE BETWEEN GUIDE BARS	-0.000, +0.030
STAINLESS STEEL THICKNESS	-0.000, +0.063
STAINLESS STEEL PLAN DIMENSIONS	-0.000, +0.125
STAINLESS STEEL FLATNESS	0.001 X NOM. DIMENSION
STAINLESS STEEL SURFACE FINISH: SLIDING SURFACE	MIRROR FB
PTFE THICKNESS	-0.000, +0.063
PTFE PLAN DIMENSIONS	-0.000, +0.030
PTFE FLATNESS	0.001 X NOM. DIMENSION
SHEAR RESTRICTING ELEMENT DIMENSIONS	-0.000, +0.005
SHEAR RESTRICTING ELEMENT FLATNESS/OUT OF ROUND	0.001 X NOM. DIMENSION
SHEAR RESTRICTING ELEMENT SURFACE FINISH	32 μ RMS
OTHER MACHINED PARTS THICKNESS	-0.000, +0.063
OTHER MACHINED PARTS PLAN DIMENSIONS	-0.000, +0.063
OTHER MACHINED PARTS FLATNESS	0.002 X NOM. DIMENSION
OTHER MACHINED PARTS SURFACE FINISH	63 μ RMS

NOTE: SURFACE FINISH & FLATNESS TOLERANCES ARE PRIOR TO COATING.

#### GENERAL NOTES:

1. MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION, SECTION 14, AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS 3RD EDITION, SECTION 18, THE MASSACHUSETTS HIGHWAY CONTRACT PLANS, AND THE PROJECT SPECIAL PROVISIONS SHALL GOVERN.
2. PTFE SHALL BE VIRGIN, UNFILLED POLYTETRAFLUOROETHYLENE ON THE SLIDING SURFACE. RESIN FOR THE PTFE SHALL SATISFY THE REQUIREMENTS OF ASTM D4894.
3. PTFE IS TO BE PURCHASED ETCHED ON ONE SIDE FOR BONDING INTO MACHINED RECESS. STEEL MATING SURFACES OF PTFE SHALL BE GRIT BLASTED AND DEGREASED PRIOR TO APPLICATION OF ADHESIVE. ADHESIVE SHALL BE APPLIED USING DIRECTIONS SUPPLIED BY THE ADHESIVE MANUFACTURER. CORNERS OF THE PTFE SHALL BE FILLETED TO ACCOMMODATE THE RADIUS OF THE MACHINED RECESS.
4. THE POLYETHER URETHANE DISC SHALL MEET THE PHYSICAL PROPERTIES IN TABLE 18.3.2.8-1 OF THE AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATIONS (3RD EDITION, 2010) SUMMARIZED IN THE TABLE ON THIS SHEET. HARDNESS SHALL BE 62 ±3 DUROMETER, SHORE "D". INTERMEDIATE VALUES SHALL BE DETERMINED BY INTERPOLATION. EACH DISC SHALL BE MOLDED AS A SINGLE (MONOLITHIC) PIECE. THE TOP AND BOTTOM OF THE DISC SHALL BE ROUGHENED.
5. WELDING SHALL CONFORM TO THE MOST CURRENT VERSION OF ANSI/AASHTO/AWS-D1.5 BRIDGE WELDING CODE.
6. HOLES MUST BE DRILLED OR SUB-PUNCHED AND REAMED TO FULL SIZE.
7. ALL SHARP CORNERS OF STEEL MATERIALS SHALL BE REMOVED BY GRINDING OR SANDING.
8. HLNR "DISC" STYLE BEARING MANUFACTURING FACILITY AND REPRESENTATIVE FOR COORDINATING PRODUCTION:  
THE D.S. BROWN COMPANY  
300 EAST CHERRY STREET  
NORTH BALTIMORE, OHIO 45872  
CSR - ERIC JOHNSON - (419) 257-3561

#### MARKING NOTES:

1. EACH BEARING SHALL BE MARKED WITH THE MANUFACTURER'S NAME, PROJECT NUMBER, THE BEARING TYPE OR MODEL NUMBER, THE BEARING NUMBER, UPSTATION, AND THE INSTALLED LOCATION. CENTERLINES SHALL BE MARKED ON BOTH SOLE PLATE & MASONRY PLATE FOR ALIGNMENT IN THE FIELD. THE MARKING SHALL BE PERMANENT AND IN A LOCATION THAT WILL BE VISIBLE AFTER ERECTION OF THE STRUCTURE.
2. ALL BEARINGS SHALL HAVE MARKS PLACED ON THE VERTICAL EDGES OF THE SOLE PLATE AND MASONRY PLATES TO INDICATE THE CENTERLINE OF BEARING. EACH EXPANSION BEARING SHALL HAVE MARKS PLACED ON THE SIDE OF THE GUIDE BARS OR SOLE PLATE TO INDICATE THE CENTERLINE OF MOVEMENT. THE TOP OF THE MASONRY PLATE SHALL BE MARKED TO INDICATE THE LOCATION OF THE CENTERLINE OF MOVEMENT EXTENDED. THIS MARK SHALL BE FULL LENGTH ON THE MASONRY PLATE PRIOR TO ASSEMBLY. THESE MARKS CAN BE USED IN THE FIELD TO DETERMINE THE INITIAL OFFSET LOCATION OF THE SLIDE PLATE, IF APPLICABLE. THE MARKS SHALL BE MADE IN INDELEBIL INK AND SHALL BE VISIBLE AFTER BEARING INSTALLATION.

#### SAMPLING AND TESTING NOTES:

1. SAMPLING & TESTING SHALL BE IN ACCORDANCE WITH THE SPECIAL PROVISIONS & AASHTO LRFD BRIDGE CONSTRUCTION SPECIFICATION, SECTION 18.3.4.
2. THE MAXIMUM COEFFICIENT OF FRICTION SHALL BE 4% @ 68°F

#### CONTRACTOR NOTES:

1. DUE TO DESIGN DIFFERENCES THE OVERALL HEIGHTS OF THE BEARING BEING SUPPLIED DIFFER FROM THE HEIGHTS SHOWN IN THE CONTRACT PLANS. THESE DIFFERENCES ARE GIVEN IN THE DATA TABLE ON THE INDIVIDUAL BEARING DETAIL SHEETS. CONTRACTOR TO MODIFY PEDESTAL ELEVATIONS ACCORDINGLY.
2. THE LOCATIONS OF THE ANCHOR RODS SHALL BE CROSS-REFERENCED WITH SHOP DRAWINGS TO VERIFY THAT LOCATIONS HAVE NOT CHANGED FROM ORIGINAL CONTRACT PLANS.
3. WELDING PROCEDURES SHALL BE ESTABLISHED BY THE CONTRACTOR TO RESTRICT THE MAXIMUM TEMPERATURE REACHED BY BONDED PTFE SURFACES TO 300°F (149°C) AND 200°F (93°C) FOR SURFACES IN CONTACT WITH THE DISC. TEMPERATURES SHALL BE DETERMINED BY TEMPERATURE INDICATING WAX PENCILS OR OTHER SUITABLE MEANS. PROTECT THE DISC FROM ANY WELDING SPATTER, SPARK AND FLASH. WELD CURRENT SHALL NOT PASS THROUGH INTERIOR COMPONENTS OF THE BEARING.
4. THE EXPANSION BEARINGS WILL BE SHIPPED CENTERED AND IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO OFFSET THE SLIDE PLATES IN THE FIELD DURING INSTALLATION, IF APPLICABLE. THE CONTRACT DRAWINGS DID NOT INDICATE ANY INITIAL OFFSET VALUES, SO IF REQUIRED, THE OFFSETS WOULD BE PROVIDED TO THE CONTRACTOR BY THE BRIDGE DESIGNER.
5. CONTRACTOR SHALL ENSURE NO DAMAGE OCCURS TO ANY BEARING COMPONENT DURING SURFACE PREPARATION FOR ANY SUBSEQUENT PROTECTIVE COATING OPERATIONS. THE DISC AND ALL EXPOSED STAINLESS STEEL SHALL BE PROPERLY MAINTAINED. CARE SHALL BE EXERCISED BY THE CONTRACTOR TO PROTECT THE STAINLESS STEEL AND PTFE SLIDING SURFACES FROM DAMAGE AT ALL TIMES. THE PTFE SHALL BE PROTECTED FROM DIRECT EXPOSURE TO ULTRAVIOLET RAYS AT ALL TIMES.
6. BEARINGS ARE TO BE SHIPPED AS COMPLETE UNITS, STEEL Banded, AND SHALL BE WRAPPED TO PROTECT FROM MOISTURE AND DIRT DURING TRANSIT AND STORAGE. BEARINGS SHALL BE STORED IN A CLEAN, DRY, LEVEL UPRIGHT POSITION WHILE AT JOBSITE. BEARINGS SHALL BE LIFTED FROM THEIR UNDERSIDES ONLY.
7. AT NO TIME MAY THE BEARINGS BE DISASSEMBLED WITHOUT AUTHORIZATION FROM D.S. BROWN OR WITHOUT THE PRESENCE OF A D.S. BROWN REPRESENTATIVE.

PHYSICAL PROPERTY	ASTM TEST METHOD	REQUIREMENTS	
HARDNESS, TYPE "D" DUROMETER	D 2240	55	65
MINIMUM TENSILE STRESS, AT 100% ELONGATION	D 412	1.9	2.3
MINIMUM TENSILE STRESS, AT 200% ELONGATION		3.4	4.0
MINIMUM TENSILE STRENGTH, KSI	D 412	5.0	6.0
MINIMUM ULTIMATE ELONGATION, %	D 412	285	220
MAXIMUM COMPRESSION SET, 22 HR @ 158 °F, %	D 395	40	40

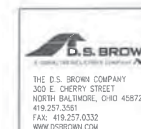
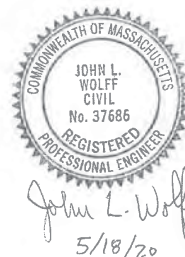
PLEASE NOTE THE FOLLOWING.  
-SOLE PLATES DO NOT REQUIRE A BEVEL.  
-BEARINGS ARE TO BE GALVANIZED.

BAYSIDE ENGINEERING, INC.  
800 LINCOLN PARK DRIVE  
WOBURN, MA 01801

☐ APPROVED ☒ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CORRECTIONS OR COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. APPROVAL OF AN ASSEMBLY OF WHICH THE ITEM IS AN COMPONENT. CONTRACTOR IS RESPONSIBLE FOR THE FABRICATION PROCESSES OF THE WORK. METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION, COORDINATION OF THE WORK OF ALL TRADES, AND FOR PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER.

REVIEWED BY: *John Keefe*  
DATE: 5-19-2020

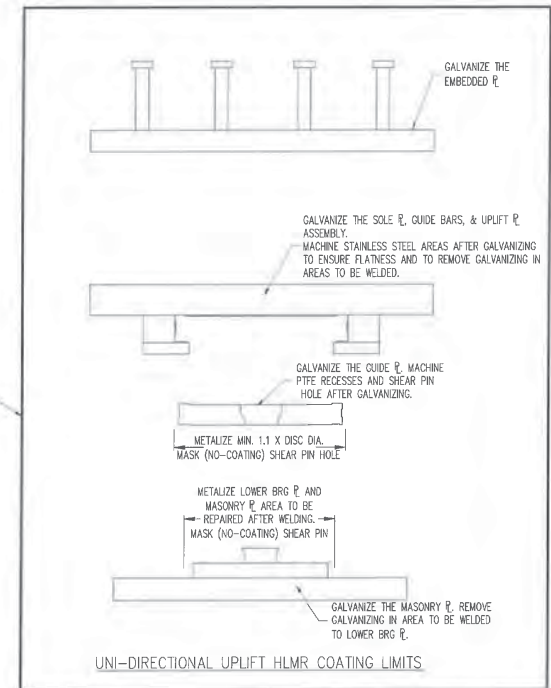


REV	DESCRIPTION	DATE	DET.	CHK.
	MASSACHUSETTS DOT BOXFORD			
	LOCATION — LOCKWOOD LANE OVER FISH BROOK		ITEM	QUANTITY
	BRIDGE NO. — B-19-013		—	—
	PROJECT FILE NO. —	B.I.N. — 81B	—	—
	—		—	—
	CUSTOMER — KENEFICK CONSTRUCTION	P.O. NO. —	—	—
	DESIGNER — BAYSIDE ENGINEERING		—	—
GENERAL NOTES & TOLERANCE TABLE				
ESSEX CO., MA				

PROJECT NUMBER	1059601	PROJECT DATE	11/14	REVISION	1	DATE	4/20	BY	GN1
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1. ALL EXTERNAL STEEL SPECIFIED AS GALVANIZED SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A123.
2. REPAIR ALL GALVANIZATION IN ACCORDANCE WITH ASTM A780. GALVANIZING REPAIR PAINTS CONTAINING ALUMINUM SHALL NOT BE USED ON SURFACES TO BE IN CONTACT WITH FRESH CONCRETE.
3. GALVANIZATION LIFTING DEVICES MAY BE WELDED TO PARTS IF NECESSARY. WHEN THEIR USE IS COMPLETE, REMOVE AND GRIND FLUSH ALL CONNECTION LOCATIONS. REPAIR GALVANIZE AREA PER ASTM A780.
4. ALL EXTERNAL STEEL SPECIFIED AS METALIZED SHALL BE BLAST CLEANED (SSPC-SP10) AND WELDED IN ACCORDANCE WITH AWS C2.18 TO 6 MILS MINIMUM. METALIZING WIRE SHALL BE 99.99% PURE ZINC.

PLEASE VERIFY  
BEARINGS ARE TO  
BE GALVANIZED.



John L. Wolf  
5/18/20

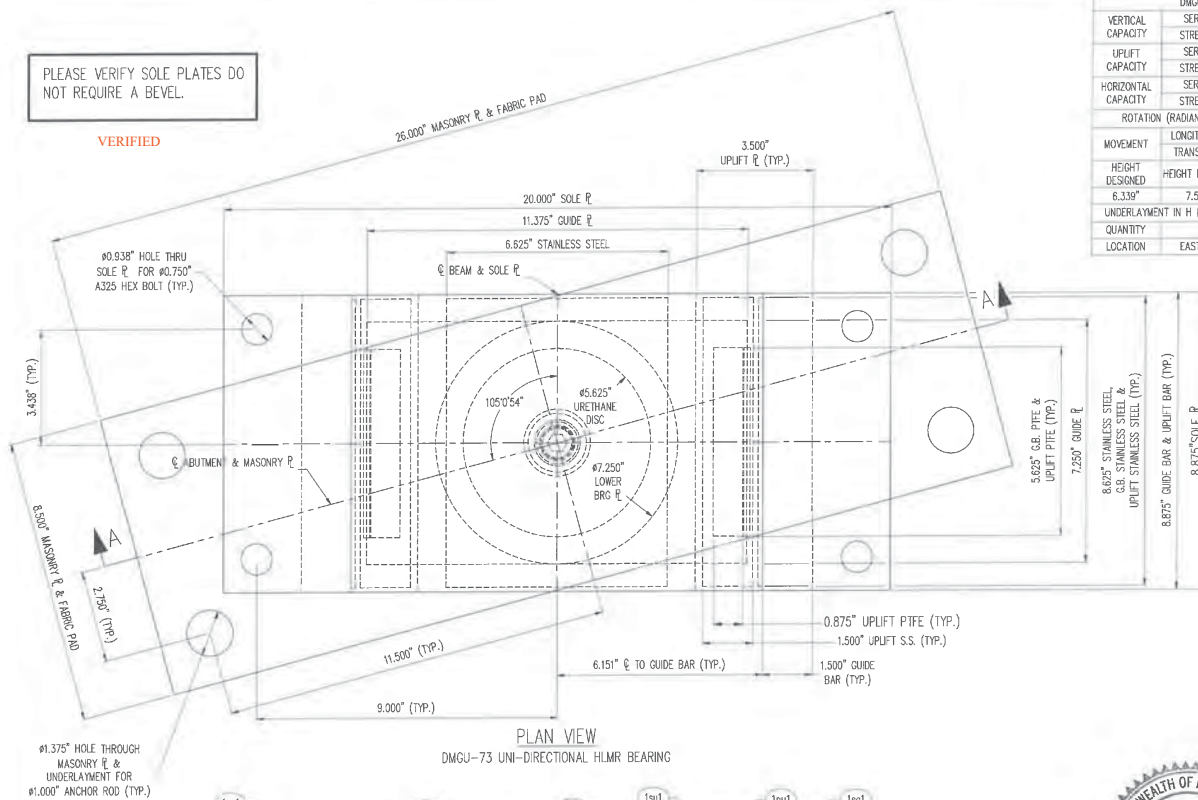
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PLEASE VERIFY SOLE PLATES DO NOT REQUIRE A BEVEL.

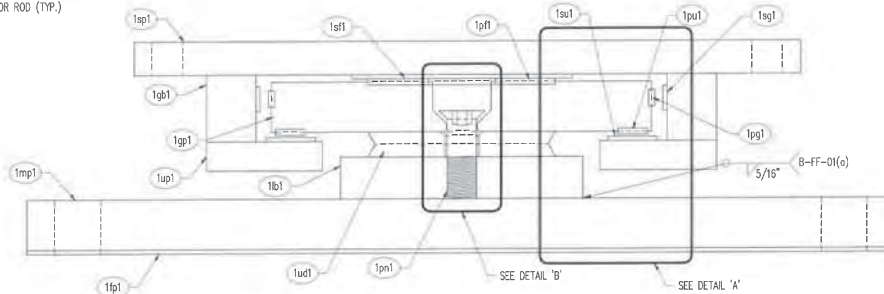
VERIFIED

DMGU-73		
VERTICAL CAPACITY	SERVICE	73 KIPS
UPLIFT	STRENGTH	97 KIPS
UPLIFT	SERVICE	19 KIPS
CAPACITY	STRENGTH	29 KIPS
HORIZONTAL CAPACITY	SERVICE	8 KIPS
	STRENGTH	11 KIPS
ROTATION (RADIAN)		0.02
MOVEMENT	LONGITUDINAL	1.00"
	TRANSVERSE	0
HEIGHT DESIGNED	HEIGHT IN PLANS	DIFFERENCE
6.339"	7.500"	-1.161"
UNDERLAYMENT IN H (Y/N)?		Y
QUANTITY		8
LOCATION		EAST & WEST ABUTMENT



PLAN VIEW  
DMGU-73 UNI-DIRECTIONAL HLMR BEARING

#1.375\"/>



SECTION 'A-A'  
GUIDE BARS SHOWN SQUARE FOR CLARITY

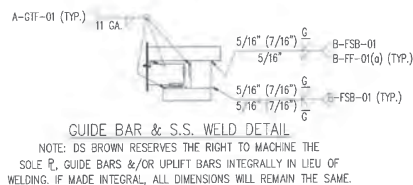
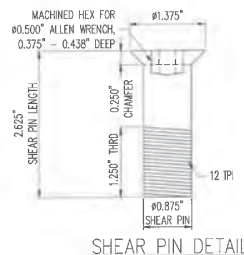
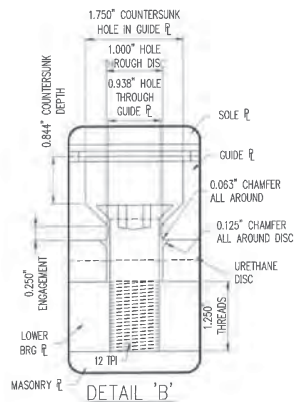
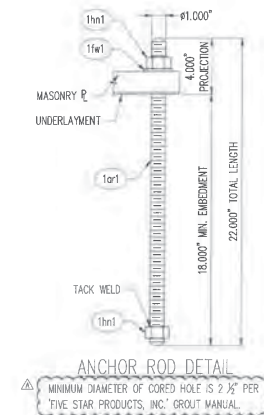
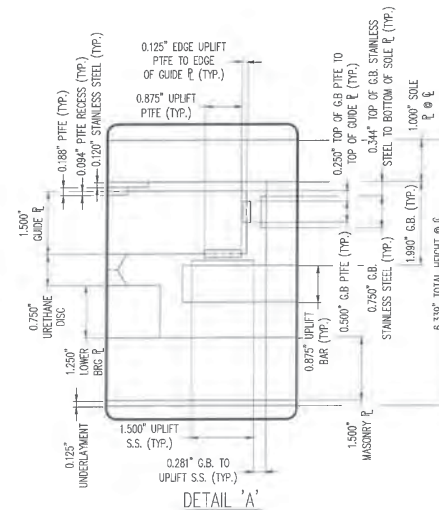
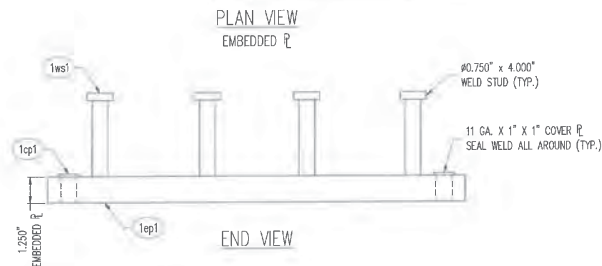
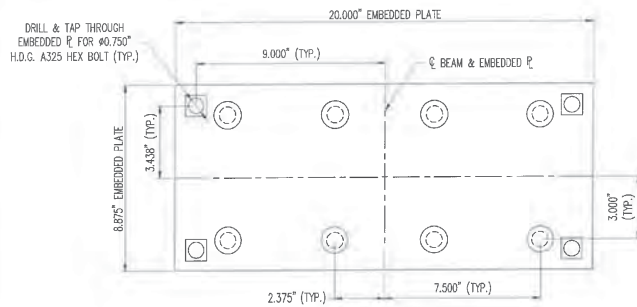


John L. Wolff  
5/18/20

MK	QTY	DESCRIPTION	MATERIAL	LENGTH	REMARKS	WT*	REV
1A	8	DMGU-73 UNI-DIRECTIONAL UPLIFT HLMR	*1059601-1114-A			231	
1qb1	16	1.500" X 1.590"	A709 GR. 36	8.875"	A123-HDG	8	
1qp1	8	1.500" X 11.375"	A709 GR. 36	7.250"	A123-HDG	35	
1qb1	8	1.250" X 0.875"	A709 GR. 36		A123-HDG	15	
1mp1	8	1.500" X 26.000"	A709 GR. 36	8.500"	A123-HDG	94	
1pfl	8	0.188" X 05.625"	PTFE		PURE VIRGIN UNFILLED; #2.000 HOLE		
1pg1	16	0.188" X 0.500"	PTFE	5.625"	15% GLASS FILLED	< 1	
1pn1	8	01.375"	AKS 4000 SERIES	2.625"	FY=55 KSI (MIN.); FU=115 KSI (MIN.); PLAIN	< 1	
1puf1	16	0.188" X 0.875"	PTFE	5.625"	15% GLASS FILLED	< 1	
1sf1	8	11 GA. X 0.625"	A240 T304, #8 & 29	8.625"	PLAIN	2	
1sq1	16	11 GA. X 0.750"	A240 T304, #8 & 29	8.625"	PLAIN	< 1	
1sp1	8	1.000" X 20.000"	A709 GR. 36	8.875"	A123-HDG	50	
1su1	16	11 GA. X 1.500"	A240 T304, #8 & 29	8.625"	PLAIN	< 1	
1ud1	8	0.750" X 05.625"	POLYETHER URETHANE		PLAIN	1	
1up1	16	0.875" X 3.500"	A709 GR. 36	8.875"	A123-HDG	8	
1B	8	UNDERLAYMENT	1059601-1114-A			< 1	
1fp1	8	0.125" X 25.000"	AASHTO (LRFD) 18.10.2	8.500"	HOLES	< 1	
1C	8	EMBEDDED PLATE	1059601-1114-A			67	
1cp1	32	11 GA. X 1.000"	A1011 GR. 36	1.000"	A780 COLD GALV. SPRAY	< 1	
1ep1	8	1.250" X 20.000"	A709 GR. 36	8.875"	A123-HDG	63	
1ws1	64	00.750" X 4.000"	A108		A123-HDG	< 1	
1HA	32	THREADED ROD	*1059601-1114-HA			108	
1ar1	32	022.000" X 1.000"	F1554 GR. 105		A153-HDG	108	
1HB	64	HEAVY HEX NUT	1059601-1114-HA			< 1	
1hn1	64	01.000" HEX NUT	A563-DH GR A194-2H HEAVY HEX		A153-HDG, DRY LUBE & DYE	< 1	
1HC	32	FLAT WASHER	1059601-1114-HA			< 1	
1fw1	32	01.000" FLAT WASHER	F436		A153-HDG	< 1	
1HD	32	HEX HEAD BOLT	1059601-1114-A			< 1	
1hb1	32	00.750" X 2.250"	A325		A153-HDG	< 1	
1HF	32	LOCK WASHER	1059601-1114-A			< 1	
1lw1	32	00.750" X 2.250"	WASHER		A153-HDG	< 1	
		*Approx. Gross Wt. Lbs Per Single Unit			5/1/2020 12:24:10 PM		

SEE SHT. G01 FOR GENERAL NOTES.  
SEE SHT. G02 FOR COATING NOTES.  
SEE SHT. G02 FOR EMBEDDED P & SUB-ASSEMBLY DETAILS.  
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED

REV	DESCRIPTION	DATE	DET.	CRD.
	MASSACHUSETTS DOT BOXFORD			
	LOCATION — LOCKWOOD LANE OVER FISH BROOK			
	BRIDGE NO. — B-19-013			
	PROJECT FILE NO. —			
	CUSTOMER — KENEFICK CONSTRUCTION			
	DESIGNER — BAYSIDE ENGINEERING			
	P.O. NO. —			
	DMGU-73 HLMR BEARING DETAILS			
	ESSEX CO., MA			
	ITEM			
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John L. Wolff  
5/18/20

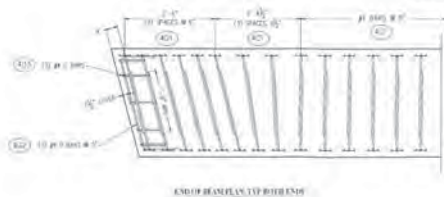
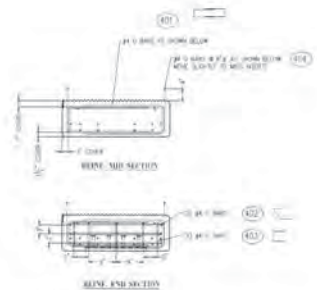
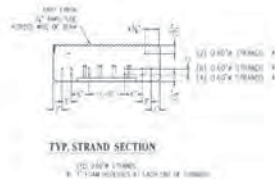
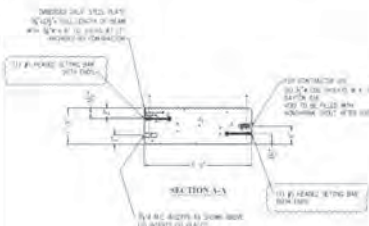
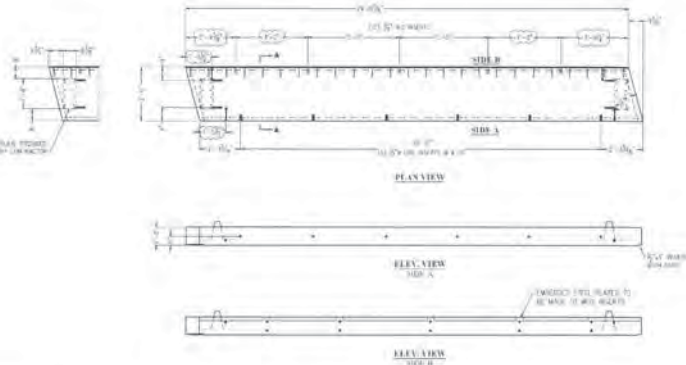
SEE SHT. G01 FOR GENERAL NOTES.  
SEE SHT. G02 FOR COATING NOTES.  
SEE SHT. 01 FOR DMGU-73 ASSEMBLY DETAILS.  
ALL DIMENSIONS IN INCHES UNLESS OTHERWISE NOTED



REVISION		DATE	DET	CHKD
A	ADDED NOTE ABOUT MIN. CORED HOLE SIZE FOR ANCHOR ROD	05.15.2020	DSB	KTG
MASSACHUSETTS DOT				
BOXFORD		ITEM	QUANTITY	
LOCATION — LOCKWOOD LANE OVER FISH BROOK		—	—	
BRIDGE NO. — B-19-013		—	—	
PROJECT FILE NO. —		—	—	
CUSTOMER — KENEFICK CONSTRUCTION		P.O. NO. —	—	
DESIGNER — BAYSIDE ENGINEERING		—	—	
EMBEDDED PLATE & SUB-ASSEMBLY DETAILS		DATE	4/20	—
ESSEX CO., MA		1059601	1114	02





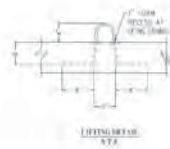


BAYSIDE ENGINEERING, INC.  
600 UNICORN PARK DRIVE  
WOBURN, MA 01801

☐ APPROVED ☒ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

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REVIEWED BY: *John Kelleh*  
DATE: 5-29-2020

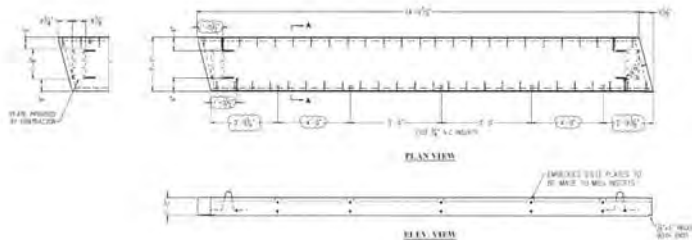


INSPECTION TO BE PERFORMED BY ENGINEER OF RECORD FOR TOWN OF BOSTON, MA, OR DESIGNATED REPRESENTATIVE, CONTACT AT LEAST SEVEN (7) DAYS PRIOR TO THE SCHEDULED START OF FABRICATION.

ITEM	QTY	UNIT	DESCRIPTION	REMARKS
1	101	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
2	102	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
3	103	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
4	104	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
5	105	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
6	106	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
7	107	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
8	108	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
9	109	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
10	110	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
11	111	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
12	112	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
13	113	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
14	114	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
15	115	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
16	116	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
17	117	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
18	118	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
19	119	sq ft	FORMWORK - 10' x 10' PANELS	10 EA
20	120	sq ft	FORMWORK - 10' x 10' PANELS	10 EA

PRESTRESS CONCRETE BRIDGE LAYOUT		PROJECT DATA	
OWNER	GENESEE CORP.	DATE	5/29/2020
DESIGNER	GENESEE CORP.	PROJECT NO.	100-100-100
CONTRACTOR	GENESEE CORP.	CONTRACT NO.	100-100-100
INSPECTOR	GENESEE CORP.	INSPECTOR NO.	100-100-100

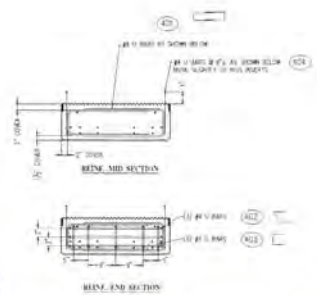
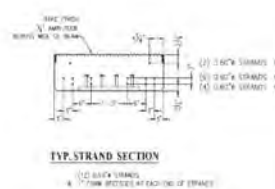
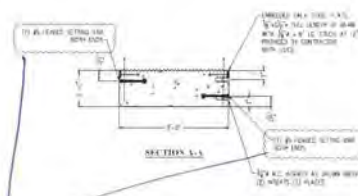
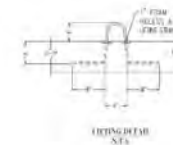
EPOXY COATED REINFORCING



☐ APPROVED ☒ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

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REVIEWED BY: *John Kelleh*  
 DATE: 5-29-2020



BAY 2 ← WE WANT DOWEL ON TOP (BAY 1)  
 BAY 1 OPPOSITE HAND OF WHAT IS SHOWN.



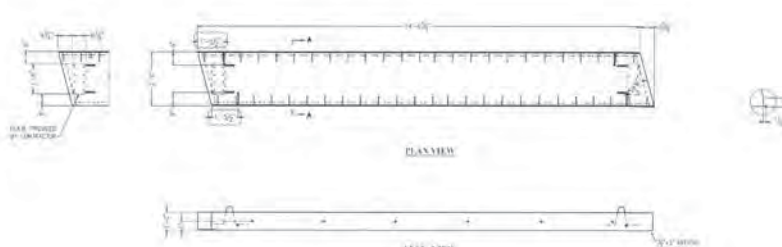
INSPECTION TO BE PERFORMED BY ENGINEER OF RECORD FOR TOWN OF BEDFORD, MA, OR DESIGNATED REPRESENTATIVE. CONTACT AT LEAST SEVEN (7) DAYS PRIOR TO THE SCHEDULED START OF FABRICATION.

ITEM	QTY	DESCRIPTION	UNIT
1	400	40# BENT BAR - SPOT LOCATED	TO LA
2	400	40# BENT BAR - SPOT LOCATED	TO LA
3	400	40# BENT BAR - SPOT LOCATED	TO LA
4	400	40# BENT BAR - SPOT LOCATED	TO LA
5	400	40# BENT BAR - SPOT LOCATED	TO LA
6	400	40# BENT BAR - SPOT LOCATED	TO LA
7	400	40# BENT BAR - SPOT LOCATED	TO LA
8	400	40# BENT BAR - SPOT LOCATED	TO LA
9	400	40# BENT BAR - SPOT LOCATED	TO LA
10	400	40# BENT BAR - SPOT LOCATED	TO LA
11	400	40# BENT BAR - SPOT LOCATED	TO LA
12	400	40# BENT BAR - SPOT LOCATED	TO LA
13	400	40# BENT BAR - SPOT LOCATED	TO LA
14	400	40# BENT BAR - SPOT LOCATED	TO LA
15	400	40# BENT BAR - SPOT LOCATED	TO LA
16	400	40# BENT BAR - SPOT LOCATED	TO LA
17	400	40# BENT BAR - SPOT LOCATED	TO LA
18	400	40# BENT BAR - SPOT LOCATED	TO LA
19	400	40# BENT BAR - SPOT LOCATED	TO LA
20	400	40# BENT BAR - SPOT LOCATED	TO LA

EPOXY COATED REINFORCING

UNITED CONCRETE PRODUCTS, INC.  
 1000 MAIN STREET  
 BEDFORD, MA 01730  
 TEL: (508) 864-2111  
 FAX: (508) 864-2112

PRESTRESS CONCRETE BRIDGE LAYOUT		PROJECT NUMBER	
DESIGNER	UNIVERSITY OF MASSACHUSETTS	DATE	5-29-2020
CONTRACT	BRIDGE REPLACEMENT	BY	UNIVERSITY OF MASSACHUSETTS
LOCATION	BRIDGEWAY	DATE	5-29-2020
BRIDGE NO.	10-1000-10	DATE	5-29-2020

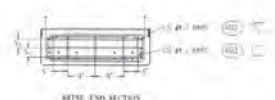
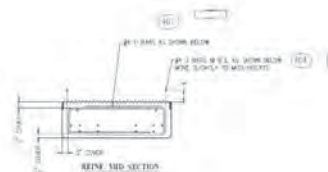
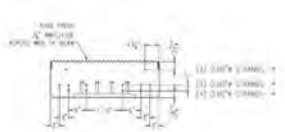
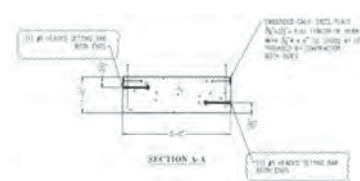
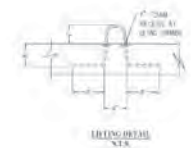


BAYSIDE ENGINEERING, INC.  
 800 UNICORN PARK DRIVE  
 WILMINGTON, MA 01897

☐ APPROVED    ☒ APPROVED AS NOTED  
☐ REJECTED    ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

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REVIEWED BY: *John Kelleher*  
 DATE: 5-29-2020



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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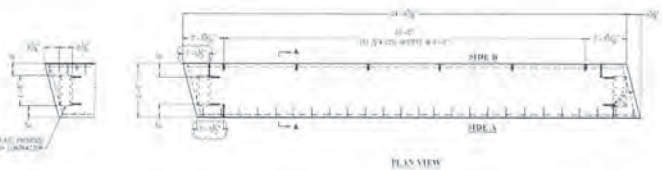
INSPECTION TO BE PERFORMED BY ENGINEER OF RECORD FOR TOWN OF BOYFORD, MA. OR DESIGNATED REPRESENTATIVE. CONTACT AT LEAST SEVEN (7) DAYS PRIOR TO THE SCHEDULED START OF FABRICATION.

ITEM	MARK	DESCRIPTION	QTY
1	BAR	#1 REIN BAR - 10'0" LONG	10 EA
2	BAR	#1 REIN BAR - 10'0" LONG	10 EA
3	BAR	#1 REIN BAR - 10'0" LONG	10 EA
4	BAR	#1 REIN BAR - 10'0" LONG	10 EA
5	BAR	#1 REIN BAR - 10'0" LONG	10 EA
6	BAR	#1 REIN BAR - 10'0" LONG	10 EA
7	BAR	#1 REIN BAR - 10'0" LONG	10 EA
8	BAR	#1 REIN BAR - 10'0" LONG	10 EA
9	BAR	#1 REIN BAR - 10'0" LONG	10 EA
10	BAR	#1 REIN BAR - 10'0" LONG	10 EA
11	BAR	#1 REIN BAR - 10'0" LONG	10 EA
12	BAR	#1 REIN BAR - 10'0" LONG	10 EA
13	BAR	#1 REIN BAR - 10'0" LONG	10 EA
14	BAR	#1 REIN BAR - 10'0" LONG	10 EA
15	BAR	#1 REIN BAR - 10'0" LONG	10 EA
16	BAR	#1 REIN BAR - 10'0" LONG	10 EA
17	BAR	#1 REIN BAR - 10'0" LONG	10 EA
18	BAR	#1 REIN BAR - 10'0" LONG	10 EA
19	BAR	#1 REIN BAR - 10'0" LONG	10 EA
20	BAR	#1 REIN BAR - 10'0" LONG	10 EA

EPOXY COATED REINFORCING

PREPARED CONCRETE BRIDGE LAYOUT		PROJECT #888	
CONTRACT	CONTRACT #	DATE	DATE
DESIGN	DESIGNER	DATE	DATE
CHECKED	CHECKER	DATE	DATE
APPROVED	APPROVER	DATE	DATE





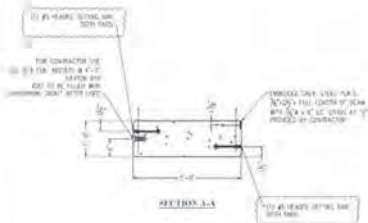
PLAN VIEW



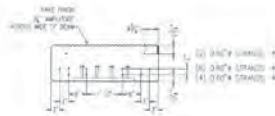
ELEV. VIEW



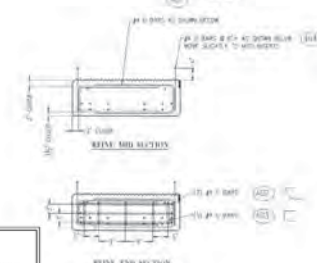
ELEV. VIEW



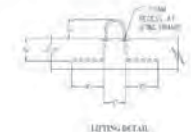
SECTION A-A



TYP. STRAND SECTION



REIN. DETAIL



REIN. DETAIL

INSPECTION TO BE PERFORMED BY ENGINEER OF RECORD FOR TOWN OF BOSTON, MA. ON DESIGNATED REPRESENTATIVE. CONTACT AT LEAST SEVEN (7) DAYS PRIOR TO THE SCHEDULED START OF FABRICATION.

ITEM	QUANTITY	UNIT	PRICE	TOTAL
1. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
2. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
3. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
4. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
5. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
6. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
7. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
8. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
9. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
10. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
11. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
12. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
13. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
14. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
15. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
16. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
17. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
18. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
19. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00
20. 1/2" DIA. EPOXY COATED REINFORCING BARS	1,200.00	LB	0.15	180.00

☐ APPROVED  
☐ REJECTED  
☐ SUBMIT SPECIFIED ITEM

☒ APPROVED AS NOTED  
☐ REVISE AND RESUBMIT

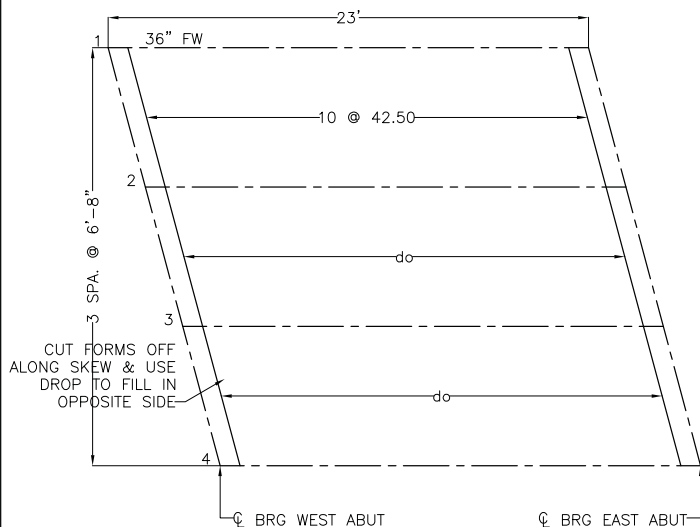
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REVIEWED BY: *John Kelleh*  
 DATE: 5-29-2020

EPOXY COATED REINFORCING

UNITED CONCRETE PRODUCTS, INC.  
 1000 W. 10TH STREET  
 MINNEAPOLIS, MN 55408  
 TEL: 612-338-4444  
 FAX: 612-338-4444

PROJECT INFORMATION	
PROJECT NAME	REINFORCING
PROJECT NUMBER	1000
PROJECT LOCATION	MINNEAPOLIS, MN
PROJECT DATE	5-29-2020

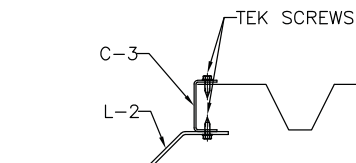


Bill of Materials				
Mark	Qty	Actual Length	Design Length	Description G-165 Material
42.50	30	42.50"	42.00"	.030" Non Galv Thickness
				2" Deep, 6" Pitch
				30" Coverage, Closed Ends
				$I = .296 \text{ in}^4$ $S = .267 \text{ in}^3$
				Form Weight = 2.07 psf

Accessories				
Mark	Qty	Length	Description	Part
C-3	4	10'-0"	.030" 0.875" x 2.125" x 0.875"	Channel Closure
L-1	13	12'-0"	12 Gauge 2" x 3"	90° Brg Angle
L-2	4	10'-0"	14 Gauge 2" x 2"	135° End
-----	500	-----	12 - 14 x 3/4" HWH Tek's/3	Form Screws

#### GENERAL NOTES:

- PERFORM FIELD CUTTING OF FORMS, SUPPORTS, AND CLOSURES, USING SAWS, SHEARS, OR OTHER ACCEPTABLE METHODS. DO NOT CUT BY BURNING.
- ALL MATERIAL SUPPLIED FOR STAY IN PLACE METAL FORMS CONFORM TO ASTM SPECIFICATION A-653 (GRADES SHOWN IN CALCULATIONS) HAVING A COATING DESIGNATION OF G-165 ACCORDING TO SPECIFICATION A-924.
- ALL STAY IN PLACE METAL FORMS ARE TO BE ATTACHED FROM THE TOPSIDE.
- ALL STAY IN PLACE METAL FORMS SHALL HAVE A MINIMUM BEARING OF (1") AT EACH END AND BE CENTERED IN THE BAY.
- CALCIUM CHLORIDE (OR ANY ADMIXTURE CONTAINING CHLORIDE SALTS) IS NOT TO BE USED IN THE CONCRETE PLACED ON THE STAY IN PLACE METAL FORMS.
- VERTICAL ADJUSTMENT OF SUPPORT ANGLES SHALL BE DETERMINED IN THE FIELD TO MAINTAIN THE REQUIRED SLAB THICKNESS AND ROADWAY SLOPE.
- CONCRETE IS NOT TO BE DROPPED FROM A HEIGHT GREATER THAN 10" ABOVE THE TOP OF THE STAY IN PLACE METAL FORMS.
- NO HAUNCH OR BUILD-UP IS PROVIDED. CONTRACTOR IS TO VERIFY BEARING ANGLE SIZES. SIP IS NOT RESPONSIBLE.
- ALL DIMENSIONS ON THE PLACING PLAN MUST BE VERIFIED BY THE CONTRACTOR.
- CONTRACTOR IS TO USE ALL DROP, SUCH AS, BEARING ANGLE, END ANGLES AND CLOSURES.
- EACH FORM SHEET MUST BE FASTENED IMMEDIATELY UPON PLACEMENT TO AVOID HAZARD THAT CAN RESULT FROM LATERAL MOVEMENT OR SUDDEN UPLIFT. FORMS ARE BUNDLED LONGEST LENGTH TO SHORTEST LENGTH AND MAY NOT BE IN ORDER OF FORM PLACING LAYOUT.
- ALL ADDITIONAL SERVICES PROVIDED BY S.I.P. INC. ARE TO BE CONSIDERED ESTIMATES, BASED ON THE REQUIREMENTS, AS ADVISED. ALL ADDITIONAL SERVICES MUST BE APPROVED BY THE CONTRACTOR AND THE OWNER, NO EXCEPTIONS.



NOTE:  
ALL ACCESSORIES ARE INTENDED FOR CLOSURE AND ALIGNMENT ONLY AND ARE NOT SELF-SUPPORTING. SUPPORT, IF NEEDED, BY OTHERS.

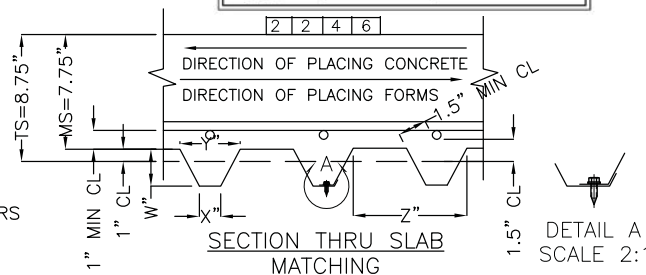
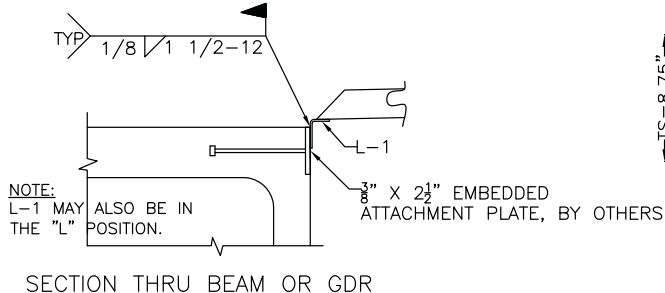
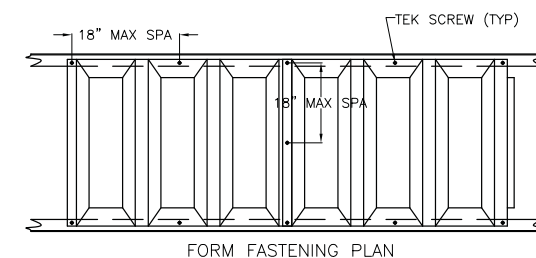
#### SECTION THRU CONCRETE DIAPHRAGM @ ABUTMENTS

BAYSIDE ENGINEERING, INC.  
600 UNICORN PARK DRIVE  
WOBBURN, MA 01801

☒ APPROVED ☐ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

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REVIEWED BY: *John Kelleh*  
DATE: **4-29-2020**



<b>KENEFICK CORP.</b> OWNER: THE STATE OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION DRAWN BY: REID GLADDEN		<b>S.I.P. Incorporated of Delaware</b> Stay In Place Metal Bridge-Decking Systems	
APPR: JASON YANCEY DATE: 3/9/2020 COMPANY CONTACT INFORMATION: S.I.P. INC. OF DELAWARE P.O. BOX 4347 2204 CHESTNUT STREET GADSDEN, AL 35904 PHONE (256) 546-5858 FAX (256) 546-5859	LOCATION AND DESCRIPTION: BRIDGE B-19-013 (81B) LOCKWOOD LANE OVER FISH BROOK BOXFORD COUNTY, MA		
DWG NO: 5347	PROJECT NO: NOT GIVEN		
SCALE: NOT NOTED	SHEET 1 OF 1	SIZE B	

# S.I.P. Incorporated of Delaware

Stay In Place Metal Bridge-Decking Systems

Work Order #

5347

P.O. Box 4347 - 2204 Chestnut Street Gadsden, AL 35904 Phone: (256) 546-5858 Fax: (256) 546-5859

## Calculation and Design Cover Sheet

Date 4/7/20

Page 1

Customer Name Kenefick Corp

Project Not Given

Bridge or Structure B-19-013 (81B)

Project Description Lockwood Lane Over Fish Brook  
Boxford County, MA

### PLEASE READ INFORMATION BELOW FOR TERMS OF DESIGN PACKAGE

All calculations and engineering drawings provided are for the intended party listed above. If you have received this package in error please inform the sender and delete any and all copies received.

All engineering calculations and drawings are to be approved prior to manufacturing.

S.I.P. of Delaware would like to thank you for your business and hopes you will re-use our services on your future projects.

If you have any questions please contact S.I.P. of Delaware. The engineering/ detailing department is open Monday through Thursday 7:30 AM to 4:30 PM and 7:30 AM to 1:30 PM on Fridays.

Very truly yours,

*Jason Yancey*

Direct (256) 312-8401





**S.I.P. Incorporated of Delaware - 2204 Chestnut Street Gadsden, AL 35904**

<b>Customer</b>	Kenefick Corp	<b>Sectional Properties</b>				
<b>Work Order</b>	5347	<b>Profile</b>	<b>Galv. Th.</b>	<b>Design Th.</b>	<b>Inertia-in<sup>4</sup></b>	<b>Stress-in<sup>3</sup></b>
<b>State</b>	MA	2 x 6	.0330"	.0300"	0.296	0.267
<b>Date</b>	7-Apr-20					
<b>Page</b>	2					

Coverage 30.00"

**Design Conditions**

*G165 Metal Deck Form*

Slab Thickness 8.19"

With Parabolic Crown

Flute Extra Con. 1.000" Con. Wt. 150 pcf

Additional Wt. 0 psf

Deadload W1 116.945 psf Minimum Deadload 120 psf

Construction Load 50 psf Actual Deadload 116.945 psf

W1 + CL = W2 166.945 psf

Δ Allowed .50" Max  $L(12)/180 = .233"$

Center to Center 80.00"

Flange Width (-) 36.00"

Support Len. (-) 1.50"

**Metal Deck Form Calculations**

Form Length 42.50" (-2) Design Span L 42.00" 3.5000' Open Space 3.6500'

Inertia Required  $(5/384)(W1)L^4/(E=29,000,000)(\Delta \text{ Allowed})$  0.0599 in<sup>4</sup>

Grade F  $f_s = 0.725$   $f_y = 50$  ksi  $f_a = 36000$  psi

Stress Required  $W2(L^2)/8 = m$  255.635 lbf-ft  $m(12)/f_a$  0.0852 in<sup>3</sup>

**Support Angle Calculations**

Support Angle Gauge 12 Thickness of Metal .1003"

Grade D  $f_s = 0.725$   $f_y = 40$  ksi  $f_a = 29000$  psi

Support Reaction  $W2 \times \text{Open Space}/2$  304.67 plf

Open Space is Calculated as  $((\text{Center to Center-Flange Width}) - \text{Thickness of Support Angle} \times 2)/12$

Bending Moment 274.112 in-lbf/ft  $S = 0.02012$  in<sup>3</sup>/ft  $S \times f_a$  583.49 in-lbf/ft

Therefore, 583.49 in-lbf/ft > 274.112 in-lbf/ft (Actual)

Support Stress 13623.74 psi 13.6237 ksi

**Weld Calculations**

Weld Conditions Weld Size .1250" Spacing 12" Length 1.50"

$T_w = 0.08838$  5965.31 Ultimate

$f_s = 2.65$  2251.06 lb/weld

Distributed Load = Support Reaction \* Weld Spacing / 12" 304.67 lb/weld

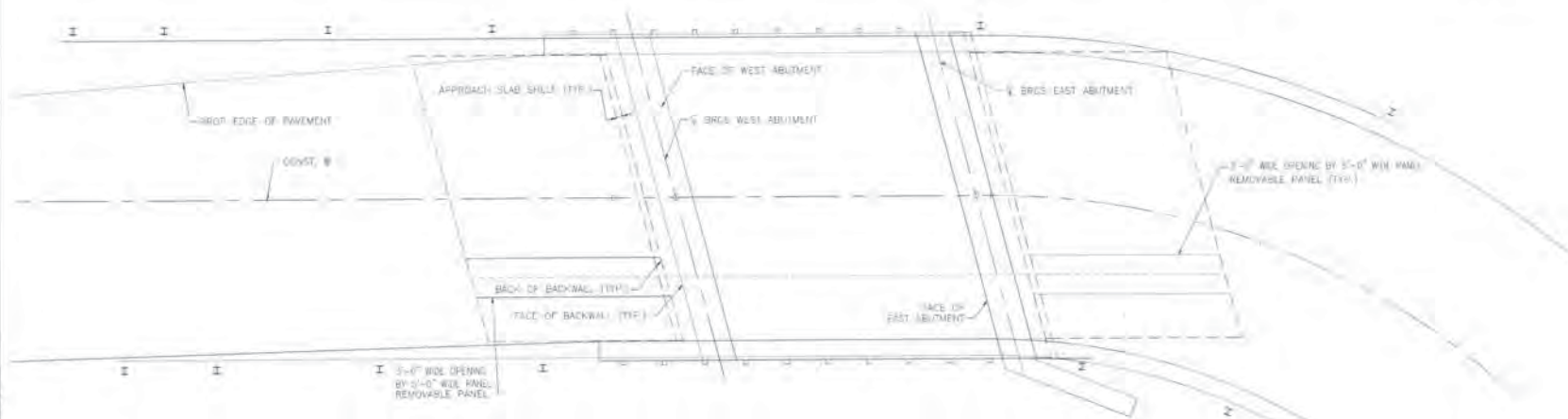
Please be advised that the section properties, listed above, have been calculated in accordance with the latest edition of the American Iron and Steel Institute's "Specification for the Design of Cold Formed Steel Structural Members".



# NOTICE

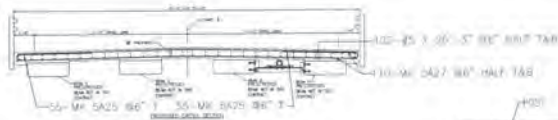
SHORTAGES, IMPROPER FABRICATION OR CLAIMS FOR ANY OTHER REASON MUST BE REPORTED TO THIS COMPANY WITHIN 10 DAYS FROM ORIGINAL DELIVERY. THIS COMPANY ALSO RESERVES THE RIGHT TO FIELD INSPECT MATERIALS PRIOR TO REPLACEMENT OR RECONDITIONING OF MATERIALS AND WILL NOT BE LIABLE FOR CHARGES FROM WORK DONE IN THE FIELD WITHOUT PRIOR AUTHORIZATION FROM THIS COMPANY.

REINFORCING STEEL PLACING DRAWING ONLY USE IN CONJUNCTION WITH CONTRACT DRAWINGS & SPECIFICATIONS. ELEVATIONS & DIMENSIONS SHOWN ON DRAWING ARE FOR DETAILING PURPOSES ONLY AND SHOULD NOT BE USED FOR CONSTRUCTION UNLESS VERIFIED BY ENGINEER OR CONTRACTOR.

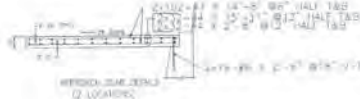


## DECK PLAN

BAR SUPPORTS (SPACING 8'-0\"/>



ADDITIONALS AT POSTS  
(18 LOCATIONS)



MM 4A19-TYPE 192  
TOTAL LENGTH 8'-6\"/>

BAVISE ENGINEERING, INC.  
600 UNICORN PARK DRIVE  
WOBURN, MA 01801

☐ APPROVED ☒ APPROVED AS NOTED  
☐ REJECTED ☐ REVISE AND RESUBMIT  
☐ SUBMIT SPECIFIED ITEM

THIS REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. CORRECTIONS OR COMMENTS MADE ON THE SHOP DRAWINGS DURING THIS REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. APPROVAL OF SPECIFIC ITEM SHALL NOT INCLUDE APPROVAL OF AN ASSUMED OF WHICH THE ITEM IS AN COMPONENT. CONTRACTOR IS RESPONSIBLE FOR DIMENSIONS TO BE CONFIRMED AND CORRELATED AT THE JOBSITE. INFORMATION THAT PERTAINS SOLELY TO THE FABRICATION PROCESSES OR TO THE MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES OF CONSTRUCTION, COORDINATION OF THE WORK OF ALL TRADES, AND FOR PERFORMING ALL WORK IN A SAFE AND SATISFACTORY MANNER.

REVIEWED BY: *John Keech*  
DATE: **4-1-2020**

## EPOXY REBAR GRADE 60E ASTM A-751 SPICES USED

TOP BARS	OTHER BARS	ABBREVIATIONS	BAR MARK SIZE EQUIVALENT
#4 .35"	#4 .35"	ADOL = Additional	#3 #13
#3 .44"	#5 .31"	B.O.W. = Bottom of wall	#4 #13
#6 .50"	#6 .50"	C.B. = Center Bars	#5 #16
#7 .58"	#7 .58"	D.O. = Outer Girding	#6 #19
		D.O.L. = Diagonal	#7 #22
		E.S. = Each Side	#8 #25
		E.S. = Each Side	#9 #29
		F.T. = Facing	#10 #32
		F.T. = Facing	#11 #36
		I.F. = Inside Face	
		I.F. = Inside Face	
		L.W. = Long Way	
		L.W. = Long Way	
		O.P. = Outside Face	
		O.P. = Outside Face	
		S.W. = Short Way	
		T.B. = Top & Bottom	
		T.B. = Top of Deck	
		T.B. = Transverse	
		V. = Vertical	

A/E/C  
PLEASE VERIFY ALL CLOUDED ITEMS.  
IT WILL BE UNDERSTOOD THAT ALL CLOUDED ITEMS RETURNED FROM APPROVAL WITHOUT A SPECIFIC ANSWER OR CONFORMED WILL BE CORRECT AS SUBMITTED

WORK THIS DRAWING WITH DRAWING # R1 TO R3 FOR BENDING DETAILS SEE DRAWING # R3  
REINFORCING BARS A615-GRADE 60  
REF. DRAWINGS: SHEET 5 OF 15 DATED NOT DATED  
8-18-015 (R18)

**HDSUPPLY**  
CONSTRUCTION & INDUSTRIAL  
HARMAC WHITE CAP

183 Cornshop Road  
Fryeburg, ME 04027  
Tel. 800-294-4702

301 Hartin Street  
Sayreville, NJ 03301  
Tel. 732-451-7822

**LOCKWOOD LANE OVER FISH BROOK**  
DECK PLAN  
**BOXFORD, MA**

CUSTOMER: KENEFLOCK CORPORATION

DESIGNER: STATE BRIDGE ENGINEERS

DRAWN BY: DATE: JOB NO: SHEET NO:

LOD/CV 03/02/20 **M920V168** **R-1**

REV NO.	DATE	SENT FOR	DESCRIPTION
04.01.20	FINAL APPROVAL	PER ENGINEERS COMMENTS	
05.04.20	FINAL APPROVAL	PER ENGINEERS COMMENTS	
02.02.20	APPROVAL		

MK 4A37-TYPE L90  
 TOTAL LENGTH 11'-6"





#### **ATTACHMENT D: FULLER LANE OVER FISH BROOK (B-19-004)**

- ROUTINE BRIDGE INSPECTION REPORT PERFORMED BY MASSDOT ON MAY 8, 2020

## STRUCTURES INSPECTION FIELD REPORT

2-DIST  
04B.I.N.  
89A

## ROUTINE INSPECTION

BR. DEPT. NO.  
B-19-004=T-06-014

CITY/TOWN <b>BOXFORD=TOPSFIELD</b>		8-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>		11-Kilo. POINT <b>000.370</b>	41-STATUS <b>A:OPEN</b>	90-ROUTINE INSP. DATE <b>MAY 8, 2020</b>
07-FACILITY CARRIED <b>HWY FULLER LN</b>		MEMORIAL NAME/LOCAL NAME		27-YR BUILT <b>1985</b>	106-YR REBUILT <b>0000</b>	YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>		26-FUNCTIONAL CLASS <b>Urban Local</b>		DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>501 : Prestressed Concrete Slab</b>		22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER O. *Moustafa		
107-DECK TYPE <b>2 : Concrete Precast Panels</b>		WEATHER <b>Cloudy</b>	TEMP. (air) <b>16°C</b>	TEAM MEMBERS <b>A. LABIB</b>		

ITEM 58		6	DEF
DECK			
1. Wearing surface	6	M-P	
2. Deck Condition	6	M-P	
3. Stay in Place Forms	N	-	
4. Curbs	N	-	
5. Median	N	-	
6. Sidewalks	N	-	
7. Parapets	N	-	
8. Railing	5	S-P	
9. Anti Missile Fence	N	-	
10. Drainage System	N	-	
11. Lighting Standards	N	-	
12. Utilities	6	M-P	
13. Deck Joints	H	-	
14.	N	-	
15.	N	-	
16.	N	-	
CURB REVEAL (In millimeters)		N 70	S 65

APPROACHES		DEF
a. Appr. pavement condition	6	M-P
b. Appr. Roadway Settlement	7	-
c. Appr. Sidewalk Settlement	N	-
d.	N	-

OVERHEAD SIGNS (Attached to bridge)		(Y/N)	N	DEF
a. Condition of Welds	N	-		
b. Condition of Bolts	N	-		
c. Condition of Signs	N	-		

ITEM 59		6	DEF
SUPERSTRUCTURE			
1. Stringers	N	-	
2. Floorbeams	N	-	
3. Floor System Bracing	N	-	
4. Girders or Beams	6	M-P	
5. Trusses - General	N	-	
a. Upper Chords	N	-	
b. Lower Chords	N	-	
c. Web Members	N	-	
d. Lateral Bracing	N	-	
e. Sway Bracings	N	-	
f. Portals	N	-	
g. End Posts	N	-	
6. Pin & Hangers	N	-	
7. Conn Plt's, Gussets & Angles	N	-	
8. Cover Plates	N	-	
9. Bearing Devices	H	-	
10. Diaphragms/Cross Frames	N	-	
11. Rivets & Bolts	N	-	
12. Welds	N	-	
13. Member Alignment	N	-	
14. Paint/Coating	N	-	
15.	N	-	

Year Painted	N
COLLISION DAMAGE: Please explain None (X) Minor ( ) Moderate ( ) Severe ( )	
LOAD DEFLECTION: Please explain None (X) Minor ( ) Moderate ( ) Severe ( )	
LOAD VIBRATION: Please explain None (X) Minor ( ) Moderate ( ) Severe ( )	

Any Fracture Critical Member: (Y/N)	N
Any Cracks: (Y/N)	N

ITEM 60		7	DEF
SUBSTRUCTURE			
1. Abutments	Dive	Cur	7
a. Pedestals	N	N	-
b. Bridge Seats	N	6	S-P
c. Backwalls	N	N	-
d. Breastwalls	N	6	M-P
e. Wingwalls	N	6	M-A
f. Slope Paving/Rip-Rap	N	N	-
g. Pointing	N	N	-
h. Footings	N	H	-
i. Piles	N	X	-
j. Scour	N	H	-
k. Settlement	N	N	-
l.	N	N	-
m.	N	N	-
2. Piers or Bents		N	
a. Pedestals	N	N	-
b. Caps	N	N	-
c. Columns	N	N	-
d. Stems/Webs/Pierwalls	N	N	-
e. Pointing	N	N	-
f. Footing	N	N	-
g. Piles	N	N	-
h. Scour	N	N	-
i. Settlement	N	N	-
j.	N	N	-
k.	N	N	-
3. Pile Bents		N	
a. Pile Caps	N	N	-
b. Piles	N	N	-
c. Diagonal Bracing	N	N	-
d. Horizontal Bracing	N	N	-
e. Fasteners	N	N	-

UNDERMINING (Y/N)	If YES please explain	N
COLLISION DAMAGE: None (X) Minor ( ) Moderate ( ) Severe ( )		
SCOUR: Please explain None (X) Minor ( ) Moderate ( ) Severe ( )		
I-60 (Dive Report):	N	I-60 (This Report): 7
93B-U/W (DIVE) Insp		00/00/0000

X=UNKNOWN

N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE

R=REMOVED



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**ITEM 61**  
**CHANNEL & CHANNEL PROTECTION**

	Dive	Cur	DEF
1.Channel Scour	N	X	-
2.Embankment Erosion	N	6	M-P
3.Debris	N	N	-
4.Vegetation	N	7	M-A
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	7	-
7.Aggradation	N	N	-
8.Fender System	N	N	-

**STREAM FLOW VELOCITY:**  
Tidal ( ) High ( ) Moderate ( ) Low (X) None ( )

**ITEM 61 (Dive Report):** N    **ITEM 61 (This Report):** 6

**93b-U/W INSP. DATE:** 00/00/0000

**ITEM 36 TRAFFIC SAFETY**

	36	COND	DEF
A. Bridge Railing	0	5	S-P
B. Transitions	0	6	M-P
C. Approach Guardrail	0	7	M-P
D. Approach Guardrail Ends	1	7	-

**WEIGHT POSTING**    **Not Applicable** X

H	3	3S2	Single
<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>
<b>Actual Posting</b>	<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>
<b>Recommended Posting</b>	<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>	<span style="border: 1px solid black; padding: 2px;">N</span>

**Waived Date:** 00/00/0000    **EJDMT Date:** 00/00/0000

At bridge	Other Advance																																																																															
<div style="text-align: center;">E    W</div> <div style="text-align: center;">E    W</div>	<div style="text-align: center;">E    W</div> <div style="text-align: center;">E    W</div>																																																																															
<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; position: relative;"> <div center;"="" style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);&lt;/div&gt; &lt;/div&gt; &lt;/td&gt; &lt;td style=" text-align:=""> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; position: relative;"> <div 10px;"="" margin-top:="" style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);&lt;/div&gt; &lt;/div&gt; &lt;/td&gt; &lt;/tr&gt; &lt;/table&gt; &lt;/div&gt; &lt;/div&gt; &lt;/div&gt; &lt;div style="> <b>CLEARANCE POSTING</b>    <span style="border: 1px solid black; padding: 2px;">X</span> <table style="margin-left: 20px;"> <tr> <td style="width:50%; text-align: center;">N</td> <td style="width:50%; text-align: center;">S</td> </tr> <tr> <td style="display: flex; justify-content: space-around;"> <div style="text-align: center;">ft    in</div> <div style="text-align: center;">ft    in</div> </td> <td style="text-align: center;">meter</td> </tr> <tr> <td style="text-align: center;"> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; position: relative;"> <div center;"="" style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);&lt;/div&gt; &lt;/div&gt; &lt;/td&gt; &lt;td style=" text-align:=""> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; position: relative;"> <div center;"="" style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);&lt;/div&gt; &lt;/div&gt; &lt;/td&gt; &lt;td style=" text-align:=""> <div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; position: relative;"> <div 10px;"="" margin-top:="" style="position: absolute; top: 0; left: 0; width: 100%; height: 100%; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);&lt;/div&gt; &lt;/div&gt; &lt;/td&gt; &lt;/tr&gt; &lt;/table&gt; &lt;div style="> <b>Signs In Place</b>  (Y=Yes, N=No, NR=Not Required)  <b>Legibility/Visibility</b> </div> </div> </div> <div style="width:30%;"> <b>ACCESSIBILITY (Y/N/P)</b> <table border="1" style="width:100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th></th> <th>Needed</th> <th>Used</th> </tr> </thead> <tbody> <tr><td>Lift Bucket</td><td>N</td><td>N</td></tr> <tr><td>Ladder</td><td>N</td><td>N</td></tr> <tr><td>Boat</td><td>Y</td><td>Y</td></tr> <tr><td>Waders</td><td>Y</td><td>Y</td></tr> <tr><td>Inspector 50</td><td>N</td><td>N</td></tr> <tr><td>Rigging</td><td>N</td><td>N</td></tr> <tr><td>Staging</td><td>N</td><td>N</td></tr> <tr><td>Traffic Control</td><td>N</td><td>N</td></tr> <tr><td>RR Flagger</td><td>N</td><td>N</td></tr> <tr><td>Police</td><td>N</td><td>N</td></tr> <tr><td>Other:</td><td> </td><td> </td></tr> <tr><td> </td><td>N</td><td>N</td></tr> </tbody> </table> <div style="margin-top: 10px;"> <b>TOTAL HOURS</b>    <span style="border: 1px solid black; padding: 2px;">6</span> </div> <div style="margin-top: 10px;"> <b>PLANS (Y/N):</b> <span style="border: 1px solid black; padding: 2px;">Y</span> </div> <div style="margin-top: 10px;"> <b>(V.C.R.) (Y/N):</b> <span style="border: 1px solid black; padding: 2px;">N</span> </div> <div style="margin-top: 10px;"> <b>TAPE#:</b> _____ </div> <div style="margin-top: 10px;"> <b>List of field tests performed:</b> _____ </div> </div> </div> </div> <div style="margin-top: 10px;"> <b>RATING</b> <div style="display: flex; justify-content: space-between;"> <div style="width:45%;"> Rating Report (Y/N): <span style="border: 1px solid black; padding: 2px;">N</span>  Date: <span style="border: 1px solid black; padding: 2px;">00/00/0000</span>  Inspection data at time of existing rating  I 58: - I 59: - I 60: - Date :00/00/0000 </div> <div style="width:50%;"> <b>Recommend for Rating or Rerating (Y/N):</b> <span style="border: 1px solid black; padding: 2px;">N</span>    <b>If YES please give priority:</b>  HIGH ( ) MEDIUM ( ) LOW ( ) </div> </div> <div style="margin-top: 10px;"> <b>REASON:</b> _____ </div> </div> </div> <div style="margin-top: 10px;"> <b>CONDITION RATING GUIDE</b>    (For Items 58, 59, 60 and 61) <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th>CODE</th> <th>CONDITION</th> <th>DEFECTS</th> </tr> </thead> <tbody> <tr><td>N</td><td>NOT APPLICABLE</td><td></td></tr> <tr><td>G 9</td><td>EXCELLENT</td><td>Excellent condition.</td></tr> <tr><td>G 8</td><td>VERY GOOD</td><td>No problem noted.</td></tr> <tr><td>G 7</td><td>GOOD</td><td>Some minor problems.</td></tr> <tr><td>F 6</td><td>SATISFACTORY</td><td>Structural elements show some minor deterioration.</td></tr> <tr><td>F 5</td><td>FAIR</td><td>All primary structural elements are sound but may have minor section loss, cracking, spalling or scour.</td></tr> <tr><td>P 4</td><td>POOR</td><td>Advanced section loss, deterioration, spalling or scour.</td></tr> <tr><td>P 3</td><td>SERIOUS</td><td>Loss of section, deterioration, spalling or scour have seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.</td></tr> <tr><td>C 2</td><td>CRITICAL</td><td>Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.</td></tr> <tr><td>C 1</td><td>"IMMINENT" FAILURE</td><td>Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. 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## REMARKS

### **BRIDGE ORIENTATION**

The structure is an adjacent precast box beams bridge. The approaches are East and West. The elevations are North and South. The Fish Brook flows from North to South. The superstructure is composed of 6 precast adjacent box beams that are numbered from South to North (**Sketches 1-3**). The west breastwall is concrete and the east breastwall is masonry.

### **ITEM 58 - DECK**

#### **Item 58.1 - Wearing surface**

There are random longitudinal and transverse cracking, up to 1/8" wide and mostly at the westbound travel lane. These cracks continue into both approaches. At the east end of the bridge, there is a pothole, up to 2.5' long x 5" wide x 2" deep. At the west end of the bridge, there is a full width transverse cracks. (**Photo 1**).

#### **Item 58.2 - Deck Condition**

See Item 59.4

#### **Item 58.4 - Curbs**

There are no curbs on this structure. The curb reveals on page 1 were measured at the concrete rail base/top of fascia beams.

#### **Item 58.8 - Railing**

See Item 36.A

#### **Item 58.12 - Utilities**

The North fascia of the bridge has a 8.5" diameter gas line located approximately 3" off the fascia. The one and only bracket near the east end is bent. (**Photo 2**).

### **APPROACHES**

#### **Approaches a - Appr. pavement condition**

The east approach pavement has cracking that are continuing from the bridge at the center and the eastbound travel lane then, starting at the east approach guardrail end, a new wearing surface has been placed. (**Photo 1**).

On the west approach, there are up to 0.5" wide longitudinal cracks mostly on the east bound travel lane and typical full width transverse cracking. (**Photo 3**).

### **ITEM 59 - SUPERSTRUCTURE**

#### **Item 59.4 - Girders or Beams**

-The south fascia (south side of of beam 1) has up to 0.25" wide horizontal and map cracking, delamination and spalling with heavy efflorescence. (**Photo 4**). At the top corner at the west end of the beam (beam 1), there is a spall up to 9" long x 1.5' deep x 1' high. (**Photo 5**).

-Beam 1 has a longitudinal hairline crack at the center of the beam that extends from east end to the mid span. (**Photo 6**).

-There is water staining at the joint between beam 1 and beam 2 near both east and west ends.

-Beam 2 has hairline cracking at the west end. (**Photo 7**).

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## REMARKS

### Item 59.4 - Girders or Beams (Cont'd)

- There is water staining with efflorescence at the joint between beam 2 and beam 3 at the east end. **(Photo 8)**.
- Beam 5 has hairline cracking at the west end. **(Photo 9)**.
- At the north fascia (the north side of beam 6), there is a 1/4" wide horizontal crack near the top of the beam and typical vertical hairline cracking with minor efflorescence along the north face. **(Photo 10)**.

### ITEM 60 - SUBSTRUCTURE

#### Item 60.1 - Abutments

##### Item 60.1.b - Bridge Seats

##### The west bridge seat:

- There is a vertical crack on the west bridge seat, 1/8" wide x full height with moderate efflorescence under the joint between beam 4 and beam 5. **(Photo 11)**.
- There is a vertical crack on the west bridge seat, 1/8" wide x full height under beam 3. **(Photo 12)**.

##### The east bridge seat:

- There is a vertical crack on the east bridge seat, 1/8" wide x full height with moderate efflorescence under beam 1. **(Photo 13)**.
- There is a vertical cracking on the east bridge seat, up to 1/4" wide x full height with under beam 2. **(Photo 14)**.
- There are two vertical cracking on the east bridge seat, up to 1/4" wide x full height with under beam 3. **(Photo 15)**.
- There is a vertical cracking on the east bridge seat, up to 1/4" wide x full height with under beam 5. **(Photo 16)**.

##### Item 60.1.d - Breastwalls

There is typical cracking in the mortar between the stones along the west breastwall. **(Photo 17)**.

##### Item 60.1.e - Wingwalls

The southwest wingwall extension is undermined up to 1' long x 3' wide x 1' deep. **(Photo 18)**.

The southeast masonry wingwall has cracking in mortar with voids and vegetation. **(Photo 19)**.

##### Item 60.1.h - Footings

Footings are hidden due to water level.

### ITEM 61 - CHANNEL AND CHANNEL PROTECTION

#### Item 61.2 - Embankment Erosion

The Southwest embankment has moderate erosion. **(Photo 18)**.



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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## REMARKS

### Item 61.4 - Vegetation

There is a large tree growing adjacent to the bridge at the base of the northeast embankment. **(Photo 2).**

### TRAFFIC SAFETY

### Item 36a - Bridge Railing

The last post from west south bridge railing is missing. **(Photo 20).**

Both the South and North bridge rail posts extend up to 4.5" above top of rail. **(Photo 20).**

Both bridge rail concrete bases have typical areas of cracking, delamination and random areas of spalled concrete. **(Photo 21).**

### Item 36b - Transitions

The transition continue with the bridge railing with the same beam size and the spacing between the posts at all four transitions are excessive.

### Item 36c - Approach Guardrail

All approach guardrails exhibit surface rust and the southwest guardrail has minor impact damage. **(Photo 22).**

### Sketch / Photo Log

Sketch 1 : Plan View

Sketch 2 : Cross Section Looking West

Sketch 3 : Elevation Looking North

Photo 1 : Longitudinal and transverse cracks, mostly on westbound travel lane and a pothole at the east end. At the west end, there is a full width transverse cracking.

Photo 2 : The utility bracket at the North fascia beam near the east end is bent downwards. Also note the large tree growing adjacent to the bridge at the northeast embankment.

Photo 3 : Longitudinal cracks on east bound travel lane and and typical full width transverse cracking on the west approach. (Looking east)

Photo 4 : The South fascia (south side of of beam 1), up to 0.25" wide horizontal and map cracking, delamination and spalling with heavy efflorescence.

Photo 5 : Spall up to 9" long x 1.5' deep x 1' high at the top corner at the west end of the beam (beam 1).

Photo 6 : Longitudinal hairline crack at the center of the beam 1 that extends from east end to the mid span. (Looking east).

Photo 7 : Beam 2 has hairline cracking at the west end at the south corner. (Looking west).

Photo 8 : Water staining with efflorescence at the joint between beam 2 and beam 3 at the east end. (Looking east).

Photo 9 : Hairline cracking at the west end of beam 5. (Looking west).

Photo 10 : 1/4" wide horizontal crack near the top of the north fascia (the north side of beam 6) and typical vertical hairline cracking with minor efflorescence along the face.

Photo 11 : Vertical crack, up to 1/8" wide x full height with moderate efflorescence under the joint between beam 4 and beam 5 on the west bridge seat.

Photo 12 : Vertical crack on the west bridge seat, 1/8" wide x full height under beam 3.

Photo 13 : Vertical crack on the east bridge seat, 1/8" wide x full height with moderate efflorescence under beam 1.

Photo 14 : Vertical crack on the east bridge seat, up to 1/4" wide x full height with under beam 2.

Photo 15 : Two vertical crack on the east bridge seat, up to 1/4" wide x full height with under beam 3.

Photo 16 : Vertical crack on the east bridge seat, up to 1/4" wide x full height with under beam 5.

Photo 17 : Typical cracking in the mortar between the stones along the west breastwall.

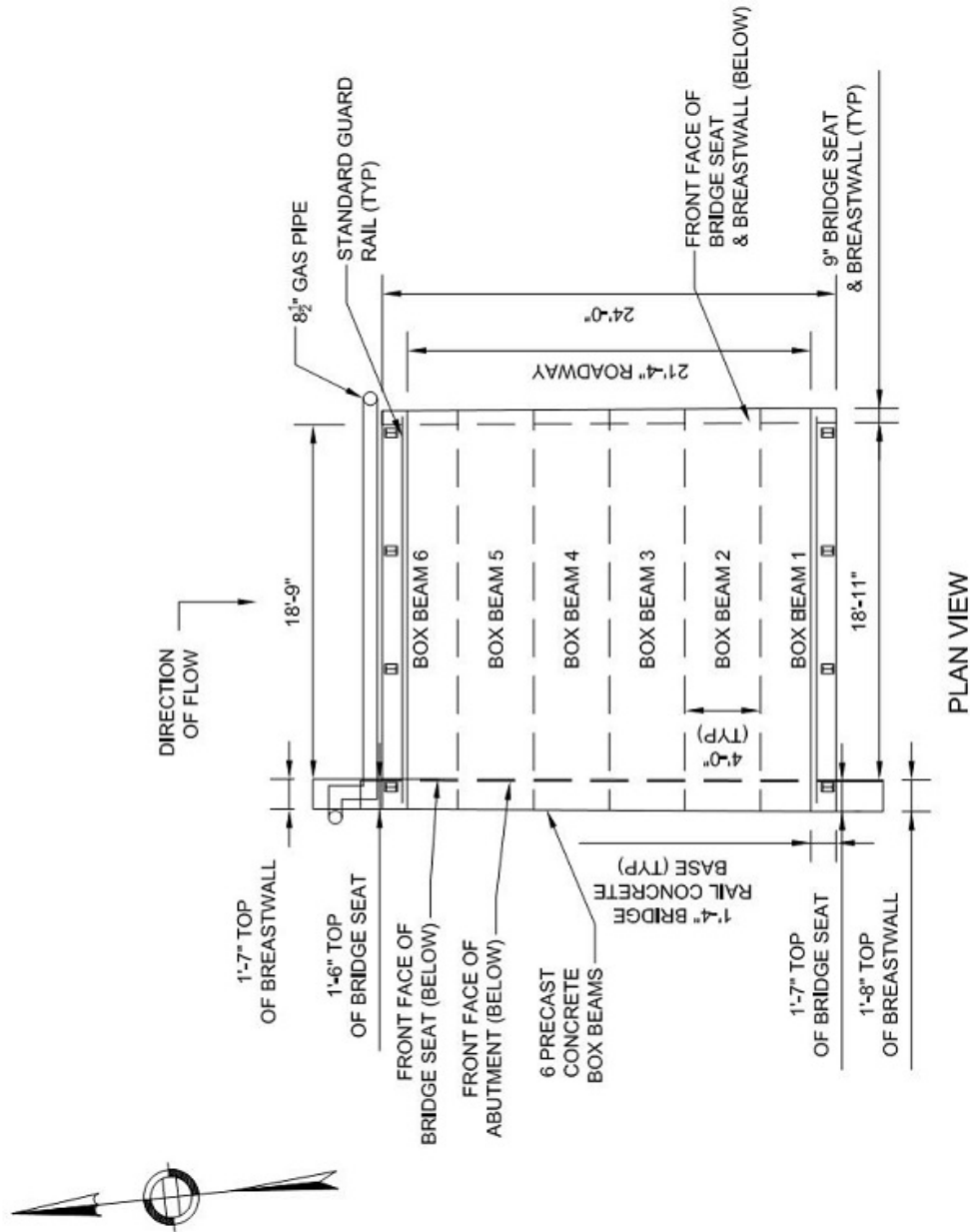
CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**REMARKS****Sketch / Photo Log (Cont'd)**

- Photo 18 : Southwest wingwall extension is undermined up to 1' long x 3' wide x 1' deep. Also note the moderate erosion at the embankment.
- Photo 19 : Southeast masonry wingwall has cracking in mortar with voids and vegetation.
- Photo 20 : The last post from west south bridge railing is missing.
- Photo 21 : Both bridge railing concrete bases have typical areas of cracking, delamination and random areas of spalled concrete. (South bridge railing shown).
- Photo 22 : Minor impact damage and surface rust at the southwest approach guardrail.

CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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## SKETCHES



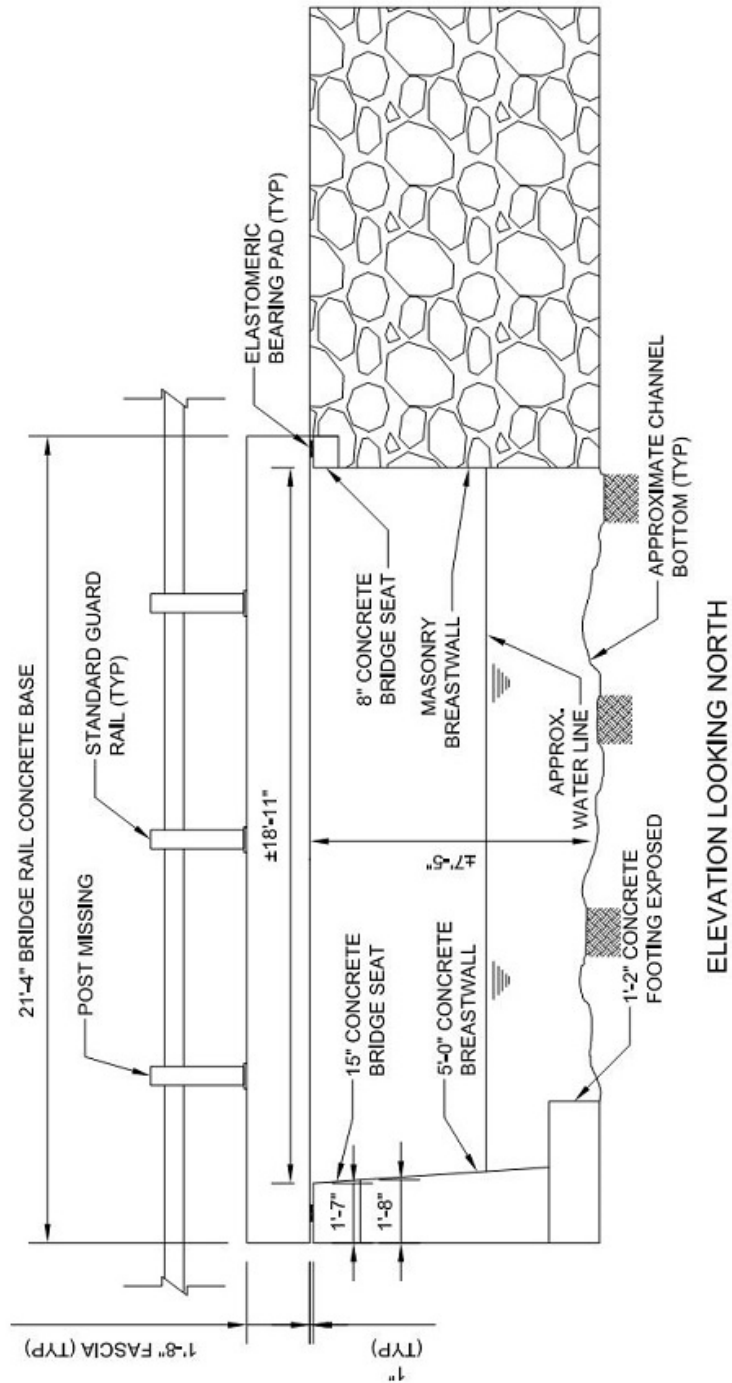
Sketch 1: Plan View





CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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## SKETCHES



**Sketch 3: Elevation Looking North**

CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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## PHOTOS



**Photo 1:** Longitudinal and transverse cracks, mostly on westbound travel lane and a pothole at the east end. At the west end, there is a full width transverse cracking.



**Photo 2:** The utility bracket at the North fascia beam near the east end is bent downwards. Also note the large tree growing adjacent to the bridge at the northeast embankment.



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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## PHOTOS



**Photo 3:** Longitudinal cracks on east bound travel lane and typical full width transverse cracking on the west approach. (Looking east)



**Photo 4:** The South fascia (south side of of beam 1), up to 0.25" wide horizontal and map cracking, delamination and spalling with heavy efflorescence.



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 5:** Spall up to 9" long x 1.5' deep x 1' high at the top corner at the west end of the beam (beam 1).



**Photo 6:** Longitudinal hairline crack at the center of the beam 1 that extends from east end to the mid span. (Looking east).

CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 7:** Beam 2 has hairline cracking at the west end at the south corner. (Looking west).



**Photo 8:** Water staining with efflorescence at the joint between beam 2 and beam 3 at the east end. (Looking east).



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 9:** Hairline cracking at the west end of beam 5. (Looking west).



**Photo 10:** 1/4" wide horizontal crack near the top of the north fascia (the north side of beam 6) and typical vertical hairline cracking with minor efflorescence along the face.

CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 11:** Vertical crack, up to 1/8" wide x full height with moderate efflorescence under the joint between beam 4 and beam 5 on the west bridge seat.



**Photo 12:** Vertical crack on the west bridge seat, 1/8" wide x full height under beam 3.



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 13:** Vertical crack on the east bridge seat, 1/8" wide x full height with moderate efflorescence under beam 1.



**Photo 14:** Vertical crack on the east bridge seat, up to 1/4" wide x full height with under beam 2.



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 15:** Two vertical crack on the east bridge seat, up to 1/4" wide x full height with under beam 3.



**Photo 16:** Vertical crack on the east bridge seat, up to 1/4" wide x full height with under beam 5.

CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 17:** Typical cracking in the mortar between the stones along the west breastwall.



**Photo 18:** Southwest wingwall extension is undermined up to 1' long x 3' wide x 1' deep. Also note the moderate erosion at the embankment.



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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**PHOTOS**

**Photo 19: Southeast masonry wingwall has cracking in mortar with voids and vegetation.**



**Photo 20: The last post from west south bridge railing is missing.**



CITY/TOWN <b>BOXFORD=TOPSFIELD</b>	B.I.N. <b>89A</b>	BR. DEPT. NO. <b>B-19-004=T-06-014</b>	8.-STRUCTURE NO. <b>B19004-89A-MUN-BRI</b>	INSPECTION DATE <b>MAY 8, 2020</b>
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## PHOTOS



**Photo 21:** Both bridge railing concrete bases have typical areas of cracking, delamination and random areas of spalled concrete. (South bridge railing shown).



**Photo 22:** Minor impact damage and surface rust at the southwest approach guardrail.

Report Date: November 20, 2020

State Information				Classification				Code				
<b>BDEPT#= B19004=T06014</b>				Agency Br.No.				(112) NBIS Bridge Length				N
<b>Town= Boxford=Topsfield</b>				L.O.				(104) Highway System				N
<b>B.I.N= 89A</b>				AASHTO= 019.3				(26) Functional Class - Urban Local				19
RANK= 0 H.I.= NA				FHWA Select List= N (6/21/2017)				(100) Defense Highway				0
(8) Structure Number				B1900489AMUNBRI				(101) Parallel Structure				N
(5) Inventory Route				100000000				(102) Direction of Traffic - 2-way traffic				2
(2) State Highway Department District				04				(103) Temporary Structure				N
(3) County Code 009 (4) Place code				07420				(105) Federal Lands Highways				0
(6) Features Intersected				<b>WATER FISH BROOK</b>				(110) Designated National Network				N
(7) Facility Carried				<b>HWY FULLER LN</b>				(20) Toll - On free road				3
(9) Location								(21) Maintain - Town Agency				03
(11) Kilometerpoint				0000.370				(22) Owner - Town Agency				03
(12) Base Highway Network				N				(37) Historical Significance undetermined				
(13) LRS Inventory Route & Subroute				000000000000				<b>Condition</b>				<b>Code</b>
(16) Latitude				42 DEG 38 MIN 05.15 SEC				(58) Deck				6
(17) Longitude				70 DEG 58 MIN 29.24 SEC				(59) Superstructure				6
(98) Border Bridge State Code				Share %				(60) Substructure				7
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				6
								(62) Culverts				N
<b>Structure Type and Material</b>								<b>Load Rating and Posting</b>				<b>Code</b>
(43) Structure Type Main: Prestressed Concrete				Code 501				(31) Design Load - Unknown				0
Slab				Jointless bridge type: Not applicable				(63) Operating Rating Method - Allowable Stress (AS)				2
(44) Structure Type Appr:								(64) Operating Rating				00.0
Other				Code 000				(65) Inventory Rating Method - Allowable Stress (AS)				2
(45) Number of spans in main unit				001				(66) Inventory Rating				00.0
(46) Number of approach spans				0000				(70) Bridge Posting				0
(107) Deck Structure Type - Concrete Precast Panels				Code 2				(41) Structure - Open				A
(108) Wearing Surface / Protective System:								<b>Appraisal</b>				<b>Code</b>
A) Type of wearing surface - Bituminous				Code 6				(67) Structural Evaluation				3
B) Type of membrane - Unknown				Code 8				(68) Deck Geometry				2
C) Type of deck protection - Unknown				Code 8				(69) Underclearances, vert. and horiz.				N
								(71) Waterway adequacy				6
								(72) Approach Roadway Alignment				7
(27) Year Built				1985				(36) Traffic Safety Features				0 0 0 1
(106) Year Reconstructed				0000				(113) Scour Critical Bridges				6
(42) Type of Service: On - Highway								<b>Inspections</b>				
Under - Waterway				Code 15				(90) Inspection Date 05/08/20				(91) Frequency 24 MO
(28) Lanes: On Structure 02 Under structure				00				(92) Critical Feature Inspection:				(93) CFI DATE
(29) Average Daily Traffic				001200				(A) Fracture Critical Detail				N 00 MO A) 00/00/00
(30) Year of ADT 2018 (109) Truck ADT				05 %				(B) Underwater Inspection				N 00 MO B) 08/01/87
(19) Bypass, detour length				004 KM				(C) Other Special Inspection				N 00 MO C) 00/00/00
								(*) Other Inspection ( )				N 00 MO *) 00/00/00
								(*) Closed Bridge				N 00 MO *) 00/00/00
								(*) UW Special Inspection				N 00 MO *) 00/00/00
								(*) Damage Inspection				MO *) 00/00/00
<b>Geometric Data</b>								<b>Rating Loads</b>				
(48) Length of maximum span				0005.8 M				Report Date 00/00/00				H20 Type 3 Type 3S2 Type HS
(49) Structure Length				00006.4 M				Operating				0.0 0.0 0.0 0.0
(50) Curb or sidewalk: Left 00.0 M Right				00.0 M				Inventory				0.0 0.0 0.0 0.0
(51) Bridge Roadway Width Curb to Curb				006.5 M				<b>Field Posting</b>				
(52) Deck Width Out to Out				007.3 M				Status				2 Axle 3 Axle 5 Axle Single
(32) Approach Roadway Width (w/shoulders)				007.3 M				Actual				
(33) Bridge Median - No median				Code 0				Recommended				
(34) Skew 00 DEG (35) Structure Flared				Y				Missing Signs				N
(10) Inventory Route MIN Vert Clear				99.99 M				<b>Misc.</b>				
(47) Inventory Route Total Horiz Clear				06.5 M				Bridge Name				N Anti-missile fence N Acrow Panel N Jointless Bridge
(53) Min Vert Clear Over Bridge Rdwy				99.99 M				Freeze/Thaw				N : Not Applicable
(54) Min Vert Underclear ref				N 00.00 M				<b>Accessibility (Needed/Used)</b>				
(55) Min Lat Underclear RT ref				N 00.0 M				N / N Liftbucket				N / N Rigging N / N Other
(56) Min Lat Underclear LT				00.0 M				N / N Ladder				N / N Staging
								Y / Y Boat				N / N Traffic Control
								Y / Y Wader				N / N RR Flagperson
								N / N Inspector 50				N / N Police
<b>Navigation Data</b>												
(38) Navigation Control - No navigation control on waterway				Code 0								
(111) Pier Protection				Code								
(39) Navigation Vertical Clearance				000.0 M								
(116) Vert-lift Bridge Nav Min Vert Clear				M								
(40) Navigation Horizontal Clearance				0000.0 M								
								Inspection Hours: 006				

**ATTACHMENT E: ENDICOTT ROAD OVER FISH BROOK (B-19-005)**

- CULVERT INSPECTION REPORT PERFORMED BY MASSDOT ON MAY 7, 2020



2-DIST  
04B.I.N.  
89B

## STRUCTURES INSPECTION FIELD REPORT

BR. DEPT. NO.

B-19-005

## CULVERT INSPECTION

CITY/TOWN <b>BOXFORD</b>	8-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	11-Kilo. POINT <b>000.000</b>	41-STATUS <b>A:OPEN</b>	90-ROUTINE INSP. DATE <b>MAY 7, 2020</b>
07-FACILITY CARRIED <b>HWY ENDICOTT RD</b>	MEMORIAL NAME/LOCAL NAME	27-YR BUILT <b>1850</b>	106-YR REBUILT <b>1900</b>	YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>	26-FUNCTIONAL CLASS <b>Urban Minor Arterial</b>	DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>819 : Masonry Culvert</b>	22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER O. *Moustafa	
107-DECK TYPE <b>N : Not applicable</b>	WEATHER <b>Sunny</b>	TEMP. (air) <b>18°C</b>	TEAM MEMBERS <b>A. LABIB</b>	

## TYPE OF CULVERT:

SHAPE:	RECTANGULAR
MATERIAL:	CONCRETE AND MASONRY
COATING:	NONE

## BARRELS: (In Meters)

SIZE:	5.00Wx2.00H	NUMBER:	2
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## DEPTH OF COVER

(To the nearest tenth of a meter)

E	W
0.3	0.3

## CURB REVEAL

(In millimeters)

150	0
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## ITEM 62 CULVERT &amp; RETAINING WALLS

6

I62 (Dive Report):

N

I62 (This Report):

6

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		Dive This Rpt.	DEF			
1. Roof	N	6	M-P	7. Protective Coating	N	N	-	13. Member Alignment	N	7	-
2. Floor	N	N	-	8. Embankment	N	N	-	14. Deformation	N	N	-
3. Walls	N	6	M-P	9. Wearing Surface	N	7	M-P	15. Scour	N	X	-
4. Headwall	N	5	S-A	10. Railing	N	3	S-A	16. Settlement	N	N	-
5. Wingwall	N	7	M-P	11. Sidewalks	N	5	S-A	17.	N	N	-
6. Pipe	N	N	-	12. Utilities	N	7	-	18.	N	N	-

UNDERMINING (Y/N) If YES please explain **N**

COLLISION DAMAGE: **Please explain**  
None (X) Minor ( ) Moderate ( ) Severe ( )

LOAD VIBRATION: **Please explain**  
None (X) Minor ( ) Moderate ( ) Severe ( )

## ITEM 61 CHANNEL &amp; CHANNEL PROTECTION

7

## STREAM FLOW VELOCITY:

Tidal ( ) High ( ) Moderate ( ) Low (X)

ITEM 61 (Dive Report):

N

ITEM 61 (This Report):

7

93b-

U/W INSP DATE: 00/00/0000

## APPROACH CONDITION

	Dive This Rpt.	DEF		Dive This Rpt.	DEF		
1. Channel Scour	N	X	-	5. Utilities	N	N	-
2. Embankment Erosion	N	6	M-P	6. Rip-Rap/Slope Protection	N	N	-
3. Debris	N	N	-	7. Aggradation	N	N	-
4. Vegetation	N	7	-				

a. Appr. pavement condition **7** **-**

b. Appr. Roadway Settlement **7** **-**

c. Appr. Sidewalk Settlement **7** **-**

d. **N** **-**

## WEIGHT POSTING

Not Applicable **X**

Actual Posting

H	3	3S2	Single
N	N	N	N

Recommended Posting

N	N	N	N
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Waived Date: 00/00/0000

EJDMT Date: 00/00/0000

Signs In Place  
(Y=Yes, N=No,  
NR=Not Required)

Legibility/  
Visibility

At bridge

Advance

N	S	N	S

## ITEM 36 TRAFFIC SAFETY

## ACCESSIBILITY (Y/N/P):

TOTAL HOURS **6**

	36	COND	DEF	Needed	Used	Needed	Used
A. Bridge Railing	0	3	S-A	Ladder	N	N	Other:
B. Transitions	0	3	S-A	Boat	Y	Y	N
C. Approach Guardrail	0	3	S-A	Waders	P	Y	
D. Approach Guardrail Ends	0	3	S-A				

PLANS (Y/N): **Y**

(V.C.R.) (Y/N): **N**

TAPE#:

## RATING

Rating Report (Y/N): **N**

Date: 00/00/0000

Inspection data at time of existing rating  
I 62: - Date: 00/00/0000

Recommend for Rating or Rerating (Y/N): **N**

REASON:

If YES please give priority:

HIGH ( ) MEDIUM ( ) LOW ( )

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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### REMARKS, PHOTOS & SKETCHES

#### BRIDGE ORIENTATION

The structure is a double barrel rectangular culvert composed of concrete and masonry walls with concrete and granite slabs. The approaches are North and South. The elevations are East and West. The spans were numbered from South to North. Fish Brook flows from West to East. **(Sketches 1,2 and 3).**

#### ITEM 62 - CULVERT

##### Item 62.1 - Roof

The roof for both the East and West entrance undersides consists of concrete slabs and then there is approximately 19'-7" of granite slabs making up the remainder of the roof. **(Sketch 1).**

The West fascia has widespread areas of large spalls with exposed reinforcing that have extended down the face from the bridge rail concrete base and the headwall. **(Photo 1).**

Span 1 near the west fascia, the underside of the concrete deck has a spall 30" long x 12" wide x 1.5" deep with exposed and rusted rebar that has 100% section loss. Also, there is an area of scaling and honeycombing up to full width x 2.5' long x 1" deep. **(Photo 2).**

Both span 1 and span 2 near the east end, the joint between the concrete slab and the first granite slab has active leakage with efflorescence. **(Photos 3 and 4).**

Span 2 at the edge of the west fascia, there is a spall up to 7" diameter **(Photo 5)** and the underside of the concrete deck has full length x full width area of honeycombing/scaling with moderate efflorescence **(Photo**

### CONDITION RATING GUIDE

	CODE	CONDITION	DEFECTS
	N	NOT APPLICABLE	Use if structure is not a culvert.
G	9	EXCELLENT	No deficiencies.
G	8	VERY GOOD	No noticeable or noteworthy differences which affect the condition of the culvert. Insignificant scrape marks caused by drift.
G	7	GOOD	Shrinkage cracks, light scaling, and insignificant spalling, which does not expose reinforcing steel. Insignificant damage caused by drift with not misalignment and not requiring corrective action. Some minor scouring has occurred near curtain walls, wingwalls, or pipes. Metal culverts have a smooth symmetrical curvature with superficial corrosion and no pitting.
F	6	SATISFACTORY	Deterioration or initial disintegration, minor chloride contamination, cracking with some leaching, or spalls on concrete or masonry walls and slabs. Local minor scouring at curtain walls, wingwalls, or pipes. Metal culverts have a smooth curvature, non-symmetrical shape, significant corrosion or moderate pitting.
F	5	FAIR	Moderate to major deterioration, or disintegration, extensive cracking and leaching, or spalls on concrete or masonry walls and slabs. Minor settlement or misalignment. Noticeable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection in one section, significant corrosion or deep pitting.
P	4	POOR	Large spalls, heavy scaling, wide cracks, considerable efflorescence, or opened construction joints permitting loss of backfill. Considerable settlement or misalignment. Considerable scouring or erosion at curtain walls, wingwalls, or pipes. Metal culverts have significant distortion and deflection throughout, extensive corrosion or deep pitting.
P	3	SERIOUS	Any condition described in Code 4 but which is excessive in scope. Severe movement or differential settlement of the segments, or loss of fill. Holes may exist in walls or slabs. Integral wingwalls, nearly severed from culvert. Severe scour or erosion at curtain walls, wingwalls, or pipes. Metal culverts have extreme distortion and deflection in one section, extensive corrosion, or deep pitting with scattered perforations.
C	2	CRITICAL	Advanced deterioration of primary structural elements. Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure support. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
C	1	"IMMINENT" FAILURE	Bridge closed. Corrective action may put back in light service.
	0	FAILED	Bridge closed. Replacement necessary.

### DEFICIENCY REPORTING GUIDE

**DEFICIENCY:** A defect in a structure that requires corrective action.

#### CATEGORIES OF DEFICIENCIES:

**M= Minor Deficiency** - (Examples include but are not limited to: Spalled concrete, minor to moderate corrosion to steel culverts, minor settlement or misalignment, minor scouring, minor damage to guardrail, etc.)

**S= Severe/Major Deficiency** - (Examples include but are not limited to: Large spalls, wide cracks, moderate to major deterioration in concrete, considerable settlement, considerable scouring or undermining, extensive corrosion and deflection in steel culverts, etc.)

**C-S= Critical Deficiency** - A deficiency in a structural component or element of a bridge that poses an extreme hazard or unsafe condition to the public. (Follow-up Critical Deficiency Report must be submitted separately)

#### URGENCY OF REPAIR:

**I = Immediate-** [Inspector(s) stay at the bridge until the District Maintenance crew or the responsible Agency crew(if not a State bridge) show up and corrective action is taken.]

**A = ASAP-** [Action will be taken by the District Maintenance Engineer or the Responsible Agency (if not a State owned bridge) upon receipt of the Inspection Report].

**P = Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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## REMARKS

### Item 62.1 - Roof (Cont'd) 6).

### Item 62.3 - Walls

There is typical cracking with efflorescence in the mortar between stones at all granite walls. **(Photo 7).**

Both north and south concrete walls typically have minor abrasion along the water line and up to 2" high and efflorescence at the east end. ( **Photo 8**).

### Item 62.4 - Headwall

The West fascia headwall has large areas of heavily spalled concrete with exposed reinforcing steel that extend down from the bridge rail concrete base. **(Photo 1).**

### Item 62.5 - Wingwall

All wingwalls typically have minor abrasion along the water line and up to 2" high.

### Item 62.9 - Wearing Surface

There is random transverse hairline cracking mainly in the southbound travel lane.

### Item 62.10 - Railing

See Item 36.A

### Item 62.11 - Sidewalks

There is a 3'-11" sidewalk on the west side and there is unpaved shoulder on the east side.

The west sidewalk and the curb are continuous pour asphalt surface. The curb has sections that have deteriorated which is propagating into the sidewalk. **(Photo 9).**

### Item 62.12 - Utilities

There is a 5" diameter gas pipe located along the west fascia and a 20" diameter utility pipe located along the east fascia.

## ITEM 61 - CHANNEL AND CHANNEL PROTECTION

### Item 61.2 - Embankment Erosion

There is minor to moderate erosion behind the northeast and southeast wingwalls. **(Photos 10 and 11).**

## TRAFFIC SAFETY

### Item 36a - Bridge Railing

#### West bridge rail:

All three concrete posts have heavy spalls with exposed rebars up to full height. **(Photo 12).**

The top rail has split and section loss and is not attached at the center concrete post and the post has heavy spalls with exposed rebars for the full height. **(Photo 12).**

The bridge rail concrete base has large spalling with one fully exposed longitudinal rebar along the full length of the base. **(Photo 1).**

All timber bridge railings have splits and checks up to full length.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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## REMARKS

### Item 36b - Transitions

The approach guardrails are not attached to the bridge railing on all four corners of the bridge.

### Item 36c - Approach Guardrail

The approach guardrail at the Northeast, Northwest and Southwest approaches is a two-wire cable rail on concrete posts. Cable wire is mostly missing or ineffective. Concrete posts are heavily deteriorated and ineffective. **(Photos 13, 14 and 15).**

The southeast approach guardrail is a steel rail on steel posts that is too low (resting on the ground) and has major impact damage and is ineffective. It also exhibits 100% section loss at the posts connections. **(Photo 16).**

### Item 36d - Approach Guardrail Ends

All guardrail ends are either missing or completely ineffective.

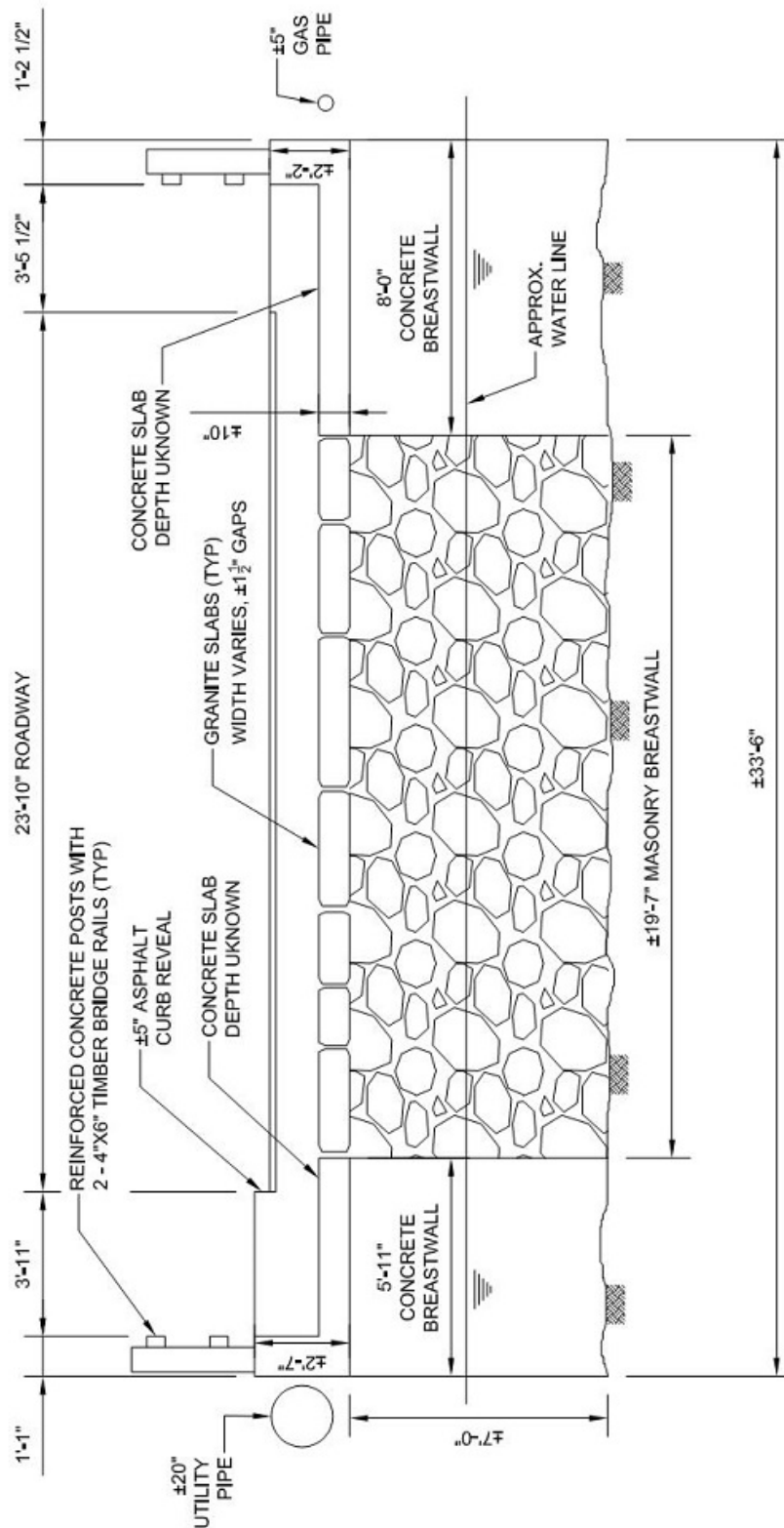
### Sketch / Photo Log

- Sketch 1 : Plan View.
- Sketch 2 : Cross section at span 2, looking North.
- Sketch 3 : Elevation, looking east.
- Photo 1 : West fascia, areas of heavy and large spalls with exposed and rusted rebars.
- Photo 2 : Span 1, near the west fascia, area of scaling, honeycombing and a spall at the concrete deck with exposed and rusted rebar.
- Photo 3 : Active leakage with heavy efflorescence at the joint between the concrete slab and the first granite slab in span 2, near the east end.
- Photo 4 : Active leakage with heavy efflorescence at the joint between the concrete slab and the first granite slab in span 1, near the east end.
- Photo 5 : Span 2, spall up to 7" diameter at the edge of the west fascia.
- Photo 6 : Span 2, west end, the underside of the concrete deck has full length x full width area of honeycombing/scaling with moderate efflorescence.
- Photo 7 : Typical cracking with efflorescence in the mortar between stones at all granite walls.
- Photo 8 : Typical abrasion along the water line and up to 2' high at the concrete walls. Also note the efflorescence at the east end of both north and south concrete walls. (Northeast wall shown).
- Photo 9 : West sidewalk, deterioration at the curb which is propagating into the sidewalk.
- Photo 10 : Minor erosion behind the southeast wingwall.
- Photo 11 : Minor erosion behind the northeast wingwall.
- Photo 12 : West bridge rail, the top rail has split and is not attached to concrete post. Also note the concrete post has heavy spalls with exposed rebars for the full height.
- Photo 13 : The southwest approach guardrail cables are missing, and the concrete posts heavily deteriorated and ineffective.
- Photo 14 : The northwest approach guardrail lower cable is missing, the upper cable is loose and ineffective and the concrete posts heavily deteriorated.
- Photo 15 : The northeast approach guardrail cables are missing, and the concrete posts heavily deteriorated and ineffective.
- Photo 16 : The southeast approach steel guardrail has 100% section loss, major impact damage and is ineffective.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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## SKETCHES



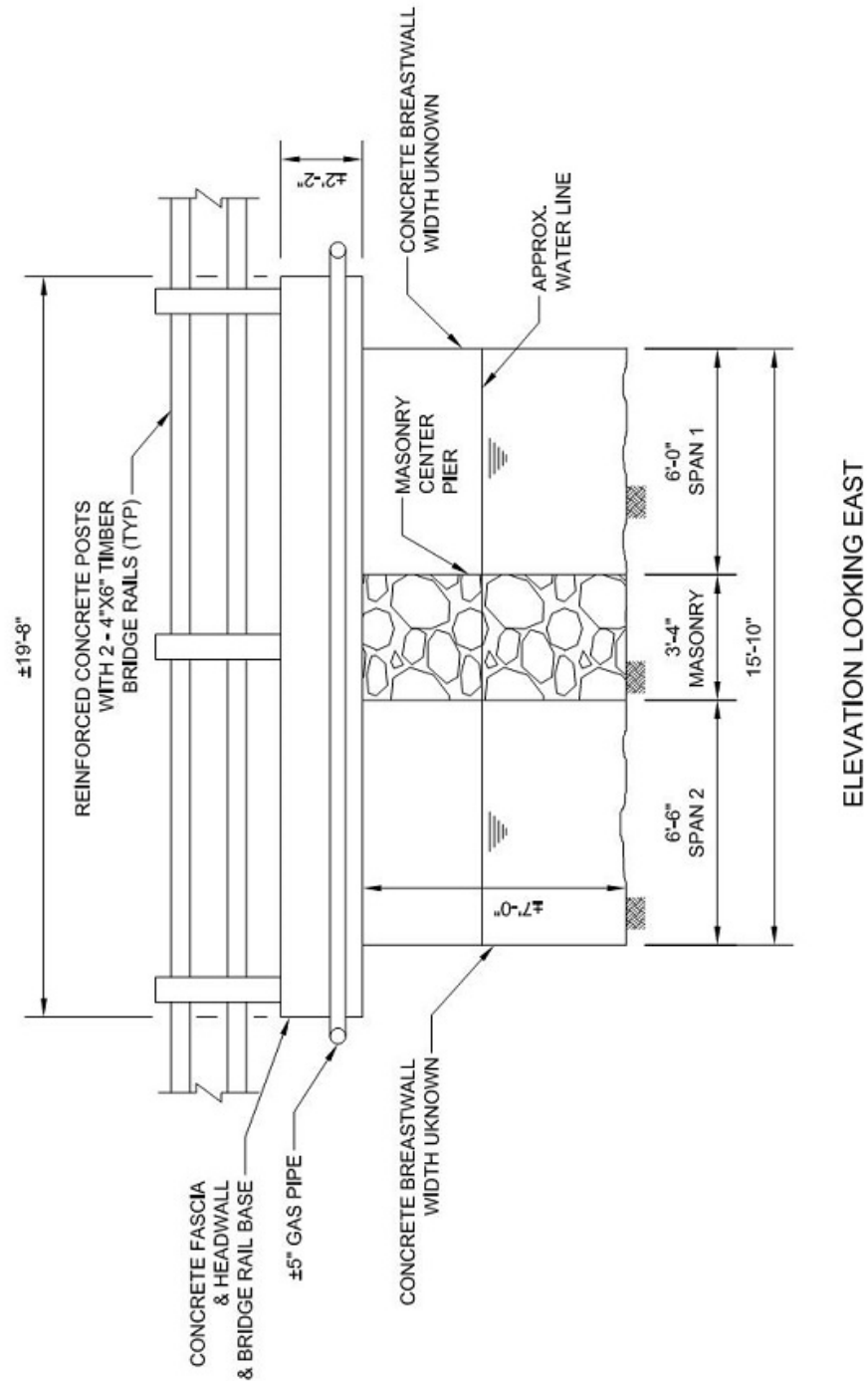
CROSS SECTION @ SPAN 2 LOOKING NORTH

**Sketch 2: Cross section at span 2, looking North.**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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## SKETCHES



**Sketch 3: Elevation, looking east.**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 1:** West fascia, areas of heavy and large spalls with exposed and rusted rebar.



**Photo 2:** Span 1, near the west fascia, area of scaling, honeycombing and a spall at the concrete deck with exposed and rusted rebar.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 3:** Active leakage with heavy efflorescence at the joint between the concrete slab and the first granite slab in span 2, near the east end.



**Photo 4:** Active leakage with heavy efflorescence at the joint between the concrete slab and the first granite slab in span 1, near the east end.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 5:** Span 2, spall up to 7" diameter at the edge of the west fascia.



**Photo 6:** Span 2, west end, the underside of the concrete deck has full length x full width area of honeycombing/scaling with moderate efflorescence.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 7:** Typical cracking with efflorescence in the mortar between stones at all granite walls.



**Photo 8:** Typical abrasion along the water line and up to 2' high at the concrete walls. Also note the efflorescence at the east end of both north and south concrete walls. (Northeast wall shown).



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 9: West sidewalk, deterioration at the curb which is propagating into the sidewalk.**



**Photo 10: Minor erosion behind the southeast wingwall.**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 11: Minor erosion behind the northeast wingwall.**



**Photo 12: West bridge rail, the top rail has split and is not attached to concrete post. Also note the concrete post has heavy spalls with exposed rebars for the full height.**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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## PHOTOS



**Photo 13:** The southwest approach guardrail cables are missing, and the concrete posts heavily deteriorated and ineffective.



**Photo 14:** The northwest approach guardrail lower cable is missing, the upper cable is loose and ineffective and the concrete posts heavily deteriorated.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>89B</b>	BR. DEPT. NO. <b>B-19-005</b>	8.-STRUCTURE NO. <b>B19005-89B-MUN-BRI</b>	INSPECTION DATE <b>MAY 7, 2020</b>
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**PHOTOS**

**Photo 15:** The northeast approach guardrail cables are missing, and the concrete posts heavily deteriorated and ineffective.



**Photo 16:** The southeast approach steel guardrail has 100% section loss, major impact damage and is ineffective.



State Information										Classification										Code
BDEPT#= B19005		Agency Br.No.				(112) NBIS Bridge Length														N
Town= Boxford		L.O.				(104) Highway System														N
B.I.N= 89B		AASHTO= 007.0				(26) Functional Class -				Urban Minor Arterial								16		
RANK= 0		H.I.= NA		FHWA Select List= N (6/21/2017)		(100) Defense Highway														0
(8) Structure Number		B1900589BMUNBRI				(101) Parallel Structure														N
(5) Inventory Route						(102) Direction of Traffic -				2-way traffic								2		
(2) State Highway Department District		04				(103) Temporary Structure														N
(3) County Code 009		(4) Place code		07420		(105) Federal Lands Highways														0
(6) Features Intersected		WATER FISH BROOK				(110) Designated National Network														N
(7) Facility Carried		HWY ENDICOTT RD				(20) Toll -				On free road								3		
(9) Location						(21) Maintain -				Town Agency								03		
(11) Kilometerpoint		0000.000				(22) Owner -				Town Agency								03		
(12) Base Highway Network		N				(37) Historical Significance				undetermined										
(13) LRS Inventory Route & Subroute		000000000000								Condition								Code		
(16) Latitude		42 DEG 37 MIN 50.42 SEC				(58) Deck														N
(17) Longitude		70 DEG 58 MIN 25.69 SEC				(59) Superstructure														N
(98) Border Bridge State Code		Share %				(60) Substructure														N
(99) Border Bridge Structure No. #						(61) Channel & Channel Protection														7
						(62) Culverts														6
		Structure Type and Material								Load Rating and Posting								Code		
(43) Structure Type Main: Masonry				Code 819		(31) Design Load -				Unknown								0		
Culvert		Jointless bridge type:		Not applicable		(63) Operating Rating Method -				Allowable Stress (AS)								2		
(44) Structure Type Appr:						(64) Operating Rating														00.0
Other				Code 000		(65) Inventory Rating Method -				Allowable Stress (AS)								2		
(45) Number of spans in main unit				002		(66) Inventory Rating														00.0
(46) Number of approach spans				0000		(70) Bridge Posting														0
(107) Deck Structure Type -		Not applicable		Code N		(41) Structure -				Open								A		
(108) Wearing Surface / Protective System:										Appraisal								Code		
A) Type of wearing surface -		Bituminous		Code 6		(67) Structural Evaluation														2
B) Type of membrane -		Not applicable=no deck		Code N		(68) Deck Geometry														2
C) Type of deck protection -		Not applicable=no deck		Code N		(69) Underclearances, vert. and horiz.														N
						(71) Waterway adequacy														6
						(72) Approach Roadway Alignment														7
						(36) Traffic Safety Features				0 0 0 0								0		
						(113) Scour Critical Bridges														6
										Inspections										
(27) Year Built				1850		(90) Inspection Date				05/07/20				(91) Frequency		24 MO				
(106) Year Reconstructed				1900		(92) Critical Feature Inspection:														(93) CFI DATE
(42) Type of Service: On -		Highway				(A) Fracture Critical Detail				N		00		MO A)		00/00/00				
Under -		Waterway		Code 15		(B) Underwater Inspection				N		00		MO B)		00/00/00				
(28) Lanes: On Structure		02		Under structure 00		(C) Other Special Inspection				N		00		MO C)		00/00/00				
(29) Average Daily Traffic				007200		(*) Other Inspection ()				N		00		MO *)		00/00/00				
(30) Year of ADT		2018		(109) Truck ADT 05 %		(*) Closed Bridge				N		00		MO *)		00/00/00				
(19) Bypass, detour length				004 KM		(*) UW Special Inspection				N		00		MO *)		00/00/00				
						(*) Damage Inspection								MO *)		00/00/00				
										Rating Loads										
(48) Length of maximum span				0002.4 M		Report Date				00/00/00		H20		Type 3		Type 3S2				
(49) Structure Length				00005.1 M		Operating						0.0		0.0		0.0				
(50) Curb or sidewalk:		Left 01.2 M		Right 00.0 M		Inventory						0.0		0.0		0.0				
(51) Bridge Roadway Width Curb to Curb				007.3 M																
(52) Deck Width Out to Out				010.2 M																
(32) Approach Roadway Width (w/shoulders)				008.3 M																
(33) Bridge Median -		No median		Code 0																
(34) Skew		00 DEG		(35) Structure Flared		N		Status				Posting Date				00/00/00				
(10) Inventory Route MIN Vert Clear				99.99 M		2 Axle				3 Axle		5 Axle		Single						
(47) Inventory Route Total Horiz Clear				08.3 M		Actual														
(53) Min Vert Clear Over Bridge Rdwy																				

## **ATTACHMENT F: BROOKVIEW ROAD OVER FISH BROOK (B-19-018)**

- ROUTINE UNDERWATER INSPECTION REPORT PERFORMED BY MASSDOT ON SEPTEMBER 18, 2020
- SPECIAL MEMBER INSPECTION REPORT PERFORMED BY MASSDOT ON JANUARY 31, 2020
- ROUTINE & SPECIAL MEMBER INSPECTION REPORT PERFORMED BY MASSDOT ON NOVEMBER 26, 2019

2-DIST  
**04**B.I.N.  
**C68****UNDERWATER OPERATIONS TEAM**  
**ROUTINE UNDERWATER INSPECTION REPORT**BR. DEPT. NO.  
**B-19-018**

CITY/TOWN <b>BOXFORD</b>		8-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>		LEVEL OF INSPECTION <b>II</b>	93B-DATE INSPECTED <b>SEP 18, 2020</b>
07-FACILITY CARRIED <b>HWY BROOKVIEW RD</b>		ACCESS TO BRIDGE <b>EMBANKMENT</b>		UNDERWATER OPERATIONS ENGINEER <b>RANDI E. BONICA</b>	
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>		DEPTH <b>1 m</b>	VISIBILITY <b>0.5 m</b>	TEAM LEADER (DIVE MASTER) <b>WILLIAM J. COLLERAN</b>	Report submitted by:
BOTTOM CONDITION <b>BOULDERS &amp; SAND</b>		CURRENT <b>SLIGHT</b>	TEAM MEMBERS <b>R. E. BONICA, G. BROZ, B. FITZGERALD, M. GRIFFIN</b>		

ITEM 60		6	ITEM 61		6	ITEM 62		N
SUBSTRUCTURE		DEF	CHANNEL & CHANNEL PROTECTION		DEF	CULVERTS		DEF
<b>1. Abutments</b>	6		<b>1. Channel Scour</b>	6	-	<b>1. Roof</b>	N	-
a. Pedestals	N	-	<b>2. Embankment Erosion</b>	6	-	<b>2. Floor</b>	N	-
b. Bridge Seats	N	-	<b>3. Debris</b>	6	-	<b>3. Walls</b>	N	-
c. Backwalls	N	-	<b>4. Vegetation</b>	7	-	<b>4. Headwall</b>	N	-
d. Breastwalls	6	-	<b>5. Utilities</b>	N	-	<b>5. Wingwall</b>	N	-
e. Wingwalls	6	-	<b>6. Rip-Rap/Slope Protection</b>	N	-	<b>6. Pipe</b>	N	-
f. Slope Paving/Rip-Rap	N	-	<b>7. Aggradation</b>	7	-	<b>7. Protective Coating</b>	N	-
g. Pointing	N	-	<b>8. Fender System</b>	N	-	<b>8. Embankment</b>	N	-
h. Footings	N	-	a. Piles	N	-	<b>9. Wearing Surface</b>	N	-
i. Piles	N	-	b. Diagonal Bracing	N	-	<b>10. Railing</b>	N	-
j. Scour	6	-	c. Horizontal Bracing	N	-	<b>11. Sidewalks</b>	N	-
k. Settlement	6	-	d. Wales	N	-	<b>12. Utilities</b>	N	-
l.	N	-	e. Fasteners	N	-	<b>13. Member Alignment</b>	N	-
<b>2. Piers or Bents</b>	N		f. Ladders	N	-	<b>14. Deformation</b>	N	-
a. Pedestals	N	-	<b>9.</b>	N	-	<b>15. Scour</b>	N	-
b. Caps	N	-	<b>ITEM 59 SUPERSTRUCTURE</b>			<b>16. Settlement</b>	N	-
c. Columns	N	-		N	DEF	<b>17.</b>	N	-
d. Stems/Webs/Pierwalls	N	-		N	-	<b>18.</b>	N	-
e. Pointing	N	-		N	-	<b>UNDERMINING (Y/N)</b>		
f. Footing	N	-		N	-	<b>N</b>		
g. Piles	N	-	<b>DEFICIENCY REPORTING GUIDE</b>					
h. Scour	N	-	<b>DEFICIENCY:</b> A defect in a structure that requires corrective action.					
i. Settlement	N	-	<b>CATEGORIES OF DEFICIENCIES:</b>					
j.	N	-	<b>M= Minor Deficiency-</b> Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.					
k.	N	-	<b>S= Severe/Major Deficiency-</b> Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.					
<b>3. Pile Bents</b>	N		<b>C-S= Critical Structural Deficiency-</b> A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.					
a. Pile Caps	N	-	<b>C-H= Critical Hazard Deficiency-</b> A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.					
b. Piles	N	-	<b>URGENCY OF REPAIR:</b>					
c. Diagonal Bracing	N	-	<b>I=Immediate-</b> [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]					
d. Horizontal Bracing	N	-	<b>A=ASAP-</b> [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]					
e. Fasteners	N	-	<b>P=Prioritize-</b> [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]					
<b>UNDERMINING (Y/N)</b>		<b>N</b>						

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## REMARKS

### **GENERAL REMARKS**

This bridge is a single span structure with dry laid fieldstone abutments and concrete bridge seats.

**Orientation:** Abutments are labeled left and right, looking downstream.

Sta 10+00 is at the downstream end of the superstructure. Sta 10+25 is the upstream end of the superstructure.

The undermining of the right abutment, the settled stone in the right abutment and the large void in the left abutment and many smaller voids throughout the structure reported in inspection reports prior to 12/23/19 have been repaired with a concrete tremie repair.

The undermining void on the right side was from Sta 10+10 to Sta 10+22 with a maximum height of 1.6' and a maximum penetration of 3.3'.

The settled stone in the right abutment was from Sta 10+05 to Sta 10+12 and had displaced 0.8' toward the channel and there was 0.3' settlement down from the bridge seat. There was a 1/8" crack in the bridge seat above the settled stone.

The large void in the left abutment was from Sta 10+06 to Sta 10+15 with a height of 3.5' and a penetration of 4.9'. This void was directly below the bridge seat. There was a 1/8" crack in the bridge seat above the void area.

The repair was done by members of the Mass DOT Underwater Operations Team. The repair was done between 12/13/19 and 12/23/19. The repair consisted of laying out grout bags to be used as a form to repair undermining and filling undermined area with concrete. Forms were then constructed in front of the void areas and filled with tremie concrete. Extensive voids behind and between stones in both abutments due to erosion of material were filled with concrete. Eighteen cubic yards of concrete were pumped into grout bags, undermined areas and into voids in the breastwalls.

### **ITEM 60 - SUBSTRUCTURE**

#### **Item 60.1 - Abutments**

##### **Item 60.1.d - Breastwalls**

##### **Left Breastwall**

Breastwall is dry laid fieldstone.

Prior to the repair of December 2019 there was a large void in the breastwall from Sta 10+06 to Sta 10+15. The void was 3.5' high with 4.9' penetration. The bridge seat above the void was unsupported and had a 1/8" vertical crack. The void area continued behind stones in the breastwall to the downstream end of the breastwall (Sta 10+01). There were several other voids. As part of the repair forms were put in front of the breastwall from Sta 10+01 (downstream end of breastwall) to Sta 10+17 and at the downstream wingwall. The entire area was filled with concrete. Breastwall is now in equilibrium with the bridge seat supported for the full length of the abutment.

Upstream of the repaired area stones are in good condition with no large voids.

##### **Right Breastwall**

Breastwall is dry laid fieldstone.

Prior to the repair of December 2019 there was a large stone from Sta 10+05 to Sta 10+12 that had displaced 0.8' toward the channel and there was 0.3' settlement down from the bridge seat. There was a 1/8" crack in the bridge seat above the settled stone. There was a large void below the stone and the stone was only supported by point loading at the ends. There was a void at the downstream end of the breastwall measuring 3.0' long, 1.5' high and 3.5' penetration. There were several other voids. As part of the repair forms were put in front of the breastwall from Sta 9+97 (downstream end of breastwall) to Sta 10+21 and at

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## REMARKS

### **Item 60.1.d - Breastwalls (Cont'd)**

the downstream wingwall. The entire area was filled with concrete. Breastwall is now in equilibrium with the bridge seat supported for the full length of the abutment.

Upstream of the repaired area stones are in good condition with no large voids.

### **Item 60.1.e - Wingwalls**

Wingwalls are dry laid fieldstone.

### **Downstream Right Wingwall**

Prior to the repair of December 2019 there was a void at the downstream end of the breastwall/wingwall measuring 3.0' long along the breastwall, 1.5' high and 3.5' penetration into the wingwall. There were several other voids. As part of the repair forms were put in front of the breastwall and the downstream wingwall. The entire area was filled with concrete. Breastwall and wingwall are now in equilibrium.

The downstream left and upstream right and left wingwalls are in good condition with no large voids.

### **Item 60.1.j - Scour**

The undermining of the right abutment reported in inspection reports prior to 12/23/19 has been filled in with a concrete tremie repair. The undermining void was from Sta 10+10 to Sta 10+22 with a maximum height of 1.6' and a maximum penetration of 3.3'. The repair consisted of using grout bags filled with concrete and sand bags to build a form in front of the undermined area. The undermined area was then filled with tremie concrete. Extensive voids in both abutments were filled with concrete.

### **Item 60.1.k - Settlement**

#### **Left Breastwall**

Breastwall is dry laid fieldstone.

Prior to the repair of December 2019 there was a large void in the breastwall from Sta 10+06 to Sta 10+15. The void was 3.5' high with 4.9' penetration. The bridge seat above the void was unsupported and had a 1/8" vertical crack. The void area continued behind stones in the breastwall to the downstream end of the breastwall (Sta 10+01). There were several other voids. As part of the repair forms were put in front of the breastwall from Sta 10+01 (downstream end of breastwall) to Sta 10+17 and at the downstream wingwall. The entire area was filled with concrete. Breastwall is now in equilibrium with the bridge seat supported for the full length of the abutment.

Upstream of the repaired area stones are in good condition with no large voids.

#### **Right Breastwall**

Breastwall is dry laid fieldstone.

Prior to the repair of December 2019 there was a large stone from Sta 10+05 to Sta 10+12 that had displaced 0.8' toward the channel and there was 0.3' settlement down from the bridge seat. There was a 1/8" crack in the bridge seat above the settled stone. There was a large void below the stone and the stone was only supported by point loading at the ends. There was a void at the downstream end of the breastwall measuring 3.0' long, 1.5' high and 3.5' penetration. There were several other voids. As part of the repair forms were put in front of the breastwall from Sta 9+97 (downstream end of breastwall) to Sta 10+21 and at the downstream wingwall. The entire area was filled with concrete. Breastwall is now in equilibrium with the bridge seat supported for the full length of the abutment.

Upstream of the repaired area stones are in good condition with no large voids.

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## REMARKS

### ITEM 61 - CHANNEL AND CHANNEL PROTECTION

#### Item 61.1 - Channel Scour

The undermining of the right abutment reported in inspection reports prior to 12/23/19 has been filled in with a concrete tremie repair. The undermining void was from Sta 10+10 to Sta 10+22 with a maximum height of 1.6' and a maximum penetration of 3.3'. The repair consisted of using grout bags filled with concrete and sand bags to build a form in front of the undermined area. The undermined area was then filled with tremie concrete. Extensive voids in both abutments were filled with concrete.

#### Item 61.2 - Embankment Erosion

There is minor embankment erosion at all embankments.

#### Item 61.3 - Debris

There is some tree debris in the channel at the upstream end of the bridge.

There is a large tree with a diameter of 1.5' across the channel approximately 100' downstream of the bridge.

#### Sketch / Chart Log

Sketch 1 : PLAN VIEW SHOWING UNDERMINING, VOIDS AND DISPLACED STONE PRIOR TO 2019 REPAIR

Sketch 2 : PLAN VIEW SHOWING GROUT BAG PLACEMENT FOR 2019 UNDERMINING REPAIR

Sketch 3 : ELEVATION VIEW AT STA 10+08 PRIOR TO 2019 REPAIR

Sketch 4 : ELEVATION VIEW AT STA 10+08 AFTER 2019 REPAIR

Sketch 5 : ELEVATION VIEW AT STA 10+14 PRIOR TO 2019 REPAIR

Sketch 6 : ELEVATION VIEW AT STA 10+14 AFTER 2019 REPAIR

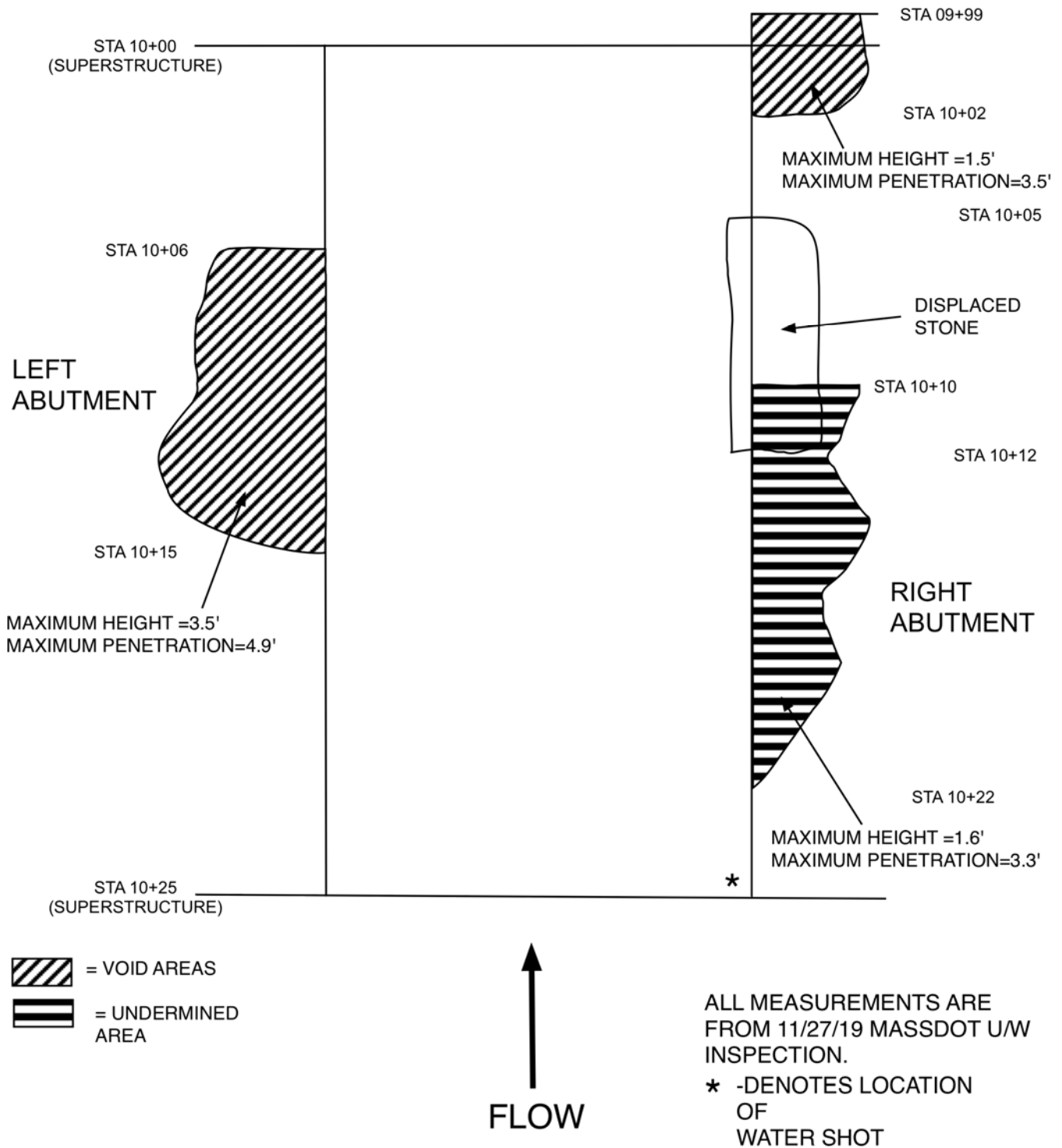
Chart 1 : UNDERMINING & VOID CHART PRIOR TO 2019 REPAIR

Chart 2 : SCOUR MONITORING CHART



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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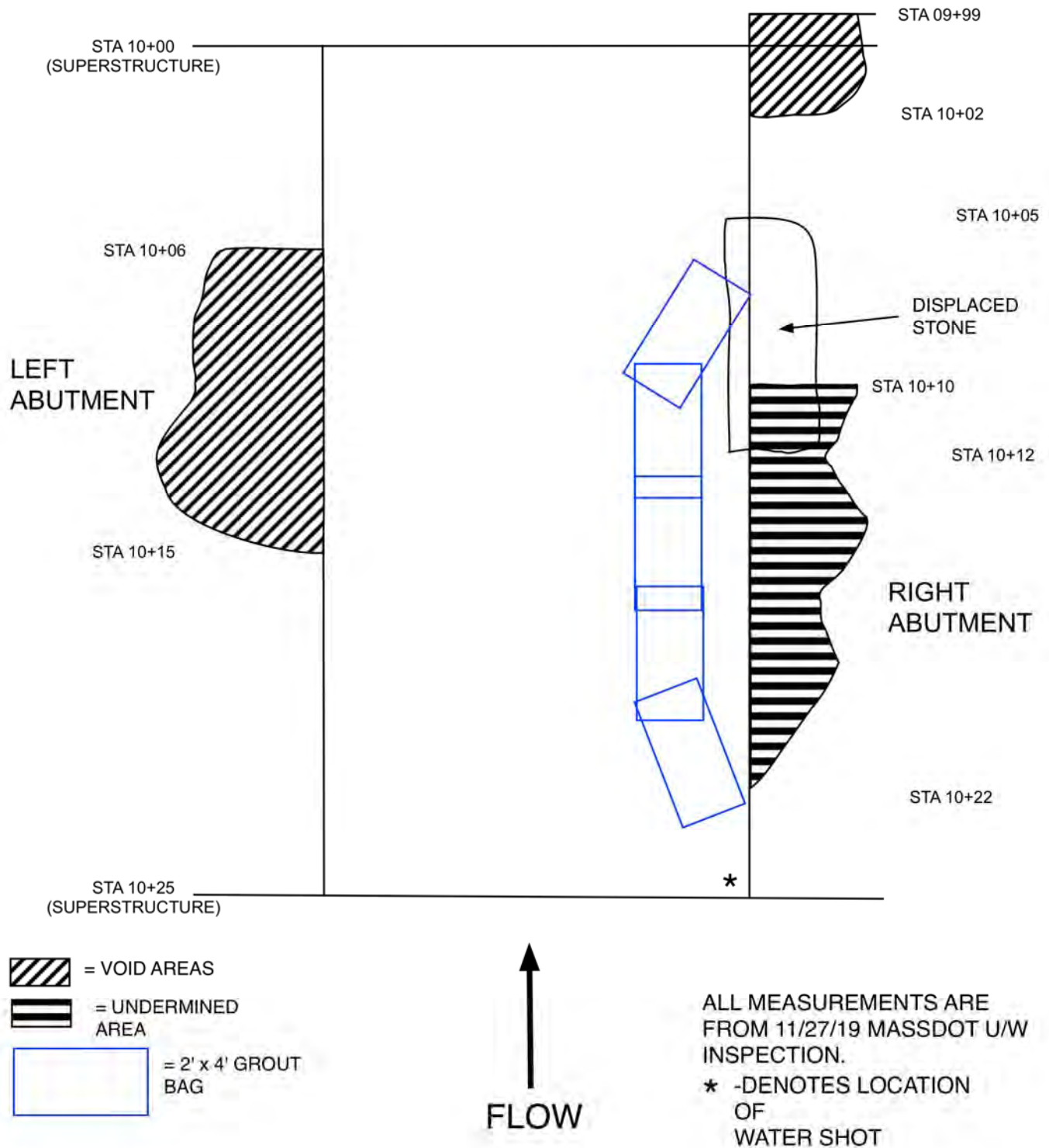
## SKETCHES



**Sketch 1: PLAN VIEW SHOWING UNDERMINING, VOIDS AND DISPLACED STONE PRIOR TO 2019 REPAIR**

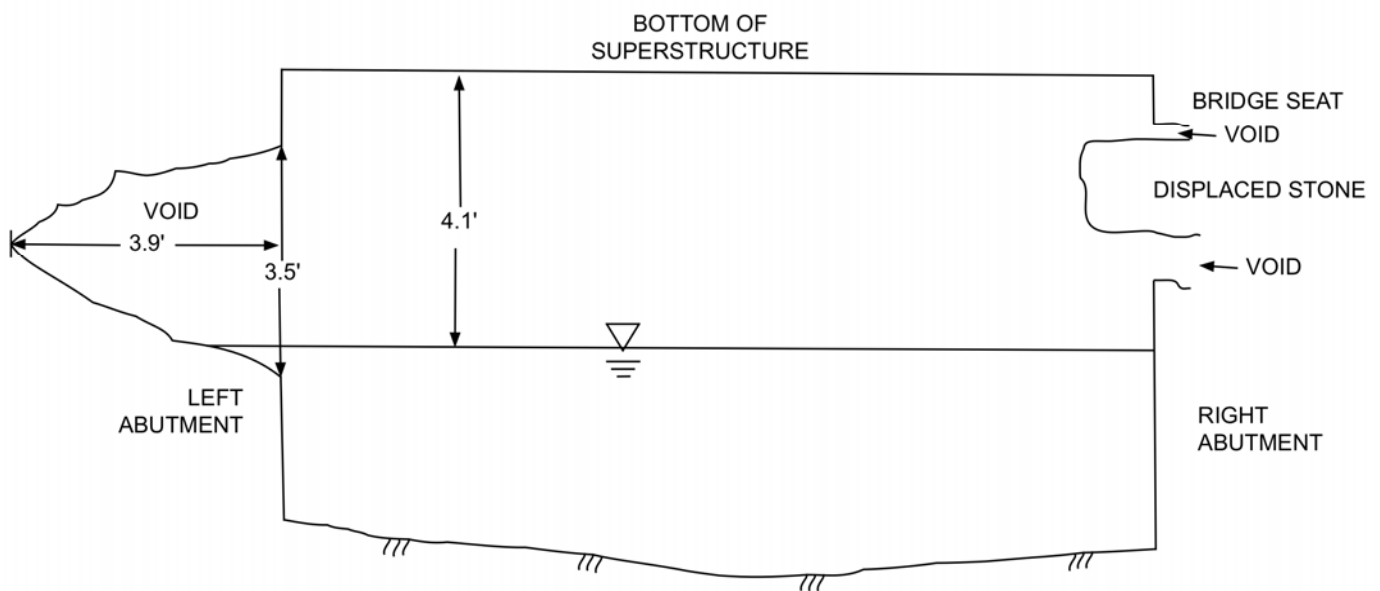
CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## SKETCHES



**Sketch 2: PLAN VIEW SHOWING GROUT BAG PLACEMENT FOR 2019 UNDERMINING REPAIR**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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**SKETCHES**

— MUDLINE AT STA 10+14

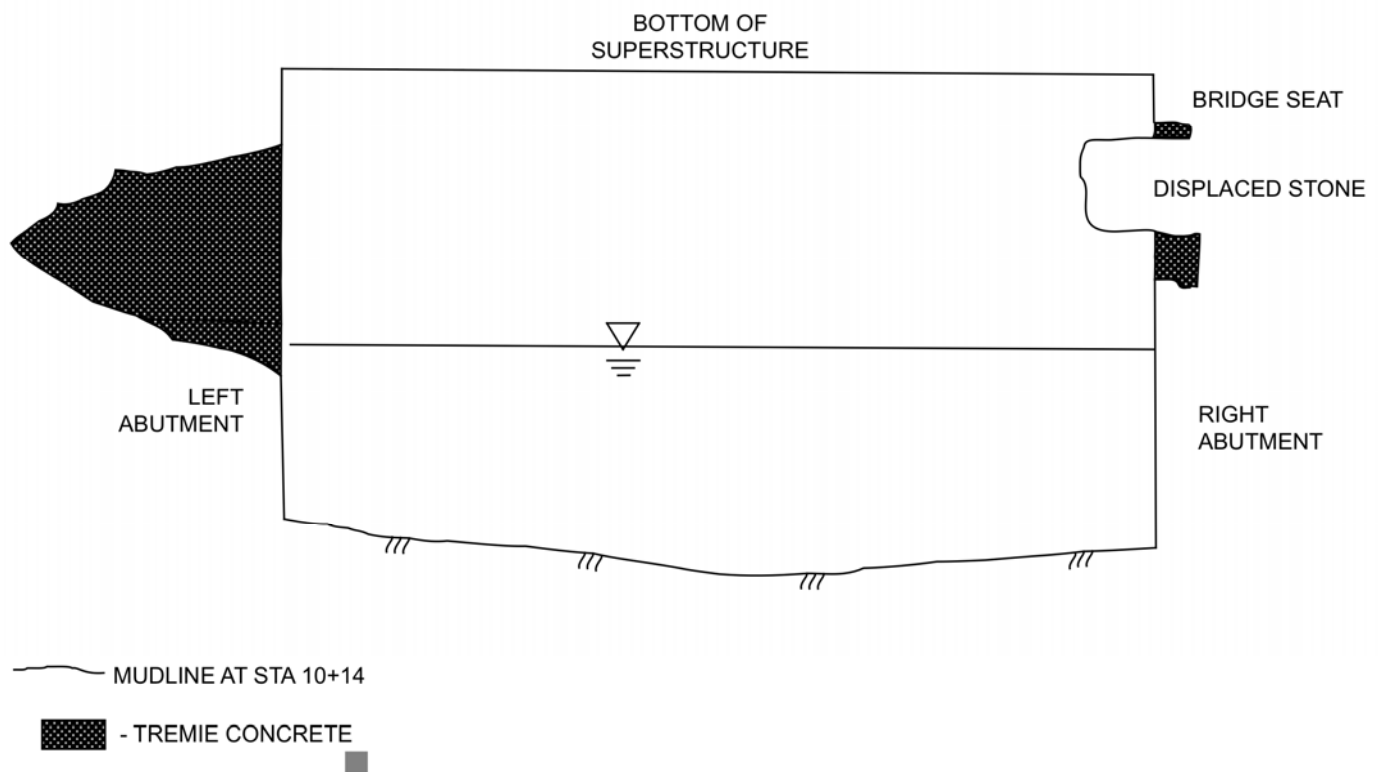
NOTE: ALL SOUNDINGS AND FIELD MEASUREMENTS  
TAKEN DURING U/W INSPECTION DATED 11/27/19

**Sketch 3: ELEVATION VIEW AT STA 10+08 PRIOR TO 2019 REPAIR**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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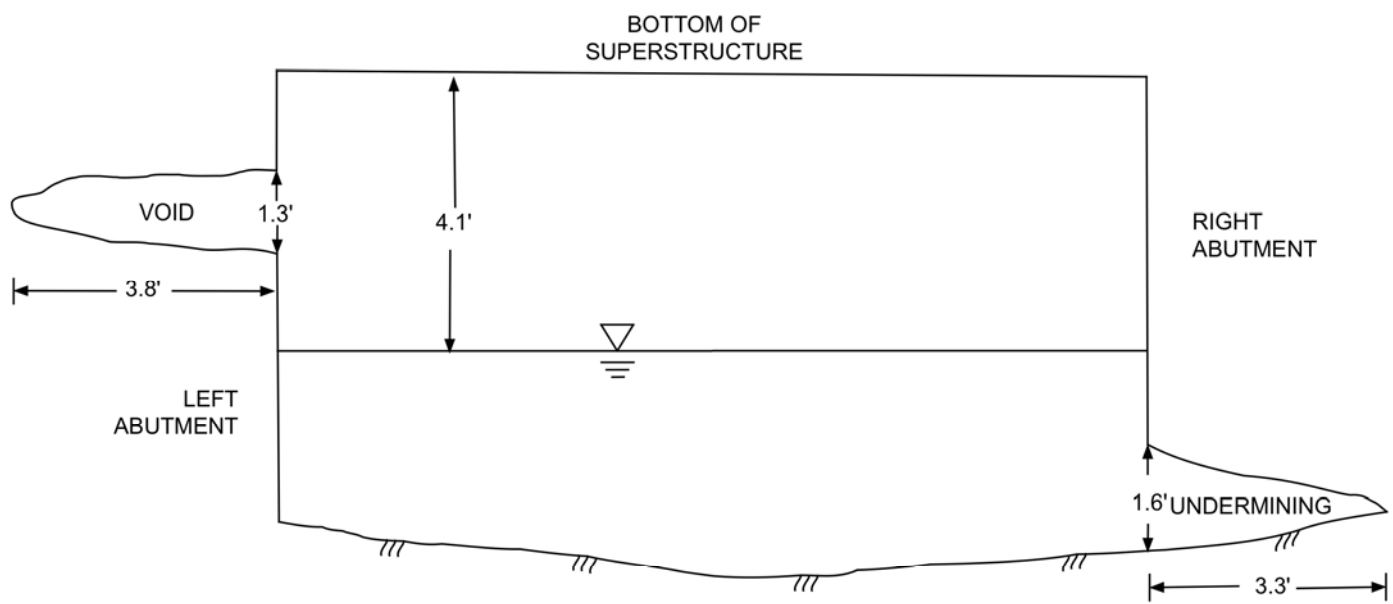
## SKETCHES



**Sketch 4: ELEVATION VIEW AT STA 10+08 AFTER 2019 REPAIR**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## SKETCHES

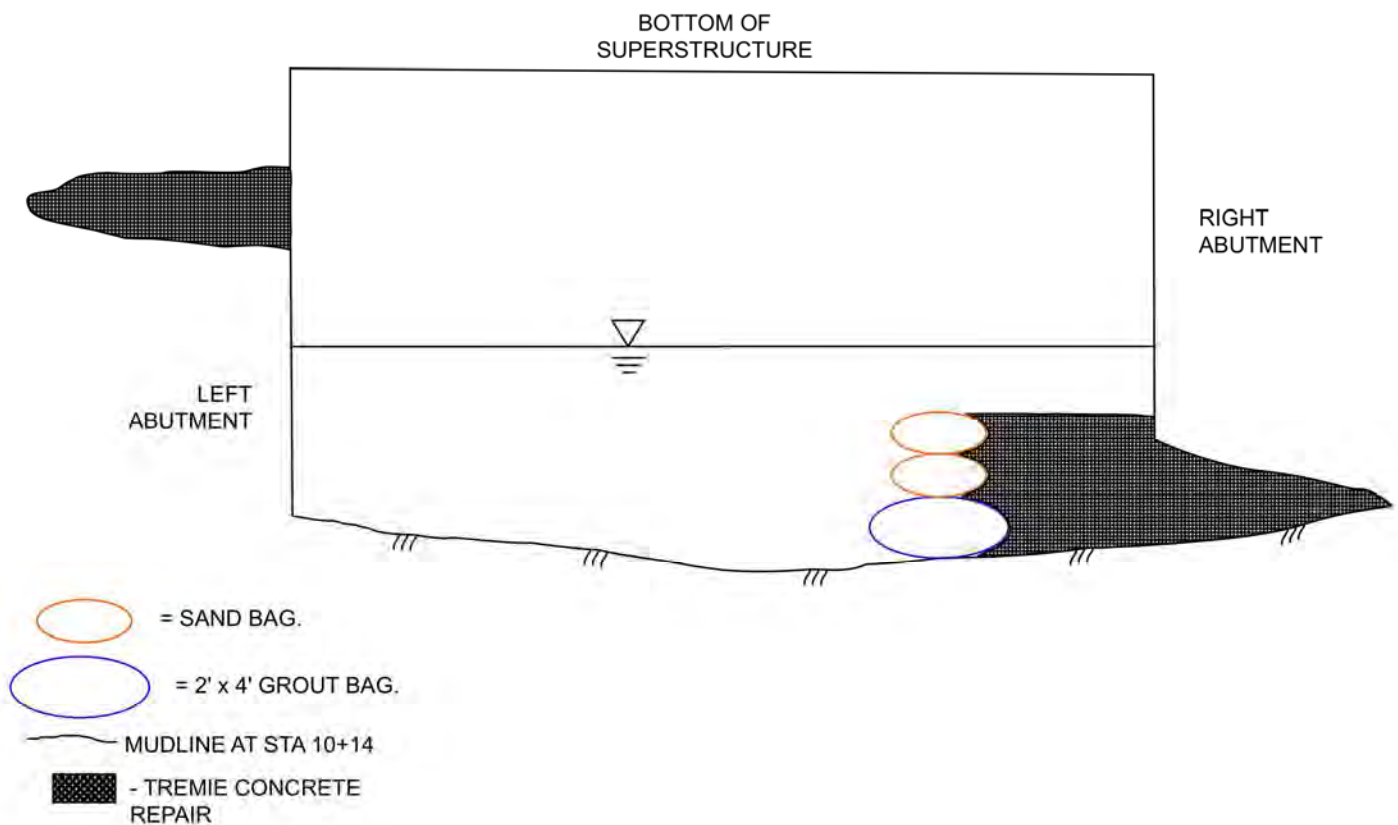


NOTE: ALL SOUNDINGS AND FIELD MEASUREMENTS  
TAKEN DURING U/W INSPECTION DATED 11/27/19

**Sketch 5: ELEVATION VIEW AT STA 10+14 PRIOR TO 2019 REPAIR**

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## SKETCHES



**Sketch 6: ELEVATION VIEW AT STA 10+14 AFTER 2019 REPAIR**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## CHARTS

### RIGHT ABUTMENT UNDERMINING CHART

	<b>11/27/19</b>	
	<b>HEIGHT</b>	<b>PENETRATION</b>
<b>STA 10+10</b>	0.6'	3.0'
<b>STA 10+12</b>	0.7'	2.1'
<b>STA 10+14</b>	1.6'	3.3'
<b>STA 10+16</b>	1.2'	2.0'
<b>STA 10+18</b>	0.9'	2.5'
<b>STA 10+20</b>	0.4'	1.5'
<b>STA 10+22</b>	0.0'	0.0'

### LEFT ABUTMENT VOID CHART

	<b>11/27/19</b>	
	<b>HEIGHT</b>	<b>PENETRATION</b>
<b>STA 10+06</b>	2.0'	2.9'
<b>STA 10+08</b>	3.5'	3.9'
<b>STA 10+10</b>	3.3'	3.8'
<b>STA 10+12</b>	3.0'	4.9'
<b>STA 10+14</b>	1.3'	3.8'
<b>STA 10+15</b>	0.0'	0.0'

#### NOTES:

1. STA 10+00 IS AT THE DOWNSTREAM END OF THE SUPERSTRUCTURE.

Chart 1: UNDERMINING & VOID CHART PRIOR TO 2019 REPAIR

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>SEP 18, 2020</b>
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## CHARTS

	11/27/19	12/23/19	9/18/20		
<b>STA 10+00</b>					
<b>LEFT ABUTMENT</b>	1.3'	1.2'	1.7'		
<b>C/L SPAN</b>	2.6'	2.6'	3.8'		
<b>RIGHT ABUTMENT</b>	3.5'	3.0'	3.2'		
<b>STA 10+14</b>					
<b>LEFT ABUTMENT</b>	2.5'	1.5'/3.2'	1.5'/3.2'		
<b>C/L SPAN</b>	3.3'	3.3'	3.3'		
<b>RIGHT ABUTMENT</b>	3.0'	1.6'/3.2'	1.7'/3.5'		
<b>STA 10+25</b>					
<b>LEFT ABUTMENT</b>	2.0'	2.3'	2.2'		
<b>C/L SPAN</b>	1.9'	2.0'	2.0'		
<b>RIGHT ABUTMENT</b>	1.0'	1.1'	0.9'		
<b>Y</b>	4.1'	4.3'	5.3'		
<b>CORRECTION FACTOR</b>	-	+0.2'	+1.2'		

### NOTES:

1. WATER CONTROL SHOT (Y) = WATERLINE TO BOTTOM OF BEAM AT UPSTREAM END OF RIGHT ABUTMENT.
2. FOR COMPARISON ALL SOUNDINGS ARE ADJUSTED TO 11/2019 WATER LEVEL.
3. STA 10+00 IS AT THE DOWNSTREAM END OF THE SUPERSTRUCTURE.
4. WHERE TWO SOUNDINGS ARE SHOWN FIRST NUMBER IS ON TOP OF REPAIR/SECOND NUMBER IS OFF REPAIR.

**Chart 2: SCOUR MONITORING CHART**

Report Date: November 20, 2020

State Information										Classification										Code																													
<b>BDEPT#= B19018</b>										Agency Br.No.										(112) NBIS Bridge Length										N																			
<b>Town= Boxford</b>										L.O.										(104) Highway System										N																			
<b>B.I.N= C68</b>										AASHTO= 037.5										(26) Functional Class - Urban Local										19																			
RANK= 0 H.I.= NA										FHWA Select List= N (6/21/2017)										(100) Defense Highway										0																			
(8) Structure Number										B19018C68MUNBRI										(101) Parallel Structure										N																			
(5) Inventory Route										04										(102) Direction of Traffic - 2-way traffic										2																			
(2) State Highway Department District										009										(103) Temporary Structure										N																			
(3) County Code										(4) Place code										07420										(105) Federal Lands Highways																			
(6) Features Intersected										<b>WATER FISH BROOK</b>										(110) Designated National Network										N																			
(7) Facility Carried										<b>HWY BROOKVIEW RD</b>										(20) Toll - On free road										3																			
(9) Location																				(21) Maintain - Town Agency										03																			
(11) Kilometerpoint										0000.000										(22) Owner - Town Agency										03																			
(12) Base Highway Network										N										(37) Historical Significance																													
(13) LRS Inventory Route & Subroute																				<b>Condition</b>										<b>Code</b>																			
(16) Latitude										42DEG 39MIN 53.40 SEC										(58) Deck										5																			
(17) Longitude										71DEG 01MIN 40.30 SEC										(59) Superstructure										5																			
(98) Border Bridge State Code										Share %										(60) Substructure										5																			
(99) Border Bridge Structure No. #																				(61) Channel & Channel Protection										6																			
																				(62) Culverts										N																			
<b>Structure Type and Material</b>																				<b>Load Rating and Posting</b>										<b>Code</b>																			
(43) Structure Type Main: Prestressed Concrete										Code 501										(31) Design Load - Unknown										0																			
Slab										Jointless bridge type: Not applicable										(63) Operating Rating Method -																													
(44) Structure Type Appr: Other										Code 000										(64) Operating Rating										0																			
(45) Number of spans in main unit										001										(65) Inventory Rating Method -																													
(46) Number of approach spans										0000										(66) Inventory Rating										0																			
(107) Deck Structure Type - Concrete Precast Panels										Code 2										(70) Bridge Posting										0																			
(108) Wearing Surface / Protective System:																				(41) Structure - Open										A																			
A) Type of wearing surface - Bituminous										Code 6										<b>Appraisal</b>										<b>Code</b>																			
B) Type of membrane - Unknown										Code 8										(67) Structural Evaluation										3																			
C) Type of deck protection - Unknown										Code 8										(68) Deck Geometry										N																			
																				(69) Underclearances, vert. and horiz.										N																			
																				(71) Waterway adequacy										7																			
																				(72) Approach Roadway Alignment										7																			
																				(36) Traffic Safety Features										0 0 0 0																			
																				(113) Scour Critical Bridges																													
<b>Age and Service</b>																				<b>Inspections</b>																													
(27) Year Built										0000										(90) Inspection Date 11/26/19										(91) Frequency 24 MO																			
(106) Year Reconstructed										0000										(92) Critical Feature Inspection:										(93) CFI DATE																			
(42) Type of Service: On - Highway																				(A) Fracture Critical Detail N 00 MO A)										00/00/00																			
Under - Waterway										Code 15										(B) Underwater Inspection Y 36 MO B)										09/18/20																			
(28) Lanes: On Structure 02 Under structure										00										(C) Other Special Inspection N 00 MO C)										01/31/20																			
(29) Average Daily Traffic										000350										(*) Other Inspection ( ) N 00 MO *)										00/00/00																			
(30) Year of ADT 2019 (109) Truck ADT										05 %										(*) Closed Bridge N 00 MO *)										00/00/00																			
(19) Bypass, detour length										008 KM										(*) UW Special Inspection N 00 MO *)										00/00/00																			
																				(*) Damage Inspection										MO *) 00/00/00																			
<b>Geometric Data</b>																				<b>Rating Loads</b>																													
(48) Length of maximum span										0004.1 M										Report Date 00/00/00										H20																			
(49) Structure Length										00004.1 M										Operating										0.0																			
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M																				Inventory										0.0																			
(51) Bridge Roadway Width Curb to Curb										000.0 M																				Type 3																			
(52) Deck Width Out to Out										000.0 M																				Type 3S2																			
(32) Approach Roadway Width (w/shoulders)										000.0 M																				Type HS																			
(33) Bridge Median -										Code																																							
(34) Skew 00 DEG (35) Structure Flared										N																																							
(10) Inventory Route MIN Vert Clear										00.00 M										Status										Posting Date 00/00/00																			
(47) Inventory Route Total Horiz Clear										00.0 M										2 Axle										3 Axle																			
(53) Min Vert Clear Over Bridge Rdwy										00.00 M										5 Axle										Single																			
(54) Min Vert Underclear ref										00.00 M										Actual																													
(55) Min Lat Underclear RT ref										00.0 M										Recommended																													
(56) Min Lat Underclear LT										00.0 M										Missing Signs N																													
																				<b>Misc.</b>																													
<b>Navigation Data</b>																				<b>Bridge Name</b>																													
(38) Navigation Control - No navigation control on waterway										Code 0										N Anti-missile fence										N Acrow Panel																			
(111) Pier Protection										Code 1										N Jointless Bridge																													
(39) Navigation Vertical Clearance										000.0 M										Freeze/Thaw																													
(116) Vert-lift Bridge Nav Min Vert Clear										M										Accessibility (Needed/Used)																													
(40) Navigation Horizontal Clearance										0000.0 M										N / N Liftbucket										N / N Rigging																			
																				N / N Ladder										Other																			
																				N / N Boat										N / N Staging																			
																				Y / Y Wader										N / N Traffic Control																			
																				N / N Inspector 50										N / N RR Flagperson																			
																														Inspection																			
																														Hours: 012																			



2-DIST

B.I.N.

## STRUCTURES INSPECTION FIELD REPORT

BR. DEPT. NO.

04

C68

## SPECIAL MEMBER INSPECTION

B-19-018

CITY/TOWN <b>BOXFORD</b>	8-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	11-Kilo. POINT <b>000.000</b>	90-ROUTINE INSP. DATE <b>Nov 26, 2019</b>	93*-SPEC. MEMB. INSP. DATE <b>Jan 31, 2020</b>
07-FACILITY CARRIED <b>HWY BROOKVIEW RD</b>	MEMORIAL NAME/LOCAL NAME		27-YR BUILT <b>0000</b>	106-YR REBUILT <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>	26-FUNCTIONAL CLASS <b>Urban Local</b>	DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>501 : Prestressed Concrete Slab</b>	22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER <b>A. Labib</b>	
107-DECK TYPE <b>2 : Concrete Precast Panels</b>	WEATHER <b>Clear</b>	TEMP. (air) <b>-5°C</b>	TEAM MEMBERS <b>K. CARR</b>	

<b>WEIGHT POSTING</b>		<i>Not Applicable</i> <input checked="" type="checkbox"/>		<b>At bridge</b>		<b>Advance</b>		<b>PLANS</b> (Y/N): <b>N</b>	
	H	3	3S2	Single	N	S	N	S	
Actual Posting	<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>					
Recommended Posting	<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>					<b>(V.C.R.)</b> (Y/N): <b>N</b>
Waived Date: 00/00/0000	EJDMT Date: 00/00/0000								<b>TAPE#:</b> _____

<b>RATING</b>		Rating Report (Y/N): <b>N</b> Date: ----		Recommend for Rating or Rerating (Y/N): <b>N</b>		If YES please give priority: HIGH ( ) MEDIUM ( ) LOW ( )	
Inspection data at time of existing rating I 58: - I 59: - I 60: - I 62: - Date :00/00/0000				<b>REASON:</b> _____			

## SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS (0-9)	PRESENT (0-9)	H-20	3	3S2	
A	Item 60.1.d - Breastwalls	N		See remarks in comments section.	2	5	Not Rated			M-P
B	Item 60.1.j - Scour	N		See remarks in comments section.	3	6	Not Rated			-
C	Item 61.1 - Channel Scour	N	N	See Item 60.1.j - Scour	3	6	Not Rated			-
D										
E										

List of field tests performed:	(Overall Previous Condition)	I-58	I-59	I-60	I-62
		<b>5</b>	<b>5</b>	<b>2</b>	<b>-</b>
	(Overall Current Condition)	<b>5</b>	<b>5</b>	<b>5</b>	<b>-</b>

**DEFICIENCY:** A defect in a structure that requires corrective action.

**CATEGORIES OF DEFICIENCIES:**

**M= Minor Deficiency** - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

**S= Severe/Major Deficiency** - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

**C-S= Critical Structural Deficiency** - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

**C-H= Critical Hazard Deficiency** - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

**URGENCY OF REPAIR:**

**I = Immediate-** [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

**A = ASAP-** [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

**P = Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

X=UNKNOWN

N=NOT APPLICABLE

H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>JAN 31, 2020</b>
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## REMARKS

### **BRIDGE ORIENTATION**

The one span structure carries Brookview Road over the Fish brook, which flows from west to east. For this report, the abutments are labeled South and North.

### **ITEM 60 - SUBSTRUCTURE**

#### **Item 60.1 - Abutments**

#### **Item 60.1.d - Breastwalls**

##### Both Breastwalls:

There are penetrable void areas between all stones.

Several stones have full height cracks, up to 1/4" wide.

The concrete cap has areas of minor honeycombing throughout.

For underwater details, refer to the Routine Underwater Inspection Report dated 12/23/2019.

##### North Breastwall:

The east half of the breastwall has been repaired with concrete. The repair is approximately 17' long x full height above the current water level. **See photos 1 & 2.**

The remaining length has penetrable voids between all stones. **See photo 3.**

At the west edge, the second stone from the top has a full height crack, up to 1" wide.

The concrete cap has a full height crack, up to 1/8" wide, above the west edge of the washout area. **See photo 4.**

##### South Breastwall:

There is a concrete repair along the majority of the breastwall length starting near the west end and extending into the southeast wingwall area. **See photo 5.**

#### **Item 60.1.j - Scour**

The previously noted scour area has been filled with a concrete tremie repair.

The Routine Underwater Inspection Report dated 12/23/2019 rated the element "6" with no deficiency code.

For underwater details, refer to the Routine Underwater Inspection Report dated 12/23/2019.

### **Photo Log**

- Photo 1 : North breastwall, concrete repair throughout the east half.
- Photo 2 : North breastwall, concrete repair starting at the east edge; alternate view.
- Photo 3 : North breastwall, typical void areas throughout the remaining length past the repair.
- Photo 4 : North breastwall, west edge stone with a full height crack.
- Photo 5 : South breastwall, large concrete repair extending into the southeast wingwall corner.

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>JAN 31, 2020</b>
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**PHOTOS**

**Photo 1:** North breastwall, concrete repair throughout the east half.



**Photo 2:** North breastwall, concrete repair starting at the east edge; alternate view.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>JAN 31, 2020</b>
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**PHOTOS**

**Photo 3:** North breastwall, typical void areas throughout the remaining length past the repair.



**Photo 4:** North breastwall, west edge stone with a full height crack.

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>JAN 31, 2020</b>
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**PHOTOS**

**Photo 5:** South breastwall, large concrete repair extending into the southeast wingwall corner.

Report Date: November 20, 2020

State Information				Classification				Code				
<b>BDEPT#= B19018</b>				Agency Br.No.				(112) NBIS Bridge Length				N
<b>Town= Boxford</b>				L.O.				(104) Highway System				N
<b>B.I.N= C68</b>				AASHTO= 037.5				(26) Functional Class - Urban Local				19
RANK= 0 H.I.= NA				FHWA Select List= N (6/21/2017)				(100) Defense Highway				0
(8) Structure Number				B19018C68MUNBRI				(101) Parallel Structure				N
(5) Inventory Route				04				(102) Direction of Traffic - 2-way traffic				2
(2) State Highway Department District				009				(103) Temporary Structure				N
(3) County Code				(4) Place code				(105) Federal Lands Highways				
(6) Features Intersected				<b>WATER FISH BROOK</b>				(110) Designated National Network				N
(7) Facility Carried				<b>HWY BROOKVIEW RD</b>				(20) Toll - On free road				3
(9) Location								(21) Maintain - Town Agency				03
(11) Kilometerpoint				0000.000				(22) Owner - Town Agency				03
(12) Base Highway Network				N				(37) Historical Significance				
(13) LRS Inventory Route & Subroute								<b>Condition</b>				<b>Code</b>
(16) Latitude				42DEG 39MIN 53.40 SEC				(58) Deck				5
(17) Longitude				71DEG 01MIN 40.30 SEC				(59) Superstructure				5
(98) Border Bridge State Code				Share %				(60) Substructure				5
(99) Border Bridge Structure No. #								(61) Channel & Channel Protection				6
								(62) Culverts				N
<b>Structure Type and Material</b>								<b>Load Rating and Posting</b>				<b>Code</b>
(43) Structure Type Main: Prestressed Concrete				Code 501				(31) Design Load - Unknown				0
Slab				Jointless bridge type: Not applicable				(63) Operating Rating Method -				
(44) Structure Type Appr: Other				Code 000				(64) Operating Rating				0
(45) Number of spans in main unit				001				(65) Inventory Rating Method -				
(46) Number of approach spans				0000				(66) Inventory Rating				0
(107) Deck Structure Type - Concrete Precast Panels				Code 2				(70) Bridge Posting				0
(108) Wearing Surface / Protective System:								(41) Structure - Open				A
A) Type of wearing surface - Bituminous				Code 6				<b>Appraisal</b>				<b>Code</b>
B) Type of membrane - Unknown				Code 8				(67) Structural Evaluation				3
C) Type of deck protection - Unknown				Code 8				(68) Deck Geometry				N
								(69) Underclearances, vert. and horiz.				N
								(71) Waterway adequacy				7
								(72) Approach Roadway Alignment				7
(27) Year Built				0000				(36) Traffic Safety Features				0 0 0 0
(106) Year Reconstructed				0000				(113) Scour Critical Bridges				
(42) Type of Service: On - Highway								<b>Inspections</b>				
Under - Waterway				Code 15				(90) Inspection Date 11/26/19				(91) Frequency 24 MO
(28) Lanes: On Structure 02				Under structure 00				(92) Critical Feature Inspection:				(93) CFI DATE
(29) Average Daily Traffic				000350				(A) Fracture Critical Detail				N 00 MO A) 00/00/00
(30) Year of ADT 2019				(109) Truck ADT 05 %				(B) Underwater Inspection				Y 36 MO B) 09/18/20
(19) Bypass, detour length				008 KM				(C) Other Special Inspection				N 00 MO C) 01/31/20
								(*) Other Inspection ( )				N 00 MO *) 00/00/00
								(*) Closed Bridge				N 00 MO *) 00/00/00
								(*) UW Special Inspection				N 00 MO *) 00/00/00
								(*) Damage Inspection				MO *) 00/00/00
<b>Geometric Data</b>								<b>Rating Loads</b>				
(48) Length of maximum span				0004.1 M				Report Date 00/00/00				H20 Type 3 Type 3S2 Type HS
(49) Structure Length				00004.1 M				Operating				0.0 0.0 0.0 0.0
(50) Curb or sidewalk: Left 00.0 M				Right 00.0 M				Inventory				0.0 0.0 0.0 0.0
(51) Bridge Roadway Width Curb to Curb				000.0 M				<b>Field Posting</b>				
(52) Deck Width Out to Out				000.0 M				Status				Posting Date 00/00/00
(32) Approach Roadway Width (w/shoulders)				000.0 M				2 Axle 3 Axle 5 Axle Single				
(33) Bridge Median -				Code				Actual				
(34) Skew 00 DEG				(35) Structure Flared				Recommended				
(10) Inventory Route MIN Vert Clear				00.00 M				Missing Signs N				
(47) Inventory Route Total Horiz Clear				00.0 M				<b>Misc.</b>				
(53) Min Vert Clear Over Bridge Rdwy				00.00 M				Bridge Name				
(54) Min Vert Underclear ref				00.00 M				N Anti-missile fence N Acrow Panel N Jointless Bridge				
(55) Min Lat Underclear RT ref				00.0 M				Freeze/Thaw				
(56) Min Lat Underclear LT				00.0 M				Accessibility (Needed/Used)				
(38) Navigation Control - No navigation control on waterway				Code 0				N / N Liftbucket				N / N Rigging Other
(111) Pier Protection				Code 1				N / N Ladder				N / N Staging
(39) Navigation Vertical Clearance				000.0 M				N / N Boat				N / N Traffic Control
(116) Vert-lift Bridge Nav Min Vert Clear				M				Y / Y Wader				Inspection Hours: 012
(40) Navigation Horizontal Clearance				0000.0 M				N / N Inspector 50				N / N Police



2-DIST  
**04**B.I.N.  
**C68****STRUCTURES INSPECTION FIELD REPORT**

BR. DEPT. NO.

**ROUTINE & SPECIAL MEMBER INSPECTION****B-19-018**

CITY/TOWN <b>BOXFORD</b>		8-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>		11-Kilo. POINT <b>000.000</b>	41-STATUS <b>A:OPEN</b>	90-ROUTINE INSP. DATE <b>NOV 26, 2019</b>
07-FACILITY CARRIED <b>HWY BROOKVIEW RD</b>		MEMORIAL NAME/LOCAL NAME		27-YR BUILT <b>0000</b>	106-YR REBUILT <b>0000</b>	YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>		26-FUNCTIONAL CLASS <b>Urban Local</b>		DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>501 : Prestressed Concrete Slab</b>		22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER <b>A. Labib</b>		
107-DECK TYPE <b>2 : Concrete Precast Panels</b>		WEATHER <b>Clear</b>	TEMP. (air) <b>-3°C</b>	TEAM MEMBERS <b>O. MOUSTAFA</b>		

<b>ITEM 58</b> <div>5</div> <b>DECK</b> <div>DEF</div> <table border="1"> <tr><td>1. Wearing Surface</td><td>7</td><td>-</td></tr> <tr><td>2. Deck Condition</td><td>5</td><td>M-P</td></tr> <tr><td>3. Stay in Place Forms</td><td>N</td><td>-</td></tr> <tr><td>4. Curbs</td><td>N</td><td>-</td></tr> <tr><td>5. Median</td><td>N</td><td>-</td></tr> <tr><td>6. Sidewalks</td><td>N</td><td>-</td></tr> <tr><td>7. Parapets</td><td>N</td><td>-</td></tr> <tr><td>8. Railing</td><td>3</td><td>S-A</td></tr> <tr><td>9. Anti Missile Fence</td><td>N</td><td>-</td></tr> <tr><td>10. Drainage System</td><td>N</td><td>-</td></tr> <tr><td>11. Lighting Standards</td><td>N</td><td>-</td></tr> <tr><td>12. Utilities</td><td>N</td><td>-</td></tr> <tr><td>13. Deck Joints</td><td>N</td><td>-</td></tr> <tr><td>14.</td><td>N</td><td>-</td></tr> <tr><td>15.</td><td>N</td><td>-</td></tr> <tr><td>16.</td><td>N</td><td>-</td></tr> </table> <div> <div>E</div> <div>W</div> </div> <div> <div>CURB REVEAL</div> <div>(In millimeters)</div> <div>N</div> <div>N</div> </div>			1. Wearing Surface	7	-	2. Deck Condition	5	M-P	3. Stay in Place Forms	N	-	4. Curbs	N	-	5. Median	N	-	6. Sidewalks	N	-	7. Parapets	N	-	8. Railing	3	S-A	9. Anti Missile Fence	N	-	10. Drainage System	N	-	11. Lighting Standards	N	-	12. Utilities	N	-	13. Deck Joints	N	-	14.	N	-	15.	N	-	16.	N	-	<b>ITEM 59</b> <div>5</div> <b>SUPERSTRUCTURE</b> <div>DEF</div> <table border="1"> <tr><td>1. Stringers</td><td>N</td><td>-</td></tr> <tr><td>2. Floorbeams</td><td>N</td><td>-</td></tr> <tr><td>3. Floor System Bracing</td><td>N</td><td>-</td></tr> <tr><td>4. Girders or Beams</td><td>N</td><td>-</td></tr> <tr><td>5. Trusses - General</td><td>N</td><td>-</td></tr> <tr><td>    a. Upper Chords</td><td>N</td><td>-</td></tr> <tr><td>    b. Lower Chords</td><td>N</td><td>-</td></tr> <tr><td>    c. Web Members</td><td>N</td><td>-</td></tr> <tr><td>    d. Lateral Bracing</td><td>N</td><td>-</td></tr> <tr><td>    e. Sway Bracings</td><td>N</td><td>-</td></tr> <tr><td>    f. Portals</td><td>N</td><td>-</td></tr> <tr><td>    g. End Posts</td><td>N</td><td>-</td></tr> <tr><td>6. Pin &amp; Hangers</td><td>N</td><td>-</td></tr> <tr><td>7. Conn Plt's, Gussets &amp; Angles</td><td>N</td><td>-</td></tr> <tr><td>8. Cover Plates</td><td>N</td><td>-</td></tr> <tr><td>9. Bearing Devices</td><td>N</td><td>-</td></tr> <tr><td>10. Diaphragms/Cross Frames</td><td>N</td><td>-</td></tr> <tr><td>11. Rivets &amp; Bolts</td><td>N</td><td>-</td></tr> <tr><td>12. Welds</td><td>N</td><td>-</td></tr> <tr><td>13. Member Alignment</td><td>7</td><td>-</td></tr> <tr><td>14. Paint/Coating</td><td>N</td><td>-</td></tr> <tr><td>15. Slab</td><td>5</td><td>M-P</td></tr> </table> <div> <div>Year Painted</div> <div>N</div> </div> <div> <div>COLLISION DAMAGE: Please explain</div> <div>None (X) Minor ( ) Moderate ( ) Severe ( )</div> </div> <div> <div>LOAD DEFLECTION: Please explain</div> <div>None (X) Minor ( ) Moderate ( ) Severe ( )</div> </div> <div> <div>LOAD VIBRATION: Please explain</div> <div>None (X) Minor ( ) Moderate ( ) Severe ( )</div> </div> <div> <div>Any Fracture Critical Member: (Y/N)</div> <div>N</div> </div> <div> <div>Any Cracks: (Y/N)</div> <div>N</div> </div>			1. Stringers	N	-	2. Floorbeams	N	-	3. Floor System Bracing	N	-	4. Girders or Beams	N	-	5. Trusses - General	N	-	a. Upper Chords	N	-	b. Lower Chords	N	-	c. Web Members	N	-	d. Lateral Bracing	N	-	e. Sway Bracings	N	-	f. Portals	N	-	g. End Posts	N	-	6. Pin & Hangers	N	-	7. Conn Plt's, Gussets & Angles	N	-	8. Cover Plates	N	-	9. Bearing Devices	N	-	10. Diaphragms/Cross Frames	N	-	11. Rivets & Bolts	N	-	12. Welds	N	-	13. Member Alignment	7	-	14. Paint/Coating	N	-	15. Slab	5	M-P	<b>ITEM 60</b> <div>2</div> <b>SUBSTRUCTURE</b> <div>DEF</div> <table border="1"> <tr><td>1. Abutments</td><td>Dive</td><td>Cur</td><td>2</td><td>-</td></tr> <tr><td>    a. Pedestals</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    b. Bridge Seats</td><td>N</td><td>H</td><td></td><td>-</td></tr> <tr><td>    c. Backwalls</td><td>N</td><td>H</td><td></td><td>-</td></tr> <tr><td>    d. Breastwalls</td><td>N</td><td>2</td><td></td><td>C-S-I</td></tr> <tr><td>    e. Wingwalls</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    f. Slope Paving/Rip-Rap</td><td>N</td><td>H</td><td></td><td>-</td></tr> <tr><td>    g. Pointing</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    h. Footings</td><td>N</td><td>H</td><td></td><td>-</td></tr> <tr><td>    i. Piles</td><td>N</td><td>X</td><td></td><td>-</td></tr> <tr><td>    j. Scour</td><td>N</td><td>3</td><td></td><td>C-S-I</td></tr> <tr><td>    k. Settlement</td><td>N</td><td>7</td><td></td><td>-</td></tr> <tr><td>    l.</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    m.</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>2. Piers or Bents</td><td></td><td></td><td>N</td><td>-</td></tr> <tr><td>    a. Pedestals</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    b. Caps</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    c. Columns</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    d. Stems/Webs/Pierwalls</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    e. Pointing</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    f. Footing</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    g. Piles</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    h. Scour</td><td>N</td><td>N</td><td></td><td>-</td></tr> <tr><td>    i. 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Fasteners</td><td>N</td><td>N</td><td></td><td>-</td></tr> </table> <div> <div>UNDERMINING (Y/N) If YES please explain</div> <div>N</div> </div> <div> <div>COLLISION DAMAGE:</div> <div>None (X) Minor ( ) Moderate ( ) Severe ( )</div> </div> <div> <div>SCOUR: Please explain</div> <div>None ( ) Minor ( ) Moderate (X) Severe ( )</div> </div> <div> <div>I-60 (Dive Report):</div> <div>N</div> <div>I-60 (This Report):</div> <div>2</div> </div> <div> <div>93B-U/W (DIVE) Insp</div> <div>00/00/0000</div> </div>			1. Abutments	Dive	Cur	2	-	a. Pedestals	N	N		-	b. Bridge Seats	N	H		-	c. Backwalls	N	H		-	d. Breastwalls	N	2		C-S-I	e. Wingwalls	N	N		-	f. Slope Paving/Rip-Rap	N	H		-	g. Pointing	N	N		-	h. Footings	N	H		-	i. Piles	N	X		-	j. Scour	N	3		C-S-I	k. Settlement	N	7		-	l.	N	N		-	m.	N	N		-	2. Piers or Bents			N	-	a. Pedestals	N	N		-	b. Caps	N	N		-	c. Columns	N	N		-	d. Stems/Webs/Pierwalls	N	N		-	e. Pointing	N	N		-	f. Footing	N	N		-	g. Piles	N	N		-	h. Scour	N	N		-	i. Settlement	N	N		-	j.	N	N		-	k.	N	N		-	3. Pile Bents			N	-	a. Pile Caps	N	N		-	b. Piles	N	N		-	c. Diagonal Bracing	N	N		-	d. Horizontal Bracing	N	N		-	e. Fasteners	N	N		-
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b. Lower Chords	N	-																																																																																																																																																																																																																																																																																								
c. Web Members	N	-																																																																																																																																																																																																																																																																																								
d. Lateral Bracing	N	-																																																																																																																																																																																																																																																																																								
e. Sway Bracings	N	-																																																																																																																																																																																																																																																																																								
f. Portals	N	-																																																																																																																																																																																																																																																																																								
g. End Posts	N	-																																																																																																																																																																																																																																																																																								
6. Pin & Hangers	N	-																																																																																																																																																																																																																																																																																								
7. Conn Plt's, Gussets & Angles	N	-																																																																																																																																																																																																																																																																																								
8. Cover Plates	N	-																																																																																																																																																																																																																																																																																								
9. Bearing Devices	N	-																																																																																																																																																																																																																																																																																								
10. Diaphragms/Cross Frames	N	-																																																																																																																																																																																																																																																																																								
11. Rivets & Bolts	N	-																																																																																																																																																																																																																																																																																								
12. Welds	N	-																																																																																																																																																																																																																																																																																								
13. Member Alignment	7	-																																																																																																																																																																																																																																																																																								
14. Paint/Coating	N	-																																																																																																																																																																																																																																																																																								
15. Slab	5	M-P																																																																																																																																																																																																																																																																																								
1. Abutments	Dive	Cur	2	-																																																																																																																																																																																																																																																																																						
a. Pedestals	N	N		-																																																																																																																																																																																																																																																																																						
b. Bridge Seats	N	H		-																																																																																																																																																																																																																																																																																						
c. Backwalls	N	H		-																																																																																																																																																																																																																																																																																						
d. Breastwalls	N	2		C-S-I																																																																																																																																																																																																																																																																																						
e. Wingwalls	N	N		-																																																																																																																																																																																																																																																																																						
f. Slope Paving/Rip-Rap	N	H		-																																																																																																																																																																																																																																																																																						
g. Pointing	N	N		-																																																																																																																																																																																																																																																																																						
h. Footings	N	H		-																																																																																																																																																																																																																																																																																						
i. Piles	N	X		-																																																																																																																																																																																																																																																																																						
j. Scour	N	3		C-S-I																																																																																																																																																																																																																																																																																						
k. Settlement	N	7		-																																																																																																																																																																																																																																																																																						
l.	N	N		-																																																																																																																																																																																																																																																																																						
m.	N	N		-																																																																																																																																																																																																																																																																																						
2. Piers or Bents			N	-																																																																																																																																																																																																																																																																																						
a. Pedestals	N	N		-																																																																																																																																																																																																																																																																																						
b. Caps	N	N		-																																																																																																																																																																																																																																																																																						
c. Columns	N	N		-																																																																																																																																																																																																																																																																																						
d. Stems/Webs/Pierwalls	N	N		-																																																																																																																																																																																																																																																																																						
e. Pointing	N	N		-																																																																																																																																																																																																																																																																																						
f. Footing	N	N		-																																																																																																																																																																																																																																																																																						
g. Piles	N	N		-																																																																																																																																																																																																																																																																																						
h. Scour	N	N		-																																																																																																																																																																																																																																																																																						
i. Settlement	N	N		-																																																																																																																																																																																																																																																																																						
j.	N	N		-																																																																																																																																																																																																																																																																																						
k.	N	N		-																																																																																																																																																																																																																																																																																						
3. Pile Bents			N	-																																																																																																																																																																																																																																																																																						
a. Pile Caps	N	N		-																																																																																																																																																																																																																																																																																						
b. Piles	N	N		-																																																																																																																																																																																																																																																																																						
c. Diagonal Bracing	N	N		-																																																																																																																																																																																																																																																																																						
d. Horizontal Bracing	N	N		-																																																																																																																																																																																																																																																																																						
e. Fasteners	N	N		-																																																																																																																																																																																																																																																																																						

X=UNKNOWN

N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE

R=REMOVED

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**ITEM 61**  
**CHANNEL & CHANNEL PROTECTION**

	Dive	Cur	DEF
1.Channel Scour	N	3	-
2.Embankment Erosion	N	6	M-P
3.Debris	N	4	S-A
4.Vegetation	N	7	-
5.Utilities	N	N	-
6.Rip-Rap/Slope Protection	N	H	-
7.Aggradation	N	7	-
8.Fender System	N	N	-

**STREAM FLOW VELOCITY:**  
Tidal ( ) High ( ) Moderate ( ) Low ( ) None ( )

ITEM 61 (Dive Report): ☐ N    ITEM 61 (This Report): ☐ 3

93b-U/W INSP. DATE:

**ITEM 36 TRAFFIC SAFETY**

	36	COND	DEF
A. Bridge Railing	0	3	S-A
B. Transitions	0	3	S-A
C. Approach Guardrail	0	3	S-A
D. Approach Guardrail Ends	0	4	S-A

**WEIGHT POSTING**    *Not Applicable* ☒ X

	H	3	3S2	Single
Actual Posting	N	N	N	N
Recommended Posting	N	N	N	N

Waived Date:     EJDMT Date:

	At bridge	Other Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)	N    S	N    S
Legibility/Visibility	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>

**CLEARANCE POSTING**    ☒ X

	E	W	meter
Actual Field Measurement	ft    in    0	ft    in    0	
Posted Clearance	ft    in    0	ft    in    0	

	At bridge	Advance
Signs In Place (Y=Yes, N=No, NR=Not Required)	E    W	E    W
Legibility/Visibility	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>	<div style="border: 1px solid black; width: 40px; height: 20px; background: linear-gradient(to top right, transparent 49%, black 49%, black 51%, transparent 51%);"></div>

**ACCESSIBILITY (Y/N/P)**

	Needed	Used
Lift Bucket	N	N
Ladder	N	N
Boat	N	N
Waders	Y	Y
Inspector 50	N	N
Rigging	N	N
Staging	N	N
Traffic Control	N	N
RR Flagger	N	N
Police	N	N
Other:		

**TOTAL HOURS**

**PLANS (Y/N):**    ☐ N

**(V.C.R.) (Y/N):**    ☐ N

**TAPE#:** \_\_\_\_\_

**List of field tests performed:**

**RATING**  
Rating Report (Y/N): ☐ N  
Date:   
Inspection data at time of existing rating  
I 58: - I 59: - I 60: - Date :00/00/0000

**Recommend for Rating or Rerating (Y/N):**    ☐ Y  
**REASON:**    Has not been rated

**DEFICIENCY REPORTING GUIDE**

**DEFICIENCY:**    A defect in a structure that requires corrective action.

**CATEGORIES OF DEFICIENCIES:**

**M= Minor Deficiency** - Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor pot holes, Minor corrosion of steel, Minor scouring, Clogged drainage, etc.

**S= Severe/Major Deficiency** - Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroded rebars, Considerable settlement, Considerable scouring or undermining, Moderate to extensive corrosion to structural steel with measurable loss of section, etc.

**C-S= Critical Structural Deficiency** - A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

**C-H= Critical Hazard Deficiency** - A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Loose concrete hanging down over traffic or pedestrians, A hole in a sidewalk that may cause injuries to pedestrians, Missing section of bridge railing, etc.

**URGENCY OF REPAIR:**

**I = Immediate-** [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her].

**A = ASAP-** [Action/Repair should be initiated by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) upon receipt of the Inspection Report].

**P = Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available].

2-DIST  
**04**B.I.N.  
**C68****STRUCTURES INSPECTION FIELD REPORT**  
**ROUTINE & SPECIAL MEMBER INSPECTION**BR. DEPT. NO.  
**B-19-018**

CITY/TOWN <b>BOXFORD</b>		8-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>		11-Kilo. POINT <b>000.000</b>	90-ROUTINE INSP. DATE <b>Nov 26, 2019</b>	93*-SPEC. MEMB. INSP. DATE <b>Nov 26, 2019</b>
07-FACILITY CARRIED <b>HWY BROOKVIEW RD</b>		MEMORIAL NAME/LOCAL NAME		27-YR BUILT <b>0000</b>	106-YR REBUILT <b>0000</b>	*YR REHAB'D (NON 106) <b>0000</b>
06-FEATURES INTERSECTED <b>WATER FISH BROOK</b>		26-FUNCTIONAL CLASS <b>Urban Local</b>		DIST. BRIDGE INSPECTION ENGINEER <b>J. Dideo</b>		
43-STRUCTURE TYPE <b>501 : Prestressed Concrete Slab</b>		22-OWNER <b>Town Agency</b>	21-MAINTAINER <b>Town Agency</b>	TEAM LEADER <b>A. Labib</b>		
107-DECK TYPE <b>2 : Concrete Precast Panels</b>		WEATHER <b>Clear</b>	TEMP. (air) <b>-3°C</b>	TEAM MEMBERS <b>O. MOUSTAFA</b>		

<b>WEIGHT POSTING</b>		<i>Not Applicable</i> <input checked="" type="checkbox"/>		<b>At bridge</b>		<b>Advance</b>		<b>PLANS</b> (Y/N): <b>N</b>																	
		<table border="1"> <tr> <td>H</td> <td>3</td> <td>3S2</td> <td>Single</td> </tr> <tr> <td><b>N</b></td> <td><b>N</b></td> <td><b>N</b></td> <td><b>N</b></td> </tr> </table>		H	3	3S2	Single	<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>	<table border="1"> <tr> <td>N</td> <td>S</td> </tr> <tr> <td></td> <td></td> </tr> </table>		N	S			<table border="1"> <tr> <td>N</td> <td>S</td> </tr> <tr> <td></td> <td></td> </tr> </table>		N	S			<b>(V.C.R.)</b> (Y/N): <b>N</b>	
H	3	3S2	Single																						
<b>N</b>	<b>N</b>	<b>N</b>	<b>N</b>																						
N	S																								
N	S																								
<b>Actual Posting</b>				<b>Signs In Place</b> (Y=Yes, N=No, NR=Not Required)				<b>TAPE#:</b>																	
<b>Recommended Posting</b>				<b>Legibility/Visibility</b>																					
<b>Waived Date:</b> 00/00/0000		<b>EJDMT Date:</b> 00/00/0000																							

<b>RATING</b>		<b>Recommend for Rating or Rerating (Y/N):</b> <b>Y</b>		<b>If YES please give priority:</b>	
<b>Rating Report (Y/N):</b> <b>N</b>		<b>Date:</b> ----		<b>HIGH</b> ( ) <b>MEDIUM</b> ( <b>X</b> ) <b>LOW</b> ( )	
<b>Inspection data at time of existing rating</b> I 58: - I 59: - I 60: - I 62: - <b>Date : 00/00/0000</b>		<b>REASON:</b> <b>Has not been rated</b>			

SPECIAL MEMBER(S):

	MEMBER	CRACK (Y/N):	WELD'S CONDITION (0-9)	LOCATION OF CORROSION, SECTION LOSS (%), CRACKS, COLLISION DAMAGE, STRESS CONCENTRATION, ETC.	CONDITION		INV. RATING OF MEMBER FROM RATING ANALYSIS			Deficiencies
					PREVIOUS	PRESENT	H-20	3	3S2	
					(0-9)	(0-9)				
A	Item 60.1.d - Breastwalls	N		See remarks in comments section.	N	2				C-S-I
B	Item 60.1.j - Scour	N		See remarks in comments section.	N	3				C-S-I
C										
D										
E										

<b>List of field tests performed:</b>	<b>(Overall Previous Condition)</b>	<b>I-58</b>	<b>I-59</b>	<b>I-60</b>	<b>I-62</b>
		-	-	-	-
	<b>(Overall Current Condition)</b>	5	5	2	-

**DEFICIENCY:** A defect in a structure that requires corrective action.

**CATEGORIES OF DEFICIENCIES:**

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**X=UNKNOWN****N=NOT APPLICABLE****H=HIDDEN/INACCESSIBLE****R=REMOVED**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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## REMARKS

### **BRIDGE ORIENTATION**

The one span structure carries Brookview Road over the Fish brook, which flows from west to east. For this report, the abutments are labeled South and North.

### **GENERAL REMARKS**

Abutment length measured along the concrete cap = 23'-11" long

### **ITEM 58 - DECK**

#### **Item 58.2 - Deck Condition**

See Item 59.15 - Slab.

#### **Item 58.8 - Railing**

The west rail panel is loose throughout the north half.

The east rail panel is loose near the south end with minor damage. **See photo 2.**

### **APPROACHES**

#### **Approaches a - Appr. pavement condition**

The south approach has a transverse crack along the full width of the roadway near the south deck end. **See photo 1.**

### **ITEM 59 - SUPERSTRUCTURE**

#### **Item 59.15 - Slab**

At 1.5' from the east edge of the slab, there is a delamination/incipient spalling area near the north end, 3' long x 1' wide. **See photo 3.**

### **ITEM 60 - SUBSTRUCTURE**

#### **Item 60.1 - Abutments**

##### **Item 60.1.d - Breastwalls**

Both Breastwalls:

There are penetrable void areas between all stones. **See photos 4 & 5.**

There are several displaced stones leaning toward the stream throughout the full length. **See photos 4 & 5.**

Several stones have full height cracks, up to 1/4" wide.

The concrete cap has areas of minor honeycombing throughout.

##### North Breastwall:

At 4'-10" from the east edge of the concrete cap, there is a large washout area in the masonry section, 8'-2" long x full height x up to 4.5' deep, with stones and gravel washing into the stream. **See photo 6.**

The concrete cap has a full height crack, up to 1/8" wide, above the west edge of the washout area.

At the west edge, the second stone from the top has a full height crack, up to 1" wide. **See photo 7.**

##### South Breastwall:

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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## REMARKS

### Item 60.1.d - Breastwalls (Cont'd)

At approximately 6' from the east edge, the top stone under the concrete cap indicates severe displacement, up to 1' misalignment with the concrete cap. The concrete cap has a full height crack, up to 1/8" wide, at the mid-length point of the noted stone. **See photo 8.**

At the east edge, the bottom stone (At current water level) is undermined with no signs of support. **See photo 9.**

For underwater details, refer to the Routine Underwater Inspection Report dated 11/27/2019.

### Item 60.1.f - Slope Paving/Rip-Rap

For underwater details, refer to the Routine Underwater Inspection Report dated 11/27/2019.

### Item 60.1.h - Footings

For underwater details, refer to the Routine Underwater Inspection Report dated 11/27/2019.

### Item 60.1.j - Scour

There is a sudden drop in the stream adjacent to the South Breastwall near mid-length suggesting a scour hole.

For underwater details, refer to the Routine Underwater Inspection Report dated 11/27/2019.

### SubStructure Scour Notes

See Item 60.1.j

## ITEM 61 - CHANNEL AND CHANNEL PROTECTION

### Item 61.1 - Channel Scour

See Item 60.1.j - Scour

For underwater details, refer to the Routine Underwater Inspection Report dated 11/27/2019.

### Item 61.2 - Embankment Erosion

All four embankment corners have areas of minor washout.

### Item 61.3 - Debris

There is scattered debris throughout the channel. **See photos 10-12.**

### Item 61.6 - Rip-Rap/Slope Protection

For underwater details, refer to the Routine Underwater Inspection Report dated 11/27/2019.

## TRAFFIC SAFETY

### Item 36a - Bridge Railing

Both bridge rails consist of w-beam panels mounted on steel posts extending into all four approach corners. See Item 58.8 - Railing.

### Item 36b - Transitions

All four corners consist of w-beam panels mounted on steel posts. See Item 58.8 - Railing.

CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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## REMARKS

### Item 36c - Approach Guardrail

All four corners consist of w-beam panels mounted on steel posts. See Item 58.8 - Railing.

### Item 36d - Approach Guardrail Ends

All four corners consist of boxing glove type ends.

The southeast corner has minor damage. **See photo 2.**

The northwest corner is loose.

### Photo Log

- Photo 1 : South approach, transverse cracking near the south deck end.
- Photo 2 : East rail, south end damage and loose panel.
- Photo 3 : Slab, delamination/incipient spalling area near the northeast corner.
- Photo 4 : South breastwall, typical voids and displaced stones.
- Photo 5 : North breastwall, typical voids and displaced stones.
- Photo 6 : North breastwall, washout area starting at 4'-10" from the east edge of the concrete cap.
- Photo 7 : North breastwall, west edge stone, second layer from top, full height crack.
- Photo 8 : South breastwall, displaced stone starting at 5.5' from the east edge.
- Photo 9 : South breastwall, undermined stone at the east edge.
- Photo 10 : Typical debris throughout channel; view at west elevation.
- Photo 11 : Typical debris throughout channel; upstream.
- Photo 12 : Typical debris throughout channel; downstream.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**PHOTOS**

**Photo 1: South approach, transverse cracking near the south deck end.**



**Photo 2: East rail, south end damage and loose panel.**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**PHOTOS**

**Photo 3:** Slab, delamination/incipient spalling area near the northeast corner.



**Photo 4:** South breastwall, typical voids and displaced stones.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**PHOTOS**

**Photo 5:** North breastwall, typical voids and displaced stones.



**Photo 6:** North breastwall, washout area starting at 4'-10" from the east edge of the concrete cap.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**PHOTOS**

**Photo 7:** North breastwall, west edge stone, second layer from top, full height crack.



**Photo 8:** South breastwall, displaced stone starting at 5.5' from the east edge.



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**PHOTOS**

**Photo 9: South breastwall, undermined stone at the east edge.**



**Photo 10: Typical debris throughout channel; view at west elevation.**



CITY/TOWN <b>BOXFORD</b>	B.I.N. <b>C68</b>	BR. DEPT. NO. <b>B-19-018</b>	8.-STRUCTURE NO. <b>B19018-C68-MUN-BRI</b>	INSPECTION DATE <b>NOV 26, 2019</b>
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**PHOTOS**

**Photo 11: Typical debris throughout channel; upstream.**



**Photo 12: Typical debris throughout channel; downstream.**



Report Date: November 22, 2020

State Information										Classification										Code																													
<b>BDEPT#= B19018</b>										Agency Br.No.										(112) NBIS Bridge Length										N																			
<b>Town= Boxford</b>										L.O.										(104) Highway System										N																			
<b>B.I.N= C68</b>										AASHTO= 037.5										(26) Functional Class - Urban Local										19																			
RANK= 0 H.I.= NA										FHWA Select List= N (6/21/2017)										(100) Defense Highway										0																			
(8) Structure Number										B19018C68MUNBRI										(101) Parallel Structure										N																			
(5) Inventory Route										04										(102) Direction of Traffic - 2-way traffic										2																			
(2) State Highway Department District										009										(103) Temporary Structure										N																			
(3) County Code										(4) Place code										07420										(105) Federal Lands Highways																			
(6) Features Intersected										<b>WATER FISH BROOK</b>										(110) Designated National Network										N																			
(7) Facility Carried										<b>HWY BROOKVIEW RD</b>										(20) Toll - On free road										3																			
(9) Location																				(21) Maintain - Town Agency										03																			
(11) Kilometerpoint										0000.000										(22) Owner - Town Agency										03																			
(12) Base Highway Network										N										(37) Historical Significance																													
(13) LRS Inventory Route & Subroute																				<b>Condition</b>										<b>Code</b>																			
(16) Latitude										42DEG 39MIN 53.40 SEC										(58) Deck										5																			
(17) Longitude										71DEG 01MIN 40.30 SEC										(59) Superstructure										5																			
(98) Border Bridge State Code										Share %										(60) Substructure										5																			
(99) Border Bridge Structure No. #																				(61) Channel & Channel Protection										6																			
																				(62) Culverts										N																			
<b>Structure Type and Material</b>																				<b>Load Rating and Posting</b>										<b>Code</b>																			
(43) Structure Type Main: Prestressed Concrete										Code 501										(31) Design Load - Unknown										0																			
Slab										Jointless bridge type: Not applicable										(63) Operating Rating Method -																													
(44) Structure Type Appr: Other										Code 000										(64) Operating Rating										0																			
(45) Number of spans in main unit										001										(65) Inventory Rating Method -																													
(46) Number of approach spans										0000										(66) Inventory Rating										0																			
(107) Deck Structure Type - Concrete Precast Panels										Code 2										(70) Bridge Posting										0																			
(108) Wearing Surface / Protective System:																				(41) Structure - Open										A																			
A) Type of wearing surface - Bituminous										Code 6										<b>Appraisal</b>										<b>Code</b>																			
B) Type of membrane - Unknown										Code 8										(67) Structural Evaluation										3																			
C) Type of deck protection - Unknown										Code 8										(68) Deck Geometry										N																			
																				(69) Underclearances, vert. and horiz.										N																			
																				(71) Waterway adequacy										7																			
																				(72) Approach Roadway Alignment										7																			
																				(36) Traffic Safety Features										0 0 0 0																			
																				(113) Scour Critical Bridges																													
<b>Age and Service</b>																				<b>Inspections</b>																													
(27) Year Built										0000										(90) Inspection Date 11/26/19										(91) Frequency 24 MO																			
(106) Year Reconstructed										0000										(92) Critical Feature Inspection:										(93) CFI DATE																			
(42) Type of Service: On - Highway										Code 15										(A) Fracture Critical Detail N 00 MO A)										00/00/00																			
Under - Waterway																				(B) Underwater Inspection Y 36 MO B)										09/18/20																			
(28) Lanes: On Structure 02 Under structure										00										(C) Other Special Inspection N 00 MO C)										01/31/20																			
(29) Average Daily Traffic										000350										(*) Other Inspection ( ) N 00 MO *)										00/00/00																			
(30) Year of ADT 2019 (109) Truck ADT										05 %										(*) Closed Bridge N 00 MO *)										00/00/00																			
(19) Bypass, detour length										008 KM										(*) UW Special Inspection N 00 MO *)										00/00/00																			
																				(*) Damage Inspection										MO *) 00/00/00																			
<b>Geometric Data</b>																				<b>Rating Loads</b>																													
(48) Length of maximum span										0004.1 M										Report Date 00/00/00										H20																			
(49) Structure Length										00004.1 M										Operating										0.0																			
(50) Curb or sidewalk: Left 00.0 M Right 00.0 M																				Inventory										0.0																			
(51) Bridge Roadway Width Curb to Curb										000.0 M																																							
(52) Deck Width Out to Out										000.0 M																																							
(32) Approach Roadway Width (w/shoulders)										000.0 M																																							
(33) Bridge Median -										Code										<b>Field Posting</b>																													
(34) Skew 00 DEG (35) Structure Flared										N										Status										Posting Date 00/00/00																			
(10) Inventory Route MIN Vert Clear										00.00 M										2 Axle										3 Axle																			
(47) Inventory Route Total Horiz Clear										00.0 M										5 Axle										Single																			
(53) Min Vert Clear Over Bridge Rdwy										00.00 M										Actual																													
(54) Min Vert Underclear ref										00.00 M										Recommended																													
(55) Min Lat Underclear RT ref										00.0 M										Missing Signs N																													
(56) Min Lat Underclear LT										00.0 M																																							
<b>Navigation Data</b>																				<b>Misc.</b>																													
(38) Navigation Control - No navigation control on waterway										Code 0										Bridge Name										N Anti-missile fence N Acrow Panel N Jointless Bridge																			
(111) Pier Protection										Code 1										Freeze/Thaw																													
(39) Navigation Vertical Clearance										000.0 M										Accessibility (Needed/Used)																													
(116) Vert-lift Bridge Nav Min Vert Clear										M										N / N Liftbucket										N / N Rigging																			
(40) Navigation Horizontal Clearance										0000.0 M										N / N Ladder										N / N Staging																			
																				N / N Boat										N / N Traffic Control																			
																				Y / Y Wader										N / N RR Flagperson																			
																				N / N Inspector 50										N / N Police																			
																														Inspection Hours: 012																			

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