CONNECTICUT
DEPARTMENT OF TRANSPORTATION

REHABILITATION STUDY REPORT

STATE PROJECT NO. 126-170

BRIDGE NO. 00571A
ROUTE 8 OVER THE HOUSATONIC RIVER

SHELTON/DERBY

July 2014

AECOM

500 Enterprise Drive, Suite 1A
Rocky Hill, Connecticut 06067

REHABILITATION STUDY REPORT

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State Project No. 126-170
Route 8 over the Housatonic River (Commodore Hull Bridge)
Rehabilitation of Bridge No. 00571A
Shelton/Derby, CT

REHABILITATION STUDY REPORT

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II. EXECUTIVE SUMMARY

Scope of Work:
Based on the recent bridge inspection reports on Bridge No. 00571A and AECOM's condition survey, the following repairs are recommended:

- Structural steel repair – webs @ girder ends; floorbeam flanges; strengthening truss gusset plates; perforations in stringers.
- Painting beam ends @ approach span girders – original steel
- Painting truss ends @ joint locations – original trusses.
- Extend existing weepholes in median truss spans.
- Replace damaged and leaking scupper drainage pipes.
- Repair fencing on parapets.
- Replace railing on bottom inspection walkway.
- Patch concrete substructure.
- Replace navigational lighting.
- Provide security fencing to prevent access to Pier 11.

Recommended/Investigated Repairs Beyond Original Scope:

- Painting bottom truss nodes of original trusses.
- Replacement of the existing bridge fencing with metal bridge rail.
- Replacement of the entire existing bottom inspection catwalk.
- Replacement of the bottom lateral cross bracing between original trusses.
- Restraining fixed bearings that exhibit excessive loss to their anchor bolts/nuts.
- Replacement of bracing members at original truss pier bents at Piers 8 & 11.
- Update transitions at ends of bridge to be R-B 350 compliant.

Maintenance and Protection of Traffic:
Although only minor disruptions to traffic are presently anticipated that can be done with off peak lane closures, the Contractor's painting operations in the truss span over the river may require placement of painting vehicles/equipment on the bridge which could affect traffic operations and require maintenance and protection of traffic.

Notable Facts:

Length of Bridge:	1,578'
Maximum Width of Bridge:	153.02' @ Sta.128+55.20
Number of Spans:	12
Length of Truss Spans:	254.16'(Span 9), 253.5'(Span 10), 253.5'(Span 11)
Estimated Construction Cost:	$8,900,000
ROW Involvement:	None
Utilities Impacted:	None
Permits Required:	To be determined
Present Load Rating:	HS20
Estimated ADT (2010):	13,200
Sufficiency Rating:	53.72

III. INTRODUCTION

A. Project Description:

This project involves the rehabilitation of Bridge No. 00571A, which includes steel repairs; localized painting; substructure repair; upgrade of the lower inspection catwalk; and general repairs to the fencing, railing, drainage, and navigation systems.

Bridge No. 00571A was rehabilitated in 2011 under CTDOT Project No. 126-167. That project consisted of constructing new deck joints, milling and overlay of the wearing surface and steel repairs. Also, included were pier cap strengthening and repairs to Ramp Bridges 00571B and 00571C.

This proposed project scope was generated from additional deficiencies identified during CTDOT Project 126-167 while in construction. These additional repairs are to be addressed in this rehabilitation project as indicated in the scope of work.

B. Design Criteria/References:

The proposed bridge rehabilitation will be designed in accordance with the current AASHTO Standard Specifications and the latest version of the CTDOT Bridge Design Manual.

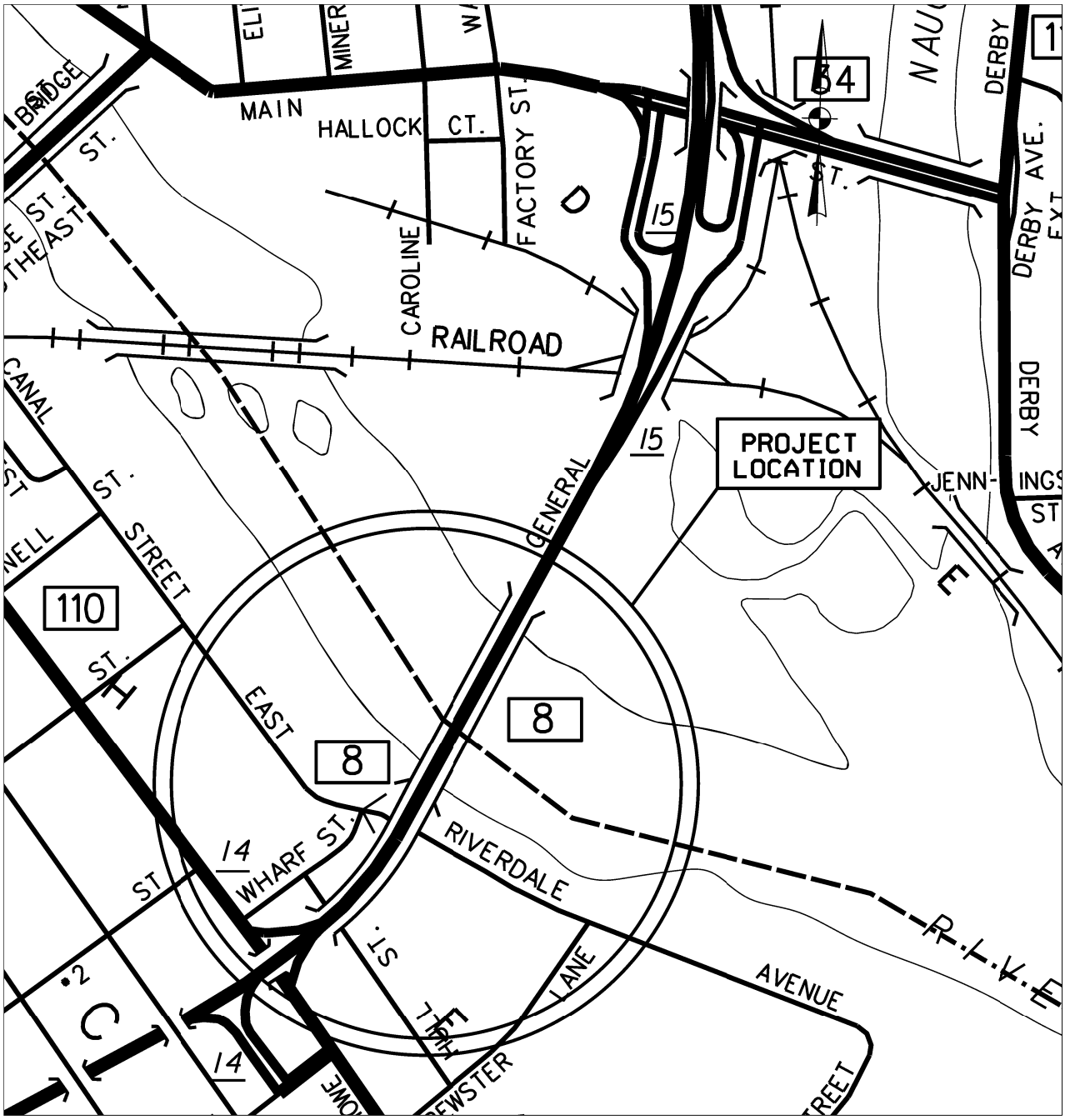
This report also references the In-Depth Inspection performed by HAKS Engineers, P.C., dated September 2013 and the previous In-Depth Inspection performed by TranSystems Corporation, dated March 2011 and The Rehabilitation Study Report by Close, Jensen and Miller, P.C., dated May 2012.

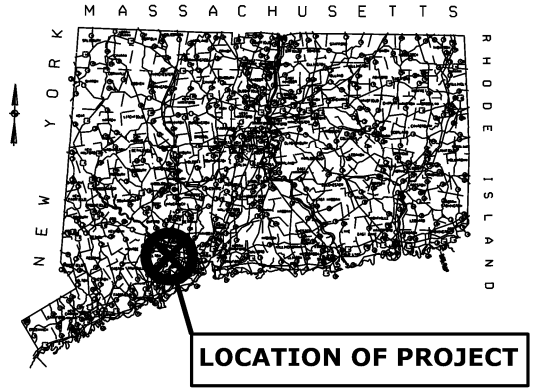
C. Proposed Improvements to Bridge No. 00571A:

The improvements proposed to the bridge are primarily to rehabilitate deficient elements of the existing bridge. The Rehabilitation Study Report by Close, Jensen and Miller, P.C., dated May 2012 and the In-Depth Inspection Reports both present similar deficiencies in the existing bridge that must be addressed in this project. The rehabilitation items along with other required tasks are:

- Structural steel repair
- Bearing repair
- Painting deck truss ends at expansion joint locations
- Security fence installation
- Expansion joint repair
- Repair drainage system

- Catwalk access protection update
- Extension of weephole pipes with required support
- Replace navigation lights
- Repair parapet fencing



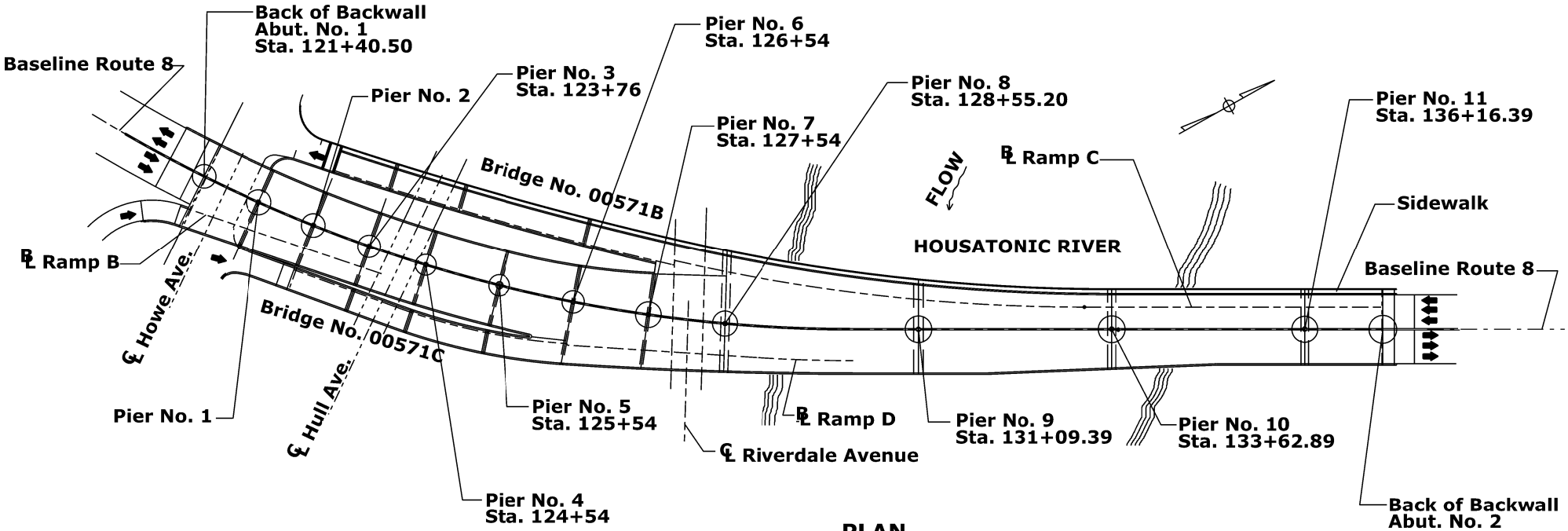


PROJECT TITLE:

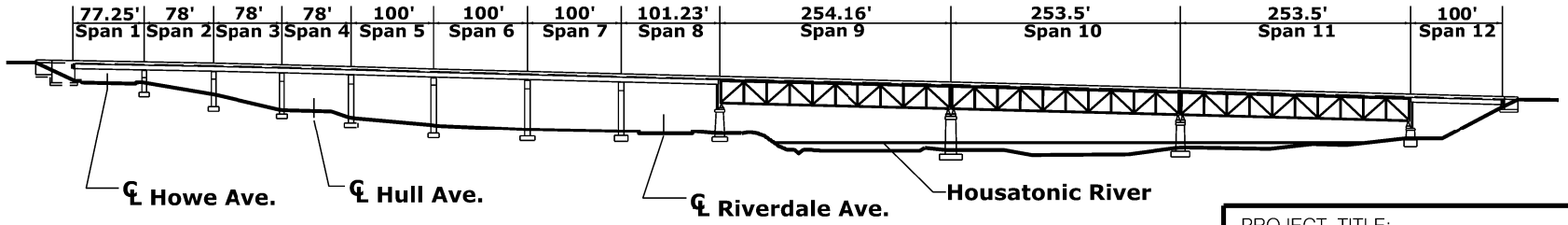
COMMODORE HULL BRIDGE
PAINT AND REHAB
ROUTE 8 OVER HOUSATONIC RIVER

TOWN: SHELTON/DERBY	PROJECT NO.: 126-170
	BRIDGE NO.: 00571A
DRAWING TITLE: LOCATION PLAN	FIGURE NO.: 1

AECOM



PLAN



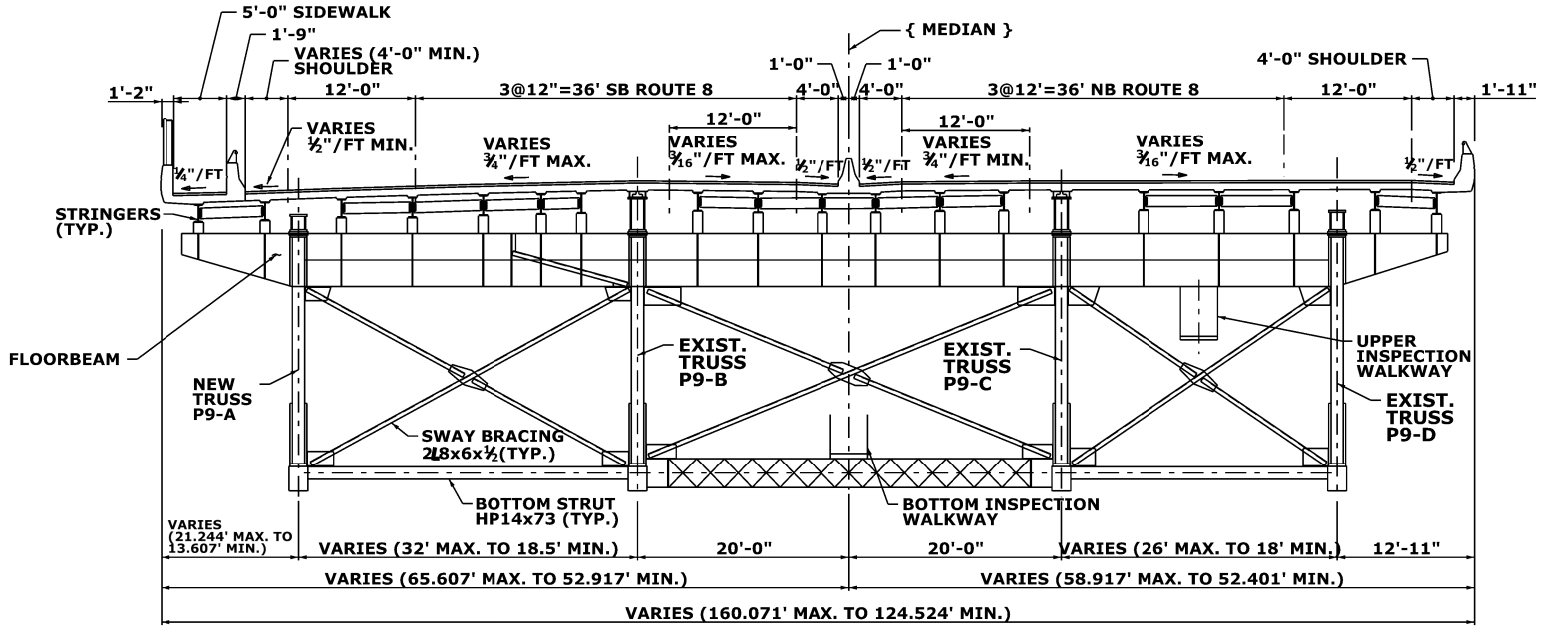
ELEVATION

(ONLY BRIDGE NO. 00571A SHOWN)

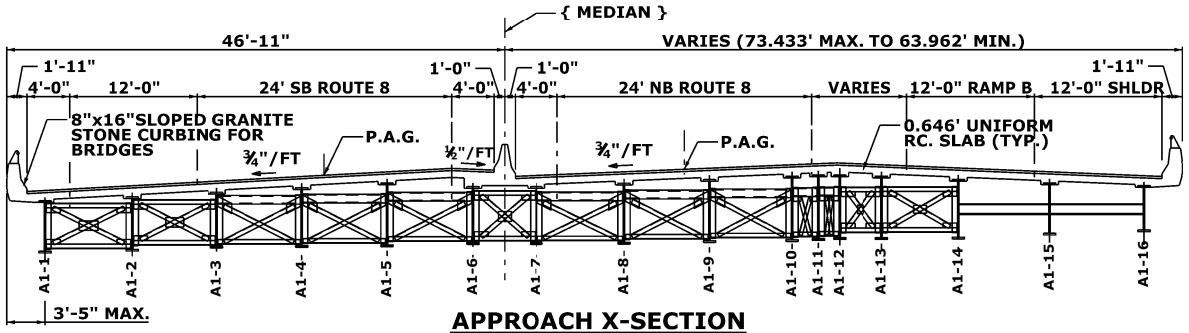
AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE
PAINT AND REHAB
ROUTE 8 OVER HOUSATONIC RIVER

TOWN: SHELTON/DERBY	PROJECT NO.: 126–170
	BRIDGE NO.: 00571A
DRAWING TITLE: PLAN & ELEVATION	FIGURE NO.: 2



TRUSS X-SECTION (SPAN 10 SHOWN)



APPROACH X-SECTION

AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE PAINT AND REHAB ROUTE 8 OVER HOUSATONIC RIVER

TOWN: SHELTON/DERBY	PROJECT NO.: 126-170
	BRIDGE NO.: 00571A
DRAWING TITLE: CROSS SECTIONS	FIGURE NO.: 3

IV. Existing Condition of Bridge

A. Construction History

Bridge No. 00571A carries Route 8 over the Housatonic River, Riverdale Avenue, Hull Street, and Howe Avenue (Route 110) in Shelton/Derby and was constructed in 1951 under Project No. 36-37-03A (See **Appendix A** for Plans). The bridge was reconstructed in 1990, under Project No. 126-119, which consisted of widening the substructure and superstructure and replacing the concrete deck. The bridge consists of twelve (12) simply supported spans totaling approximately 1,578 feet. Span Nos. 1 through 8 and Span No. 12 (numbered from south to north) are composite welded plate girder spans with span lengths of 77.25', 78', 78', 78', 100', 100', 100', 101.23', and 100' respectively. Span Nos. 9 through 11 are deck truss, floor beam and stringer spans with span lengths of 254.16', 253.5' and 253.5', respectively.

The reconstruction in 1990 widened the truss spans by splicing extensions onto the existing floor beams and adding new trusses outward from the two existing trusses. In Span Nos. 10 and 11, two new trusses were added, and in Span No. 9 three trusses were added. Some of the existing trusses were strengthened, bracing was repaired and existing stringers were made continuous. The original steel was not painted during the reconstruction project and the steel used for repairs and bearing and diaphragm replacement was only shop primed.

In 2011 a rehabilitation project, Project No. 126-167 (See **Appendix A** for plans) replaced the existing expansion joints throughout the bridge, milling the top 1 ½ inches and repaved the bridge's overlay, and strengthened the existing gusset plates in truss spans as required along with other minor steel repairs.

B. Existing Condition of Bridge

In the CTDOT Bridge Safety and Evaluation Bridge Inspection Report dated September 2013, the main components of the bridge were rated as follows:

Bridge Deck	6 (Satisfactory Condition)
Superstructure	3 (Serious Condition)
Overlay	7 (Good Condition)
Substructure	3 (Serious Condition)
Channel Protection	5 (Fair Condition)

In the CTDOT Bridge Safety and Evaluation Bridge Inspection Report dated September 2011, the main components of the bridge were rated as follows:

Bridge Deck	6 (Satisfactory Condition)
Superstructure	4 (Poor Condition)

Overlay - - - -	7 (Good Condition)
Substructure - - - -	4 (Poor Condition)
Channel Protection - - -	5 (Fair Condition)

The drop in rating of the Superstructure and the Substructure from Poor Condition in 2011 to Serious Condition in 2013 is primarily due to a particular element in both the superstructure and the substructure.

In the superstructure section of the 2013 report, the rating for the truss was lowered from a 4 to a 3 primarily due to the section losses experienced in the vertical gusset plates; a condition established with D-meter readings taken over the width of the vertical gusset plates on the two original trusses in Span Nos. 9, 10 and 11. All other elements of the superstructure are rated as 4 (poor condition) or above. More detail on these conditions is provided in the following Superstructure Section.

In the substructure section of the 2013 Report, the rating for the Piers/Bents Caps was lowered from a 4 to a 3 primarily due to the section losses experienced in the steel bent caps at Pier Nos. 8 and 11 with the most critical area at the steel bent cap at Pier No. 8 between Girders G12 and G13 that has 42.3% top flange section loss. This location is a cantilever section with the top flange in tension at this location. All other elements of the substructure are rated as 4 (poor condition) or above. More detail on these conditions is provided in the following Substructure Section.

Bridge Deck:

The bridge deck was replaced under Project No. 126-119. That project, along with widening the existing bridge, replaced the existing concrete deck with a new 7.75 inch concrete deck, with epoxy coated reinforcing bars in the top mat of the deck. Bottom mat reinforcing was uncoated. The deck has a 2.5 inch bituminous concrete overlay with membrane waterproofing (sheet) placed between the deck and the overlay. The 2013 Bridge Inspection Report states that there are random hollow areas and spalls with exposed rebar but the deck is in satisfactory condition.

The issues that the 2013 Bridge Inspection Report identifies as needing to be addressed are the bridge drainage (which includes weepholes), fencing, and expansion joints. Rating of 6 (Satisfactory Condition)

Bridge Drainage: There are PVC weephole pipes throughout the structure that are either broken or too short and drain onto the structural steel elements of the superstructure causing deterioration. In the approach spans that consist of welded plate girders, the weepholes were extended below the bottom flange of the girders and only have issues at 5 locations, 3 of which are in Span No. 12 (the PVC pipes are broken). In the truss spans the weepholes only extend below the level of the stringers and are draining onto the floorbeams, secondary truss members and the inspection catwalks at some locations causing extensive corrosion. Bridge scupper drains are

100% clogged at three locations and at all of the west sidewalk drains in Span No. 10. At six locations on the bridge the scupper pipes are damaged and leaking causing active leaking onto stringers, floorbeams, secondary truss members and the inspection catwalks causing extensive corrosion. Rating of 5 (Fair Condition)

Fence: The 5'-0" high anodized aluminum fence with expanded metal mesh is mounted on the west parapet in Span Nos. 5-6 and Span Nos. 9-12 and the east parapet in Span Nos. 7-9. There are areas of extensive damage to the fencing especially the portion mounted on the east parapet. On the west parapet there is one section of damage about 2 feet in width in Span No. 11. The fencing on the west parapet in Span Nos. 9-12 are adjacent to the sidewalk and is not subject to impact from vehicles. Rating of 5 (Fair Condition)

Expansion Joints: All of the expansion joints on the bridge were replaced on the bridge under Project No. 126-167. The asphaltic plug joints at Pier Nos. 1-7 and at both abutments have isolated adhesion and cohesion cracks and random areas of leakage. The strip seal joints at Pier Nos. 8-11 have random transverse cracks in their headers and have heavy sand accumulation in the joint glands. Longitudinal joints consisting of pourable sealant between Span No. 6 and Bridge No. 00571 B (Ramp C) and between Span No. 8 and Bridge No. 00571C (Ramp D) have heavy sand accumulation and adhesion cracks up to 1 foot long. The longitudinal compression seal joint between Span No. 8 and Bridge No. 00571C (Ramp D) is lifted upwards 2 inches for an 8 foot length. Rating of 6 (Satisfactory Condition)

Overlay:

As stated the bridge has a 2.5 inch bituminous concrete overlay with membrane waterproofing (sheet) between the deck and the overlay placed during Project No. 126-119. Under Project No. 126-167 the existing bituminous concrete overlay was milled 1.5", leaving 1" of existing overlay, and replaced with a 1 1/2" layer of Hot Mix Asphalt SO 0.5". Under the same project all existing deck joints were replaced with asphaltic plug expansion joints in the approach spans and strip seal expansion joints with new concrete headers in the truss spans. Rating of 7 (Good Condition)

Superstructure:

The superstructure is in serious condition (rating of 3). As indicated above, the original steel elements of the superstructure were not painted under the widening project, Project No. 126-119. The failed expansion joints that exhibited active leakage prior to the replacement of the bridge's expansion joints under Project 126-167, contributed to the extensive corrosion of the steel girders and truss members at sections near the joints. New members added under the widening project are in much better condition than the original steel elements. Under the widening project all existing steel rocker

expansion bearings in the approach spans were replaced with new steel rocker bearings. At random locations in the approach spans the existing steel fixed bearings were also replaced. Steel end and intermediate diaphragms at random locations between original steel members were replaced with new diaphragms under the widening project and steel repairs to the existing steel members were also done under the widening project at random locations. All of the new steel used in the areas was shop primed, but no field top coats were applied.

Bearings: All existing steel rocker expansion bearings were replaced in the widening project, but the fixed bearings supporting the original plate girders in the approach spans generally were not replaced and are in the worst condition. The fixed bearings supporting the original girders in Span Nos. 1-8 and Span No.12 have heavy laminated rust with up to ¼ " pitting, 100% loss to anchor bolt nuts and up to 25% loss to anchor bolts. Fixed bearings on the original trusses in Span Nos. 9-11 have rosebudding of the anchor bolt nuts with up to 50% section loss and heavy laminated rust on the vertical plates. Rating of 5 (Fair Condition)

The steel rocker expansion bearings on the original trusses in Span Nos. 9-11 have laminated rust with up to 1" of pack rust under the rocker and up to 90% section loss of the anchor bolt nuts. The bearings were in expansion mode during the 2013 inspection but the inspection report indicates that the bearings do not appear to be moving freely when compared to the movements reported in the 2011 inspection report. Rating of 5 (Fair Condition)

Stringers: The steel stringers in the truss spans, Span Nos. 9-11, are continuous over the floorbeams, but not over the piers. The stringer ends at piers have heavy rust with section loss up to 3/16" remaining (0.686" original) on the bottom flange, with a few areas of perforations in the bottom flanges due to deterioration. Rating of 5 (Fair Condition)

Girders: The original girders in the approach spans, Span Nos. 1-8 and Span No. 12, have random areas of heavy laminated rust but the most serious deterioration occurs at the girder ends under joints. At these locations there is heavy laminar rust, with severe section losses up to 100% at numerous locations in the webs and the bearing stiffeners.

Also note that there are random bearing stiffeners that are crippled due to section loss and associated loading. Rating of 5 (Fair Condition)

Floor Beams: The built-up steel riveted floorbeams in the truss spans have heavy rust mainly in the original median bay with up to ¼" deep by 2" wide section loss on the bottom flange and a 1/8" reduction in width. There are isolated perforations at the base of the floorbeam webs up to 3" in diameter. The most critical section loss is at Floorbeam 0 in Span No. 9 at Pier No. 8 with a 25% bottom flange loss between Stringers in S17 and S18. Note that there is a difference in the section loss calculations between the 2011 and the 2013 Inspection Reports with the section loss % actually less

in 2013 due to errors calculating losses in section in the 2011 Bridge Inspection Report. Rating of 4 (Poor Condition)

Trusses: The original riveted built up trusses have peeling paint, areas of light to heavy rust and areas of heavy laminated rust. The built-up bottom chord members have random areas along the top plate with up to 7/16" pitting. The bottom plate and the bottom chord bottom angle have up to 2" of impact rust and up to 1" of impact rust between the web and the bottom chord bottom angle. There is also up to 3/8" pitting of the webs and up to ¼" pitting of the bottom chord bottom angle. The top chords of the original trusses have heavy laminated rust mostly at the ends at the piers with up to 1-1/8" thick impact rust between the top chord bottom angle and the bottom plate.

The biggest concern on the trusses, and the reason for the drop in rating to a serious condition, is the condition of the vertical gusset plates of the trusses, as previously stated. The vertical gusset plates on the original trusses have heavy laminated rust and section loss along the top of the bottom chord where the horizontal gusset plates that the bracing is attached to connects to the vertical gusset plates. This area allows for debris and water to collect and pond adjacent to the vertical gusset plate causing areas of considerable section losses, up to 79% localized section loss approximately 40% average section loss along the full length of the gusset plate. Rating of 3 (Serious Condition)

Substructure:

The substructure is in serious condition. As indicated above, the original steel elements of the superstructure and the steel truss bents at Pier Nos. 8 and 11 were not painted under the widening project, Project No. 126-119. The failed expansion joints that exhibited active leakage prior to the replacement of the expansion joints under Project No. 126-167 contributed to the extensive corrosion of the steel bents at these two piers. The new truss bents added under the widening project are in much better condition than the original steel elements. Under the widening project all the concrete piers were widened, as were the abutments and the four solid shaft piers at Pier Nos. 8-11. Although there is cracking, hollow areas and spalls to the various concrete elements of the substructure, the severe deterioration to the steel truss bents is the issue that controls the present rating of a 3 for the substructure (Serious Condition).

Abutments-Stem: There are isolated horizontal and vertical cracks, and hollow areas with a few spalls. Rating of 6 (Satisfactory Condition)

Abutments-Backwall: There are random vertical hairline cracks, and isolated areas of mapcracking. Rating of 7 (Good Condition)

Abutments-Wingwalls: There are random horizontal and diagonal hairline cracks, isolated areas of mapcracking and a single small spall at the Northeast Wingwall. Rating of 7 (Good Condition)

Pier-Caps: (Steel) The original steel caps of the truss bents have peeling paint, heavy laminated rust throughout with up to 1 ¼" pack rust between the bottom flange angle and the bottom batten plates of the steel cap. Typical areas of the top flange have full width section losses of 3/16" deep. Web plates have random areas of laminar rust with 1/8" section losses to the web plates over the full height between the top and bottom flange angles. The worst location is between Girders G12 and G13 has full width section loss to ¼" remaining from an original top flange plate that was 5/8" in thickness. The top flange angles in this location have section loss to 5/16" remaining for a total section loss in this cantilevered portion of the top flange cap of 42.3% section loss. Rating of 3 (Serious Condition)

Pier-Caps: (Concrete) The concrete caps of pier bents on Pier Nos. 1-7 have random horizontal and vertical cracks, map cracking, hollow areas and spalls. The cracks are up to 1/8" wide with rust and efflorescence. There are spalls up to 2' wide x 3' high x 3" deep at Pier No. 7 North elevation. Isolated bearing pedestals have vertical cracks and corner spalls but none undermine the bearings.

Pier-Columns: (Steel) The original steel caps of the truss bents have peeling paint, moderate to laminated rust especially at connections where the vertical gusset plates also have up to 5/8" pack rust between plates and members. Diagonal bracing members and bottom web channel member between the columns have heavy section loss to paper thin and numerous perforations especially at connections and at vertical gusset plates. Rating of 4 (Poor Condition)

Pier- Columns: (Concrete) The concrete caps of pier bents on Pier Nos. 1-7 have random horizontal and vertical cracks, map cracking, hollow areas and spalls. The cracks are up to 1/16" wide with rust and efflorescence. There are spalls up to 4' wide x 3' high x 2" deep with exposed rusted rebars at Pier No. 6 Column 5. The solid stem piers, Pier Nos. 8-11, have random areas of shallow rebar, random horizontal and vertical cracks, map cracking, hollow areas and isolated spalls. Pier Nos. 9 and 10 are river piers and have granite stone masonry facing at the waterline. The stone masonry facing has up to 10% missing masonry with up to 1'-0" of penetration between the stones.

Channel Protection:

For issues involving the Channel Protection and Pier Scour see the **Pier Stability Review** prepared under separate cover.

C. Condition Survey

AECOM performed a field condition survey to confirm the condition of bridge elements as reported in the bridge inspection reports, and to assess repair methods for those elements. (See **Appendix E** – Condition Survey Notes)

Superstructure

Approach Spans: The main issue for the approach spans for Bridge No. 00571A is the condition of the approach span girders at their ends under the deck joints at the piers. The condition of the girder webs and bearing stiffeners in these areas, as shown in **Photos 5, 6 and 7**, show heavy rust, severe section loss and several perforations developing in the original girder webs and their bearing stiffener plates. The condition survey confirmed the losses and perforations, as reported in the 2013 Bridge Inspection Report. The other element of concern at the approach spans are fixed bearings of the original girders. These have heavy rust, severe section loss, and severe loss to the anchor bolt nuts. Although replacement of all original fixed bearings is not warranted, we anticipate that the losses to the anchor bolts (see **Photos 9 and 10**) will require providing additional restraint for these bearings.

Deck: Our condition survey of deck elements was limited due to no traffic control on Route 8, but the elements to be addressed in the rehabilitation report are limited to the aluminum fencing and bridge drainage. **Photos 21 and 22** show the damage to the fencing that will be repaired as proposed in **Section V**, and **Photos 27, 28 and 29** confirm the clogged scuppers along the western gutter line of Route 8 Southbound and those in the pedestrian sidewalk. Other elements such as joints and the newly placed overlay continue to function properly as indicated in the 2013 Bridge Inspection Report. See **Photos 30 and 31**.

Truss Span Steel: The condition of the structural steel in the truss spans varies per element and if the steel is from original construction or added during the widening project. The deterioration to the original stringers is limited to the stringer ends located at truss ends, while most of the section loss to the original floorbeams occurs in the bay that was the original median bay before the bridge was widened. The concrete filled open grid median allowed water to drain onto the floorbeams causing the deterioration now present in their top flanges. See **Photos 25 and 26**.

The condition rating of the truss is controlled by the condition of the vertical gusset plates at the bottom chords. **Photos 23 and 24** show the potential for debris to build up on the horizontal gussets which is the primary cause for the deterioration and section loss of the vertical gusset plates. The 2013 Bridge Inspection Report used a D-meter to measure the plate thicknesses of the vertical gusset plates. Our condition survey, while confirming the presence of deterioration and section loss at these nodes, did not perform independent D-meter readings.

Truss Bracing and Inspection Walkway: The original top cross bracing and sway bracing, consisting of back to back angles, has impact rust between the angles, but as our condition survey has confirmed, they do not warrant replacement. The original truss bottom cross bracing and bottom lateral bracing that have lacing bars that form the web between the double angle top and bottom flanges were confirmed, in our condition survey, to require repairs and possible replacement due to the deterioration and complete loss of many of the lacing bars. See **Photos 11, 14, 15, and 16**.

The lower inspection walkway was confirmed to have numerous areas of deterioration throughout its length. These areas all result from weephole drains or leaking bridge drainage that are dripping water onto the inspection walkway. **Photos 8, 12, and 13** confirm the deteriorated condition of various elements of the walkway.

Approach Span Bearings: Our condition survey confirms that the original steel rocker expansion bearings that were replaced during Project No. 126-119 are in good to fair condition, as are the few locations that the fixed bearings were also replaced, see **Photo 32**. At the fixed bearings for the original steel girders in the approach spans that were not replaced under the widening project, the bearings show heavy laminated rust and some section loss. The anchor bolt nuts of some of these bearings have up to 100% section loss, see **Photo 7**.

Truss Bearings: The large fixed and expansion bearings of the original trusses in Span Nos. 9, 10, and 11, have relatively little rust or section loss as compared to other original steel elements or the remaining original fixed bearings in the approach slabs. See **Photo 33**. The expansion bearings were measured for their movement and found to be consistent with the recent findings in the 2011 and 2013 Inspection Reports. These reports indicated that there were concerns that they do not appear to be moving freely. Computations done on the bearings movement show that due to the large radius of these bearings their movement is difficult to detect and our analysis shows that they seem to be functioning properly. The Fixed Bearings for the Steel Truss Bearings at Pier Nos. 8 and 11 also have heavy rust, and some section loss at the masonry plates along with losses of anchor bolt nuts up to 100%, (see **Appendix E** – Condition Survey Notes) see **Photos 9 and 10**. Note the heavy accumulation of debris at the top of pier cap at Pier No. 8. See **Photo 34**.

Drainage: According to the 2013 Bridge Inspection Report many of the weepholes in the truss span in the median bay are draining onto the inspection walkway. This was confirmed in our condition survey that noted the severe deterioration that this is causing to the lower inspection walkway. Extending and angling these weephole drains will place them further away from the inspection walkway limiting the amount of drainage onto it and the deterioration that drainage is causing.

Our condition survey did not note leaking bridge drains, but did note signs of leakage on some bridge drains noted in the 2013 Bridge Inspection Report, and on structural elements exposed to these leaks.

Electrical: Electrical conduits and navigation lights located on the underside of the bridge were inspected. 1" RGS conduit with cables providing power for navigation lights was severely corroded at multiple locations. Several conduit bodies and supports were severely corroded as well. Cast iron NEMA 3R junction boxes used for feeder splicing appeared to be in good condition, but were missing gasketed covers and instead were covered with discarded road signs. Navigation lights were damaged and non-functioning. Navigation light pivoting pendants were non-functioning and missing service chains. Existing navigation lights transformer junction box (1 KVA 480 – 240/120V) was severely corroded and covered with cover made of plywood. Several high-tension electrical cables were routed under the bridge without proper support. See **Photos 36-43**.

Substructure

Approach Spans: The substructures for the approach spans do have some minor cracking and spalling, all of which can be addressed by the standard patching details and repairs proposed. See **Photos 18, 19 and 20**. (No condition survey of the River piers was performed due to access issues).

D. Load Rating

The bridge is not posted for live load restriction. CTDOT's latest Bridge Inspection Report (2013) lists the following live load ratings for the bridge:

Inventory Rating: 39.2 English Tons
Operating Rating: 65.5 English Tons

The previous Inspection Report (2011) had the following live load ratings for the bridge:

Inventory Rating: 35 English Tons
Operating Rating: 58 English Tons

The ratings from the 2001 Inspection Report were taken from A.G. Lichtenstein's 1996 Load Ratings on the Bridge. These ratings were updated in 2010 by Close Jensen and Miller for the vertical truss members, the controlling members of the 1996 Load Rating, and incorporates strengthening repairs to these members that were part of the steel repairs performed under Project No. 126-167.

The CTDOT updated the load ratings at the steel truss pier bent at Pier No. 8 for the losses indicated in the steel pier cap in the 2013 Bridge Inspection Report. See **Appendix F**. The revised rating at this location is:

Inventory Rating: 19.6 English Tons
Operating Rating: 32.7 English Tons

Based on these revised ratings CTDOT may impose some restrictions on the bridge until this condition is addressed. A temporary repair should be performed until final repairs are done under this Rehabilitation Project.

The CTDOT also updated the truss gusset plate ratings based on the gusset plate losses noted in the 2013 Bridge Inspection Report and the updated Rating Procedures for Gusset Plates, which allow averaging of the gusset plate thicknesses across the length of the plate and averaging of the gusset plate thickness at a connection. The results are shown in **Appendix F** which shows that all inventory rating factors are all above 1.0.

Note that due to the rehabilitation being proposed, the serious condition of the superstructure, and the increasing losses of section to the steel members as reported in the 2013 Bridge Inspection Report the bridge should have a new load rating calculated. The new rating should be in LRFR and done as per CTDOT standards and procedures.

V. Proposed Options/ Recommendations

Recommended Repairs

Superstructure

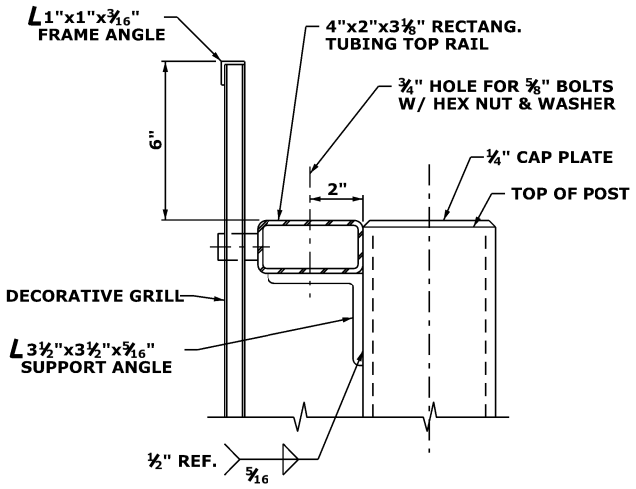
Deck

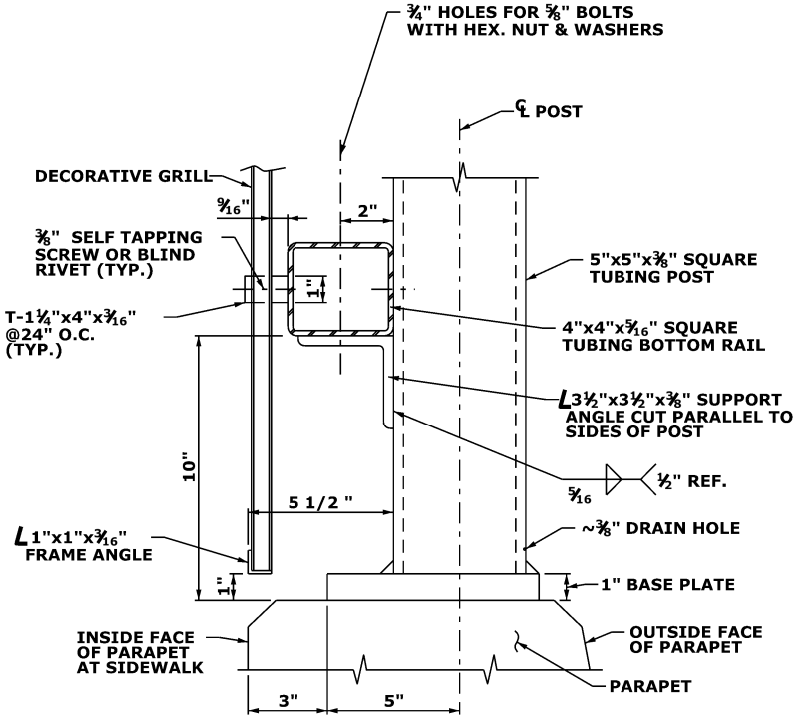
Drainage, Weepholes: The weepholes presently draining onto structural members below them will be fitted with a 45 degree elbow connector and an extended piece of PVC pipe to avoid direct drainage onto the members below. Where the pvc weephole pipes drain onto the top horizontal cross bracing, when there are in the median bay, they will also be extended below the top horizontal cross bracing members. As noted in our Condition Survey, in those areas in the truss spans where the weepholes were not directly overhead of the inspection walkway the deterioration was significantly less then areas where they were. 45 degree bends are present in other weepholes on the bridge and are performing normally without breaks in the PVC, they are easy to install, and if extended long enough will prevent any additional leakage and resulting deterioration to the lower inspection catwalk.

Drainage, Scuppers: All scuppers will be cleaned on the project and cracked and broken drainage pipes will be replaced in kind.

Fencing: The extensively damaged anodized aluminum fence mounted to the east parapet in Span Nos. 7-9 is adjacent to traffic as is the fencing mounted to the west parapet in Span Nos. 5-6. The fencing mounted to the west parapet in Span Nos. 9-12 is adjacent to the sidewalk and not exposed to vehicle traffic and associated vehicle impacts. The anodized aluminum fencing is flush with the face of the parapet as shown in **Figure 4**. This may contribute to the damage that the fencing has experienced. The proposed repair is to reset the fencing back with the use of new top and bottom rail elements. The replacement of the existing grill for the full length of the fencing is also recommended. The fencing on the east parapet also runs the full length of Ramp D on Bridge No. 00571C. A detail of this repair is shown in **Figure 5**. If the fencing rails are reset back and the grill replaced on the fence mounted to the eastern parapet in Span Nos. 7-9 is done then this repair should also be performed on the ramp bridge's eastern parapet for its full length. (Cost of repair to ramp fencing is included in the cost estimate)

Alternative Repair Option No. 1: An alternative option is the replacement of the existing anodized aluminum fence mounted to the east parapet in Span Nos. 7-9 and mounted to the west parapet in Span Nos. 9-12 with metal bridge rail. The fencing seems to have been placed as protection for railroads beneath these spans as shown in the detail from the reconstruction plans shown below. The rail lines along Canal Street are no longer present. There is no need for the protection that this 5'-0" high fencing provided, in parts of the bridge that do not have sidewalks. The post spacing for the fencing is the same post spacing for





SECTION

AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE
PAINT AND REHAB
ROUTE 8 OVER HOUSATONIC RIVER

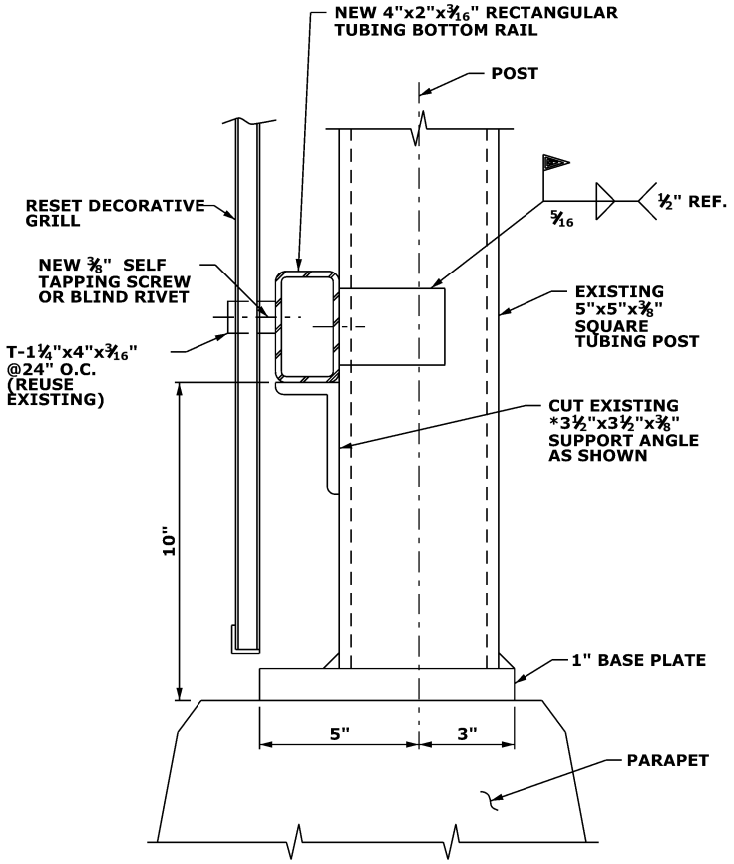
TOWN:
SHELTON/DERBY

PROJECT NO.:
126-170

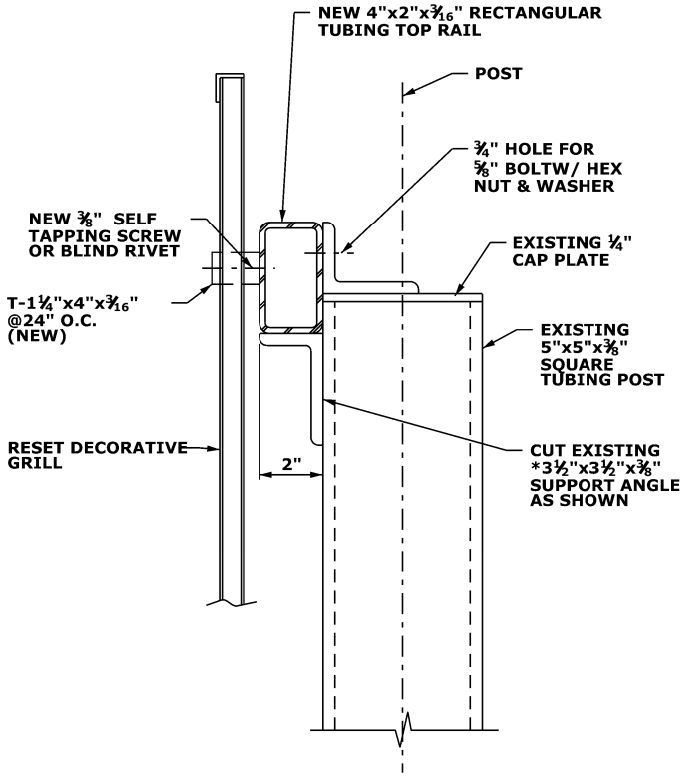
BRIDGE NO.:
00571A

DRAWING TITLE:
EXISTING FENCING DETAILS

FIGURE NO.:
4



RESET SECTION



RESET SECTION

AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE
PAINT AND REHAB
ROUTE 8 OVER HOUSATONIC RIVER

TOWN: SHELTON/DERBY	PROJECT NO.: 126-170
	BRIDGE NO.: 00571A
DRAWING TITLE: PROPOSED FENCING DETAILS	FIGURE NO.: 5

the metal bridge railing on the bridge. The costs associated with the replacement of the fencing with metal bridge rail is similar to the costs of the proposed repair, and the long term maintenance of the new metal bridge rail would be far less expensive than the maintenance of the anodized aluminum fence, which has a history of maintenance problems at this bridge and other bridges throughout the State.

Expansion Joints: The longitudinal compression seal between Span No. 8 and Bridge 00571C should be replaced with a silicone expansion joint system. All other expansion joints do not warrant repairs at this time.

Alternative Repair Option No. 6: The metal beam guide rail at the Southeast, Southwest, and Northeast approaches is not R-B 350 Compliant. Update transition at leading and trailing ends to current standards.

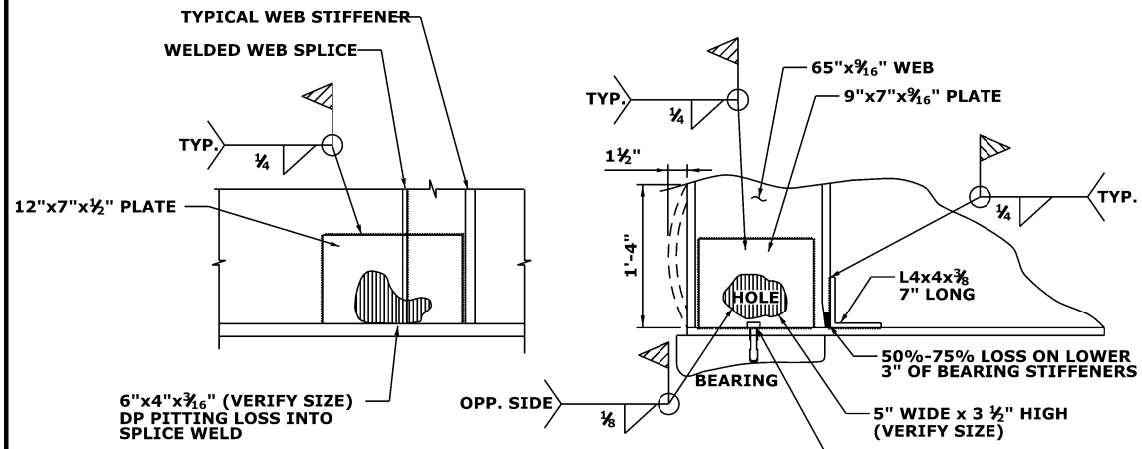
Field Painting

Due to the poor condition of the paint and the deterioration and section loss of the steel superstructure at existing joint locations, localized paint removal and painting of girder ends, ends of stringers, end floorbeams and truss ends, will be performed. For more information on the limits of field painting at specific elements of the superstructure, see the section on Steel Repairs.

Steel Repairs

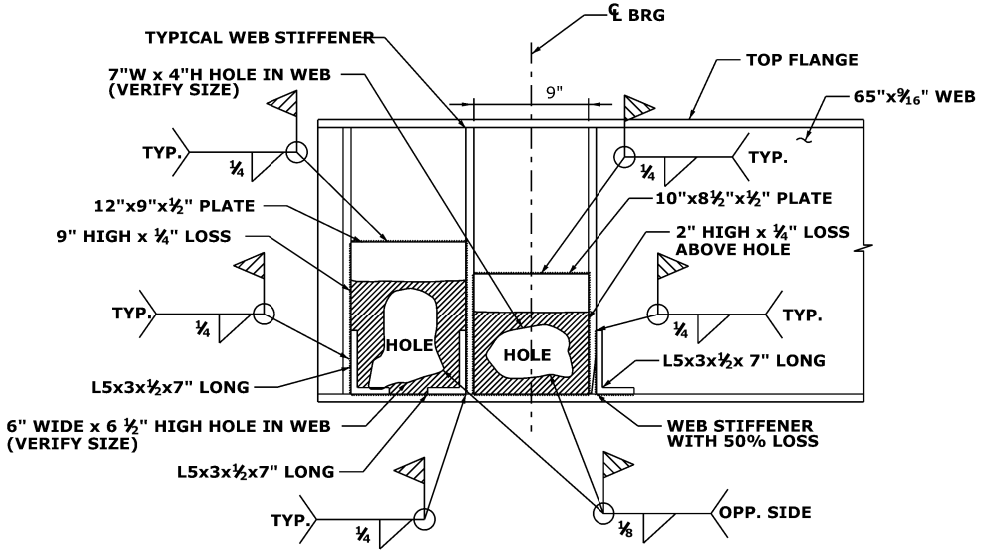
Girders: All the original approach span girders in Span Nos. 1-8 and Span No. 12 will have their ends blast cleaned and field painted. This treatment will include all bearing stiffeners, end diaphragms and bearings. The limits of painting shall be the last 5'-0" of the girders as shown in **Figure 7**. As previously stated, most of the deterioration, section loss and perforations to girder webs and bearing stiffeners occur within these limits. The present deterioration will be addressed once the girders are cleaned then primed and painted with a top coat after the repairs are made. Any perforations to girder webs or bearing stiffeners will be repaired with steel plates or angles welded to the girder webs and/or bearing stiffeners. A typical repair detail for this type of repair is as shown in **Figure 6**. Since these areas will be blast cleaned and field painted, these repairs should be performed after these areas have been blast cleaned and the remaining steel primed. The repair plates or angles will be primed and the entire repair area field painted.

Bearings: The bearings in the approach spans are all steel fixed or steel rocker expansion bearings. All the steel rocker expansion bearings were replaced under Project No. 126-119 in 1990 and are in satisfactory condition but the steel fixed bearings on the original approach span girders are in fair condition. These bearings will be within the limits of the proposed field painting at girder ends. This will address the deterioration at the fixed bearings but the loss at the anchor bolt nuts and anchor bolts

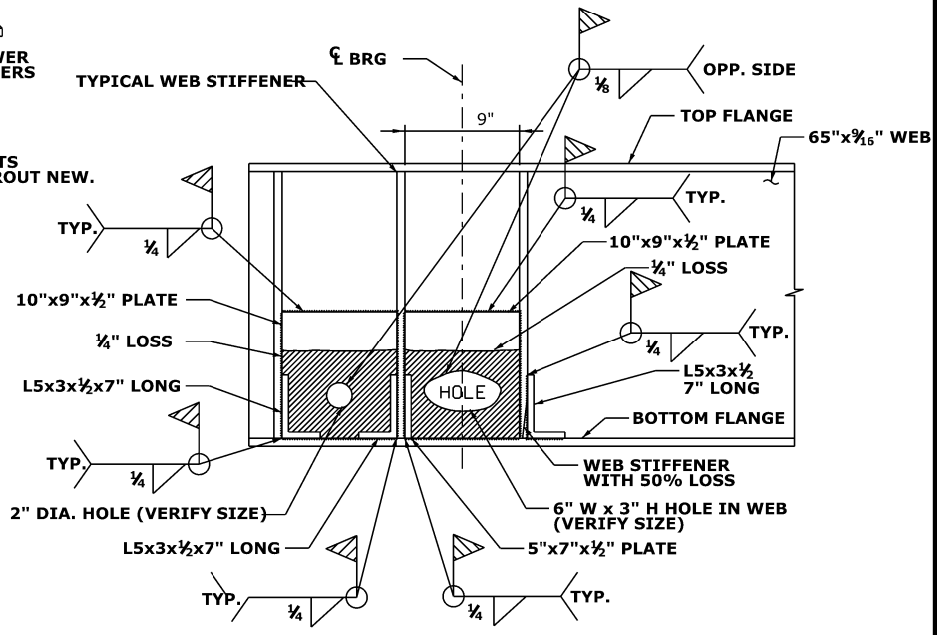


A S-010 **STEEL REPAIR DETAIL**
G-7 WEB SPLICE SPAN 2

B S-011 **STEEL REPAIR DETAIL**
G-7 PIER 7 IN SPAN 7



C S-011 **STEEL REPAIR DETAIL**
G-11 PIER 8 IN SPAN 8



D S-011 **STEEL REPAIR DETAIL**
G-9 PIER 8 IN SPAN 8

AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE PAINT AND REHAB ROUTE 8 OVER HOUSATONIC RIVER

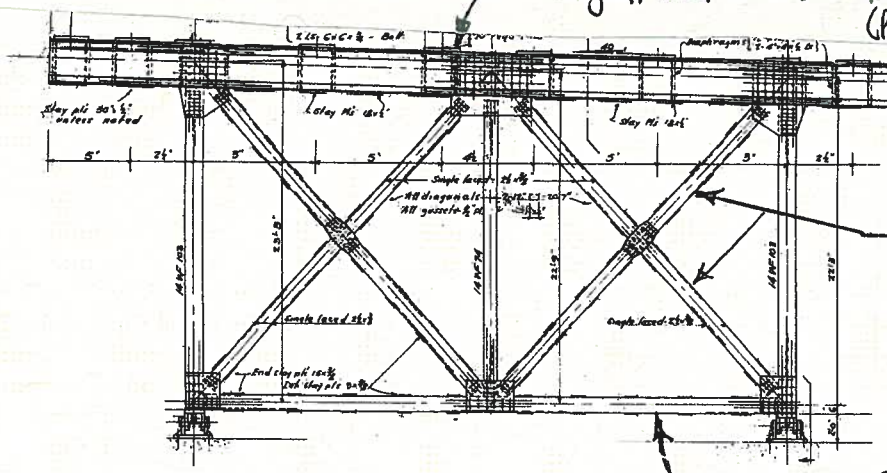
TOWN: SHELTON/DERBY

PROJECT NO.: 126-170

BRIDGE NO.: 00571A

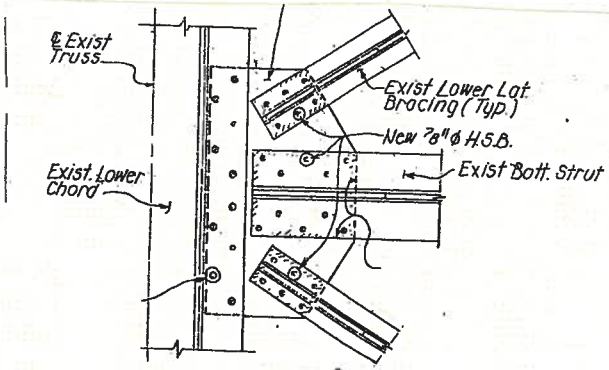
DRAWING TITLE: GIRDER STEEL REPAIRS

FIGURE NO.: 6

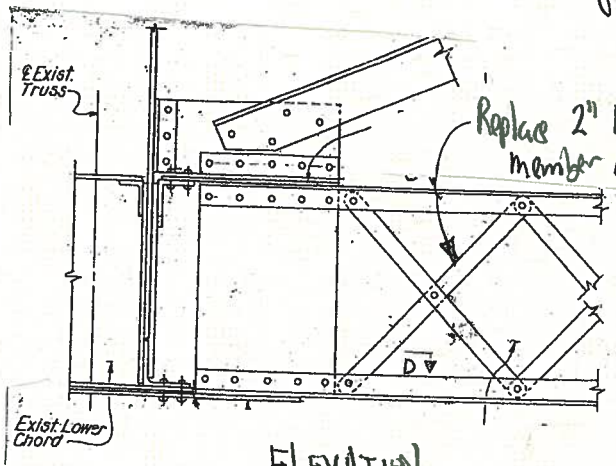


Alternative Repair No. 5
Replacement of Bracing members at Steel Truss Pier Bents at Piers B & 11.

Angles @ Lower Bracing: 7 x 4 x 7/16 (Bottom Struts)
4 x 5 x 3/8 (Lateral Bracing)



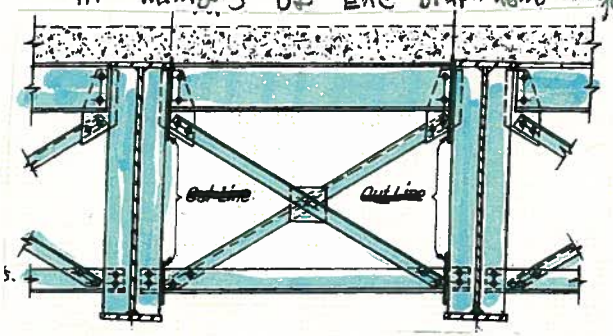
PLAN



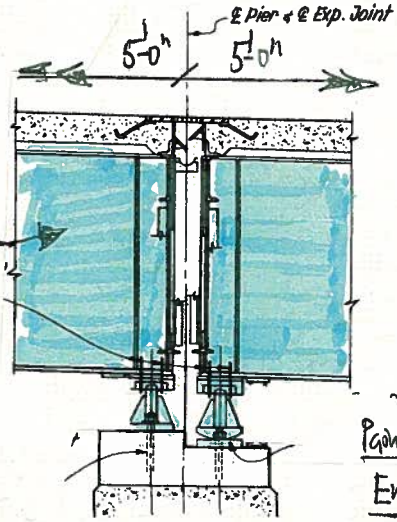
ELEVATION

Repair of Lower Bracing

Paint limits to include all Bearing Stiffeners and all members at End Diaphragm (typ.)



Painting Limits - End Diaphragm



Paint Limits Girder Ends - At Piers

AECOM

PROJECT TITLE: COMMODORE HULL BRIDGE PAINT AND REHAB ROUTE 8 OVER HOUSATONIC RIVER	
TOWN: SHELTON/DERBY	PROJECT NO.: 126-170
DRAWING TITLE: SKETCH #1	BRIDGE NO.: 00571A
	FIGURE NO.: 7

will need to be addressed. At several locations the section loss to the anchor bolts and the anchor bolt nuts will require restrainer angles that are welded to the masonry plates after the anchor bolts are cut flush with the plates. The concern is the lack of horizontal or vertical restraint provided by the deteriorated anchor bolts and nuts. Supplemental anchor bolts for these restrainer angles are drilled and grouted into the existing pier caps/abutment seats.

The bearings for the original trusses, both fixed and steel rocker expansion bearings, will also be cleaned and painted. Limits of field painting the truss ends extends to include the complete top and bottom nodes of the trusses which includes the bearings. The fixed bearings for the truss spans, like some of the fixed bearings for the approach span girders, have severe losses to the anchor bolt nuts. A restrainer for horizontal and vertical restraint is proposed for all fixed bearings on original trusses.

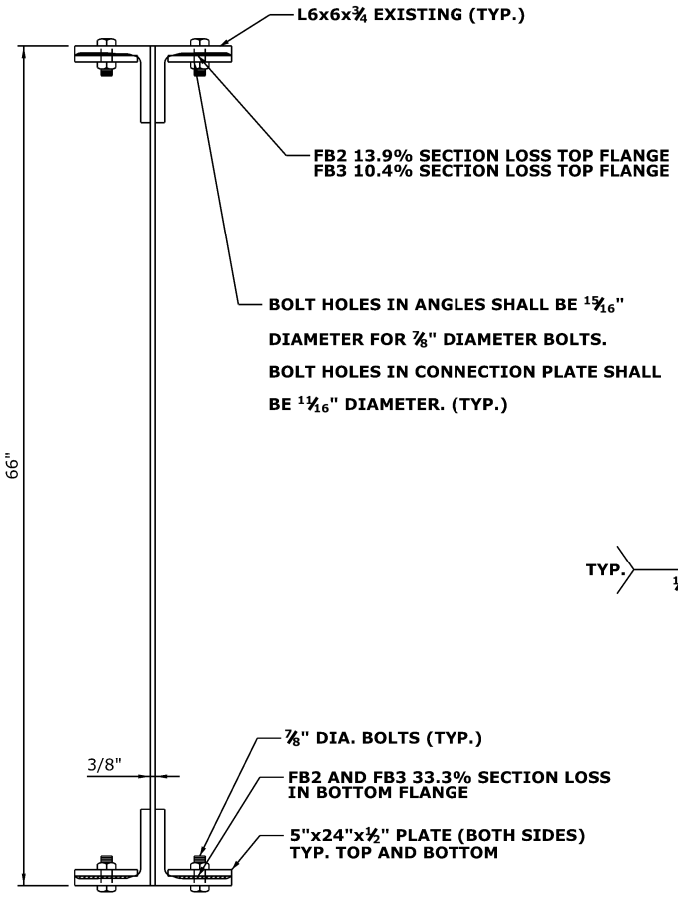
> Alternative Repair No. 4: Restrain all truss and selected approach span fixed bearings as described above. A detail for these restrainers is shown in **Figure 9**.

Stringers: The deterioration at the stringers occurs mostly at the ends adjacent to the piers and will be within the limits of field painting of the truss ends. Any perforations in stringer ends at webs or flanges will be repaired with steel plates in a manner similar to the methods described under the girder repair section.

Floorbeams: The floorbeams have deterioration and section loss to top and bottom flanges mostly in the stringer bay at the center of the bridge in the area under the original median prior to the reconstruction project done in 1990. The repair will be a steel plate bolted to the underside of each of the 6” x 6” x ½” angles that the built-up top flange consists of. These repair plates will be galvanized because they are not within the limits of the field painting to be performed. A typical detail for this type of repair is shown in **Figure 8**. Any perforations in floorbeam webs will be repaired with steel plates in a manner similar to the methods described under the girder repair section.

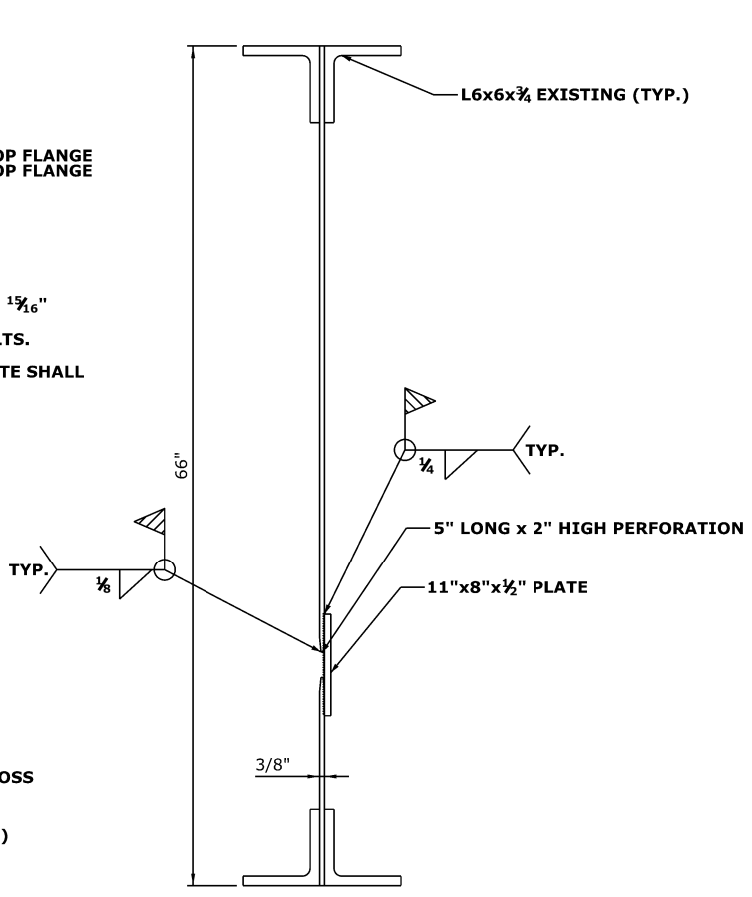
Trusses: The deterioration to truss chord members mostly occurs at the ends near piers. These areas will be within the limits of painting of the truss ends. These limits will include the complete top and bottom nodes of the truss, all vertical and horizontal gusset plates as well as all end bracing, end floorbeams and ends of stringers within field painting limits.

The impact rust between the bottom chord, bottom angle, and the bottom plate has distorted the plates and puts pressure on the riveted connection between the two elements. This occurs at the ends of bottom chords near the piers of the original trusses. A repair for this situation is the replacement of the existing bottom chord bottom angle with a new galvanized angle in areas with high impact rust. The new angle is connected to the existing angle with high strength bolts after the impact rust is removed.



H S-011 **STEEL REPAIR DETAIL**

FB-2 AND 3 NEAR MID-SPAN IN SPAN 9



I S-012 **STEEL REPAIR DETAIL**

FB-9 SPAN 10 BETWEEN S10 AND S11

AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE
PAINT AND REHAB
ROUTE 8 OVER HOUSATONIC RIVER

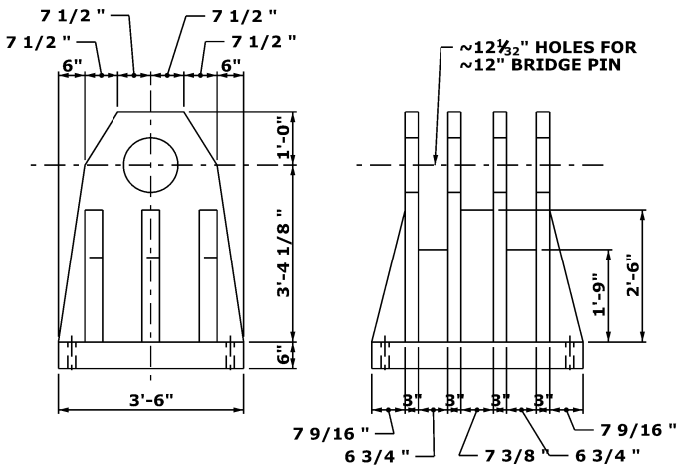
TOWN:
SHELTON/DERBY

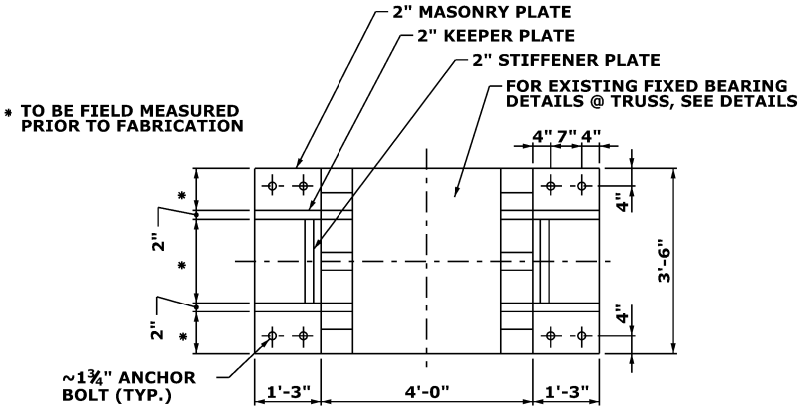
PROJECT NO.:
126-170

BRIDGE NO.:
00571A

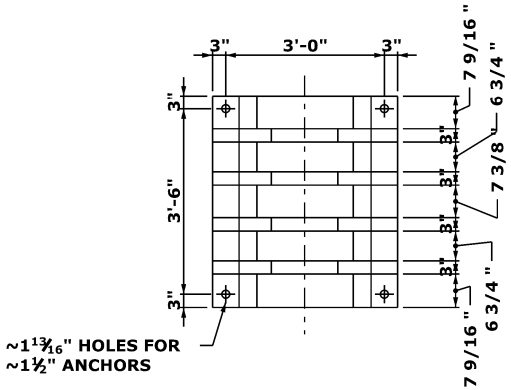
DRAWING TITLE:
FLOOR BEAM
STEEL REPAIRS

FIGURE NO.:
8

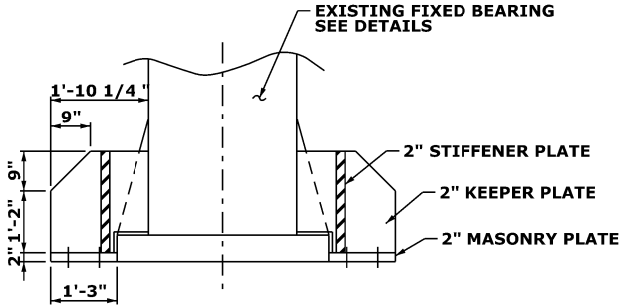




PLAN



EXISTING FIXED BEARING



SECTION

FIXED BEARING RESTRAINERS

AECOM

PROJECT TITLE:
COMMODORE HULL BRIDGE
PAINT AND REHAB
ROUTE 8 OVER HOUSATONIC RIVER

TOWN:
SHELTON/DERBY

PROJECT NO.:
126-170

BRIDGE NO.:
00571A

DRAWING TITLE:
FIXED BEARING
RESTRAINER DETAIL

FIGURE NO.:
9

The section loss to the existing vertical gusset plates of the original trusses has caused the condition rating of the trusses to be dropped from a poor condition (4) to a serious condition (3) in the latest Bridge Inspection Report. Bottom chord nodes that have both vertical and diagonal members framing into them are locations where the section losses are most severe. Strengthening each gusset plate with repair angles or plates will be done where required. As stated in **Section IV** under Load Ratings, the CTDOT updated the gusset plate analysis performed by Close, Jensen and Miller under Project No. 126-167 for the gusset plate losses reported in the 2013 Bridge Inspection Report. Although the resulting load rating factors calculated were all over 1.0, repairs and strengthening of some of these nodes is anticipated. Updating the analysis for the recent section losses should be included in the Final Design phase of this project, and any additional gusset plate repairs incorporated into the project.

The bottom chord truss nodes of the original trusses, at nodes where diagonals tie into these nodes, should also be blast cleaned and field painted. These nodes have significant section loss and deterioration to the gusset plates and the truss members due to the horizontal gusset plates that allow for debris and water to pond against the vertical members causing corrosion. This would be an additional area of painting called for on the bridge but would address one of the main areas of deterioration on the bridge. There are 30 such nodes on the two original trusses in Span Nos. 9-11. If these areas were included in the limits of proposed field painting then the repair steel would be primed, if these areas were not included then any repair steel for the gusset plates would be galvanized. (Note that the additional costs of painting these nodes has been included in the Structural Items of the Construction Cost Estimate and not broken out as an Alternative).

Secondary Truss Bracing:

Top Horizontal “X” Bracing: Although there are some areas of significant impact rust between the twin angles of the top cross bracing between the original trusses, the condition does not warrant their repair or replacement at this time given the present scope of this project.

Vertical “X” Bracing: Similar to the top horizontal cross bracing there are areas of significant impact rust between the twin angles, but the condition does not warrant their repair or replacement at this time given the present scope of this project.

Bottom Horizontal Cross Bracing: The bottom horizontal cross bracing between the original trusses is composed of dual angle top and bottom flanges connected with diagonal lacing bars. The connection of the lacing bars to the angles at both the top and bottom flanges have some areas of significant deterioration and many areas where there is 100% section loss to the lacing member. The reconstruction project in 1990 replaced a significant number of these lacing bars with new bars. Weepholes from the

deck above in the median area are draining onto these members and are causing significant deterioration. These bottom horizontal cross bracing members also support the lower inspection catwalk so their structural capacity must be maintained. The proposed repair should include the replacement of the deteriorated lacing member as shown in **Figure 7**.

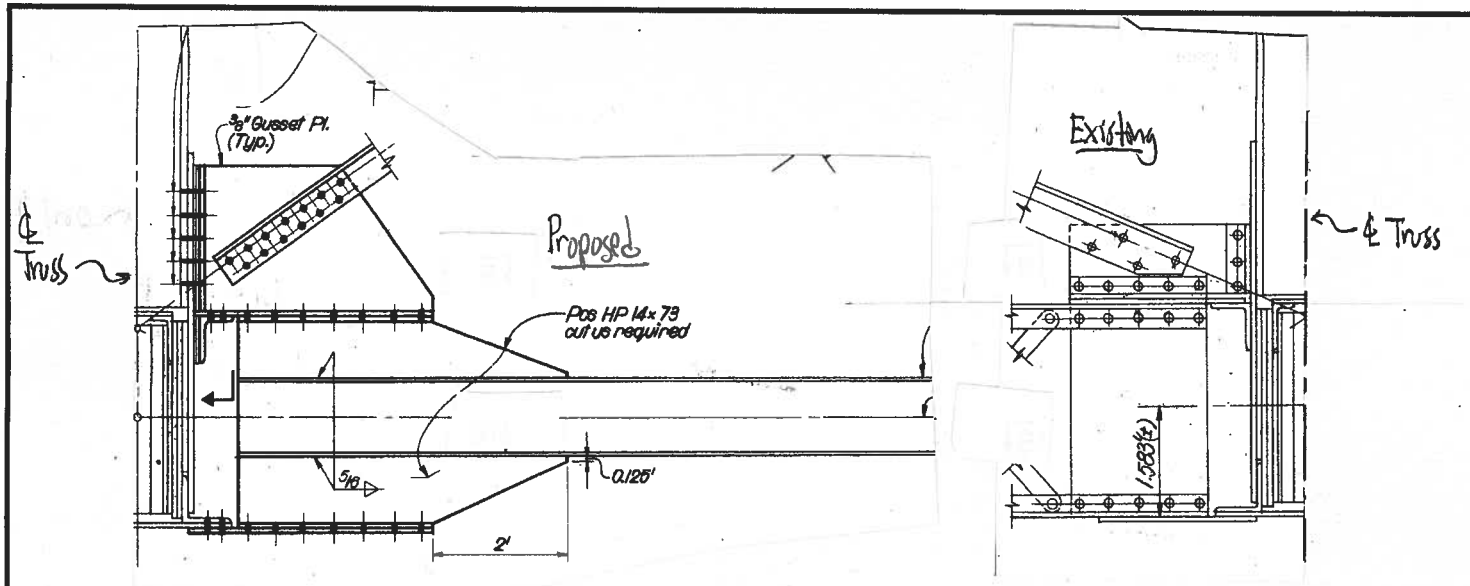
Alternative Repair Option No. 3: Another alternative is the complete replacement of these members throughout the truss, performed in concert with the proposed repairs to the lower inspection catwalk. A proposed member for the replacement of this diagonal bracing is shown in **Figure 10**. These bracing members have a depth of 3'-2" and the new member should be approximately the same depth for ease of connections to the truss but shouldn't add significant weight to the trusses that a rolled shape of that depth would. The replacement of these members is not in the present scope but due to the continued deterioration of these members even after significant repairs performed in the reconstruction project, is warranted and recommended.

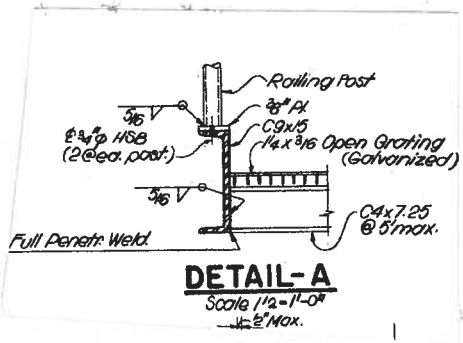
Lower Inspection Catwalk: The proposed repairs to the Lower Inspection Catwalk railing to meet the OSHA requirements of fall protection will require the replacement of the existing railing on both sides of the inspection catwalk. The existing railing is deteriorated as are portions of the galvanized steel grating and steel channel support members. The support members shall be repaired where required.

Alternative Repair Option No. 2: The deteriorated condition of the support members and steel grating warrant the complete replacement of the Lower Inspection Catwalk which will include the new railing, new support members, new grating, new plates and any required connections to the supports at the truss bracing. See proposed detail in **Figure 10**.

Electrical: For the replacement of the navigational lights in Truss Span No. 9 the following work is required:

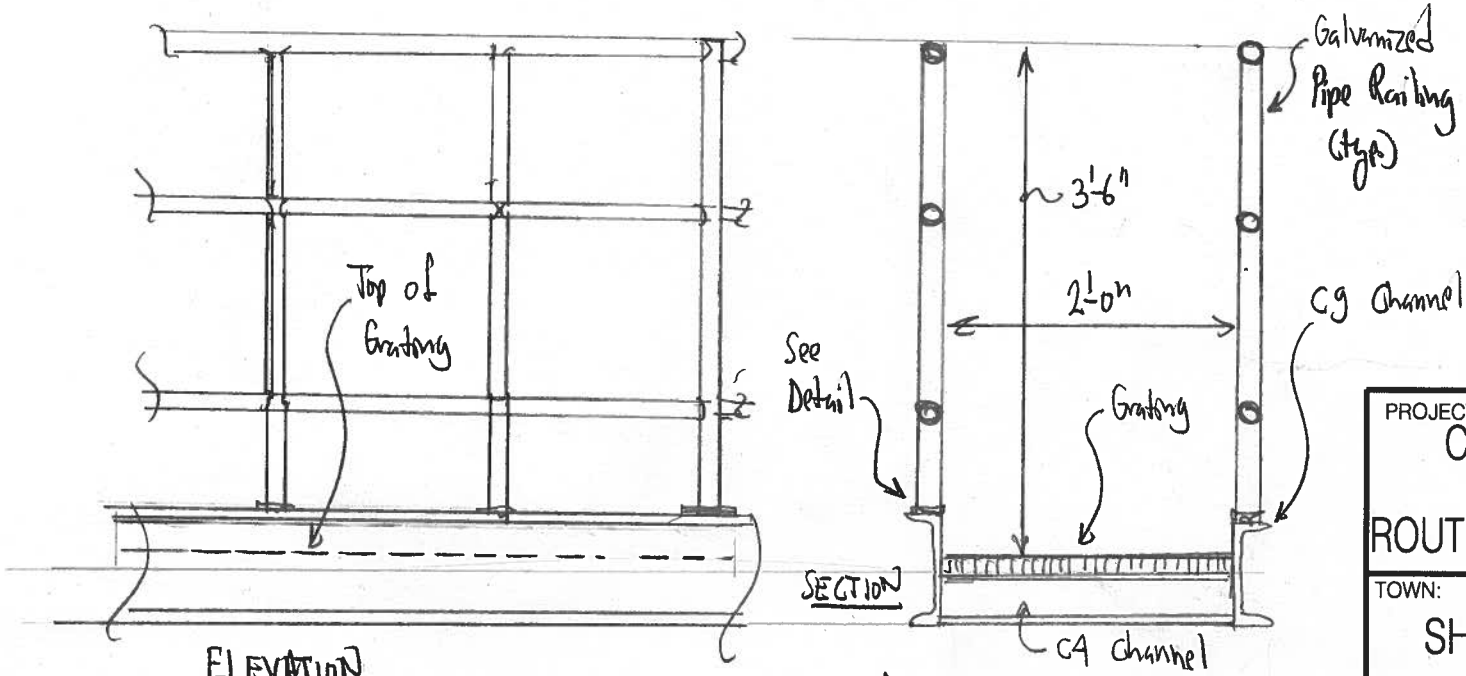
- Furnish and install new navigation lights with pivoting pendants and service chains.
- Replace 1" RGS conduit in its entirety along with cables (2/C #10 + GND). Conduit will be replaced up to existing box located on the underside of the bridge above the Canal Street.
    - Furnish and install RGS/SS conduit bodies, covers and supports.
    - Consider outer coating (PVC) of RGS conduit to further protect it from corrosion.
- Furnish and install new cast-iron gasketed covers for existing cast-iron junction boxes and attach them using vandal-resistant screws.





DETAIL-A
Scale 1½"=1'-0"
± 2" Max.

Replacement of Bottom Lateral Bracing



Proposed Replacement of Lower Inspection Catwalk
Alternative Repair No. 2

AECOM

PROJECT TITLE: COMMODORE HULL BRIDGE PAINT AND REHAB ROUTE 8 OVER HOUSATONIC RIVER	
TOWN: SHELTON/DERBY	PROJECT NO.: 126-170
	BRIDGE NO.: 00571A
DRAWING TITLE: SKETCH #2	FIGURE NO.: 10

- Furnish and install new navigation lights transformer junction box (18" x 18" x 10", NEMA 3R cast iron with gasketed cover) with new transformer.
- Provide proper support for messenger-cable mounted high-tension feeders on the underside of the bridge.

Substructure

Steel Truss Bents at Piers 8 and 11:

The original portions of the steel truss bents at Piers 8 and 11 are in serious condition due to deterioration and section loss to their top cap members. The losses to the top flange plates and top flange connection angles requires significant strengthening with a new top plate spliced to the existing deteriorated top flange plate. The existing top flange connection angles should be replaced in areas of significant deterioration. This repair will require the temporary bracing of the existing truss bents. The entire original portions of the steel truss bents are included in the field painting limits on the project. Bottom bracing members of both original truss bents are significantly deteriorated with heavy rust, section loss and perforations. As previously stated, due to the lowered load rating due to this deterioration, a temporary repair should be performed prior to the permanent fix proposed under this Rehabilitation Project.

> Alternative Repair Option No. 5: Replacement of all this bracing members of the original steel truss bents at Piers 8 and 11 is the recommended alternative to the repair and painting of these severely deteriorated steel bracing members. See **Figure 7** for the proposed repairs to the steel truss bent at Pier 8.

Concrete Pier Bents – Caps and Columns:

The concrete caps of pier bents on Piers 1-7 have random horizontal and vertical cracks, map cracking, hollow areas and spalls. These repairs will be made with standard repair details with Variable Depth Patching or Class "S" Concrete depending on the condition of the concrete areas. The concrete columns on Piers 1-7 also have random horizontal and vertical cracks, hollow areas and spalls, and will be repaired with Variable Depth Patching or Class "S" Concrete depending on the condition of the concrete areas. The standard repairs will also include the use of embedded galvanic anodes. Typical repair details will be shown on a substructure repairs detail sheet, and the repair limits for the piers will be detailed on the plans.

River Piers:

The solid stem piers, Piers 8-11, have random areas of shallow rebar, random horizontal and vertical cracks, map cracking, hollow areas and isolated spalls.

Proposed repairs will be as specified for the concrete pier bents, with typical repair details will be shown on a substructure repairs detail sheet, and the repair limits the piers will be detailed on the plans. Piers 9 and 10 are river piers and have granite stone masonry facing at the waterline. The stone masonry facing has up to 10% missing masonry with up to 1'-0" of penetration between the stones. The masonry will be re-pointed under the repair project.

Abutments/Wingwalls

The Abutments and wingwalls isolated horizontal and vertical cracks, and hollow areas with a few spalls. Proposed repairs will be as specified for the concrete pier bents, with typical repair details as shown on the Substructure Repairs Detail Sheet, and the repair limits the piers will be detailed on the plans.

Scour Related Work

All work associated with repair of scour at the Piers is as proposed in the **Pier Stability Review** submitted to the Department under separate cover.

VI. Construction

A. Maintenance and Protection of Traffic

There is little work being performed to elements at the deck level that will require maintenance and protection of traffic or protection of the work zone. The fencing repairs proposed for the east parapet on Route 8 Northbound will require work zone protection. The present shoulder at that location is 4'-0" wide due to the Ramp D taper in these spans. To provide an effective work zone for these repairs precast concrete barrier should be placed separating the work zone from the travel lanes. This would require some narrowing of the travel lanes, and may depend on the extent and limits of the repairs to the fencing in this area.

Painting on the bridge in the truss spans over the river could require the placement of painting and abrasive blast cleaning equipment in either the roadway above or on a barge in the river below the structural steel being painted. If the Contractor chose to use/place his equipment in the roadway, then provisions for maintenance and protection of traffic will be required and be provided by the Contractor. The plans and specifications can note the constraints on the Contractor if he places this equipment in the road and clearly indicate that the costs of providing maintenance and protection of traffic items are the Contractor's responsibility. Another possibility is providing the maintenance and protection plans for this operation in the contract documents.

B. Temporary Facilities Required During Construction

The painting of beam ends and truss ends on the bridge will be done under Item No. 0603479A Abrasive Blast Cleaning and Field Painting of Beam Ends (Site No. 1) which will require the use of a Class 1 Containment and Collection of Surface Preparation Debris item for the project. The Containment enclosure shall meet the requirements of the specification for Item No. 0603928A Class 1 Containment and Collection of Surface Preparation Debris (Site No. 1) for a containment enclosure with a suspended platform. The enclosure shall be designed and detailed by the Contractor and submitted for review to the Engineer. The loading on the bridge due to the containment structure shall be calculated by the Contractor and reviewed by the Engineer as called for in the specifications.

Given that the enclosures are mostly located in low moment areas at the ends of beams and trusses, it is not anticipated that there will be any overload issues due to the containment enclosures. With the enclosures at beam ends, the concrete piers can be used to assist in the support of the enclosures and should make the erection of the enclosures easier.

The support of the pier cap at the steel truss ends may be required for the steel repairs to the top plate in the pier cap at Pier Nos. 8 and 11. The temporary support of the cap

by use of towers supported on the concrete pier seat of Pier Nos. 8 and 11 will accomplish this if required. Any temporary supports will be designed and detailed by the Contractor and submitted to the Engineer for review.

VII. Construction Cost Estimate Summary

The following estimate is based on the proposed repairs in **Section V**. For additional information see the following pages in this section and **Appendix D** Cost Estimate Computations.

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
AND BRIDGE NOS. 0571B & 0571C

CONTRACT ITEMS SUMMARY

Route 8 Roadway	$	120,490
Structure Costs	$	4,019,550
SUBTOTAL	$	4,140,040

CLEARING & GRUBBING	(3%)	$124,200
M & P OF TRAFFIC	(2%)	$82,800
MOBILIZATION	(15%)	$621,000
CONSTRUCTION STAKING	(0.5%)	$20,700
MINOR ITEMS	(15%)	$621,000
CONTRACT ITEMS		$5,609,740
SAY		$5,625,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS		$5,625,000
CONTINGENCIES	(20%)	$1,125,000
INCIDENTALS TO CONSTRUCTION	(20%)	$1,125,000
UTILITIES		$300,000
TOTAL ESTIMATED COST 2014		**$8,175,000**
COST ADJUSTMENT 4% per year	**2015**	**$8,502,000**
	2016	**$8,842,080**
TOTAL ESTIMATED COST		**$8,900,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

Prepared by: MPE
Date: 6/23/2014
Checked by: A. St.Germain
Date: 6/23/2014

Project Description: Commodore Hull Bridge Rehabilitation - Route 8 over the Housatonic River
STATE PROJECT NUMBER: 126-170
FEDERAL AID PROJECT NUMBER: BHF-19(182)
TOWNS: Derby/Shelton

HIGHWAY ESTIMATE

ITEM NO.		DESCRIPTION	UNIT	QNT.	PRICE	AMOUNT
0822001		Temporary Precast Concrete Barrier Curb	L.F.	750	$20.00	$15,000
0822002		Relocated Temporary Precast Concrete Barrier Curb	L.F.	750	$5.00	$3,750
1220011	A	Construction Signs - Type III Reflective Sheeting	S.F.	800	$25.00	$20,000
1807010		Temporary Impact Attenuation System Type A Module 200 Lb	EA.	4	$375.00	$1,500
1807011		Temporary Impact Attenuation System Type A Module 400 Lb	EA.	2	$350.00	$700
1807012		Temporary Impact Attenuation System Type A Module 700 Lb	EA.	6	$360.00	$2,160
1807013		Temporary Impact Attenuation System Type A Module 1400 Lb	EA.	8	$360.00	$2,880
1807014		Temporary Impact Attenuation System Type A Module 2100 Lb	EA.	4	$400.00	$1,600
1807101		Relocation of Temporary Impact Attenuation System Type A	EA.	6	$900.00	$5,400
0913023	A	6' Polyvinyl Chloride Chain Link Fence	L.F.	300	$75.00	$22,500
969064	A	Construction Field Office, Large	MO.	9	$5,000.00	$45,000
		HIGHWAY AND TRAFFIC ITEMS SUBTOTAL			**Total**	**$120,490**

AECOM

Prepared by: MPE
Date: 6/23/2014
Checked by: A. St.Germain
Date: 6/23/2014

Project Description: Commodore Hull Bridge Rehabilitation -
Route 8 over the Housatonic River
STATE PROJECT NUMBER: 126-170
FEDERAL AID PROJECT NUMBER: BHF-19(182)
TOWNS: Derby/Shelton

STRUCTURE ESTIMATE

ITEM NO.		DESCRIPTION	UNIT	QNT.	PRICE	AMOUNT
0511007	A	Clean Existing Scuppers	Ea.	37	$ 500.00	$ 18,500.00
0511204	A	Extend Existing Weepholes	Ea.	76	$ 700.00	$ 53,200.00
0512018	A	Removal and Replacement of Existing Bridge Drainage System	L.F.	40	$ 200.00	$ 8,000.00
0520035	A	Silicone Expansion Joint System	L.F.	50	$ 325.00	$ 16,250.00
0522158	A	Keeper Assembly	Ea.	10	$ 1,500.00	$ 15,000.00
0522155	A	Replace Bridge Bearings	Ea.	5	$ 3,000.00	$ 15,000.00
0601070	A	Class "S" Concrete	C.Y.	5	$ 5,000.00	$ 25,000.00
0601097	A	Variable Depth Patch	C.F.	500	$ 200.00	$ 100,000.00
0601954	A	Epoxy Injection Concrete Repair	L.F.	50	$ 160.00	$ 8,000.00
0602911	A	Drilling Holes and Grinding Anchor Bolts	Ea.	60	$ 60.00	$ 3,600.00
0603026	A	Disposal of Lead Blast Debris	bbl.	50	$ 550.00	$ 27,500.00
0603272	A	Decontamination Facility	MO	9	$ 6,400.00	$ 57,600.00
0603273	A	Portable Handwash Facility	MO	9	$ 1,050.00	$ 9,450.00
0603366	A	Walkway Modifications	L.S.	L.S.	L.S.	$ 403,200.00
0603444	A	Lead Health Protection Program (LHPP)	est.	est.	$ 100,000.00	$ 100,000.00
0603801	A	Structural Steel (Cwt.)	Cwt.	150	$ 2,500.00	$ 375,000.00
0603479	A	Abrasive Blast Cleaning & Field Painting of Structure (Site #1)	L.S.	L.S.	($25/sf)	$ 1,250,000.00
0603928	A	Containment and Collection of Debris (Site #1)	L.S.	L.S.	($25/sf)	$ 1,250,000.00
0904103	A	Repair Metal Bridge Rail	L.F.	960	$ 200.00	$ 192,000
1008460	A	1" RMC PVC-Coated Service	L.F.	700	$ 8.00	$ 5,600
1008901		Remove Conduit	L.F.	700	$ 10.00	$ 7,000
1009015	A	18"x18"x10" Cast Iron Junction Box	Ea.	1	$ 2,000.00	$ 2,000
1009300	A	Steel Junction Box Cover	Ea.	6	$ 425.00	$ 2,550
		Cable in Duct (Two No. 10 and No. 8 Ground)	L.F.	700	$ 12.00	$ 8,400
		Step Down Transformer, 1kVA	Ea.	1	$ 2,500.00	$ 2,500
1018001	A	Navigational Lights	Ea.	6	$ 10,000.00	$ 60,000
1018101		Remove Navigational Lights	Ea.	6	$ 700.00	$ 4,200
		CONSTRUCTION ITEMS SUBTOTAL			**Total**	**$4,019,550**

The following alternative repair options are for repair work beyond the proposed rehabilitation work scoped for this project. For more information see Cost Estimate Computations in **Appendix D**.

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
Alternative No. 1 (Replace Fence with Metal Bridge Rail)

CONTRACT ITEMS SUMMARY

Structure Costs	$	120,000
SUBTOTAL	$	120,000

MOBILIZATION	(15%)	$18,000
CONSTRUCTION STAKING	(0.5%)	$600
CONTRACT ITEMS		$138,600
SAY		$140,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS		$140,000
CONTINGENCIES	(20%)	$28,000
INCIDENTALS TO CONSTRUCTION	(20%)	$28,000
TOTAL ESTIMATED COST 2014		**$196,000**
COST ADJUSTMENT 4% per year	**2015**	**$203,840**
	2016	**$211,994**
TOTAL ESTIMATED COST		**$215,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
Alternative No. 2 (Replace Inspection Walkway)

CONTRACT ITEMS SUMMARY

Structure Costs	$	363,300
SUBTOTAL	$	363,300

MOBILIZATION	(15%)	$54,500
CONSTRUCTION STAKING	(0.5%)	$1,800
CONTRACT ITEMS		$419,600
SAY		$420,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS		$420,000
CONTINGENCIES	(20%)	$84,000
INCIDENTALS TO CONSTRUCTION	(20%)	$84,000
TOTAL ESTIMATED COST 2014		**$588,000**
COST ADJUSTMENT 4% per year	**2015**	**$611,520**
	2016	**$635,981**
TOTAL ESTIMATED COST		**$640,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
Alternative No. 3 (Replace Cross Bracing)

CONTRACT ITEMS SUMMARY

Structure Costs	$	1,382,000
SUBTOTAL	$	1,382,000

MOBILIZATION ----------	(15%)	$207,300
CONSTRUCTION STAKING ----------	(0.5%)	$6,900
CONTRACT ITEMS ----------		$1,596,200
SAY ----------		$1,600,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS ----------		$1,600,000
CONTINGENCIES ----------	(20%)	$320,000
INCIDENTALS TO CONSTRUCTION ----------	(20%)	$320,000
TOTAL ESTIMATED COST 2014 ----------		**$2,240,000**
COST ADJUSTMENT 4% per year	**2015**	**$2,329,600**
	2016	**$2,422,784**
TOTAL ESTIMATED COST ----------		**$2,425,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
Alternative No. 4 (Provide Keepers for Fixed Bearings as Required)

CONTRACT ITEMS SUMMARY

Structure Costs	$	38,000
SUBTOTAL	$	38,000

MOBILIZATION	(15%)	$5,700
CONSTRUCTION STAKING	(0.5%)	$200
CONTRACT ITEMS		$43,900
SAY		$45,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS		$45,000
CONTINGENCIES	(20%)	$9,000
INCIDENTALS TO CONSTRUCTION	(20%)	$9,000
TOTAL ESTIMATED COST 2014		**$63,000**
COST ADJUSTMENT 4% per year	**2015**	**$65,520**
	2016	**$68,141**
TOTAL ESTIMATED COST		**$70,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
Alternative No. 5 (Replacement of Steel Truss Bents Bracing)

CONTRACT ITEMS SUMMARY

Structure Costs	$	50,764
SUBTOTAL	$	50,764

MOBILIZATION ----------	(15%)	$7,600
CONSTRUCTION STAKING ----------	(0.5%)	$300
CONTRACT ITEMS ----------		$58,664
SAY ----------		$60,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS ----------		$60,000
CONTINGENCIES ----------	(20%)	$12,000
INCIDENTALS TO CONSTRUCTION ----------	(20%)	$12,000
TOTAL ESTIMATED COST 2014 ----------		**$84,000**
COST ADJUSTMENT 4% per year	**2015**	**$87,360**
	2016	**$90,854**
TOTAL ESTIMATED COST ----------		**$91,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

STATE PROJECT NO. 126-170

COMMODORE HULL BRIDGE REHABILITATION
BRIDGE NO. 0571A over the HOUSATONIC RIVER
Alternative No. 6 (Modify Transitions to Metal Beam Guide Rail)

CONTRACT ITEMS SUMMARY

Structure Costs	$	6,000
SUBTOTAL	$	6,000

MOBILIZATION ----------	(15%)	$900
CONSTRUCTION STAKING ----------	(0.5%)	$30
CONTRACT ITEMS ----------		$6,930
SAY ----------		$7,000

COST ESTIMATE SUMMARY

CONTRACT ITEMS ----------		$7,000
CONTINGENCIES ----------	(20%)	$1,400
INCIDENTALS TO CONSTRUCTION ----------	(20%)	$1,400
TOTAL ESTIMATED COST 2014 ----------		**$9,800**
COST ADJUSTMENT 4% per year	**2015**	**$10,192**
	2016	**$10,600**
TOTAL ESTIMATED COST ----------		**$11,000**

* Estimate is based on Contract Items

ESTIMATED BY: MPE
DATE: 06/25/14

AECOM

Prepared by: MPE
Date: 6/24/2014
Checked by: A. St.Germain
Date: 6/24/2014

Project Description: Commodore Hull Bridge Rehabilitation - Route 8 over the Housatonic River
STATE PROJECT NUMBER: 126-170
FEDERAL AID PROJECT NUMBER: BHF-19(182)
TOWNS: Derby/Shelton

STRUCTURE ESTIMATE

ITEM NO.		DESCRIPTION	UNIT	QNT.	PRICE	AMOUNT
		Replace Fence with Metal Bridge Rail				
0904997	A	Removal of Existing Metal Bridge Rail	L.F.	960	$ 25.00	$ 24,000.00
0904936	A	Metal Bridge Rail	L.F.	960	$ 300.00	$ 288,000.00
0904103	A	Repair Metal Bridge Rail	L.S.	L.S.	L.S.	$ (192,000.00)
		Alternative No. 1 Subtotal			**Total**	**$ 120,000.00**
		Replace Inspection Walkway				
		Removal of Existing Catwalk	L.S.	L.S.	L.S.	$ 75,000.00
0603345	A	Inspection Walkway (Type 1)	L.F.	1,152	$ 500.00	$ 576,000.00
0603545	A	Steel Grating	S.F.	2,310	$ 50.00	$ 115,500.00
0603366	A	Walkway Modifications	L.S.	L.S.	L.S.	$ (403,200.00)
		Alternative No. 2 Subtotal			**Total**	**$ 363,300.00**
		Replace Cross Bracing				
		Removal of Existing Bracing	L.S.	L.S.	L.S.	$ 50,000.00
0603801	A	Structural Steel	Cwt.	1,776	$ 750.00	$ 1,332,000.00
		Alternative No. 3 Subtotal			**Total**	**$ 1,382,000.00**
		Provide Keepers for Fixed Bearings as Required				
0522158	A	Keeper Assembly (Approach Spans)	Ea.	16	$ 500.00	$ 8,000.00
0522158	A	Keeper Assembly (Truss Spans)	Ea.	6	$ 5,000.00	$ 30,000.00
		Alternative No. 4 Subtotal			**Total**	**$ 38,000.00**
		Replacement of Steel Truss Bents Bracing				
		Removal of Existing Bracing	L.S.	L.S.	L.S.	$ 20,000.00
0603801	A	Structural Steel (Replacement)	cwt	159	$ 750.00	$ 119,250.00
0603801	A	Structural Steel (Repair)	cwt	20	$ 2,500.00	$ (50,000.00)
0603479	A	Abrasive Blast Cleaning & Field Painting of Structure (Site #1)	S.F.	1,539	$ 25.00	$ (38,486.50)
		Alternative No. 5 Subtotal			**Total**	**$ 50,763.50**
		Modify Transitions to Metal Beam Guide Rail				
0910989	A	R-B 350 Bridge Attachment Jersey Shape Parapet 106A	Ea.	1	$ 3,000.00	$ 3,000.00
0910187		R-B 350 Bridge Attachment Trailing End 106A	Ea.	2	$ 1,500.00	$ 3,000.00
		Alternative No. 6 Subtotal			**Total**	**$ 6,000.00**

VIII. Alternatives

Supplemental Recommendations

Alternative Repair Option No. 1

Description: Replacement of the 5'-0" high Metal Bridge Rail Protective Fencing on the eastern parapet and western parapet between Sta.124+95 and Sta.126+35, with Metal Bridge Rail.

Justification: The proposed repairs will not guarantee that this fencing is not damaged further in the future, and the original reason for the fencing seems to be to protect two railroad lines under the bridge that are no longer in existence.

Cost: $215,000

Recommendation: Eliminating the future maintenance concerns warrants the additional cost, therefore we recommend the replacement of the existing 5'-0" high metal bridge rail protective fencing with new metal bridge rail versus its repair.

Alternative Repair Option No. 2

Description: Replacement of the Entire Lower Catwalk with new support members and grating.

Justification: The original support members and grating have severe corrosion at various locations and should be replaced along with the replacement of the railing that is already scoped as a repair for this project.

Cost: $640,000

Recommendation: The support members are all original steel from the original construction project and are significantly deteriorated in numerous locations. The replacement of all of the railing is already called for. Therefore we recommend the replacement of the lower catwalk versus its repair.

Alternative Repair Option No. 3

Description: Replacement of the Bottom Lateral Cross Bracing between the original trusses instead of repairing damaged portions.

Justification: The lacing bars of the cross bracing are completely severed from the top and bottom double angle flanges at numerous locations.

Cost: $2,425,000

Recommendation: Although there are numerous lacing bars with perforations that are severed from the top or bottom flange angles, in most locations flanges are in fair condition, and access in river spans makes the replacement option very costly.

Therefore we recommend repairing the bottom lateral bracing and not replacing the bracing.

Alternative Repair Option No. 4

Description: Restraining the Fixed Bearings at the original trusses as well as the fixed bearings in the Original Approach Span Girders.

Justification: The loss of the anchor bolt nuts compromises the uplift resistance of the Fixed Bearings throughout the Bridge, especially at the original trusses.

Cost: $70,000

Recommendation: The condition of the existing anchor bolts and anchor bolt nuts warrants this repair, therefore we recommend installing the restrainers at all fixed bearings of trusses and at fixed bearings at approaches where required.

Alternative Repair Option No. 5

Description: Replacement of the bracing members of the original steel truss bents at Pier Nos. 8 and 11.

Justification: The bracing members are severely deteriorated with numerous perforations. Replacement is in lieu of repairs and painting.

Cost: $91,000

Recommendation: When the cost of not having to repair and paint these bracing members are factored in, replacement costs are not significant. Therefore we recommend replacing the bracing members of the steel truss bents at Pier Nos. 8 and 11.

Alternative Repair Option No. 6

Description: Update the transition to the metal beam guide rail at southeast, southwest and northeast approaches at leading and trailing ends to current standards.

Justification: Current transitions are not R-B 350 compliant.

Cost: $11,000

Recommendation: The current transitions are not compliant; therefore we recommend updating them to current standards.

Appendix A: Photographs

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

Photo 1: **Bridge No. 00571A, Approach Span and Piers.**

Photo 2: **Bridge 00571A, Perforation and Section Loss in Vertical at Steel Truss Bent at Pier No. 8.**

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

Photo 3: Bridge No. 00571A, Perforation in Lacing Member of Bracing in Steel Truss Bent at Pier No. 8.

Photo 4: Bridge 00571A, Original Steel Girders in Span No. 2. Note Weep Hole Drains in Median Bearing.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

Photo 5: **Bridge No. 00571A, Perforations in Bearing Stiffeners at Girder Ends. Girder G8 in Spans 3 and 4 at Pier No. 2.**

Photo 6: **Bridge No. 00571A, Perforations in Web and Bearing Stiffeners at Girder Ends at Pier No. 3.**

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

Photo 7: **Bridge No. 00571A, Typical Condition at Original Girders Fixed Bearing in Approach Spans. Note the 90% Section Loss to Anchor Bolt Nut.**

Photo 8: **Bridge No. 00571A, Heavy Corrosion of Inspection Walkway Grating.**

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 9:</u> Bridge No. 00571A, Significant Rust Accumulation at Steel Truss Bent at Pier No. 8.

<u>Photo 10:</u> Bridge No. 00571A, Severe Anchor Bolt Nut Section Loss at Bearing of Steel Truss Bent at Pier No. 8.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

Photo 11: **Bridge No. 00571A, Lattice Member and Cross Bracing Section Losses.**

Photo 12: **Bridge No. 00571A, Severe Section Loss of Inspection Walkway Channel Member.**

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

Photo 13: **Bridge No. 00571A, Heavy Corrosion of Inspection Walkway Channel Member.**

Photo 14: **Bridge No. 00571A, Corrosion of Cross Bracing Member and Gusset Plate.**

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 15:</u> Bridge No. 00571A, Cross Bracing Member Perforation and Section Loss.

<u>Photo 16:</u> Bridge No. 00571A, Complete Loss of Lattice Bracing Members.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 17:</u> Bridge No. 00571A, Gusset Plate Section Loss and Perforations.

<u>Photo 18:</u> Bridge No. 00571A, Deterioration and Exposed Rebar at Pier No. 1.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 19:</u> Bridge No. 00571A, Exposed Rebar at Pier No. 5.

<u>Photo 20:</u> Bridge No. 00571A, Exposed Rebar and Spall at Pier No. 8.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 21:</u> Bridge No. 00571A, Extensive Aluminum Fencing Loss.

<u>Photo 22:</u> Bridge No. 00571A, Aluminum Fencing Damage.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 23:</u> Bridge No. 00571A, Rust Accumulation around Horizontal and Vertical Gusset Plates at Bottom Chord of Span Truss.

<u>Photo 24:</u> Bridge No. 00571A, Deterioration of Vertical Gusset Plate due to Rust Accumulation on Horizontal Gusset Plate.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 25:</u> Bridge No. 00571A, general state of Floorbeam Deterioration.

<u>Photo 26:</u> Bridge No. 00571A, Section Loss of Top Flange of Floorbeam due to leakage.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 27:</u> Bridge No. 00571A, Partially Clogged roadway Scupper.

<u>Photo 28:</u> Bridge No. 00571A, Heavily Clogged pedestrian sidewalk Scupper.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 29:</u> Bridge No. 00571A, Severely Clogged pedestrian sidewalk Scupper.

<u>Photo 30:</u> Bridge No. 00571A, Deck Joint in good condition with Minor Debris Accumulation.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 31:</u> Bridge No. 00571A, general condition of Bridge Wearing Surface.

<u>Photo 32:</u> Bridge No. 00571A, general condition of Fixed and Rocker Expansion Bearings replaced during Project No. 126-119.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 33:</u> Bridge No. 00571A, general condition of Fixed and Expansion Bearings of Original Trusses in Spans 9, 10 and 11.

<u>Photo 34:</u> Bridge No. 00571A, severe section loss of Fixed Bearing Anchor Bolt Nuts in the Original Trusses in Spans 9, 10 and 11.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 35:</u> Bridge No. 00571A, typical weepholes spaced longitudinally throughout the length of the bridge.

<u>Photo 36:</u> Bridge No. 00571A, 1" RGS Conduit mounted to railing on Lower Inspection Catwalk.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 37:</u> Bridge No. 00571A, Corrosion of 1” RGS Conduit.

<u>Photo 38:</u> Bridge No. 00571A, Junction in 1” RGS Conduit, note corrosion.

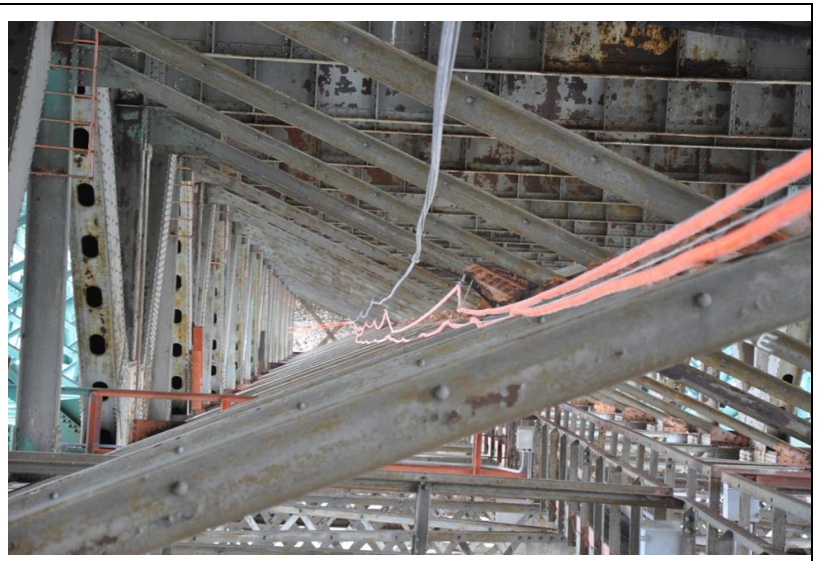
Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 39:</u> Bridge No. 00571A, Cast Iron Junction Box for Navigational Lighting.

<u>Photo 40:</u> Bridge No. 00571A, Navigation Lights.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

<u>Photo 41:</u> Bridge No. 00571A, High-tension electrical cables routed under Bridge.



<u>Photo 42:</u> Bridge No. 00571A, High-tension electrical cables routed under Bridge.

Bridge No.	00571A, Commodore Hull Bridge	**Inspected by:**	MICHAEL EGAN
Town:	SHELTON/DERBY	**Inspected by:**	ANDRE ST. GERMAIN
Feature Carried:	Route 8	**Date Inspected:**	
Feature Crossed:	HOUSATONIC RIVER	**Project No.:**	126-170

	
<u>Photo 43:</u> Bridge No. 00571A, Junction Box.	**<u>Photo 44:</u> Bridge No. 00571A,**

Appendix B: Existing Plans

NO REVISIONS SUBMITTED FOR THIS SHEET

FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		6	35

PROFILE
HORZ. SCALE 1"=200'
VERT. SCALE 1"=20'

PROFILE
ENTRANCE & EXIT RAMPS
HORZ. SCALE 1"=200'
VERT. SCALE 1"=20'

Grades to be adjusted as per profiles Bridge Sh. # 3 (Superstructure)

LIST OF BRIDGE SHEETS

1	General Plan	
2	Boring Data	
3	Boring Data	
4	Details	S.W. Abutment
5	"	Pier 1 & Ramp Pier 1N
6	"	Pier 2
7	"	Pier 3 & Ramp Pier 3S
8	"	Pier 4 & Ramp Pier 4S
9	"	Pier 5 & Ramp Pier 5N.
10	"	Pier 6
11	"	Pier 7
12	"	Ramp Abutments
13	"	Ramp Piers-2S-3N-4N
14	"	Pier 8
15	"	Pier 9
16	"	Pier 10
17	"	Pier 11
18	"	NE Abutment

TOTAL QUANTITIES

Item	Quantity	Unit
Bridge Excavation - Piers 8-9-10-11-NW. E. Abutment	5114	C.Y.
Bridge Excavation - S.W. Abutment to Pier 7 inclusive	5633	C.Y.
PILE LOADING TEST.	2	Each
Furnishing steel piles	1,579,400	Lbs.
Driving steel piles	28150	L.F.
Portland Cement	13801	Bbls.
Natural Cement	2452	Bbls.
Class "A" Concrete	9689	C.Y.
½" Bituminous Expansion Joint Filler for Bridges	280	S.F.
Dimension Stone Masonry	146	C.Y.
Deformed Steel Bars	790,000	Lbs.
Metal Flashing	130	Lbs
Damp Proofing	540	S.Y.
Lead Pointing	2070	L.F.
Tremie Concrete	359	C.Y.
Single Post	16	Each
Splicing Steel Piles	100	Each
Pile Caps	160	Each

Footings	Substructure		
5405	8396	Bbls.	Portland Cement
975	1477	Bbls.	Natural Cement
3825	5864	C.Y.	Class "A" Concrete

NOTES
Specifications - Connecticut State Highway Department & AASHO. H20S16-44
See also Special Provisions
All anchor bolts to be drilled for & set by Superstructure Contractor

ELEVATION

SECTION THRU GIRDER SPANS

SECTION THRU TRUSS SPANS

APPROVED J. D. Percy May 24, 1948 F.A.P. U136 (A)
ACTING ENGINEER OF BRIDGE DESIGN
APPROVED J. H. Willis May 24 1948
ENGINEER OF BRIDGES AND STRUCTURES
APPROVED _____ 194 —
DIRECTOR OF ENGINEERING AND CONSTRUCTION

REVISIONS		
No.	DATE	DESCRIPTION
	6/21/48	Sta. Piers 9 & 10
	9/27/48	100' Span and Counterweights changed

CONNECTICUT
STATE HIGHWAY DEPARTMENT
HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
GENERAL PLAN

DESIGNED BY
SCALES 1"=50' ⅛"=1'-0"
MADE BY DATE
CHECKED BY DATE 9/24/48
APPROVED DATE 9/24/48

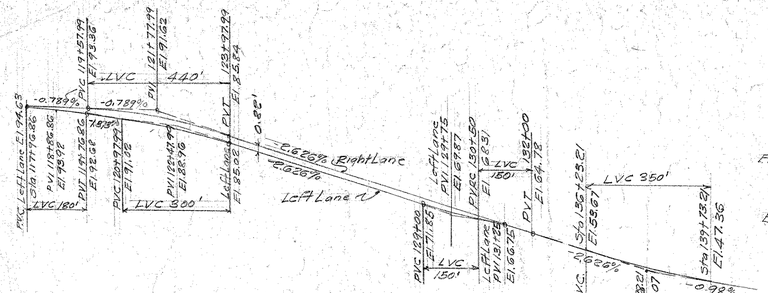
PROJECT NO. 36-370-3A
BRIDGE SHEET 1 of 18

136 37

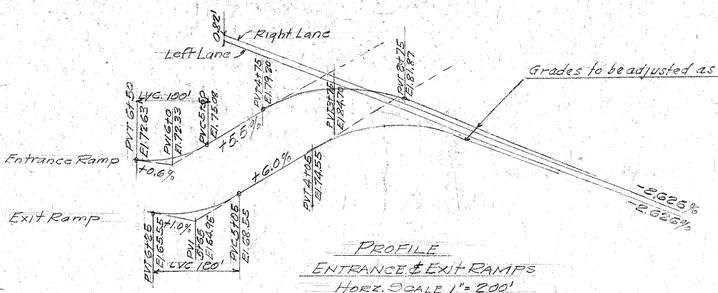
151.0

FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	0-136(4)	36-37	1948		6	18

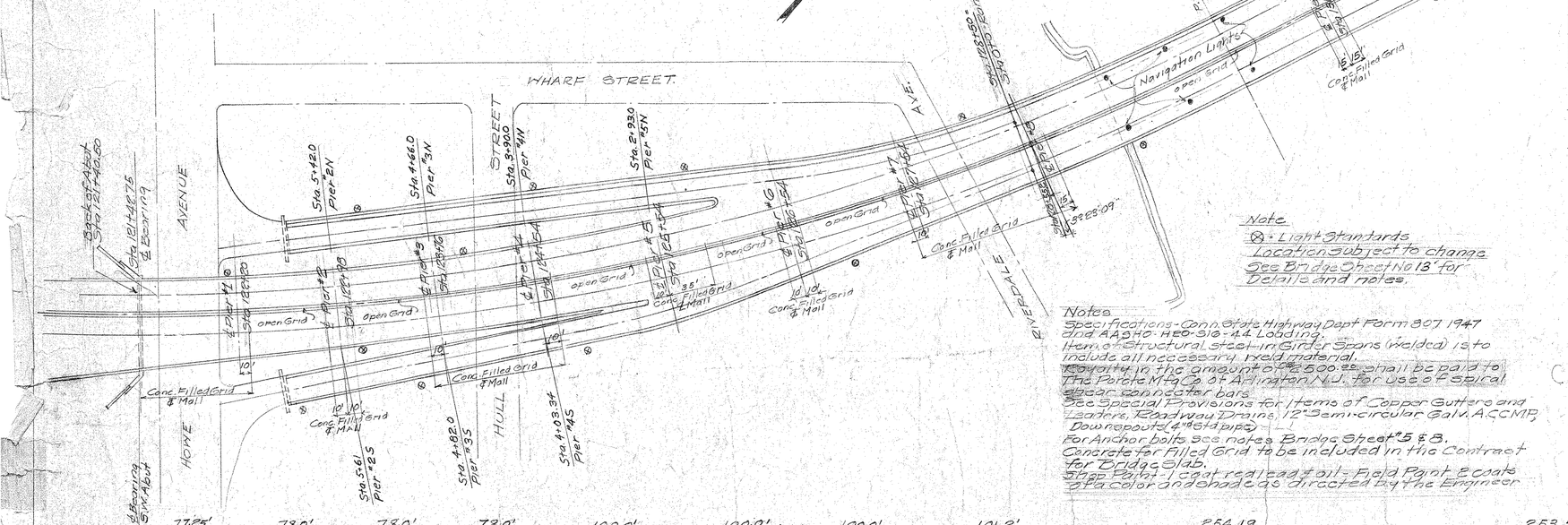
SHELTON-DERBY-ANSONIA EXPRESSWAY

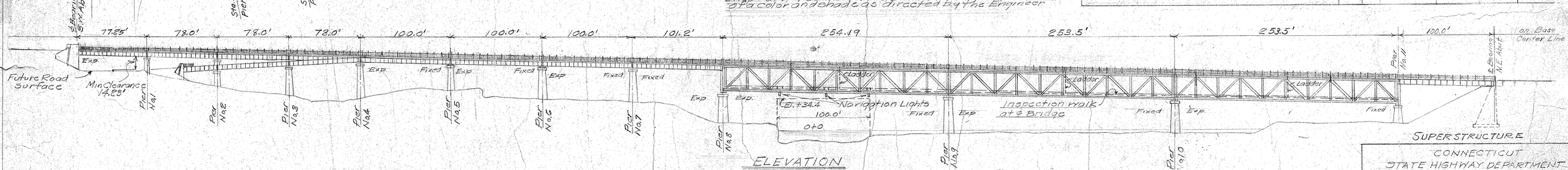


PROFILE
HORZ. SCALE 1"=200'
VERT. SCALE 1"=20'



PROFILE
ENTRANCE & EXIT RAMPS
HORZ. SCALE 1"=200'
VERT. SCALE 1"=20'





ELEVATION

SUPERSTRUCTURE

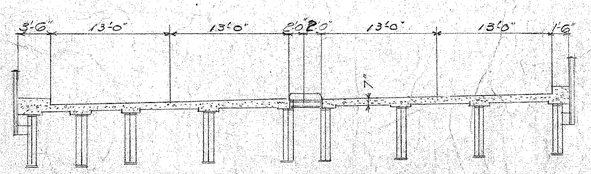
SUPERSTRUCTURE
LIST OF BRIDGE SHEETS.

No 1	General Plan
2	Viaduct Layout
3	Viaduct Layout
4	Viaduct Details
5	Viaduct Bearing Details
6	River Spans - Plan & Sections and N.E. Span
7	River Spans - Stress Sheet & Floor Beam Section
8	River Spans - Bearings, Expansion Joint & Truss Details
9	River Spans - Expansion Joint, Railing etc.
10	Trussed Bent #11 and Bearing Details
11	Expansion Details (riveted)
12	Drainage Details
13	Light Standards and Conduit.

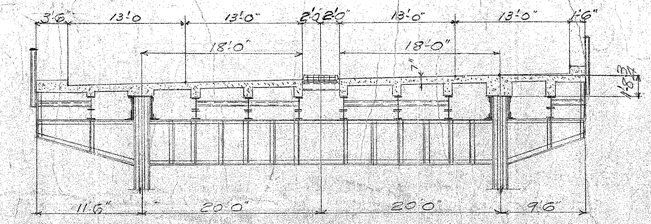
QUANTITIES.		TRUSS SPANS	GIRDER SPANS	BRIDGE SLAB
Portland Cement	BBL			4462.
Natural Cement	BBL			805.
Class A Concrete	C.Y.			3157.
Deformed Steel Bars	LB			692,990
Structural Steel				
Truss Spans (Riveted)	LB	- 5109000.		
Alternate 'A' Girder Spans (Riveted)	LB	-	3750,000.	
Alternate 'B' Girder Spans (Welded)	LB	-	3210.000.	
Open Steel Grid Floor	SF.	- 2190.	2302.	
Metal Bridge Rail	L.F.	- 1516.	2916.	
Spiral Shear Connector Bars	LB			40458
Copper Gutters & Leaders (20oz)	LB	- 524	2039.	
Roadway Drains	EA			120.
12" Semi-circular Galv. A.C.C.M.P.	L.F.	-	1800.	
Downspouts (4" ø Std Steel Pipe)	L.F.	-	1400.	
Electrical Pipe Conduit (2")	L.F.	1095.	1685.	

Note
⊗ - Light Standards
Location Subject to change
See Bridge Sheet No 13 for
Details and notes.

Notes
Specifications - Conn. State Highway Dept. Form 807 1947
and A.A.S.H.O. H-20-S16-44 Loading.
Item of Structural steel in Girder Spans (welded) is to include all necessary weld material.
Royalty in the amount of $2500.25 shall be paid to The Parke Mfg Co. of Arlington N.J. for use of Spiral shear connector bars.
See Special Provisions for Items of Copper Gutters and Leaders, Roadway Drains, 12" Semi-circular Galv. A.C.C.M.P. Downspouts (4" std pipe)
For Anchor bolts see notes Bridge Sheet #5 & 8.
Concrete for Filled Grid to be included in the Contract for Bridge Slab.
Shop Paint: 1 coat red lead paint - Field Paint & coats of Paint color and Shade as directed by the Engineer



SECTION THRU GIRDER SPANS.



SECTION THRU TRUSS SPANS.

APPROVED J. D. Drury Apr 13 1948
ACTING ENGINEER OF BRIDGE DESIGN.
APPROVED J. F. Willis Apr 15 1948
ENGINEER OF BRIDGES AND STRUCTURES.
APPROVED _____ 194_
DIRECTOR OF ENGINEERING AND CONSTRUCTION.

REVISIONS		
NO.	DATE	DESCRIPTION

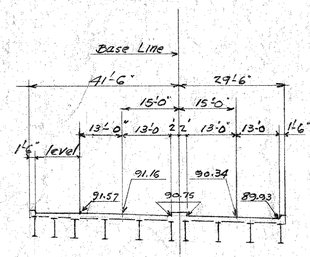
CONNECTICUT
STATE HIGHWAY DEPARTMENT
HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
GENERAL PLAN.

DESIGNED BY R.J.T.
SCALES 1"=50'-8"=1'-0"
MADE BY H.E.J. DATE 3/26/48
CHECKED BY O.K.T. DATE 4/13/48
J. D. Drury DATE 4-13-48
PROJECT NO. 36-37-E
SHEET NO. 6 OF 18 SHEETS

36 62 151 02 6

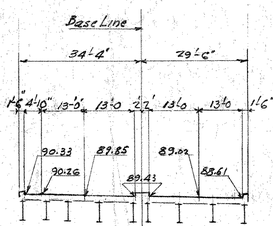
FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN	SHELTON & DERBY	U-136(4)	36-37	1948		7	18

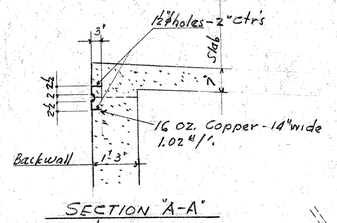
SHELTON-DERBY-ANSONIA EXPRESSWAY



AT ABUTMENT

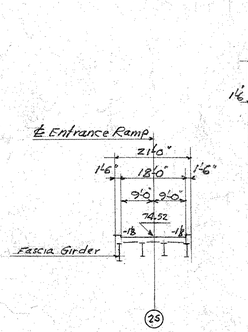
Elevs. are over ℄ of Bearing

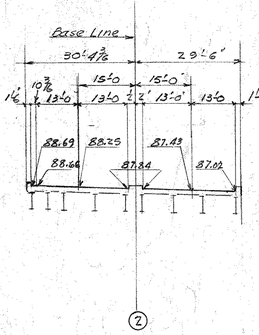


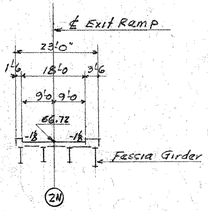


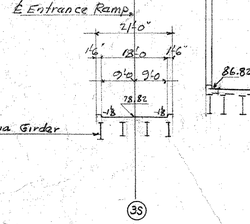
SECTION "A-A"

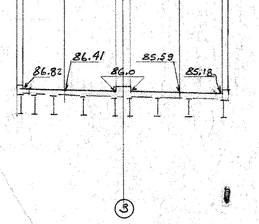
Sect E-E Similar.

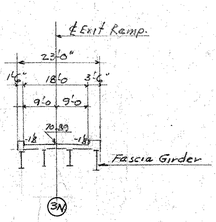






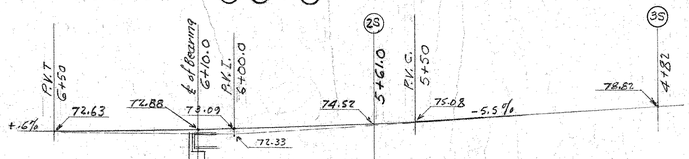






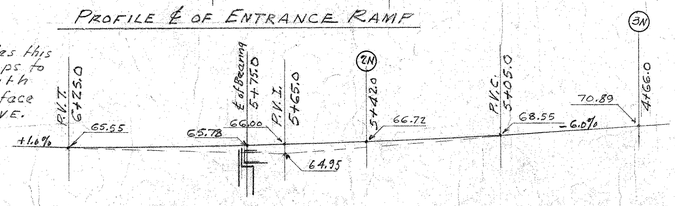
SECTIONS

Except as noted Elevs are over ℄ of piers.
For section at piers 4S ④ & 4N See Br. Sht No 3



PROFILE ℄ OF ENTRANCE RAMP

NOTE:- Adjust grades this end of ramps to conform with finished surface of HOWE AVE.



PROFILE ℄ OF EXIT RAMP

SUPERSTRUCTURE

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY

VIADUCT LAYOUT

REVISIONS		
NO.	DATE	DESCRIPTION

DESIGNED BY F.J.T
SCALES 1"=20'-0" unless noted
MADE BY H.W.W. DATE 1/29/48
CHECKED BY DATE 4/1/48
APPROVED DATE 4-13-48

PROJECT NO. 3637-03A
BRIDGE SHT NO. 2 OF 13

36 62

151 02

7

		TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		8	18

SHELTON-DERBY-ANSONIA EXPRESSWAY

PLAN

DETAIL (A)

DETAIL (B) See Br. Sht No. 2.

SECTIONS

Elevations are at top of concrete over ℄ of girders

PROFILE-℄ OF ENTRANCE RAMP

PROFILE-℄ OF EXIT RAMP

ELEVATION.

PLAN

DETAIL (A)

FOR DETAIL (B) See Br. Sht. No 2.

scale 4"=1'-0"

SUPERSTRUCTURE

CONNECTICUT
STATE HIGHWAY DEPARTMENT

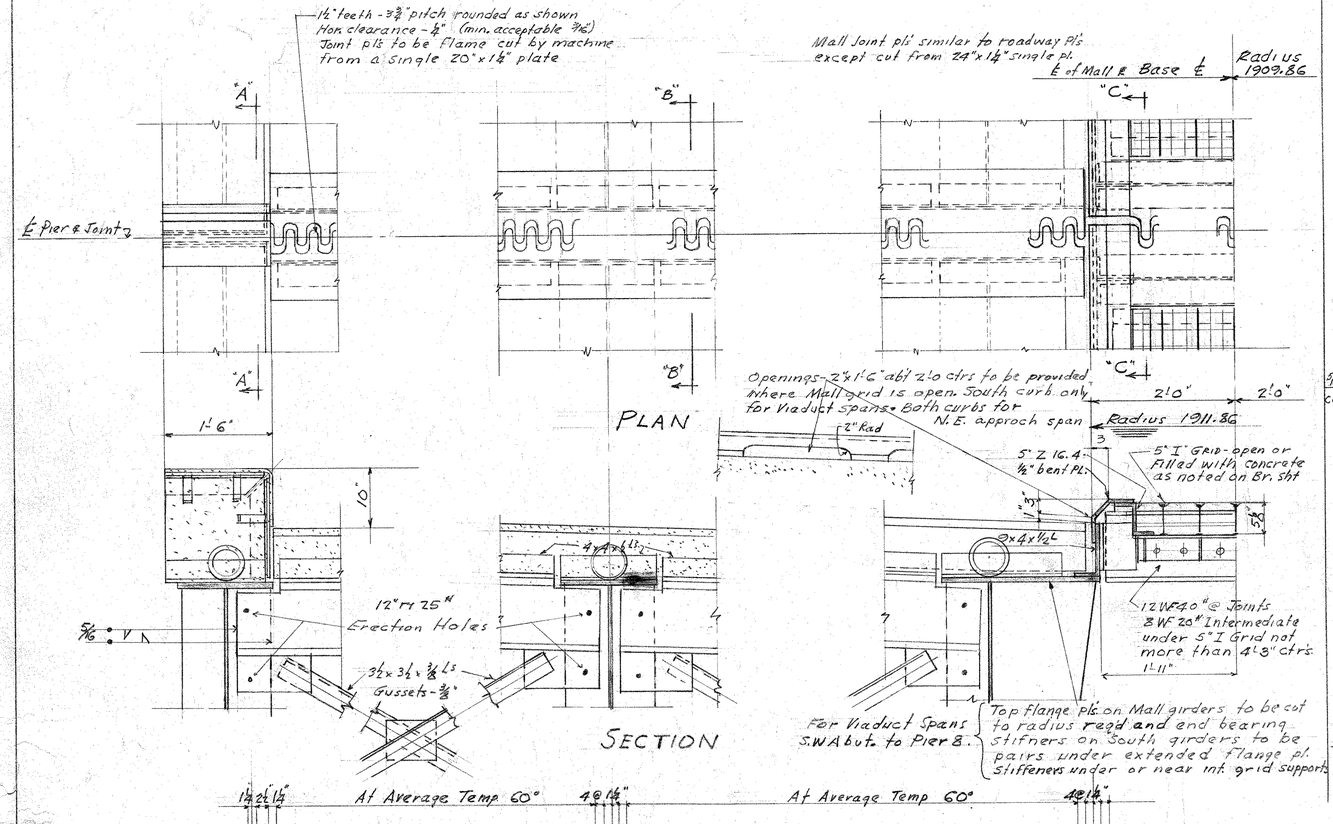
HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
VIADUCT LAYOUT

REVISIONS		
NO.	DATE	DESCRIPTION

DESIGNED BY F. J. T.
SCALES 1"=20'-0" unless noted
MADE BY H. W. W. DATE 11/3/48
CHECKED BY DATE 11/12/48
APPROVED DATE 11-13-48
PROJECT NO 3G37-03A
BRIDGE SHT. NO 3 OF 13

FED. ROAD DIST. NO	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		9	18

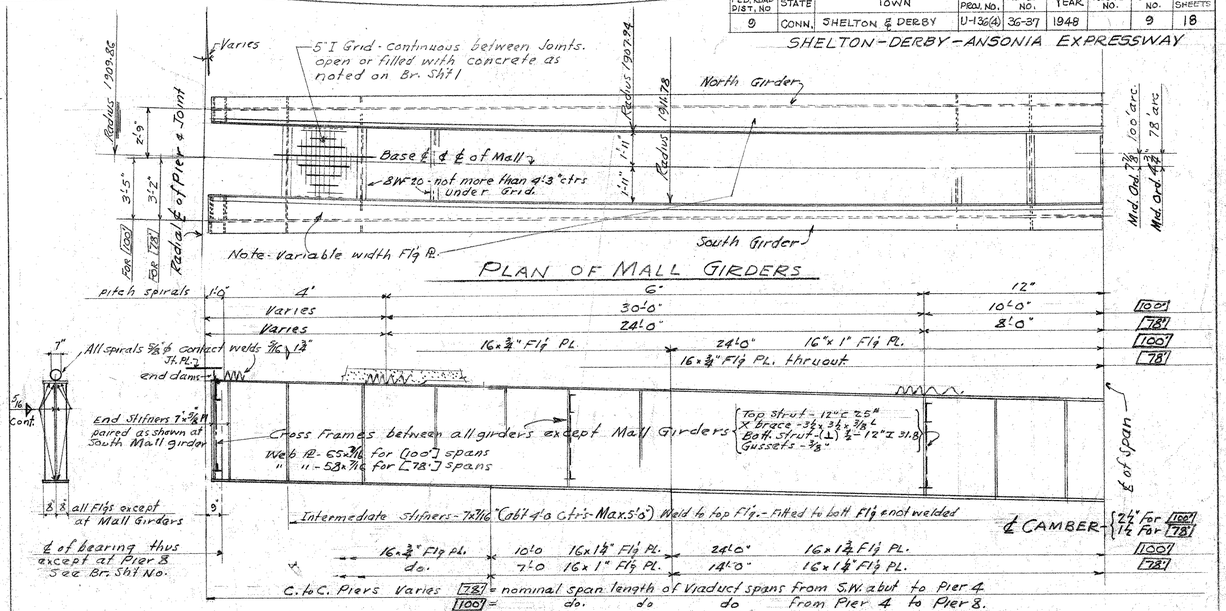
SHELTON-DERBY-ANSONIA EXPRESSWAY



TYPICAL JOINT DETAILS

Scale 1" = 1'-0"

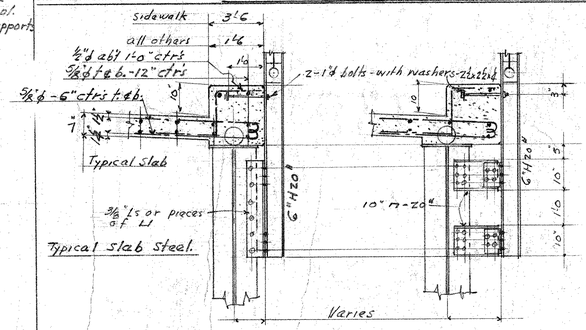
NOTE:- Expansion Jt. Details to be paid for as STRUCTURAL STEEL



NOTE:

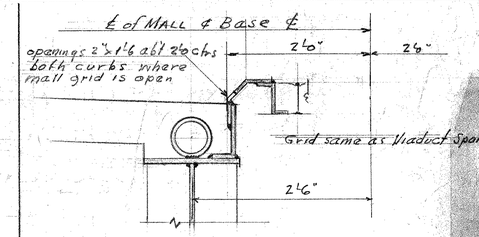
Girders in spans (4N to 5N) (5N to C) & (4S to 5) are to be made similar to [100'] Spans.
Fascia Girders in both ramps from abuts. to 4N & 4S are to be made similar to [100'] Spans.
Interior Girders in both ramps - abutments to 4N & 4S are to be made similar to [78'] Spans, except use 16x¾" Flange plates thruout and omit camber in short end spans at ramp abutments.
Loss of Camber due to shrinkage shall be compensated for by additional camber to be determined by the Fabricator.
For Bearing Pedestals See Br. Sht No 5.

GIRDER DATA FOR VIADUCT SPANS - S.W. ABUTMENT TO PIER 8.



DETAIL - RAILING SUPPORTS

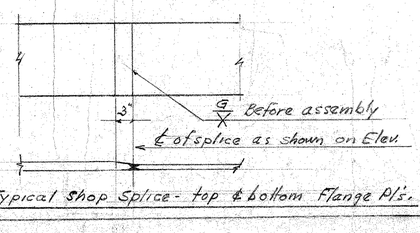
Railing above parapet to be same as detailed on Bridge Sheet No. 9.
Allowance must be made for adjustment in both horizontal & vertical directions to insure proper alignment.
All posts and spindles to stand vertical.
For detail of support for Lighting Standard See Bridge Sheet No 13.



DETAIL @ MALL GIRDER

Except as shown for Mall Construction - all details for girders in N.E. Approach Spans to be same as for [100'] Viaduct Spans.
For Bearing Pedestal @ Pier 11 see Br. Sht No. 10.
For " " @ N.E. Abutment See Br. Sht No 5.

GIRDER DATA - N.E. APPROACH - PIER 11 to N.E. ABUT



Typical Shop Splice - top & bottom Flange Pls.

REVISIONS		
NO.	DATE	DESCRIPTION

SUPERSTRUCTURE

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
DETAILS OF
VIADUCT & N.E. APPROACH SPANS
WELDED CONSTRUCTION

DESIGNED BY F.J.T.
SCALES noted
MADE BY H.W.W. DATE 2/13/48
CHECKED BY F.J.T. DATE 4/19/48
APPROVED J.A. Drury DATE 4-13-48
PROJECT NO 36-37-03A
BR. ENT NO 4 OF 13

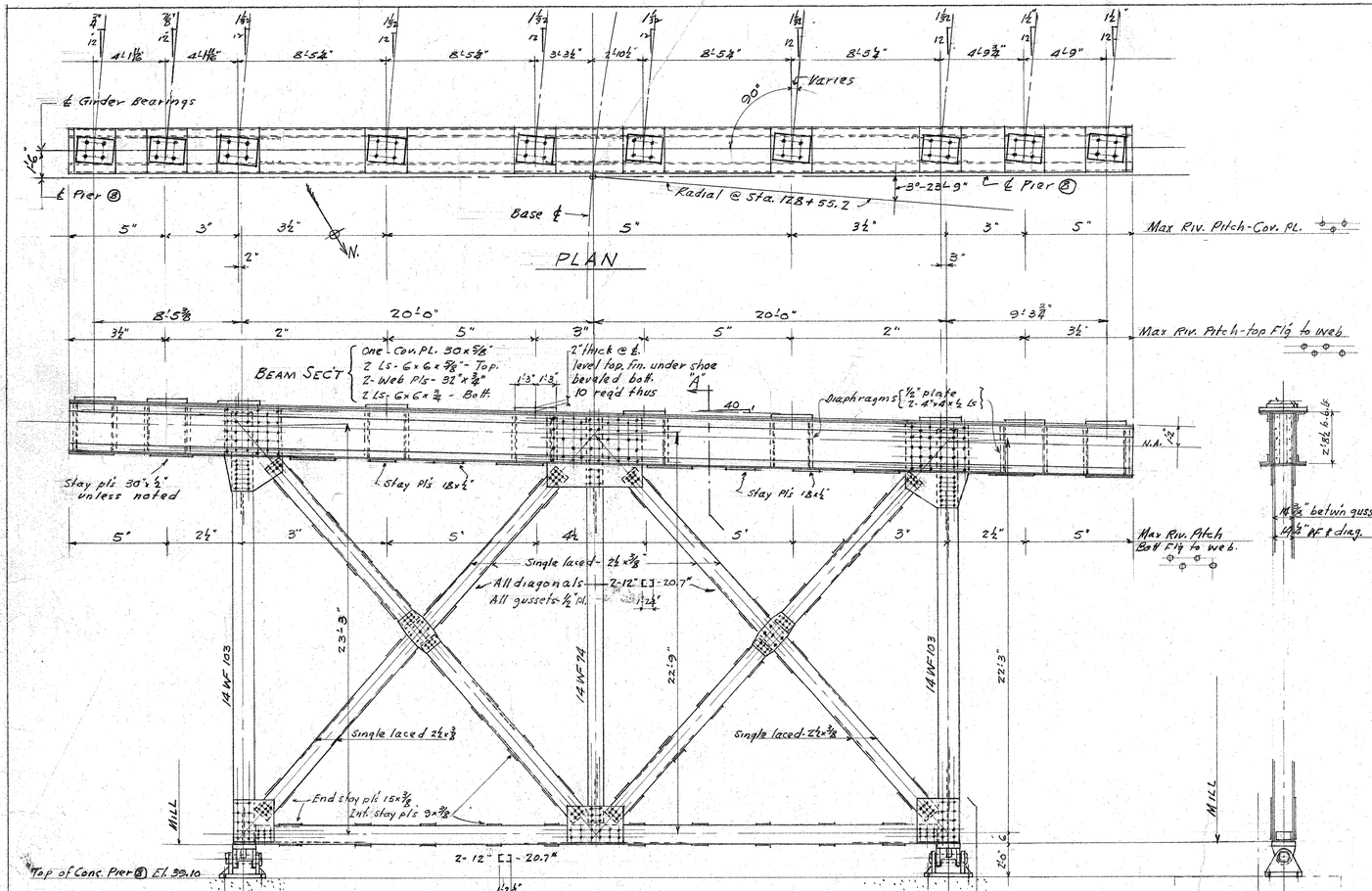
36 62

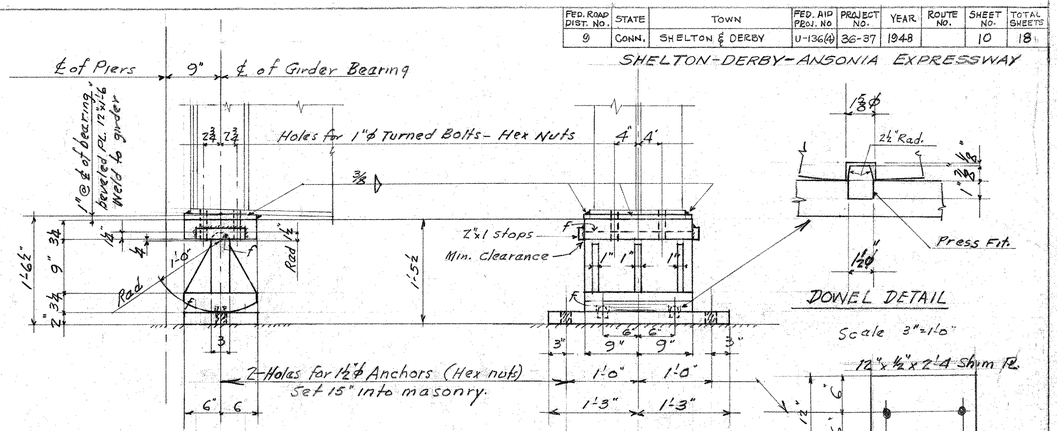
151 02

9

FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		10	18

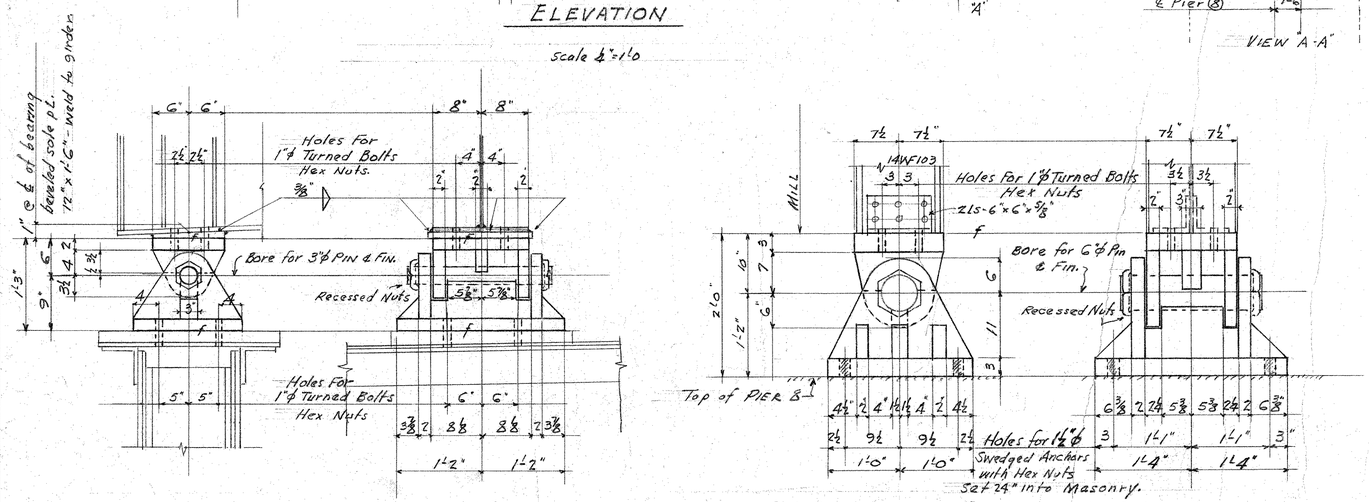
SHELTON-DERBY-ANSONIA EXPRESSWAY





NOTE:- All welds 1/4" continuous fillet unless noted
Plates to be square & true.

PEDESTAL DETAILS- FOR ALL WELDED PLATE GIRDERS - Except at Piers 8 & 11 Scale-1"=1'0



ANCHOR BOLT SCHEDULE

Hex Nut / Swedged	NO	SIZE	LENGTH	EMBEDMENT	LOCATION
	442	1 1/2" ϕ	1'-7"	1'-3"	S.W. Abutment to Pier 7 incl. and N.E Abutment
	16	"	2'-5"	2'-0"	Pier 8 West Bearings - Pier 11 East Bearings
	48	"	2'-8"	2'-0"	Pier 8 East Bearings - Piers 9 & 10 both Bearings - Pier 11 West Bearings

NOTES

The Contractor shall drill for and set all anchor bolts on Piers and Abutments. Location of Bearings and Anchor Bolts are shown on plans for the Substructure, copies of which form part of the plans for this Contract.

SUPERSTRUCTURE

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
BEARING DETAILS
VIADUCT & N.E APPROACH

WELDED CONSTRUCTION

REVISIONS		
NO.	DATE	DESCRIPTION

DESIGNED BY F.J.T.
SCALES noted
MADE BY H.W.W. DATE 3/16/48
CHECKED BY F.J.T. DATE 4/16/48
APPROVED A.B. Drury DATE 1-13-49

PROJECT NO. 36-37-03A
BRIDGE SHT. NO. 5 OF 13

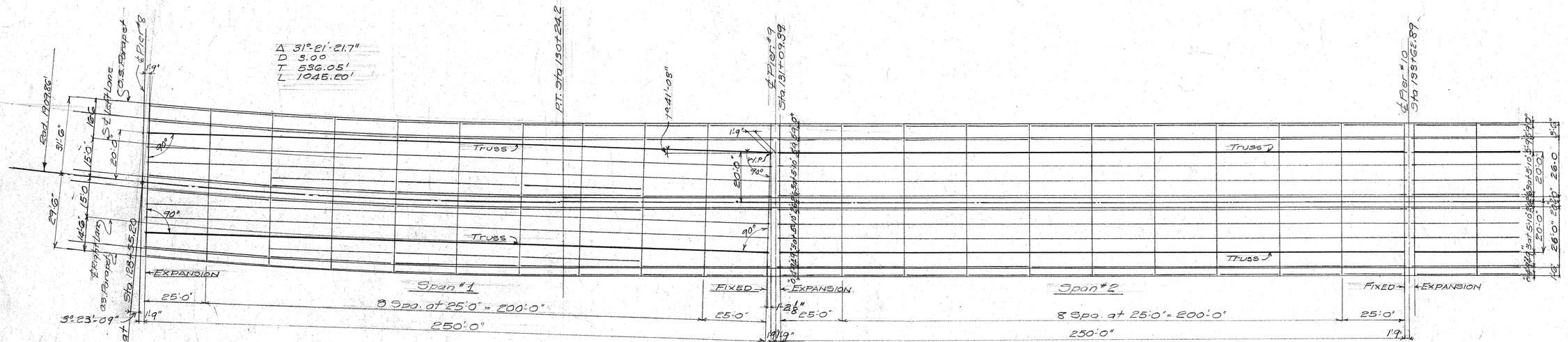
36 62

151 02

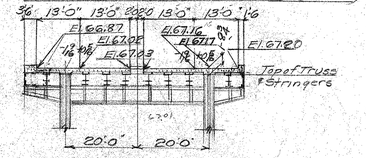
10

FED. ROAD DIST. No.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	NO. SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		11	18

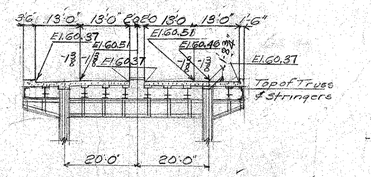
SHELTON-DERBY-ANSONIA EXPRESSWAY



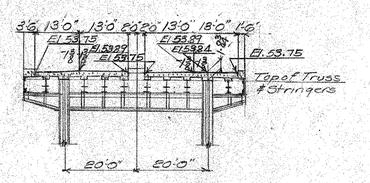
ELEVS. AT ℄ PIER STA 128+55.20 (PIER 8)



ELEVS AT ℄ PIER STA 131+09.39 (PIER 9)



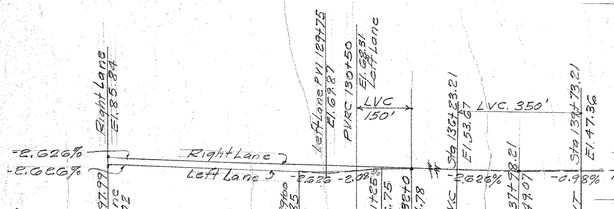
ELEVS AT ℄ PIER STA 133+62.89 (PIER 10)

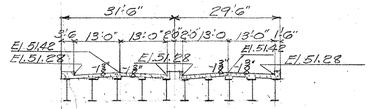


ELEVS AT ℄ BEARING 3 STA 136+14.64

Cross Slopes given above are for a slope of 11:0 thus (-1/8 in 11-0) (-1 1/8 in 11:0)

ELEVS. AT ℄ BENT "11 STA 136+17.89





ELEVS AT ℄ BEARING STA 137+16.89
N.E. ABUTMENT

SUPERSTRUCTURE

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
PLAN & SECTIONS.

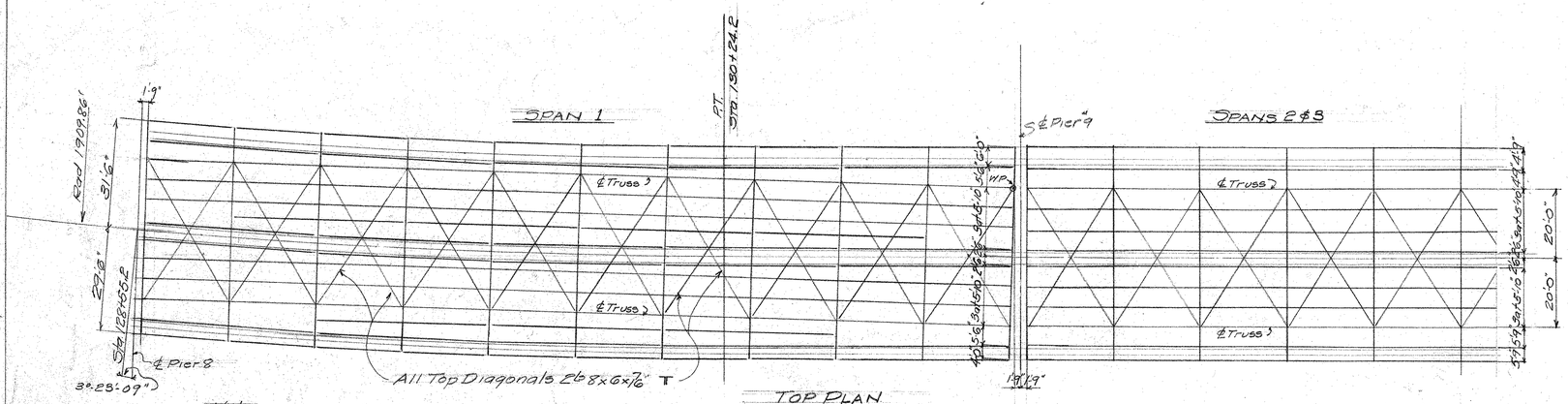
REVISIONS		
NO	DATE	DESCRIPTION

DESIGNED BY F.J.T.
SCALES 1" = 20'-0"
MADE BY H.E.J. DATE 11/3/48
CHECKED BY DATE 11/4/48
APPROVED DATE 1-12-49

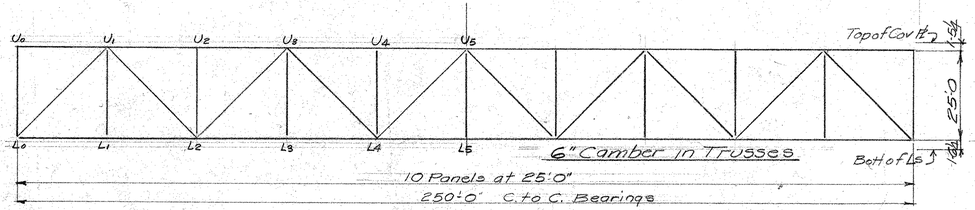
PROJECT NO. 36-37-05
BRIDGE SHEETING 6 OF 13

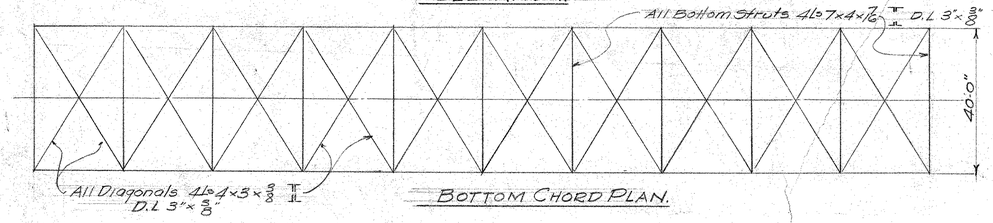
SHELTON-DERBY-ANSONIA EXPRESSWAY

FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO	YEAR	ROUTE NO.	SHEET NO	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		12	18



Note
Top & bottom chords follow grade.
Post and Floor beams are vertical





250' TRUSS - CARBON STEEL - MOMENT SUMMARY & SECTIONS

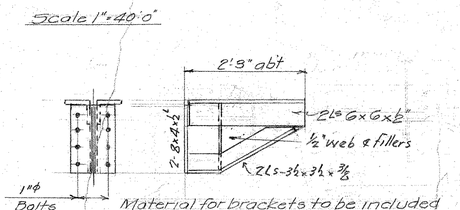
Member	D.L.	L.L.	Imp	Total Stress (K)	Section	Net Area	Gross Area	
L0 L1	+945	+171	+24	+1140	4 L's 6"x6"x 9/16"; 2 Pls 36"x 5/8"	67.76	78.76	D.L Top & Bott
L1 L2	+945	+171	+24	+1140	4 L's 6"x6"x 9/16"; 2 Pls 36"x 5/8"		78.76	do
L2 L3	+2205	+399	+60	+2664	4 L's 6"x6"x 9/16"; 4 Pls 36"x 3/4"; 2 Pls 24"x 3/4"	156.26	177.76	do
L3 L4	+2205	+399	+60	+2664	4 L's 6"x6"x 9/16"; 4 Pls 36"x 3/4"; 2 Pls 24"x 3/4"		177.76	do
L4 L5	+2625	+475	+67	+3167	4 L's 6"x6"x 9/16"; 4 Pls 36"x 3/4"; 2 Pls 34 1/2"x 5/8"; 2 Pls 24"x 3/4"	183.38	220.88	do
U0 U1	0	0	0	0	Cov. Pl 36"x 7/16"; 2 L's 6"x6"x 7/16"; 2 Pls 8"x6"x 7/16"; 2 Pls 36"x 9/16";		117.76	D.L Both
U1 U2	-1680	-304	-43	-2027	Cov. Pl 36"x 7/16"; 2 L's 6"x6"x 7/16"; 2 Pls 8"x6"x 7/16"; 4 Pls 36"x 5/8"; 2 Pls 24"x 3/8";		189.76	do
U2 U3	-1680	-304	-43	-2027	Cov. Pl 36"x 5/8"; 2 L's 6"x6"x 7/16"; 2 Pls 8"x6"x 7/16"; 4 Pls 36"x 5/8"; 2 Pls 24"x 3/8";		189.76	do
U3 U4	-2520	-456	-64	-3040	Cov. Pl 36"x 5/8"; 2 L's 6"x6"x 9/16"; 2 Pls 8"x6"x 7/16"; 4 Pls 36"x 5/8"; 2 Pls 34 1/2"x 5/8"; 2 Pls 24"x 3/8";		259.51	do
U4 U5	-2520	-456	-64	-3040	Cov. Pl 36"x 5/8"; 2 L's 6"x6"x 9/16"; 2 Pls 8"x6"x 7/16"; 4 Pls 36"x 5/8"; 2 Pls 34 1/2"x 5/8"; 2 Pls 24"x 3/8";		259.51	do
L0 U1	-1337	-262	-37	-1680	4 L's 6"x6"x 9/16"; 2 Pls 36"x 7/16"; 2 Pls 24"x 3/8"		163.76	D.L Top & Bott
U1 L2	+1040	+216	+30	+1286	4 L's 6"x6"x 7/16"; 2 Pls 33"x 3/8"	72.76	83.26	do
L2 U3	-743	-178	-25	-941	4 L's 6"x6"x 7/16"; 2 Pls 30"x 5/16"		71.26	do
U3 L4	+440	+136	+19	+601	4 L's 4"x4"x 5/16"; 2 Pls 24"x 6"	35.94	42.44	do
L4 U5	-149	-102	-14	-265	2-18" [s] 42.7#		24.96	D.L Top & Bott
U0 L0	-90	-51	-7	-148	2-15" [s] 33.9#		19.80	D.L Top & Bott
U1 L1	+30	0	0	+30	4 L's 4"x3"x 5/8"		9.92	D.L I
U2 L2	-180	-66	-10	-256	2-15" [s] 33.9#		19.80	D.L Top & Bott
U3 L3	+30	0	0	+30	4 L's 4"x3"x 5/8"		9.92	D.L I
U4 L4	-180	-66	-10	-256	2-15" [s] 33.9#		19.80	D.L Top & Bott
U5 L5	+30	0	0	+30	4 L's 4"x3"x 5/8"		9.92	D.L I

Tension (+)
Compression (-)

D.L. 8 x 5/8" bars.

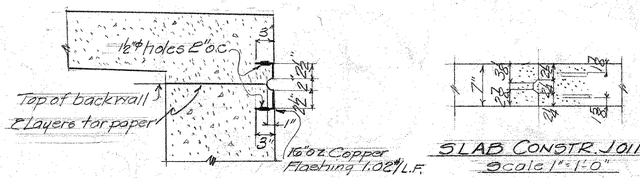
END SWAY FRAMES
U0 - L0

INTERMEDIATE SWAY FRAMES
U1 - L1 : U2 - L2 ETC.



Material for brackets to be included in the item of Structural Steel. Location of brackets to be determined.

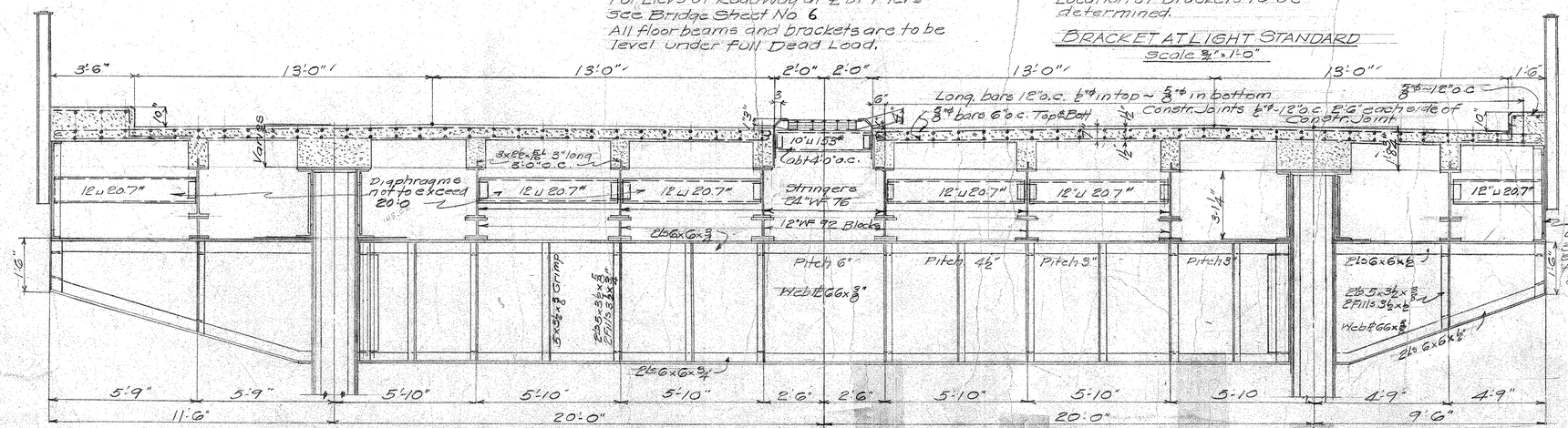
BRACKET AT LIGHT STANDARD
Scale 3/4"=1'0"



METAL FLASHING AT SLAB AND BACKWALL
Scale 1"=1'0"

SLAB CONSTR. JOINT
Scale 1"=1'0"

NOTE
For Elevs of Roadway at ℄ of Piers
See Bridge Sheet No. 6
All floor beams and brackets are to be level under Full Dead Load.



TYPICAL CROSS SECTION OF TRUSS SPANS.
Scale 3/4"=1'0"

NOTE.
For details of open grid at center, inspection walks and railing see Bridge Sheet No. 9

SUPERSTRUCTURE
RIVER SPANS.

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY

STRESS SHEET (FLOOR BEAM SEC.)

REVISIONS		
NO	DATE	DESCRIPTION

DESIGNED BY F.J.T.
SCALES As Noted
MADE BY H.E.J. DATE 3/8/48
CHECKED BY DJT DATE 4/13/48
APPROVED [illegible] DATE 5-13-48
PROJECT NO 36-37-034
BRIDGE SHEET NO 7 OF 13

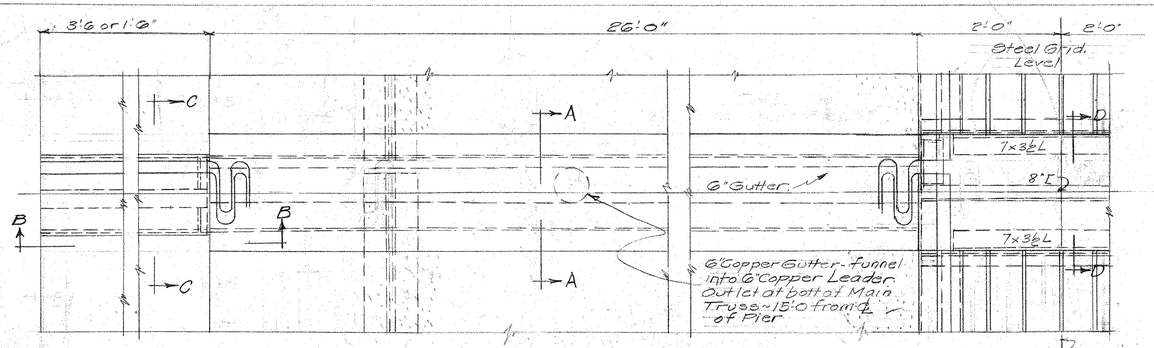
36 62

151 02

12

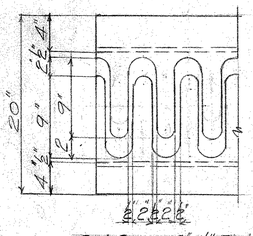
FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9.	CONN.	SHELTON & DERBY	U-134(4)	36-37	1948		13	18

SHELTON-DERBY-ANSONIA EXPRESSWAY



HALF PLAN - EXPANSION JOINT

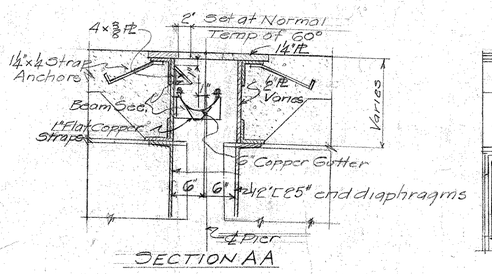
Scale 1"=1'-0"



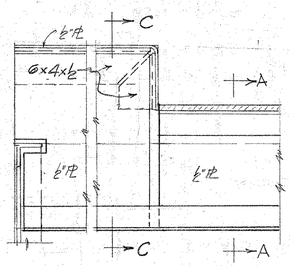
Cut from 18"x1¼" Plate

EXPANSION JOINT

Scale 1½"=1'-0"



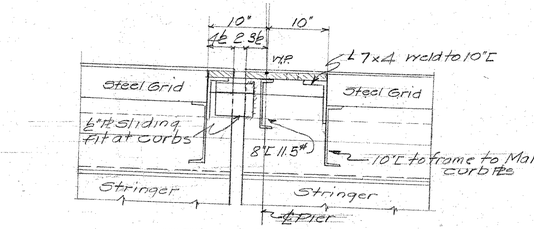
SECTION AA



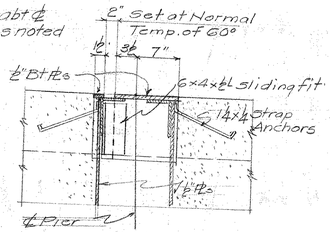
SECTION-BB

EXPANSION DETAILS AT PIERS # 9 & 10

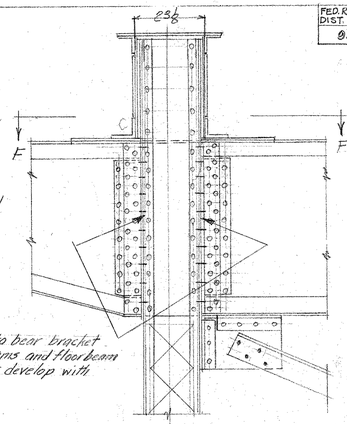
Scale 1"=1'-0"



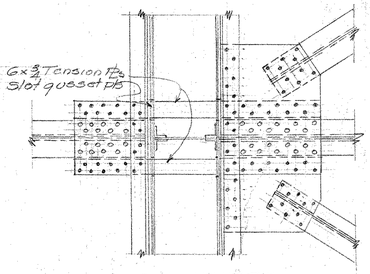
SECTION-DD.



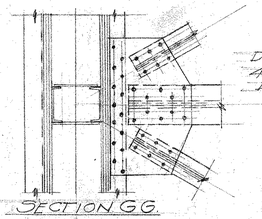
SECTION CC



FLOOR BEAM & BRACKET CONNS.

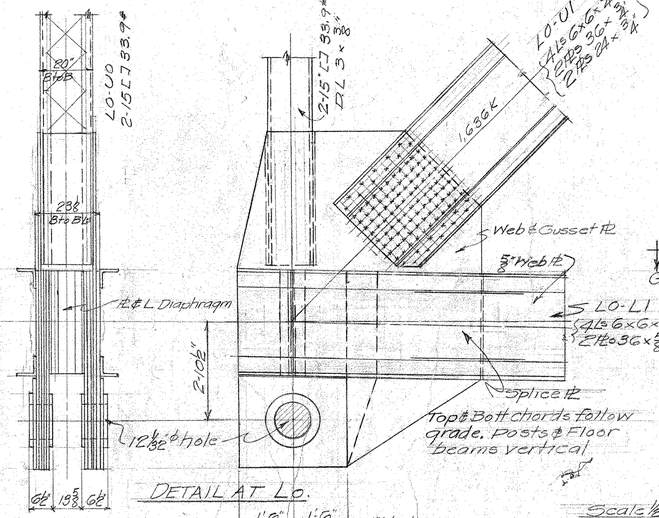


SECTION FF
TOP LATERAL CONNECTION & TENSION PLATES



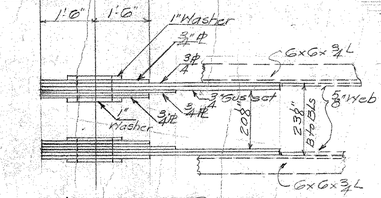
SECTION GG.

Diagonals
4 L⁰ 4x3½x⅜
D.L. 3x

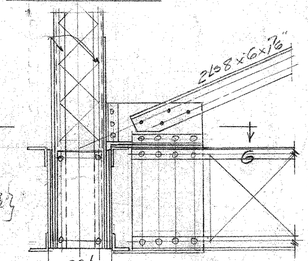


DETAIL AT L0.

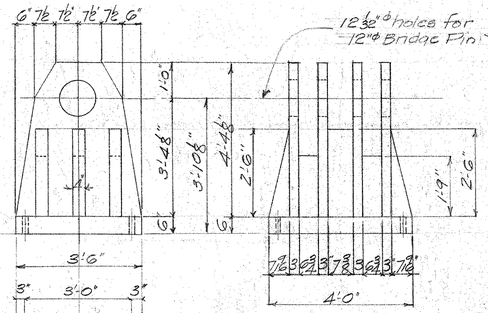
Scale ½"=1'-0"



ASSEMBLY SKETCH



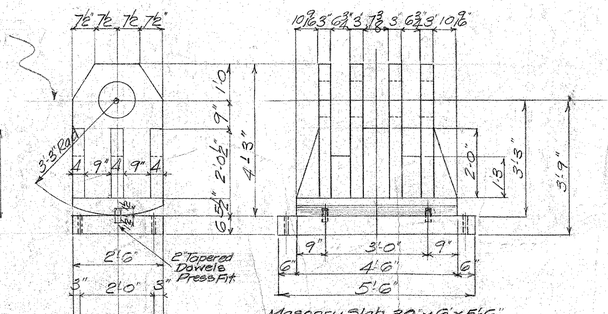
INTERNAL SWAY BRACING AT L2-U2



FIXED BEARING

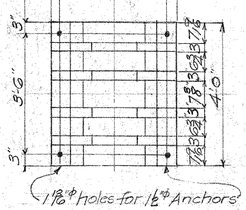
Scale ½"=1'-0"

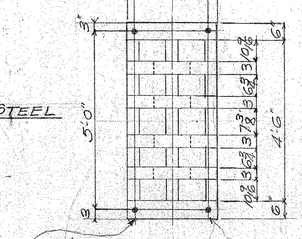
NOTE
BEARINGS-CAST STEEL



EXPANSION BEARING

Scale ½"=1'-0"





250' SPANS

NOTE: The Contractor shall drill for & set all anchors on Piers and Abutments
Expansion Joint Details to be paid for as STRUCTURAL STEEL

SUPERSTRUCTURE
RIVER SPANS.

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE

BETWEEN

SHELTON & DERBY

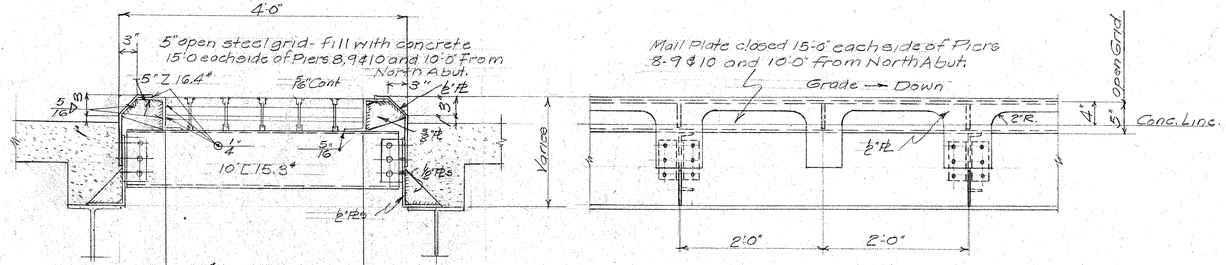
BEARINGS, EXPAN. JT. & TRUSS DETAILS

REVISIONS		
NO	DATE	DESCRIPTION

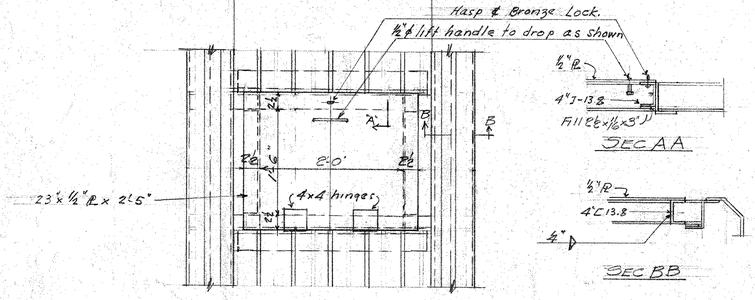
DESIGNED BY F.J.T.
SCALES ½" 1" & 1½"=1'-0"
MADE BY H.E.J. DATE 3/48
CHECKED BY DATE 4/7/48
APPROVED DATE 4-12-48
PROJECT NO. 36-37-03
BRIDGE SHEET NO. 8 OF 13

FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-136(4)	36-37	1948		14	18

SHELTON-DERBY-ANSONIA EXPRESSWAY

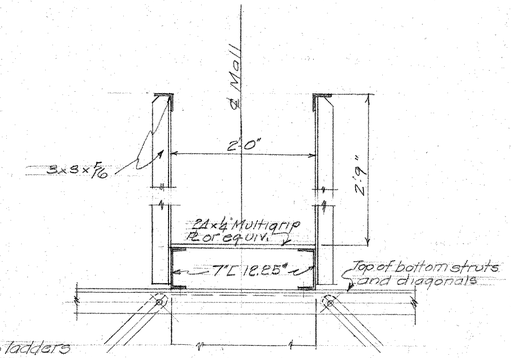


MALL SECTION



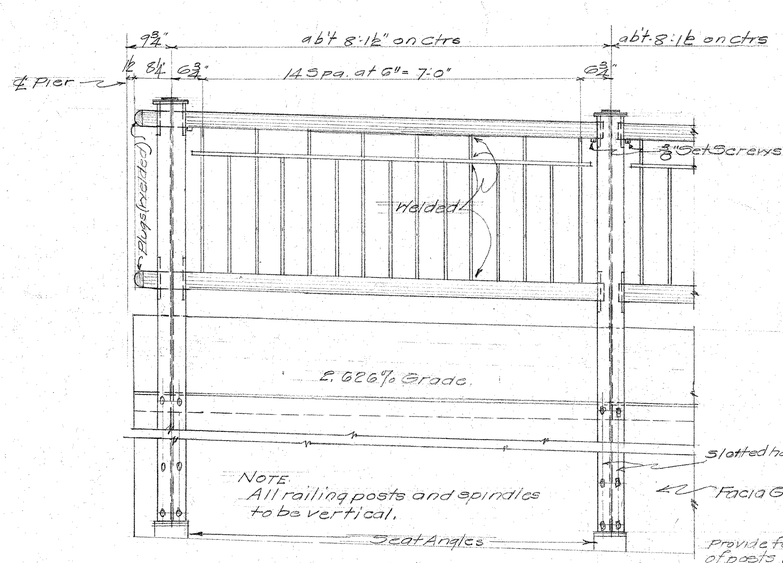
MALL MANHOLE

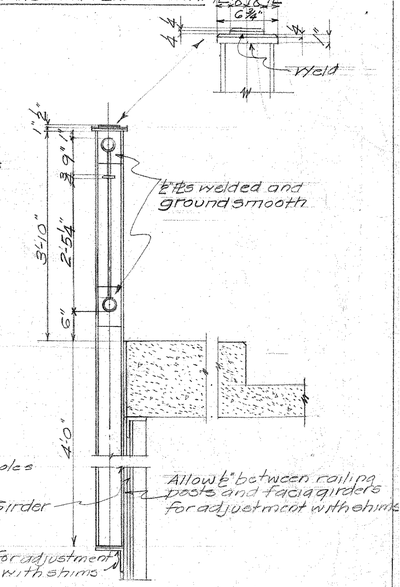
Scale 1"=1'-0"



INSPECTION WALKWAY.

Note
Provide manholes and access ladders to inspection walks, midway between Piers 8 & 9 ~ 9 & 10 and Pier 10 and Abutment.
Provide transverse Inspection Walk to Navigation Lights as indicated on Bridge Sheet #1
Provide access ladder from Inspection Walkway to tops of Piers 8, 9 & 10 similar to details shown.
All inspection walks, ladders, etc. to be included in the item "Structural Steel"

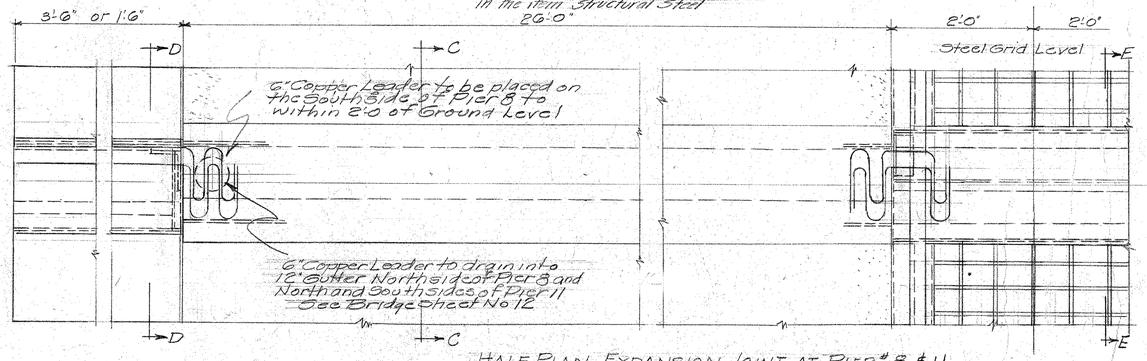




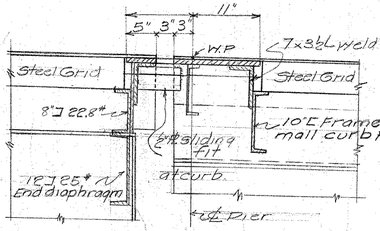
Posts 6"H 20#
Top & bott. rails 3"ø Extra strong pipe.
Intermediate rail 2"x ¾"
Spindles 1"ø

Note
Railing as shown is typical for girder & Truss spans.
Provision to be made for Railing Expansion.

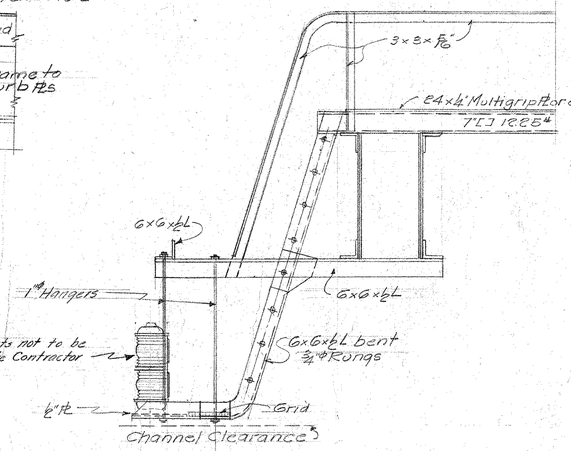
RAILING DETAILS.
TRUSS SPANS.
Scale ¾"=1'-0"



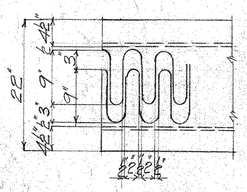
HALF PLAN EXPANSION JOINT AT PIER # 8 & 11
Scale 1"=1'-0"



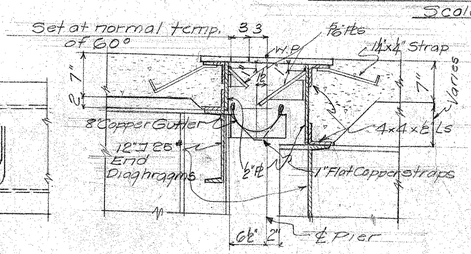
SECTION EE



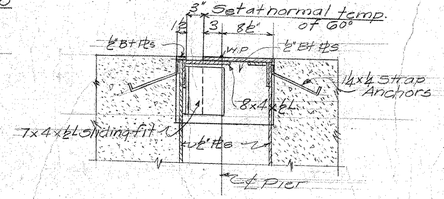
LADDER & PLATFORM FOR NAVIGATION LIGHTS
Scale ¾"=1'-0"



Cut from 19"x1¼" Plate
EXPANSION JOINT
Scale 1"=1'-0"



SECTION-CC



SECTION-DD
Showing Curb Plates

NOTE: { Same general apply whether welded or riveted. Expansion Jt. Details to be paid for as STRUCTURAL STEEL. }

Scale 1"=1'-0"

REVISIONS		
NO	DATE	DESCRIPTION

SUPERSTRUCTURE.
RIVER SPANS.

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY

EXPANSION JOINTS, RAILING ETC

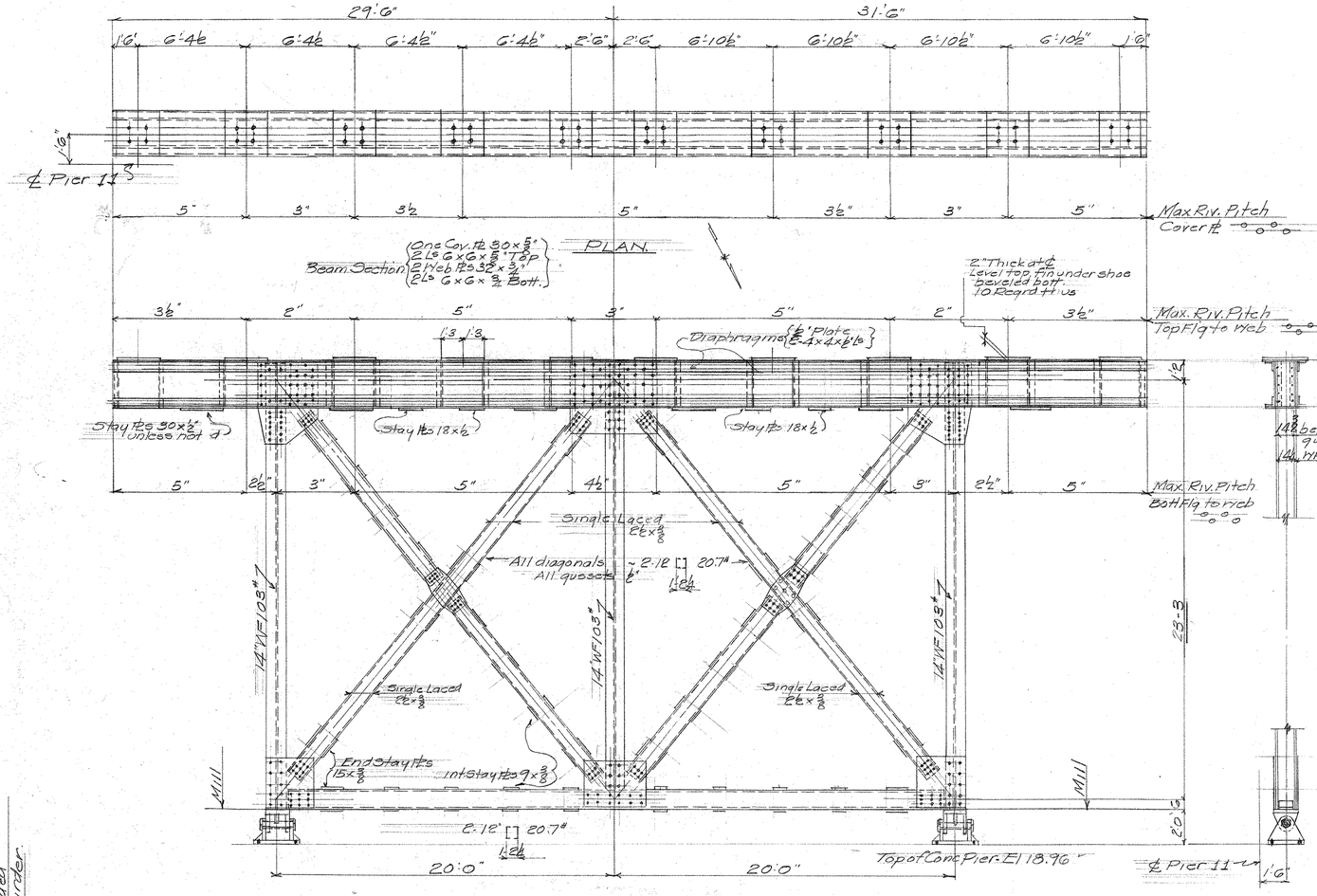
DESIGNED BY	F. J. T.		PROJECTION
SCALES	¾" & 1"=1'-0"		
MADE BY	H.E.J.	DATE 8/24/48	36-37-0
CHECKED BY		DATE 11/3/48	BRIDGE SHEET
APPROVED	W. R. Dailey	DATE 1-13-49	9 OF 14

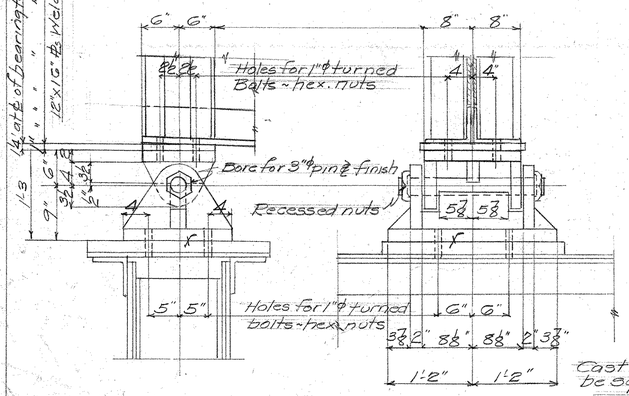
36 62

151 02

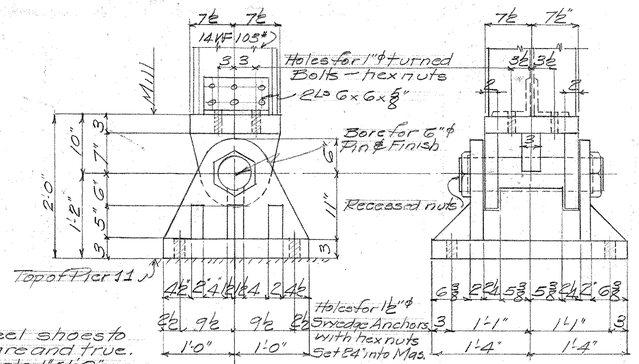
FED. ROAD DIST. NO	STATE	TOWN	FED. AID PROJ. NO	PROJECT NO	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN.	SHELTON & DERBY	U-126(4)	36-87	1948		15	18

SHELTON-DERBY-ANSONIA EXPRESSWAY

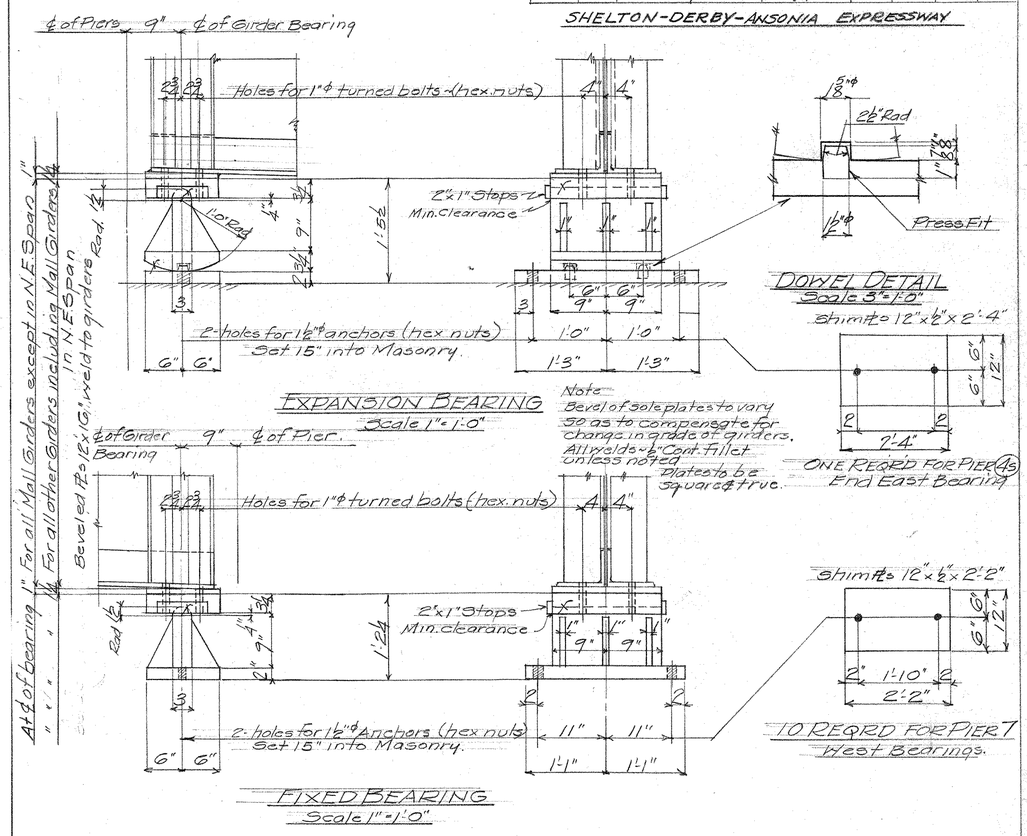




Cast steel shoes to be square and true.
Scale 1" = 1'-0"



DETAILS OF TRUSSED BENT AT PIER 11



PEDESTAL DETAILS - FOR ALL RIVETED GIRDERS EXCEPT AT PIERS 8 & 11

Note
For Anchor Bolt Schedule and notes on drilling and setting Anchor Bolts see Bridge Sheet # 5.V

REVISIONS		
NO	DATE	DESCRIPTION

SUPERSTRUCTURE

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE

BETWEEN

SHELTON & DERBY

BEARING DETAILS VIADU

DESIGNED BY F.J.T.
SCALES 1/4" & 1"-1'-0"
MADE BY H.E.J. DATE 9/47
CHECKED BY DATE
APPROVED DATE

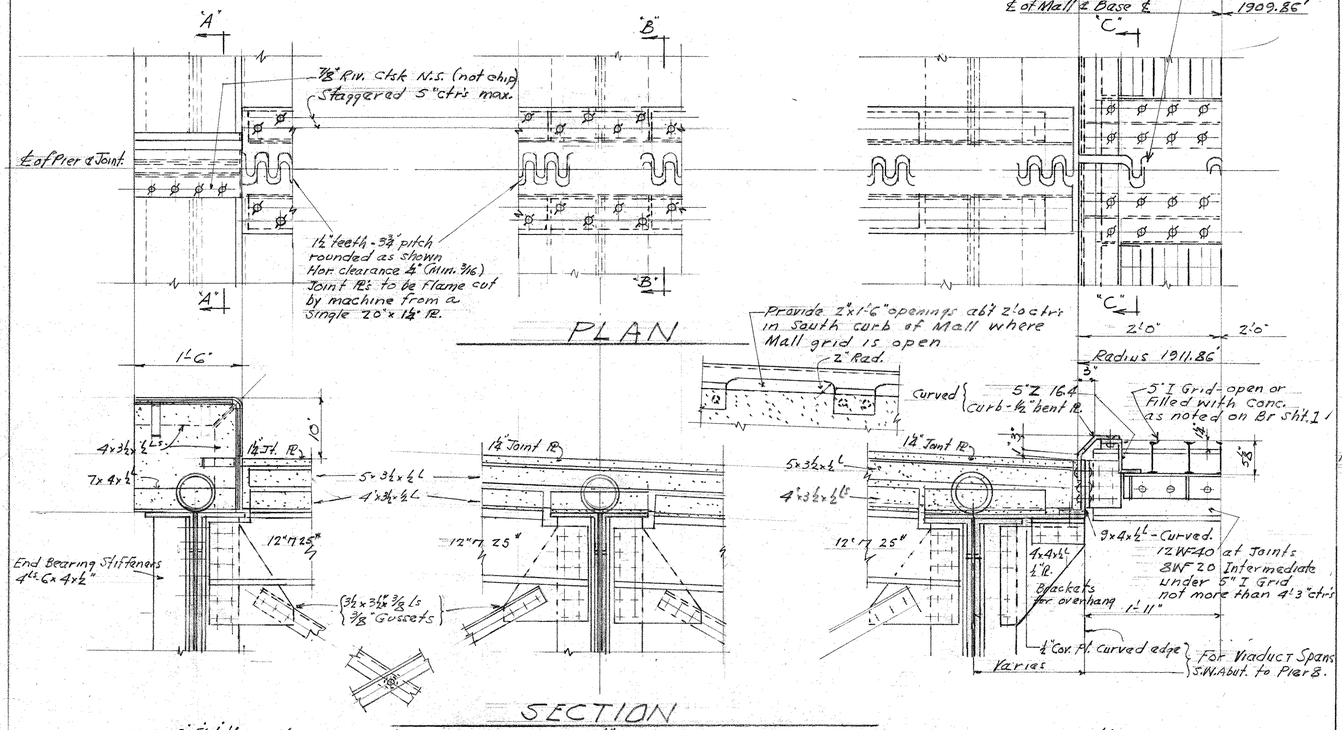
SHEET 10 OF 13

36 62

151 02

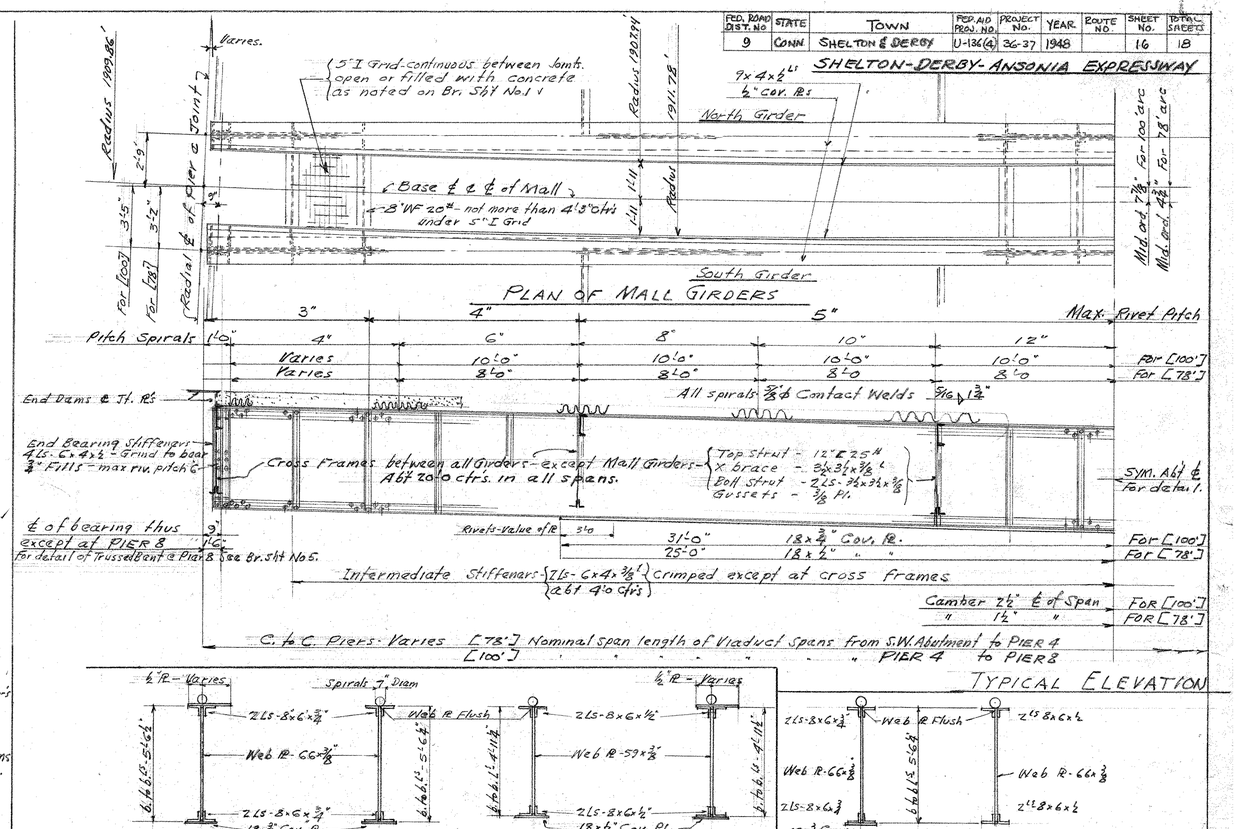
FED. ROAD DIST. NO.	STATE	TOWN	FED. AID PROJ. NO.	PROJECT NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
9	CONN	SHELTON & DERBY	U-136(4)	36-37	1948		16	18

SHELTON-DERBY-ANSONIA EXPRESSWAY

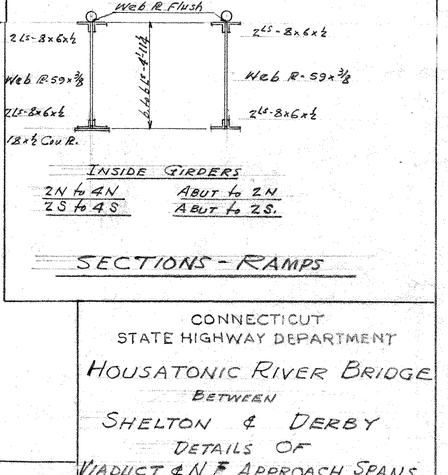


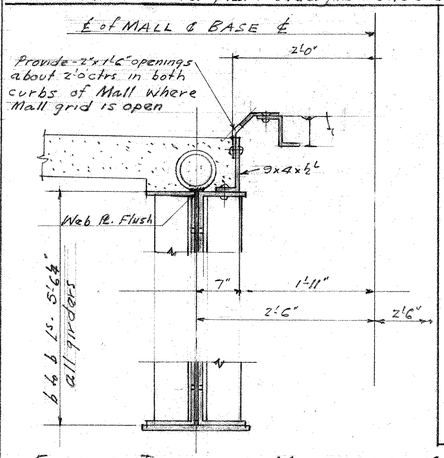
TYPICAL JOINT DETAILS

Scale 1" = 1'-0"



NOTE: For Girders which frame to Headers & for Headers use 8x6x½ Flg Ls with no bottom cover plate. Web PLs & b. to b Ls same as adjacent girders





Parts not shown to be similar to [100'] Viaduct spans
For Joint detail over pier 11. see Br. Sht No 9.
For Pedestal details See Br. sht No 10.

REVISIONS		
NO.	DATE	DESCRIPTION

CONNECTICUT
STATE HIGHWAY DEPARTMENT

HOUSATONIC RIVER BRIDGE
BETWEEN
SHELTON & DERBY
DETAILS OF
VIADUCT & N.E. APPROACH SPANS
RIVETED CONSTRUCTION

DESIGNED BY F. J. T.
SCALES
MADE BY H.W.W. DATE 9/1/48
CHECKED BY DATE
TRACED DATE
PROJECT NO
BRIDGE SHT NO 11 OF 13

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19 (116)	126-119	1983	8	45	297

THIS SHEET CORRECTED

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

LEGEND (BORINGS):
- Denotes Borings made in 1948
- Denotes Borings made in 1979

LEGEND (DRAINAGE):
- Bridge Scupper (Fiberglas Hopper)
- Floor Drain

LEGEND (ELECTRICAL):
- For Illumination Abbreviations & Terms see "Electrical Details" Bridge Sheet No. 99
- ℄ Light Standard Anchorage (11" Bolt Circle)
- 16"x12"x8" Cast Iron Junction Box
- Junction Box w/stub down & cap
- 2" Rigid Metal Conduit in Structure, Extend 1" Conduit from Junction Box to location of flasher (See Plan on this dwg.)
- 2" Rigid Metal Conduit in Structure for Loop Vehicle Detectors from Sta. 27+00 to Steel Span Pole of Sta. 27+63 LT. 48'. Install Junction Boxes (16"x12"x8") at Sta. 27+00, Sta. 25+60, Sta. 24+20 and Sta. 22+80 (at end of Structure). Install Loop Detectors 1" below Concrete Surface to be installed before concrete hardens.

LEGEND (TRAFFIC SIGNS):
- (A) Parapet Mounted 4'x4'
- (B) Jersey Barrier Mounted Sign Assembly
- (C) Parapet Mounted 3'x2'
- (D) J.B.M. 3'x2'
- (E) P.M. 6'x5'
- (F) J.B.M. Signs back to back 3'x2', 3'x2.5'
- (G) P.M. 3'x6'
- (H) J.B.M. 3'x6'
- (I) P.M. 4'x4'

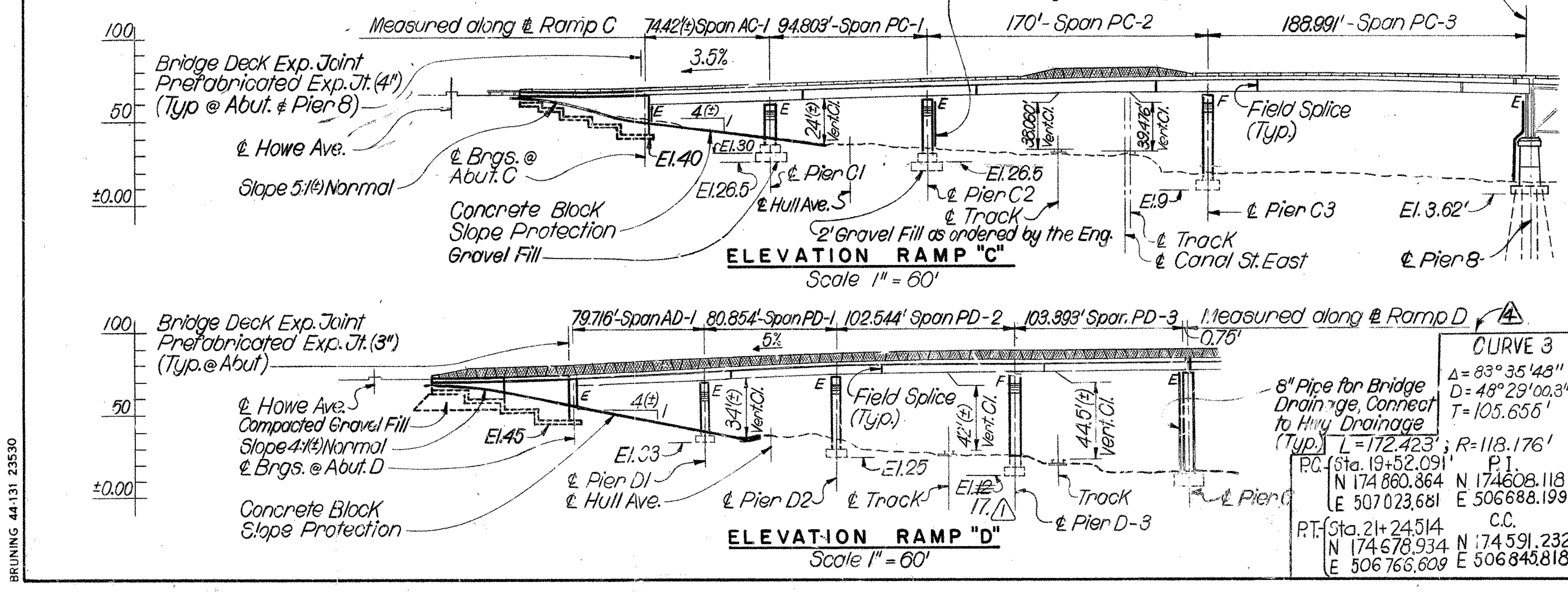
PLAN
Scale 1" = 60'

ELEVATION
Scale 1" = 60'

NOTE:
Work this Sheet with Str. Sh. 2

F.A.P. No. BHF-19(116)

4	11/84	Rev. Curve 3 Data	
NO.	DATE	DESCRIPTION	
REVISIONS			



ELEVATION RAMP "C"
Scale 1" = 60'

ELEVATION RAMP "D"
Scale 1" = 60'

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK, SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

CURVE DATA (revision 4)

		CURVE 1	CURVE 2	CURVE 3	CURVE 4	CURVE 5	CURVE 6
Δ		31°21'21.7"	36°53'14.5"	~~63°35'48"~~	5°27'26.0"	12°56'21.7"	16°21'18.0"
D		3°00'00"	2°10'00"	~~48°25'03"~~	1°08'45.3"	2°23'14.4"	7°09'43.1"
T		536.047'	881.921'	~~105.799'~~	238.296'	272.159'	114.961'
L		1045.201'	1702.494'	~~172.058'~~	476.232'	542.003'	228.359'
R		1909.859'	2644.421'	~~118.337'~~	5000.000'	2400.000'	800.000'
P.C.	Sta.	119+79.000	137+93.901	~~10+52.00~~	23+08.948	27+85.180	24+22.042
P.C.	N	174638.554	176040.384	~~174522.182~~	174867.534	175208.507	174860.864
P.C.	E	506611.684	507717.407	~~506749.912~~	506816.045	507147.899	507023.681
P.T.	Sta.	130+24.201	154+96.395	~~21+24.656~~	27+85.180	33+27.183	26+50.401
P.T.	N	175369.003	177683.805	~~174670.030~~	175204.476	175647.465	175032.152
P.T.	E	507340.995	508031.906	~~506706.716~~	507152.343	507463.869	507173.531
P.I.	N	174901.429	176809.651	~~174606.118~~	175027.991	175410.071	174935.741
P.I.	E	507078.848	508148.599	~~506688.199~~	506992.223	507330.773	507110.913
C.C.	N	176302.995	177333.604	~~174591.296~~	178564.156	176821.154	175467.902
C.C.	E	505675.094	505410.775	~~506846.632~~	503449.295	503370.437	506502.620

CURVE 3 (revised)
Δ = 63°35'48"
D = 48°29'00.3"
T = 105.656'
L = 172.423'
R = 118.176'

		P.I.	C.C.
P.C.	Sta. 19+52.091		
	N 174 860.864	N 174608.118	
	E 507 023.681	E 506688.199	
P.T.	Sta. 21+24.514		
	N 174 678.934		N 174 591.232
	E 506 766.609		E 506 845.818

* includes 348.0 CY of "Underwater concrete"

CONCRETE DISTRIBUTION		
Superstructure	C.Y.	6,679
Substructure	C.Y.	4,859
Footings*	C.Y.	2,911
TOTAL	C.Y.	14,449

INSPECTION OF FIELD WELDS

METHOD	UNIT	QUANTITY
Radiographic or Ultrasonic	In.	0
Ultrasonic	In.	0
Magnetic Particle	L.F.	1896

(4) Revised navigation light locations & clearances.

NO.	DATE	DESCRIPTION
1	3/84	Correct Footing Elev.
2	7/84	Reloc. Sec. B-B
3	11/84	Rev. Sta. @ Pier C1

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

GENERAL PLAN-1

ENGINEER	FRANKLAND & LIENHARD CONSULTING ENGINEERS		
APPROVED	[signature]	DATE	11/23/82
DRAFTSMAN E.P.	CHECKER R.D.	DESIGNER E.S.	
STRUCTURE NO. 126-119-1		STRUCTURE SHEET 1 OF 135	

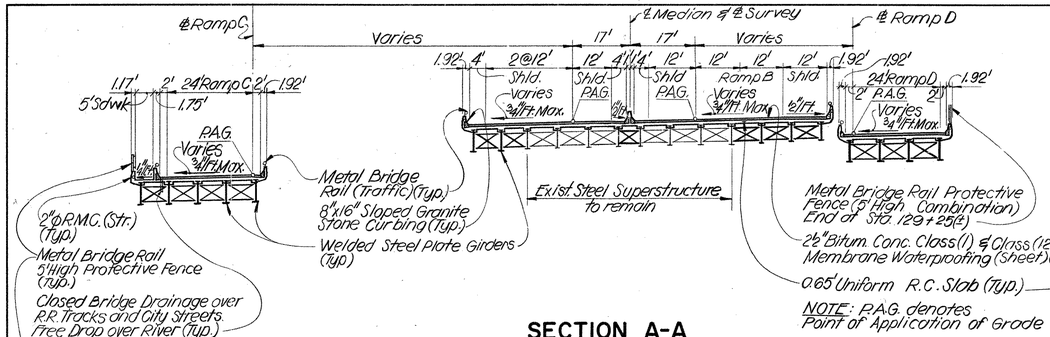
BRUNING 44-131 23530

126-119-36 137

513 01

FORM NO. ENG. 15A ED. 1/71

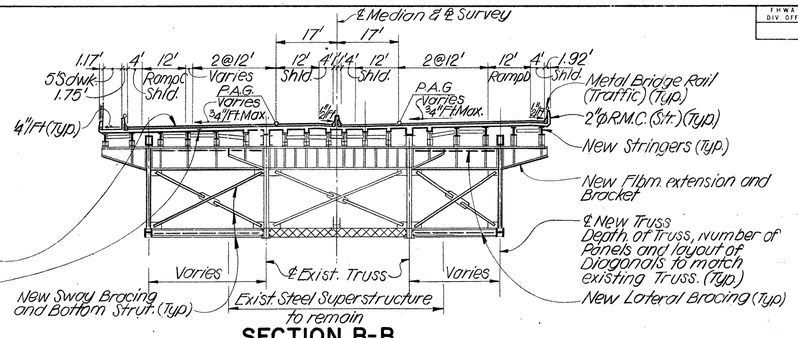
F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON – DERBY	BHF-19(116)	126-119	1983	8	46	297



NOTE: P.A.G. denotes Point of Application of Grade

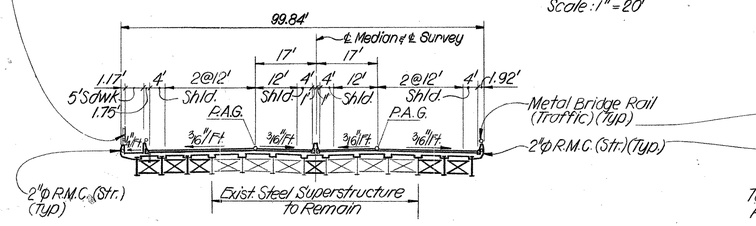
SECTION A-A

Scale: 1" = 20'



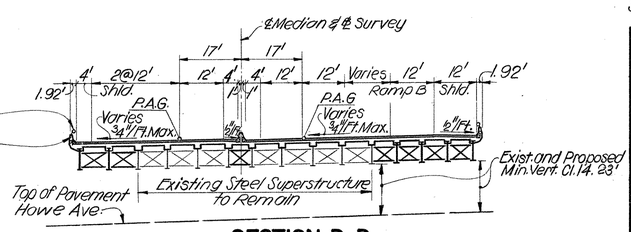
SECTION B-B

Scale: 1" = 20'



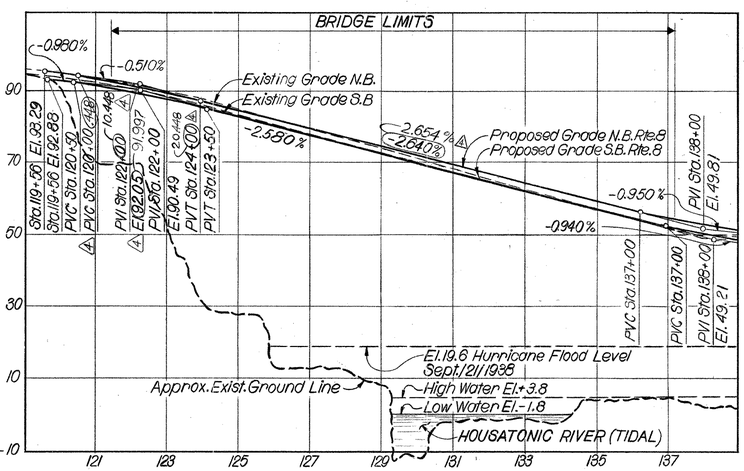
SECTION C-C

Scale 1" = 20'

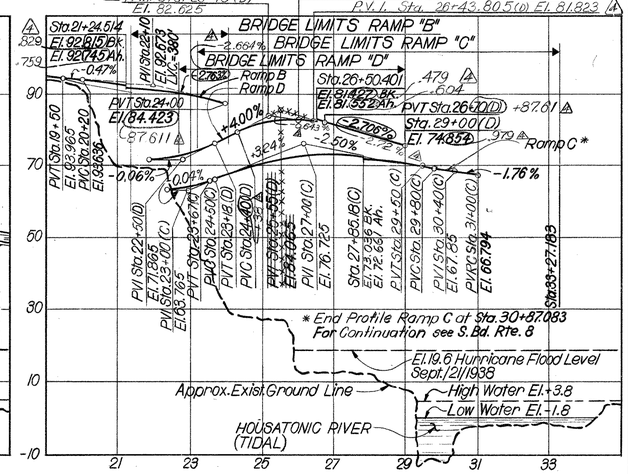


SECTION D-D

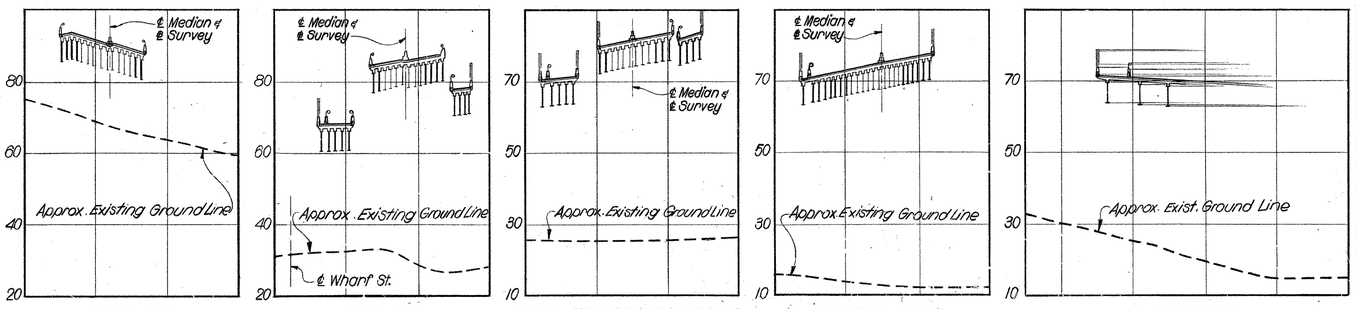
Scale 1" = 20'



PROFILE ALONG EXIST. AND PROPOSED ℄ OF RTE. 8 N.B. AND S.B. ROADWAYS
SCALES: HORIZ. 1"=200'; VERT. 1"=20'



PROFILE ALONG PROPOSED ℄ OF RAMPS B,C & D
SCALES: HORIZ. 1"=200'; VERT. 1"=20'



PROFILES ALONG ℄ OF STREETS AND R.R. TRACKS UNDER THE COMMODORE HULL BRIDGE IN SHELTON
SCALES: HORIZ. 1"=100'; VERT. 1"=20'

GENERAL NOTES

SPECIFICATIONS: Connecticut Department of Transportation Form 812 (1980), and Special Provisions.
DESIGN SPECIFICATION: Standard Specifications for Highway Bridges (AASHTO 1977) with the Interim Specifications up to and including (1980) as supplemented by the Connecticut Department of Transportation Bridge Manual (1964).
ALLOWABLE DESIGN STRESSES: Class "A" and Class "F" Concrete Based on f'_c = 3000 PSI - Reinforcement (AB 15 Grade 60) f_s (Tensile) = 24,000 PSI Structural Steel ASTM A588 Ft = 27,000 PSI all thicknesses up to 4" (inclusive).
Structural Steel ASTM A 36 Ft = 20,000 PSI All Thicknesses up to 8"
LIVE LOAD: HS 20-44
FUTURE PAVING ALLOWANCE: None
COMPOSITE CONSTRUCTION: No temporary intermediate supports shall be used during the placing and setting of the concrete deck slab. Temporary supports may be used for structural steel erection only. For each reconstruction stage, live and superimposed dead loads will be permitted when directed by the Engineer but not less than 10 days after the final portion of deck slab has been placed.
CLASS "A" CONCRETE: Class "A" concrete shall be used for the entire substructure and parapets of the U-Type wings.
CLASS "F" CONCRETE: Class "F" Concrete shall be used for bridge decks and parapets.
PARAFFIN: The cost of furnishing and applying paraffin is included in the item for Class "F" Concrete.
EXPOSED EDGES: Exposed Edges shall be beveled 1"x1" unless dimensioned otherwise.
* STRUCTURAL STEEL: See structure Sheet Nos. 41, 46 & 64 for ASTM designations.
PAINT: Paint shall conform to the requirements of Article 6.03.03-30c "Colored Finish Vinyl System". The color of the final field coat of paint on the structural steel shall match the Department's Standard Bridge Color No. 510 (Green). See Special Provisions.
FELT: The cost of furnishing and placing 15 # felt is included in the item for Class A" Concrete
FOUNDATION PRESSURES AND PILE LOADS: The various Group Loadings noted on the substrure plan sheets refer to the Group Loads as given in the AASHTO, Standard Specifications for Highway Bridges.
CONSTRUCTION JOINTS: Constructions Joints, other than those shown on the plans, will not be permitted without prior approval of the Engineer.
DECIMAL DIMENSIONS: When dimensions are given to less than three decimal places, the omitted digits shall be assumed to be zeros.
JOINT SEAL: See Special Provisions.

5 * Str. Steel Shop drawings were supplemented with F.W. drwgs. Prepared by the Standard Structural Steel Co., Inc.

NO.	DATE	REVISIONS
4	6/85	Revised Profiles for N.B., Ramp B & Ramp D
5	4/91	See notes

QUANTITIES

ITEM	UNIT	QUANTITY
Structure Excavation-Earth (Complete)	C.Y.	8,380
Structure Excavation-Earth (Excluding Cofferdam and Pumping)	C.Y.	2,006
Cofferdam and Pumping (Pier 9)	L.F.	295
Cofferdam and Pumping (Pier 10)	L.F.	247
Gravel Fill	C.Y.	292
Compacted Gravel Fill	C.Y.	645
Soil Loading Test	EA.	1
Pervious Structure Backfill	C.Y.	5,046
Bituminous Concrete - Class (1)	Ton	1,777
Bituminous Concrete - Class (12)	Ton	1,243
Removal of Superstructure (126-119-1)	L.S.	L.S.
Removal of Existing Masonry (126-119-1)	C.Y.	1,021
Shear Connectors	L.S.	L.S.
2" Elastomeric Compression Seal	L.F.	245
3" Elastomeric Compression Seal	L.F.	634
4" Elastomeric Compression Seal	L.F.	332
12"φ Pipe for Bridge Drainage	L.F.	886
8"φ Pipe for Bridge Drainage	L.F.	401
Pot or Spherical Bearings (1300 Kips)	Ea.	5
Pot or Spherical Bearings (900 Kips)	Ea.	7
Pot or Spherical Bearings (500 Kips)	Ea.	5
Pot or Spherical Bearings (300 Kips)	Ea.	22
Pot or Spherical Bearings (150 Kips)	Ea.	13
Class "A" Concrete	C.Y.	7,422
Class "F" Concrete	C.Y.	6,079
Underwater Concrete	C.Y.	348
Calcium Chloride Stabilized Base	Ton	85
Deformed Steel Bars	Lbs.	2,161,871
Deformed Steel Bars-Epoxy Coated	Lbs.	804,664
Prefabricated Expansion Joint (Movement Capacity 3")	L.F.	399
Prefabricated Expansion Joint (Movement Capacity 4")	L.F.	47
Prefabricated Expansion Joint (Movement Capacity 5")	L.F.	169
Remove and Reset Granite Stone Masonry	C.Y.	49
Granite Stone Masonry	C.Y.	126
Epoxy mortar and Epoxy Splash Zone Mastic	Gal.	70
Concrete Cylinder Curing Box	Ea.	1
Furnishing Steel Piles	Lb.	980,000
Driving Steel Piles	L.F.	18,500
Point Reinforcement for Steel Piles	Ea.	14
Splicing Steel Piles	Ea.	14
Bridge Scuppen (Fiberglass Hopper)	Ea.	33
Floor Drain	Ea.	19
Dampproofing	S.Y.	1,256
Membrane Waterproofing (Sheet)	S.Y.	21,976
Permanent Steel Sheet Piling (Railroad)	L.F.	64
Permanent Steel Sheet Piling	L.F.	211
Temporary Sheet Piling	L.F.	223
Sheet Piling Material Left in Place	L.F.	223
Bagged Stone	C.F.	80
Concrete Block Slope Protection	S.Y.	3,924
6"C.C.M. Outlets for Underdrain	L.F.	113
8"x16" Sloped Granite Stone Curbing For Bridges	L.F.	5,167
5¾"x12½" Sloped Granite Stone Curbing For Bridges	L.F.	3,150
Protective Compound for Bridges	S.Y.	5,629
Temporary Barrier	L.F.	4,220
Relocated Temporary Barrier	L.F.	7,600
Metal Bridge Rail (Traffic)	L.F.	3,945
Metal Bridge Rail (Protective Fence) (5' High)	L.F.	1,505
Metal Bridge Rail (Protective Fence) (5' High) combination	L.F.	1,194
2" Rigid Metal Conduit in Structure	L.F.	4,732
18"x12"x8" Cast Iron Junction Box	Ea.	31
Navigation Lights	Ea.	6
Remove Navigation Lights	Ea.	6
Drilling Holes and Grouting Dowels	Ea.	3,153
Saw Cutting Concrete	L.F.	929
Splicing Steel Girders (126-119-1)	Ea.	37
Sawing and Sealing Joints	L.F.	2,088
Epoxy Injection Crack Repair	L.F.	100
2" Preformed Joint Filler for Bridges	S.F.	589
1" Preformed Joint Filler for Bridges	S.F.	623

QUANTITIES

ITEM	UNIT	QUANTITY
Repointed Masonry	S.Y.	200
Epoxy Bonding Compound	Gal.	100
Repair of Existing Piers	C.F.	2700
Saw Cutting Bridge Joints	L.F.	1211
Field Painting of Existing Structure Bp. No. 126-119-1	L.S.	LS
Test Pile (Steel HP 12x53-55' long)	Ea.	1
Test Pile (Steel HP 12x53-60' long)	Ea.	3
Test Pile (Steel HP 12x53-65' long)	Ea.	1
Test Pile (Steel HP 12x53-75' long)	Ea.	1
Structural Steel Bridge No. 126-119-1 (Relnf. @ Trusses)	CWT	473
12" Polyvinyl Chloride Plastic Pipe (Bridge)	L.F.	357
Struct. Steel Bridge No. 126-119-1 (Replacement of Existing Steel)	CWT	1,276
Structural Steel Bridge No. 126-119-1	L.S.	L.S.

THIS SHEET CORRECTED

F.A.P. No. FU-19(101)

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

GENERAL PLAN-2

THE INFORMATION, INCLUDING ESTIMATED QUANTITIES OF WORK SHOWN ON THESE SHEETS IS BASED ON LIMITED INVESTIGATIONS BY THE STATE AND IS IN NO WAY WARRANTED TO INDICATE THE TRUE CONDITIONS OR ACTUAL QUANTITIES OR DISTRIBUTION OF QUANTITIES OF WORK WHICH WILL BE REQUIRED.

NO.	DATE	DESCRIPTION
		REVISIONS

ENGINEER: FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED: [signature] DATE: 11/23/82
DRAFTSMAN: G.F. CHECKER: R.D. DESIGNER: E.S.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 2 OF 135

BRUNING 44-131 23530

126-119-36 137

513 01

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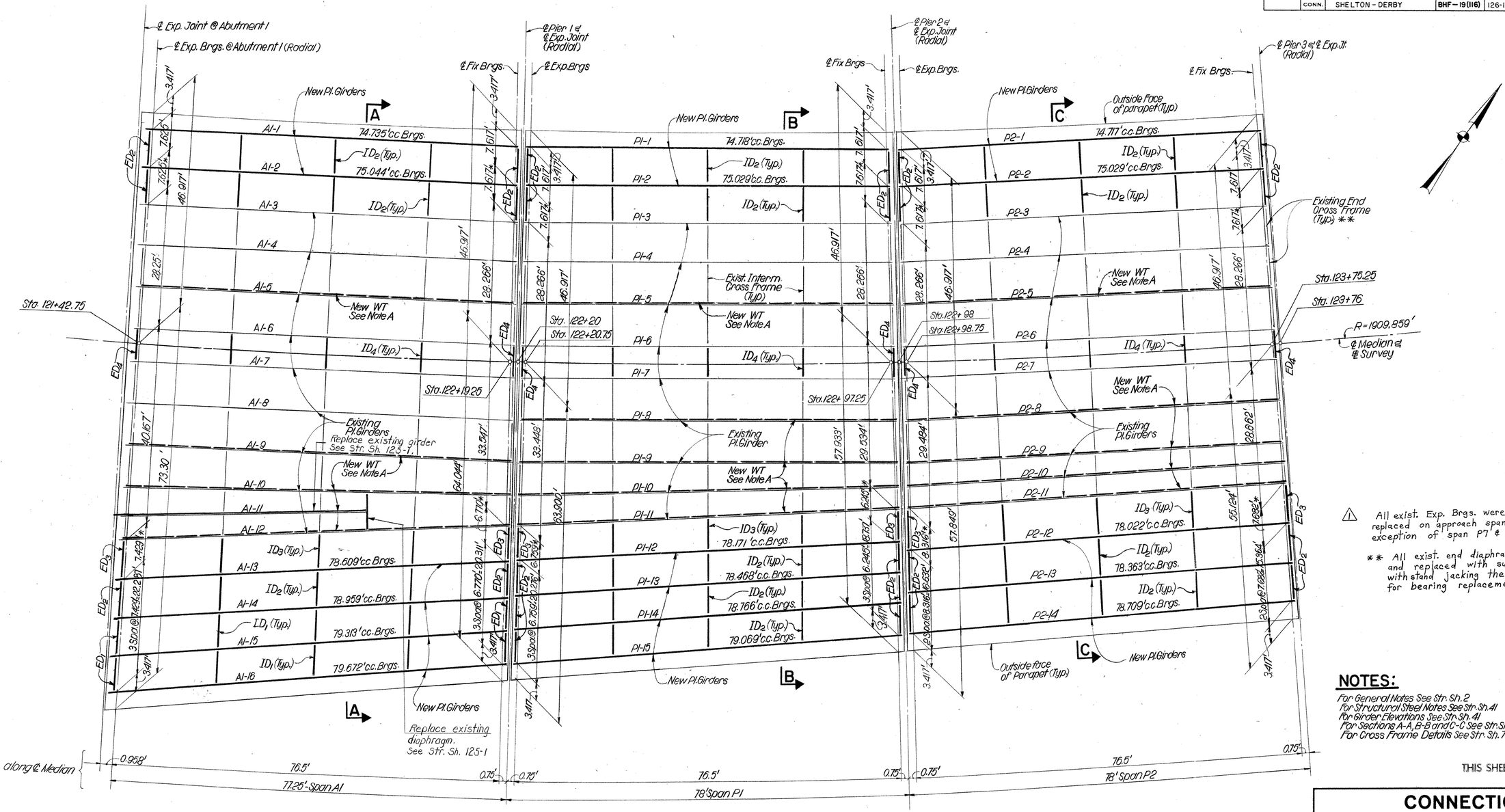
FORM NO. ENG. 154 ED. 171

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	78	297



⚠ All exist. Exp. Brgs. were removed and replaced on approach spans with the exception of span P1 & P11.

** All exist. end diaphragms were removed and replaced with such that can withstand jacking the existing structure for bearing replacement under live loads.

NOTES:

For General Notes See Str. Sh. 2
For Structural Steel Notes See Str. Sh. 41
For Girder Elevations See Str. Sh. 41
For Sections A-A, B-B and C-C See Str. Sh. 68, 69
For Cross Frame Details See Str. Sh. 77

THIS SHEET CORRECTED

FRAMING PLAN SPANS A1, P1 & P2

Scale: 1" = 10'

NOTE A:

Build-up existing girders by field welding a continuous Structural Tee (WT) shape of variable depth centered on top of the existing girder top flange. See Detail on Str. Sh. 68.

Payment to be included in item "Structural Steel Bridge No. 126-119-1.

Note:

ED denotes End Diaphragm or Cross Frame
ID denotes Intermediate Diaphragm or Cross Frame.

For Details see Str. Sh. 40.

Note: * Denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the Special Provisions.

BRUNING 44-131 23530

126-119-BR 197

513 01

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CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

FRAMING PLAN-SPANS A1, P1 & P2

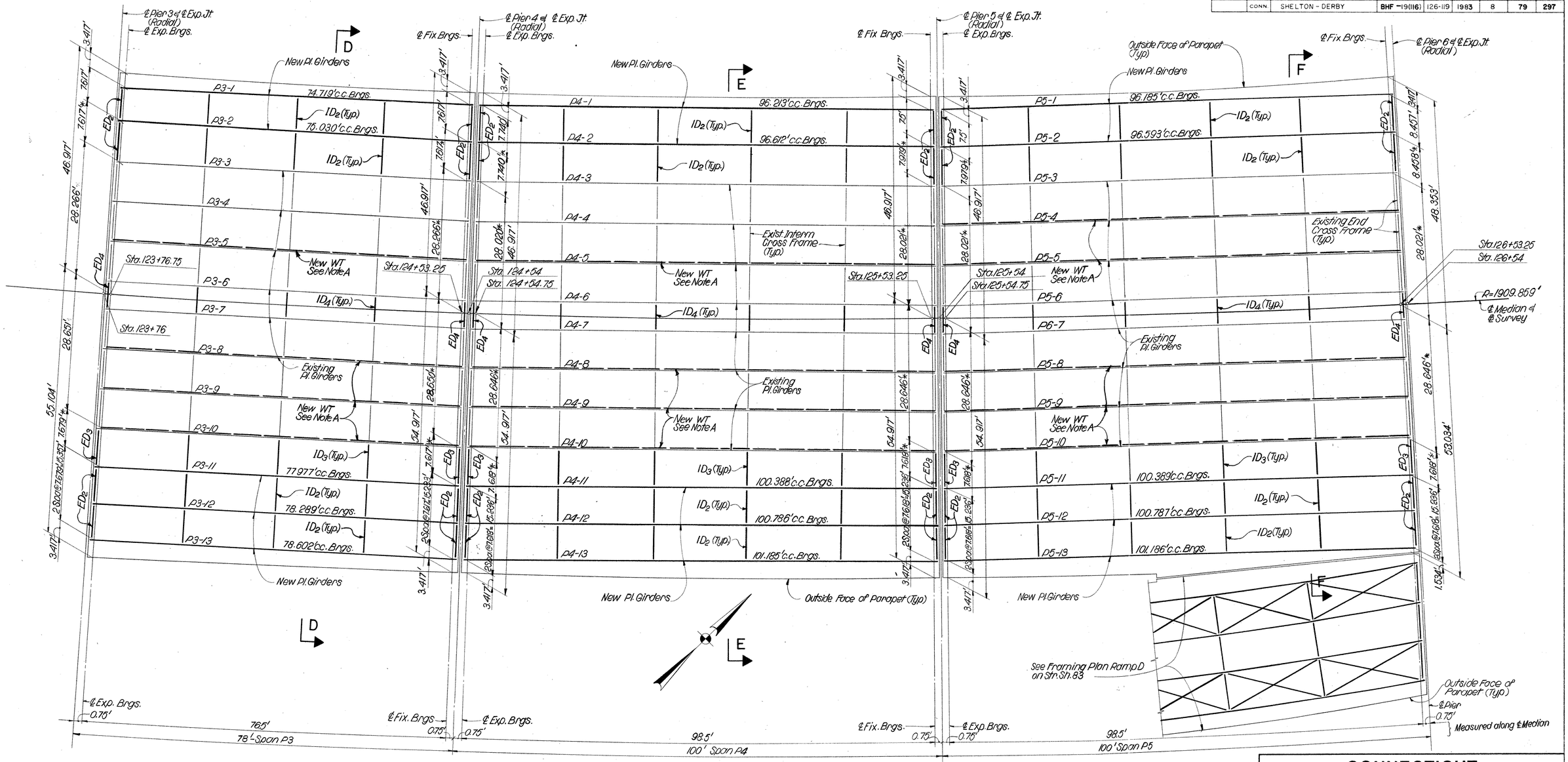
NO.	DATE	DESCRIPTION
⚠		See notes.

REVISIONS

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN C.M. CHECKER R.D. DESIGNER V.P.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 34 OF 135

FORM NO. ENG. 154 (D. ...)

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF -19(116)	126-119	1983	8	79	297



NOTES:

For General Notes See Str. Sh. 2
For Structural Steel Notes See Str. Sh. 41
For Girder Elevations see Str. Sh. 41
For Sections D-D, E-E, G-G and F-F see Str. Sh. 70, 71

THIS SHEET NOT CORRECTED

NOTE A:

Build-up existing girders by field welding a continuous Structural Tee (WT) shape of variable depth centered on top of the existing girder top flange. See Detail on Str. Sh. 68.

Payment to be included in Item "Structural Steel Bridge No. 126-119-1."

Note:

ED denotes End Diaphragm on Cross Frame.
ID denotes Intermediate Diaphragm on Cross Frame.

For Details see Str. Sh. 40.

FRAMING PLAN-SPANS P3, P4 & P5

Note: * Denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the Special Provisions.

NO.	DATE	DESCRIPTION

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

FRAMING PLAN-SPANS P3, P4 & P5

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN GT CHECKER R.D. DESIGNER M.C.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 35 OF 135

BRUNING 44 131 23530

126-119-36 137

513 01

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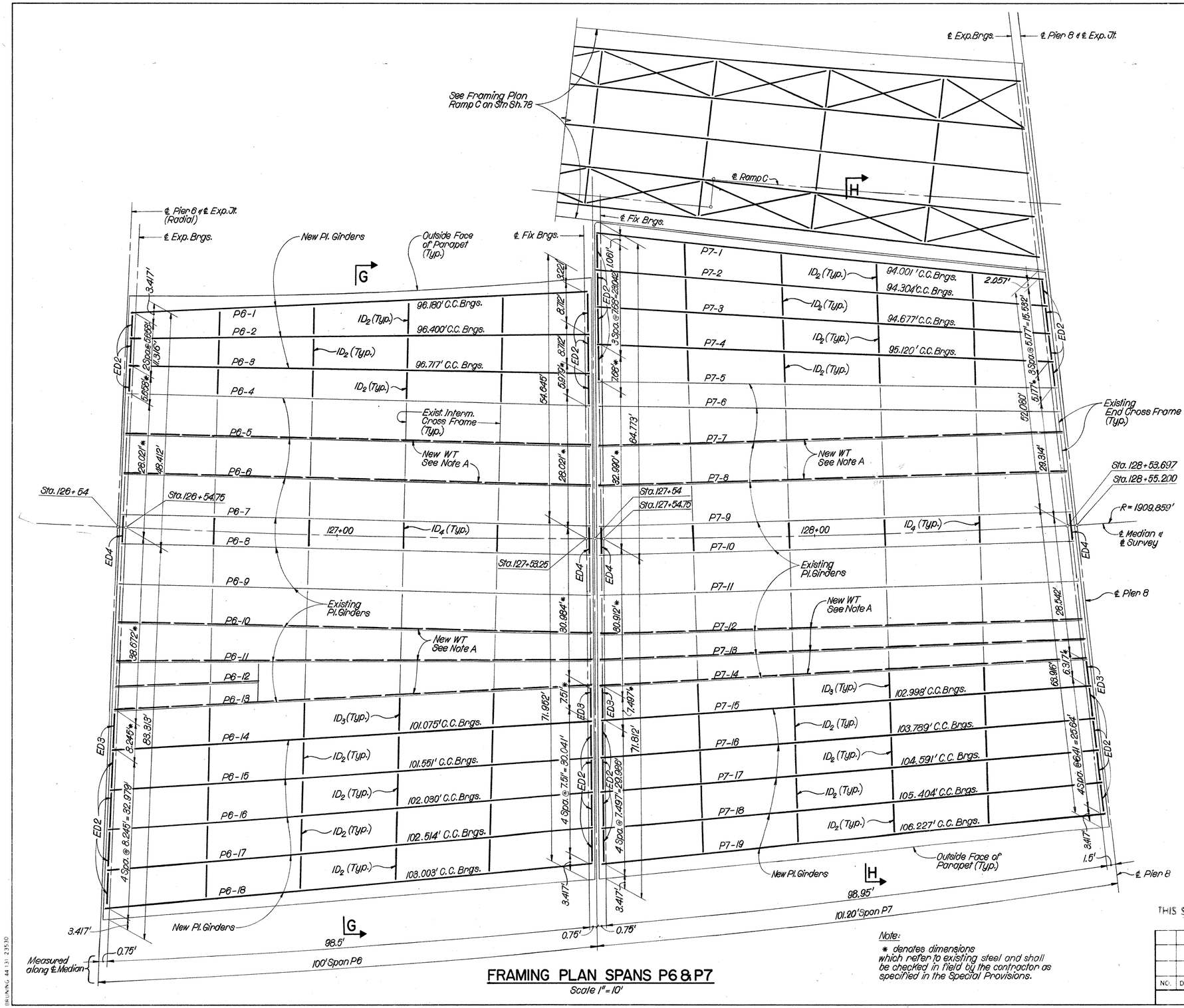
FORM NO. ENG. 15A

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	80	297



FRAMING PLAN SPANS P6 & P7

Scale 1" = 10'

Note:
* denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the Special Provisions.

NOTE A:
Build-up existing girders by field welding a continuous Structural Tee (WT) shape of variable depth centered on top of the existing girder top flange. See Detail on Str. Sh. 68.
Payment to be included in item "Structural Steel Bridge No. 126-119-1"

NOTE:
ED denotes End Diaphragm or Cross Frame

ID denotes Intermediate Diaphragm or Cross Frame.

For Details see Str. Sh. 40.

NOTES:

For General Notes see Str. Sh. 2

For Structural Steel Notes see Str. Sh. 41

For Girder Elevations see Str. Sh. 41

For Sections G-G and H-H see Str. Sh. 72

THIS SHEET NOT CORRECTED

NO.	DATE	DESCRIPTION

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

FRAMING PLAN-SPANS P6 & P7

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN C.M./E.A. CHECKER R.D. DESIGNER V.P.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 36 OF 135

PRINTING 44 131 23530

126-119-36 137

513 01

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FHWA DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19 (116)	126-119	1983	8	81	297

NOTE: FOR FRAMING PLAN OF WESTERLY WIDENING SEE STRUCTURE SHEET 45A

Along ℄ Brgs.
℄ Pier 8 & ℄ Exp. Jt.
℄ Exp. Brgs.
New Stringers W24x76 (Typ.)
Outside Face of Parapet
Floorbeam Extension & New Flbm. Bracket (Typ.)
New Diaphragms C12x25 @20' max. CC. (Typ.)
Upper Lateral Bracing WT 12x34 (Typ.)
Lower Lateral Bracing W14x43 (Typ.)
℄ Fix. Brgs.
℄ Pier 9 & ℄ Exp. Jt.
℄ New Truss
℄ Exist. Truss
Exist. Floorbeam & Flbm. Bracket (Typ.)
Exist. Diaphragms 12 [25 (Typ.)
Exist. Upper & Lower Lateral Bracing (Typ.)
Exist. Stringers 24 WF x 76 (Typ.) (To be reset)
New Diaphragm C12x25 (Typ.)
Exist. Floorbeam (Typ.)
Exist. Stringer btwn. P8-F2 & P8-F8 (To be reset)
New W8x40 See Note A
Note Angle Point in ℄ Floorbeam
See Note B
Sta. 131+07.060
Sta. 131+09.39
N29°16'38.3"E
℄ Median & ℄ Survey
PT Sta. 130+24.20
Sta. 128+55.20
Sta. 128+56.953
R=1909.859'
Radial Line at Sta. 128+55.23
Exp. Jt. Support See det. on Str. Sh. 89
New Diaphragms C12x25 @20' max. CC. (Typ.)
New Stringers W24x76 (Typ.)
See Typical Floorbeam & Bracket Details on Str. Sh. 52 (Typ.)
10 Spaces @ 25'* = 250'* (Along ℄ existing truss P8-B & P8-C)
254.190'* Span P8 (Along ℄ Median)
WP1 WP2 WP3 WP4 WP5 WP6 WP7 WP8 WP9 WP10 WP11 WP12
P8-1 P8-2 P8-3 P8-A P8-4 P8-5 P8-6 P8-7 P8-8 P8-9 P8-10 P8-11 P8-B P8-12 P8-13 P8-14 P8-15 P8-16 P8-17 P8-18 P8-C P8-19 P8-20 P8-21 P8-22 P8-D P8-23 P8-24
P8-F0 P8-F1 P8-F2 P8-F3 P8-F4 P8-F5 P8-F6 P8-F7 P8-F8 P8-F9 P8-F10
84°43'14.50"
83°02'11.47"
89°00'13.72"
89°18'43.25"
3°23'05.73"

NOTE B

Provide WT 6x13 bracing at Top & Bottom Flanges of Floorbeam. Connect to Upper lateral Bracing System.

NOTES:

For General Notes See Str. Sh. 2
For Structural Steel Notes See Str. Sh. 46
For Section L-L See Str. Sh. 73
For Section M-M See Str. Sh. 74

COORDINATES								
WP	N	E	WP	N	E	WP	N	E
1	175 225.437	507 251.937	~~5~~	~~175 265.434~~	~~507 168.670~~	~~9~~	~~175 467.166~~	~~507 336.536~~
2	175 226.885	507 252.925	6	175 237.139	507 235.833	10	175 451.517	507 364.449
3	175 441.278	507 381.516	7	175 216.560	507 270.134	11	175 430.939	507 398.749
4	175 443.311	507 382.655	8	175 201.641	507 295.002	12	175 418.224	507 421.428

BRUNING 44-131 23530

FRAMING PLAN - SPAN P8

Scale: 1"=10'-0"

Note: * denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the General Notes.

NOTE A:

Provide Slab Support over the existing truss by installing a continuous Wide Flange (W8x40) Shape centered on top of the existing truss top chord and seated on field welded bolsters of variable depth spaced at max. 5'-0" c.c. See Detail on Str. Sh. 52
Payment to be included in Item "Structural Steel Bridge No. 126-119-1"

THIS SHEET NOT CORRECTED

NO.	DATE	DESCRIPTION
1	7/84	Void Westerly Widening

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

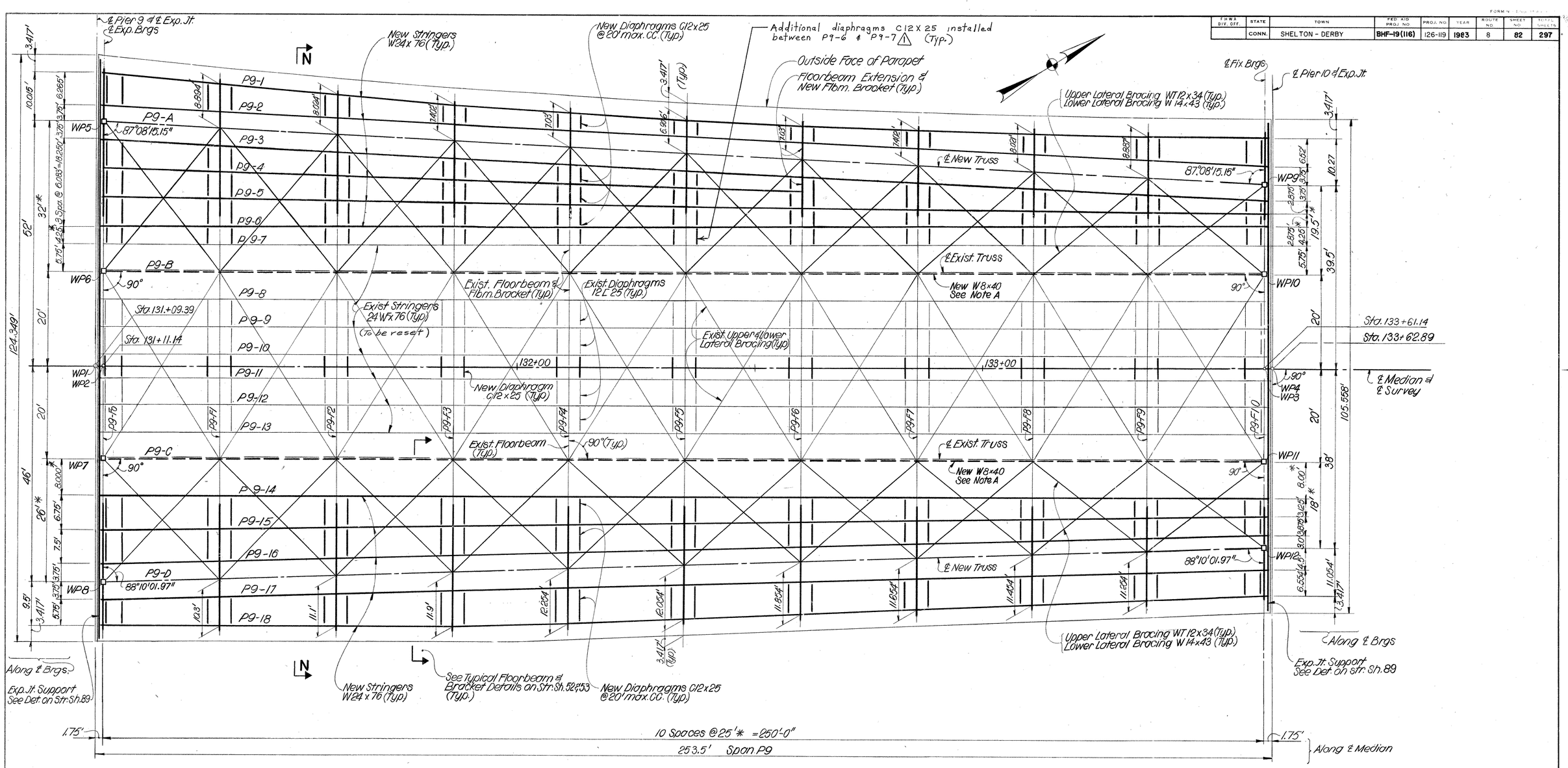
FRAMING PLAN - SPAN P8

ENGINEER: FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED: [signature] DATE 11/23/82
DRAFTSMAN G.T. CHECKER R.D. DESIGNER V.R.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 37 OF 135

513 01

126-119-36 137

FHWA DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	82	297



NOTES:

For General Notes See Str. Sh. 2
For Structural Steel Notes See Str. Sh. 46
For Section N-N See Str. Sh. 75

COORDINATES								
WP	N	E	WP	N	E	WP	N	E
1	175 443.311	507 382.655	5	175 470.267	507 338.153	9	175 682.220	507 471.316
2	175 444.837	507 383.511	6	175 454.618	507 366.066	10	175 672.684	507 488.325
3	175 662.903	507 505.771	7	175 435.056	507 400.956	11	175 653.122	507 523.216
4	175 664.429	507 506.626	8	175 422.341	507 423.635	12	175 644.319	507 538.917

FRAMING PLAN - SPAN P9

Scale: 1" = 10'-0"

Note: * Denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the General Notes.

THIS SHEET CORRECTED

NOTE A
Provide Slab Support over the existing truss by installing in field a continuous wide Flange (W8x40) Shape centered on top of the existing truss top chord and seated on field welded bolsters of variable depth spaced at max. 5'-0" c.c. See Detail on Str. Sh. 52.
Payment to be included in Item "Structural Steel Bridge No. 126-119-1".

NO.	DATE	REVISIONS
1		Additional diaphragms

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE,
ROUTE 8 OVER THE HOUSATONIC RIVER

FRAMING PLAN - SPAN P9

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED JW Sigrow RKeklund DATE 11/23/82
DRAFTSMAN G.T. CHECKER R.D. DESIGNER V.P
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 38 OF 135

513 01

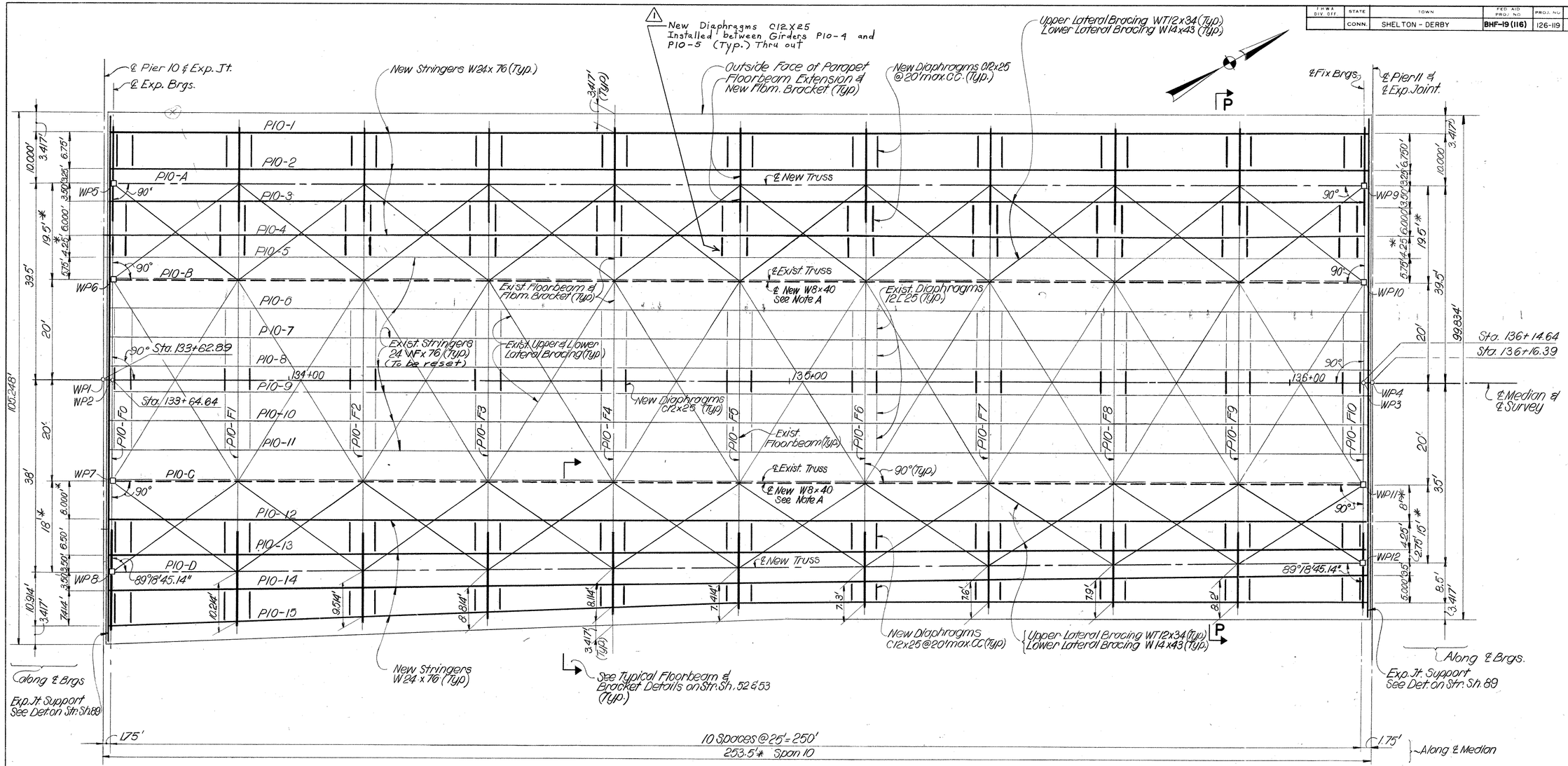
126-119-36 127

82

BRUNING 44-131 23530

FHWA DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	83	297

FORM N. ENG. 1411



COORDINATES

WP	N	E	WP	N	E	WP	N	E
1	175 664.429	507 506.626	5	175 685.273	507 473.028	9	175 903.338	507 595.287
2	175 665.956	507 507.482	6	175 675.736	507 490.037	10	175 893.802	507 612.296
3	175 884.021	507 629.742	7	175 656.175	507 524.927	11	175 874.241	507 647.187
4	175 885.548	507 630.597	8	175 647.372	507 540.628	12	175 866.905	507 660.271

FRAMING PLAN - SPAN P10

Scale: 1" = 10'-0"

Note: * Denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the General Notes.

NOTES:
For General Notes See Str. Sh. 2
For Structural Steel Notes See Str. Sh. 46
For Section P-P See Str. Sh. 76

THIS SHEET CORRECTED

NOTE A:
Provide Slab Support over the existing truss by installing in field a continuous Wide Flange (W8 x 40) Shape centered on top of the existing truss top chord and seated on field welded bolsters of variable depth spaced at max. 5'-0" c.c. See Detail on Str. Sh. 52
Payment to be included in Item "Structural Steel Bridge No. 126-119-1"

NO.	DATE	DESCRIPTION
1	2/84	New Diaphragms C12x25 installed

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

FRAMING PLAN - SPAN P10

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN G.T. CHECKER R.D. DESIGNER V.P.
STRUCTURE NO. 06-119 STRUCTURE SHEET 39 OF 135

513-01

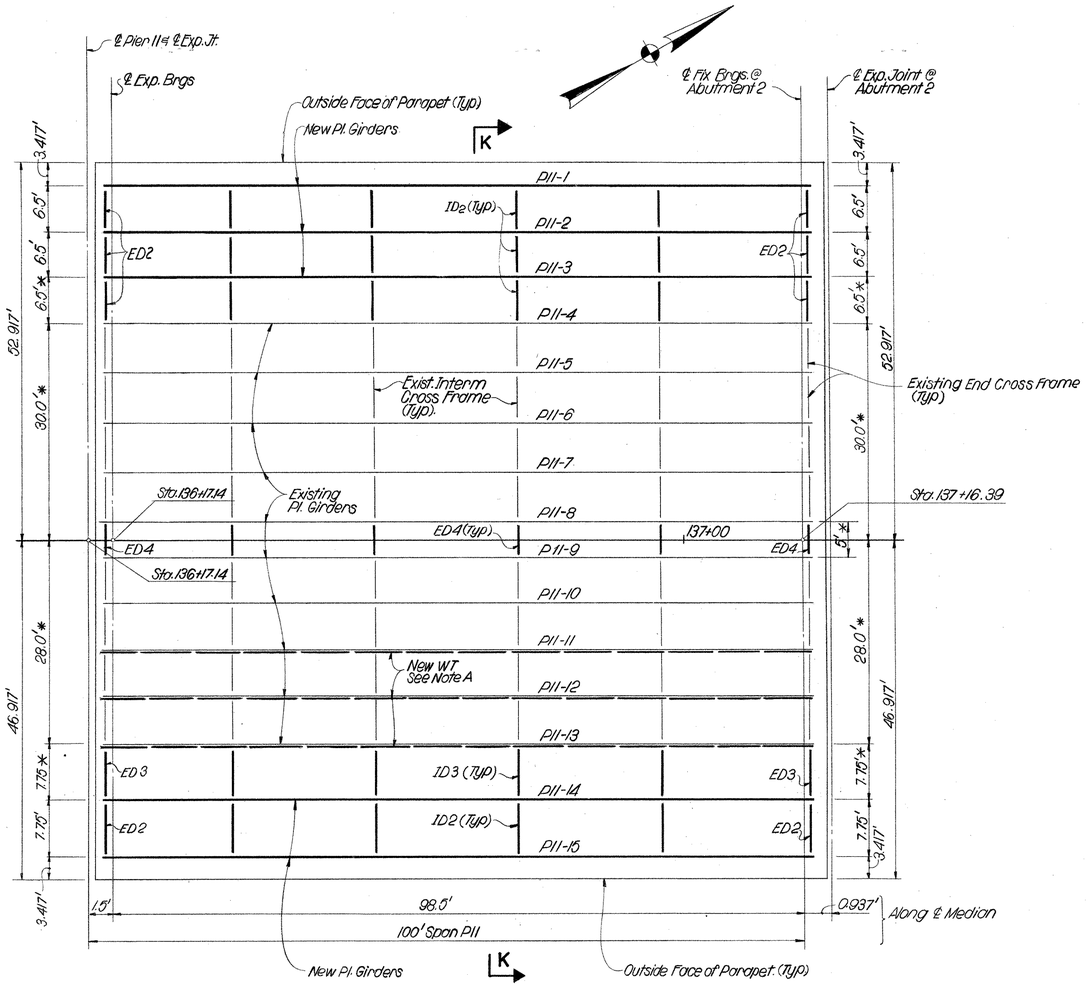
83

BRUNING 44 131 2350

126-119-36 137

FORM NO. ENG. 154 ED. 1/71

F.H.W.A. DIV. OFF	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON – DERBY	BHF-19(116)	126-119	1983	8	84	297

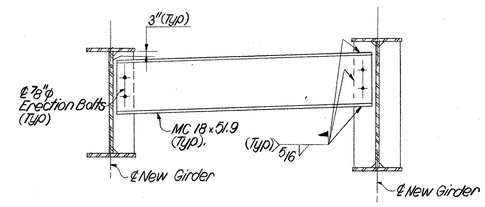


FRAMING PLAN SPAN P II

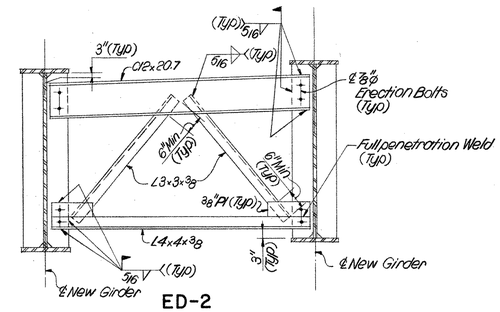
Scale: 1" = 10'

Note: * denotes dimensions which refer to existing steel and shall be checked in field by the contractor as specified in the Specials Provisions.

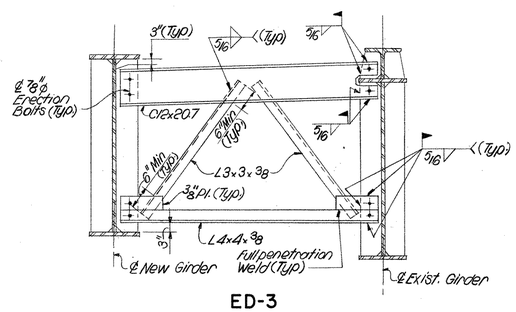
Note A:
Build-up Existing Girders by field welding a continuous structural Tee (WT) Shape of variable depth centered on top of the existing Girder top Flange. See detail on Str. Sh. 68
Payment to be included in Item "Structural Steel Bridge No. 126-119-1"



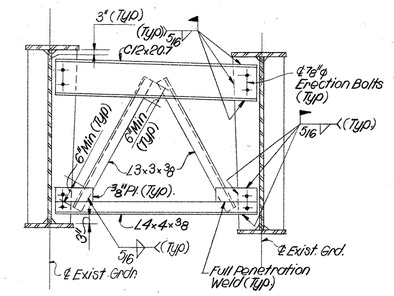
ED-1



ED-2



ED-3



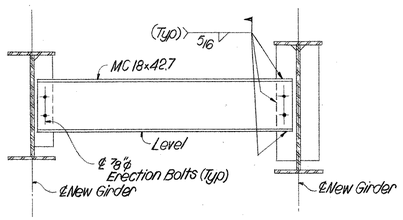
ED-4

TYPICAL END DIAPHRAGM AND CROSS FRAMES.

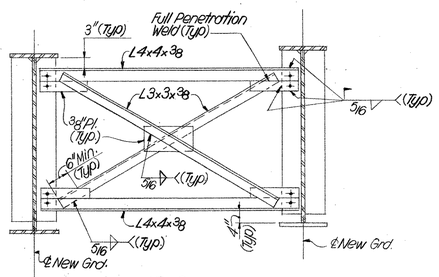
Scale: 1/2" = 1'-0"

NOTES:
For General Plan See Str. Sh. 2
For Structural Steel Notes See Str. Sh. 41
For Girder Elevations See Str. Sh. 41
For Section K-K See Str. Sh.

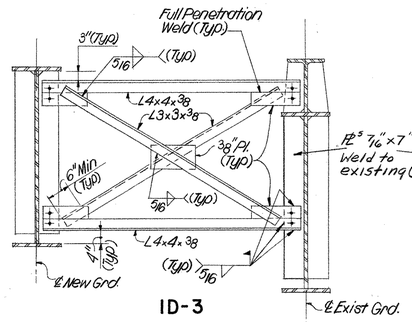
ED - denotes End Diaphragm or Cross Frame
ID - denotes Intermediate Diaphragm or Cross Frame
For Details see on this Sheet



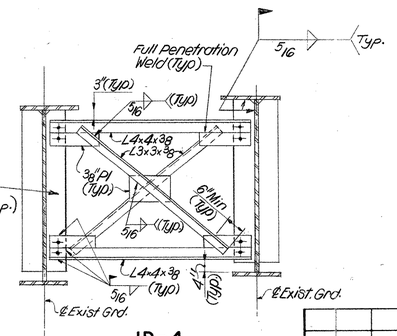
ID-1



ID-2



ID-3



ID-4

FE 3 7/16" x 7" weld to existing (Typ.)

TYPICAL INTERMEDIATE DIAPHRAGM AND CROSS FRAMES

Scale: 1/2" = 1'-0"

THIS SHEET NOT CORRECTED

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

FRAMING PLAN – SPAN P II

NO.	DATE	DESCRIPTION
		REVISIONS

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN G.T. CHECKER R.D. DESIGNER M.C.
STRUCTURE NO. 126 – 119 – 1 STRUCTURE SHEET 40 OF 135

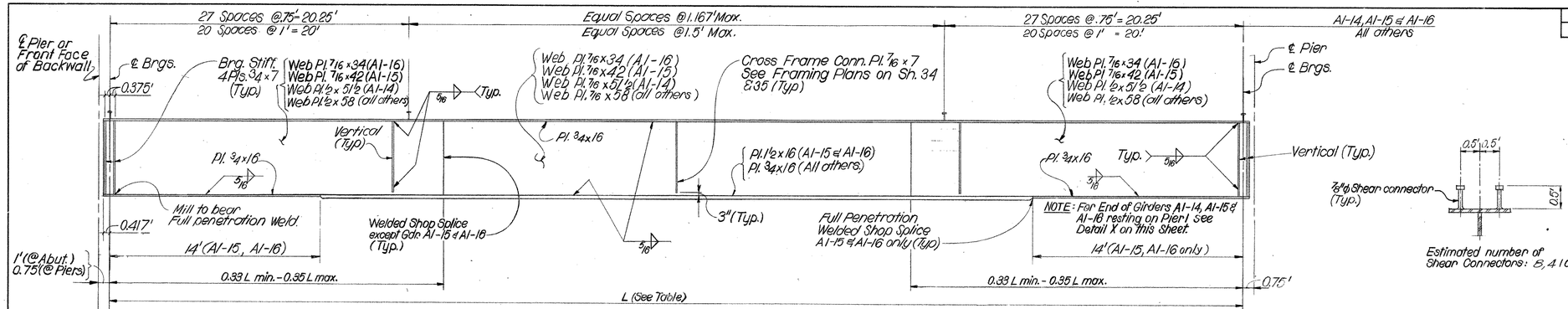
BRUNING 44-131 23530

126-119-86 137

513 01

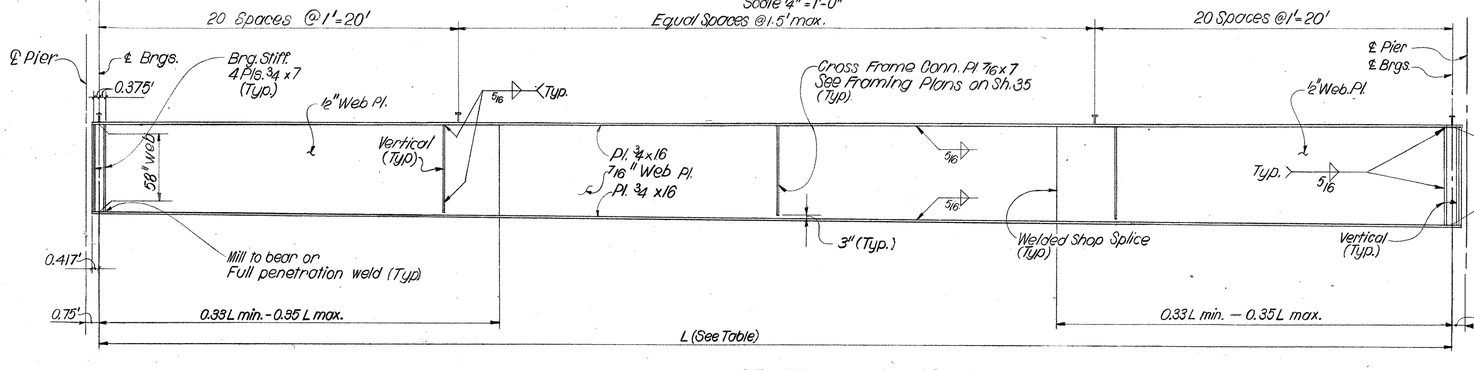
84

FHWA DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	85	297



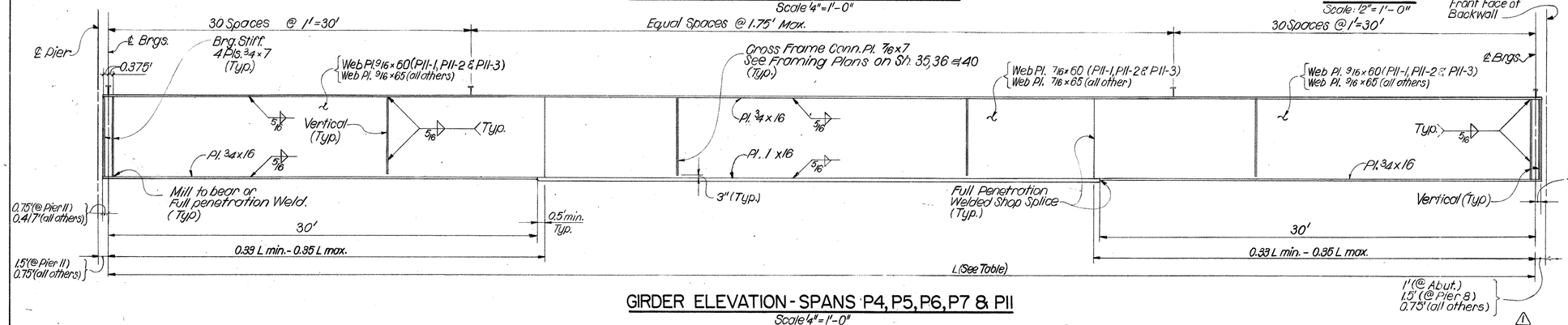
GIRDER ELEVATION - SPANS A1, P1, P2 & P3

Scale 1/4" = 1'-0"



GIRDER ELEVATION - P3-18 & P3-13 ONLY

Scale 1/4" = 1'-0"



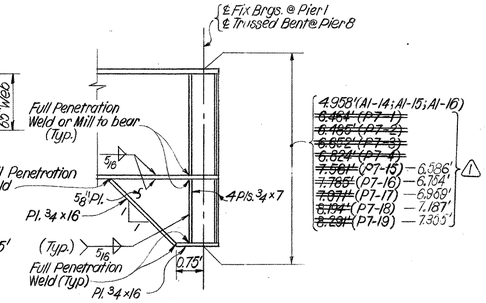
GIRDER ELEVATION - SPANS P4, P5, P6, P7 & P11

Scale 4" = 1'-0"

SHEAR CONNECTOR - DETAIL

No to Scale

Estimated number of Shear Connectors: 8,410



DETAIL X

Scale: 12" = 1'-0"

NOTES:

For General Notes See Str. Sh. 2
For Framing Plan See Str. Sh. 34; 35; 36 & 40
For Cross Frame details See Str. Sh. 77
For Camber and Deflections See Str. Sh. 54, 55 & 56.
For Structural Steel Notes See Str. Sh. 84

⚠ NOTE: For End of Girders ~~P7-1 thru P7-4 only~~ P7-15 thru P7-19 resting on Trussed Bent at Pier 8 see Detail X on this sheet.

DIMENSION L (FEET)

SPAN A1		SPAN P1		SPAN P2		SPAN P3		SPAN P4		SPAN P5		SPAN P6		SPAN P7		SPAN P11	
GIRDER	L	GIRDER	L	GIRDER	L	GIRDER	L	GIRDER	L	GIRDER	L	GIRDER	L	GIRDER	L	GIRDER	L
A1-1	74.735'	P1-1	74.718'	P2-1	74.717'	P3-1	74.719'	P4-1	96.213'	P5-1	96.185'	P6-1	96.180'	P7-1	94.001'	P11-1	98.500'
A1-2	75.044'	P1-2	75.029'	P2-2	75.029'	P3-2	75.030'	P4-2	96.612'	P5-2	96.593'	P6-2	96.400'	P7-2	94.304'	P11-2	98.500'
A1-13	78.609'	P1-12	78.171'	P2-12	78.022'	P3-11	77.977'	P4-11	100.388'	P5-11	100.389'	P6-3	96.717'	P7-3	94.677'	P11-3	98.500'
A1-14	78.959'	P1-13	78.468'	P2-13	78.363'	P3-12	78.289'	P4-12	100.796'	P5-12	100.787	P6-14	101.076'	P7-4	95.120'	P11-14	98.500'
A1-15	79.313'	P1-14	78.766'	P2-14	78.709'	P3-13	78.602'	P4-13	101.185'	P5-13	101.186	P6-15	101.551'	P7-15	102.998'	P11-15	98.500'
A1-16	79.672'	P1-15	79.060'									P6-16	102.030'	P7-16	103.789'		
												P6-17	102.514'	P7-17	104.591'		
												P6-18	103.003'	P7-18	105.404'		
														P7-19	106.227'		

THIS SHEET NOT CORRECTED

NO	DATE	DESCRIPTION
⚠	3/84	Rev. Det. X and Note

REVISIONS

513 01

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE

ROUTE 8 OVER THE HOUSATONIC BRIDGE

PLATE GIRDERS SPANS A1 THRU P7 & P11

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN G.T. CHECKER A.D. DESIGNER V.P.
STRUCTURE NO 126-119-1 STRUCTURE SHEET 41 OF 135

BRUNING 44-131 23530

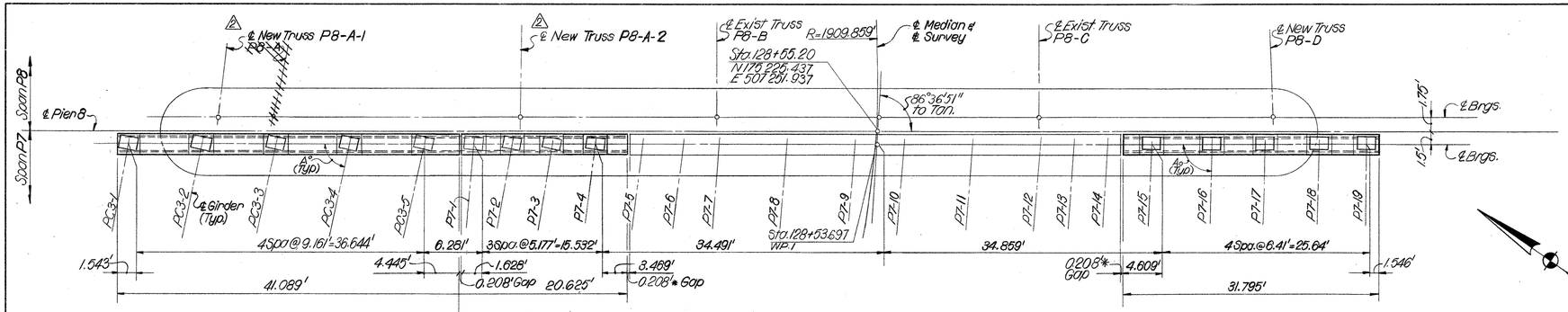
126-119-36 137

85

FORM NO. ENG. 15A ED. 6-71

T.I.H.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	86	297

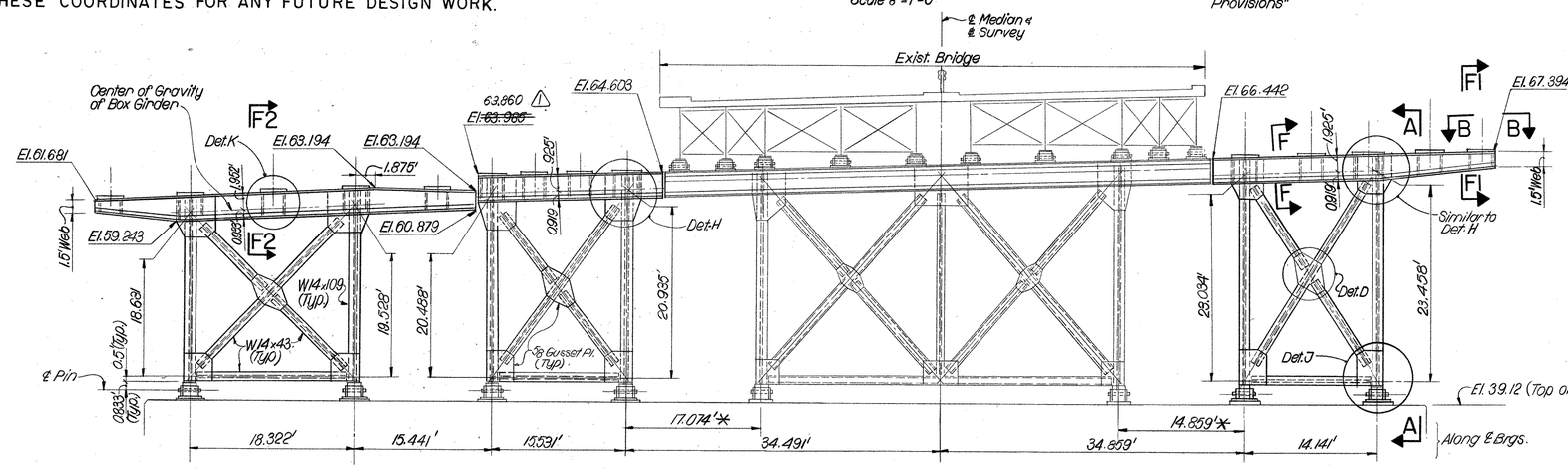
W.P.	ANGLE "A"	ELEVATION AT TOP OF SPREADER PL.	COORDINATES N	COORDINATES E
WP-1			175 224.197	507 251.089
PC3-1	80°09'56.62"	61.923	175 272.015	507 171.385
PC3-2	78°24'49.96"	62.372	175 267.302	507 179.240
PC3-3	77°49'54.42"	62.821	175 262.589	507 187.096
PC3-4	77°24'56.04"	63.269	175 257.876	507 194.951
PC3-5	77°04'33.06"	63.361	175 253.163	507 202.807
P7-1	76°36'42.62"	⚠ ~~64.261~~ 64.086	175 249.932	507 208.193
P7-2	76°11'02.01"	~~64.356~~ 64.272	175 247.268	507 212.632
P7-3	79°44'40.98"	~~64.511~~ 64.459	175 244.605	507 217.072
P7-4	81°17'31.72"	~~64.666~~ 64.645	175 241.941	507 221.512
P7-15	87°07'26.22"	66.747	175 206.263	507 280.960
P7-16	87°43'13.48"	66.939	175 202.965	507 286.477
P7-17	88°18'27.87"	67.131	175 199.668	507 291.973
P7-18	88°53'10.04"	67.322	175 196.370	507 297.470
P7-19	89°27'20.15"	67.514	175 193.073	507 302.966

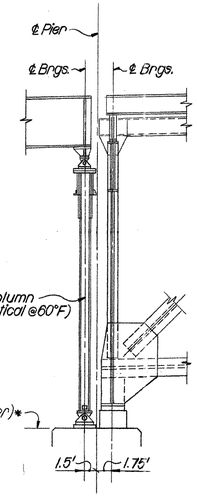


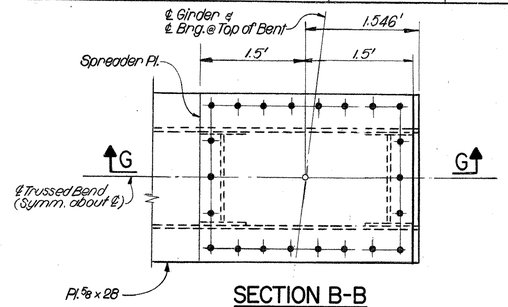
COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE ANY OF THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

* denotes dimensions which refer to existing structure and shall be checked in field by the contractor as specified in the "Special Provisions"

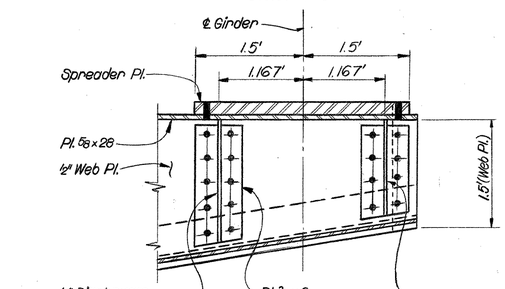
PLAN
Scale 1/8"=1'-0"





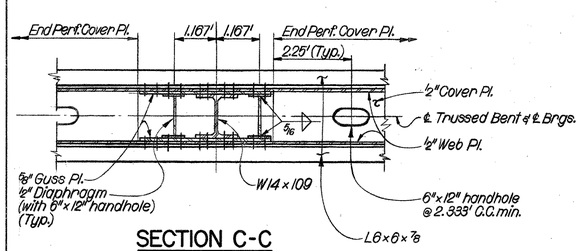


SECTION B-B
Scale 1"=1'-0"

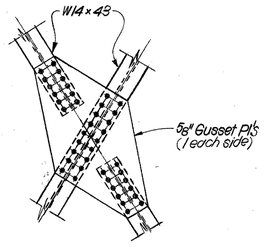


SECTION G-G
Scale 1"=1'-0"

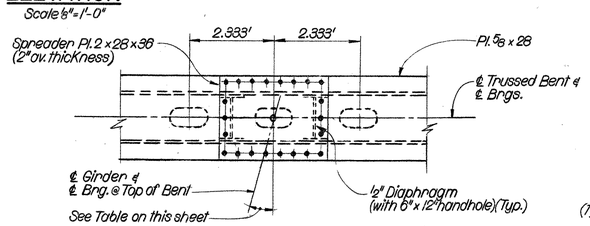
THIS SHEET NOT CORRECTED



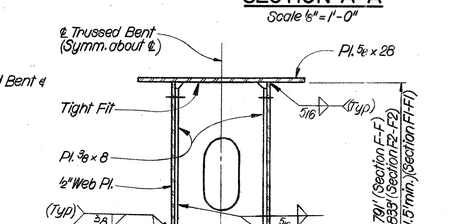
SECTION C-C
Scale 1/2"=1'-0"



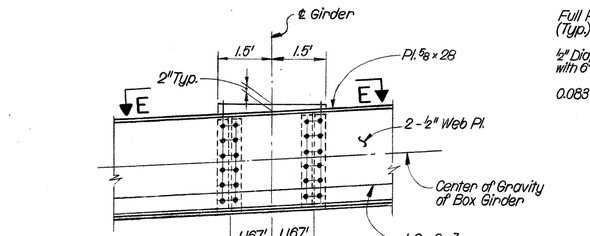
DETAIL D
Scale 1/2"=1'-0"



ELEVATION
Scale 1/2"=1'-0"



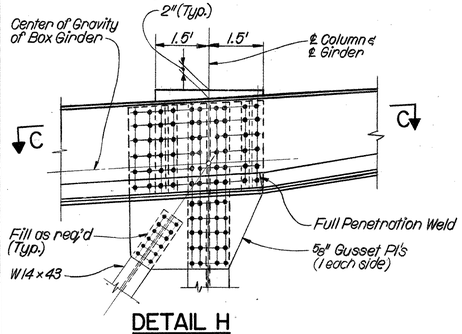
SECTION A-A
Scale 1/2"=1'-0"



VIEW E-E
Scale 1/2"=1'-0"

SECTION F-F; F1-F1; F2-F2
Scale 1"=1'-0"

NOTE:
For General Notes see Str. Sh. 2
For Bearings See Str. Sh. 44



DETAIL H
Scale 1/2"=1'-0"

DETAIL J
Scale 1/2"=1'-0"

DETAIL K
Scale 1/2"=1'-0"

NO.	DATE	DESCRIPTION
⚠2	7/84	Add Truss P8A-2
⚠1	3/84	Revised Elevations
REVISIONS		

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

TRUSSED BENT AT PIER 8

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN CP CHECKER RD DESIGNER V.P.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 42 OF 135

BRUNING 44-131 23530

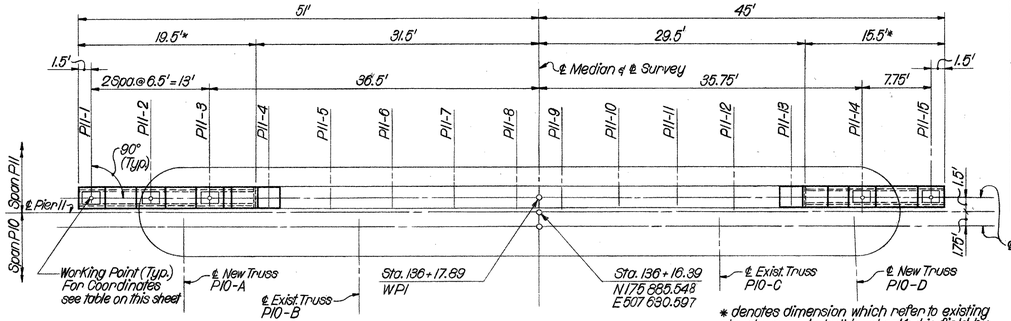
126-119-36 137

513 01

86

FORM NO. ENG. 15A ED. 1/71

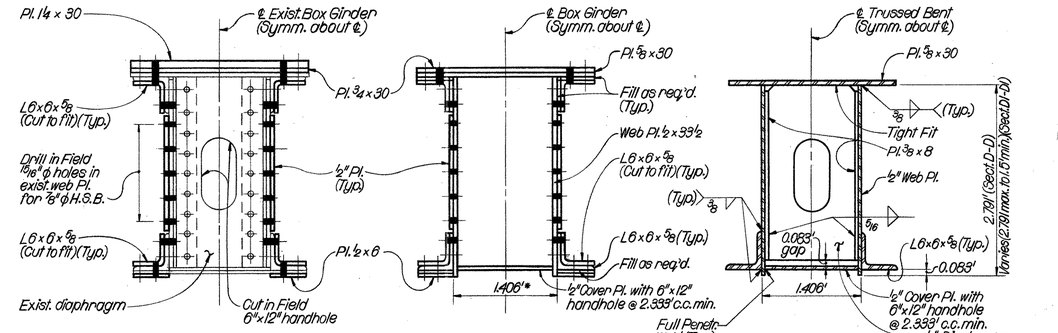
F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON ~ DERBY	BHF-19(116)	126-119	1983	8	87	297



WORKING POINT	COORDINATES N	E
WP1	175 886.866	507 631.331
P11-1	175 911.063	507 588.154
P11-2	175 907.684	507 593.628
P11-3	175 904.706	507 599.498
P11-14	175 869.373	507 662.515
P11-15	175 865.583	507 669.275

PLAN
Scale: 1/8"=1'-0"

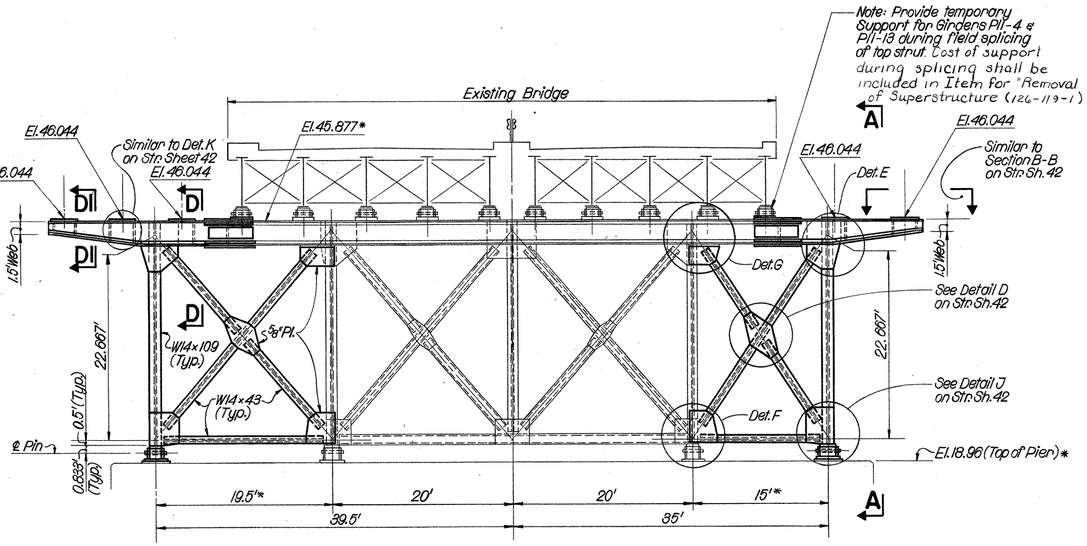
* denotes dimension which refer to existing structure and shall be checked in field by the contractor as specified in the "Special Provisions"



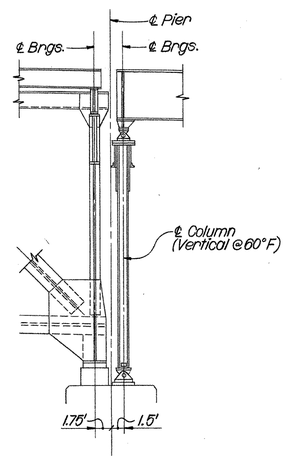
SECTION B-B
Scale 1"=1'-0"

SECTION C-C
Scale 1"=1'-0"

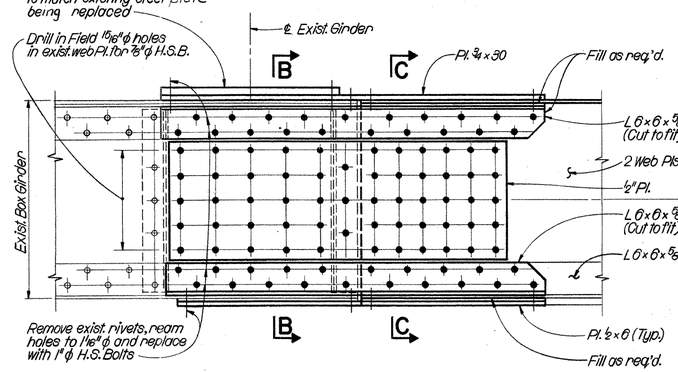
SECTION D-D
SECTION DI-DI
Scale 1"=1'-0"



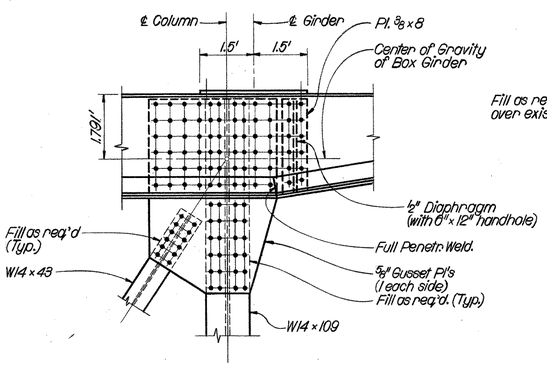
ELEVATION
Scale: 1/8"=1'-0"



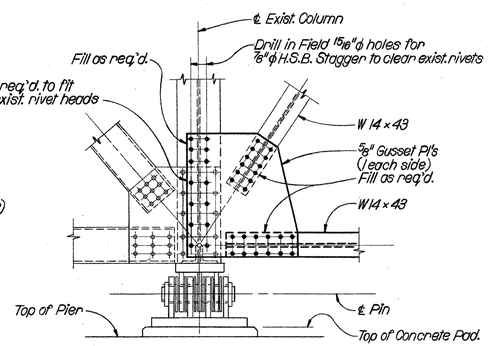
SECTION A-A
Scale 1/8"=1'-0"



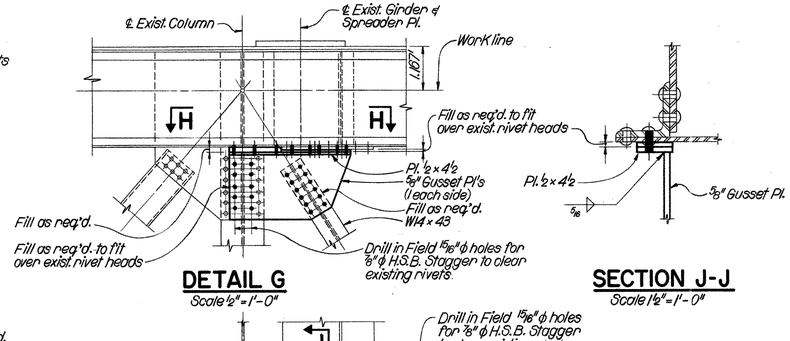
SPLICE DETAIL
Scale 1"=1'-0"



DETAIL E
Scale 1/2"=1'-0"



DETAIL F
Scale 1/2"=1'-0"



DETAIL G
Scale 1/2"=1'-0"

SECTION H-H
Scale 1/2"=1'-0"

SECTION J-J
Scale 1 1/2"=1'-0"

NOTES:
For General Notes see Str. Sh. 2
For Bearing Shoes at top and bottom of Trussed Bent see Str. Sh. 44
See Str. Sh. 42 for Backing Strip Note.

THIS SHEET NOT CORRECTED

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

TRUSSED BENT AT PIER II

NO.	DATE	DESCRIPTION

REVISIONS

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 43 OF 135

BRUNING 44-131 23530

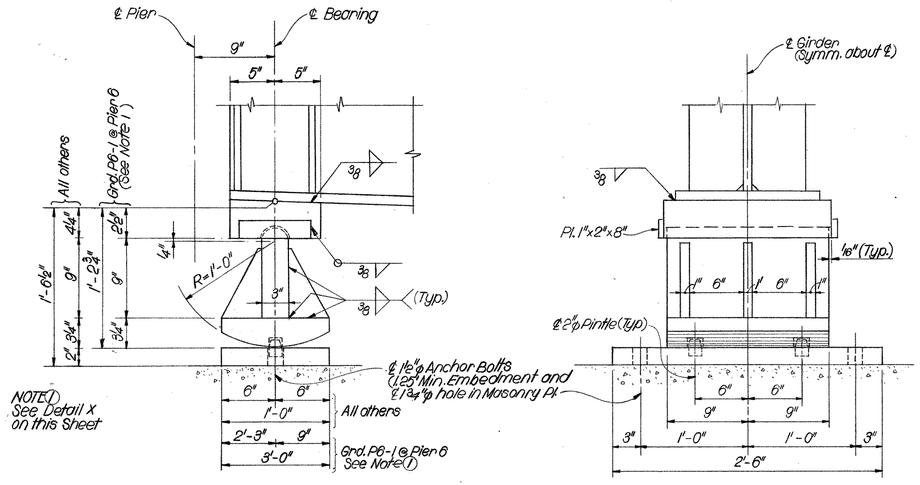
126-119-36 137

513 01

87

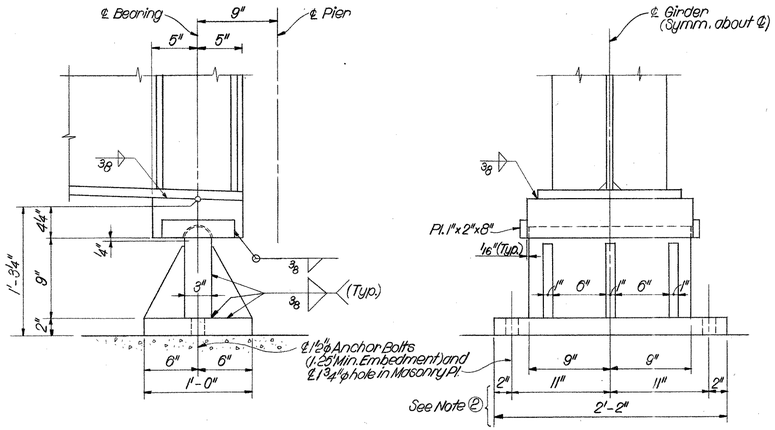
FORM NO. ENG.-15A ED. 1/71

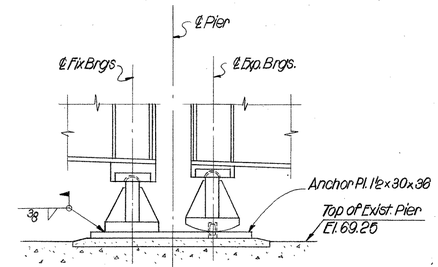
FHWA DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	88	297



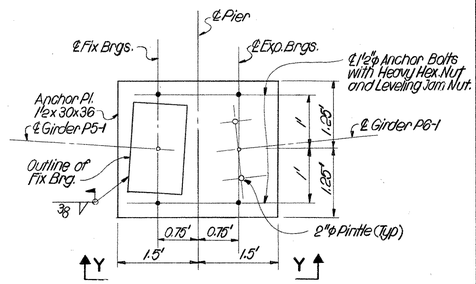
EXPANSION STEEL BEARING SHOE-E1
PIERS 1,2,3,4,5,6 & ABUT.1

Scale: 1½"=1'-0"





VIEW Y-Y

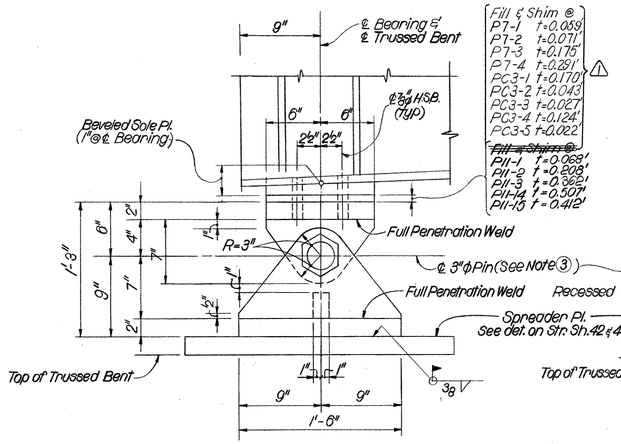


PLAN

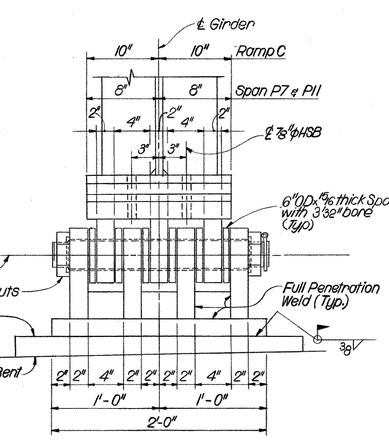
DETAIL-X
Scale 3/4"=1'-0"

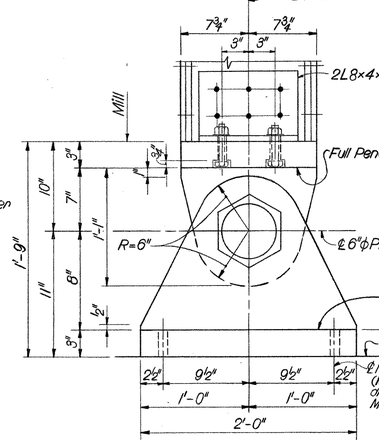
FIXED STEEL BEARING SHOE-F1
PIERS 1,2,3,4,5,6,7 & ABUT.2

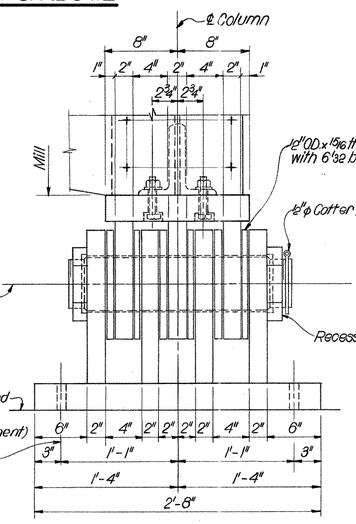
Scale 1½"=1'-0"



DETAIL
Scale: 3"=1'-0"





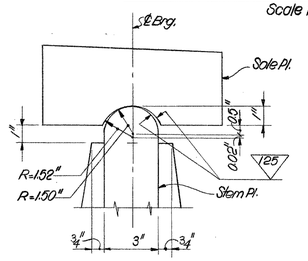


NOTES:
For General Notes see Str. Sheet 2

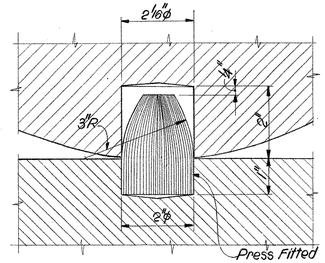
NOTE③ - Pin Material Shall Conform to ASTM A-668 Class F and Shall have a Finished Surface of an ANSI Standard Finish of 125

EXPANSION STEEL BEARING SHOE-E2
TOP OF TRUSSED BENT AT PIERS 8 & 11

Scale 1½"=1'-0"



DETAIL
Scale: 3"=1'-0"



PINTLE DETAIL
Half Scale

EXPANSION STEEL BEARING SHOE-E3
BOTTOM OF TRUSSED BENT AT PIERS 8 & 11

Scale 1½"=1'-0"

THIS SHEET NOT CORRECTED

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

STEEL BEARING SHOES

NO.	DATE	DESCRIPTION
⚠	3/84	Rev. Fill & Shim

REVISIONS

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN G.T. CHECKER R.D. DESIGNER M.C.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 44 OF 135

BRUNING 44-131 23530

126-119-36 137

513 01

FORM NO. ENG. 13A ED. 1/71

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	96	297

Varies (See Framing Plans)

℄ Existing Truss

Along ℄ Fibm. { 26' to ℄ Survey (Easterly Bracket) / 30' to ℄ Survey (Westerly Bracket)

℄ New Stringer and Slab Construction Joint

Varies

1" Min haunch

0.206' Bit. Conc. Class (1) & Class (12) on Sheet Membrane Waterproofing

0.646' Uniform R.C. Slab

0.25' R

⅜" Pl. / Pl. ⅜ × 6 } @ 5' Max.

5/16

Remove exist. rivets, Ream holes to 1"ø and install 1"ø H.S. Bolts (Exist. Steel only)

New W8 × 40 See Framing Plans

See Section 1-1 on Str. Sh. 53

New Tie Pl. See Str. Sh. 53

New ⅜" Pl.

⅜" Gusset Pl.

Splice Pl. ⅜ × 12½

A

0.333' (Typ.)

2 L 3½ × 3½ × ⅜ (Typ.)

C12 × 25 Same Spacing as existing diaphragms (Typ.)

1.5' (±) End of Exist. Bracket before widening

0.75'

℄ Field Splice

See Truss Joint Details on Str. Sh. 50 & 51

For size of Tie Pl. see Str. Sh. 45-48 (Typ.)

P 8-A all others

162.5' / 375'

W24 × 76 New Stringer (Typ.)

4-⅞"ø H.S.B. @ Each Bolster (Typ.)

Parallel to grade (Typ.)

⅜" Pls. (Typ.)

Pl. ⅜ × 12 × 12 (Typ.)

½" Nom. Shims (Typ.)

Typ. 5/16

Pl. 1 × 12

2½" × 14" Slotted hole in Gusset Pl. (Typ.)

Mill to bear (Typ.)

1.5' Web

Typ. 5/16

⅜" Web Pl.

2 Pls. ⅜ × 5 (Typ.)

1'

3.417'

Exist. Steel

Pl. 1 × 12

Shim as req'd.

½" R (Typ.)

Full Penetr. Weld.

⅜" Pls. Steel Wedge block machined to fit

Exist. Steel

Mill to bear (Typ.)

2-¾" Pls.

2 L 6 × 6 × ⅜ Cut to fit

℄ 3¾"ø Erection Pin

Fill as req'd.

* See Note

Full Penetr. Weld.

2-⅜" Pls.

1⅜" Web. Pl.

Similar to detail Shown for Lower Chord

⅜" Web Pl.

Pl. ½ × 12

Fill as req'd.

2 Pls. ⅜ × 5

6" max. (Typ.)

Tight Fit (Typ.)

Pl. 1 × 12

Top Lateral Bracing For Size See Framing Plans on Str. Sh. 37, 38 & 39

⅝" Gusset Pl.

2 L 6 × 6 × ½ (Bend ℄ Cut to fit)

5.417' Web Pl.

5.417' Web Pl.

2 Pls. ½ × 5½

⅜" Pls. (Typ.)

½" Pl. Full Penetr. Weld.

Typ. 5/16

2 Pls. ½ × 5½

Detail X

After Stage I work has been completed drill in field holes in main mat'l. Using holes in splice mat'l. as template, then complete bolting at splice.

* NOTE: Cut existing Fibm. Bracket as shown. Weld plug holes left by removing rivets and grind smooth. Drill in field new 15/16"ø holes to fit new ¾" splice Pls.

Drill in Field 15/16"ø holes for ⅞ HSB Stagger to clear existing rivets.

All Lateral Gussets Replaced in Span P10

⅜" Gusset Pl.

Sway Bracing For Size See Typical Cross Sections on Str. Sh. 73, 74, 75 & 76

NOTE: Provide 1" × 2" Vertical Slotted holes in gusset plate at Panel Points 3 thru 7. Install all bolts and leave finger tight until all Stage I work has been completed, then tighten bolts as prescribed.

⅜" Pl. (Typ.)

⅜" Pl. (Typ.)

⅜" Gusset Pl. (Typ.)

B

B

Pos HP 14 × 73 cut as required

Bottom Strut For Size See Str. Sh. 45, 46, 47 & 48

Level

B1

B1

1.583' (±)

0.125'

5/16

2'

23.333' (P8-A); 27' (P8-D); 25' (all others)

Drill 15/16"ø holes in Field (Typ.)
Clip Corner 1"x1"
Fill to clean Exist rivet heads
Face of Exist. Gusset

DETAIL X
Scale: 1½" = 1'-0"

℄ Existing Truss

1

1

NOTE:
For General Notes See Str. Sh. 2
For Truss-Joint Details See Str. Sh. 50 & 51
For Sections A-A, B-B & C-C see Str. Sh. 53

⅜" Pl. / ⅜" × 6" } @ 5' MAX.
Install .2" x 6" x 1" shims

SECTION 1-1

DETAIL Y 3
Scale: ¾" = 1'-0"

FLOOR BEAM & SWAY BRACING DETAILS

Scale ¾" = 1'-0"

THIS SHEET CORRECTED

NO.	DATE	REVISIONS
1	3/84	Correct dimension.
2	3/89	Lateral Gusset Replacement - Span P10 Detail "Y"
3		

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

FLOOR BEAM & SWAY BRACING DETAILS I

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/1982
DRAFTSMAN G.T. CHECKER R.D. DESIGNER M.C.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 52 OF 135

BRUNING 44-131 23530

126-119-36 137

513 01

96

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	104	297

NOTE A: Place additional #5×10' Epoxy Coated bars midway btwn. top longit. bars and #5×10' bars midway btwn. bottom longit. bars at both ends of slab.

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD. DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

SLAB PLAN SPANS A1, P1 & P2

SCALE: 1"=10'-0"

NOTES:

For General Notes see Structure Sheet 2
For Section A-A, B-B, C-C see Str. Sheets 68 & 69
For Miscellaneous Details see Str. Sheet 89
For Scupper Details see Str. Sheet 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

* Concrete Inserts Eliminated 4

THIS SHEET CORRECTED

NO.	DATE	DESCRIPTION
4		See Notes
3		Revised Long. Constr. Jt. to A1-10 and A1-12
2	7/86	Elevations N.Bd. Slab
1	11/84	Rev. Curve 3 Data

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPANS A1, P1 & P2

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 60 OF 135

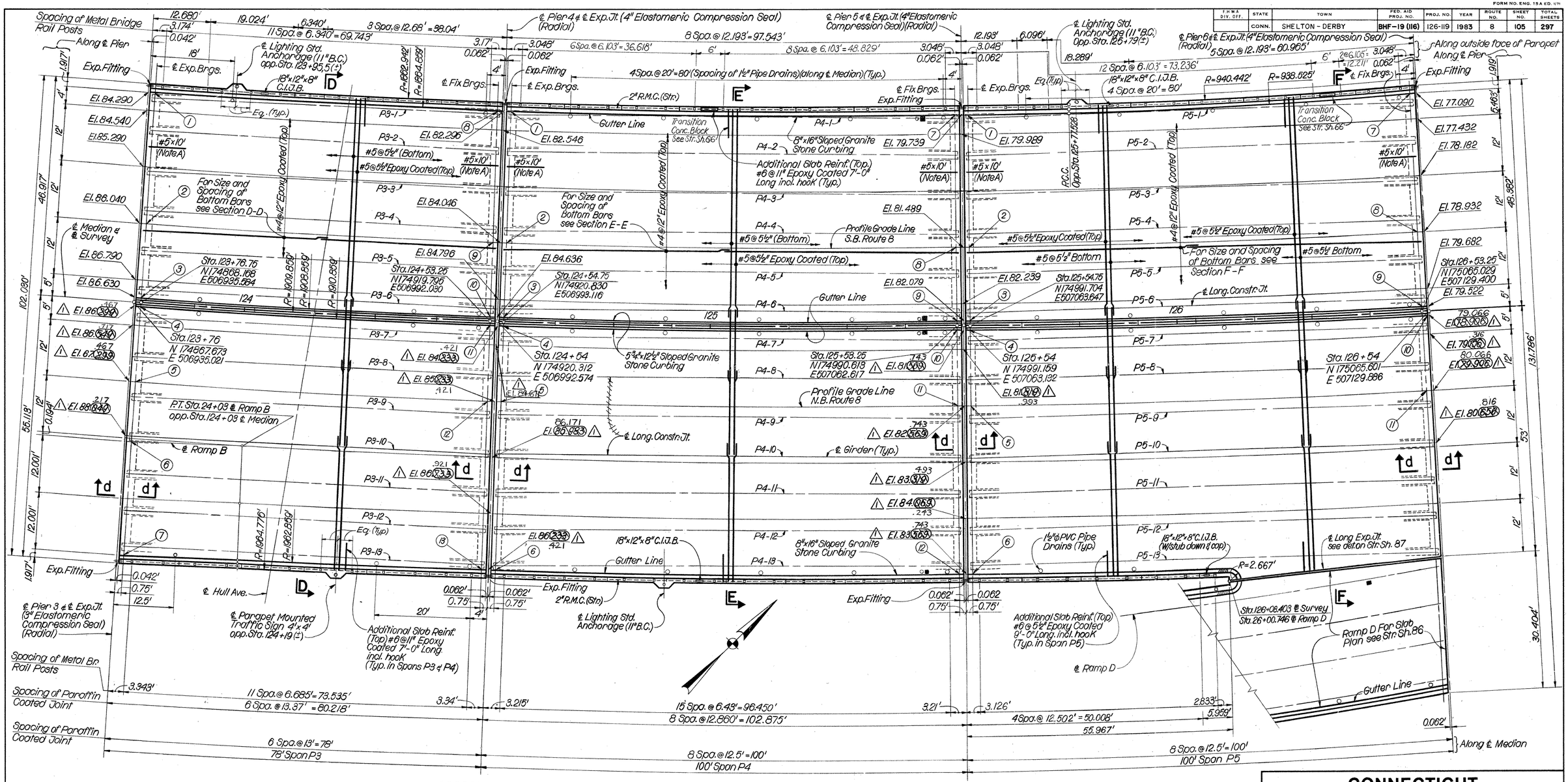
BRUNING 44-131 23530

126-119-36 137

513 01

FORM NO. ENG. 15A ED. 1/71

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19 (116)	126-119	1983	8	105	297



NOTE A:
Place additional #5x10' Epoxy Coated bars midway btwn. top longit. bars and #5x10' bars midway btwn. bottom longit. bars at both ends of slab.

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

NOTES:

For General Notes see Structure Sheet 2.
For Sections D-D, E-E and F-F see Str. Sheets 70 & 71
For Miscellaneous Details see Str. Sheet 89
For Scupper Details see Str. Sheet 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

THIS SHEET CORRECTED

SLAB PLAN SPANS P3, P4 & P5

SCALE: 1"=10'-0"

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPANS P3, P4 & P5

NO.	DATE	REVISIONS DESCRIPTION
1	7/86	Elevations N. Bd. Slab

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11-23-82
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 61 OF 135

513 01

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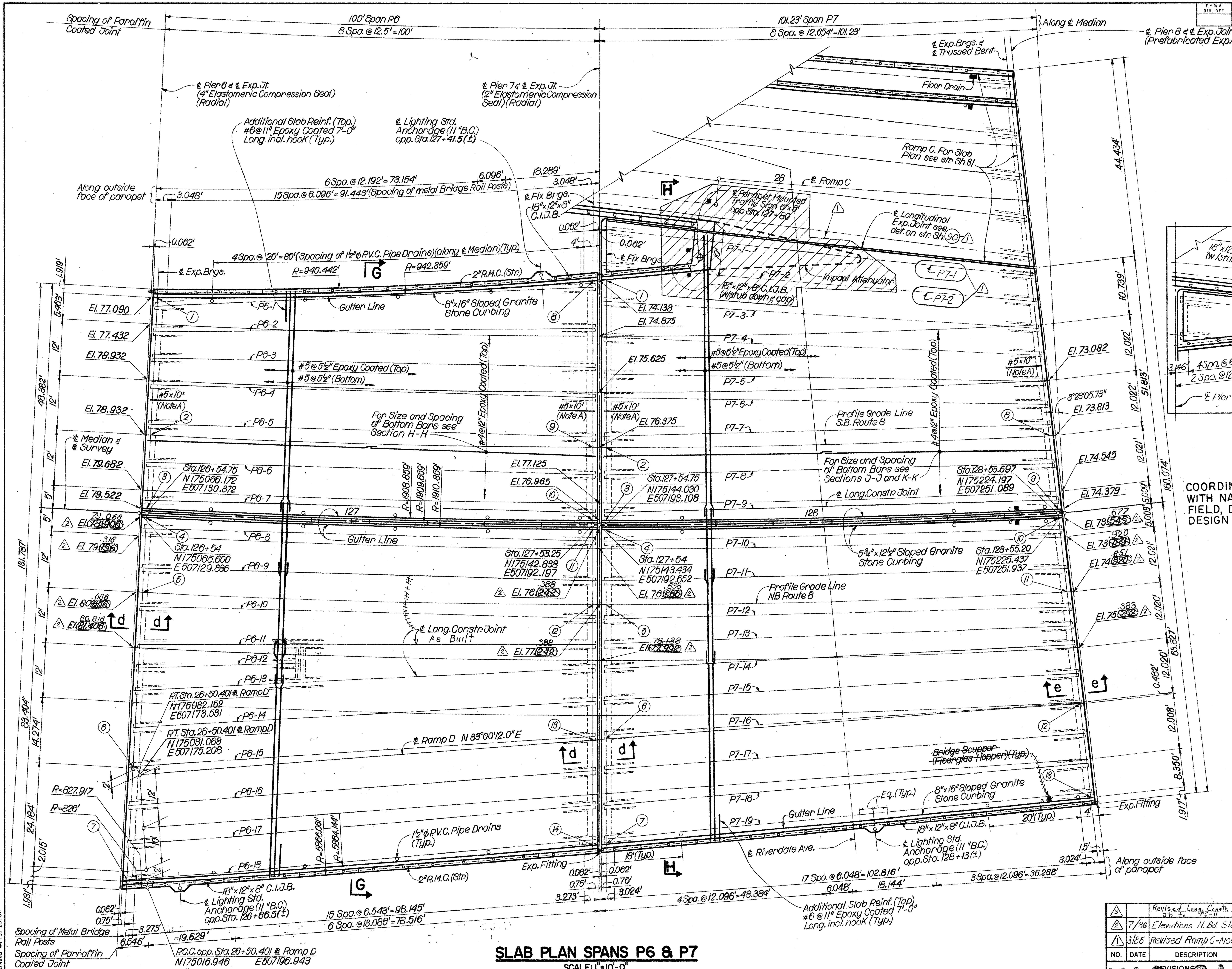
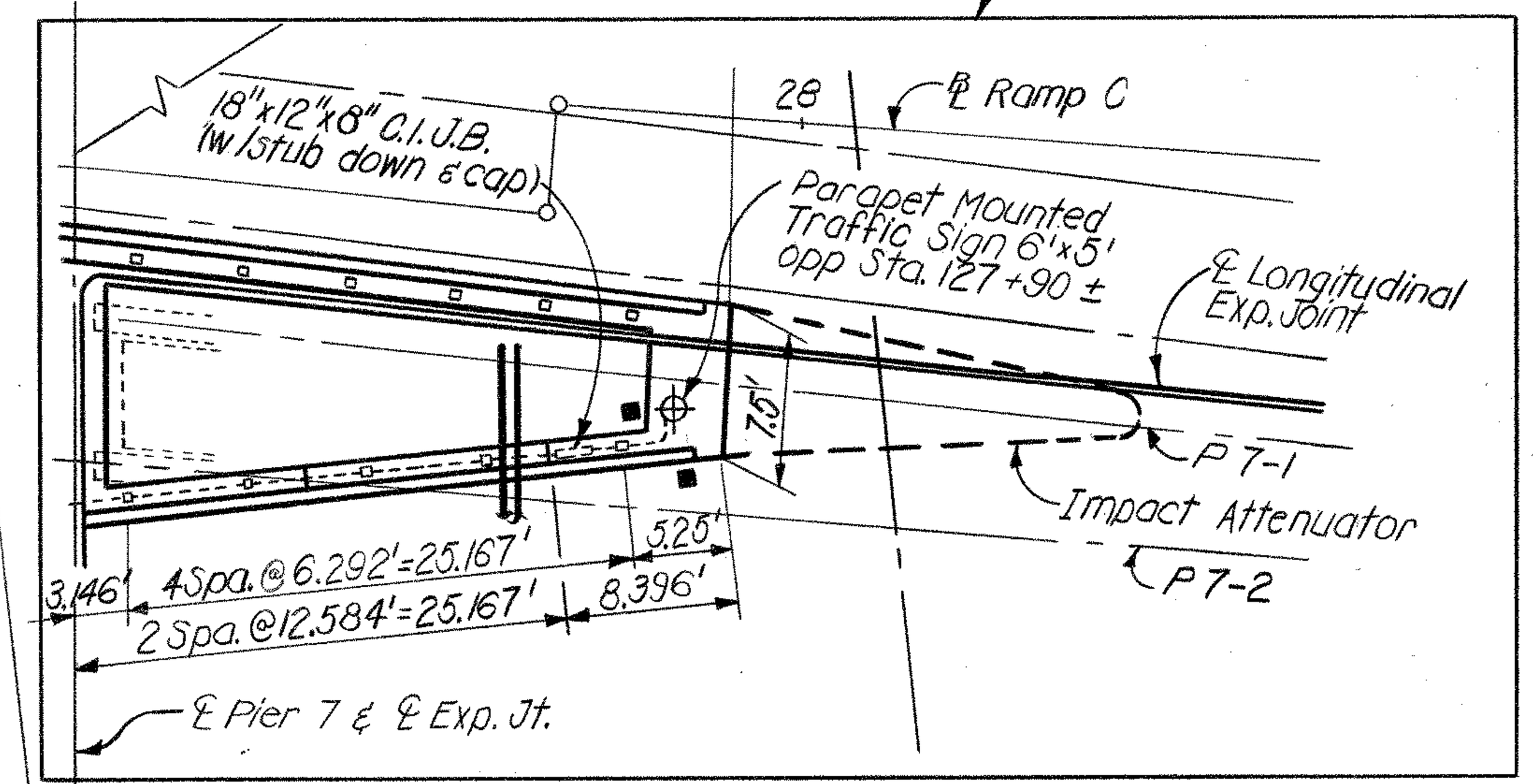
BRUNING 44-131 23530

126-119-86 137

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	106	297





NOTE A: Place additional #5x10' Epoxy Coated bars midway btwn. top longit. bars and #5x10' bars midway btwn. bottom longit. bars at both ends of slab.

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

NOTES:

For General Notes see Structure Sheet 2
For Sections G-G and H-H see Str. Sheet 71 & 72
For Miscellaneous see Str. Sheet 69
For Scupper Details see Str. Sheet 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

THIS SHEET CORRECTED

SLAB PLAN SPANS P6 & P7

SCALE: 1" = 10'-0"

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPANS P6 & P7

NO.	DATE	DESCRIPTION
3		Revised Long. Constr. Jt. to "P6-11"
2	7/86	Elevations N. Bd. Slab
1	3/85	Revised Ramp C-Nose

REVISIONS

ENGINEER: FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED: [signature] DATE 11/23/82
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 62 OF 135

126-119-36 137

513 01

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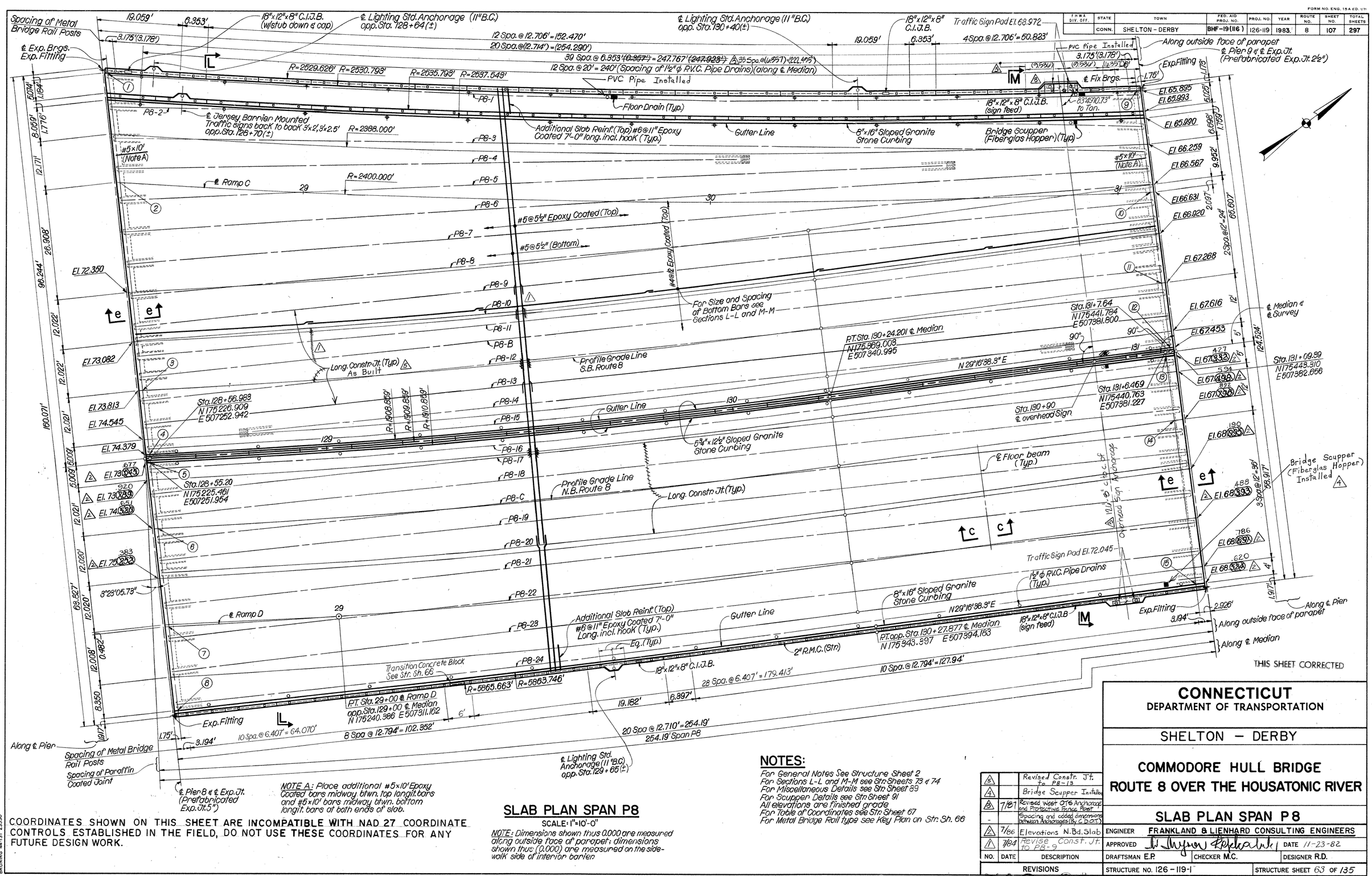
FORM NO. ENG. 15A ED. 1/71

FHWA DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON – DERBY	BHF-19(116)	126-119	1983	8	107	297



NOTE A: Place additional #5x10' Epoxy Coated bars midway btwn. top longit. bars and #5x10' bars midway btwn. bottom longit. bars of both ends of slab.

SLAB PLAN SPAN P8

SCALE: 1"=10'-0"

NOTE: Dimensions shown thus 0.000 are measured along outside face of parapet; dimensions shown thus (0.000) are measured on the side-walk side of interior barrier

NOTES:

For General Notes See Structure Sheet 2
For Sections L-L and M-M see Str. Sheets 73 & 74
For Miscellaneous Details see Str. Sheet 89
For Scupper Details see Str. Sheet 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

THIS SHEET CORRECTED

NO.	DATE	DESCRIPTION
E		Revised Constr. Jt. to P8-13
A		Bridge Scupper Installed
B	7/87	Revised West OTS Anchorage and Protective Fence Post
-		Spacing and added dimensions between Anchorages (By C.D.O.T.)
A	7/86	Elevations N.Bd. Slab
A	7/84	Revise Const. Jt. to P8-9

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPAN P8

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11-23-82
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 63 OF 135

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

BRUNING 44-131 23530

126-119-36 137

513 01

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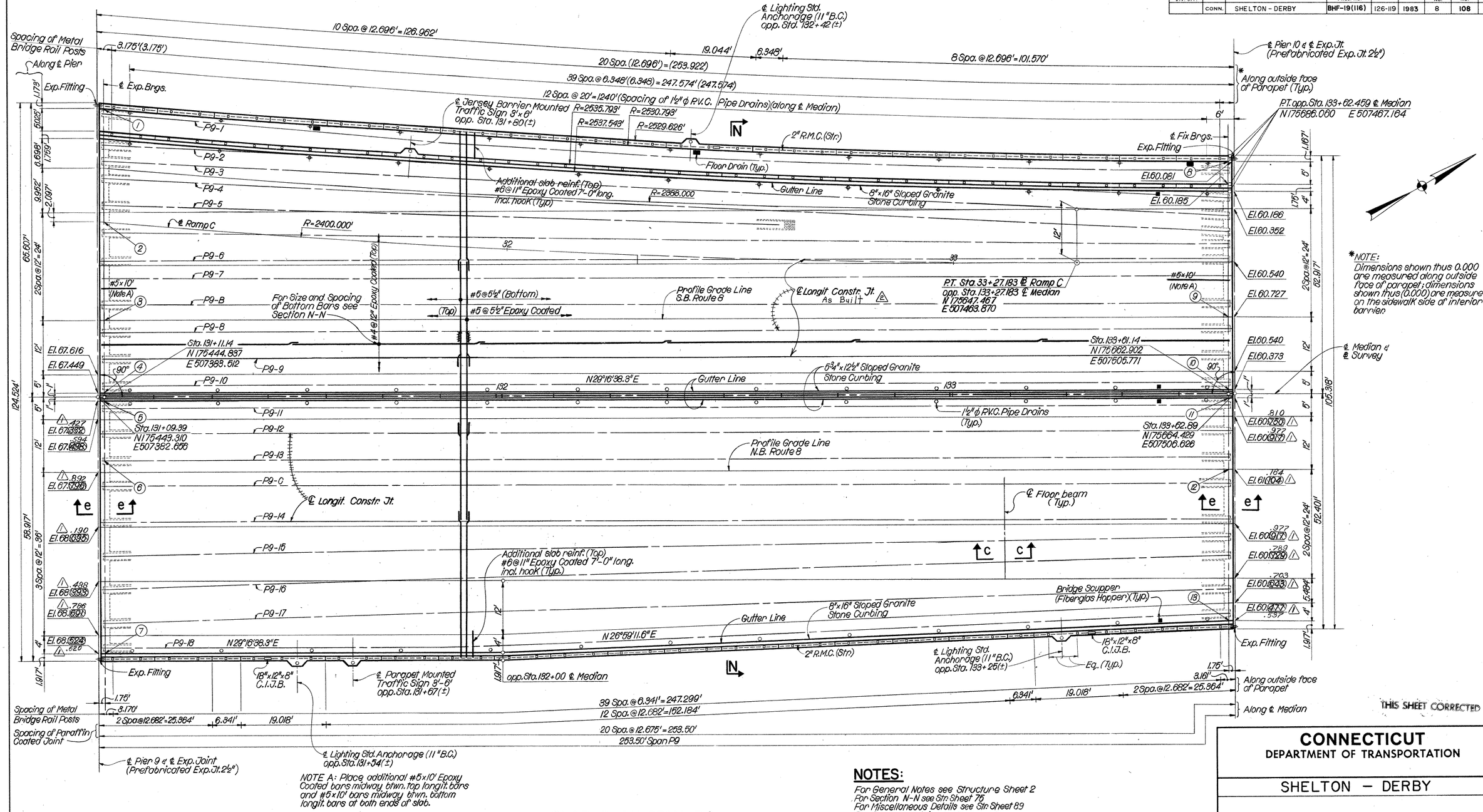
FORM NO. ENG. 15A ED. 5-71

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON – DERBY	BHF-19(116)	126-119	1983	8	108	297



*NOTE:
Dimensions shown thus 0.000 are measured along outside face of parapet; dimensions shown thus (0.000) are measured on the sidewalk side of interior barrier.

SLAB PLAN SPAN P9
SCALE: 1"=10'-0"

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27

COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

NOTES:

For General Notes see Structure Sheet 2
For Section N-N see Str. Sheet 75
For Miscellaneous Details see Str. Sheet 89
For Scupper Details see Str. Sheet 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

THIS SHEET CORRECTED

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPAN P 9

NO.	DATE	DESCRIPTION
2		Revised Long. Constr. Jt. to P9-9
1	7/86	Elevations N. Bd. Slab

REVISIONS

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/1982
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 64 OF 135

513 01

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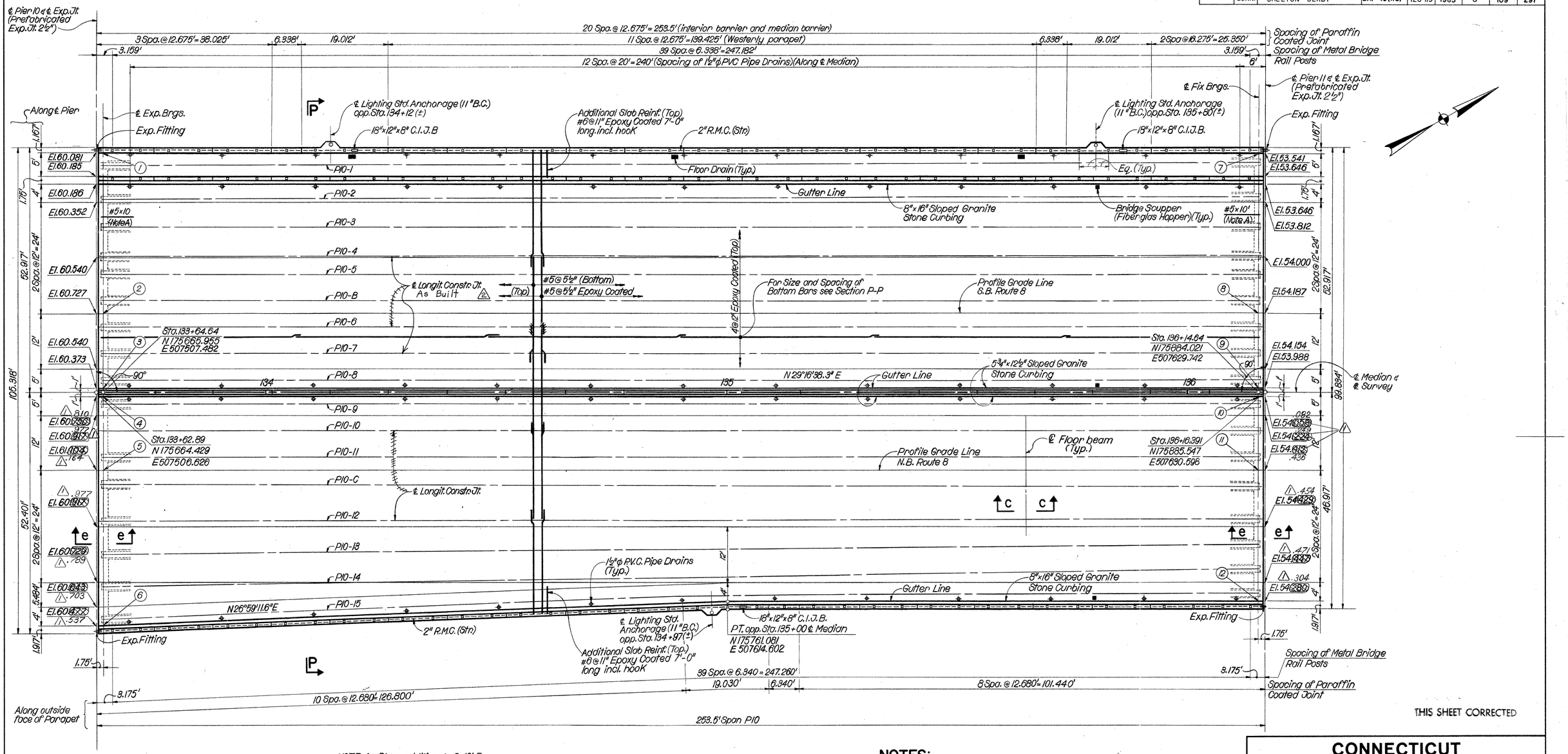
BRUNING 44-131 23530

FORM NO. ENG. 15 A ED. 1/71

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	109	297



NOTE A: Place additional #5x10' Epoxy Coated bars midway btwn. top longit. bars and #5x10' bars midway btwn. bottom longit. bars at both ends of slab.

SLAB PLAN SPAN P10

SCALE: 1"=10'-0"

NOTES:

For General Notes see Structure Sheet
For Section P-P see Str. Sheet 76
For Miscellaneous Details see Str. Sheet 89
For Scupper Details see Str. Sheet 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK

THIS SHEET CORRECTED

NO.	DATE	REVISIONS
2		Revised Long. Constr. Jt. to P10-7
1	7/86	Elevations N. Bd. Slab

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPAN P10

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN E.P CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 65 OF 135

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BRUNING 44-131 23530

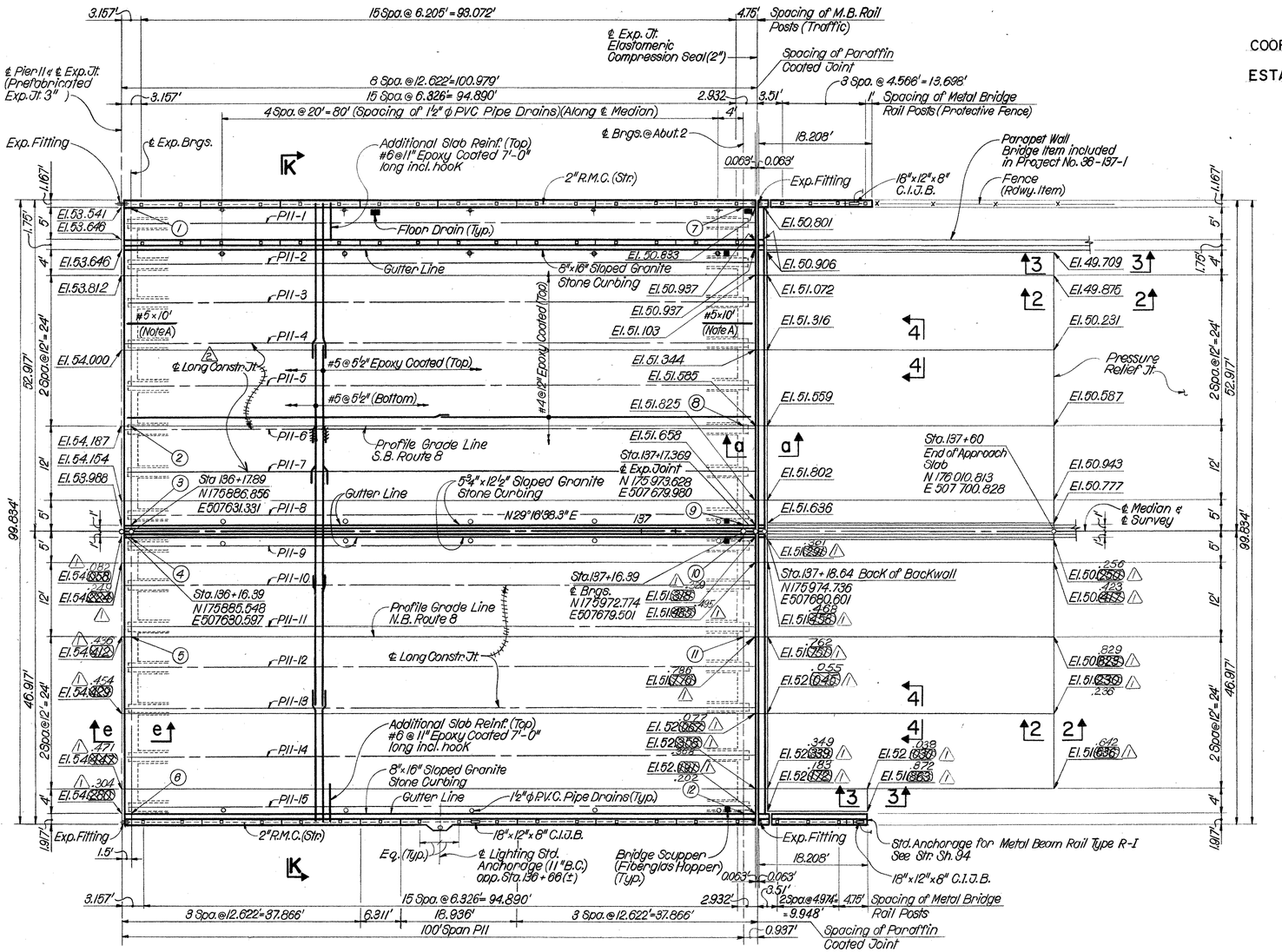
126-119-36 137

513 01

FORM NO. ENG. 15A ED. 1/71

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	110	297

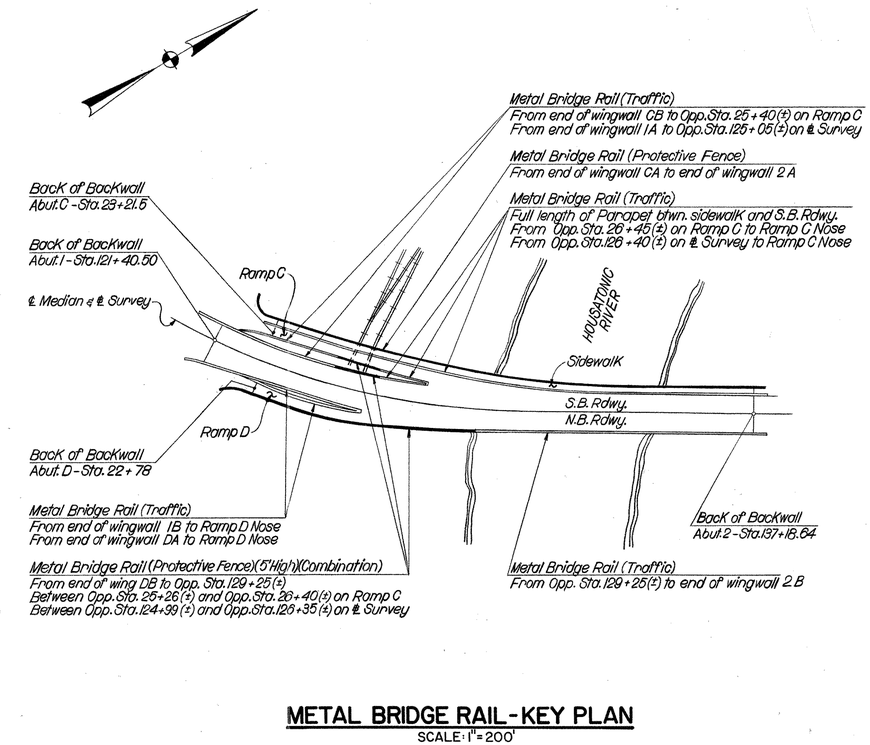
COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.



NOTE A: Place additional #5x10' Epoxy Coated bars midway btwn. top longit. bars and #5x10' bars midway btwn. bottom longit. bars at both ends of slab.

SLAB PLAN SPAN P11

SCALE: 1"=10'-0"

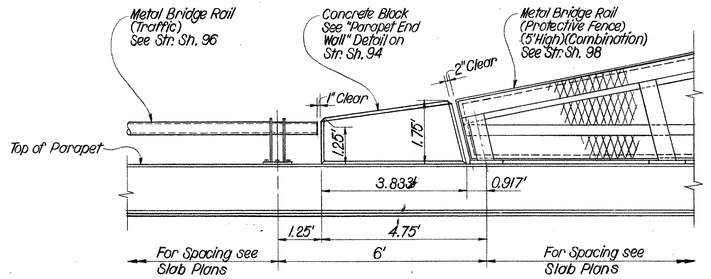


METAL BRIDGE RAIL - KEY PLAN

SCALE: 1"=200'

NOTES:

For General Notes see Structure Sheet 2
For Section K-K see Str. Sheet 72
For Miscellaneous Details see Str. Sheet 89
For Scupper Details see Str. Sh. 91
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66



METAL BRIDGE RAIL TYPICAL TRANSITION DETAIL

Scale: ½" = 1'-0"

THIS SHEET CORRECTED

NO.	DATE	REVISIONS
2		Revised Long. Constr. Jt. to P11-7
1	7/86	Elevations N. Bd. Slab

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON - DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPAN P11

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 66 OF 135

BRUNING 44-131 23530

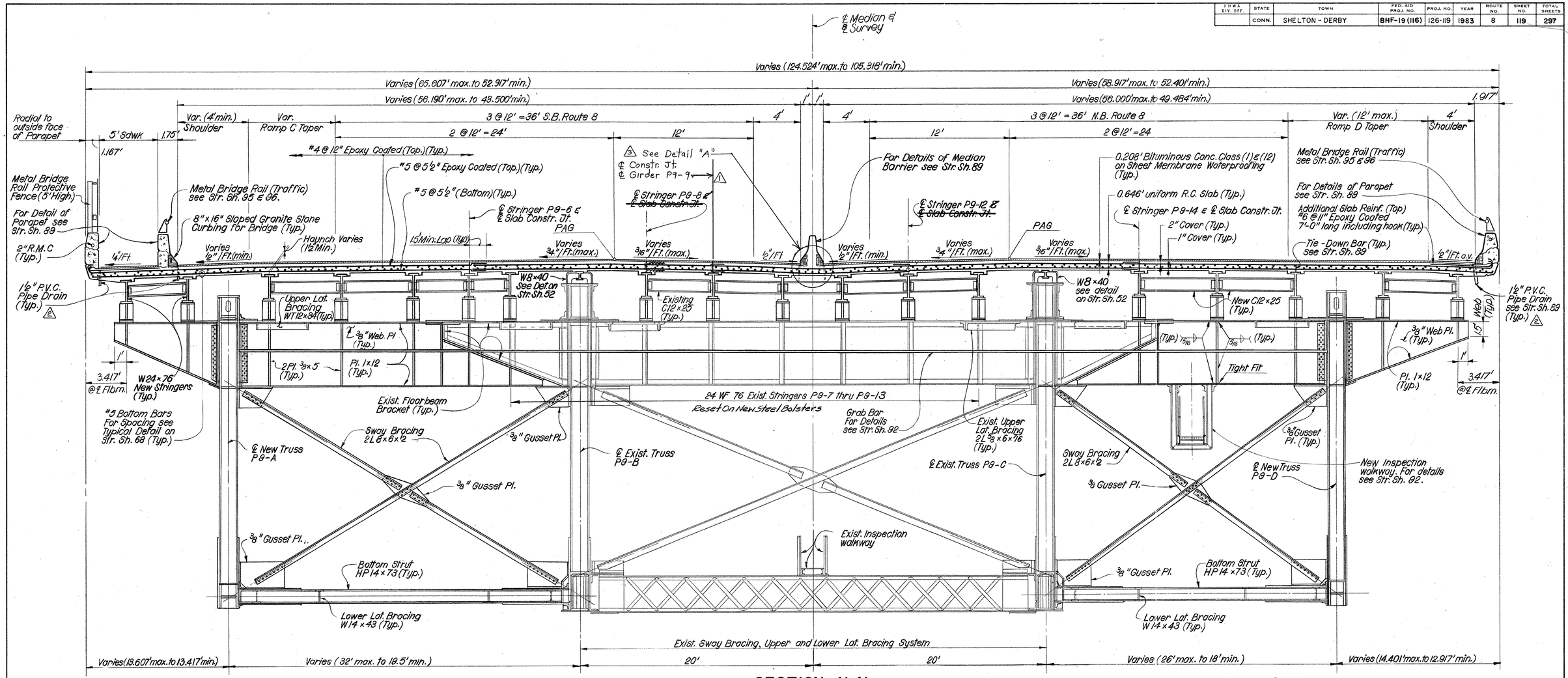
126-119-86 185

513 01

110

FORM NO. ENG. 15 A ED. 1/71

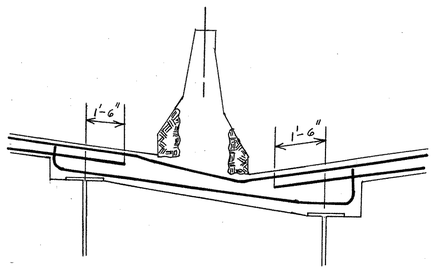
F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19 (116)	126-119	1983	8	119	297



SECTION N-N

Scale: 4" = 1'-0"

NOTE: PAG denotes Point of Application of Grade.



DETAIL A ③

Revised Median Haunch Reinforcement

N.T.S.

NOTES:

For General Notes see Str. Sh. 2.
For Framing Plan Span P9 see Str. Sh. 38
For Slab Plan Span P9 see Str. Sh. 64.
For Typical Floorbeam and Bracket Details see Str. Sh. 82.
For Slab Details see Str. Sh. 68

THIS SHEET CORRECTED

NO.	DATE	DESCRIPTION
③		Detail "A"
②	5/87	Revision in Standards for PVC Pipe
①		Revised Long. Constr. Jt. to P9-9

REVISIONS

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

CROSS SECTION - SPAN P9

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN G.T. CHECKER R.D. DESIGNER E.S.
STRUCTURE NO. 126 – 119 – 1 STRUCTURE SHEET 75 OF 135

BRUNING 44-131 23550

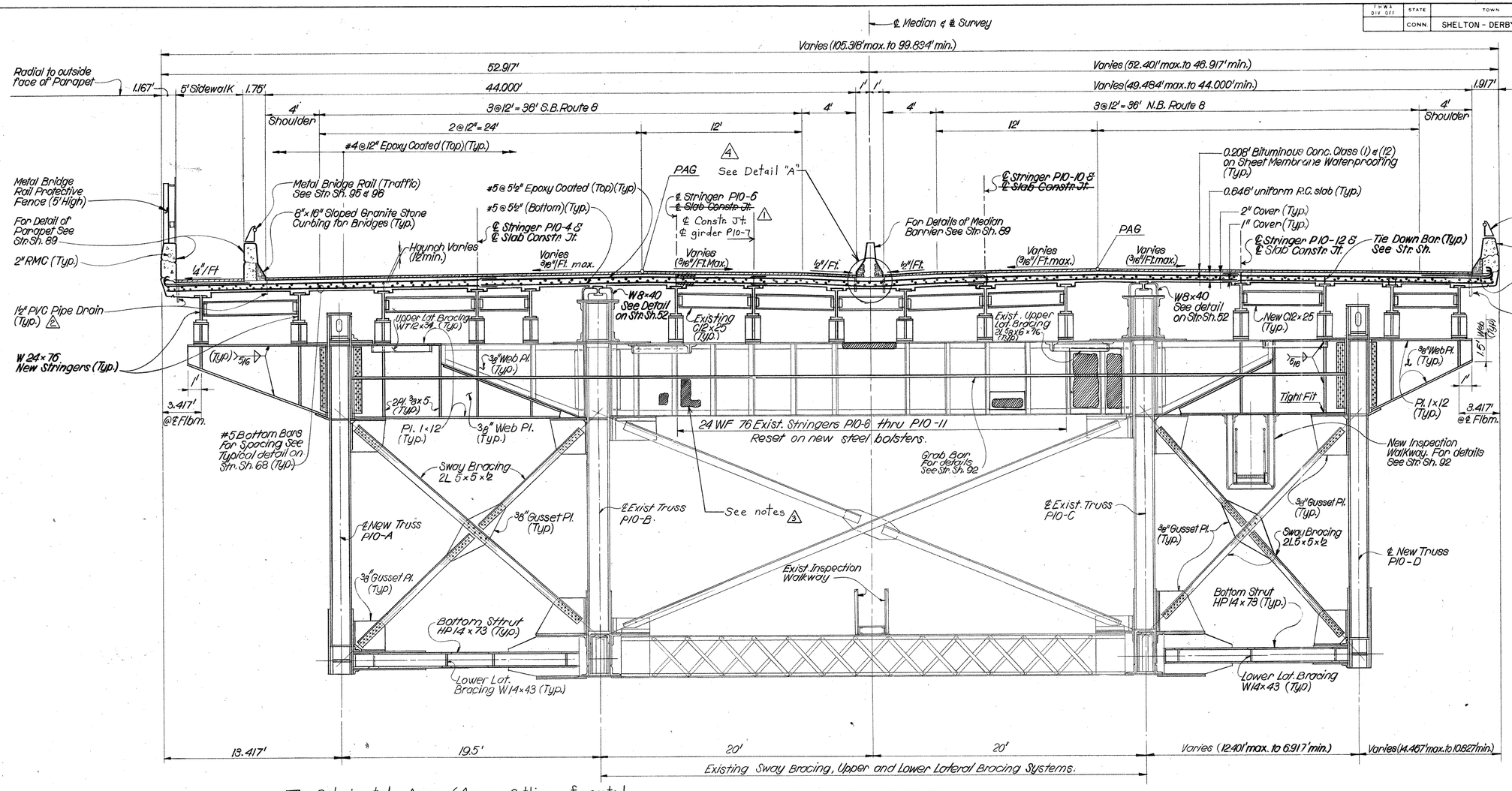
126-119-36 137

513 01

119

FORM NO. ENG. 15A ED.

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON - DERBY	BHF-19(116)	126-119	1983	8	120	297

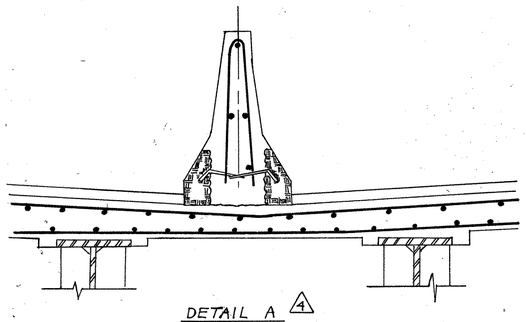


3 Deteriorated Areas (Approx. Outline of rusted Area)
For FLBM F10 Only. Rusted areas shown are on north elev. of FLBM, web repair pl.'s on south elevation.

SECTION P-P

Scale: ¼" = 1'-0"

Note: PAG denotes Point of Application of Grade



DETAIL A 4

Reinforcement at Median Barrier Wall

NOTES:

For General Notes See Str. Sh. 2
For Framing Plan Span P10 See Str. Sh. 39
For Slab Plan Span P10 See Str. Sh. 65
For Typical Floorbeam and Bracket Details See Str. Sh. 52
For Slab Details See Str. Sh. 68

3 Repairs on heavily rusted areas made by grinding, removing rivets, installing 7/8" ϕ H.S. bolts where required, field drilling holes, and installing plates and shims as required.

THIS SHEET CORRECTED

NO.	DATE	REVISIONS
4		Detail "A"
3		Repair work on FLBM 10
2	5/87	Revised Standards for PVC Pipe
1		Revised Long. Constr. Jt. to P10-7

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

CROSS SECTION SPAN P10

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN GT CHECKER R.D. DESIGNER M.O.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 76 OF 135

BE-ANNG 44-31-235C

126-119-86 187

513 01

FORM NO. ENG. 15A ED. 1/71

F.H.W.A. DIV. OFF.	STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
	CONN.	SHELTON – DERBY	BHF-19(116)	126-119	1983	8	136	297

2 Provide a permanent end Closure for the Existing Inspection Walkway when the Existing Navigation Lights are no longer needed (Typ.)

New Channel Margin – 180° Red Navigation Light Opp. Sta. 129+88.83 (2) 83.86

New Channel Centr – 360° Green Navigation Light Opp. Sta. 130+32.41 (2)

New Channel Margin – 180° Red Navigation Light Opp. Sta. 130+83.86 (2)

℄ Pier 8

℄ Pier 9

℄ Pier 10

℄ Pier

SHELTON-FAIRFIELD CO. DERBY-NEW HAVEN CO.

HOUSATONIC RIVER (TIDAL)

Ebb Flow

1 New Inspection Walkways to be similar to Details shown on this Dwg. Cut and Remove Exist. Railing as required to provide access to the New Insp. Walkway.

New Inspection Walkway

Exist. Navigation Lights to Be Removed

Existing Walkway (See Sht. 125-1)

129 130 131 132 S.B. Route 8 133 134 ℄ Median & ℄ Survey 135 136

Sta. 128+55.20

Sta. 131+09.39

N.B. Route 8

Sta. 133+62.89

Sta. 136+16.39

New Inspection Walkway

New Channel Margin – 180° Red Navigation Light Opp. Sta. 129+83.31 (2) 36.31

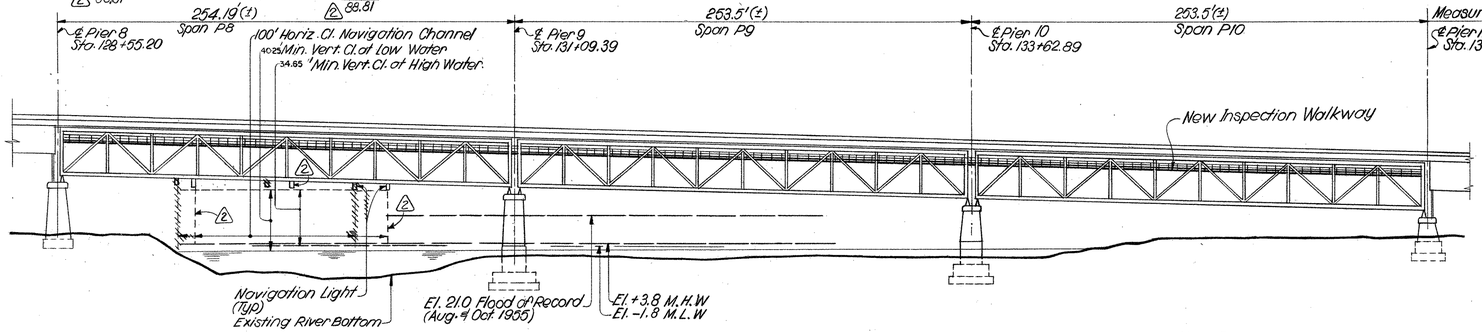
New Channel Center – 360° Green Navigation Light Opp. Sta. 129+88.81 (2)

New Channel Margin – 180° Red Navigation Light Opp. Sta. 130+41.73 (2)

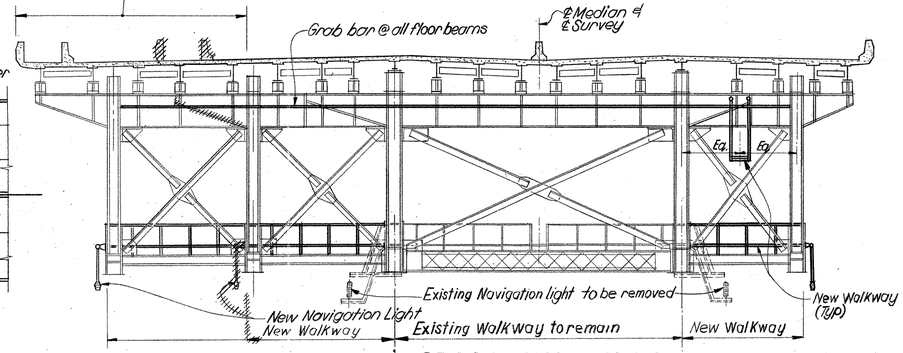
Town Line and County Line

PLAN

Scale 1"=40'



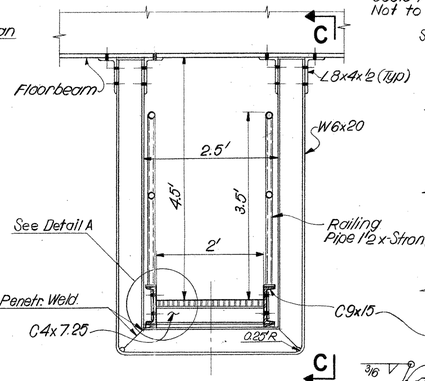
1 Section Widened to Show Additional New Truss

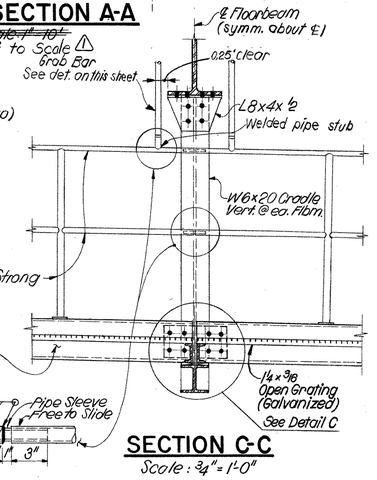


CROSS SECTION A-A

~~Scale 1"=10'~~ 1 Not to Scale

Grab Bar See det. on this sheet





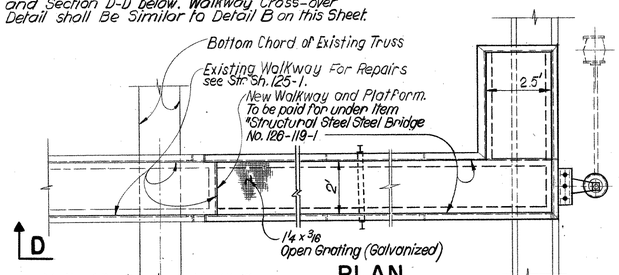
SECTION B-B

Scale: ¾" = 1'-0"

SECTION C-C

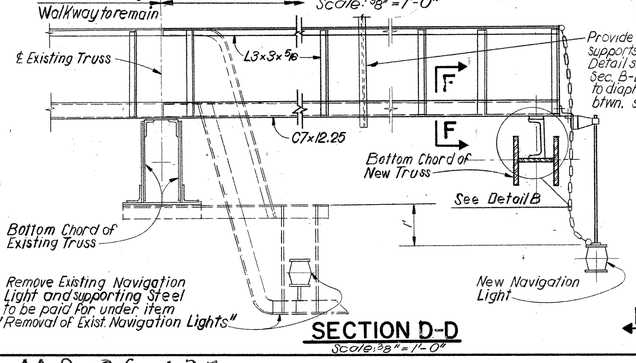
Scale: ¾" = 1'-0"

⚠ NOTE: New Truss P8A-2 is not Shown in Plan and Section D-D below. Walkway Cross-over Detail shall Be Similar to Detail B on this Sheet.



PLAN

Scale: ⅜" = 1'-0"

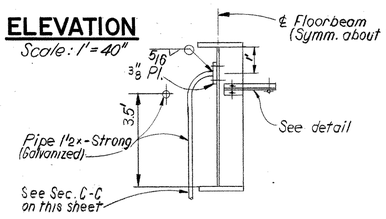


SECTION D-D

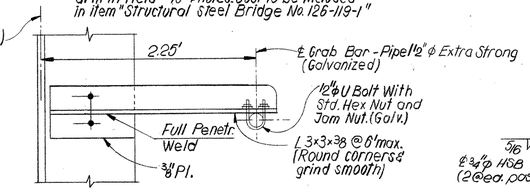
Scale: ⅜" = 1'-0"

ELEVATION

Scale: 1" = 40"

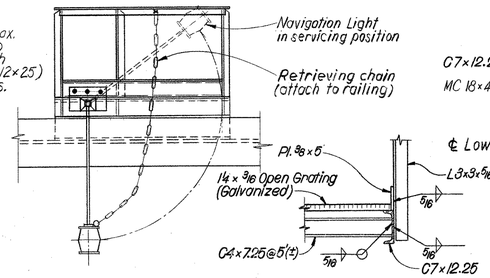


Note: For connection to exist. Fibm. Stiffeners drill in Field 15/16" ϕ holes. Cost to be included in Item "Structural Steel Bridge No. 126-119-1"



GRAB BAR DETAILS

Scale ⅜" = 1'-0" & ½" = 1'-0"

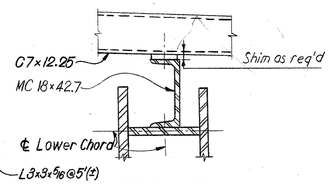


SECTION E-E

Scale: ⅜" = 1'-0"

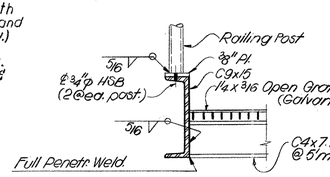
SECTION F-F

Scale ¾" = 1'-0"



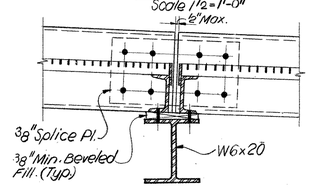
DETAIL-B

Scale ¾" = 1'-0"



DETAIL-A

Scale 1½" = 1'-0"



DETAIL-C

Scale 1½" = 1'-0"

NOTES:

For General Notes See Str. Sh. 2

The Contractor is permitted to use ASTM-A36 steel in lieu of ASTM-A588 steel for all elements detailed on this sheet.

All galvanized steel called for on this sheet shall conform to ASTM-A123.

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

NAVIGATION LIGHTS AND INSPECTION WALKWAY.

NO.	DATE	DESCRIPTION
2	6/85	Navigation Lights Location
1	7/84	Add New Truss P8A-2

REVISIONS

ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED [signature] DATE 11/23/82
DRAFTSMAN C.M. CHECKER R.D. DESIGNER M.O.
STRUCTURE NO. 126 – 119 – 1 STRUCTURE SHEET 92 OF 135

BRUNING 44-131 23530

126-119-36-137

513.01

136

Appendix C: Bridge Safety and Inspection Report

STATE OF CONNECTICUT
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

INSPECTION REPORT TRANSMITTAL FORM
FORM BRI-27, REV. 9/97

STRUCTURE NO. 0571A TOWN Shelton

Inspectors ZM, BNS, JCW, AS, MAA, EA, SH Date 9/23/2013

TABLE OF CONTENTS

Loose forms (not bound in report)	No. of Sheets Enclosed
Maintenance Memo	4
Flagging Memos	
Plan Sheets 36-37 (1948) Check here if already on file ☑	
126-119 (1983)	

Bound Report Pages	Sheet Numbers
Title Cover Sheet	1
Table of Contents	2
Location Map	3
Executive Summary and Section Loss Tables	4-19
BRI - 19, HWY Bridge SI&A Form	20-21
BRI - 25, Under Entry SI&A Form	22
BRI - 18, Bridge Inspection Form	23-39
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Field Notes (Include Forms BRI-10, BRI-13, BRI-15 & BRI-16)	42-342
Calculations:	
Load Rating Evaluation	
Quantities & Cost Estimates	
Photo Sheets	343-422
PONTIS Element Data Collection Form	423-424

HAKS

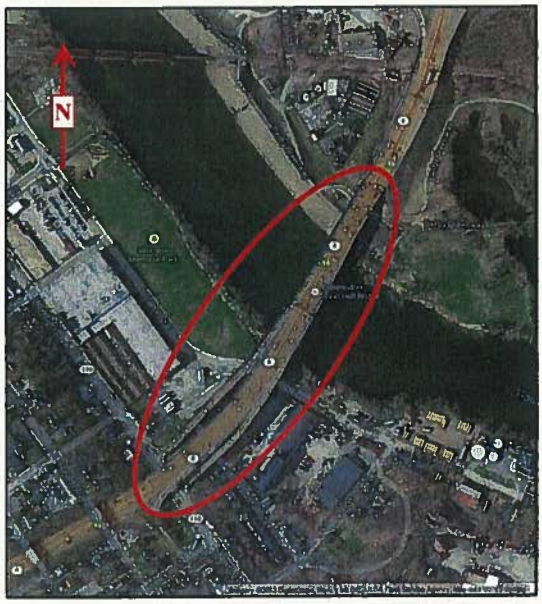
BRIDGE SAFETY INSPECTION
STATE PROJECT NO. 170-3224

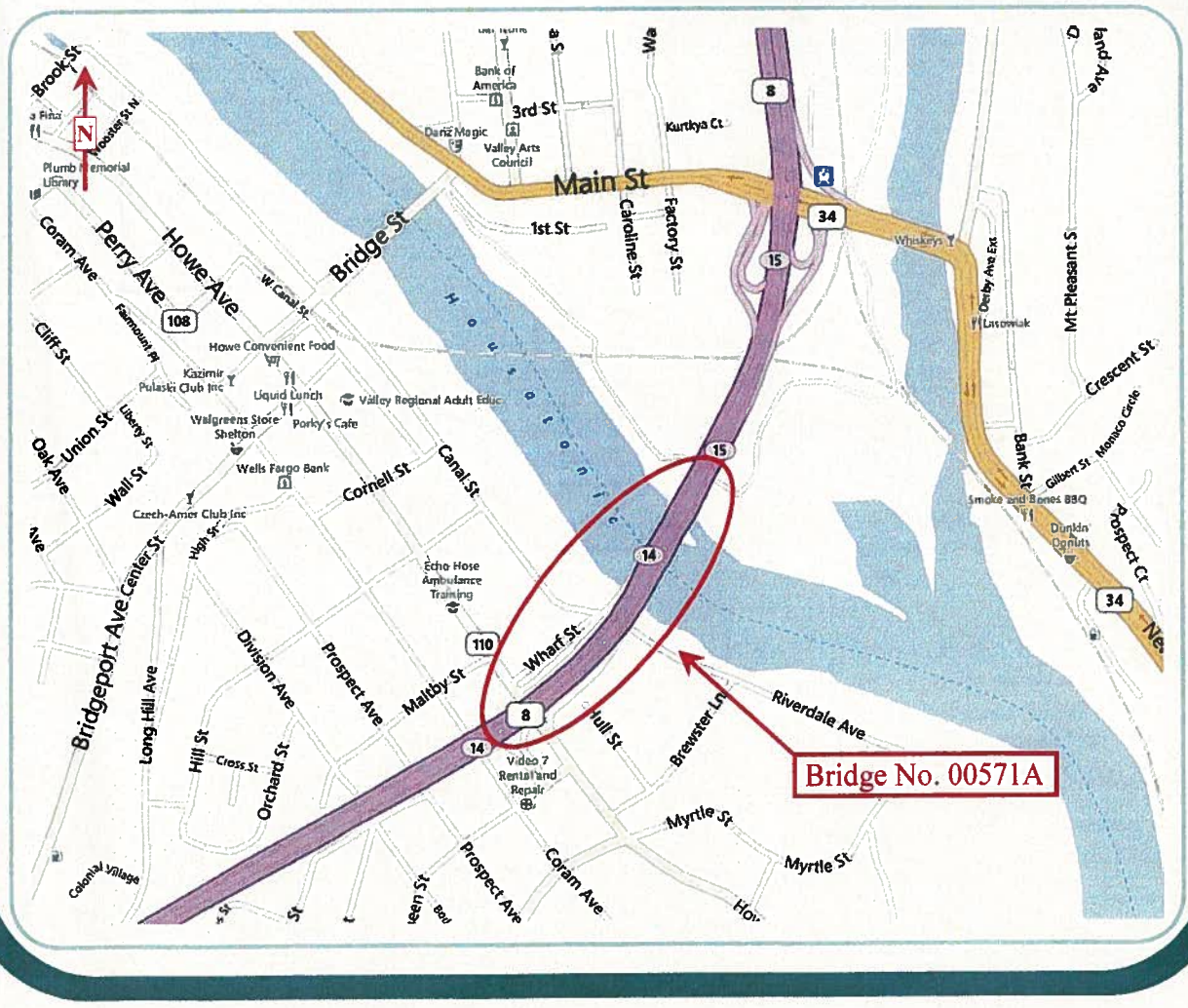
LOCATION MAP & AERIAL VIEW

Bridge No.	00571A
Bridge Name	Commodore Hull
Town:	Shelton
Mile Point:	12.28
Latitude:	41° 18' 44.50" N
Longitude:	73° 05' 20.40" W

Feature Carried: Route 8

Feature Crossed: Housatonic River
Route 110 & Local
Roads





PROJECT No. 170-3224 **BRIDGE No. 00571A**

EXECUTIVE SUMMARY

Bridge No. 00571A (Commodore Hull) was built in 1951 and rehabilitated in 2010. It carries Route 8 over Route 110, the Housatonic River and local roads in the town of Shelton. This twelve span bridge consists of nine steel multi-girder system approach spans and three steel deck truss/floorbeam/stringer main spans that are composite with a reinforced concrete deck and supported by reinforced concrete abutments and piers. The curb-to-curb roadway width is 88 feet and the overall length of the bridge is 1,578 feet. As per information in the Connecticut Department of Transportation files, the Inventory Rating for an AASHTO HS20 loading is 39.2 Tons. During this routine inspection completed in November 2013, the bridge was found to be in serious condition.

Due to significant section loss to webs, flanges, gusset plates and steel pier bents at or near critical areas, a new superstructure load rating analysis and substructure load rating analysis is recommended for this structure.

Deck

The deck is in satisfactory condition.

1. The anodized aluminum bridge fence mounted to the west parapet in Spans 5-6 and 9-12 and to the east parapet in Spans 7-9 has random areas of impact damage with dents and tears/openings in the mesh typically less than 1 foot wide. The mesh is secure but has loose sections (when pulled). Span 7, east fence has an approximately 40 foot long section of extensive damage to the mesh. There are several tears with openings up to full height by up to 2 feet wide. Span 11, west fence mesh along the sidewalk has a tear with a 4 foot high by up to 1 foot wide opening.
2. Random PVC weep pipes in Spans 6-12 are short/broken and are draining onto the superstructure and substructure elements causing deterioration. Median weep pipes are draining onto secondary members and catwalks causing extensive corrosion.
3. Scupper grates are clogged up to 100% at the following locations: Span 5, Southbound left shoulder; Span 8, Southbound right shoulder; and Span 9, Northbound right shoulder. The west sidewalk floor drains in Span 10 are fully clogged/covered with sand and debris.
4. Scupper pipes are clogged/cracked and are draining onto the structural steel causing deterioration at the following locations:
    - Span 9, North side of FB9, between S1 and S2 - leaking onto S2.
    - Span 9, South side of FB9, between S15 and S16 - leaking onto FB9.
    - Span 10, North side of FB9, between S1 and S2 - leaking onto FB9.
    - Span 11, South side of FB9, between S8 and S9 - cracked and leaking onto FB9.
    - Span 11, South side of FB9, East cantilever - leaking and appears clogged.
    - Span 12, East side of G9 - leaking onto G9.
5. East parapet lighting standards in Spans 10 and 11 have dents up to 2 feet high by 8 inches wide by 3 inches deep. Span 8, East parapet junction box has a plywood cover. Span 9, East parapet junction box near Pier 9 has a broken cover with exposed wires that are protruding from the opening. Northeast approach parapet junction box cover is broken with exposed wires and the white wire has damaged insulation.
6. Asphaltic plug joints at Piers 1-7 and at both abutments have isolated adhesion and cohesion cracks in the shoulders up to 3 feet long and open up to 1/8 inch wide. Random areas of active leakage were noted below during the inspection.

7. Longitudinal strip seal joint in Span 6 (Northbound side) was not replaced and was mostly filled with sand and debris during this inspection. Twenty feet of missing seal was noted in previous inspections but was not visible due to sand and debris accumulation. There is evidence of leakage at the underside of the joint.
8. West sidewalk joint at Pier 11 is missing a 1 foot long section of the gland and the aluminum hold down panel at Pier 9 joint is vertically misaligned up to 1 inch at one end due to broken/failed anchorages.

Superstructure

The superstructure is in serious condition.

1. Girder rocker bearings in the approach spans have random areas of light to heavy accumulation of debris, areas of peeling paint with light to heavy rust and laminated rust with pitting to 1/4 inch deep. Random bearings have ±1/4 inch pack rust under the rockers and up to 1/2 inch pack rust between the sole plate and rocker. Girder G6 rocker bearing in Span 7 over Pier 6 has a minor gap under the rocker due to pack rust. Girder G1 rocker bearing in Span 6 over Pier 5 has a 3/16 inch high by up to 1-1/2 inch wide gap under the rocker due to pack rust. Most bearings at 51°-65° F are in expansion mode except for bearings in Span 4 at Pier 3, girder G12 in Span 3 at Pier 2, girder G11 in Span 6 at Pier 5 and girder G1, G3, G16 and G18 bearings in Span 7 at Pier 6 which are in contraction mode and girder G1 bearings in Span 3 at Pier 2 and in Span 5 at Pier 4 which are neutral. Random bearings are overexpanded. Anchor bolt nuts have up to 50% section loss.
2. Original truss rocker bearings in Spans 9-11 have heavy laminated rust with up to 1 inch pack rust under the rocker and up to 90% section loss on the anchor bolt nuts. Truss T2 rocker bearing in Span 11 over Pier 10 has a 1/4 inch gap between the east pin and the rocker due to pack rust. Bearings were in expansion mode at 40°-60° F with very minimal changes, if any, and do not appear to be moving freely when compared with the 2011 measurements taken at 60°-80° F. Truss T4 bearing in Span 9 over Pier 8 is overexpanded.
3. Fixed bearings in the approach spans have heavy laminated rust with pitting to 1/4 inch deep, up to 100% section loss on anchor bolt nuts, up to 25% section loss on anchor bolts and isolated loose anchor bolt nuts. Original truss fixed bearings in Spans 9-11 have rosebudding of the anchor bolt nuts with up to 50% section loss and heavy laminated rust on the vertical plates.
4. Stringer bearings in Spans 9-11 have isolated locations with up to 1/2 inch pack rust between the bearing plate and the floorbeam top flange and between the bolster and stringer bottom flange. Random bolster top plates are bent downwards due to the pack rust.
5. Stringer ends in Spans 9-11 over the piers have heavy rust with section loss. Webs have section loss up to 3 feet long by 7-1/2 inches high by 3/16 inch deep (7/16 inch Original) over the bearing area. Bottom flanges have section loss to 3/16 inch remaining. Some of the worst conditions are as follows:
    - Stringer S9 web over FB10 in Span 11 has two perforations up 2-1/2 inches by 1 inch resulting in up to 16.1% web loss for shear and 65.8% web loss for bearing. Bottom flange at this location has section loss to 1/16 inch remaining on the west side with a 1 inch by 1/2 inch perforation, section loss to 1/8 inch remaining on the east side and a ±1 inch loss of width resulting in 72% flange loss (not a critical area).
    - Random stringer webs beyond the bearing have up to 6 inch diameter areas of section loss to paper thin remaining with perforations up to 4 inch diameter.
    - See the Stringer Section Loss Table for locations.

6. Original girders in the approach spans have laminated rust with severe section loss and perforations at random ends. Webs between bearing stiffeners have section loss to paper thin remaining (7/16 inch Original) by up to 8-1/2 inches high with perforations up to 4 inches high by up to full width. Random bearing stiffeners have up to 100% section loss at the bottom 6 inches.
    - **Four** girder ends have between 10% and 25% web loss for shear and **twenty-eight** girder ends have between 5% and 10% web loss for shear.
    - **One** girder end has 81.4% web loss for bearing. **Nine** girder ends have between 50% and 75% web loss for bearing and **twenty-nine** girder ends have between 25% and 50% web loss for bearing.
    - See the Girder Section Loss Summary Sheets for locations.
7. Original girders in the approach spans have random areas of heavy laminated rust with up to 5/16 inch deep by 8 inch wide section loss on the bottom flange at mid-span resulting in 8.7% flange loss. Girders G7 and G8 (median girders) in Spans 4-7 and 12 have an existing bolted repair angle at the girder bottom flanges and lower webs that is discontinuous at web stiffeners (does not improve the overall bending strength). Bottom flanges at these locations have existing section loss, up to 14.6% flange loss. This condition remains the same since the last inspection.
8. Girders G7 and G8 in Span 7 over Pier 7 each have a bearing stiffener that is bowed 1-1/2 inches to the south by up to 1-1/2 feet high. Girder G3 southwest bearing stiffener in Span 6 at Pier 5 is bowed 3/4 inch to the north by 1 foot high. Girder G9 in Span 8 at Pier 7 has a bearing stiffener that is slightly bowed to the north.
9. Floorbeams in Spans 9-11 have heavy rust mainly in the original median bay with up to 1/4 inch deep by 2 inch wide section loss on the bottom flange and an 1/8 inch reduction in width (FB3, Span 9 between S15 and S16 resulting in 17.8% bottom flange loss) and up to 10 inch high by 10 inch wide by 1/8 inch deep section loss on the web (FB6, Span 9 between S15 and S16 resulting in 5.1% web loss). Floorbeam FB0 in Span 9 at Pier 8 has severe section loss with random perforations up to 14 inches long by 2-1/2 inches at the bottom flange south angle horizontal leg between trusses T3 and T4. The most critical section loss is between stringers S15 and S16 resulting in 23.3% bottom flange loss and 4.7% web loss and between stringers S17 and S18 resulting in approximately 25% bottom flange loss. Webs have isolated perforations at the bottom up to 3 inch diameter. The bottoms of web stiffeners have section loss with isolated perforations up to 4 inches high by 4 inches wide. See the Floorbeam Section Loss Table for members with section loss in critical areas.
10. Original truss members have areas peeling paint with light to heavy rust and areas of heavy laminated rust. Bottom chords have random areas of pitting along the top of the top plate up to 7/16 inch deep (Span 9, T4 at Node L1). The bottom chord angle horizontal legs and bottom plates have areas of pitting to 1/16 inch remaining with edge perforations and up to 1/4 inch deep pitting on the vertical leg mostly at the end nodes resulting in 14% loss (Span 10, T3, L0L1 at Node L0). Webs at these locations have areas of pitting to 3/8 inch deep. Impacted rust was noted at random areas between the bottom chord bottom angle horizontal leg and bottom plate up to 2 inches thick, between web and bottom angle vertical leg up to 1 inch thick and between web and top plate ±1/4 inch thick. There is a heavy debris build-up inside random bottom chord nodes with areas of pitting to 5/16 inch deep on top of the bottom plate. The bottom plates at these locations are bent down ±1/2 inch due to impacted rust. Top chords have random areas of heavy laminated rust mainly at the ends, random areas of section loss up to 1/8 inch deep and debris accumulation in the interior of the top chord. There are random locations of up to 1-1/8 inch thick impacted rust between the top chord bottom angle and bottom plate.

11. Original truss diagonals typically have less than 5% section loss near the lower nodes, with up to 5/16 inch deep pitting (Span 11, Truss T2, L0U11). The vertical compression truss members at the end nodes have areas of up to 3/8 inch deep pitting along the top of the bottom vertical gusset plates resulting in 15.6% section loss (Span 9, Truss T4, L10U10). These members inside end nodes L0 and L10 above the bottom chord have laminated rust with section loss to paper thin remaining on the web (0.512 inch original thickness) with perforations up to 2-1/2 inches high by 13 inches wide and the flanges have ±1/8 inch deep section loss resulting in approximately 39.5% loss of cross sectional area (Span 11, Truss T3, L10U10). The bottom chord top plate at these locations has section loss to 1/8 inch remaining with perforations up to 9 inches by 5 inches resulting in <10% loss of cross sectional area (Note: these locations are beyond the center line of the node/bearing - not a critical area).
12. Vertical gusset plates on the original trusses have areas of heavy laminated rust with section loss along the top of the bottom chord and along the bracing horizontal gusset plates. The interior and exterior surfaces **of all gusset plates** have section loss to 7/16 inch deep (3/4 inch original thickness) by up to full width by up to 6 inches high. D-meter readings were also taken showing up to **79% localized section loss** and approximately **40% average section loss** along the full length of the gusset plate. Some of the worst conditions are as follows:
    - D-meter readings were taken at Nodes L0, L2, L4, L6, L8 & L10 along the top of the bottom chord due to heavy pigeon debris inside nodes. The minimum recorded reading was 0.16 inches (Span 10, T3 at Node L4 and Span 11, T3 at Node L8).
    - Span 10, Truss T3 vertical gusset plates at Node L2 (five member node) have the most significant section loss. East gusset plate has section loss up to 7/16 inch deep by full width by up to 4-1/2 inches high on the interior surface and west gusset plate has up to 7/16 inch deep section loss on the interior surface and up to 5/16 inch deep section loss on the exterior surface.
    - The end node vertical gusset plates have section loss to 1/8 inch remaining with isolated perforations up to 1 inch high by 1-1/2 inches long (Span 11, T2, Node L10).
    - See the Bottom Vertical Gusset Plate Section Loss table for locations.
13. Original truss bracing have peeling paint with moderate to heavy rust throughout. There is up to 1-1/2 inch impacted rust between back to back angles and the upper lateral cross bracing has sagged up to 2 inches at random locations. The lower bracing members and the connecting lateral gusset plates that are exposed to drainage have random areas of heavy laminated rust with up to 3/16 inch deep section loss to knife edge and random perforations up to 10 inches by 3 inches. Random lacing bars have up to 100% section loss mainly near the lower catwalk. Sway bracing and transverse struts have peeling paint and up to 1/2 inch impacted rust between back to back angles. The connection plates for the upper and lower lateral and sway bracings have laminated rust with up to 1/4 inch deep section loss and random perforations up to 8 inches by 5 inches in the vertical connection plates (Span 11, T3 at node L9).
14. Rivet heads and bolt heads at original truss members in main spans 9-11 have rosebudding with up to 100% section loss at random locations.
15. Spans 9-11 have missing/broken/sheared bolts at the following locations:
    - 1 (of 4) bolts is broken at the southwest connection between FB10 bottom flange to new truss T5 vertical member in Span 9.
    - 1 sheared off bolt at new truss T5 vertical gusset plate at node L0 in Span 9.
    - 1 missing bolt at FB1 top flange connection to tie plate and horizontal gusset plate at new truss T4 in span 10 at node U5.

- 1 missing bolt at original truss T2 lateral brace gusset plate at the bottom chord connection at node L7 in span 10.
- 1 missing bolt at the vertical gusset plate, Span 10 new truss T4 at node U5.

16. Spans 9-11 have loose bolts/nuts at floorbeam tie plates, floorbeam connections, truss bottom chord and lateral bracing connection plates at the following locations:
    - 1 bolt at FB3 top flange connection to upper lateral brace gusset plate in Span 9 between S18 & S19.
    - 7 (of 13) bolts at the sway bracing diagonal angle connection to vertical plate at node U8, new truss T4 in Span 10.
    - 2 (of 10) bolts at cross brace connection plate to new truss T1 vertical at node U2 in Span 10.
    - 1 bolt at east gusset plate connection to diagonal at new truss T1 at node U3 in Span 10.
    - 4 bolts at FB5 top flange tie plate in Span 11 at the connection to new truss T4.
    - 1 nut at the center gusset plate connection of the bottom lateral brace between original trusses T2 and T3, panel 5 in Span 9.
    - 1 nut at the top lateral brace gusset plate at original truss T4 and FB4 in Span 9.
    - 1 nut at the top gusset plate of the lateral bracing connection to original truss T2 in Span 11 at node L2.
    - Loose erection pins were noted at the following floorbeam connections: FB2, FB4 and FB 9 in Span 9; FB4 & FB5 in Span 10; and FB0, FB1 & FB8 in Span 11.
17. Approach Spans 1-8 & 12 have several cracks in secondary structural members at the following locations:
    - 1 inch long vertical hairline crack in the stiffener weld to girder G15 web in Span 1, at the bottom of the second intermediate diaphragm from the south abutment (No change since the last inspection).
    - Full height through crack on the bottom of "T" member end at the second intermediate diaphragm from Pier 5 at girder G8 in Span 6.
    - The fourth intermediate diaphragm from Pier 11 at girder G13 in Span 12, Bay 12 has a disconnected lower "T" section from the stiffener.
    - The third intermediate diaphragm from pier 11 at the east side of girder G11 in Span 12 has a full depth by full height through crack on the lower "T" section.
    - S13 bolster at FB9 and FB10 in Span 11 has undercut and cracked welds at the top and bottom of the stiffening plate (< 6 inches long).
18. Main spans have tack welds throughout the nodes of new trusses T1, T2 & T5 in Span 9 and T1 & T4 in Spans 10 & 11. Tack welds between filler plates or between truss members and filler plates are cracked at the following locations:
    - U4L4 at node L4, truss T5 in span 9 – 1 tack weld
    - U4L4 at node L4, truss T5 in span 9 – 1 tack weld
    - U5L6 at node L6, truss T5 in span 9 – 1 tack weld
    - U5L6 at node L6, truss T1 in span 10 – 2 tack welds
    - U5L6 at node U5, truss T1 in span 10 – 5 tack welds
    - U3L4 & U5L4 at node L4, truss T1 in span 10 – 2 tack welds
    - U3L4 at node L4, truss T4 in span 10 – 1 tack weld
    - U5L6 at node L6, truss T4 in span 10 – 3 tack welds
    - U9L8 at node L8, truss T4 in span 10 – 1 tack weld
    - U5L5 at node U5, truss T4 in span 10 – 1 tack weld
    - U6L6 at node L6, truss T4 in span 10 – 2 tack welds

- U5L6 at node L6, truss T1 in span 11 – 1 tack weld
- U3L4 at node L4, truss T4 in span 11 – 3 tack welds
- U1L2 at node L2, truss T4 in span 11 – 2 tack welds

19. Access ladders to the lower inspection catwalks in the original trusses are not furnished with OSHA approved cage protection. Additionally the access ladder at pier 11 is near a park walkway and accessible to intruders.
20. The lower catwalk members in Spans 9-11 typically have areas of heavy laminated rust especially below weep pipes locations. There are random areas of section loss typically up to 1/8 inch deep. Handrails and main channels have perforations at random locations.

Substructure

The substructure is in serious condition.

1. Original steel bent caps at Piers 8 and 11 have peeling paint with heavy laminated rust throughout and up to 1-1/4 inch impacted rust between bottom flange angles and batten plates. Top and bottom flange angles and top flange plates typically have areas of section loss up to 8 feet long by full width by 3/16 inch deep (up to 23.2% loss). Web plates have random areas of laminated rust with up to 1/8 inch deep section loss over the full height between the top and bottom flange angles (up to 10.4% web loss). Pier 8 steel bent cap top flange between girders G12 and G13 is in the worst condition. The flange plate has full width section loss to 1/4 inch remaining (5/8 inch original) and the top flange angles (5/8 inch original) have section loss to 5/16 inch remaining (42.3% top flange loss). Note that this is the cantilever section of the cap beam that supports girders G13 and G14.
2. Original steel bent columns at Piers 8 and 11 have peeling paint with moderate to laminated rust and minor pitting. Columns at the connections to the bottom vertical gusset plates have moderate rust to laminated rust with up to 5/8 inch impacted rust between the plates and members. Flanges typically have up to 1/8 inch deep section loss along the gusset plates. Pier 8, column 5 and 7 flanges have section loss along the bottom vertical gusset plates up to full width by 4 inches high by up to 5/16 inch deep (15.1% section loss). Diagonal bracing and bottom web channels have heavy section loss to paper thin remaining with numerous perforations up to 16 inches wide by 2-1/2 inches high. Lacing bars and batten plates have random perforations and several lacing bars are severed. The interior surfaces of the bottom vertical gusset plates have laminated rust with up to 1/4 inch deep section loss along the columns and bracing members. Pier 11 bent, column 3, south vertical gusset plate has heavy section loss to paper thin remaining with two perforations up to 3-1/2 inches by 1-1/2 inches. A few gusset plates are bowed from pack rust.
3. The concrete pier caps for Piers 1-7 have random horizontal, vertical and map cracks open up to 1/8 inch wide with rust and efflorescence, areas of light to moderate honeycombing and several areas of shallow rebar. There are random hollow areas up to 4 feet wide by 6 feet high and spalls up to 2 feet wide by 3 feet high by 3 inches deep with exposed rebar. Isolated bearing pedestals have vertical cracks and minor corner spalls up to 1 foot high by 5 inches wide by 3 inches deep.
4. The concrete columns for Piers 1–7 have random vertical and horizontal cracks with rust and efflorescence open up to 1/16 inch wide, isolated hairline map cracks up to 4 feet by 3 feet and random areas of shallow rebar. Columns have random hollow areas with rust up to 16 feet high by 4 feet wide and spalls with exposed rebar up to 4 feet wide by 3 feet high by 2 inches deep with exposed rusted rebar. Rebar has minor section loss.

5. Stem solid concrete Piers 8-11 have random areas of hairline map cracks and random horizontal, diagonal and vertical cracks with efflorescence and rust open up to 1/8 inch wide. There are random hollow areas up to 20 feet wide by 6 feet high and isolated spalls up to 3 feet wide by 1 foot high by 2 inches deep with exposed rebar. Pier 9, South elevation has a 20 foot wide by 10 foot high hollow area with a 6 foot by 5 foot by 2 inch deep spall with exposed rusted rebar. Rebar has minor section loss. Stone masonry facing on Piers 9 and 10 has up to 10% missing mortar with up to 1 foot of penetration between stones. Isolated bearing pedestals have vertical cracks and minor edge spalls up to full perimeter by 2 inches wide by 3 inches high.

Channel and Channel Protection

The channel and channel protection are in fair condition.

1. Since the 2010 inspection the channel bottom has experienced large areas of both scour, up to 10 feet deep, and aggradation, up to 6.2 feet high. Pier 9 channel bottom has experienced scour along the west and north face up to 5.6 feet deep. Pier 10 channel bottom has experienced scour along the west face up to 4.8 feet deep (at southwest corner). Pier 9 tremie is undermined on the west side for 32 feet long by up to 3.2 feet high with up to 8 feet of penetration. The footing is exposed up to 108 feet long on the north face by up to full height and 50 feet long by up to full height on the south face. Pier 10 tremie is exposed at the southwest corner up to 5 feet high by 12 feet long. The footing is exposed up to 39 feet long on the south face by up to full height and 10 feet long by up to 2 feet high on the north face.
2. Navigation lights in Span 9 only were not 'on' at the time of inspection. The north light on the east fascia has a detached safety chain and the green light on the west fascia has a broken glass lens.

Approach Condition

The approaches are in good condition. There are no major deficiencies.

00571A Stringer Section Loss Summary for Spans 9-11

Span	Stringer	TF/BF/Web	Location	Width/Height (in.)	Remaining thickness (in.)	Depth (in.)	Total Loss (in²)	Orig. Area (in²)	% Loss 2011	% Loss 2013
9	14	Web	At FB 0	2.0	0.2525	0.1875	0.375	9.926	3.8	3.8
9	16	BF	At FB 0	9.0	0.6175	0.0625	0.563	6.113	9.1	9.2
9	18	Web	At FB 0, East Side	3.0	0.3150	0.1250	0.375	9.926	3.8	3.8
10	10	Web	At FB 10	3.5	0.1875	0.2525	0.884	9.926	4.4	8.9
10	11	BF	At FB 6, West Side	4.5	0.3750	0.3050	1.373	6.113	22.7	22.5
11	6	Web	At FB 10	2.0	0.3150	0.1250	0.250	9.926	2.5	2.5
11	9	BF	At FB 10	7.5	0.0918	0.5883	4.403	6.113	21.2	72.0
11	9	TF & BF	At FB 10	3.0	0.3675	0.3125	0.938	6.113	15.2	15.3
11	9	Web	At FB 10	7.5" (W) & 3" (E)	Varies	3/16" (W) & 1/16" (E)	1.594	9.926	16.2	16.1
11	11	Web	At FB 10	7.5	0.2525	0.1875	1.406	9.926	14.3	14.2

Note: Bottom flange section loss is located over/near the bearing area - Not a critical area.

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00571A Girder Web Loss Summary for Spans 1-8 & 12

			Web Loss Between Brg. Stiffeners									
Span	Girder	Location	West Elev. Web Section Loss Depth	East Elev. Web Section Loss Depth	Web Perforation	Brg. Stiffener Section Loss Depth	Brg. Stiffener with Perf.	*2011 % loss	2013 % Web loss for Shear	2013 % Web loss for Brg.	Original Web Area	Original Brg. Stiffener Area
1	12	Pier 1	1/8"	1/4"	-	-	-	3	5.4	8.0	58" x 7/16"	7" x 5/8"
2	9	Pier 1	1/32" Rem.	1/32" Rem.	3" x 1" 1" x 1/2"	Up to 1/4"	-	-	5.0	31.3	58" x 7/16"	7" x 5/8"
2	5	Pier 2	1/32" Rem.	1/32" Rem.	1" ∅	1/8" Rem.	2-1/2"H x 4"W	-	7.6	49.8	58" x 7/16"	7" x 5/8"
2	7	Pier 2	5/16"	-	-	1/2" Rem.	-	7	7.4	15.4	58" x 7/16"	7" x 5/8"
2	8	Pier 2	3/16" Rem.	3/16" Rem.	4-1/2" x 2-1/2" 42" ∅	Up to 1/4" Rem.	1"H x 2"W 3/4" ∅	6	7.4	40.8	58" x 7/16"	7" x 5/8"
3	8	Pier 2	1/16"	1/4"	-	5/16" Rem. to KE	1"H x 2-1/2"W	3.5	6.4	56.5	58" x 7/16"	7" x 5/8"
3	9	Pier 2	1/4"	-	-	3/16" to KE	3"H x 4"W	3.5	< 5	38.5	58" x 7/16"	7" x 5/8"
3	10	Pier 2	5/16"	-	-	Up to 5/16" Rem.	-	-	7.4	33.0	58" x 7/16"	7" x 5/8"
3	11	Pier 2	1/32" Rem.	1/32" Rem.	(2) 3" ∅	1/4" Rem. to KE	1"H x 6"W	4.5	6.0	56.8	58" x 7/16"	7" x 5/8"
3	3	Pier 3	1/8"	3/16"	1-1/4" ∅	Up to 1/8" Rem.	3/8" ∅	-	5.6	44.5	58" x 7/16"	7" x 5/8"
3	6	Pier 3	1/8"	1/8"	-	1/8"	6" x 2-1/2"	-	< 5	32.4	58" x 7/16"	7" x 5/8"
3	8	Pier 3	1/32" Rem.	1/32" Rem.	(2) 1"H x 2-1/2"W	Up to 1/8" Rem.	1/4" ∅ 3" x 1"	-	< 5	63.3	58" x 7/16"	7" x 5/8"
3	9	Pier 3	5/16" Rem.	-	-	Up to 3/8" Rem.	-	-	< 5	28.7	58" x 7/16"	7" x 5/8"
3	10	Pier 3	5/16"	-	-	Up to 5/16" Rem.	-	3	< 5	35.3	58" x 7/16"	7" x 5/8"
3	11	Pier 3	1/4"	1/4"	2-1/2" x 7/8"	3/8" Rem.	-	-	6.7	46.0	58" x 7/16"	7" x 5/8"
4	4	Pier 3	1/8" Rem.	1/8" Rem.	4-1/2"H x 3"W 1/2" ∅	Up to 9/16"	-	8	11.0	57.1	58" x 7/16"	7" x 5/8"
4	5	Pier 3	3/16"	1/8"	-	Up to 1/8" Rem.	5" x 3"	-	< 5	48.1	58" x 7/16"	7" x 5/8"
4	6	Pier 3	3/16"	3/16"	2" x 2" 1/4" ∅ 1/2" x 2"	Up to 3/16" Rem.	-	-	5.9	68	58" x 7/16"	7" x 5/8"
4	7	Pier 3	1/32" Rem.	1/32" Rem.	4" H x 6" W	Up to 1/4"	-	10	10.1	21.9	58" x 7/16"	7" x 5/8"
4	8	Pier 3	1/4"	1/8"	-	Up to 1/8" Rem.	1/4" ∅	-	5.4	60.0	58" x 7/16"	7" x 5/8"
4	10	Pier 3	1/16" Rem.	1/4"	1-1/8"H x 3/4"W	Up to 1/16" Rem.	-	-	5.6	30.5	58" x 7/16"	7" x 5/8"
4	3	Pier 4	-	1/4"	2" ∅	Up to 5/16"	-	6	5.4	29.9	58" x 7/16"	7" x 5/8"
4	4	Pier 4	1/32" Rem.	1/32" Rem.	2"H x FW	Up to 1/4"	-	7	6.7	35.8	58" x 7/16"	7" x 5/8"
4	6	Pier 4	1/32" Rem.	1/32" Rem.	3-1/2"H x 6-1/2"W	Up to 19/32"	4"H x 4"W (NW) 1/2"H x 1"W (SW) 6"H x FW (NE)	6	14.0	81.4	58" x 7/16"	7" x 5/8"
5	6	Pier 4	1/8"	1/8"	(2) 1"H x 2-1/2"W 1" ∅	Up to 3/8"	-	6	< 5	37.9	65" x 7/16"	7" x 5/8"
5	8	Pier 4	3/16"	1/16"	-	Up to 1/2"	-	3	7.0	62.8	65" x 7/16"	7" x 5/8"
5	9	Pier 5	3/16"	1/32" Rem.	2"H x 4"W	Up to 5/16"	-	5	< 5	26.3	65" x 7/16"	7" x 5/8"
5	10	Pier 5	1/32" Rem.	1/32" Rem.	2"H x 3"W	Up to 1/4"	-	6	6.5	30.8	65" x 7/16"	7" x 5/8"
6	4	Pier 5	1/32" Rem.	1/32" Rem.	(3) Up to 1/2" ∅	Up to 5/16"	-	-	9.2	37.7	65" x 7/16"	7" x 5/8"
6	10	Pier 5	5/16"	-	-	Up to 1/8"	-	6	6.6	<25	65" x 7/16"	7" x 5/8"

C11

00571A Girder Web Loss Summary for Spans 1-8 & 12

			Web Loss Between Brg. Stiffeners									
Span	Girder	Location	West Elev. Web Section Loss Depth	East Elev. Web Section Loss Depth	Web Perforation	Brg. Stiffener Section Loss Depth	Brg. Stiffener with Perf.	*2011 % loss	2013 % Web loss for Shear	2013 % Web loss for Brg.	Original Web Area	Original Brg. Stiffener Area
6	4	Pier 6	1/32" Rem.	1/32" Rem.	1"H x 2-1/2"W 1/2" Ø	Up to 1/4"	-	-	5.8	40.7	65" x 7/16"	7" x 5/8"
6	8	Pier 6	1/32" Rem.	1/32" Rem.	1-3/4"H x 3/4"W 1/2" Ø 2-1/2" Ø	Up to 1/4"	-	9	6.7	29.0	65" x 7/16"	7" x 5/8"
7	4	Pier 7	1/8" Rem.	1/8" Rem.	1-1/4" Ø	Up to 3/8"	-	-	< 5	43.9	65" x 7/16"	7" x 5/8"
7	5	Pier 7	-	1/4"	-	-	-	-	5.3	25.0	65" x 7/16"	7" x 5/8"
7	9	Pier 7	3/16"	1/8"	-	Up to 3/16"	-	-	< 5	29.0	65" x 7/16"	7" x 5/8"
7	10	Pier 7	1/8" Rem.	1/8" Rem.	1" Ø 1/2" Ø 3/8" Ø	Up to 1/4"	-	5	11.4	50.3	65" x 7/16"	7" x 5/8"
7	11	Pier 7	5/16" Rem.	5/16" Rem.	3-1/2"H x 5-1/2"W	Up to 1/2"	-	5	6.5	53.4	65" x 7/16"	7" x 5/8"
7	13	Pier 7	-	3/16"	-	Up to 7/16"	4"H x FW (E. Mid.)	3	5.9	36.9	65" x 7/16"	7" x 5/8"
8	6	Pier 7	11/32"	11/32"	1"H x 2-3/4"W	Up to 3/8"	-	-	8.8	39.4	65" x 7/16"	7" x 5/8"
8	7	Pier 7	1/32" Rem.	1/32" Rem.	1-1/2"H x 1"W 2-1/4"H x 1"W	Up to 3/8"	-	-	5.5	34.1	65" x 7/16"	7" x 5/8"
8	9	Pier 7	-	5/16"	3/8" Ø 1-1/2" Ø	Up to 9/16"	3"H x 2"W	-	8.4	8.1	65" x 7/16"	7" x 5/8"
8	11	Pier 7	3/16"	1/8"	-	Up to 1/4" Rem.	-	-	< 5	35.3	65" x 7/16"	7" x 5/8"
8	12	Pier 7	1/4"	-	-	Up to 3/8" Rem.	-	-	7.0	25.0	65" x 7/16"	7" x 5/8"
12	13	North Abutment	1/8"	1/8"	5/8" Ø	Up to 15/32"	2"H x 5-1/2"W (W. Mid.)	2	< 5	49.6	65" x 7/16"	7" x 5/8"

Note: Girders with < 5% web loss for shear and < 25% web loss for bearing are considered negligable not shown on table.

* Significant laminated rust was removed to ascertain actual section loss to the steel. Previous section loss calculations are incorrect, wrong section used in calculation.

C12

13/4.

00571A Girder Bottom Flange Loss Summary for Spans 1-8 & 12

		LOCATION		LOSS DIMENSIONS					
Span	**Girder**	**Description**	**Length along Element**	**Width (in.)**	**Depth (in.)**	**Total Loss (in²)**	****2011 % loss**	**2013 % loss**	**Original Area**
1	7	South BF Transition	0.18L	4	0.25	1.00	8.3	8.3	16" x 3/4"
2	6	South BF Transition	0.18L	4	0.375	1.50	12.5	12.5	16" x 3/4"
2	6	North BF Transition	0.83L	6.375	0.25	1.59	14	7	16" x 3/4"
2	7	12' From Pier 2	0.15L	5	0.25	1.25	10.4	10.4	16" x 3/4"
3	7	10' From Pier 2	0.13*	6	0.375	2.25	18.8	18.8	16" x 3/4"
3	7	South BF Transition	0.18L	5	0.25	1.25	10.4	10.4	16" x 3/4"
3	11	North BF Transition	0.83L	5	0.1875	0.94	11	7.8	16" x 3/4"
4	10	North BF Transition	0.83L	3	0.25	0.75	6.3	6.3	16" x 3/4"
4	6	South BF Transition	0.18L	8	0.25	2.00	16.7	16.7	16" x 3/4"
4	6	South BF Transition	0.18L	6	0.5	3.00	10	15	16" x 1-1/4"
4	10	South BF Transition	0.18L	8	0.25	2.00	16.7	16.7	16" x 3/4"
5	7	Random Locs throughout - repair plates present but discontinuous at web stiffeners (worst)	0.14L	7.781	0.375 + 1/4" w/KE	2.92	25	14.6	16" x 3/4"
6	6	North BF Transition	0.70L	3	0.375	1.13	5.6	5.6	16" x 1-1/4"
6	7	North BF Transition	0.70L	7.5	0.25	1.88	7.5	9.4	16" x 1-1/4"
7	7	Midspan	0.50L	7.78	0.3125	2.43	16	8.7	16" x 1-3/4"
7	8	Midspan	0.50L	7.78	0.125	0.97	7	3.5	16" x 1-3/4"
7	8	North flange transition	0.70L	5	0.09375	0.47	6	< 5	16" x 1-1/4"
12	8	Midspan	0.50L	7	0.25	1.75	11	6.3	16" x 1-3/4"
12	9	Midspan	0.50L	7	0.25	1.75	11	6.3	16" x 1-3/4"

Legend:

* = Worst Case

* * Previous section loss calculations are incorrect, wrong section used in calculation.

00571A Floorbeam Section Loss Summary for Spans 9-11

Span	Floorbeam	TF/BR/Web	Location	* % loss 2011	% loss 2013
9	0	TF	Between S15-S16	8.3	4.4
9	0	BF	Between S15-S16	-	23.3
9	0	Web	Between S12-S15 (5 Areas)	2.1	2.0
9	0	Web	Between S15-S16	-	4.7
9	0	BF	Between S12-S13	8.3	4.4
9	0	BF	Between S17-S18	-	24.9
9	1	BF	Between S16-S17	2.1	1.1
9	2	BF	Between S15-S16	6.3	3.3
9	2	Web	Between S15-S16	1.5	1.5
9	3	TF	Between S15-S16	12.2	6.5
9	3	BF	Between S15-S16	33.3	17.8
9	3	TF	Between S16-S17	10.4	11.1
9	4	TF	Between S15-S16	25.0	13.3
9	4	BF	Between S15-S16	0.7	0.3
9	4	TF	Between S16-S17	12.5	6.7
9	5	TF	Between S15-S16	17.1	9.1
9	5	BF	Between S15-S16	16.7	8.9
9	6	TF	Between S15-S16	20.8	11.1
9	6	BF	Between S15-S16	2.1	2.2
9	6	Web	Between S15-S16	5.1	5.1
9	7	TF	Between S14-S15	8.4	4.4
9	7	TF	Between S15-S16	20.8	11.1
9	7	TF	Between S16-S17	4.2	2.2
9	8	TF	Between S15-S16	20.8	11.1
9	8	BF	Between S15-S16	20.8	11.1
9	8	Web	Between S15-S16	2.1	2.0
9	9	TF	Between S15-S16	19.5	10.4
9	9	Web	Between S15-S16	4.1	4.1
9	9	TF	Between S16-S17	8.3	4.4
9	10	TF	Between S15-S16	20.8	11.1
9	10	TF	Adjacent to S16	4.2	2.2
9	10	BF	Between S15-S16	6.9	3.7
9	10	TF	Between S16-S17	4.2	2.2

00571A Floorbeam Section Loss Summary for Spans 9-11

Span	Floorbeam	TF/BR/Web	Location	* % loss 2011	% loss 2013
9	10	TF	Between S19-S20	20.8	11.1
10	0	TF	Between S8-S9	8.3	4.4
10	0	TF	Between S10-S11	20.8	13.3
10	0	BF	Between S13-S14 (2 Areas)	11.2	3.0
10	0	TF	Between S13-S14	29.2	15.6
10	1	TF	Between S10-S11 (2 Areas)	20.8	11.1
10	1	Web	Between S10-S11	2.1	2.0
10	2	TF	Between S10-S11	12.5	6.6
10	2	BF	Between S10-S11	6.9	3.7
10	3	TF	Between S10-S11 (2 Areas)	16.7	8.9
10	4	TF	Between S11-S12	8.3	4.4
10	5	TF	Between S9-S10	2.3	1.5
10	5	TF	Between S10-S11	8.3	4.4
10	5	Web	Between S10-S11	2.3	2.3
10	6	TF	Between S10-S11	12.5	6.7
10	6	BF	Between S10-S11	5.6	2.9
10	6	Web	Between S10-S11 (3 Areas)	6.1	6.1
10	7	BF	Between S10-S11	11.1	5.9
10	7	Web	Between S10-S11	4.1	4.1
10	8	TF	Between S10-S11	18.8	9.9
10	9	TF	Between S9-S10	16.7	8.9
10	9	TF	Between S10-S11 (2 Areas)	20.8	11.1
10	9	BF	Between S10-S11	12.5	11.1
10	10	TF	Between S10-S11	11.1	5.9
11	0	TF	Between S8-S9 (2 Areas)	16.7	1.5
11	0	BF	Between S8-S9	4.2	2.2
11	0	Web	Between S8-S9	4.2	4.2
11	0	TF	Between S10-S11	-	8.9
11	0	Web	Between S10-S11	-	3.0
11	0	BF	Between S14-S15	16.7	8.9
11	2	TF	Adjacent to S8	31.3	16.7
11	2	TF	Adjacent to S9	11.5	6.1
11	2	BF	Between S8-S9	5.6	2.9

00571A Floorbeam Section Loss Summary for Spans 9-11

Span	Floorbeam	TF/BR/Web	Location	* % loss 2011	% loss 2013
11	3	TF	Between S8-S9	16.7	8.9
11	3	BF	Between S8-S9	12.5	6.7
11	3	Web	Between S8-S9	3.8	3.8
11	4	TF	Between S8-S9	12.5	6.7
11	4	BF	Between S8-S9	11.1	5.9
11	4	Web	Between S8-S9	1.5	1.5
11	4	TF	Between S9-S10	27.1	14.4
11	5	TF	Between S8-S9	16.7	8.9
11	5	BF	Between S8-S9	6.3	4.6
11	5	Web	Between S8-S9	3.0	3.0
11	5	TF	Between S8-S9	16.7	8.9
11	5	BF	Between S8-S9	16.7	8.9
11	5	TF	Between S9-S10	16.7	8.9
11	6	TF	Between S8-S9	16.7	8.9
11	6	BF	Between S8-S9	11.1	5.9
11	6	Web	Between S8-S9	2.3	2.3
11	6	TF	Between S9-S10	16.7	8.9
11	7	TF	Between S8-S9	16.7	8.9
11	7	BF	Between S8-S9	5.6	2.9
11	7	TF	Between S9-S10	20.8	11.1
11	7	BF	Between S9-S10	12.5	6.7
11	8	Web	Between S8-S9	2.3	2.3
11	8	TF	Between S9-S10	20.8	11.1
11	9	TF	Between S8-S9	20.8	16.5
11	9	BF	Between S8-S9	22.9	12.2
11	9	Web	Between S8-S9	-	4.5
11	10	Web	Between S5-S6	2.3	2.3
11	10	BF	Between S6-S7	-	19.4
11	10	Web	Between S6-S7	-	2.6
11	10	BF	Between S8-S9	-	13.3
11	10	Web	Between S9-S10	-	4.2

* Previous section loss calculations are incorrect, wrong section used in calculation.

00571A Spans 9-11 Original Trusses
Bottom Chord Vertical Gusset Plate Section Loss Table

Original Thickness = 3/4 inch

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Span	Truss	Node	Gusset Plate (East, West)	Exterior or Interior of Plate	Total Combined Length (in.)	2011 S. Loss Depth (in.)	2013 Measurements (in.)	
							Max. S. Loss Depth	Min. D-Meter Reading
9	T3	L0	West	Exterior	36	-	1/8	0.42
9	T3	L0	East	Exterior	36	-	1/4	0.41
9	T3	L2	West	Interior	104	-	1/16	0.60
9	T3	L2	East	Interior	110	-	1/16	0.65
9	T3	L4	West	Exterior	66	-	1/8	0.61
9	T3	L4	East	Exterior	30	-	1/16	0.65
9	T3	L6	West	Interior	71	1/4	1/16-1/4	0.56
9	T3	L6	East	Interior	78	-	1/16	0.61
9	T3	L8	East	Interior	31	1/4	1/8	-
9	T3	L10	West	Interior	18	-	1/4	0.50
9	T3	L10	East	Exterior	26	-	3/8	0.26
9	T4	L0	West	Exterior	36	3/16	5/16	0.52
9	T4	L0	East	Exterior	36	3/16	1/4	0.40
9	T4	L2	West	Exterior	42	1/3	5/16-3/8	0.30
9	T4	L2	West	Interior	84	1/3	1/8-1/4	0.30
9	T4	L2	East	Interior	FL	1/8	1/16-1/8	0.56
9	T4	L4	West	Exterior	58	1/4	1/4	0.44
9	T4	L4	West	Interior	32	-	1/16-3/16	0.44
9	T4	L4	East	Interior	86	-	1/16-1/8	0.59
9	T4	L6	West	Exterior	54	5/16	1/8-5/16	0.38
9	T4	L6	West	Interior	73	5/16	1/16-3/16	0.38
9	T4	L8	West	Exterior	37	1/4	3/16-1/4	0.50
9	T4	L8	West	Interior	91	1/4	1/16-1/8	0.50
9	T4	L8	East	Interior	91	1/4	1/16-3/16	0.64
9	T4	L10	West	Exterior	25	3/16	1/4	0.43
9	T4	L10	East	Exterior	16	-	1/16	0.56
10	T2	L0	West	Exterior	-	-	-	0.50
10	T2	L0	East	Exterior	22	3/16	7/16	0.27
10	T2	L2	West	Interior	54	3/16	3/16-1/4	0.53
10	T2	L2	East	Exterior	42	3/16	1/4	0.37
10	T2	L2	East	Interior	64	3/16	1/16-1/4	0.37
10	T2	L4	West	Exterior	65	1/4	1/16-1/8	0.53
10	T2	L4	West	Interior	61	1/4	1/8-3/16	0.53
10	T2	L4	East	Exterior	40	3/16	1/8	0.56
10	T2	L4	East	Interior	114	3/16	1/8-1/4	0.56
10	T2	L6	West	Interior	FL	5/16	1/8	0.57
10	T2	L6	East	Exterior	36	5/16	1/16-3/16	0.48
10	T2	L6	East	Interior	81	5/16	1/16-3/16	0.48
10	T2	L8	West	Interior	FL	1/8	1/8-1/4	0.51
10	T2	L8	East	Exterior	33	1/8	1/8-1/4	0.29
10	T2	L8	East	Interior	117	1/8	1/8-5/16	0.29
10	T2	L10	East	Exterior	22	1/8	1/16	0.46
10	T2	L10	West	Exterior	24	1/8	1/4	0.25

Note: Section loss is along the top of the bottom chord / lateral bracing gusset plate

00571A Spans 9-11 Original Trusses
Bottom Chord Vertical Gusset Plate Section Loss Table

Original Thickness = 3/4 inch

Span	Truss	Node	Gusset Plate (East, West)	Exterior or Interior of Plate	Total Combined Length (in.)	2011 S. Loss Depth (in.)	2013 Measurements (in.)	
							Max. S. Loss Depth	Min. D-Meter Reading
10	T3	L0	West	Exterior	24	-	1/8	0.50
10	T3	L0	East	Exterior	29	-	3/16	0.42
10	T3	L2	West	Exterior	40	3/16	5/16	0.34
10	T3	L2	West	Interior	FL	3/16	5/16-7/16	0.34
10	T3	L2	East	Interior	FL	3/16	1/4-7/16	0.43
10	T3	L4	West	Exterior	76	3/8	1/4-7/16	0.16
10	T3	L4	West	Interior	73	3/8	1/16-3/16	0.16
10	T3	L4	East	Interior	54	3/8	1/16-3/16	0.55
10	T3	L6	West	Exterior	58	7/16	1/16-3/8	0.29
10	T3	L6	West	Interior	56	7/16	1/16-1/4	0.29
10	T3	L6	East	Exterior	36	-	1/16-3/16	0.63
10	T3	L6	East	Interior	95	-	1/16	0.63
10	T3	L8	West	Exterior	40	9/16	1/4-1/2	0.22
10	T3	L8	West	Interior	FL	9/16	1/16-1/4	0.22
10	T3	L8	East	Interior	FL	9/16	1/8-1/4	0.48
10	T3	L10	West	Exterior	31	7/16	5/16	0.30
10	T3	L10	East	Exterior	29	-	1/8	0.36
11	T2	L0	West	Exterior	16	-	1/16	0.43
11	T2	L0	East	Exterior	32	1/4	1/4	0.39
11	T2	L2	West	Interior	98	1/8	1/8-1/4	0.56
11	T2	L2	East	Exterior	44	1/8	1/16-1/8	0.50
11	T2	L2	East	Interior	98	1/8	1/8-3/16	0.50
11	T2	L4	West	Exterior	36	1/8	1/4	0.56
11	T2	L4	West	Interior	36	1/8	1/8	0.56
11	T2	L4	East	Exterior	14	1/8	3/16	0.44
11	T2	L4	East	Interior	24	1/8	1/8	0.44
11	T2	L6	West	Interior	85	1/4	1/16-1/4	0.50
11	T2	L6	East	Exterior	40	1/4	3/16	0.62
11	T2	L6	East	Interior	102	1/4	1/8-1/4	0.62
11	T2	L8	West	Exterior	12	1/8	1/16	0.65
11	T2	L8	West	Interior	FL	1/8	1/8	0.55
11	T2	L8	East	Exterior	42	1/8	1/4	0.18
11	T2	L8	East	Interior	87	1/8	1/8	0.18
11	T2	L10	West	Exterior	16	-	3/16	0.32
11	T2	L10	East	Exterior	28	-	1/4	0.24
11	T3	L0	West	Exterior	26	-	5/16	0.32
11	T3	L0	East	Exterior	46	-	1/16-5/16	0.44
11	T3	L2	West	Exterior	72	3/16	1/4	0.46
11	T3	L2	West	Interior	FL	3/16	1/8-5/16	0.46
11	T3	L2	East	Interior	FL	-	1/16-1/4	0.52
11	T3	L4	West	Exterior	46	-	1/4	0.42
11	T3	L4	West	Interior	90	-	1/16-5/16	0.42
11	T3	L4	East	Interior	42	3/16	1/8	0.64
11	T3	L6	West	Exterior	58	5/16	3/16	0.41
11	T3	L6	West	Interior	FL	5/16	1/8-1/4	0.41
11	T3	L6	East	Interior	FL	-	1/16-1/8	0.67
11	T3	L8	West	Exterior	54	5/16	1/4	0.16
11	T3	L8	West	Interior	68	5/16	1/8-1/4	0.16
11	T3	L8	East	Interior	96	5/16	1/8-5/16	0.44
11	T3	L10	West	Exterior	27	1/4	7/16	0.24
11	T3	L10	East	Exterior	49	-	1/8	0.25

Note: Section loss is along the top of the bottom chord / lateral bracing gusset plate

DEPARTMENT OF TRANSPORTATION
BRIDGE SAFETY & EVALUATION

STRUCTURE EVALUATION

SHEET 1 OF 2 FORM BRI-19 REV 10/00

SHEET_____ OF_____

Inspected By: _____ & _____

Sufficiency Rating 54.00
Previous Inspection Date 9/26/2011

BS&E Received ☐ Data Entry By: _____
Copies Made ☐ Data Entry Date: _____

Indepth Insp	Deck Survey	Access	Flagman
9/26/2011	1/1/1900	38	00

CRITICAL FEATURE INSPECTIONS

	Type	Frequency	Team	Date	
Fracture:	F	24	20	9/26/2011	09/23/13
Uwater:		36	19	8/24/2010	08/22/13
Special:			0		

RED FLAG

IDENTIFICATION

Bridge Name COMMODORE HULL
Town Name SHELTON Town Code 68170
5) Inventory Route:
A) Record Type 1
B) Signing Prefix 3 State Highway
C) Level of Service 1 Mainline
D) Route Number 00008
E) Directional Suffix 0 NA
6) Feature Intersected HOUSATONIC RIVER, RT 110
7) Facility Carried: ROUTE 8
9) Location ROUTE 8, EXIT 14
11) Milepoint 12.28 Miles
16) Latitude 41deg 18 min 48.00 sec 41deg 18 min 44.50 sec
17) Longitude 73deg 5 min 18.00 sec 73deg 05 min 20.40 sec
98) Border Bridge:
A) State Code B) Percent Responsibility %
C) Border Town Name
99) Border Bridge Structure No

STRUCTURE TYPE AND MATERIAL

43) Structure Type, Main:
A) Material 3 Steel B) Design Type 9 Truss - Deck
44) Structure Type, Approach:
A) Material 3 Steel B) Design Type 2 Stringer/Multi-beam o
45) Number of Spans, Main Unit 3
46) Number of Approach Spans 9
107) Deck Structure Type 1 Concrete Cast-in-Place
108) Wearing Surface/Protective System:
A) Type of Wearing Surface 6 Bituminous
B) Type of Membrane 2 Preformed Fabric
C) Type of Deck Protection 1 Epoxy Coated Reinforcing

AGE AND SERVICE

27) Year Built 1951
106) Year Reconstructed 2010
42) Type of Service:
A) On 1 Highway B) Under 6 HIGHWAY-WATER
28) Number of Lanes:
A) On 6 B) Under 7
29) Average Daily Traffic 82300 Half ADT?: No
109) Percent Truck 8%
30) Year of ADT 2010
19) Bypass, Detour Length 2miles

GEOMETRIC DATA

48) Length of Max Span 254ft
49) Structure Length 1578ft
50) Curb or Sidewalk Widths:
A) Left 5.0ft B) Right 0.0ft
51) Brg Rdwy width,curb-curb 88.0ft
52) Deck Width, Out-Out 99.8ft
32) Approach Roadway Width 88ft
33) Bridge Median 3 Closed Median w/barrier
Deck Area 181150 sqft
34) Skew Angle 0deg
35) Structure Flared 1
10)Inv. Rte. Min. Vert Clearance 22ft 3in ✓
47) Log Inv. Rte. Total Horiz Clr.: 44.0ft
47) RLog Inv. Rte. Total Horiz. Clr.: 44ft
53) Min Vert Clearance Over Bridge 19ft 8in ✓
54) Min Vert Under Clearance H Ref 14ft 5in ✓
55) Min Lat Under Clearance on Right H Ref 8.3ft ✓
56) Min Lat Under Clearance on Left 0.0ft ✓

BRIDGE COMMENTS

Project No. 0126-0167 (2011): Gusset Plate and Joint Repair. The long anticipated main project for these three structures is being delayed for an undefined period under Project No. 0126-0159 per MEB (KMR 8/16/11).
SUMMER-WINTER JOINT MEASUREMENT LIST (KMR 3/1/10).

C19

STRUCTURE EVALUATION

SHEET 2 OF 2 FORM BRI-19 REV 10/00

SHEET_____ OF_____

		NBIS Length
Bridge Number	00571A	
Town Name	SHELTON	Yes 1578
Facility Carried	ROUTE 8	
Feature Crossed	HOUSATONIC RIVER, RT 110	

Inspected By: _____ & _____

CLASSIFICATION

112) NBIS Bridge Length	Yes	
104) Highway System	1	On System
26) Functional Class	12	Urban Principal Arterial - Other
100) Defense Highway	0	Route is not a STRAHNET Route
101) Parallel Structure	N	No parallel structure exists
102) Direction of Traffic	2	2-way traffic
103) Temporary Structure		
110) Designated National Network	1	On national network
20) Toll	3	On Free Road
21) Maintain	1	State Highway Agency
22) Owner	1	State Highway Agency
Report Class	S	STATE
37) Historical Significance	5	Bridge is not eligible for National Register

WATERWAY

DrainageBasinCode	6000	
38) Navigation Control	1	Navigation control on waterway
39) Navigation Vert Clr.	34	40) Navigation Horiz Clr. 100
116) Vert-Lift Brg Nav Min		
111) Pier Abutment Protection	1	Navigation protection not required

PROPOSED IMPROVEMENTS

75A) Type of Work Proposed		
75B) Work Done By		
76) Length of Struct. Improvement		ft
94) Bridge Improvement Cost	$	
95) Roadway Improvement Cost	$	
96) Total Project Cost	$	
97) Year of Improvement Cost Est.		
114) Future ADT		115) Year Future ADT

List No. 14 Project No. 0126-0159 O Advertised 1/1/2030 1

POSTED SIGNS & UTILITIES

Other Posted Signs 1					
Other Posted Signs 2					
Actual P.L. Single Unit Truck	tons		Actual P.L. 4Axle Truck	tons	
Rec. P.L. Single Unit Truck	tons		Rec. P.L. 4Axle Truck	tons	
Actual P.L. Semi-TrailerTruck	tons		Actual P.L. 3S2 Truck	tons	
Rec. P.L. Semi-TrailerTruck	tons		Rec. P.L. 3S2 Truck	tons	
Rec. P.L. All Vehicles	tons		Actual P.L. All Vehicles	tons	
Posted Vert Clearance On Bridge	ft	in		ft	In
Posted Vert UnderClearance	ft	in		ft	In
Posted Speed Limit	50 mph				mph
Utility					

LOAD RATING AND POSTING

31) Design Load	5	Evaluation Code	L
63) Operating Rating Type	1	Year of Evaluation	2010
64) Operating Rating	65.5	70) Bridge Posting	5
65) Inventory Rating Type	1	41) Structure Status	A
66) Inventory Rating	39.2		

CONDITION

	Rating	By
58) Deck	6	6 ZM
59) Superstructure	4	3 ZM
60) Substructure	4	3 ZM
61) Channel & Chan. Protection	5	5 ZM
62) Culverts	N	N ZM

APPRAISALS

	Rating	By
67) Structure Evaluation	4	3 GL
68) Deck Geometry	6	5 ZM
69) Under Clear Vert & Horiz	4	4 ZM
71) Waterway Adequacy	9	9 ZM
72) Approach Rdwy Alignment	8	8 ZM
113) Scour Critical	4	

Items 58 Thru 72 Checked By: _____

36) Traffic Safety Features:

A) Bridge Railings	1	1
B) Transitions	0	0
C) Approach Guardrail	0	0
D) Approach Guardrail End	0	0

C20

OTHER FEATURES

Fence Required	Yes		Barrel Ladder	Yes
Fence Present	Yes	Y	Stand Pipes	No
Fence Height	8.5 ft	ft	Cat Walks	Yes
Fence Type	1	Expanded Meta	Movable Inspection System	No
Fence Material	1	Aluminum	Loose Concrete Checked?	Yes Y
Fence Top Type	1	Vertical		

INSPECTION COMMENTS

Proposed Next Indepth Insp Year 2021

Senior Ron Jantzen

Supervisor Leo Cain

REVIEWED BY: _____ Date 3/20/2014

NUMBER		LGTH
00571A	SHELTON	True 1578
FACILITY CARRIED	FEATURE CROSSED	
ROUTE 8	HOUSATONIC RIVER, RT 110	

INSPECTED BY:

REVIEWED BY: DATE: 3/20/14

DEPARTMENT OF TRANSPORTATION
DIVISION OF BRIDGE SAFETY EVALUATION

INVENTORY ROUTE UNDER STRUCTURE EVALUATION

FORM BRI-25 REV 10/00

SHEET_____ OF_____ (INSP. REPORT)

IDENTIFICATION

DESCRIPTION:

5) INVENTORY ROUTE:

A) RECORD TYPE	2	
B) ROUTE SIGNING PREFIX	3 State Highway	
C) DESIGNATED LEVEL OF SERVICE	1 Mainline	
D) ROUTE NO.	00110	
11) MILE POINT (INV.RTE)	8.80	

AGE & SERVICE

+ 28B) NUMBER OF INV.ROUTE LANES	3 ✓	
* 29) ADT (INV. RTE)	13200	13000
* 109) TRUCK ADT % (INV.RTE)	5	05
* 30) YEAR OF ADT (INV. RTE)	2010	2012
* 41) INV ROUTE OPERATIONAL STATUS	A Open, no restriction	A
19) BYPASS DETOUR LENGTH	1 Miles	

GEOMETRIC DATA

+ 10) INV. RTE. MIN. VERT. CLEARANCE	14 ft 11 in ✓	ft in
+ 47) LOG INV. RTE. TOTAL HORIZ CLR.	75 ft ✓	ft
+ 47) RLOG INV. RTE. TOTAL HORIZ CLR.	0 ft	ft
+ LOG MIN VERT CLR OVER INV ROUTE	14 ft 5 in ✓	ft in
+ RLOG MIN VERT CLR OVER INV ROUTE	0 ft 0 in ✓	ft in
+ 55) MIN LAT UNDERCLR ON RIGHT	H 8.3 ft ✓	ft
+ 56) MIN LAT UNDERCLR ON LEFT	0 ft	ft

CLASSIFICATION

26) INV. RTE. FUNCT CLASSIFICATION	16 Urban Minor Arterial	
100) DEFENSE HIGHWAY DESIGNATION	0 Route is not a STRAHNE	
** 102) DIRECTION OF TRAFFIC	2 2-way traffic	
104) HIGHWAY SYSTEM OF INV. ROUTE	1 On System	
110) DESIGNATED NATIONAL NETWORK		

POSTED SIGNS

+ POSTED VERT. CLR UNDER BRIDGE ft in ft in

COMMENTS:

C21

* FILL OUT ON EVERY INSPECTION 29, 109, 30, 41

\+ VERIFY EVERY INSPECTION 28B, 10, 47, 53, 55, 56 & POSTED VERT CLEARANCE UNDER THE BRIDGE

** MUST BE FILLED OUT OR VERIFIED ON THE FIRST INSPECTION MADE BASED ON THE NEW FHWA GUIDE 102

23/424

Connecticut Department of Transportation

Bridge Inspection Report BRI-18

Bridge #: 00571A **Inspection Date: 09/23/2013**

Inspection Type:	Routine	**Previous Inspection Date:**	9/26/2011	**Snooper Required:**	No
Inspection Performed By:	HAKS Engineers	**Feature Carried:**	ROUTE 8	**Snooper Used:**	Yes
Town:	SHELTON	**Feature Intersected:**	HOUSATONIC RIVER, RT 110	**Year Built:**	1951
Location:	ROUTE 8, EXIT 14	**Main Design:**	Truss - Deck	**Year Rebuilt:**	2010
Main Material:	Steel				

Visits

Visit Date:	Temp:	Start Time:	End Time:
9/23/2013	64	8:30:00 AM	3:00:00 PM
11/18/2013	60	8:45:00 AM	2:30:00 PM

Inspectors:

Inspector:	Task:
A. Shandermani	Inspector
B. Safa	Lead Inspector
J. Wadsworth	Lead Inspector
M. Adorno	Inspector
Z. Mahiaoui	Lead Inspector
E. ABO	INSPECTOR

DECK: REINFORCED CONCRETE DECK
BITUMINOUS OVERLAY W/MEMBRANE

Overall Rating: 6

	Rating	
OVERLAY:	7	The bituminous concrete overlay has isolated transverse and longitudinal cracks and light sand and debris accumulation in the shoulders. Span 10 Northbound left lane has a few gouges up to 12' long x 5" wide x 1" deep and an 8" x 3" x 1/2" deep pothole. Span 9 Northbound center lane has a 2-1/2' diameter x 1" deep depression with map cracks and a 1' long x 8" wide pothole. See sheets 56-61 and Photos 13-15.
DECK-STR. CONDITION:	6	Approach spans (1-8 & 12): The underside of deck has random hairline transverse and map cracks with efflorescence, isolated areas of honeycombing, isolated spalls up to 3' x 6" x 2" deep and hollow areas with map cracks, rust and efflorescence at random weep pipe locations. Span 6, East overhang has a 20' long x full width hollow area with a 15' long x 2' wide x 3" deep spall with exposed and de-bonded rebar. The deck ends below the joints have random hollow areas up to full bay width with cracks and spalls with exposed rebar up to 8' long x 6" wide x 11" deep (Span 5, Bay

		10 at Pier 5). Main spans (9-11): The underside of deck has random transverse and map hairline cracks with efflorescence. The overall underside of deck deterioration is 3% with a maximum of 7.5% in Span 10. See sheets 76-171 and Photos 16-20.
CURBS:	7	Sloped granite curbs have plow scrapes and rust stains throughout. Average curb reveal is 3". See sheets 56-62 and Photos 21-23.
MEDIAN:	6	The Jersey shaped concrete median barrier has a few hollow areas up to 14" x 14" and isolated spalls up to 5' long x full width x 11" deep with exposed and de-bonded rebar (Span 7 near Pier 6). See sheets 56-61 and Photo 23.
SIDEWALKS:	6	Concrete sidewalk with a bituminous overlay along the west side of Spans 9-12 has sand accumulation, vegetation growth and transverse cracks up to 2' long x 3/16" wide (Span 11). There is debris and trash accumulation throughout that poses a tripping hazard. See sheets 60 & 61 and Photo 24.
PARAPET:	6	Concrete parapets have random scrape marks and areas of light scale throughout. There are random vertical hairline cracks up to full height, areas of shallow rebar and random hollow areas up to 12' long x 1-1/2' high (Span 11, East parapet). Span 11, west parapet, has a 1' x 1' x 3" deep corner spall at the north abutment. The parapet joint sealant is missing or cracked at random locations. See sheets 56-62 and Photos 21, 22, 24 & 25.
RAILING:	6	There is a single extruded aluminum bridge rail mounted on the East parapet in Spans 1-6 & 9-12, on the West parapet in Spans 1-5, 7 & 8 and on the West sidewalk parapet in Spans 9-12. Span 1, West railing near Pier 1 and Span 4, West railing near Pier 3 each have one post base plate missing 1 (of 4) anchor bolt. Span 5 West railing near Pier 4 has (2) posts with dents and tears from impact. Span 12, East railing has (2) posts with sheared off rivets, sheared off anchor bolts and broken welds due to impact. Span 11, west sidewalk railing has a 3' long x 3" deep impact dent. Northwest approach sidewalk railing (southbound) approximately 60' from the north abutment has (2) posts with dents and tears. See sheets 56-61 and Photos 27 & 28.
PAINT:	N	-
FENCE:	5	5' high anodized aluminum fence with expanded metal mesh mounted to the west parapet in spans 5-6 & 9-12 and to the east parapet in spans 7-9. The fence has random repaired sections, areas of impact damage with dents and tears/openings in the mesh typically less than 1' wide, and secure but loose sections (when pulled). Span 7, east fence has an approximately 40' long section of extensive damage to the mesh. There are several tears with openings up to full height x up to 2' wide. Span 11, west fence mesh along the sidewalk has a tear with a 4' high by up to 1' wide opening. Note: There does not appear to be a fall hazard through the damaged sections of fence.

		See sheets 58-61 and Photos 29-32.
DRAINS:	5	PVC weep pipes. There are random short/broken weep pipes throughout that are draining onto the superstructure and substructure elements causing deterioration at the following locations: • Span 6, West side of G13 at Pier 6 • Span 7, West side of G8 - 1st (2) weeps North of Pier 6 • Span 9, South side of FB5 between S2 & S3 • Span 9, North side of FB10 at the east side of S24 • Span 10, North side of FB1 at the west side of S1 • Span 10, North side of FB1 between S2 and S3 • Span 10, North side of FB5 between S2 and S3 • Span 10, South side of FB7 between S1 and S2 • Span 10, South side of FB10 between S10 and S11 • Span 11, North side of FB1 between S1 and S2 • Span 11, North side of FB5 between S1 and S2 • Span 12, West side of G9 at Pier 11 • Span 12, West side of G2 near the North abutment • Span 12, East side of G7 near the North abutment • Median weep pipes are draining onto secondary members and catwalks causing extensive corrosion. Scupper grates are clogged up to 100% at the following locations: • Span 5, Southbound left shoulder • Span 8, Southbound right shoulder • Span 9, Northbound right shoulder West sidewalk floor drains in Span 10 are fully clogged/covered with sand and debris. Scupper pipes are clogged/cracked and are draining onto the structural steel causing deterioration at the following locations: • Span 9, North side of FB9, between S1 and S2 - downspout is actively leaking onto S2. • Span 9, South side of FB9, between S15 and S16 - downspout is actively leaking onto FB9. • Span 10, North side of FB9, between S1 and S2 - downspout is actively leaking onto FB9. • Span 11, South side of FB9, between S8 and S9 - downspout is cracked and actively leaking onto FB9. • Span 11, South side of FB9, East cantilever - downspout has active leakage and appears clogged. • Span 12, East side of G9 - downspout is actively leaking onto G9. See sheets 56-61 & 76-166 and Photos 33-38.
LIGHTING STANDARD:	5	Lighting standards typically have missing anchor bolt covers and a few minor impact scrapes and dents. East parapet lighting standard in spans 10 & 11 have dents up to 2' high by 8" wide by 3" deep. Span 3, east parapet lighting standard has 1 (of 4) backed off anchor bolt nut by 3/16". Several junction box covers are missing up to 8 (of 10) screws. Covers are loose, but secure. Span 8, East parapet junction box has a plywood cover. Span 9, East parapet junction box near Pier 9 has a broken cover with exposed wires that are protruding from the opening. Northeast approach parapet junction box cover is broken with exposed wires. The white wire has damaged insulation. Underbridge luminaires in Span 1 and at the South face of Pier 4 were not 'on' at the time of inspection. The conduit attached to the South abutment has moderate rust throughout, 2 broken connection clamps between G4 and G8 and a missing access cover with exposed wires between G7 and G8. The conduit attached to the East end of G16 at Pier 1 has a rusted out coupling and a missing access cover with exposed wires.

		See sheets 56-61 and Photos 39 & 40.
UTILITIES TYPE/SIZE:	6	There is a junction box with a missing cover and exposed wires at the steel bent over Pier 8 (Shared with Bridge No. 00571C). See sheet 280.
CONSTR JOINTS:	8	-
EXPANSION JOINTS:	6	Asphaltic plug joints at Piers 1-7 and at both abutments. There are isolated adhesion and cohesion cracks in the shoulders up to 3' long and open up to 1/8" wide. Random areas of active leakage were noted below during this inspection. Strip seal joints at Piers 8-11. Concrete headers have random transverse cracks and areas of light scale. Joint glands have heavy sand accumulation. Evidence of past leakage was noted below during this inspection. Longitudinal pourable seal joints between Span 6 & Br. 00571B and between Span 8 & Br. 00571C have light to heavy sand accumulation and adhesion cracks up to 1' long. Longitudinal compression seal joint between Span 8 & Br. 00571C, is not properly seated (lifted upwards) up to 2" inches high for 8' long. Longitudinal strip seal joint in span 6 (Northbound) was not replaced and was mostly filled with sand and debris during this inspection. 20' of missing seal noted in the previous inspection report was not visible due to sand and debris accumulation. There is evidence of leakage at the underside of the joint. West sidewalk joints at Piers 8-11 and at the North abutment are typically filled with sand. Pier 11 strip seal joint is missing a 1' long section of the gland. The aluminum hold down panel at Pier 9 joint is vertically misaligned up to 1" at one end due to broken/failed anchorages (potential tripping hazard). See sheets 56-61 and Photos 41-48.

59. SUPERSTRUCTURE:	STEEL MULTI-GIRDER (SPANS 1-8 & 12) DECK TRUSS/FLOORBEAM/STRINGER (SPANS 9-11)	Overall Rating:	3

	Rating	
BEARING DEVICES:	5	Expansion rocker bearings in Approach Spans 1-7 and 12: Bearings have random areas of light to heavy accumulation of debris, areas of peeling paint with light to heavy rust and laminated rust with pitting to 1/4" deep. Random bearings have ±1/4" pack rust under the rockers and up to 1/2" pack rust between the sole plate and rocker. Girder G6 rocker bearing in Span 7 over Pier 6 has a minor gap under the rocker due to 1/8" pack rust (lifted slightly). Girder G1 rocker bearing in Span 6 over Pier 5 has a 3/16" H x up to 1-1/2" D gap under the rocker due to pack rust. Most bearings at 51-65 degrees Fahrenheit are in expansion mode except for bearings in Span 4 at Pier 3, girder G12 in Span 3 at Pier 2, girder G11 in Span 6 at Pier 5 and girder G1, G3, G16 and G18 bearings in Span 7 at Pier 6 which are in contraction mode and girder G1 bearings in Span 3 at Pier 2 and in Span 5 at Pier 4 which are Neutral. Random bearings are over expanded. There is up to 50% section loss at the anchor bolt nuts. Span 2, Girder G14 masonry plate over Pier 1 is undermined 1" x 1" at the northwest corner due to pedestal spall. Expansion bearings over steel bents at Piers 8 and 11: Bearings have areas of peeling paint with light to heavy rust and laminated rust. Girder G5 bearing is missing 1 (of 4) anchor bolt connecting the bottom flange to the sole plate and girder G13 bearing has (2) backed off anchor bolt nuts connecting the bottom flange to the sole plate. Expansion rocker bearings in Spans 9-11 (main spans at the original trusses T3 & T4 in Span 9 and T2 & T3 in Spans 10 and 11): Bearings have heavy laminated rust with up to 1" pack rust under the rocker and up to 90% section loss on the anchor bolt nuts. Truss T2 rocker bearing in Span 11 over Pier 10 has a 1/4" gap between the east pin and the rocker due to pack rust. The bearings were in expansion mode at 40°-60° F during this inspection with very minimal changes, if any, but do not appear to be moving freely when compared with the 2011 measurements taken at 60°-80° F. Truss T4 bearing in Span 9 over Pier 8 is over expanded. Expansion pot bearings at the newer trusses in Spans 9-11: Bearings have areas of peeling paint with light rust and cracked grout pads with minor spalls (no undermining noted). Fixed bearings at approach Spans 1-8 and 12 have heavy laminated rust with up to 1/4" deep pitting, up to 100% section loss on anchor bolt nuts, up to 25% section loss on anchor bolts and isolated loose anchor bolt nuts. Fixed bearings at original trusses in main spans 9-11 have rosebudding of the anchor bolt nuts with up to 50% section loss and heavy laminated rust on the vertical plates. Fixed pot bearings at the newer trusses in Spans 9-11: Bearings have areas of peeling paint with light to moderate rust and cracked/spalled out grout pads. Span 10, Truss T1 bearing masonry plate at Pier 10 is undermined 6-1/2" x up to 1-3/4" at the northwest corner and 5" x 2-1/2" at the southwest corner due to grout pad spalls. Stringer fixed bearings are composed of stringers bearing on steel bolsters/and or steel blocks in main spans 9 – 11. There are isolated locations

		with up to 1/2" pack rust between the stringer bearing plate and the floorbeam top flange and between bolster and stringer bottom flange. Random bolster top plates are bent downwards due to the pack rust. S16 bearing over FB4 in Span 10 has a short anchor bolt. Steel bent bearings over Piers 8 and 11. Bearings have areas of peeling paint with light to heavy rust and laminated rust. The anchor bolts, nuts and rivet heads have heavy rust and rosebudding with up to 80% section loss. See sheets 63-166 and photos 49-63.
STRINGERS:	5	Stringers in main spans 9 – 11 are continuous over the floorbeams in each span; stringers are not continuous over the piers. Stringer ends over the piers have heavy rust with section loss to 3/16" remaining (0.682" original) on the bottom flange. Stringer S9 bottom flange over FB10 in Span 11 has section loss to 1/16" remaining on the west leg with a 1" x 1/2" perforation and to 1/8" remaining on the east leg. Also there is ±1" loss of width resulting in 72% bottom flange loss (beyond the bearing area below the deck joint - not a critical area). Isolated stringer bottom flanges over the intermediate floorbeams have section loss to 3/8" remaining at random locations (S11 over FB6 in Span 10 resulting in 22.5% flange loss). Isolated stringer webs (0.44" original) have up to 3' long x 7-1/2" high x 3/16" deep section loss over the bearing (S9 and S11, Span 11 over FB 10). Stringer S9 web has two perforations up 2-1/2" x 1" resulting in up to 16.1% web loss for shear and 65.8% web loss for bearing. Random stringer webs have up to 6" diameter areas of section loss to paper thin remaining with perforations up to 4" diameter beyond the bearing (S6, Span 11 over FB 10). Stringers S6 and S7 in Span 11 over FB 10 have painted over section loss and perforations. End diaphragms over the piers have areas of moderate to heavy to laminated rust with ±3/16" deep pitting to knife edge on flanges and to paper thin remaining on webs and isolated perforations. Random stringer to diaphragm connection clip angles are not painted. See the stringer section loss table for members with section loss in critical zones. See sheets 124-166 and photos 12 & 64-69.
GIRDERS:	5	Plate girders in approach Spans 1 – 8 and 12: Original girders have random areas of heavy laminated rust with up to 5/16" deep x 8" wide section loss on the bottom flange at midspan (Span 7, G7 East leg) resulting in 8.7% flange loss. Random girder ends have laminated rust with severe section loss. Webs between bearing stiffeners have section loss to paper thin by up to 8-1/2" high with perforations up to 4" high x up to full width (Span 4, G7 at Pier 3, G4 & G7 at Pier 4). Random bearing stiffeners have up to 100% section loss at the bottom 6" (Span 4, G6 at Pier 4). Four girder ends have between 10% and 25% web loss for shear and twenty-eight girder ends have between 5% and 10% web loss for shear. One girder end has 81.4% web loss for bearing (Span 4, G6 at Pier 4). Nine girder ends have between 50% and 75% web loss for bearing and twenty-nine girder ends have between 25% and 50% web loss for bearing. See Girder Section Loss Summary Sheets for locations. Girders G7 and G8 in Span 7 over Pier 7 each have a bearing stiffener that is bowed up to 1-1/2' high x 1-1/2" to the south. Girder G3 southwest bearing stiffener in Span 6 at Pier 5 is bowed to the north for 1' high x 3/4". Girder G9 in Span 8 at Pier 7 has a bearing stiffener that is slightly bowed to the north.

		Also, there are random bearing stiffeners that are crippled due to section loss. Girders G7 and G8 (median girders) in Spans 4 –7 and 12 have an existing bolted repair angle at the girder bottom flanges and lower webs. Note: these existing bolted repair angles are discontinuous at web stiffeners and therefore do not improve the overall bending strength. Existing section loss at these locations are up to 14.6% section loss on the bottom flange (G7 in Span 5). This condition remains the same since the last inspection. Newer girders have areas of peeling paint with exposed primer and areas of light to heavy rust with some laminated rust, mostly along in the fascia girders. End diaphragms over the piers have areas of light to heavy rust with some laminated rust. Random diaphragms have saw cuts in channel flanges. See the girder section loss table for members with section loss in critical zones. Also, see items "WELDS-CRACKS", "COLLISION DAMAGE" and "MEMBER ALIGNMENT" below. See sheets 76-123 & 167-170 and photos 11 & 70-81.
FLOOR BEAMS:	4	Built up steel floorbeams in main spans 9 – 11 have heavy rust mainly in the original median bay with up to 1/4" deep x 2" wide section loss on the bottom flange and a 1/8" reduction in width (FB3, Span 9 between S15 and S16 resulting in 17.8% bottom flange loss) and up to 10" high x 10" wide x 1/8" deep section loss on the web (FB6, Span 9 between S15 and S16 resulting in 5.1% web loss). Floorbeam FB0 in Span 9 at Pier 8 has a severe section loss with random perforations up to 14" long x 2-1/2" wide at the bottom flange south angle horizontal leg between trusses T3 and T4. The most critical section loss is between stringers S15 and S16 (resulting in 23.3% bottom flange loss and 4.7% web loss) and between S17 and S18 (resulting in 25% bottom flange loss). There are isolated perforations at the base of the floorbeam webs up to 3" diameter (FB9, Span 11 below S8). The web stiffeners have section loss with isolated perforations up to 4" high x 4" wide (FB10, Span 11 at S12). The top flange tie plates are in contact (rubs) with the vertical gusset plate cutout at several locations; no visible wear or abrasion rust noted during this inspection. There is a gap between tie plate and spacer plate in Span 10, truss T1, node U1 at floorbeam FB1. No change since the last inspection. See the Floorbeam section loss table for members with section loss in critical zones. See sheets 124-166 and photos 12 and 82-87.
TRUSSES-GENERAL:	3	Original Riveted Trusses (Span 9, T2-T4 and Spans 10 & 11, T2 & T3): Truss members have areas peeling paint with light to heavy rust and areas of heavy laminated rust. The built-up bottom chord has random areas of pitting along the top of the top plate up to 7/16" deep pitting (Span 9, T4 at node L1). The bottom chord angle horizontal legs and bottom plates have areas of pitting to 1/16" remaining with edge perforations and up to 1/4" deep pitting on the vertical leg mostly at the end nodes, resulting in 14% loss (Span 10, T3 at node L0). The webs at these locations have areas of pitting up to 3/8" deep. Up to 2" thick impacted rust was noted between the bottom chord bottom angle horizontal leg and bottom plate; up to 1" thick impacted rust between web and bottom angle vertical leg and ±1/4" impacted rust between web and top plate at random locations. There is heavy debris buildup inside random bottom chord nodes with areas of up to 5/16" deep pitting on top of the bottom plate. The

bottom plates at these locations are bent down ±1/2" due to impacted rust.

The top chord of the original trusses have heavy laminated rust mainly at the ends, random areas of section loss up to 1/8" deep and debris accumulation on the interior of the top chord (Span 9, T4 at node U0). There is up to 1-1/8" thick impacted rust between the top chord bottom angle and bottom plate (Span 9, T4 at node U0).

Original truss diagonals typically have less than 5% section loss near the lower nodes, with up to 5/16" deep pitting (L0U1, Truss T2 in Span 11). The vertical compression truss members at the end nodes have areas of up to 3/8" deep pitting along the top of the bottom vertical gusset plates resulting in 15.6% section loss (Span 9, T4, L10U10, west side). The vertical compression members inside end nodes L0 and L10 above the bottom chord have heavy laminated rust with section loss to paper thin on the web (0.512" original thickness) with perforations up to 2-1/2" high x 13" wide and the flanges have ±1/8" deep section loss resulting in approximately 39.5% loss of cross sectional area (L10U10 at Truss T3 in Span 11). The bottom chord top plate at these locations has section loss to 1/8" remaining with perforations up to 9" x 5" resulting in <10% loss of cross sectional area (these locations are beyond the center line of the node/bearing - not a critical area).

Vertical gusset plates on the original trusses have areas of heavy laminated rust with section loss along the top of the bottom chord and along the bracing horizontal gusset plates. The interior and exterior surfaces of all gusset plates have section loss to 7/16" deep (3/4" original thickness) x up to full width x up to 6" high. D-meter readings were also taken showing up to 79% localized section loss and approximately 40% average section loss along the full length of the gusset plate.

Span 10, Truss T3 vertical gusset plates at Node L2 (five member node) have the most significant section loss. East gusset plate has section loss up to 7/16" deep by full width by up to 4-1/2" high on the interior surface and west gusset plate has up to 7/16" deep section loss on the interior surface and up to 5/16 inch deep section loss on the exterior surface. D-meter readings were taken at Nodes L0, L2, L4, L6, L8 & L10 along the top of the bottom chord due to heavy pigeon debris inside nodes. The minimum recorded reading was 0.16" (Span 10, T3 at Node L4 and Span 11, T3 at Node L8). Note that most of the accessible areas were cleared from debris and laminated rust before taking measurements. The end node vertical gusset plates have section loss to 1/8" remaining with isolated perforations up to 1" high by 1-1/2" long (Span 11, T2, Node L10).

See the Bottom Vertical Gusset Plate Section Loss table for locations.

Random vertical gusset plates at three member nodes have section loss along the bottom chord with isolated perforations. Span 9, Truss T4, node L1 west gusset plate has the most significant section loss to 1/8" remaining (3/4" original thickness) and two perforations up to 1-1/2" x 1" resulting in approximately 53% loss.

Note: A load rating analysis to verify the current load capacity is recommended for the vertical gusset plates.

See the Gusset Plate Section Loss table.

Welded Truss (Span 9, T1 & T5 and Spans 10 & 11, T1 & T4):
Truss chord, vertical and diagonal members have random areas of peeling paint with exposed primer and areas of light to moderate rust with some laminated rust (mostly at the joints and the areas that are exposed to drainage). At these locations, the flanges and webs have isolated areas of up to 1/8" deep section loss. The top and bottom chord connections have ±1/4" impacted rust at isolated areas. Vertical gusset plates on the bottom chord have random areas of peeling paint with light to moderate rust and isolated

		areas of section loss to 1/8" deep. Previously noted 1/8" deep section loss at node L2 in Span 9 at Truss T5 was not found. The top of the truss bottom chord has areas light to moderate debris with random plugged drain holes. Sway brace and lateral brace connection plates have a few areas of section loss up to 12" long x 3" high x 1/8" deep along the bracing members. Also see "WELDS-CRACKS" and "RIVETS & BOLTS" below. See sheets 172-268 and photos 88-109.
TRUSSES-PORTALS:	N	-
TRUSSES-BRACING:	5	Original bracing connecting original trusses T3 & T4 in main span 9 and T2 & T3 in main spans 10 – 11 have peeling paint with moderate to heavy rust throughout. There is up to 1-1/2" impacted rust between back to back angles and the upper lateral cross bracing has sagged up to 2" at random locations. Lower lateral cross bracing consists of two pairs of back to back angles connected with lacing bars to form an I-Section and has heavy rust at random locations. The lower bracing members and the connecting lateral gusset plates that are exposed to drainage have random areas of heavy laminated rust with up to 3/16" deep section loss to knife edge and random perforations up to 10" x 3". Also random lacing bars have up to 100% section loss mainly near the lower catwalk. Loose lacing bars were removed at time of inspection. Sway bracing and transverse struts consist of back to back angles and have peeling paint and up to 1/2" pack rust between angles. The connection plates for the upper and lower lateral and sway bracings have heavy laminated rust with up to 1/4" deep section loss and random perforations up to 8" x 5" in the vertical connection plates (Span 11, T3 – L9). See sheets 172-268 and photos 110-113.
PAINT:	3	There is extensive peeling paint with heavy rust primarily on main spans 9-11 original structural members (50% of the overall steel area). Also see above items.
RUST:	3	There are areas with heavy laminated rust with section loss on the original trusses, girders, stringers, floorbeams and bearings. See above items.
MACHINERY MOV SPAN:	N	-
RIVETS & BOLTS:	5	There are missing/broken bolts at the following locations: • (1) of (4) bolts is broken at the southwest connection between FB10 bottom flange to new truss T5 vertical member in Span 9. • Sheared off bolt at new truss T5 vertical gusset plate at node L0 in Span 9. • (1) Missing bolt at FB1 top flange connection to tie plate and horizontal gusset plate at new truss T4 in span 10 at node U5. • (1) Missing bolt at original truss T2 lateral brace gusset plate at the bottom chord connection at node L7 in span 10. • (1) Missing bolt at the vertical gusset plate, Span 10 new truss T4 at node U5. There are loose bolts at floorbeam tie plates, floorbeam connections, truss bottom chord and lateral bracing connection plates in main spans 9-11 at the following locations: • (4) bolts at FB5 top flange tie plate in span 11 at the connection to new truss T4. • Loose erection pins were noted at the following floorbeam connections: FB2, FB4 and FB 9 in Span 9, FB4 & FB5 in Span 10 and FB0, FB1 & FB8 in Span 11. • (1) Bolt nut at the top gusset plate of the lateral bracing connection to original truss T2 in Span 11 at node L2.

		• (1) Bolt nut at the center gusset plate connection of the bottom lateral brace between original trusses T2 and T3, panel 5 in Span 9. • (1) Bolt nut at the top lateral brace gusset plate at original truss T4 and FB4 in Span 9 • (1) Bolt at FB3 top flange connection to upper lateral brace gusset plate in Span 9 between S18 & S19. • (7) of (13) bolts at the sway bracing diagonal angle connection to vertical plate at node U8, new truss T4 in Span 10. • (1) of (16) bolts at east gusset plate connection to diagonal at new truss T1 at node U3 in Span 10. • (2) of (10) bolts at cross brace connection plate to new truss T1 vertical at node U2 in Span 10. Rivet heads and bolt heads at original truss members in main spans 9-11 have rosebudding with up to 100% section loss at random locations. See sheets 76-170 & 172-268 and photos 114-116 & 119.
WELDS - CRACKS:	5	There are several cracks in secondary structural members in approach Spans 1-8 & 12 at the following locations: • 1"L vertical hairline crack in the stiffener weld to girder G15 web in Span 1, at the bottom of the second intermediate diaphragm from the south abutment, (No change since the last inspection). • Full height through crack on the bottom of "T" member end at the second intermediate diaphragm from Pier 5 at girder G8 in Span 6. • The fourth intermediate diaphragm from Pier 11 at girder G13 in Span 12, Bay 12 has a disconnected lower "T" section from the stiffener. • The third intermediate diaphragm from pier 11 at the east side of girder G11 in Span 12 has a full depth x full height through crack on the lower "T" section. • S13 bolster at FB9 and FB10 in Span 11 has undercut and cracked welds at the top and bottom of the stiffening plate (< 6"L). Approach spans 1-8 and 12 have heavy rust with random areas of section loss near the girder bottom flange transition welds. Girder G7 north bottom flange transition weld in span 6 and G8 south bottom flange transition in span 7 both have a bolt through the transition (stress riser) and a broken washer (G7 only). Main spans 9 – 11 have tack welds throughout the nodes of new trusses T1, T2 & T5 in main span 9 and T1 & T4 in main spans 10 – 11. Cracked tack welds between filler plates or between truss members and filler plates are present at the following locations on the trusses: • U4L4 at node L4, truss T5 in span 9 (1) • U4L4 at node L4 & U5L6 at node L6, truss T5 in span 9 (1 EA) • U5L6 at node L6, truss T1 in span 10 (2) • U5L6 at node U5, truss T1 in span 10 (5) • U3L4 & U5L4 at node L4, truss T1 in span 10 (2) • U3L4 at node L4, truss T4 in span 10 (1) • U5L6 at node L6, truss T4 in span 10 (3) • U9L8 at node L8, truss T4 in span 10 (1) • U6L6 at node L6 (2) & U5L5 at node U5 (1), truss T4 in span 10 • U5L6 at node L6, truss T1 in span 11 (1) • U3L4 at node L4, truss T4 in span 11 (3) • U1L2 at node L2, truss T4 in span 11 (2) See sheets 76-170 & 172-268 and photos 117-119.
TIMBER DECAY:	N	-
CONCRETE CRACKING:	N	-
COLLISION DAMAGE:	7	There are random scrapes and dents on steel members in all spans (mostly appear to be due to construction). Girder G15 web at the second intermediate diaphragm connection from the south abutment has a slight bow.

		Span 11, Truss T2 between nodes L6 and L7. Bottom chord has impact damage to the east bottom angle horizontal leg and bottom plate. No change since the last inspection. See sheets 77, 78 & 240 and photos 120 & 121.
MEMBER ALIGNMENT:	7	Span 11, Truss T2 at node U10. East vertical gusset plate is slightly bent at both ends. Also see items "GIRDERS" and "COLLISION DAMAGE" above.
DEFLECT. UNDER LOAD:	N	N – Normal, E – Excessive
VIBRATION UNDER LOAD:	N	N – Normal, E – Excessive
STAND PIPES:	8	There are stand pipes on both northbound and southbound sides of the bridge at pier 7. No notable deficiencies noted.
BARREL LADDERS:	5	Access ladders to the upper and lower inspection catwalks are located on piers 8 and 11. Ladders to the lower catwalk between the original trusses are not furnished with OSHA approved cage protection. Additionally the access ladder at pier 11 is near a park walkway and accessible to intruders. The new ladder leading to the upper new catwalk is OSHA compliant. Note: The lower catwalk members (spans 9 - 11) typically have areas of heavy laminated rust especially below weep pipes locations. There are random areas of section loss typically up to 1/8" deep. Handrails and main channels have perforations at random locations. There are minor dents and random member misalignments. See sheets 172-268 and photos 61 – 62.

ARE BARREL LADDERS OSHA COMPLIANT? No

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60. SUBSTRUCTURE:	REINFORCED CONCRETE ABUTMENTS AND PIERS STEEL PIER BENTS	**Overall Rating:**	3

	Rating	
ABUTMENTS-STEM:	6	The abutment stems have areas of light scale, isolated horizontal and random vertical cracks up to full height with efflorescence; a few of the cracks are open up to 1/16" wide. There are isolated hollow areas up to 4' wide x 1' high and a few spalls up to 9" wide x 5" high x 2" deep with exposed rebar at the base of the South abutment stem. North abutment foreslope between girders G9 & G10 has a 5' wide by up to 2' deep erosion hole below the scupper pipe. The bottom edge of the stem is visible at this location and is undermined for 30" wide by up to 7" deep. The inspectors filled the erosion hole with rip-rap. See sheets 269 & 270 and Photos 125-128 & 151.
ABUTMENTS-BACKWALL:	7	North abutment backwall has random vertical hairline cracks up to full height with and without efflorescence and isolated areas of map cracking up to 2' diameter. Bay 11 has a 3 square foot hollow area with an adjacent 2' x 1' area of punky concrete. South abutment backwall has no notable deficiencies. See sheets 269 & 270 and Photos 125 & 126.
ABUTMENTS-		

FOOTINGS:	N	Not visible.
ABUTMENTS-SETTLEMENT:	8	None noted.
ABUTMENTS-WINGWALLS:	7	Wingwalls have areas of light graffiti, random horizontal and diagonal hairline cracks up to 1-1/2' long with and without efflorescence and isolated areas of hairline map cracking (mainly on the southeast wingwall). Northeast wingwall has a 3" diameter x 1/2" deep spall with exposed rebar. The joint filler is missing at both south abutment wingwalls. See sheets 270 & 271 and Photo 129.
PIERS/BENTS-CAPS:	3	Steel bents at Pier 8 and Pier 11. Original steel caps have peeling paint with heavy laminated rust throughout and up to 1-1/4" pack rust between bottom flange angles and batten plates. Top and bottom flange angles and top flange plates typically have areas of section loss up to 8'L x full width x 3/16" deep (up to 23.2% loss). Web plates (3/4" original) have random areas of laminated rust with up to 1/8" deep section loss over the full height between the top and bottom flange angles (up to 5.2% web loss). See Photos 134 & 135. Pier 8 steel bent cap between girders G12 and G13. Top flange plate has full width section loss to 1/4" remaining (5/8" original) and the top flange angles (5/8" original) have section loss to 5/16" remaining (42.3% top flange loss). Note that this is the cantilever section of the cap beam that supports girders G13 & G14. See Photo 136. Newer steel bents at the east and west ends of the original Pier 8 and Pier 11 bents. The top flange cover plates typically have heavy laminated rust with up to 1/8" deep pitting over the full width (up to 10% section loss). See Photos 134 & 137. Concrete caps for approach Piers 1-7 have random horizontal, vertical and map cracks open up to 1/8" wide with rust and efflorescence, areas of light to moderate honeycombing and several areas of shallow rebar. There are random hollow areas up to 4' wide x 6' high (Pier 7 underside) and spalls up to 2' wide x 3' high x 3" deep with exposed rebar (Pier 7 North elevation). Isolated bearing pedestals have vertical cracks and minor corner spalls up to 1' high x 5" wide x 3" deep (Span 2, G14 pedestal at Pier 1). See sheets 272-290 and Photos 130-137.
PIERS/BENTS-PILE BENT:	N	-
PIERS/BENTS-COLUMNS:	4	Steel bent columns at Pier 8 (Columns 3-9) and Pier 11. Original steel bent columns 5-7 have peeling paint with moderate to laminated rust and minor pitting. Columns at the connections to the bottom vertical gusset plates have moderate rust to laminated rust with up to 5/8" pack rust between the plates and members. Flanges typically have up to 1/8" deep section loss along the gusset plates. Pier 8, column 5 and 7 flanges have section loss along the bottom vertical gusset plates up to full width x 4" high x up to 5/16" deep (15.1% section loss). See Photos 138 & 139. Diagonal bracing and bottom web channels have heavy section loss to paper thin remaining with numerous perforations up to 16" wide x 2-1/2" high. Lacing bars and batten plates have random perforations and several lacing bars are severed. Pier 8 bent, bottom horizontal member has bolted steel repair plates between G11 and G12. See Photos 139-144. The interior surfaces of the bottom vertical gusset plates have laminated rust with up to 1/4" deep section loss along the columns and bracing members. A few gusset plates are bowed from pack rust. Pier 11 bent, column 3, South vertical gusset plate has heavy section loss to paper thin remaining with two perforations up to 3-1/2" x 1-1/2". See Photo 145. Newer steel bents at the east and west ends of the original bents. The bottom

		horizontal members typically have debris accumulation with laminated rust and up to 1/8" deep pitting on the horizontal webs and up to 2" high on the vertical flange legs (up to 8.3% section loss). See Photo 146. Concrete columns for approach Piers 1–7 have random vertical and horizontal cracks with rust and efflorescence open up to 1/16" wide, isolated hairline map cracks up to 4' x 3' and random areas of shallow rebar. Columns have random hollow areas with rust up to 16' high x 4' wide (Pier 6, column 5) and spalls with exposed rebar up to 4' wide x 3' high x 2" deep with exposed rusted rebar. Rebar has minor section loss (Pier 5, column 4). Stem solid Piers 8-11 have random areas of shallow rebar and areas of light scale. There are scattered areas of hairline map cracks and random horizontal, diagonal and vertical cracks with efflorescence and rust open up to 1/8" wide. Pier stems typically have random hollow areas up to 20' wide x 6' high (Pier 8, South elevation) and isolated spalls up to 3' wide x 1' high x 2" deep with exposed rebar (Pier 8, North elevation). Isolated bearing pedestals have vertical cracks and minor edge spalls up to full perimeter x 2" wide x 3" high (Span 9, truss T5 pedestal at Pier 9). Piers 9 and 10 are in the channel and have stone masonry facing at the water level. Pier 9, South elevation has a 20' wide x 10' high hollow area with a 6' x 5' x 2" deep spall with exposed rusted rebar. Rebar has minor section loss. Pier 10, near the center, has a crack with efflorescence that extends across the top of the cap and down the full height of both elevations. The crack was previously sealed, but the sealant has cracked. Stone masonry facing has up to 10% missing mortar with up to 1' of penetration between stones. See sheets 272-290 and Photos 130, 133, 134, 138, 139 & 147-150.
PIERS/BENTS-FOOTING:	5	Piers founded on piles. Based on the 2013 Underwater Inspection report for Piers 9 & 10 by Collins Engineers. Pier 9 footing has light to moderate scale with two vertical hairline cracks. The exposed tremie exhibits intermittent moderate to severe scale with laitance up to 4" of penetration into the top of the tremie. Pier 10 exposed tremie exhibits a 5' wide by 2' high by 4' deep spall on the west face, intermittent spall and scaling up to 1.2' deep, and laitant concrete with up to 4" of penetration. Also see 2013 Underwater Inspection Report for additional details.
PIERS/BENTS-SETTLMT:	8	None noted. Also per the 2013 Underwater Inspection Report, there is no notable settlement occurring at Piers 9 & 10.
EROSION-SCOUR:	5	Scour: Rated – 5. Per the 2013 Underwater Inspection Report by Collins Engineers dated 8/22/2013, scour along the north and west faces of Pier 9 and along the west face of Pier 10 has exposed the footings and tremies at several locations. Pier 9 tremie is undermined on the west side for 32' long x up to 3.2' high with up to 8' of penetration. The footing is exposed up to 108' long on the north face by up to full height and 50' long by up to full height on the south face. Pier 10 tremie is exposed at the southwest corner up to 5' high x 12' long. The footing is exposed up to 39' long on the south face by up to full height and 10' long by up to 2' high on the north face. Also see the 2013 Underwater Inspection Report for additional details. Erosion: Rated - 7. North abutment foreslope between girders G9 & G10 has a 5' wide by up to 2' deep erosion hole below the scupper pipe. The bottom edge of the stem is visible at this location and is undermined for 30" wide by up to 7" deep. The inspectors filled the erosion hole with rip-rap. Slope protection between Piers 1 and 3 has random cracks, areas of minor settlement and heavy scale/spalls along the edges of the blocks. See sheets 269, 270, 272 & 274 and Photos 126-128, 130 & 151.
CONCRETE CRACK-SPALL:	5	See items "Abutment - Stem", "Abutment - Backwall", "Abutment Wingwalls", "Piers/Bents Caps", "Piers/Bents - Columns" above.
STEEL		See items "Piers/Bents – Caps" and "Piers/Bents – Column" above.

CORROSION:	3	
PAINT:	3	Greater than 50% of the painted surfaces are rusting on the steel bents at Piers 8 & 11. See sheets 280-283 & 288-290 and Photos 134-146.
TIMBER DECAY:	N	-
COLLISION DAMAGE:	8	-
DEBRIS:	6	Moderate accumulation of sand, rust and bird debris on pier caps and steel bent members up to 10" high. See Photos 146 & 152.

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61. CHANNEL & CHANNEL PROTECTION: Channel notes and condition ratings are based on the August 22, 2013 Underwater inspection report, see the full report for additional details. **Overall Rating:** 5

	Rating	
CHANNEL SCOUR:	5	2013 Underwater Inspection Report by Collins Engineers dated 8/22/2013. Since the 2010 inspection the channel bottom has experienced large areas of both scour, up to 10' deep, and aggradation, up to 6.2' high. Pier 9 channel bottom has experienced scour along the west and north face up to 5.6' deep. Pier 10 channel bottom has experienced scour along the west face up to 4.8' deep (at southwest corner). Pier 9 tremie is undermined on the west side for 32' long x up to 3.2' high with up to 8' of penetration. The footing is exposed up to 108' long on the north face by up to full height and 50' long by up to full height on the south face. Pier 10 tremie is exposed at the southwest corner up to 5' high x 12' long. The footing is exposed up to 39' long on the south face by up to full height and 10' long by up to 2' high on the north face. Also see the 2013 Underwater Inspection Report for additional details.
EMBANKMENT EROSION:	6	Sloughing of the trees along embankments with moderate undercutting was observed. See Photos 153 & 154.
DEBRIS:	6	Intermittent man-made debris was noted in the channel and along the piers.
VEGETATION:	7	Sufficient growth was observed on both embankments. See Photos 153 & 154.
CHANNEL CHANGE:	6	No significant lateral migration was noted. See "Channel Scour" above.
FENDER SYSTEM:	N	Navigation Lights Rated: 5. Navigation lights are located in Span 9 only and are misaligned. Lights were not 'on' at the time of inspection. The north light on the east fascia has a detached safety chain and the green light on the west fascia has a broken glass lens. See Photos 155 & 156.
SPUR, DIKES & JETTIES:	N	-

RIP RAP:	6	Rip rap was placed at the embankments only.

62. CULVERTS & RETAINING WALL:	-	**Overall Rating:**	N

65. APPROACH CONDITION	BITUMINOUS PAVEMENT	**Overall Rating:**	7

	Rating	
APPROACH SLAB:	7	Not visible. Rating is based on the condition of the approach pavement.
RELIEF JOINTS:	7	Not visible. Rating is based on the condition of the approach pavement.
APPROACH GUIDE RAIL:	7	Metal beam guide rail at the Southwest, Southeast and Northeast approaches. The Southwest and Northeast approach guide rails have areas of minor impact damage up to 12' long. Continuous concrete barrier at the Northwest approach has random scrape marks and light scale. See sheets 56 & 61 and Photo 157.
APPROACH PAVEMENT:	7	South approach pavement has isolated transverse cracks up to full width x up to 1/2" wide in the travel lanes and up to 4" wide with vegetation growth in the shoulders. North approach pavement is new since the last inspection. No notable deficiencies. See sheets 56 & 61 and Photos 158-160.
APPROACH EMBANKMENT:	7	There is light vegetation growth along the approach embankments.

TRAFFIC SAFETY FEATURES

	Rating	
BRIDGE RAILINGS:	Last Inspection: 1 Current: 0	Solid concrete parapets greater than 42 inches high on NHS.
TRANSITIONS:	Last Inspection: 0 Current: 0	Not R-B 350 compliant. MBR has steel block-outs.
APPROACH GUARDRAILS:	Last Inspection: 0 Current: 0	Not R-B 350 compliant. MBR has steel block-outs.
APPR. GUARDRAIL		

38/42

ENDS:	Last Inspection: 0 Current: 0	Not R-B 350 compliant.

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66. LOAD POSTING

	- Posted Loading -	
SINGLE UNIT (TONS):	Last Inspection: - Current: -	-
SEMI TRAILER (TONS):	Last Inspection: - Current: -	-
4 AXLE (TONS):	Last Inspection: - Current: -	-
3S2 (TONS):	Last Inspection: - Current: -	-
ADVANCE WARNING (Y/N):	N	-
LEGIBILITY:	N	-
VISIBILITY/LOCATION:	N	-

---

67. MISCELLANEOUS

	Rating	
MIN. VERT. UNDERCLEARANCE:	Last Inspection: 14' 5" Current: 14' 4"	Span 1 along Route 110 westbound right shoulder line.
POSTED CLR. UNDER BRIDGE:	Last Inspection: -' -" Current: -' -"	-
POSTED CLR. ON BRIDGE:	Last Inspection: -' -" Current: -' -"	-
ADVANCED WARNING (YES/NO):	No	-
SPEED LIMIT (IF ANY):	Last Inspection: 50 Current: -	-

CHARACTER OF TRAFIC:

Moderate to Heavy volume and mixed weights.

ADDITIONAL NOTES:

1. Bridge identification number is clear and legible.
2. The bridge is logged from south to north with G1 & truss T1 located at the west fascia which is consistent with the previous inspection report and bridge plans.
3. An 80' Manlift and a 30' Lift truck were used to access approach spans 1 – 8 & 12. Climbing, a UB-60 and 60' boat-lift were used to access main spans 9 -11.
4. Road access to Span 12 was via a bike path which must be arranged in advance with the city of Derby at phone #'s 203-410-5193 & 203-736-1468. City of Shelton Parks and Recreation has the key to locked gate for access to Span 7 and can be contacted at phone # 203-925-8422.

ADDITIONAL COMMENTS:

Inspection catwalks in the main spans are accessible to intruders, a controllable access gate is highly recommended at pier 11.

Item Nos. 1-3 of BMM No. 12-285 have not been addressed. Item Nos. 1, 4 & 9 - 13 for previously issued BMM No. 09-728 have not been addressed. Item Nos. 2 - 3 for previously issued BMM No. 05-445 have not been addressed.

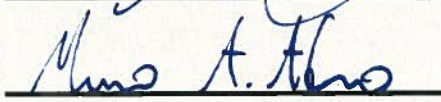
Side mounted sign structures attached to the West parapet in Span 1 and the East parapet in Span 4 are slightly loose and can be rocked by hand. Anchor bolt nuts are backed off by up to 5/16" and are frozen in place.

See sheets 56 & 57 and Photos 25 & 26.

Due to significant section loss to webs, flanges, gusset plates and steel pier bents at or near critical areas, a new superstructure load rating analysis and substructure load rating analysis is recommended for this structure.

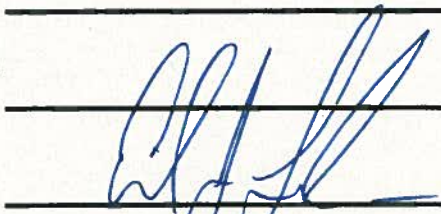
Inspectors' Signatures:

1)  **Date:** 03/20/2014

2)  **Date:** 03/20/2014

3) **Date:** ----/----/-----

4) **Date:** ----/----/-----

P.E. Signature:  **Date:** 03/20/2014

P.E. #: 22045 **Date:** ----/----/-----

Reviewed by: **Date:** ----/----/-----

conndot

Appendix D: Cost Estimate Computations

AECOM

JOB TITLE Commodore Hull Bridge - Paint Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/15/2014
REVIEWER MDS DATE 7/1/14
SCALE SHEET NO. 1 OF 9

GENERAL

- AISC Steel Construction Manual - 13th Edition
  → used for section properties of rolled-steel members
- 1982 Plans of Commodore Hull Bridge (Bridge #00571A)
  → used to determine # of specific member types within a span
  → used to determine member cross sections (span truss members excluded)
- 1948 Plans of Commodore Hull Bridge (Bridge #00571A)
  → used to determine truss span member lengths and cross sections
- Microsoft Excel
  → used for all applicable calculations

Member/Truss	Contributing Surface Area (ft^2)
GIRDERS	16,292
STRINGERS	1,995
FLOOR BEAMS	~~5,997~~ 6525
TRUSS (PIER 8)	2,405
TRUSS (PIER 11)	2,496
TRUSS SPAN	4,383
Σ	~~33,568 ft^2~~ ← Overall Area-to-be-Painted

34,096 ft^2

Additional sf of Truss Diagonal Members:

13,800 ft^2

Σ 13,800
34,096
47,896 → 50,000 ft^2

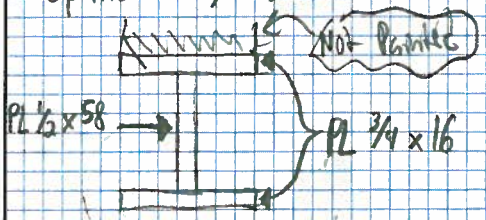
Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Paint Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/14/2014
REVIEWER MPM DATE 7/1/14
SCALE SHEET NO. 2 OF 9

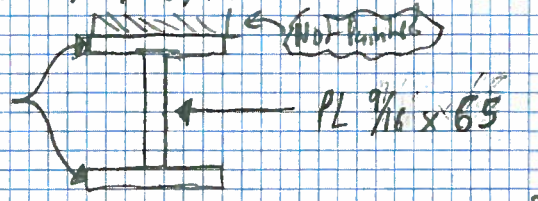
GIRDERS: * NOT TO SCALE

Spans A1, P1, P2 & P3



Cross Sectional Area (A): 53 in.² → 0.37 ft²
Perimeter: 15.17 ft (14.37 ft²) OK
Surface Area per Length Foot: 15.17 sf/length ft.

Spans P4, P5, P6, P7 & P11



Cross Sectional Area (A): 60.56 in.² → 0.42 ft²
Perimeter: 16.32 ft (14.99 ft²) OK
Surface Area per Length Foot: 16.32 sf/length ft.

SPAN	# of Existing (Original) Girders
A1	9
P1	9
P2	9
P3	6
P4	8
P5	8
P6	9
P7	9
P11	10

* Girders to be painted 5 length feet from both ends

SPAN	Area-To-Be-Painted (Ft.²)
A1	1,371.96
P1	1,371.96
P2	1,371.96
P3	914.64
P4	1,312.32
P5	1,312.32
P6	1,476.36
P7	1,476.36
P11	1,640.40
Σ	12,248.28 → 12,249 ft² (to be conservative)

* Additional 33% of projected area to account for Bearings, Bearing Stiffeners, & end diaphragms

Total Area of Girders to-be-painted = (12,249 ft²) × (1.33) = 16,291.17 ft²
→ 16,292 ft² ✓
(to be conservative)

Note:

Painted Area = # of girders in Span × [2(Cross Sectional Area) + 2(5 length feet × Surface Area per length foot)]

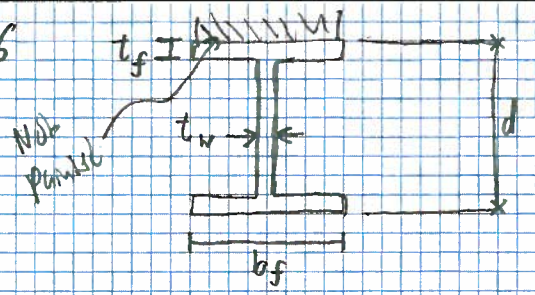
Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Paint Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/14/2014
REVIEWER MPE DATE 7/1/14
SCALE SHEET NO. 3 OF 9

STRINGERS : W24x76

t_f : 0.680 in.
b_f : 8.99 in.
t_w : 0.440 in.
d : 23.9 in.
A : 22.4 $in.^2$
↳ 0.16 ft^2



* IGNORE FILLETS FOR ESTIMATION PURPOSES
* NOT TO SCALE

Perimeter = $4t_f + (2b_f) + 2(d - 2t_f) + 2(b_f - t_w)$
= 82.88 in
= 6.91 ft.
(ok for this Estimate)

Surface Area per Foot Length : 6.91 sf/ft. length

SPAN	# of Existing (Original) Stringers
P8	9
P9	7
P10	7

* Stringers to be painted 5 length feet from both ends

SPAN	Area-To-Be-Painted ($ft.^2$)
P8	624.40
P9	485.64
P10	485.64
Σ	1,595.69 → 1,596 ft^2 (to be conservative)

* Additional 25% of projected area to account for diaphragms and connection plates

Total Area of Stringers to-be-painted = $(1{,}596\,ft^2) \times (1.25) = \boxed{1995\,ft^2}$

Note:

Painted Area = # of stringers in span × [2(Cross Sectional Area) + 2(5 length feet × Surface Area per length foot)]

Grid: 10x10 = 1"

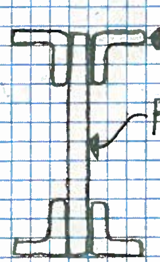
AECOM

JOB TITLE: Commodore Hull Bridge – Paint Estimate
JOB NO.: 126-170
CALCULATION NO.:
ORIGINATOR: Christopher M. Regan, Jr.
DATE: 5/14/2014
REVIEWER: MPB
DATE: 7/1/14
SCALE:
SHEET NO. 4 OF 9

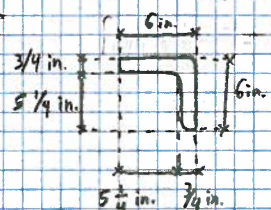
FLOORBEAMS:

*NOT TO SCALE

* IGNORE ANGLE FILLET FOR ESTIMATION PURPOSES



$L\,6\times6\times\frac{3}{4}$: $A = 8.46\,in^2 = 0.06\,ft^2$



Section Perimeter $= 8(\frac{3}{4}in.) + 8(5\frac{1}{4}in.) + 2(6in. + 6in. + \frac{3}{8}in.) + 2(66in - 12in)$

$\Rightarrow 180.75\,in. \Rightarrow 15.06\,ft$

Surface Area per length foot = 15.06 sf/length ft.

Section Area $= 0.41\,ft^2$

SPAN	# of Existing (Original) floorbeams
P8	11
P9	11
P10	11

SPAN	Area-To-Be-Painted (ft^2)	
P8	1,665.62	1807 ft^2
P9	1,665.62	1807 ft^2
P10	1,665.62	1807 ft^2
Σ	4,996.86 → ~~4,997~~ ft^2 (to be conservative)	5421 ft^2

* Floorbeams to be painted 5 length feet from both ends

* Additional 20% of projected area to account for stiffener plates

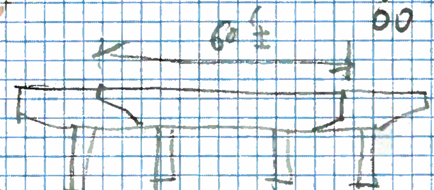
Total Area of Floorbeams to-be-painted = (~~4,997~~ ft^2) × (1.20) = ~~5,996.40~~ ft^2 ⇒ ~~5,997 ft^2~~ (to be conservative)

5421 ft^2 → 6505.92 ft^2 → 6525 ft^2

Note:

Painted Area = # of floorbeams in span × [2(Section Area) + 2(5 length feet × Surface Area per length foot)]

Only Painting End Floorbeams



~~*~~ × [~~(0.41 ft^2)~~ (2) + 2(60' × 15.06)]

0 — No Painting ends

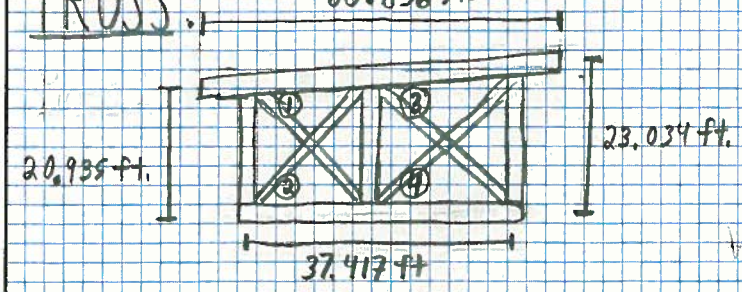
Floorbeams in Span

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Paint Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/14/2014
REVIEWER MDS DATE 7/1/14
SCALE SHEET NO. 5 OF 9

TRUSS:



Diagonal Members / Bottom Horizontal Member
W14x43
Vertical Members
W14x109

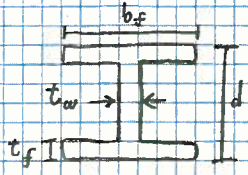
Vertical Member	Member Length (ft.)
Left	20.935
Middle	21.985
Right	23.034

Diagonal Member	Member Length (ft)
1	28.076
2	28.867
3	28.867
4	29.674

Horizontal Member	Member Length (ft)
Bottom	37.417
Top	60.892

W14x43:

$A = 12.6\ in^2$
$d = 13.7\ in$
$t_w = 0.305\ in.$
$t_f = 0.530\ in.$
$b_f = 8\ in.$



* IGNORE FILLETS FOR ESTIMATION PURPOSES

$A = 0.0875\ ft^2$

$Perimeter = 2b_f + 4t_f + 2(b_f - t_w) + 2(d - 2t_f)$
$\Rightarrow 58.79\ in. \Rightarrow 4.90\ ft.$

Surface Area per Length Foot = 4.90 sf/length ft.

W14x109:

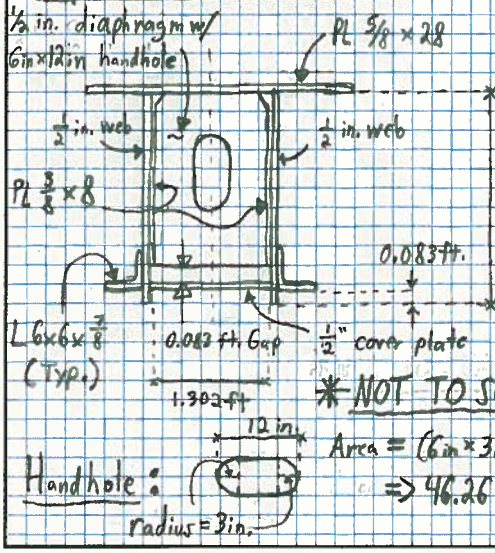
$A = 32.0\ in.^2$
$d = 14.3\ in.$
$t_w = 0.525\ in.$
$t_f = 0.860\ in$
$b_f = 14.6\ in$

$Perimeter = 2b_f + 4t_f + 2(b_f - t_w) + 2(d - 2t_f)$
$= 85.95\ in \Rightarrow 7.16\ ft$

Surface Area per Length Foot = 7.16 sf/Length ft.

$A = 0.222\ ft.^2$

Top Horizontal Member Cross Section



L 6x6x⅞: $A = 9.75\ in^2$
$t = ⅞\ in.$

$Perimeter = (2.33\ ft) + 2(0.0521\ ft.) + (2.33\ ft - 1.385\ ft.) +$
$+ 2(2.791\ ft. - 0.583\ ft.) + 4(0.073\ ft) + 4(0.427\ ft.) +$
$+ 2(0.5\ ft) + 4(0.083\ ft.) + 2(0.042\ ft) + 1.302\ ft$
$\Rightarrow 12.513\ ft$

Surface Area per Length Foot = 12.513 sf/length ft.

Handhole:

$Area = (6in \times 3in) + \pi(3in)^2$
$\Rightarrow 46.26\ in^2 \Rightarrow 0.321\ ft^2$

Grid: 10x10 = 1"

TRUSS: (PIER 8 continued)

Section Surface Area = $[(1.302\text{ft})(2.791 - 0.208\text{ft}) - (0.321\text{ft}^2)] + (7.936\text{ft} \times 0.67\text{ft}) + 2(2.791\text{ft} \times 0.042\text{ft}) +$
$+ (0.042\text{ft} \times 1.302\text{ft}) + (2.33\text{ft} \times 0.052\text{ft}) + 2(0.0678\text{ft}^2)$

$\Rightarrow 8.91\text{ft}^2$

Member	Area-To-Be-Painted (Ft.^2)
Diagonal 1	137.75
Diagonal 2	141.62
Diagonal 3	141.62
Diagonal 4	145.58
Left Vertical	150.34
Mid Vertical	157.86
Right Vertical	165.37
Bottom Horizontal	183.52
Top Horizontal	779.76
$\sum$	2,003.41

* Additional 20% of projected area for Gusset Plates and Bearings

Total Surface Area = $(2,003.41\text{ft}^2) \times (1.20) = 2,404.10\text{ ft.}^2$

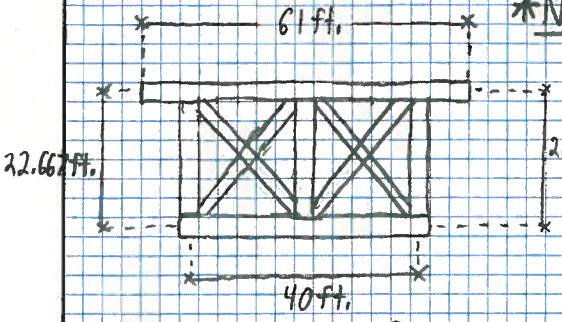
$\Rightarrow$ **2,405 ft.^{2}** (To be conservative)

AECOM

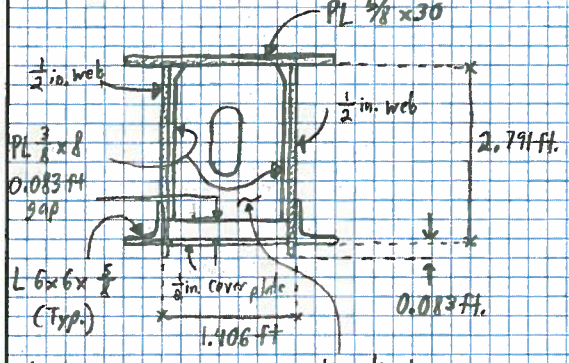
JOB TITLE Commodore Hull Bridge – Paint Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/15/2014
REVIEWER DATE
SCALE SHEET NO. 7 OF 9

TRUSS: (PIER 11)

*NOT TO SCALE



Top Horizontal Member Cross Section



*NOT TO SCALE

Diagonal Members / Bottom Horizontal Member
W14x43

Vertical Members
W14x109

Member	Member Length (Ft.)
Vertical	22.667
Diagonal	30.23
Bottom Horiz.	40.00
Top Horiz.	61.00

L6x6x 5/8 : $A = 7.11\ in^2 = 0.049\ ft^2$
$t = 5/8\ in. = 0.625\ ft.$

Perimeter = (2.5 ft) + 2(0.052 ft) + (2.5 ft − 1.406 ft.) + 2(2.791 ft. − 0.583 ft.)
+ 4(0.052 ft) + 4(0.498 ft) + 2(0.5 ft) + 4(0.083 ft) +
+ (1.406 ft)
⇒ 12.852 ft.

Surface Area per Length Foot = 12.852 sf / length ft.

Section Surface Area = [(1.406 ft. − 0.083 ft)(2.791 ft. − 0.625 ft.) − (0.321 ft²)] + 2(0.049 ft.²) +
+ 2[(2.791 ft + 0.083 ft)(0.042 ft.)] + [(1.406 ft − 0.083 ft)(0.042 ft)] +
+ (2.5 ft × 0.052 ft) + (7.936 ft × 0.67 ft.)
⇒ 9.05 ft.²

Member	Area-To-Be-Painted (ft.²)
Diagonal (x4)	593.19
Vertical (x3)	466.22
Bottom Horiz.	196.18
Top Horiz.	802.07
Σ	2,079.65

* Additional 20% of projected area for Gusset Plate and Bearings

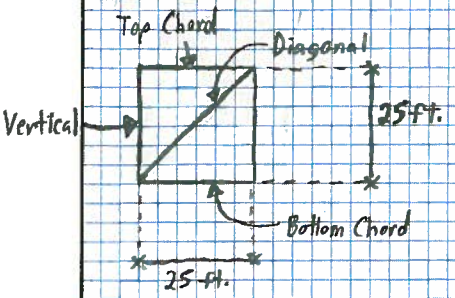
Total Surface Area = (2,079.65 ft.²) × (1.20) = 2,495.59 ft.²
⇒ 2,496 ft.²
(to be conservative)

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Paint Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/15/2014
REVIEWER DATE
SCALE SHEET NO. 8 OF 9

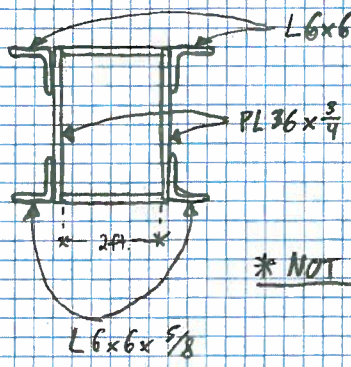
TRUSS SPAN:



Member	Member Length (ft.)
Top Chord	25
Bot. Chord	25
Vertical	25
Diagonal	35.4

* Paint Entire Vertical Member; Only Paint last 5 length feet of Chords and Diagonal

Top Chord Section

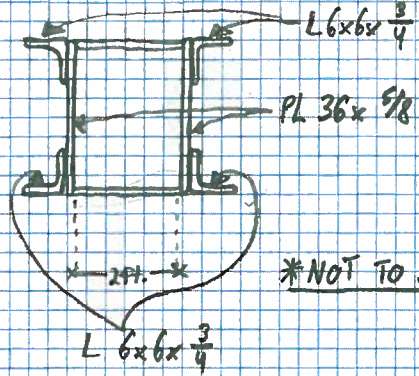


* NOT TO SCALE

Perimeter $= 2(2ft + 3ft + 0.125ft) + 4(0.0625ft.) + 4(0.052ft) +$
$+ 4(0.4375ft.) + 4(0.446ft.) + 2(3ft. - 1ft.)$
$\Rightarrow 14.25$ ft.

Surface Area per Length Foot = 14.25 sf/length ft.

Bottom Chord Section

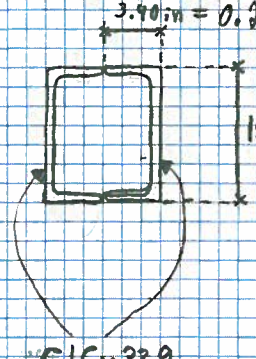


* NOT TO SCALE

Perimeter $= 2(2ft + 1ft + 0.104ft) + 8(0.0625ft.) + 8(0.4375ft.) +$
$+ 2(3ft. - 1ft.)$
$\Rightarrow 14.21$ ft.

Surface Area per Length Foot = 14.21 sf/length ft.

Vertical Section



* NOT TO SCALE

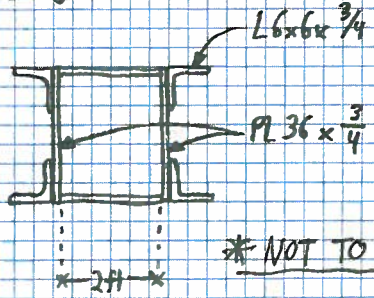
Perimeter $= 4(0.283ft) + 2(1.25ft) = 3.63$ ft

Surface Area per Length Foot = 3.63 sf/length ft.

Grid: 10x10 = 1"

TRUSS SPAN: (continued)

Diagonal Section



* NOT TO SCALE

Perimeter = 2(2ft + 1ft + 0.125ft) + 8(0.0625ft) + 8(0.4375ft.) + + 2(3ft - 1ft)

⇒ 14.25 ft.

Surface Area per Length Foot = 14.25 sf/length ft.

Member	Area-To-Be-Painted ($ft.^2$)
Top Chord	71.25
Bottom Chord	71.04
Vertical	90.80
Diagonal	71.25
$\sum$	304.34

* 6 Truss End-Spans / 2 sections per end-span

Total Surface Area To-Be-Painted = $12 \times 304.34 ft^2 = 3,652.08 ft.^2$

* Additional 20% of projected area for Gusset Plates and Bearings

Total Surface Area = $(3,652.08 ft^2)(1.20) = 4,382.50 ft.^2$

⇒ $\boxed{4,383 ft.^2}$ (to be conservative)

AECOM

JOB TITLE Commodore Hull Bridge – Additional Paint (Span Trusses)
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/20/2014
REVIEWER MPB DATE 7/1/14
SCALE SHEET NO. 1 OF 2

GENERAL:

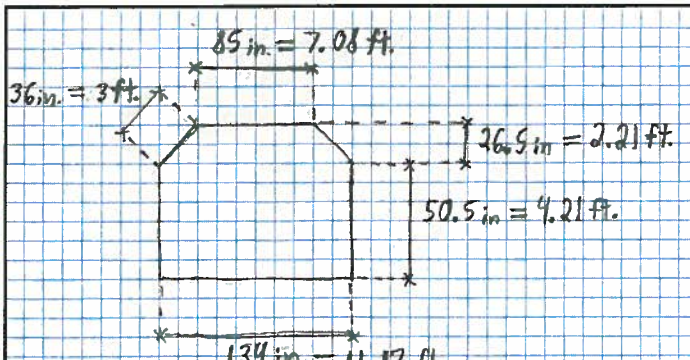
- Gusset Plate Field Inspection Report
  → used to approximate dimensions of bottom chord gusset plates on span trusses

TOTAL SURFACE AREA = 13,800 ft.^{2}

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Additional Paint (Span Trusses)
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/20/2014
REVIEWER DATE
SCALE SHEET NO. 2 OF 2



Surface Area (2D) = (4.21 ft.)(11.17 ft) +
$+ \frac{1}{2}(2.21 ft.)(7.08 ft + 11.17 ft)$
$= 67.19 ft.^2$

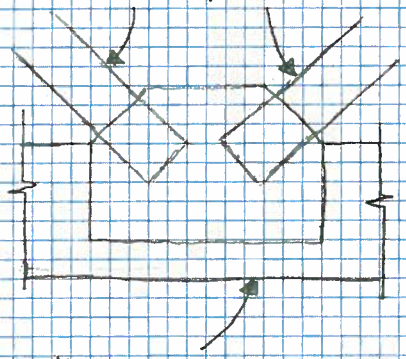
Perimeter = 2(2.21 ft) + 2(4.21 ft.) + 7.08 ft + 11.17 ft
= 31.09 ft.

• 1.5 in = 0.125 ft thick gusset plates

Span Truss Gusset Plate (Typ.)

Surface Area (3D) = $2(67.19 ft^2) + (31.09 ft.)(0.125 ft.) = 138.27 ft.^2$

→ Say $\boxed{140 ft.^2}$ to be conservative



• Paint last 5 ft. of diagonal members where they connect w/ the gusset plate at the bottom chord
• Paint 5 ft. of bottom chord in both directions from the gusset plate
• Paint entire gusset plate

Note: • 16 gusset plates per truss to paint
• 16 diagonal members per truss to paint
• 8 bottom chord 10 ft. lengths to paint per truss

PER SPAN TRUSS

Surface Area = $16(140 ft.^2) + (16)(5 ft.)(14.25 ft^2/LF) + (8)(10 ft.)(14.21 ft^2/LF)$
$= 4,516.8 ft.^2$
→ Say $4,600 ft.^2$ to be conservative

(3 SPAN TRUSSES)

Total Surface Area = $3(4,600 ft.^2) = \boxed{13,800 ft.^2}$

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Steel Repair Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/16/2014
REVIEWER JWR DATE 7/1/14
SCALE SHEET NO. 1 OF 4

GENERAL:

- AISC Steel Construction Manual – 13th Edition
  → used to obtain section properties of rolled-steel members
- 00571A Section Loss Summary Report
  → used to quantify number of repairs required and calculate the corresponding weight of steel required for said repairs
- Microsoft Excel → used for all applicable calculations

8.20 cwt	Approach Span Girders : Web loss
4.25 cwt	Approach Span Girders : Flange loss
2.25 cwt	Stringers : Flange loss
34.17 cwt	Gusset Plates
4.95 cwt	Floorbeams
20.00 cwt	Truss Bents
15.00 cwt	Truss Bracing
20.00 cwt	Pier Caps : Top Flange loss
108.82 cwt	

↑ Overall Weight of Steel required for repairs

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Steel Repair Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/15/2014
REVIEWER MPE DATE 7/1/14
SCALE SHEET NO. 2 OF 4

GIRDERS:

Note: 1 CY = 1,728 in³
Volumetric Weight of Steel = 490#/1 CY

	Web	Brg. Stiffeners
# of perforations	27	14

* Use PL 12x9x½ for each perforation

$(12in)(9in)(\frac{1}{2}in) \times \frac{490\#}{1{,}728\,in^3} = 15.3\#/perforation \rightarrow$ Say $20\#/perforation$ to be conservative

$(20\#/perforation) \times (41\ perforations) = 820\#$ * 100# of steel = 1 cwt of steel

Weight of Steel Required = 8.2 cwt

# of girder flanges w/ 15%+ loss	# of repair plates required
	4

* Use PL 16x½x36 for each girder flange loss of 15%+

* One flange has 14.6% loss → Say 5

$(16in)(\frac{1}{2}in)(36in) \times \frac{490\#}{1{,}728\,in^3} = 81.67\# \rightarrow$ Say $85\#/flange\ loss$ (to be conservative)

$(85\#/flange\ loss) \times (5\ flange\ losses) = 425\#$

Weight of Steel Required = 4.25 cwt

STRINGERS: (Flange loss)

# of stringers w/ 15%+ loss	# of repair plates required
	4

* Use PL 12x24x½ for each stringer loss

* One stringer has 9.2% loss → Say 5

$(12in)(24in)(\frac{1}{2}in) \times \frac{490\#}{1{,}728\,in^3} = 40.8\#/stringer\ loss \rightarrow$ Say $45\#/stringer\ loss$ (to be conservative)

$(45\#/stringer\ loss) \times (5\ stringer\ losses) = 225\#$

Weight of Steel Required = 2.25 cwt

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Steel Repair Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/15/2014
REVIEWER MHS DATE 7/1/14
SCALE SHEET NO. 3 OF 4

GUSSET PLATES:

# of Gusset plates w/ $\frac{1}{4}$" + loss	# of Angles required
	51

* Use L 6x4x$\frac{1}{2}$ for each gusset plate section loss

* Average section loss length = 45.9 in. → Say 48 in. to be conservative

(From AISC Steel Manual → Table 1-7) L 6x4x$\frac{1}{2}$ → 16.2#/length foot

$(48\text{ in})\times\left(\frac{1\text{ ft}}{12\text{ in}}\right)\times\left(\frac{16.2^{\#}}{1\text{ ft}}\right)=64.8^{\#}/\text{gusset plate loss}$ → Say $67^{\#}/\text{gusset plate loss}$ (to be conservative)

$(67^{\#}/\text{gusset plate loss})\times(51\text{ gusset plate losses})=3{,}417^{\#}$

Weight of Steel Required = 34.17 cwt

FLOOR BEAMS:

# of Floorbeams w/ 15% + loss	# of repair plates required
	7

* Use PL 12x24x$\frac{1}{2}$ for each floorbeam loss

* 4 floorbeams w/ 14.4%, 13.3%, 13.3% & 13.3% → Say 11

$(12\text{in})(24\text{in})(\frac{1}{2}\text{in})\times\frac{490^{\#}}{1.728\text{ in}^3}=40.8^{\#}/\text{floorbeam loss}$ → Say $45^{\#}/\text{floorbeam loss}$ (to be conservative)

$(45^{\#}/\text{floorbeam loss})\times(11\text{ floorbeam losses})=495^{\#}$

Weight of Steel Required = 4.95 cwt

TRUSS BENTS @ PIERS 8 & 11:

Weight of Steel Required = 10 cwt/Truss = 20 cwt ← Assumption

TRUSS BRACING:

Weight of Steel Required = 15 cwt ← Assumption

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Steel Repair Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/16/2014
REVIEWER MPS DATE 7/1/14
SCALE SHEET NO. 4 OF 4

TOP FLANGES OF PIER CAPS

* Use PL 30 x 96 x ½ for each pier cap

$(30\text{in})(96\text{in})(\frac{1}{2}\text{in}) \times \left(\frac{490^{\#}}{1{,}728\,\text{in}^3}\right) = 408^{\#}/\text{pier cap}$ * 4 pier cap flanges require repair

$(408^{\#}/\text{pier cap}) \times (4\ \text{pier caps}) = 1632^{\#} \rightarrow$ Say $2000^{\#}$ to be conservative

Weight of Steel Required = 20 cwt

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Metal Bridge Rail Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/20/2014
REVIEWER MAE DATE 7/1/14
SCALE SHEET NO. 1 OF 1

GENERAL:

- Commodore Hull Bridge Plans
  → used to determine applicable stations and corresponding distances

Ramp C: Sta. 25+26 → Sta. 26+40
Rail Length = 2640 ft. - 2526 ft = 114 ft.

Ramp D: Sta. 22+18 → Sta. 26+50.4 (Ramp D) & Sta. 126+54.0 → Sta. 129+25 (℄ Survey)

Rail Length = (2650.4 ft - 2218 ft) + (12,925 ft. - 12,654 ft.) = 703.4 ft ≈ 704 ft.

℄ Survey: Sta. 124+99 → Sta. 126+35

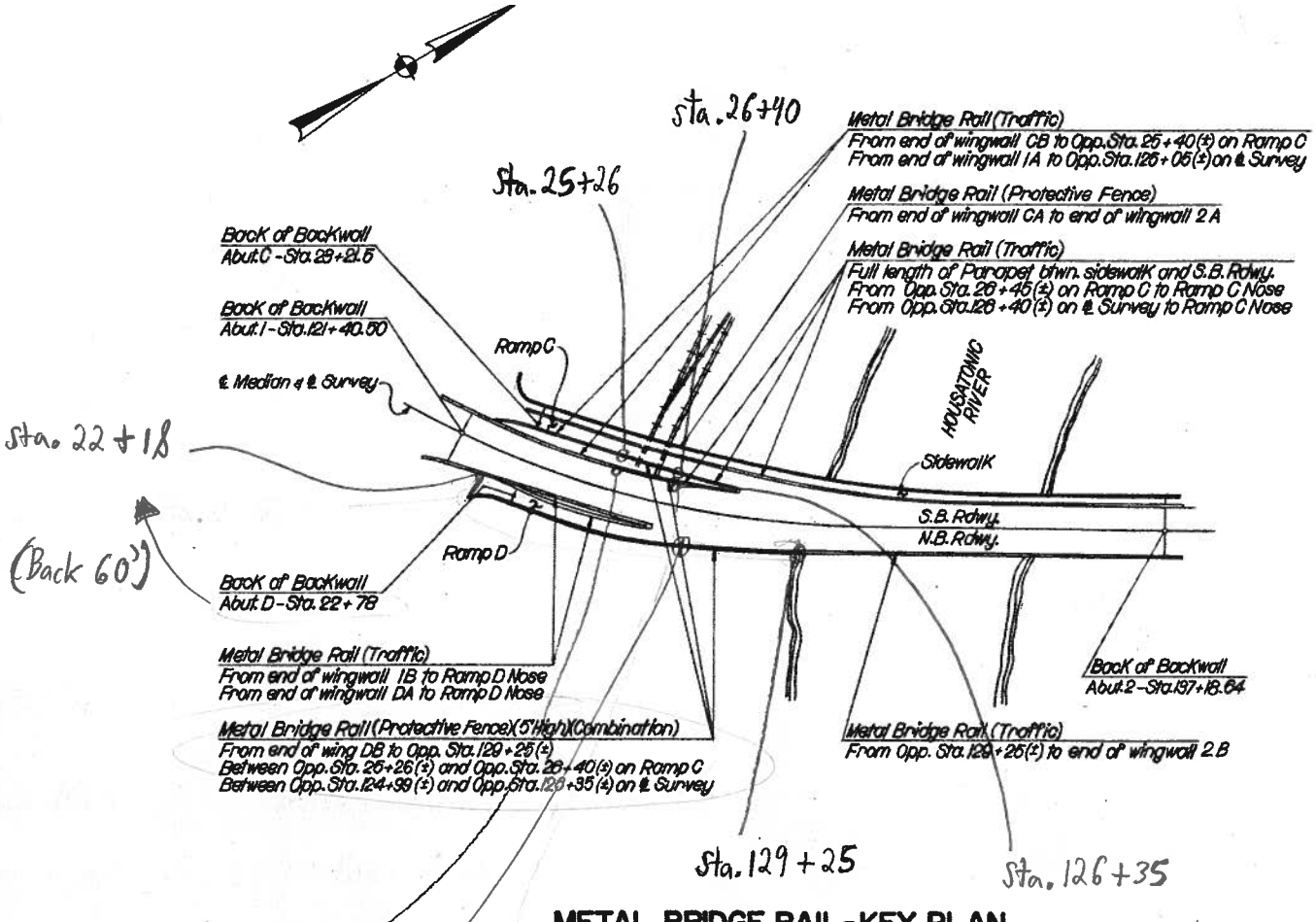
Rail Length = 12,635 ft. - 12,499 ft. = 136 ft.

Total Rail Length = 704 ft. + 136 ft. + 114 ft. = 954 ft → Say 960 ft. to be conservative

- Metal Bridge Rail height = 5 ft.

Total Length of Rail to be repaired includes sections on Ramp D & Ramp C

Grid: 10x10 = 1"



METAL BRIDGE RAIL - KEY PLAN
SCALE: 1" = 200'

Sta. 126+35

(P.T. Ramp D) Sta. 26+50.401 ⟶ corresponds to Sta. 126+54.0 (℄ Survey)

AECOM

JOB TITLE Commodore Hull Bridge - Inspection Walkway Replacement Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/19/2014
REVIEWER MPE DATE 7/1/14
SCALE SHEET NO. 1 OF 2

GENERAL:

- AISC steel Construction Manual - 14th edition
  → used to obtain rolled-steel section properties
- Commodore Hull Bridge (Bridge #00571A) Plans
  → used to determine inspection walkway(s) dimensions & rolled-steel sections used
- Microsoft Excel
  → used for all applicable calculations

35,000# (span members)
3,400# (floorbeams)
38,400# ← Total Weight of steel Required for Walkway replacements (less steel grating)

2310 ft.² ← Total Area of walkway grating.

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Inspection Walkway Replacement Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/19/2014
REVIEWER MPE DATE 7/11/14
SCALE SHEET NO. 2 OF 2

Longitudinal Walkway Length = 760.84ft.
(Spans 9, 10 & 11)

Transverse Walkways Lengths: (westward) L = 71.85ft.
(Span 9) (eastward) L = 58.42ft.

Walkway floorbeams → Assume equidistant spacing equal to 5 ft.

Floorbeams: C4x7.25 (AISC Steel Manual → Table 1-5 → 7.25#/LF)

Span Members: C9x15 (AISC Steel Manual → Table 1-5 → 15#/LF)

Walkway	# of floorbeams
Longitudinal	(760.84 ft.)/(5ft. per floorbeam) = 152.17 => 153
Trans. (West)	(71.85 ft.)/(5 ft. per floorbeam) = 14.37 => 15
Trans. (East)	(58.42ft.)/(5ft. per floorbeam) = 11.68 => 12

* 3 westward and 3 eastward transverse walkways
* All walkways are 2ft. wide

Weight of Steel (Floorbeams) = (7.25#/LF) x (2ft.) x (153 + 3(15) + 3(12)) = 3,393#
→ Say 3,400# (35 cwt) to be conservative

Weight of Steel (Span Members) = (15#/LF) x [2(760.84ft.) + 3(2 x 71.85ft.) + 3(2 x 58.42ft.)]
= 34,549.5#
= 35,000# (350cwt) ← Say to be conservative

Approximate Area of Walkway Grating:

Area = (2ft.) x [760.84ft. + 3(71.85ft.) + 3(58.42ft.)] = 2,303.3 ft.^{2}
= 2,310 ft.^{2} ← Say to be conservative

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Railing Pipe Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/16/2014
REVIEWER MPS DATE 7/1/14
SCALE SHEET NO. 1 OF 3

GENERAL:

- AISC Steel Construction Manual – 14th Edition
  → used to obtain properties of rolled-steel sections
- Commodore Hull Bridge (Bridge # 00571A) Plans
  → used to determine dimensions of inspection walkways
- Pipe 1 ½ x-strong used for railings

- Microsoft Excel
  → used for all applicable calculations

6,950 ft.	Longitudinal Walkway
2,010 ft.	Westward Transverse Walkways
1,650 ft.	Eastward Transverse Walkways
10,610 ft.	← Total Required Length of Pipe

321 cwt	Longitudinal Walkway
94 cwt	Westward Transverse Walkways
77 cwt	Eastward Transverse Walkways
492 cwt	← Total Required Weight of Steel (including connection plates)

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hall Bridge - Railing Pipe Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/16/2014
REVIEWER DATE 7/1/14
SCALE SHEET NO. 2 OF 3

INSPECTION WALKWAY:

Railings: Use Pipe 1½ x-Strong Weight per connection PL: 7.5#/PL
(AISC Steel Manual → Table 1-14) → 3.63#/length ft.

Walkway Through Spans 9, 10 & 11

Length = 254.19ft. + 253.15 ft. + 253.5ft = 760.84ft.
Vertical Rail Length = 51in. = 4.25ft. * 1.67ft long. length per vertical rail
# of longitudinal rails = 4
# of vertical rails = 2(1+(760.84ft./1.67ft)) = 916
# of connection plates = 916

Required Length of Pipe = 4(760.84ft.) + 916(4.25ft.) = 6,936.36ft
→ Say **6,950 ft.** to be conservative
Required Weight of Steel = (3.63#/lf)×(6,950ft) + 916(7.5#) = 32,098.5#
→ Say **32,100# (321 cwt)** to be conservative

TRANSVERSE WALKWAYS (Span 9)

Avg. Westward distance from Median (℄) = (87.04ft + 56.65 ft.)/2 = 71.85ft.
Avg. Eastward distance from Median (℄) = (60.83ft. + 56.00ft.)/2 = 58.42ft.
* 3 walkways west of median
* 3 walkways east of median

Westward Walkways (3): # of vertical rails = 2(1+(71.85ft./1.67ft)) = 88.21
→ Say 90 to be conservative
# of connection plates = 90

Required Length of Pipe = 3×[4(71.85ft.) + 90(4.25ft.)] = 2009.7ft ≈ **2010 ft.**
Required Weight of Steel = (3.63#/lf)(2010ft) + (3)(90)(7.5#) = 9,321.3#
→ Say **9,400# (94 cwt)** to be conservative

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Railing Pipe Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/16/2014
REVIEWER MPB DATE 7/1/14
SCALE SHEET NO. 3 OF 3

Eastward Walkways (3):

# of vertical rails = 2(1+(58.42ft/1.67ft.)) = 72.10 → Say 74 (to be conservative)
# of connection plates = 74

Required Length of Pipe = 3 × [4(58.42ft) + 74(4.25ft.)] = 1,644.48 ft
→ Say 1,650 ft to be conservative

Required Weight of Steel = (3.63#/ft)(1650 ft) + (3)(74)(7.5#) = 7,654.5 #
→ Say 7,700# (77 cwt) to be conservative

Grid: 10x10 = 1"

AECOM

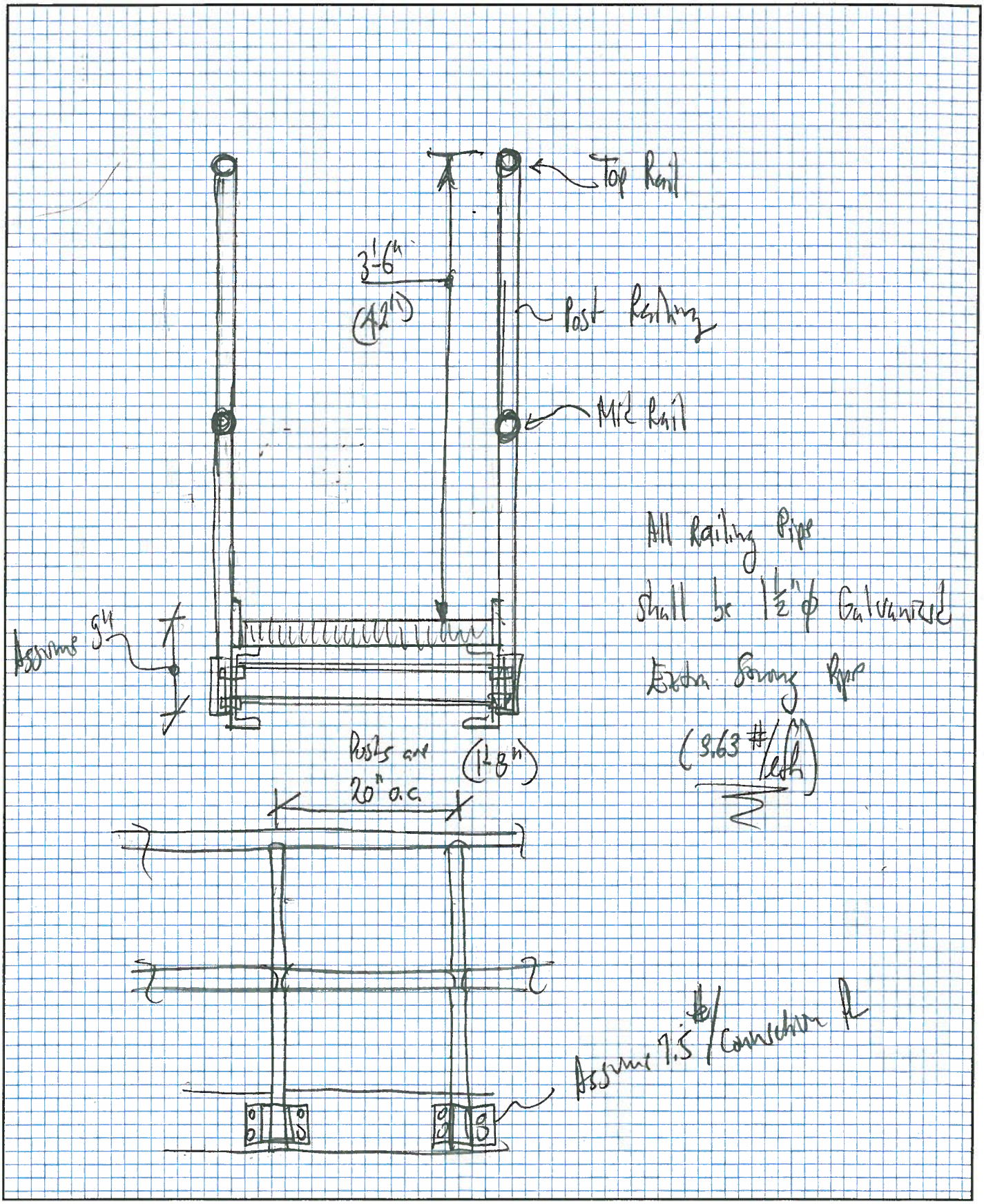
JOB TITLE _____

JOB NO. _____ CALCULATION NO. _____

ORIGINATOR _____ DATE _____

REVIEWER _____ DATE _____

SCALE _____ SHEET NO. _____ OF _____



Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Bracing Replacement Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/20/2014
REVIEWER MPB DATE 7/1/14
SCALE SHEET NO. 1 OF 2

GENERAL:

- Commodore Hull Bridge Plans
  → used to determine gusset plate dimensions and bracing member lengths
- Microsoft Excel
  → used for all applicable calculations

For Lower Lateral Bracing of Spans 9, 10 & 11

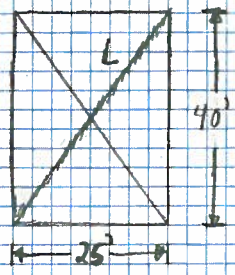
(3 spans) × (520 cwt/span) = 1,560 cwt ← Bracing Members
(3 spans) × (63 cwt/span) = 189 cwt } Gusset Plates
(3 spans) × (9 cwt/span) = 27 cwt }
1,776 cwt ← Total Weight of Steel Required

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Bracing Replacement Estimate
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/20/2014
REVIEWER DATE
SCALE SHEET NO. 2 OF 2

BRACING:

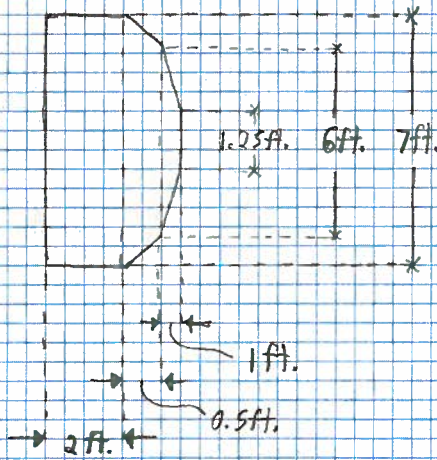


Length of Bracing (L) = $\sqrt{(25\text{ft.})^2 + (40\text{ft.})^2} = 47.17\text{ ft.}$

- Use W24x55 for bracing members
- 20 bracing members per span (lower lateral bracing)

Weight of Steel Required = $20(47.17\text{ ft.}) \times (55\#/\text{LF})$
$= 51,887\ \#$
→ Say **52,000# (520 cwt)** per span to be conservative

GUSSET PLATES

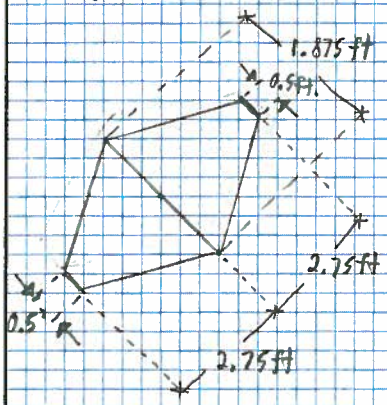


Area = $(2\text{ft.} \times 7\text{ft.}) + \frac{1}{2}(0.5\text{ft.})(7\text{ft.} + 6\text{ft.}) + \frac{1}{2}(1\text{ft.})(6\text{ft.} + 1.25\text{ft.})$
$= 20.875\text{ ft.}^2$

- Use 3/8 in. thick gusset plates

# of plates required for span 9 = 44

Weight of Steel Required = $44\left(20.875\text{ ft}^2 \times 0.375\text{ft.} \times \frac{490\#}{27\text{ft.}^3}\right)$
$= 6,250.90\ \#$
→ Say **6,300# (63 cwt)** per span to be conservative



Area = $2 \times \left[\frac{1}{2}(2.75\text{ft.})(0.5\text{ft.} + 1.875\text{ft.})\right] = 6.53\text{ ft.}^2$

- Use 3/8 in. thick gusset plates

# of plates required for span 9 = 20

Weight of Steel Required = $20\left(6.53\text{ft.}^2 \times 0.375\text{ft.} \times \frac{490\#}{27\text{ft.}^3}\right)$
$= 888.81\ \#$
→ Say **900# (9 cwt)** per span to be conservative

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Replacement of Fencing
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 6/2/2014
REVIEWER MPL DATE 7/1/14
SCALE SHEET NO. 1 OF 1

FENCING REPLACEMENT

- 0904997A : Removal of Existing Metal Bridge Rail = $25/L.F.
- 0904936A : Metal Bridge Rail (Combination - Extruded Post Aluminum) = $300/L.F.

Total Length of Rail = 960 ft.

Removal/Replacement Cost = (960 ft.)($25/L.F.) + (960 ft.)($300/L.F.) = $312,000

- Subtract costs of fencing repair

Total Cost = $312,000 - $192,000 = **$120,000**

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Lower Inspection Walkway Replacement
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 6/2/2014
REVIEWER MPB DATE 7/1/14
SCALE SHEET NO. 1 OF 1

WALKWAY REPLACEMENT

- Removal of Existing Inspection Walkway = $75,000 (L.S.)
- 06033345A: Inspection Walkway (Type 1) = $500/L.F.
- 06035545A: Steel Grating = $50/S.F.

Walkway Length = 1,152 ft.

Grating Area = 2,310 ft.^{2}

Removal/Replacement Cost = (1,152 ft.)($500/L.F.) + (2,310 ft.^{2})($50/S.F.) + $75,000 = $766,500

- Subtract cost of pipe railing replacement

Total Cost = $766,500 – $403,200 = $363,300

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Lower Lateral Bracing Replacement
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 6/2/2014
REVIEWER MPB DATE 7/1/14
SCALE SHEET NO. 1 OF 1

LOWER LATERAL BRACING (Spans 9, 10 and 11)

- weight of steel required = 1,776 cwt
- Removal of Existing Bracing = $50,000 (L.S.)
- 0603801A: Structural Steel = $2,500/cwt

Total Cost = (1,776 cwt)($2,500/cwt) + $50,000 = $4,490,000

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge - Restraining Fixed Truss Bearings
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 6/2/2014
REVIEWER MPE DATE 7/1/14
SCALE SHEET NO. 1 OF 1

RESTRAINING COSTS

- Keeper Assembly 0522158A:
  (Approach Spans) = $500 each — # of approach span fixed bearings = 16
  (Truss Spans) = $5,000 each — # of truss span fixed bearings = 6

Total Cost = ($500)(16) + ($5,000)(6) = $38,000

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Lower Lateral Bracing & Inspection Walkway
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/22/2014
REVIEWER MPS DATE 7/1/14
SCALE SHEET NO. 1 OF 1

Lower X-Bracing

Span	# of X-bracing members	# of X-bracing w/ section loss or perforations in main member or lacing member	% of X-bracing w/ SL or perf. Ø
9	20	11	55%
10	20	7	35%
11	20	11	55%

Lower Lateral Bracing

Span	# of lateral bracing members	# of members w/ section loss or perf. Ø	% of members w/ section loss or perf. Ø
9	11	4	36.4%
10	11	8	72.7%
11	11	3	27.3%

Inspection Walkway

Span	# of locations w/ section loss or perf. Ø of grating or main member
9	10
10	18
11	13
Σ	41

Grid: 10x10 = 1"

Appendix E: Condition Survey Notes

FIELD NOTES

BRIDGE NO. 00571 A | DATE: 5/22/2014
CREW: MPE / AJS | SHEET

ROCKER BEARING MEASUREMENTS

Form BRI-15, Rev. 9/97

Span No. = 9

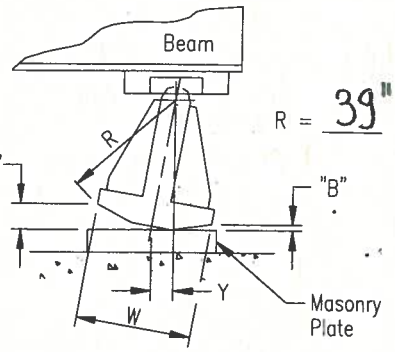
Substructure Unit = Pier No. 8

Temperature = 60 °F

$\theta = \text{Sin}^{-1} (F-B)/W$

$Y = R \text{ TAN } \theta$

The "Front" of the bearing is the side facing the fixed bearing.



R = 39"

W = 30

NOTE:

"F" & "B" should be measured at the left side corners of the rocker or on the side closest to the front face of the substructure on skewed bridges.

TRUSS

~~Beam~~	"F"	"B"	Y	Cont. or Exp.	Comments
					$Y_{max} = 0.976"$
T-3	3 3/4"	2 3/4"	1.301"	E	$1.301" > Y_{max}$ NO GOOD *
T-4	3 1/2"	2 13/16"	0.894"	E	$0.894" \leq Y_{max}$ OK
					* Beyond anticipated movement

Figure 6.2.1g – Rocker Bearing Measurement Form

FIELD NOTES

BRIDGE NO. 00571A | DATE: 5/22/2014

CREW: MPE / AJS | SHEET

ROCKER BEARING MEASUREMENTS

Form BRI-15, Rev. 9/97

Span No. = 10

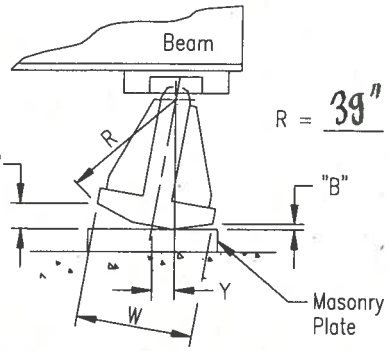
Substructure Unit = Pier 9

Temperature = 60 °F

$\theta = \sin^{-1}(F-B)/W$

$Y = R \tan \theta$

The "Front" of the bearing is the side facing the fixed bearing.



R = 39"

W = 30"

NOTE:

"F" & "B" should be measured at the left side corners of the rocker or on the side closest to the front face of the substructure on skewed bridges.

TRUSS

~~Beam~~	"F"	"B"	Y	Cont. or Exp.	Comments
					$Y_{max} = 1.166"$
T-2	3 3/4"	2 3/4"	1.301"	E	1.301" > Y_{max} NO GOOD *
T-3	3 7/8"	2 3/4"	1.467"	E	1.464" > Y_{max} NO GOOD *

* Beyond anticipated movement

Figure 6.2.1g – Rocker Bearing Measurement Form

FIELD NOTES

BRIDGE NO. 0571A | DATE: 5/22/2014

CREW: MPE/AJS/ | SHEET

ROCKER BEARING MEASUREMENTS

Form BRI-15, Rev. 9/97

Span No. = 11

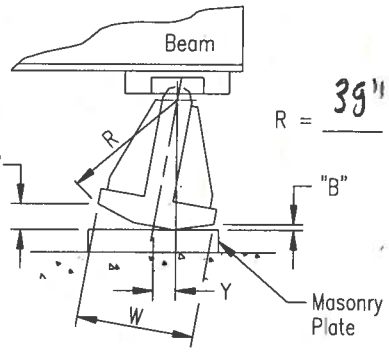
Substructure Unit = Pier 10

Temperature = 60° F

$\theta = \text{Sin}^{-1} (F-B)/W$

$Y = R \text{ TAN } \theta$

The "Front" of the bearing is the side facing the fixed bearing.



NOTE:

"F" & "B" should be measured at the left side corners of the rocker or on the side closest to the front face of the substructure on skewed bridges.

TRUSS

~~Beam~~	"F"	"B"	Y	Cont. or Exp.	Comments
					$Y_{max} = 1.166"$
T-2	4"	2 7/8"	1.464"	E	1.464" > Y_{max} NO GOOD *
T-3	3 7/8"	2 5/8"	1.626"	E	1.626" > Y_{max} NO GOOD *
					* Beyond anticipated movement

Figure 6.2.1g – Rocker Bearing Measurement Form

AECOM

JOB TITLE Commodore Hull Bridge - Rocker Bearing Measurements Check
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 7/2/2014
REVIEWER DATE
SCALE SHEET NO. 1 OF 1

Span No. 9

$L_{span} = 254.16'$, $\Delta T_{max} = 60°F$, $\alpha = 6.4 \times 10^{-6}/°F$

$Y_{max} = L_{span} \times \Delta T_{max} \times \alpha = 0.976''$

Pier No. 8

T-3 : $F = 3\frac{3}{4}''$, $B = 2\frac{3}{4}''$, $R = 39''$, $W = 30''$

$Y = R \tan\left(\sin^{-1}\left(\frac{F-B}{W}\right)\right) = 1.301'' > Y_{max}$ NO GOOD

T-4: $F = 3\frac{1}{2}''$, $B = 2\frac{13}{16}''$, $R = 39''$, $W = 30''$

$Y = R \tan\left(\sin^{-1}\left(\frac{F-B}{W}\right)\right) = 0.894'' \leq Y_{max}$ OK

Span No. 10

$Y_{max} = 1.166''$

Pier No. 9

T-2 : $F = 3\frac{3}{4}''$, $B = 2\frac{3}{4}''$, $R = 39''$, $W = 30''$

$Y = R \tan\left(\sin^{-1}\left(\frac{F-B}{W}\right)\right) = 1.301'' > Y_{max}$ NO GOOD

T-3 : $F = 3\frac{7}{8}''$, $B = 2\frac{3}{4}''$, $R = 39''$, $W = 30''$

$Y = R \tan\left(\sin^{-1}\left(\frac{F-B}{W}\right)\right) = 1.464'' > Y_{max}$ NO GOOD

Span No. 11

$Y_{max} = 1.166''$

Pier No. 10

T-2 : $F = 4''$, $B = 2\frac{7}{8}''$, $R = 39''$, $W = 30''$

$Y = R \tan\left(\sin^{-1}\left(\frac{F-B}{W}\right)\right) = 1.464'' > Y_{max}$ NO GOOD

T-3 : $F = 3\frac{7}{8}''$, $B = 2\frac{5}{8}''$, $R = 39''$, $W = 30''$

$Y = R \tan\left(\sin^{-1}\left(\frac{F-B}{W}\right)\right) = 1.626'' > Y_{max}$ NO GOOD

Grid: 10x10 = 1"

AECOM

JOB TITLE Commodore Hull Bridge – Rocker Bearings
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/22/2014
REVIEWER DATE
SCALE SHEET NO. 1 OF 1

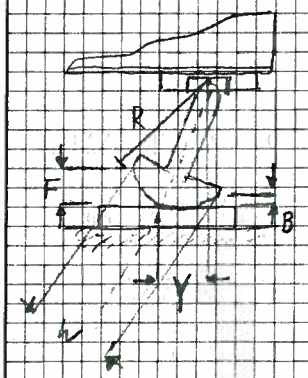
Connecticut (for design of bearings)

median temperature = 50°F coefficient of thermal expansion = 6.4×10^{-6}/°F
mean high temperature = 110°F
$\Delta_T = 110°F - 50°F = 60°F$

Rocker Bearings

Max Span Length = 253 ft = 3,036 in.

$Y_{max} = (3{,}036\text{ in}) \times (60°F) \times (6.4 \times 10^{-6}/°F) = 1.166\text{ in.}$



W = 30 in
R = 39 in

$Y = R \tan\theta, \quad \theta = \sin^{-1}\left[\frac{(F-B)}{W}\right]$

$Y = R \tan\left(\sin^{-1}\left(\frac{(F-B)}{W}\right)\right)$

$\tan^{-1}\left(\frac{Y}{R}\right) = \sin^{-1}\left(\frac{(F-B)}{W}\right)$

$(F-B) = W \cdot \sin\left(\tan^{-1}\left(\frac{Y}{R}\right)\right)$

Given: $Y_{max} = 1.166\text{ in}$

$\rightarrow (F-B) = 30\text{ in} \cdot \sin\left(\tan^{-1}\left(\frac{1.166\text{ in.}}{39\text{ in.}}\right)\right)$

$\boxed{(F-B) = 0.896\text{ in.}}$

Given: $\Delta_T = 40°F \rightarrow Y_{(max)} = 0.777\text{ in.}$

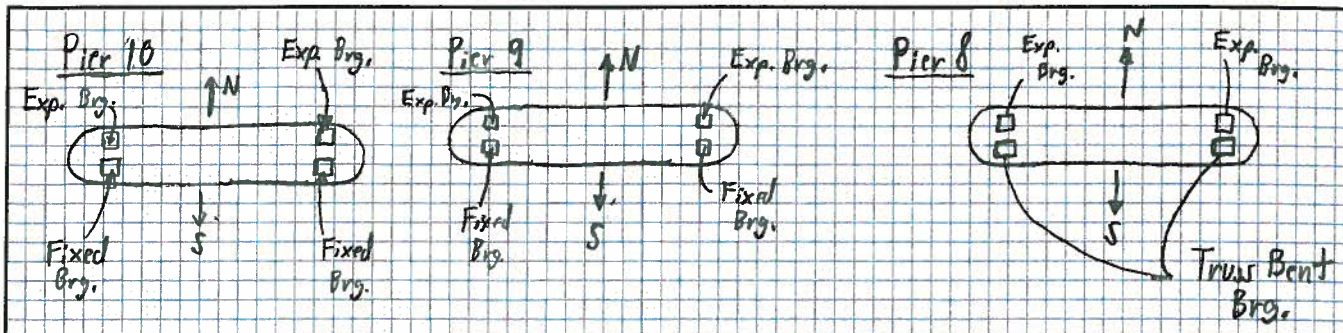
$(F-B) = 0.598\text{ in.}$

- 3 of the 4 rocker bearing measurements made in the field do not comply w/ the conditions calculated above.
- These discrepancies are most likely due to section loss of the bearings which caused inaccurate measurements to be taken.

Grid: 10x10 = 1"

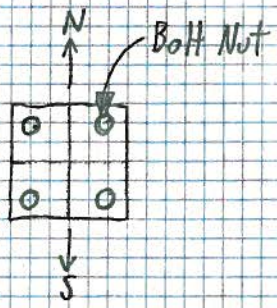
AECOM

JOB TITLE Commodore Hull Bridge – Bearing Anchor Bolt Nuts Losses
JOB NO. 126-170 CALCULATION NO.
ORIGINATOR Christopher M. Regan, Jr. DATE 5/22/2014
REVIEWER DATE
SCALE SHEET NO. 1 OF



Pier 10

Truss	Exp. Brg. Bolt Nut Losses		Fixed Brg. Bolt Nut Losses	
West	No Access	25%	No Access	25%
	No Access	0%	No Access	50%
East	No Access	25%	No Access	50%
	No Access	25%	No Access	25%



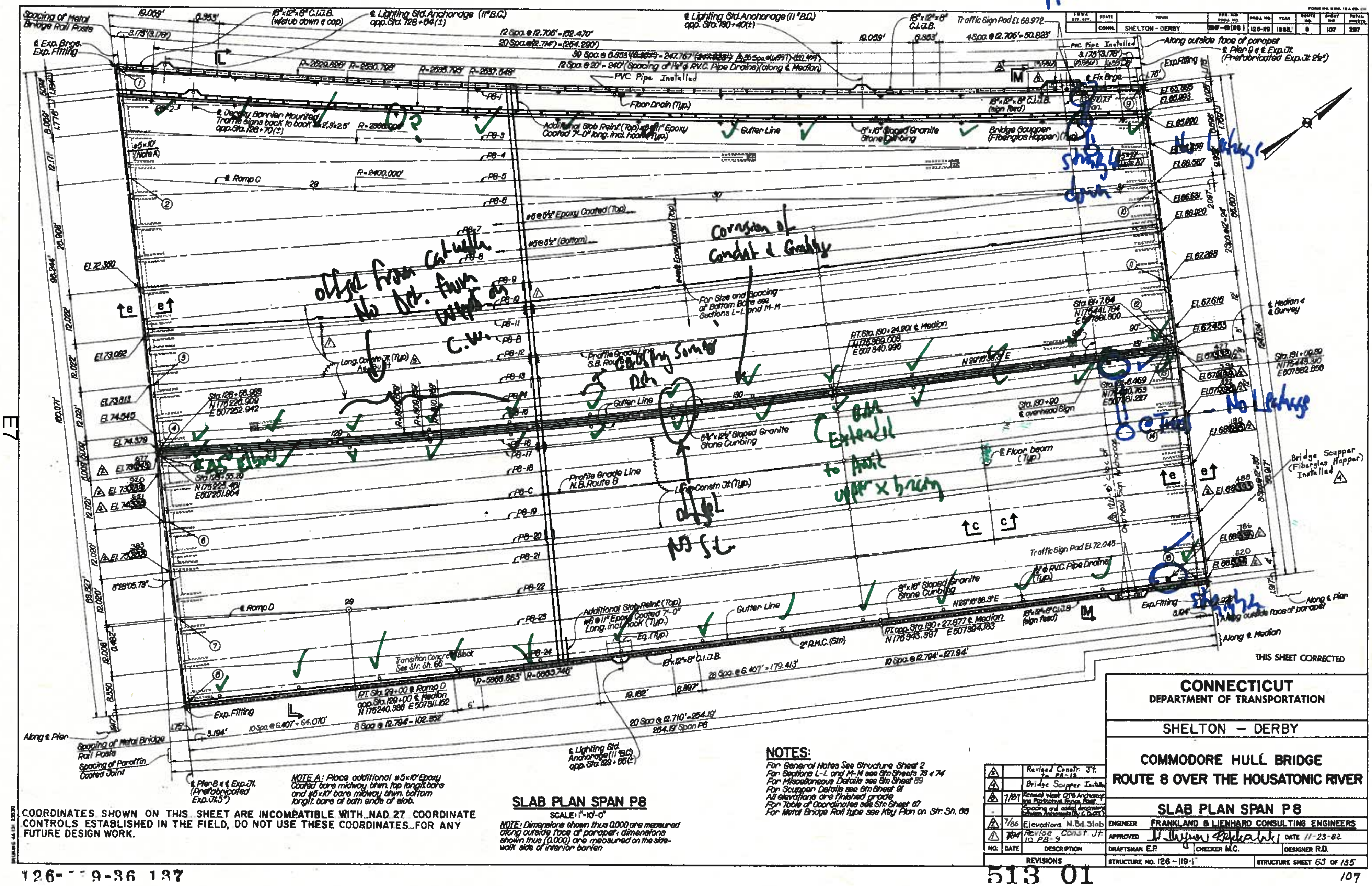
Pier 9

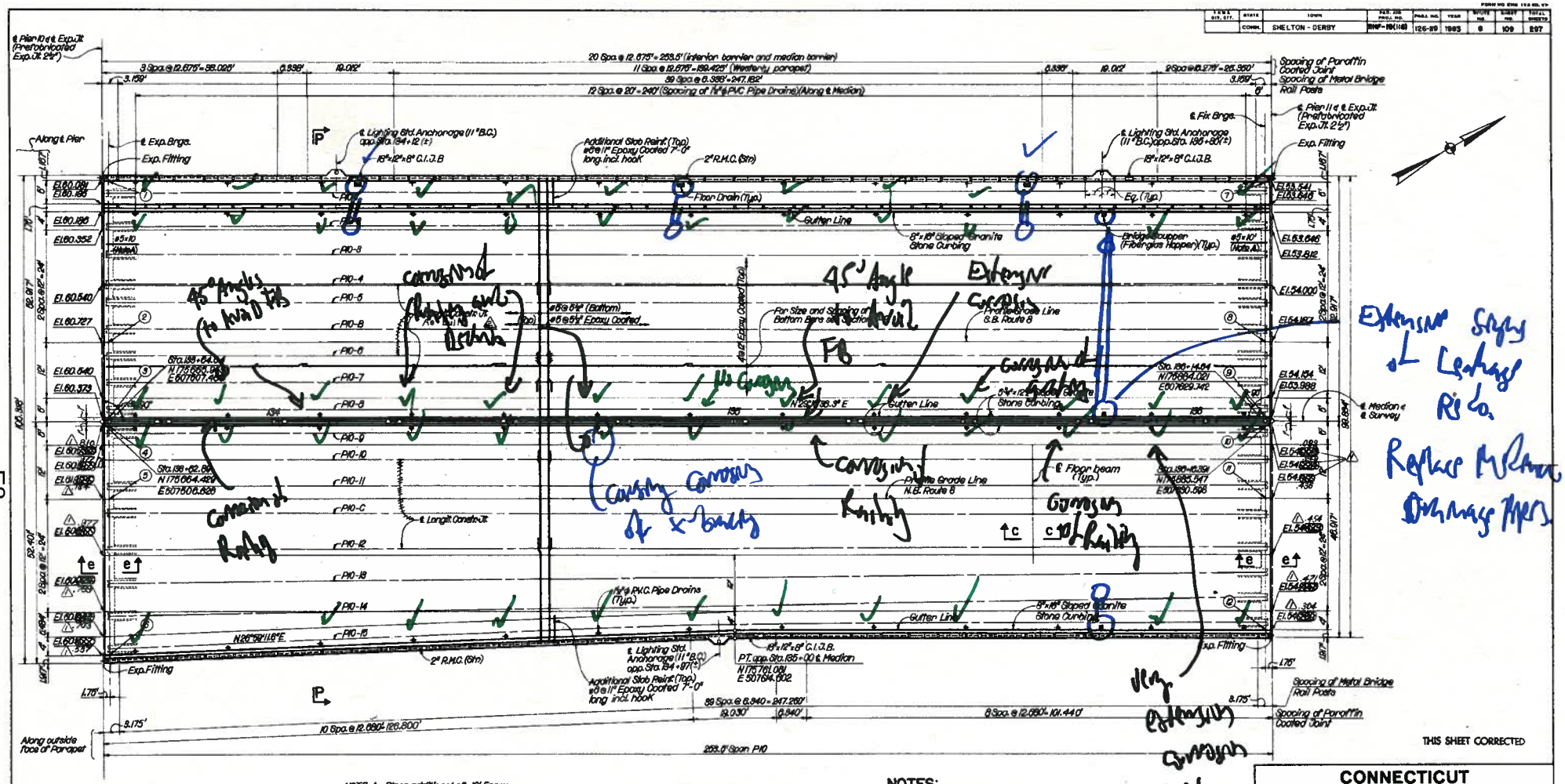
Truss	Exp. Brg. Bolt Nut Losses		Fixed Brg. Bolt Nut Losses	
West	75%	75%	100%	0%
	<25%	100%	50%	25%
East	<25%	Min.	50%	75%
	100%	25%	75%	100%

Pier 8

Truss	Exp. Brg. Bolt Nut Losses		Truss Bent Bolt Nut Losses	
West	25%	25%	100%	100%
	25%	25%	100%	100%
East	50%	50%	100%	100%
	50%	50%	100%	100%

Grid: 10x10 = 1"


SLAB PLAN SPAN P8
SCALE: 1"=10'-0"
NOTE: Dimensions shown thus 0.000 are measured along outside face of parapet; dimensions shown thus (0.000) are measured on the sidewalk side of interior barrier.
NOTE A: Place additional #5×10' Epoxy Coated bars midway btwn. top longit. bars and #5×10' bars midway btwn. bottom longit. bars at both ends of slab.
NOTES:
For General Notes See Structure Sheet 2
For Sections L-L and M-M see Str. Sheets 73 & 74
For Miscellaneous Details see Str. Sheet 69
For Scupper Details see Str. Sheet 61
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail type see Key Plan on Str. Sh. 66
COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.
THIS SHEET CORRECTED
CONNECTICUT
DEPARTMENT OF TRANSPORTATION
SHELTON – DERBY
COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER
SLAB PLAN SPAN P8
ENGINEER FRANKLAND & LIENHARD CONSULTING ENGINEERS
DATE 11-23-82
DRAFTSMAN E.P.
CHECKER M.C.
DESIGNER R.D.
STRUCTURE NO. 126-119-1
STRUCTURE SHEET 63 OF 135
REVISIONS
Revised Constr. Jt. In P8-12
Bridge Scupper Installed
7/81 Revised West CTIB Anchorage
7/86 Elevations N. Bd. Slab
7/84 Revise Const Jt. In P8-9
SHELTON-DERBY
126-119
1983
107
287
Spacing of Metal Bridge Rail Posts
℄ Exp. Brgs. Exp. Fitting
℄ Lighting Std. Anchorage (11"B.C.) app. Sta. 128+64(±)
℄ Lighting Std. Anchorage (11"B.C.) app. Sta. 190+40(±)
℄ Lighting Std. Anchorage (11"B.C.) app. Sta. 129+66(±)
Traffic Sign Pad El. 68.972
Traffic Sign Pad El. 72.045
Along outside face of parapet
℄ Pier 9 & ℄ Exp. Jt. (Prefabricated Exp. Jt. 2½")
℄ Pier 8 & ℄ Exp. Jt. (Prefabricated Exp. Jt. 5")
PVC Pipe Installed
Floor Drain (Typ.)
Gutter Line
8"×16" Sloped Granite Stone Curbing
Bridge Scupper (Fiberglas Hopper)(Typ.)
Bridge Scupper (Fiberglas Hopper) Installed
℄ Jersey Barrier Mounted Traffic Signs back to back app. Sta. 128+70(±)
Additional Slab Reinf. (Top) #6@11" Epoxy Coated 7'-0" long. incl. hook (Typ.)
#6@6½" Epoxy Coated (Top)
#5@6½" (Bottom)
For Size and Spacing of Bottom Bars see Sections L-L and M-M
Profile Grade Line S.B. Route 8
Profile Grade Line N.B. Route 8
Long. Constr. Jt. (Typ.)
Constr. Jt. (Typ.)
Transition Concrete Block See Str. Sh. 66
℄ Ramp C
℄ Ramp D
℄ Floor beam (Typ.)
℄ Median & ℄ Survey
Along ℄ Median
Along ℄ Pier
Exp. Fitting
Spacing of Metal Bridge Rail Posts
Spacing of Paraffin Coated Joint
2" R.M.C. (Str.)
4" ϕ R.M.C. Pipe Drains (Typ.)
20 Spa. @ 12.710' = 254.19'
254.19' Span P8
513 01
126-··9-36 137
E7



NOTE A: Place additional #5x10' Epoxy Coated bars midway btwn. top longit. bars and #5x10' bars midway btwn. bottom longit. bars at both ends of slab.

SLAB PLAN SPAN P10

SCALE: 1"=10'-0"

NOTES:

For General Notes see Structure Sheet
For Section P-P see Str. Sheet 76
For Miscellaneous Details see Str. Sheet 89
For Stuppan Details see Str. Sheet 81
All elevations are finished grades
For Table of Coordinates see Str. Sheet 87
For Metal Bridge Rail type see Key Plan on Str. Sh. 66

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK

TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	SHEET NO.	SHEET NO.	TOTAL SHEETS
SHELTON - DERBY	BHF-10(118)	126-119	1993	8	109	297

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER

SLAB PLAN SPAN P10

NO.	DATE	DESCRIPTION — REVISIONS
2		Revised Long. Constr. Jt. to P10-7
1	7/86	Elevations N. Bd. Slab

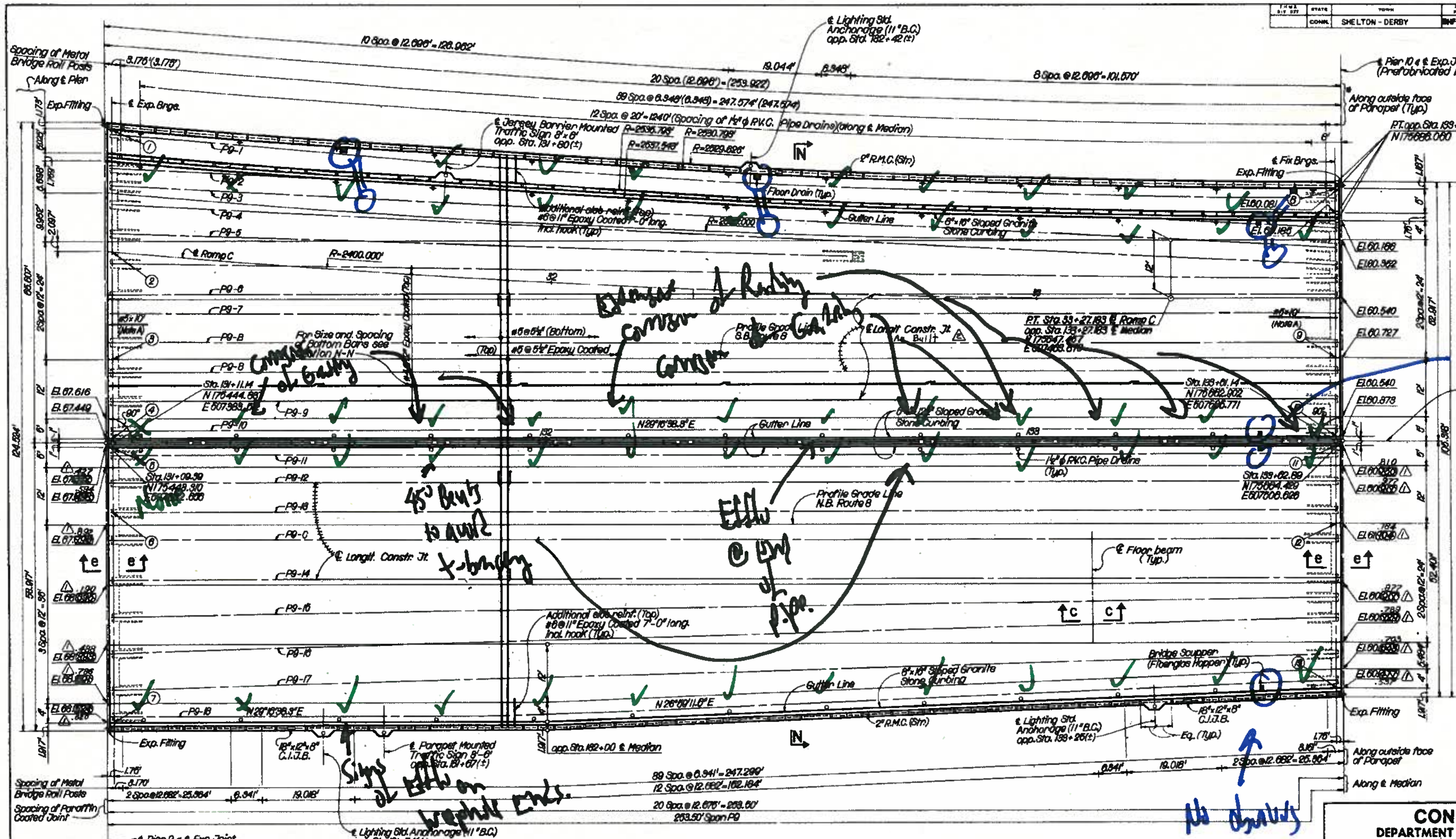
ENGINEER: FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED: [signature] DATE: 11/23/92
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 65 OF 135

109

513 01

126-119-36 197

E8


10 Spa. @ 12.696' = 126.962'
20 Spa. (12.696') = (253.922)
89 Spa. @ 2.849' (2.849) = 247.574' (247.574')
12 Spa. @ 20' = 240' (Spacing of 1½" Ø P.V.C. Pipe Drains)(along ℄ Median)
8 Spa. @ 12.696' = 101.570'
℄ Lighting Std. Anchorage (11" B.C.) opp. Std. 182+42(±)
℄ Jersey Barrier Mounted Traffic Sign 8' x 6' opp. Sta. 131+60(±)
Spacing of Metal Bridge Rail Posts
Along ℄ Pier
Exp. Fitting
℄ Exp. Brge.
℄ Pier 10 & ℄ Exp. Jt. (Prefabricated Exp. Jt. 2½")
Along outside face of Parapet (Typ.)
P.T. opp. Sta. 133+62.459 ℄ Median N175666.060 E607467.164
℄ Fix Brgs.
Floor Drain (Typ.)
Gutter Line
8" x 16" Sloped Granite Stone Curbing
Additional slab reinf. (Top) #6 @ 11" Epoxy Coated 7'-0" long. Incl. hook (Typ.)
℄ Ramp C
R=2400.000'
For Size and Spacing of Bottom Bars see Section N-N
#6 @ 5½" (Bottom)
#5 @ 5½" Epoxy Coated
℄ Longit. Constr. Jt. As Built
P.T. Sta. 33+27.183 ℄ Ramp C opp. Sta. 133+27.183 ℄ Median
Sta. 131+11.14 N175444.66 E607383.20
Sta. 131+09.39
Sta. 133+61.14 N175682.902 E607636.771
Sta. 133+62.89 N175664.429 E607600.626
N26°16'38.8"E
1½" Ø P.V.C. Pipe Drains (Typ.)
Profile Grade Line N.B. Route 8
Profile Grade Line S.B. Route 8
℄ Floor beam (Typ.)
℄ Median & ℄ Survey
Bridge Scupper (Fiberglass Hopper)(Typ.)
2" R.M.C. (Str.)
℄ Lighting Std. Anchorage (11" B.C.) opp. Sta. 133+26(±)
℄ Parapet Mounted Traffic Sign 8'-6" opp. Sta. 131+67(±)
18" x 12" x 8" C.I.J.B.
opp. Sta. 132+00 ℄ Median
89 Spa. @ 0.341' = 247.299'
12 Spa. @ 12.662' = 152.184'
20 Spa. @ 12.676' = 253.50'
253.50' Span P9
2 Spa. @ 12.662' = 25.364'
Spacing of Paraffin Coated Joint
℄ Pier 9 & ℄ Exp. Joint (Prefabricated Exp. Jt. 2½")
℄ Lighting Std. Anchorage (11" B.C.) opp. Sta. 131+54(±)
NOTE A: Place additional #5 x 10' Epoxy Coated bars midway btwn. top longit. bars and #6 x 10' bars midway btwn. bottom longit. bars at both ends of slab.
Along outside face of Parapet
Along ℄ Median
Exp. Fitting
*NOTE: Dimensions shown thus 0.000 are measured along outside face of parapet; dimensions shown thus (0.000) are measured on the sidewalk side of interior barrier.
Some type of Repair @ top
Different Pipe Material @ deck. see photo.
No drains
Signs of leakage @
Signs of Efflo. on Asphalt Ends.
45° Bends to avoid X-bracing
Efflo @ end of pipe
Corrosion of Grating
Corrosion
Corrosion of Railing

SLAB PLAN SPAN P9

SCALE: 1" = 10'-0"

NOTES:

For General Notes see Structure Sheet 2
For Section N-N see Str. Sheet 76
For Miscellaneous Details see Str. Sheet 83
For Scupper Details see Str. Sheet 81
All elevations are finished grade
For Table of Coordinates see Str. Sheet 67
For Metal Bridge Rail Type see Key Plan on Str. Sh. 66

COORDINATES SHOWN ON THIS SHEET ARE INCOMPATIBLE WITH NAD 27 COORDINATE CONTROLS ESTABLISHED IN THE FIELD, DO NOT USE THESE COORDINATES FOR ANY FUTURE DESIGN WORK.

STATE	TOWN	FED. AID PROJ. NO.	PROJ. NO.	YEAR	ROUTE NO.	SHEET NO.	TOTAL SHEETS
CONN.	SHELTON - DERBY	BNF-19(118)	126-119	1983	8	108	297

THIS SHEET CORRECTED

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

SHELTON – DERBY

COMMODORE HULL BRIDGE
ROUTE 8 OVER THE HOUSATONIC RIVER
SLAB PLAN SPAN P 9

NO.	DATE	DESCRIPTION
2		Revised Long. Constr. Jt. to P9-7
1	7/86	Elevations N.Bd. Slab

REVISIONS

ENGINEER: FRANKLAND & LIENHARD CONSULTING ENGINEERS
APPROVED: [signature] DATE 11/29/1982
DRAFTSMAN E.P. CHECKER M.C. DESIGNER R.D.
STRUCTURE NO. 126-119-1 STRUCTURE SHEET 54 OF 135

513 01

108

E9

Appendix F: Load Rating Calculations

CONNECTICUT
DEPARTMENT OF TRANSPORTATION

ROUTE 8 OVER THE HOUSATONIC RIVER,
RIVERDALE AVENUE, HULL STREET AND
HOWE AVENUE (ROUTE 110)

BRIDGE NO. 00571A
THE COMMODORE HULL BRIDGE
Shelton/Derby, Connecticut

State Project No. 126-159

AS-INSPECTED LOAD RATINGS

Prepared By:

DMJM HARRIS | AECOM

For:
Connecticut Department of Transportation

OCTOBER 2005

IV. AS-INSPECTED STEEL TRUSS PIER BENT RATINGS

CTE ENGINEERS
CONSOER TOWNSEND ENVIRODYNE ENGINEERS, INC.

COMMODORE HULL BRIDGE (PROJECT)			7314 (JOB NO.)
AS-INSPECTED RATINGS (SUBJECT)			17 of 12 (SHEET)
JTH (DESIGNED)	9-6-05 (DATE)	MPE (CHECKED)	10-19-05 (DATE)

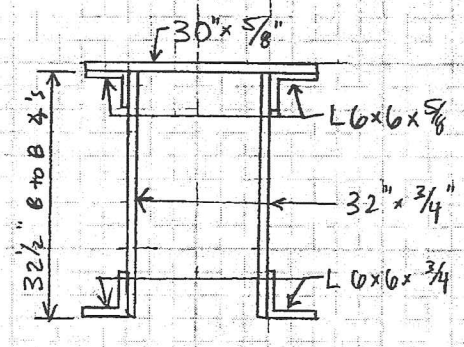
STEEL TRUSS PIER BENTS AT PIER NOS. 8 AND 11

PIER BENT AT PIER NO. 8

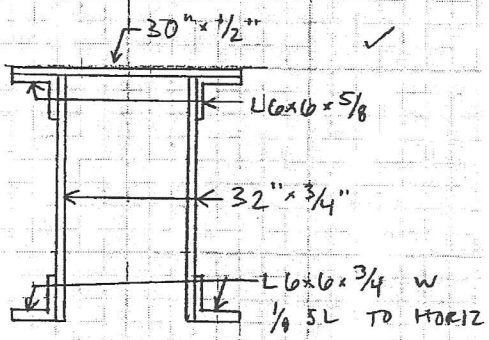
OLD TRUSS BENT

(FOR LOCATIONS OF AS INSPECTED SECTIONS, SEE SHT. 105 FROM INSP. REPORT, ATTACHED)
105A
105B

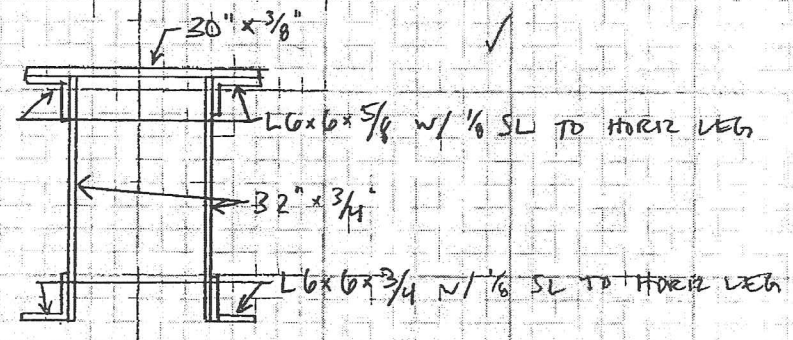
AS-BUILT SECTION



AS INSPECTED SECTION I



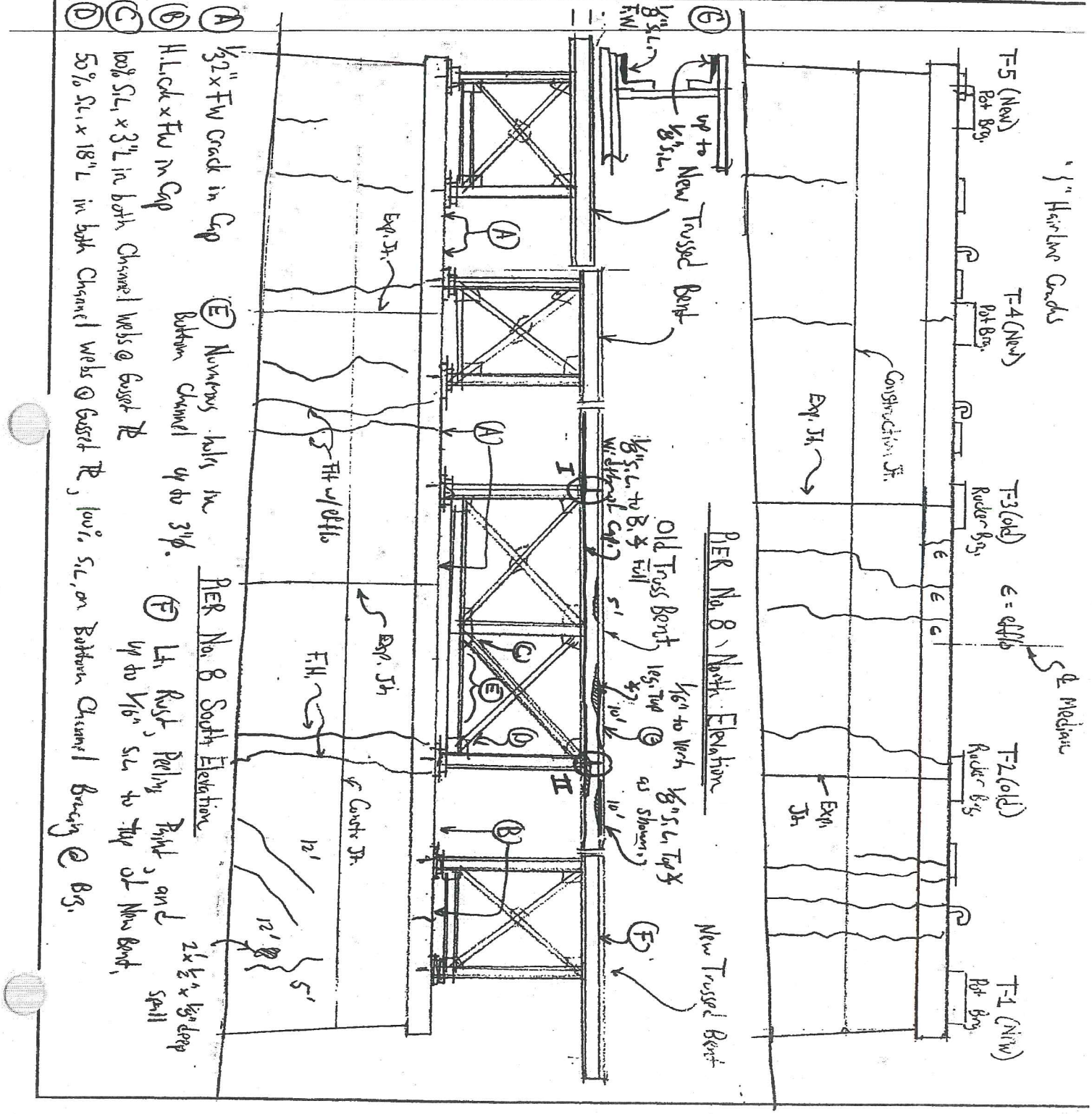
AS INSPECTED SECTION II



SEE ATTACHED LICHTENSTEIN LOAD RATING SHEETS 642 TO 669 FOR LOADING INFORMATION USED HEREIN.

FIELD NOTES

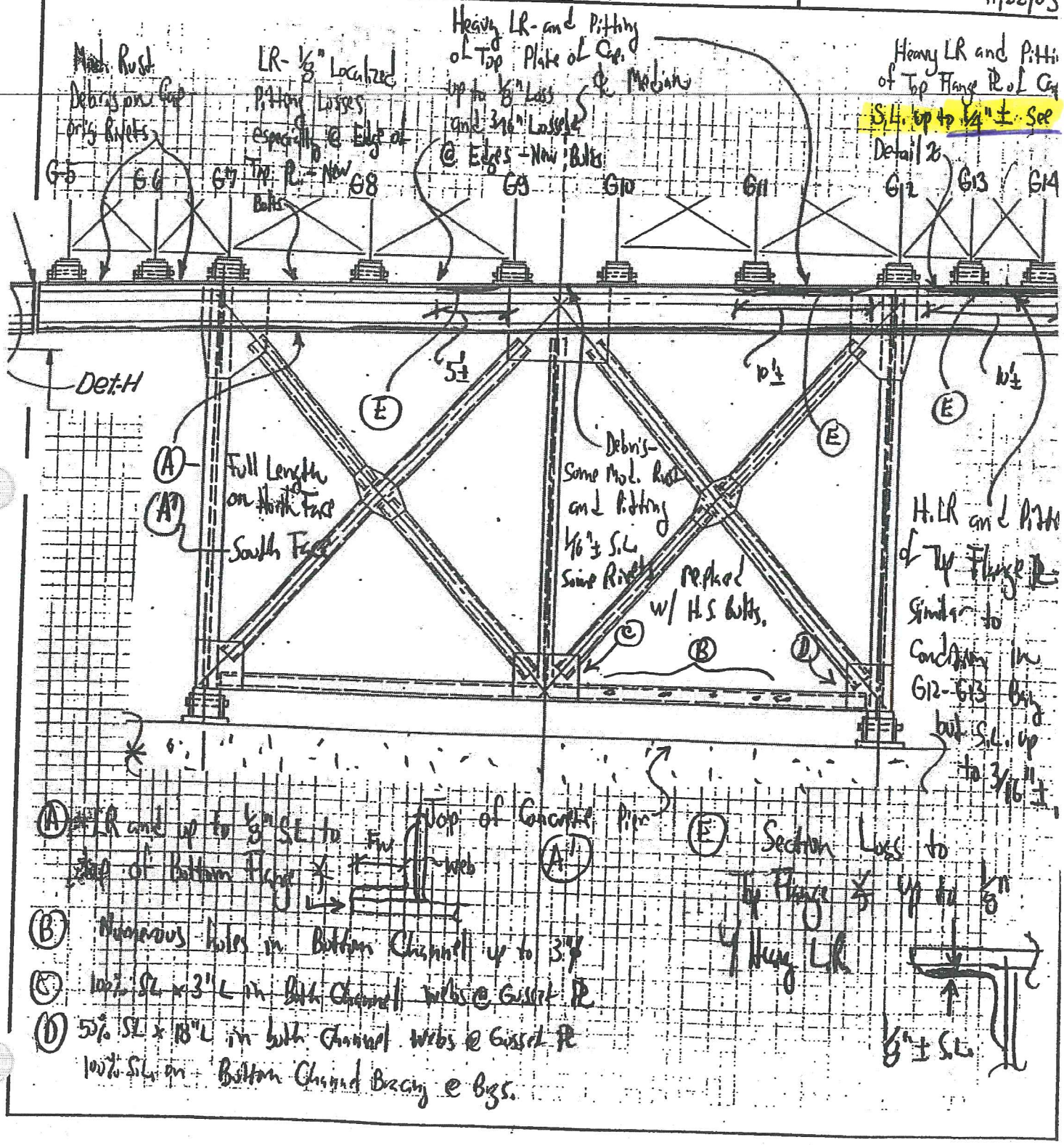
JOB NO. 7314	BRIDGE NO.: 00571A Commodore Hull Bridge Over the Housatonic River
DATE: 4/21/03	SHEET: 105
PREPARED BY: Consoer Townsend Envirodyne Engineers, Inc.	CREW: SRV / MAE / EL



FIELD NOTES

PIER No. 8 – Old Steel Truss Bent
Elevation – South Elevation

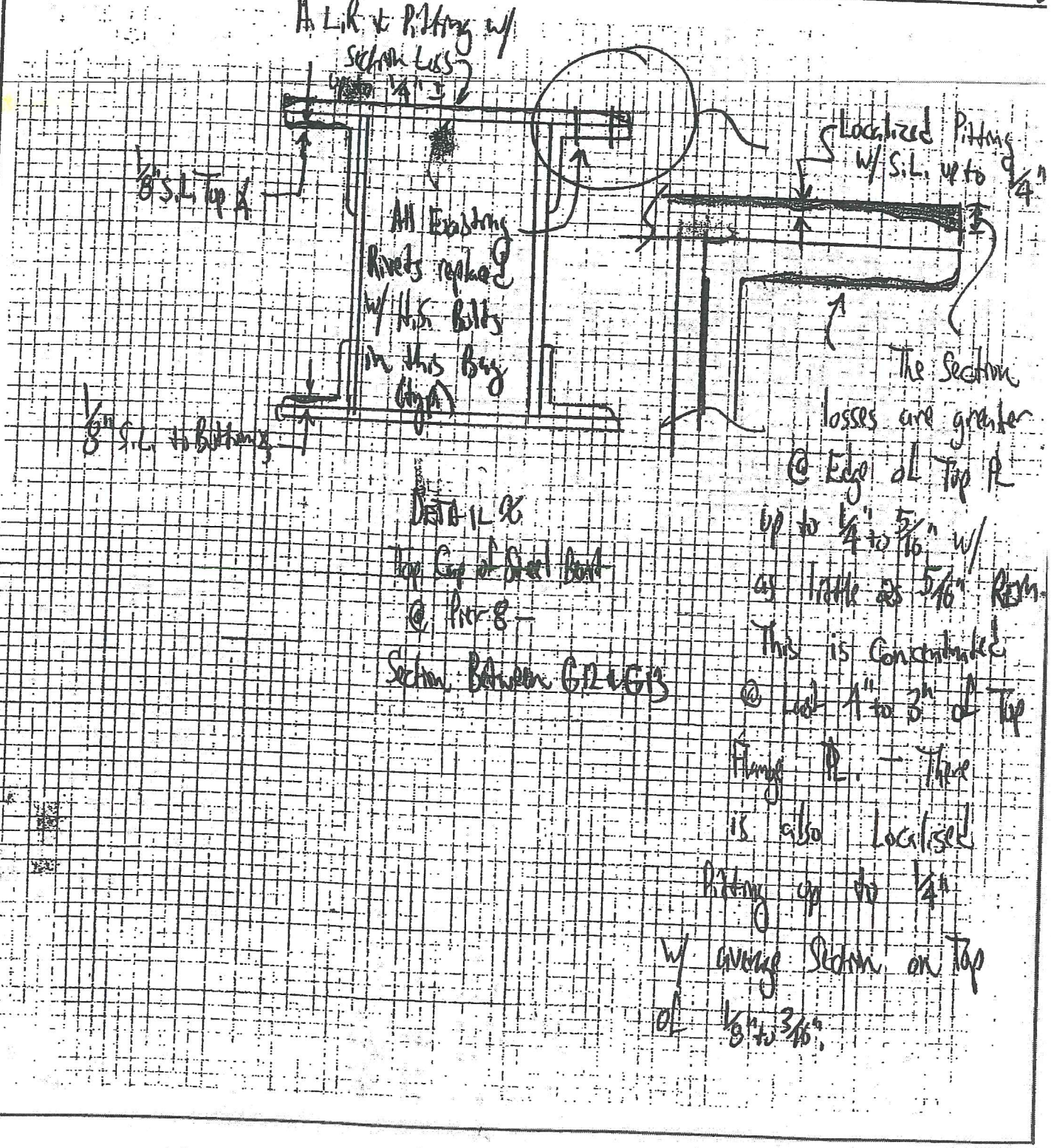
JOB NO. 7314	BRIDGE NO.: 00571A Commodore Hull Bridge Over the Housatonic River
DATE: 4/28/03 & 11/22/03	SHEET: 105A
PREPARED BY: Consoer Townsend Envirodyne Engineers, Inc.	CREW: SRV/MPE/EL MPE/AB 11/22/03



FIELD NOTES

JOB NO. 7314	BRIDGE NO.: 00571A Commodore Hull Bridge Over the Housatonic River
DATE: 4/20/03 & 11/22/03	SHEET: 105B
PREPARED BY: Consoer Townsend Envirodyne Engineers, Inc.	CREW: SKV / MPE / EL MPE/AB 11/22/03

Pier No 8 - Old Steel Truss Bent



CTE ENGINEERS
CONSOER TOWNSEND ENVIRODYNE ENGINEERS, INC.

COMMODORE HULL BRIDGE (PROJECT)			7314 (JOB NO.)
AS INSPECTED RATINGS (SUBJECT)			21 of 12 (SHEET)
JTH (DESIGNED)	9-7-05 (DATE)	MPE (CHECKED)	10-19-05 (DATE)

AS INSPECTED SECTION I

FIND CAPACITY OF OLD CAP BEAM. USE SIMILAR METHODOLOGY AS TAKEN FROM LICHTENSTEIN LOAD RATING DATED 1996. (PG 631 OF LOAD RATING) (ATTACHED)

$M_y = F_y Z$ ← STRENGTH

$A_{TOTAL} = (30" \times 1/2") + 2(7.11 in^2) + 2(32" \times 3/4") + 2(8.44 in^2) + (1/8" \times 12") = 92.6 in^2$ ✓

FOR $A_1 = A_2$

$\frac{92.6 in^2}{2} = (30" \times 1/2") + 2(7.11 in^2) + x(2 \times 0.75)$ ✓ $\therefore x = 11.39"$ BELOW TOP PL

C.G. ABOVE EQUAL AREA AXIS (AREA A_1):

$$\frac{30 \times (0.5)^2 + 2 \times 7.11 \times (1.73 + 0.5) + 2(11.39 \times 0.75) \times \left(\frac{11.39}{2} + 0.5\right)}{92.6/2} = 3.05" \text{ FROM TOP OF TOP F}$$

C.G. OF AREA A_2 FROM ~~BOTTOM OF BOTTOM ANGLES~~

$$\frac{2 \times 0.75 \times \frac{(32 - 11.39)^2}{2} + 2(7.11 \times 1.73) - (1/8 \times 12)(3/4 - 1/16)}{92.6/2} = 7.39"$$

$\therefore Z = \frac{92.6 in^2}{2} \times [(32.5" + 0.5") - 3.05" - 7.39] = 104.5 in^3$ ✓

$M_y = 33 ksi \left(104.5 in^3\right) \times \frac{1 ft}{12 in} = 2873 ft.k$ ✓ ← MOMENT CAPACITY FOR STRENGTH

CTE ENGINEERS
CONSOER TOWNSEND ENVIRODYNE ENGINEERS, INC.

PROJECT			JOB NO.
COMMODORE HULL BRIDGE			7314
SUBJECT			SHEET
AS-INSPECTED RATINGS			22 of 1
DESIGNED: JTH	DATE: 9-7-05	CHECKED: MPE	DATE: 10-19-05

$M_{u-} = 0.8 F_y S$

THE FOLLOWING TABLE COMPUTES SECTION PROPERTIES OF THE AS-INSPECTED SECTION I. LICHTENSTEIN'S LOAD RATING DID NOT ACCOUNT FOR LOSSES.

COMPONENT	AREA	Y	AY	AY^2	Io
BOTTOM ANGLES	16.88	1.78	30.0	53.5	56.4
TOP ANGLES	14.22	30.77	437.5	13463.4	48.4
TOP PLATE	15	32.75	491.3	16088.4	0.3
WEB PLATES	48	16.25	780.0	12675.0	4096.0
BOTTOM LOSS	-1.5	0.6875	-1.0	-0.7	0.0
	92.6		1737.8	42279.6	4201.1

Why use Y_t and not Y_b?

M_u @ bottom = 1625 ft-k

D=AY/AREA

Y_b = D= 18.77 $Y_t = 33 - D = 14.23$"

I=AY^2+Io-(AREA*D^2) ✓

I= 13867.32

~~$S_t = 687.7\ in^3$~~

~~$M_u = 1515\ k\text{-}ft$~~

NEG. MOMENT CONTROLS

$$M_{u-} = 0.8(33\ ksi)\left(\frac{13867.3}{14.23}\right)\left(\frac{1}{12}\right) = \underline{2144\ ft\text{-}k}$$ ✓

MOMENT CAPACITY FOR SERVICE

$f_b = \frac{Mc}{I}$ $M = F_b \frac{I}{c}$

CAP BEAM STRENGTH RATING AS-INSPECTED

$$RF = \frac{C - A_1 D}{A_2 L(1+I)}$$

C = MEMBER CAPACITY
D = DEAD LOAD EFFECT
L = LIVE LOAD EFFECT
I = IMPACT
A_1 = DEAD LOAD FACTOR
A_2 = LIVE LOAD FACTOR

$$RF_{INV}^{LF} = \frac{2873\ ft\text{-}k - 1.3(883.1)}{2.17(643.6)} = \underline{1.24}$$ ✓

883.1 k Lichtenstein sht. No. 651
643.6 k " sht. No. 653

$$RT_{INV}^{LF} = 1.24(36\ TONS) = \underline{44.6\ TONS}$$ ✓

CTE ENGINEERS
CONSOER TOWNSEND ENVIRODYNE ENGINEERS, INC.

COMMODORE HULL BRIDGE (PROJECT)			7314 (JOB NO.)
AS INSPECTED RATING (SUBJECT)			23 of 12 (SHEET)
JTH (DESIGNED)	9-7-05 (DATE)	MPB (CHECKED)	10/5/05 (DATE)

$RF_{OP}^{LF} = 1.67(1.24) = \underline{2.07}$ ✓

$RT_{OP}^{LF} = 2.07(36\ TONS) = \underline{74.5\ TONS}$ ✓

Now, with 1/4" rem @ the plate

CAP BEAM SERVICE RATING AS-INSPECTED

$RF_{INV}^{SERV} = \dfrac{2144 - 883.1}{1.67(643.6)} = \dfrac{1.17}{0.69}$ ✓ ✗ ✓

~~1253~~ 1467

1625

0.54

$RT_{INV}^{SERV} = 1.17(36\ TONS) = \underline{42.1\ TONS}$

CONTROLS PIER BENT AT PIER No. 8

$RF_{OP}^{SERV} = 1.67(1.17) = \dfrac{1.95}{1.15}$ ✓ ✗

0.91

$RT_{OP}^{SERV} = 1.94(36\ TONS) = \underline{70.3\ TONS}$

NOTE: LICHTENSTEIN'S LOAD RATING SUMMARY INCORRECTLY IDENTIFIES THE CONTROLLING SERVICEABILITY RATING OF 1.21 AT THE OLD PORTION OF THE P8 CAP BEAM. THIS RATING ACTUALLY OCCURS AT THE NEW CAP BEAM AS CALCULATED IN THE LICHTENSTEIN RATINGS ON PAGE 6068.

0.69, 1.15 should have been rating

but

should they have used Section II ?

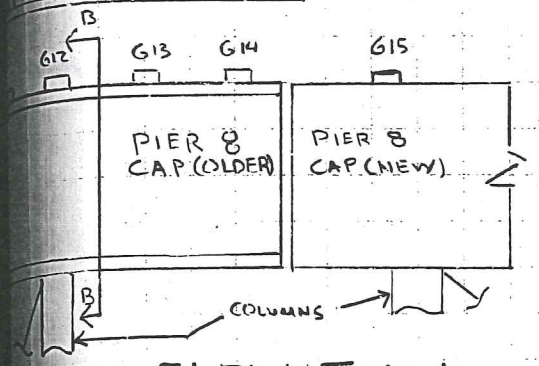
Top flange w/ 1/2" loss @ G12-G13

2013 HAKS report

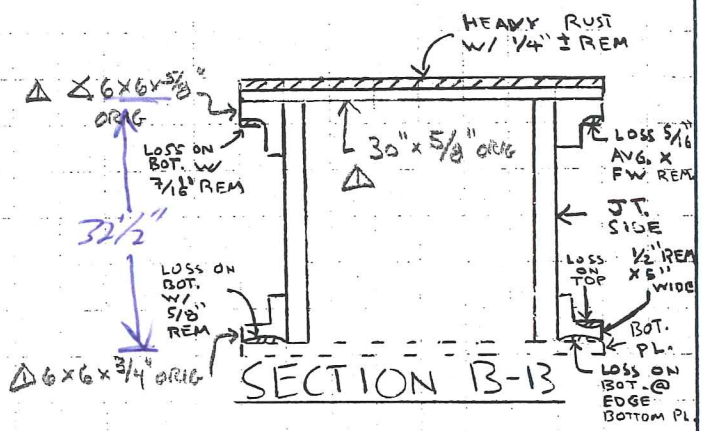
Field Notes

PROJECT NO P712100021 | BRIDGE NO 00571 A
DATE SEPT. 26, 2011 | SHEET 68
CREW KHI / RB | 281 / 424

PIER 8 CAP (LOSSES) (68)
GIRDER 12



SOUTH ELEVATION



SECTION B-13

L 6x6x5/8, A = 7.11 in²
L 6x6x3/4, A = 8.46 in²

TOP FLANGE LOSS

ORIG. TOP FLG AREA = (30" x 5/8") + 2(7.11 in²) = 32.97 in²

TOP FLG LOSS AREA = (30" x 3/8") + (5 3/8" x 3/16") + (5 3/8" x 5/16")

= (11.25) in² + (2.69) in² = 13.94 in²

% SECTION LOSS = $\frac{13.94}{32.97} \times 100\% =$ 42.3%

bottom L loss

(1.5 in²) ← 1/8" x 6" x 2 L's bottom + 1/8" x 5" top (0.625 in²)

BOTTOM FLANGE LOSS

ORIG BOTT FLG AREA = 2 x (8.46) = 16.92 in²

BOTT FLG LOSS AREA = (6" x 1/8") + (6" x 1/4") = 2.25 in²

% SECTION LOSS = $\frac{2.25}{16.92} \times 100\% =$ 13.3%

top L loss

ave rem 6/16" ⇒ 3/8" rem = 1/4" loss

6 - .625 = 5.375" x 2 x 1/4"

= 2.6875 in²

32 1/2 - .625 + .125 = 32"

NOT TO SCALE

	DATE	CREW	REVISION 2	DATE	CREW
3	DATE	CREW	REVISION 4	DATE	CREW

Find Section Modulus S with losses

Component	Area	Y	Ay	Ad2	Io
Bottom Angles	16.88	1.78	30.0	4007.4	56.4
Top Angles	14.22	30.77	437.5	2623.2	48.4
Top Plate (1/4" X 30")	7.5	32.625	244.7	1787.3	0
Web Plates	48	16.25	780.0	42.2	4096
Bottom Loss (bottom of L)	-1.5	0.0625	-0.1	-439.9	0
bottom loss (top of L)	-0.625	0.6875	-0.4	-170.2	0
Top Loss	-2.6875	32	-86.0	-589.6	0
	81.7875		1405.8	7260.4	4200.8

dbot=	17.19		Dtop=	15.56
I=	11461.2	in^4		
Sbot=	666.81	in^3	Sbot Controls	
Stop=	736.48	in^3		
Ms = 0.8 X Fy X S =	1466.99	k-ft		

Find Plastic Section Modulus Z

Total Area=	81.79	in2	
1/2 Area=	40.89	in2	
Find ytop for A1=A2 (inches down from top)	15.07	in	14.57 (inches of web, top)
Find ybot	17.68	in	17.43 (inches of web, bot)

A1 (top)

	Area	Y	Ay
Top Loss	-2.6875	14.32	-38.5
Top Angles	14.22	13.34	189.8
Top Plate (1/4" X 30")	7.5	14.95	112.1
Web Plates	21.86	7.29	159.3
	40.89		422.7

CGtop= 10.34 in

A2 (bot)

	Area	Y	Ay
Bottom Angles	16.88	15.90	268.3
Bottom Loss (bottom of L)	-1.5	17.61	-26.4
bottom loss (top of L)	-0.625	17.11	-10.7
Web Plates	26.14	8.71	227.7
	40.89		459.0

Cgbot= 11.223 in

Z = 1/2 Area X (Cgtop+Cgbot)=	881.63	in3
Mu = Fy X Z =	2424.49	k-ft

CONSULTING ENGINEERS

Lichtenstein

BRIDGES HIGHWAYS RAILROADS SITE ENGINEERING DAMS

JOB 1919-571A

SHEET NO. ____ OF ____

CALCULATED BY SPK DATE 10/96

CHECKED BY JM DATE 10/96

SCALE P8

Old bent:

Cap beam:

Strength rating: ~~24~~ 24.5

M⁻ : $RF_I^{LF} = \frac{3065.8 - 1.3 \times 883.1}{2.17 \times 643.6} = 1.37$ ~~1.37~~ 0.91, $RT_I^{LF} = 1.37 \times 36 = 49.3^T$ ~~49.3~~ ~~1.37~~ 0.91 ~~32.9~~ T

$RF_0^{LF} = 1.67 \times 1.37 = 2.29$ ~~2.29~~ 0.91 1.52

$RT_0^{LF} = 82.4^T$ ~~82.4~~ 54.9 T

V : $RF_I^{LF} = \frac{918.7 - 1.3 \times 123.5}{2.17 \times 83.4} = 4.19$

(Midspan moments are less than the ones for Pier P11 for same section. Hence, rating does not govern).

Serviceability ratings:

M⁻ : $RF_I^{Serv.} = \frac{1467.0}{2360} - \frac{883.1}{1.67 \times 643.6} = 1.37$ ~~1.37~~ 0.54 $\Rightarrow RT_I^{Serv.} = 49.3^T$ ~~49.3~~ 19.6 T

$RF_0^{Serv.} = 2.29$ ~~2.29~~ 0.91

$RT_0^{Serv.} = 82.4^T$ ~~82.4~~ 32.7 T

Bridge No. 00571A, Route 8 over Housatonic River, Shelton
Commodore Hull Bridge
Load Rating Check of Lower Chord Gusset Plates (L2 & L8 only)

Original Plate thickness = 0.75 (inches)

Original 0.90 Shear (V) Capacity = 1408 (kips)

1.3 DL = 822 (kips)

L+I = 69 (kips)

Original Rating Factors = 3.89 (INV) 6.49 (OPER)

Span No.	Truss	Node	Average Remaining	% Rem	0.90 V Cap	C/D Ratio	INV Rating Factor	OPR Rating Factor	Ratings by 2014 MBE Interim Revisions* INV Rating Factor	Ratings by 2014 MBE Interim Revisions* OPR Rating Factor
9	T3	L2W	0.68	90.7%	1277	1.46	3.04	5.07	4.29	7.17
9	T3	L2E	0.70	93.3%	1314	1.50	3.29	5.49		
9	T3	L8W	0.75	100.0%	1408	1.61	3.91	6.54	5.29	8.83
9	T3	L8E	0.75	100.0%	1408	1.61	3.91	6.54		
9	T4	L2W	0.54	72.0%	1014	1.16	1.28	2.14	2.55	4.26
9	T4	L2E	0.63	84.0%	1183	1.35	2.41	4.02		
9	T4	L8W	0.66	88.0%	1239	1.42	2.79	4.65	4.29	7.17
9	T4	L8E	0.72	96.0%	1352	1.55	3.54	5.91		
10	T2	L2W	0.58	77.3%	1089	1.25	1.78	2.98	2.31	3.85
10	T2	L2E	0.56	74.7%	1051	1.20	1.53	2.56		
10	T2	L8W	0.64	85.3%	1201	1.37	2.53	4.23	2.80	4.68
10	T2	L8E	0.56	74.7%	1051	1.20	1.53	2.56		
10	T3	L2W	0.44	58.7%	826	0.94	0.03	0.04	1.06	1.78
10	T3	L2E	0.55	73.3%	1033	1.18	1.41	2.35		
10	T3	L8W	0.52	69.3%	976	1.12	1.03	1.72	2.31	3.85
10	T3	L8E	0.62	82.7%	1164	1.33	2.28	3.81		
11	T2	L2W	0.66	88.0%	1239	1.42	2.79	4.65	3.47	5.79
11	T2	L2E	0.62	82.7%	1164	1.33	2.28	3.81		
11	T2	L8W	0.65	86.7%	1220	1.40	2.66	4.44	2.89	4.82
11	T2	L8E	0.56	74.7%	1051	1.20	1.53	2.56		
11	T3	L2W	0.53	70.7%	995	1.14	1.16	1.93	2.64	4.40
11	T3	L2E	0.65	86.7%	1220	1.40	2.66	4.44		
11	T3	L8W	0.52	69.3%	976	1.12	1.03	1.72	2.72	4.54
11	T3	L8E	0.67	89.3%	1258	1.44	2.91	4.86		

*** 2014 AASHTO MBE Interim Revisions have some modifications to gusset plate load rating calculations:**

1. Gusset plates may be rated in pairs at each panel point, rather than individually. This way, the section loss to each plate may be averaged between the two plates, which will increase the rating in areas of localized loss to one plate.

2. The ϕ_T factor used in computing the horizontal shear capacity of the gusset plate have been revised from **0.90** used in the original calulations, to **1.00**.

3. The Φ (shear reduction factor) in the Hz Shear Capacity formula has been revised from **0.74** used in the old computations to **0.88**.