Historic Bridge Rehabilitation Analysis Report

Delaware River Bridge at Milepost H-43.4

Bristol Township, Bucks County, PA
Burlington Township, Burlington County, NJ

February 2025

Prepared for the Pennsylvania Turnpike Commission (PTC) in coordination with the New Jersey Turnpike Authority (NJTA)

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1. INTRODUCTION

1.1 Executive Summary

The Delaware River Bridge (DRB) Project at Milepost H-43.4 is part of a larger PA Turnpike / I-95 Interchange Program. This Historic Bridge Rehabilitation Analysis (HBRA) is conducted in support of the DRB Project under contract with the Pennsylvania Turnpike Commission (PTC) and in partnership with the New Jersey Turnpike Authority (NJTA). The bridge project is part of the larger PTC project which does include federal funding. Therefore, the project has a federal nexus, which requires review under Section 106 of the National Historic Preservation Act of 1966, as amended. Section 106 requires consideration of project effects on historic properties eligible for or listed in the National Register of Historic Places (NRHP). This report has been prepared in accordance with PennDOT Publication 689 – Cultural Resource Handbook (September 2023) and the American Association of State Highway and Transportation Officials (AASHTO) publication, *Guidelines for Historic Bridge Rehabilitation and Replacement* (November 2008). The information in this report is in part based upon NJTA bridge inspection records (performed by others).

It is concluded that the bridge cannot be rehabilitated to meet the project's Updated Purpose and Need while not significantly impacting the characteristics that qualify it for listing in the NRHP.

1.2 Bridge Location

County: Bucks County, PA and Burlington County, NJ
Municipality: Bristol Township, PA and Burlington Township, NJ
State Route: Interstate 95 (I-95) - Delaware River Turnpike Bridge at Milepost H-43.4
Location Description: The bridge carries I-95 over the Delaware River, connecting the Pennsylvania Turnpike to the New Jersey Turnpike.

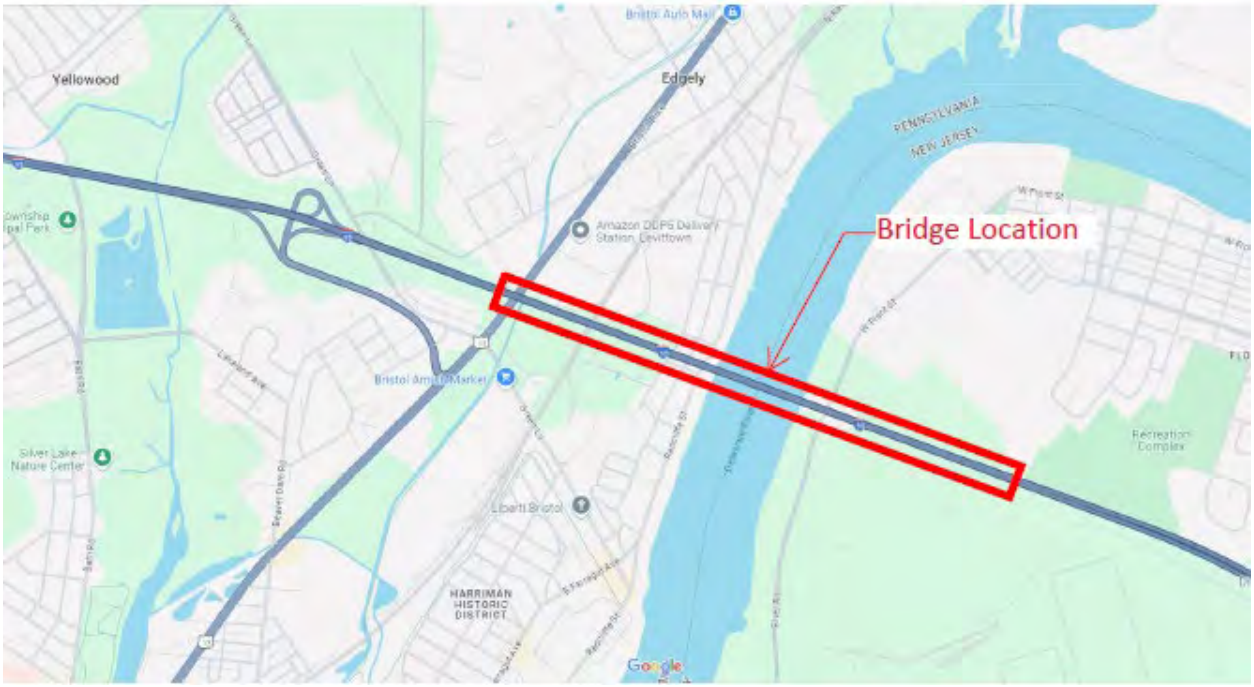


Figure 1-1 Bridge Location

1.3 Roadway and Site Information

Type of Service:	Vehicular travel lanes and shoulders
Number of Lanes:	Two lanes and two shoulders in each direction on bridge and on the Pennsylvania approach roadway, transitioning to three lanes and two shoulders in each direction on the New Jersey approach roadway.
Approach Width(s):	82'-0" and varies
Vertical Clearance:	15'-10" over US Route 13 (Bristol Pike) on PA side
Horizontal Clearance:	76'-6" curb-to-curb on bridge
Traffic Data:	ADT: 68,900; Year: 2023; Truck %: 16%
Shoulder Width:	1'-9 ¼" (Left); 11'-0" (Right)
Functional Classification:	Rural Interstate

Currently, along each side of the PTC's right-of-way are wooded areas, commercial buildings, single family houses, and residential streets. Along each side of the NJTA's right-of-way are wooded areas, commercial buildings, and park land. There is currently heavy commercial development taking place along the NJTA right-of-way throughout the entire length of the anticipated project limits.

1.4 Bridge Information

Owner:	The Pennsylvania Turnpike Commission and the New Jersey Turnpike Authority
Year Built:	1954 - 1956
Bridge Type:	Steel Continuous Warren Through Truss w/ Steel Continuous Deck Truss and Steel Girder/Floorbeam/Stringer Approach Spans
Bridge Length:	6,571'-4"
Number of Spans:	31
Length of Main Span:	682'-0" (c-c brgs)
Deck Width:	79'-8"

Additional Information: The structure is the largest single bridge, inclusive of the approach spans, on either Turnpike, being 6,571'-4" in length, and was originally designed to carry three lanes without shoulders in each direction with no median and reversible-lane capability controlled by aluminum overhead signal gantries. It presently carries two lanes with shoulders in each direction separated by a concrete median barrier. The deck width is 79'-8" and the curb-to-curb width is 76'-6" (Figure 1-4).

Based on load ratings noted in the 2022 inspection report, the bridge is in overall poor condition due to the low inventory load ratings. The overall physical condition of the structure is fair due to the superstructure. No geometric or hydraulic deficiencies exist.

Figure 1-2 Bridge View Looking Northwest (Looking Towards Pennsylvania)

1.4.1 Superstructure

The bridge consists of 31 spans and has a total length of 6571'-4". The main river unit is a three-span continuous Warren through truss with a 682'-0" long main river span and twin 341'-0" long approach spans on either side. The floor system of the main river span is suspended from the overhead arch-shaped truss by 2" diameter strands. The PA and NJ approach spans both include a 1077'-6" long four-span continuous deck truss unit and a 646'-6" long three-span continuous deck truss unit. The PA approach also includes ten simple girder/floorbeam/stringer spans, while the NJ approach also includes four simple girder/floorbeam/stringer spans. The girder/floorbeam/stringer span lengths range from 121'-8 ¼" to 124'-5". (Photos 1-12 in Appendix C)

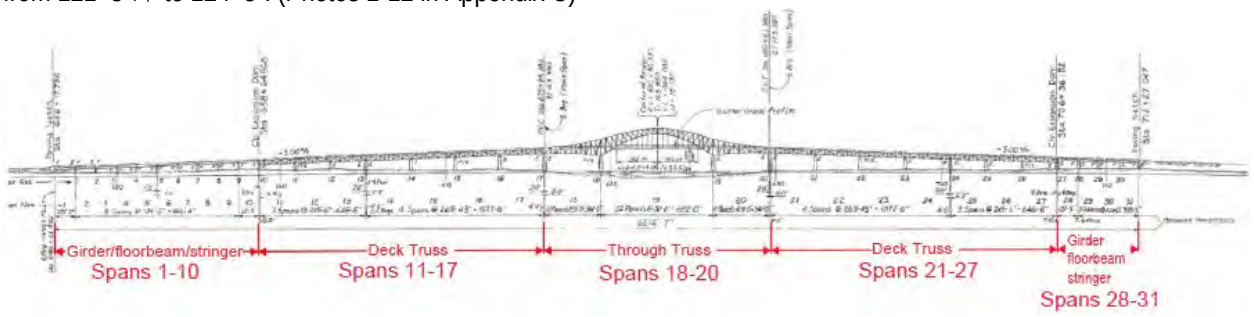


Figure 1-3 Existing Bridge Elevation

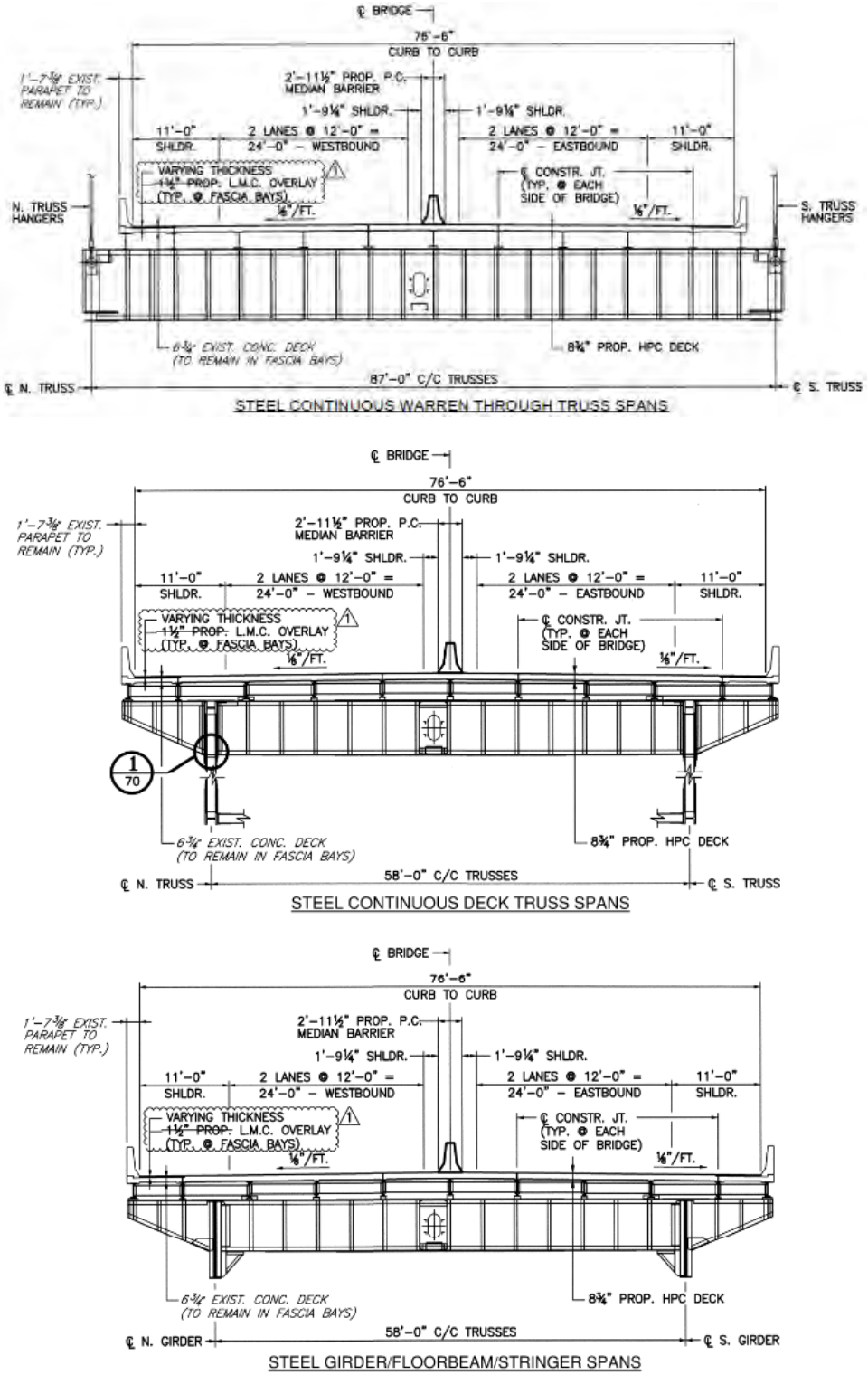


Figure 1-4 Bridge Cross Sections

All spans of the structure contain steel members in tension or with tension elements and have no load path redundancy; therefore, they are all considered non-redundant steel tension members (NSTM). The two trusses of the three- and four-span continuous deck truss units have no internal redundancy due to the single piece, rolled NSTM truss members utilized throughout.

1.4.2 Deck

The deck is 79'-8" wide and carries two lanes of traffic in each direction separated by a concrete safety shaped median barrier. The outer bridge barriers are concrete safety shaped barriers. The deck was replaced between 1998 and 2005 in its entirety by a single NJTA contract in addition to several PTC contracts. The NJTA portion is a composite deck comprised of high-performance concrete (HPC) within the travel lanes while the previously replaced right shoulders (with conventional concrete for barrier parapet installations) were retained and have a latex-modified concrete (LMC) overlay (Figure 1-4). The PTC portion of the deck is also composite but is comprised of conventional concrete with an LMC overlay in both the travel lanes and the right shoulder. Stay-in-place (SIP) formwork was utilized throughout all the various deck replacements.

1.4.3 Substructure

The substructure consists of abutments with wingwalls (full height at the West Abutment; stub at the East Abutment) and piers comprised of reinforced concrete. The river piers both consist of two independent columns, while the approach piers each consist of two column frames with a top cap (Photos 10 & 11 in Appendix C). All substructure units are soil-bearing except for Piers 17 through 20 and the East Abutment, which are pile-supported.

1.4.4 Bridge Modifications

Numerous repair and rehabilitation projects have been constructed over the years, but the bridge mostly retained its character-defining features including its contributing structural elements.

In May 1998, the Pennsylvania Turnpike Commission began a $17 million project to replace the bridge deck on the Pennsylvania part of the bridge and construct a median barrier. Emergency shoulders were added which altered the bridge's traffic capacity from six to four lanes. At the Pennsylvania approach, new toll lanes were added to accommodate the toll collection system. In 2005, the New Jersey side of the bridge deck replacement construction began under NJTA (Figure 1-4).

In 2012, the NJTA and PTC undertook an investigation of the existing suspender system on the main span. Based on destructive testing of suspenders from the similar Newark Bay Bridge, it was determined that the Delaware River bridge's suspenders had limited remaining service life and needed to be replaced. At each suspender location, the load from each original 4-inch-diameter wire rope was transferred into a set of four new 2-inch-diameter wire ropes, after which the original suspenders were removed (Photo 12 in Appendix C).

See Appendix E for a comprehensive history of Delaware River Bridge construction contracts from NJTA.

1.5 Historic Significance

Based on the Pennsylvania Historical and Museum Commission (PHMC) Concurrence Letter dated 11/18/2024, the Delaware River Bridge is individually eligible under Criterion A in the Area of Transportation and Planning and Criterion C in the Area of Engineering. The period of significance begins in 1954, the bridge's date of construction, and ends in 1974, 50 years from present.

The PHMC Concurrence Letter states the following: "The bridge, built in 1954, contains a 652 ft. long three span continuous Warren through truss where the floor system of the main span is suspended from the overhead arch-shaped truss. The bridge, including approach spans, consists of 31 spans for a total length of 6571 ft. 4 in. The bridge serves as a critical connection between the Pennsylvania Turnpike and the New Jersey Turnpike over the Delaware River. The bridge meets the criteria established by the PennDOT Methodology for 2017 Metal Truss Bridge Reevaluation (PennDOT 2017) and is a High Preservation Priority. The Delaware River Bridge receives points for the following features: an uncommon design, only three like it in the state, exceptional span length, exceptional overall length, multiple spans, unusual design for a Warren truss where main span holds a suspended deck, and artistic value as the bridge is designed without V lacing and instead has oval cutouts. The bridge is also eligible under Criterion A in the area of Transportation and Planning as a critical connection between the New Jersey and Pennsylvania turnpike systems that required planning and cooperation between both states."

The primary character-defining features of the Delaware River Bridge are:

- Truss form (continuous Warren through truss)
- Truss members (top and bottom chords, verticals, and diagonal members)
- Riveted truss member connections
- Main span suspended floor system

Secondary character-defining features are:

- Portals (at ends of main span)
- Upper lateral struts and sway struts
- Lower lateral struts and sway bracing
- Upper and lower lateral bracing
- Ornamentation (oval cutouts in the truss members, portals, struts and bracing)

1.6 Summary of Updated Purpose and Need

The Purpose and Need for the Pennsylvania Turnpike / I-95 Interchange Program was included in the Final Environmental Impact Statement which was approved on June 9, 2003. The Purpose and Need has been re-evaluated for Stage 3 of the program (Delaware River Bridge). The Updated Purpose and Need (October 2024) for the PA Turnpike / I-95 Interchange Program – Stage 3 – DRB was approved by FHWA on October 31, 2024 and can be found in Appendix A.

The 2003 project purpose as documented in the Final Environmental Impact Statement included the following:

- Improved I-276 and I-95 linkage for system continuity;
- *Improved I-95 continuity through the Mid-Atlantic Region;*
- Additional capacity for the current I-276 and I-95 connections;
- Additional I-276 and I-95 capacity;
- Improved study area travel times and delay reduction.

The second, italicized project purpose was accomplished with the re-routing of I-95 in Pennsylvania over the new flyovers, east along the PA Turnpike, across the Delaware River Bridge of the NJ Turnpike Connector to New Jersey, east along the connector to NJ Turnpike Exit 6 and then north along the NJ Turnpike.

Upon re-evaluation of the project purpose, an additional purpose has been added to the project. Given the fracture that

occurred in 2017, and the need to close the bridge, thereby detouring traffic for several weeks, this purpose has been added to the overall project's purpose and need. This additional purpose is to:

- Secure a vital link in the regional and national interstate transportation network across the Delaware River.

The 2003 project needs as documented in the FEIS included the following:

- Inadequate I-276 and I-95 linkage for system continuity;
- *Lack of I-95 continuity through the Mid-Atlantic Region;*
- Inadequate capacity for the current I-276 and I-95 connections;
- Inadequate [traffic] capacity on I-276 and I-95;
- Prolonged study area travel times and delays.

Similar to the project purpose, *Improved I-95 continuity through the Mid-Atlantic Region*, the second project need, *Lack of I-95 continuity through the Mid-Atlantic region*, has been satisfied with the completion of the flyovers that re-routed I-95 east along the PA Turnpike, across the Delaware River Bridge of the NJ Turnpike Connector to New Jersey, east along the connector to NJ Turnpike Exit 6 and then north along the NJ Turnpike.

Further evaluation of the project's purpose and need document led the Project Team to consider the 2017 fracture of the existing Delaware River Bridge structure and the potential impact to the traffic throughout the corridor. The Project Team has identified the following additional need:

- Additional Need: Lack of service reliability/redundancy of the existing Delaware River Bridge.

2. BRIDGE CONDITION AND LOAD SUFFICIENCY INFORMATION

2.1 BMS Condition Code Ratings

The following are condition ratings based on the July 18, 2022 NBIS inspection report, with a condition rating of "9" being excellent condition.

Deck – 7 (good condition)
Superstructure – 5 (fair condition)
Substructure – 6 (satisfactory condition)

The overall bridge condition rating is "4 - Poor Condition" due to low Inventory load ratings.

2.2 Structural Deficiencies

Based on the July 18, 2022 NBIS inspection report, the following structural deficiencies were noted:

- Damaged/failed tooth joints, vertical misalignment between tooth joints.
- Severe section loss and corrosion holes scattered throughout truss chords, gusset plates, girders, floorbeams, and stringers, some of which affect load capacity.
- Extensive cracks throughout stringers.
- Scattered field weld repairs created localized fatigue sensitive details in truss members, including intersecting welds, filled mis-punched holes along stress reversal members and/or tension members.

- Tack welds in NSTM members throughout main spans, deck truss spans and along several bottom flange cover plates in the girder spans. Several tack welds are of poor quality and/or cracked.
- Category D fatigue-sensitive details in riveted connections of built-up NSTM truss members.
- Severe corrosion on bearing components, non-functioning bearings.
- Cracking, delamination, spalling and evidence of reinforcement corrosion on substructure elements.

Inadequate Traffic Capacity:

The bridge carries two lanes with shoulders in each direction separated by a concrete median barrier (see Figure 2-1) and with a total deck width of 79'-8". Traffic numbers are projected to increase and warrant a bridge with additional capacity (see detailed discussion in the Updated Purpose and Need in Appendix A). Additionally, both the PA and NJ Turnpike mainlines on either side of the Delaware River bridge are currently three-lanes in each direction. The existing bridge cannot accommodate additional traffic capacity, and therefore cannot meet the project need.

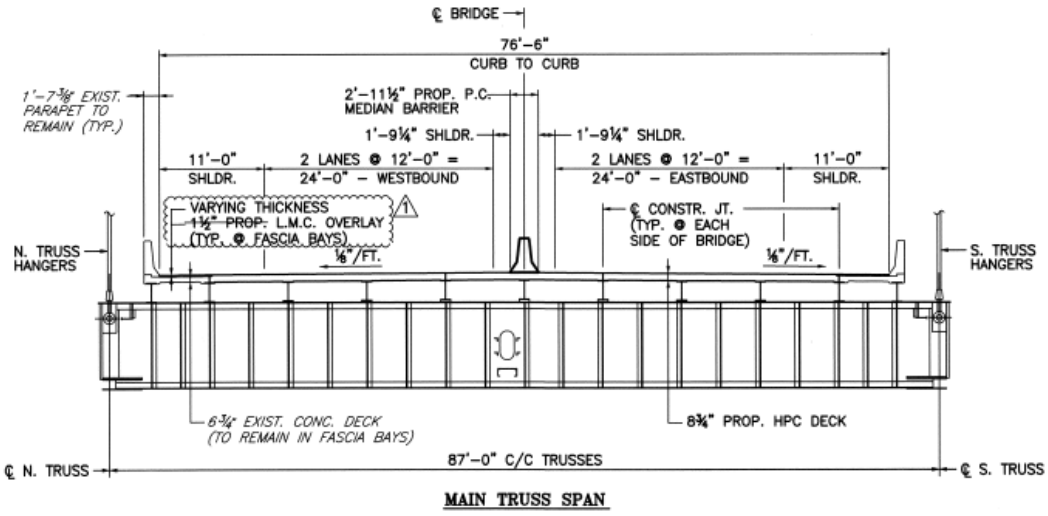


Figure 2-1 Existing Delaware River Bridge Cross Section

Lack of Redundancy:

The Bridge is comprised of three different structural steel span types: Steel Continuous Warren Through Truss, Steel Continuous Deck Truss and Steel Girder/Floorbeam/Stringer (Figure 1-3).

All three structure types contain steel tension elements that are classified as nonredundant because they only contain two main load carrying components. Typically (load path) redundancy requires at least three separate main load carrying components. Additionally, many of the truss tension members are single elements (wide flange sections), which do not provide the opportunity for internal redundancy considerations where a single element of the member can fail, but the failure is not propagated (spread) to the rest of the cross-section. Accordingly, the Delaware River Bridge, by definition, contains a large number of NSTMs. See the figures below showing NSTM truss members.

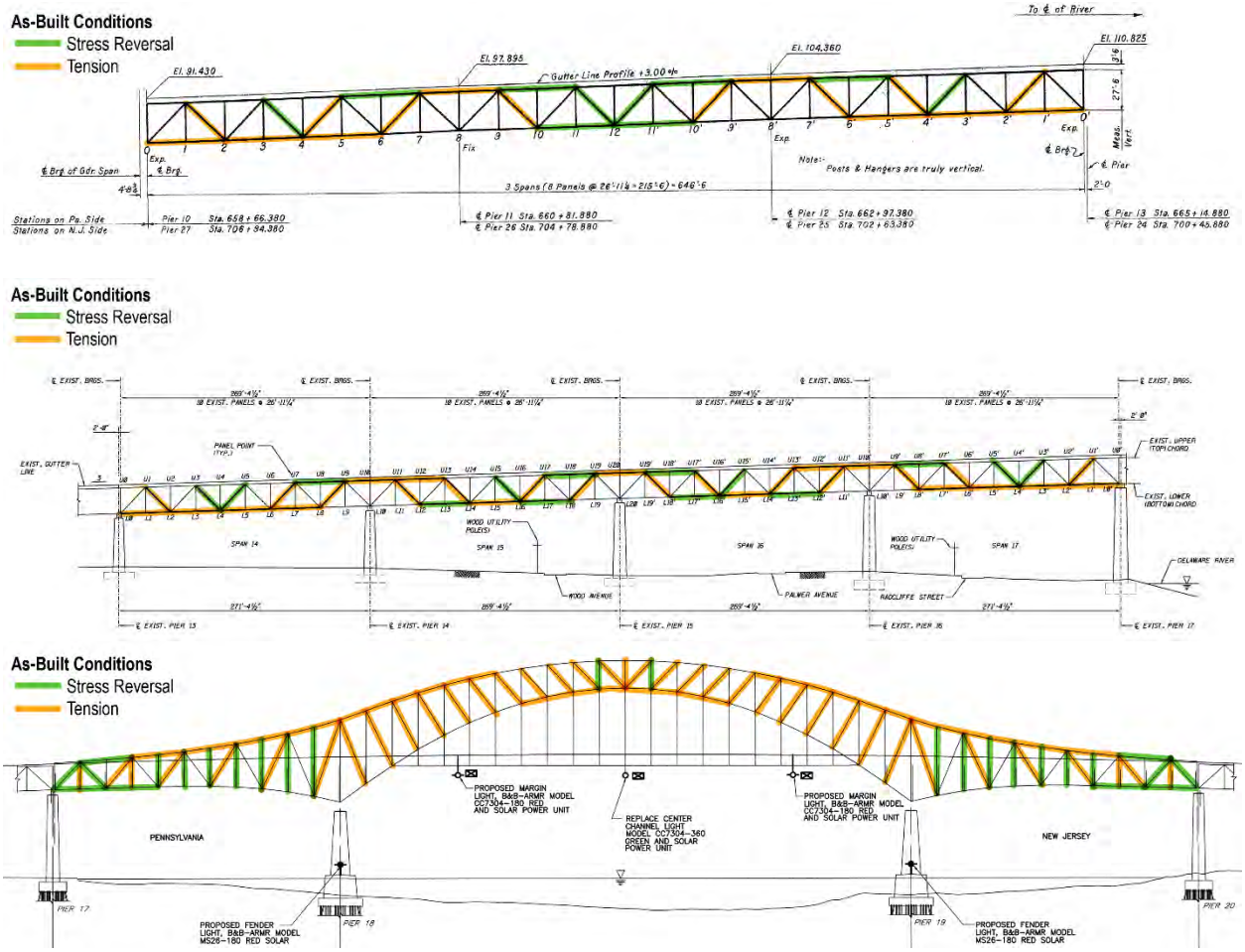


Figure 2-2 Tension and Stress Reversal NSTM Members

In addition to the truss members shown, the truss gusset plates are NSTM members. The two girders in girder/floorbeam/stringer spans are NSTM members. The floor beams are considered to be NSTM members since the floor beam spacing is greater than 14'-6" in all spans.

Lack of Service Reliability:

The Service Reliability of the bridge is limited due to both the presence of fatigue sensitive details and low load ratings as described in the Updated Purpose and Need.

Fatigue sensitive details can lead to fatigue cracking, which can cause structure failure if the remaining uncracked section cannot support the structure's loads.

Per the July 18, 2022 Inspection report, the following fatigue-sensitive details are present on the NSTMs:

- The riveted connection and construction of the girders, floorbeams, truss connections, and built-up truss members.
- Filled mis-punched holes are present along several floorbeam webs, isolated girder locations, and several

truss members, some of which are Stress Reversal Member and/or Tension Member.

- Tack welds are present at scattered locations throughout, including the main spans, deck truss members, and along several bottom flange cover plates in the girder spans.

On January 20, 2017, a fracture in a top chord member in the 4-span deck truss closed the bridge for 49 days.

Low load ratings come from the Load and resistance factor rating (LRFR) updates last performed in 2017 (summarized in Appendix D). These LRFR ratings reflect the 2016 existing as-inspected conditions documented on the Standard Inspection Forms for the 2016 cycle inspection. The current controlling (lowest) as-inspected rating factors for HL-93 loading (AASHTO's current design live load model) are 0.57 (Inventory) and 0.74 (Operating) based on Truss Diagonal Member L0-U1 of the PA 4-Span Deck Truss unit. Note that inventory rating factors below 1.0 indicate that the bridge cannot support the load on a regular basis, and operating rating factors below 1.0 indicate that the load exceeds the bridge's capacity. While HL-93 operating ratings below 1.0 do not require load posting, they limit the ability of permit vehicles to use the bridge and reduce the anticipated remaining service life of the bridge.

The trusses in the main spans and approach spans, as well as the girders, floorbeams, and stringers at select locations, also exhibit LRFR ratings below 1.0 for the HL-93 loading. See controlling HL-93 rating summary in Table 1. Note that the as-built load ratings use the original member capacities, while the as-inspected load ratings use the current member capacities accounting for deterioration.

Table 1 – Controlling HL-93 Rating Summary

Location	Controlling Member	Vehicle Type	As-Built	As-Insp.
3-Span Warren Through Truss	U7-L8	HL-93 (INV)	0.91	0.64
		HL-93 (OPR)	1.17	0.83
4-Span Deck Truss (PA Approach)	L0-U1	HL-93 (INV)	0.61	0.57
		HL-93 (OPR)	0.79	0.74
3-Span Deck Truss (PA Approach)	L0-U1	HL-93 (INV)	0.69	0.69
		HL-93 (OPR)	0.89	0.89
4-Span Deck Truss (NJ Approach)	L0-U1	HL-93 (INV)	0.61	0.61
		HL-93 (OPR)	0.79	0.79
3-Span Deck Truss (NJ Approach)	L0-U1	HL-93 (INV)	0.69	0.69
		HL-93 (OPR)	0.89	0.89
3-Span Girder/Floorbeam/Stringer (PA Approach)	G1	HL-93 (INV)	0.61	0.61
		HL-93 (OPR)	0.79	0.79
3-Span Girder/Floorbeam/Stringer (NJ Approach)	G1	HL-93 (INV)	0.61	0.61
		HL-93 (OPR)	0.79	0.79

The 2017 fracture event, the presence of NSTMs, the fatigue sensitive details throughout the entire bridge, and the low load ratings, make the bridge vulnerable to future deterioration or damage requiring emergency repairs, traffic disruptions, and bridge closures.

The bridge in its current condition does not meet the project needs because of deficiencies in traffic capacity and service reliability/redundancy.

3. REHABILITATION EVALUATION

The bridge rehabilitation analysis examines three structural rehabilitation options for the Delaware River Bridge. The bridge was rehabilitated in 1998 and 2005, and emergency repairs were conducted in 2017. The purpose of this evaluation is to determine the viability of rehabilitating the existing bridge to meet the Updated Purpose and Need while not significantly impacting the characteristics that qualify it for listing in the NRHP. The project's Updated Purpose and Need includes traffic capacity on I-95 and service reliability/redundancy of the bridge.

Member Repair

Repair to the deteriorated structural members consistent with The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Rehabilitation (SOI Standards) typically involves either bolting additional steel plates to existing members or in-kind member replacement.

Such repairs would not meet the project need for traffic capacity as the existing bridge deck width would remain, nor the need for redundancy as the NSTMs would remain.

Member repair would also not meet the project need for service reliability, as it would not eliminate fatigue sensitive details and would not sufficiently improve the low load ratings. The current design live load is heavier than the live load the bridge was designed for in the 1950's. As discussed in Section 2.2, the as-built live load ratings for AASHTO's current design live load (HL-93) are less than 1.0 and therefore do not meet current design standards. Repairs that restore the members to their original structural capacity are not adequate; strengthening is required to sufficiently address the low load ratings.

Member repairs would not meet the project needs for traffic capacity or service reliability/redundancy of the bridge.

Widespread Structure Strengthening

Several techniques were considered for increasing the load capacity of existing members, which include adding supplemental members, providing additional supports, and post-tensioning. Adding a third truss/girder line throughout the existing Delaware River Bridge is not practical, especially for the Warren through truss, where providing an additional truss line will significantly alter load paths, structural behavior, and bridge appearance. Even if the third truss/girder line was provided, NSTMs would remain throughout the bridge, as load path redundancy cannot be achieved because the significant bridge width and spacing between truss/girder lines could result in collapse of the bridge if either exterior truss/girder line were to fail.

One concept for improving the bridge load ratings and removing the NSTM designation of select members is to construct external post-tensioning. Post-tensioning was considered for individual members or for application on a much larger scale (entire span). Post-tensioning for a structure of such a large scale is not practical as this technique is typically used for short span bridges. Given the span lengths and significant forces in the DRB truss members, use of post tensioning will induce extremely high local stresses, which will trigger the need for strengthening of additional members and the truss joints. There are no known examples of widespread strengthening of similar large truss bridges using post-tensioning (PT) tendons. PT will alter load paths and truss geometry and will also change member and overall bridge appearance (character defining features). See Figure 3-1 below for a graphical representation of typical techniques for PT of trusses. PT of the entire span, if successful, could improve the bridge capacity and load ratings. However, it would not meet project need for traffic capacity as the existing bridge width would remain. It would also not meet the project need for service reliability/redundancy as fatigue sensitive details and some NSTMs would remain.

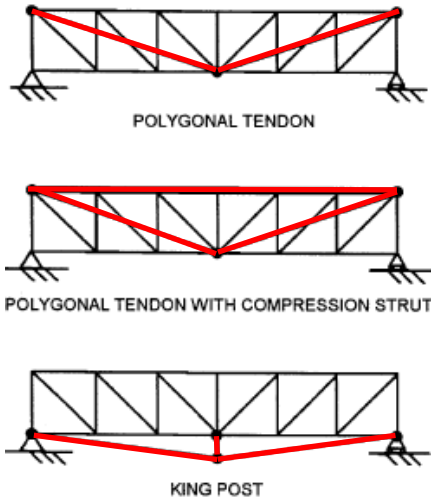


Figure 3-1 Post-tensioning Options for Truss Structure

Member Strengthening

As can be seen from Figure 2-2, over 40% of the approach deck truss members and majority of the Warren through truss members are NSTM members. To remove NSTM members using PT tendons would require PT forces in the magnitude of millions of pounds, induce extremely high local stresses due to the attachment of PT tendons at truss connections, and truss connections would also need to be strengthened. Post-tensioning of this magnitude would severely alter the appearance of the truss members and the overall bridge elevation; see Figure 3-2 for a typical technique for post-tensioning a truss member.

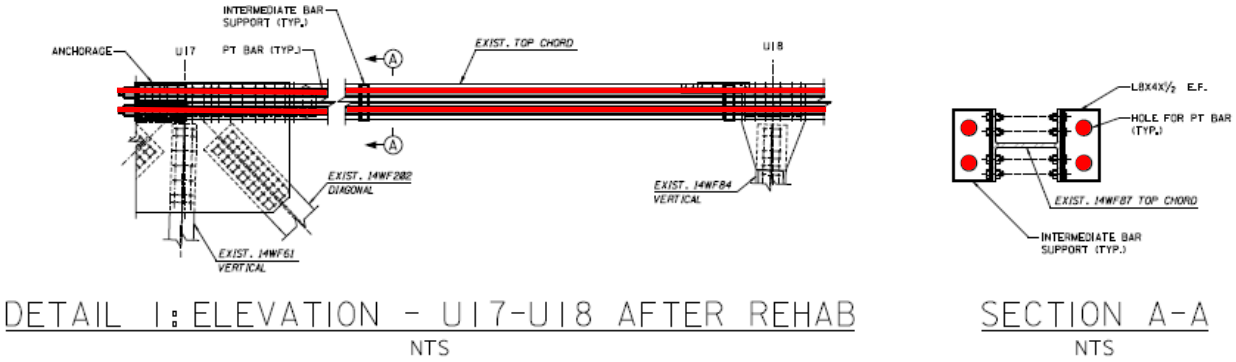


Figure 3-2 Post-tensioned Top Chord of the Truss

Figure 3-3 shows the elevation view of the 4-span approach deck truss after post-tensioning. The shapes of over 40% of members would be altered after post-tensioning. The majority of the members would likely require strengthening to carry the redistribution of force that would occur as a result of the post-tensioning. This would further impact visual aesthetics and change the structural behavior of the bridge. Gusset plate connections joining these members would also be modified; these changes would be clearly visible in both elevation view and view from the underside of the bridge. The change in appearance would be even more evident in the Warren through truss where the majority of the

truss members would require post-tensioning. Member strengthening, if successful, could improve the bridge capacity and load ratings. However, it would not meet project need for traffic capacity as the existing bridge width would remain. It would also not meet the project need for service reliability/redundancy as fatigue sensitive details and some NSTMs would remain. As previously noted, widespread PT of a truss bridge of the magnitude and complexity of the DRB is not known to exist.

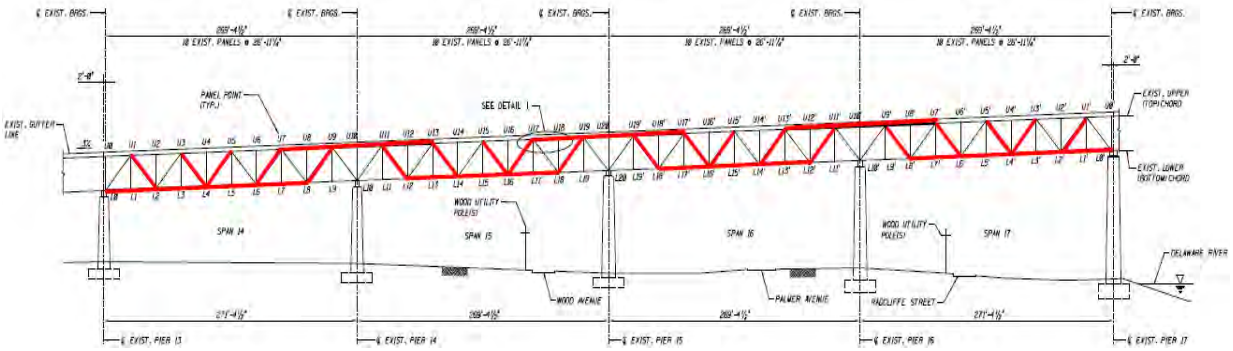


Figure 3-3 Deck Truss Span with Post-tensioning

4. CONCLUSION

The three structural rehabilitation options and whether or not they meet the Updated Project Purpose and Need and meet The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Rehabilitation (SOI Standards) are provided in Table 2.

Table 2 - Historic Bridge Rehabilitation Options Comparison Matrix

Project Goals / Concerns		OPTIONS		
		Member Repair	Widespread Structure Strengthening	Member Strengthening
Meets Updated Purpose and Need	Traffic Capacity	No	No	No
	Service Reliability	No	No	No
	Redundancy	No	No	No
Historic Preservation	Meets SOI Standards	Yes	No	No

In summary, the bridge cannot be rehabilitated to meet the project's Updated Purpose and Need and The Secretary of the Interior's Standards for the Treatment of Historic Properties and Guidelines for Rehabilitation.

5. REFERENCES

[1] Biennial Bridge Inspection Report – NSTM Bridge Structure No. P0.00 by ATANE Consulting dated 07/18/2022.

[2] Pennsylvania Historical and Museum Commission Historic Resource Survey Form dated 9/17/2024.

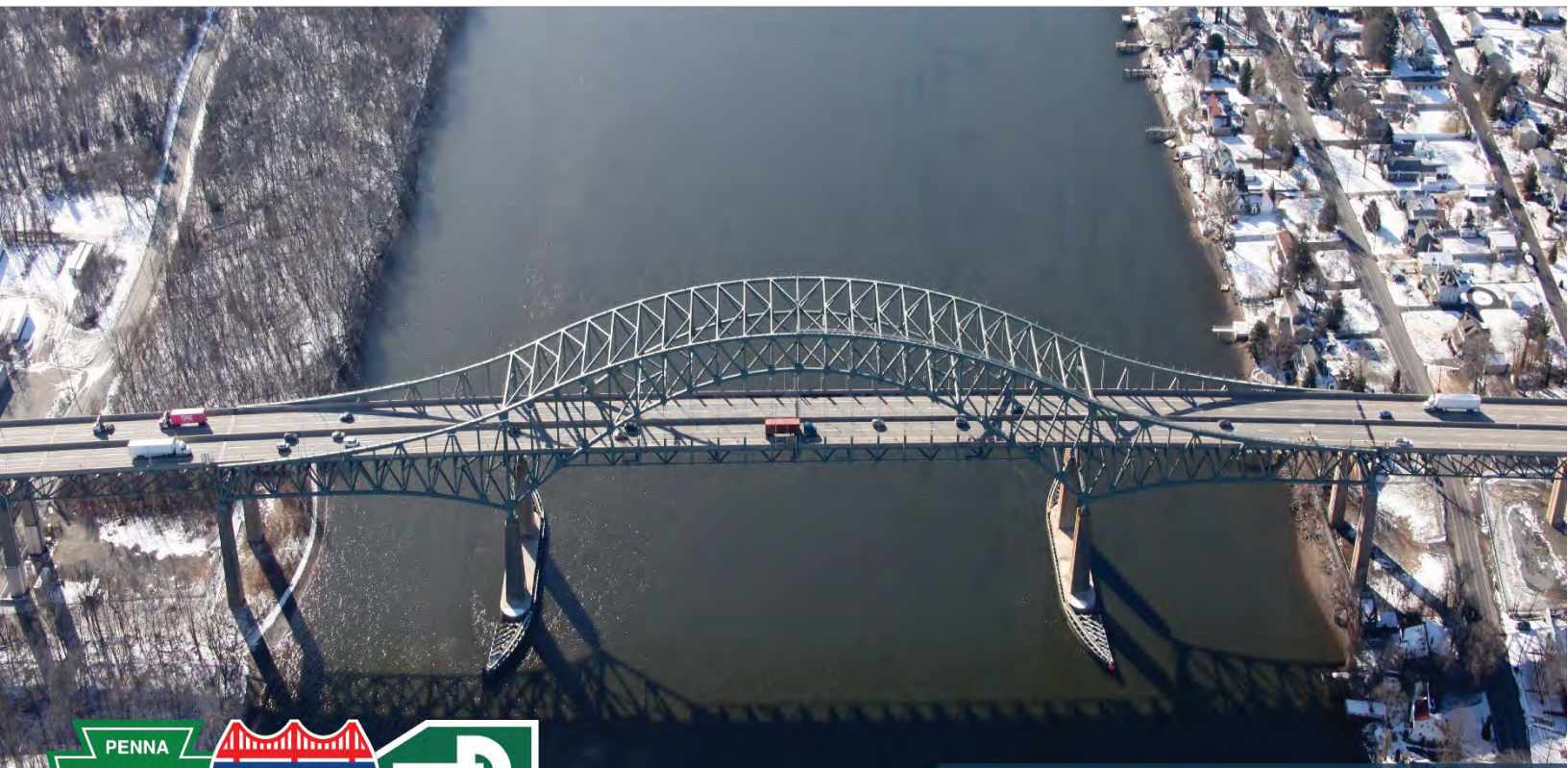
[3] Pennsylvania Historical and Museum Commission Concurrence Letter dated 11/18/2024.

Appendix A

- Updated Purpose and Need – October 2024

PA TURNPIKE / I-95 INTERCHANGE PROGRAM – STAGE 3 – DRB

Updated Purpose and Need



October 2024

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1.1 INTRODUCTION

With Federal oversight from the Federal Highway Administration (FHWA), the Pennsylvania Turnpike Commission (PTC), hereafter referred to as the Commission in partnership with the New Jersey Turnpike Authority (NJTA), hereafter referred to as the Authority, and in coordination with the Pennsylvania Department of Transportation (PennDOT), have initiated an update of the project purpose and need for the Pennsylvania Turnpike/Interstate 95 (PA Turnpike/I-95) Interchange in Bucks County, Pennsylvania and Burlington County, New Jersey. A Final Environmental Impact Statement (FEIS) was approved for this project on June 9, 2003 and a Record of Decision (ROD) was signed on December 31, 2003.

1.2 REGULATORY COMPLIANCE

This project purpose and need is being prepared in accordance with the Council on Environmental Quality (CEQ) regulations at 40 CFR 1502.13 and the Federal Highway Administration regulations at 23 CFR 771.111(f). This document is being prepared in accordance with *PennDOT's Publication 319 Needs Study Handbook* (PennDOT, 2020).

The purpose and need document helps define the range of alternatives to consider in the project development/NEPA phase. If a proposed alternative does not meet the purpose and need, it can be dismissed from further evaluation under NEPA. This purpose and need document is also intended to satisfy the requirements for Section 106, including historic bridge rehabilitation analysis, Section 404 permitting, PA Chapter 105 permitting and Section 4(f) analysis.

Per PennDOT's Publication 319, under Section 106 of the National Historic Preservation Act, PennDOT must determine the impact that a project may have on historic properties. An alternative that results in adverse effects to identified historic properties may be dismissed under Section 106.

Furthermore, Section 106 compliance for the rehabilitation or removal of a historic resource, such as a historic bridge, may also include the preparation of a feasibility analysis. The purpose of the analysis is to demonstrate whether it is prudent or feasible to rehabilitate the historic bridge and meet the purpose and need of the project.

Under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) must determine whether there is any "practicable" alternative that avoids the use of aquatic resources within its jurisdiction. An alternative that does not meet the purpose of the project can be eliminated from consideration under Section 404 (AASHTO 2016). A project purpose and need narrative is also required for projects involving PA Chapter 105 water encroachment permits.

Under Section 4(f), FHWA must determine whether there is any "feasible and prudent" alternative that avoids the use of significant publicly owned parks, recreation areas, and wildlife or waterfowl refuges, as well as any publicly or privately owned historic site listed or eligible for listing on the National Register of Historic Places. If an alternative does not

meet the purpose and need of the project, it can be eliminated under Section 4(f) (AASHTO 2016).

1.3 BACKGROUND

In 1969, Interstate 95 was completed without a direct connection to the Pennsylvania Turnpike, which had been constructed more than 10 years prior. The lack of a direct connection created confusion for regional travelers and resulted in increased congestion on local arterial roadways used by motorists to connect between the interstate highways.

Several previous studies in the 1970s and 80s suggested ways to connnect these two roads but were discontinued for a variety of engineering and environmental reasons. To address the gap along I-95 and make it continuous along the entire East Coast of the United States, Congress passed the 1982 Surface Transportation Assistance Act (STAA), which mandated the completion of I-95 using the existing Pennsylvania and New Jersey Turnpikes via an interchange between I-95 and the Pennsylvania Turnpike. In 1985, Pennsylvania Act 61, authorized the Commission to build an interchange between I-95 and I-276 and widen I-276 to six lanes between Interchange 28 (now Interchange #351) and the Delaware River.

The goal of the 2003 Environmental Impact Statement (EIS), was to determine whether a direct connection between the PA Turnpike and I-95 and related infrastructure improvements could be developed while minimizing impacts on socioeconomic and environmental resources.

The objective of the interchange project included:

- Provide an improved linkage between the PA Turnpike and I-95 for easier interstate travel;
- Complete I-95 through the Mid-Atlantic region by constructing an interchange and redesignating the PA and NJ Turnpikes;
- Reduce the amount of traffic on local roads currently used to make the connection between I-95 and the PA Turnpike;
- Increase the capacity on the PA Turnpike and I-95 to accommodate the transfer of traffic from the local roads to the interstates;
- Improve travel time through the study area by reducing traffic delays.

During the EIS phase, the project was divided into three elements: the Interchange Element, the Toll Plaza Element, and the Delaware River Bridge.

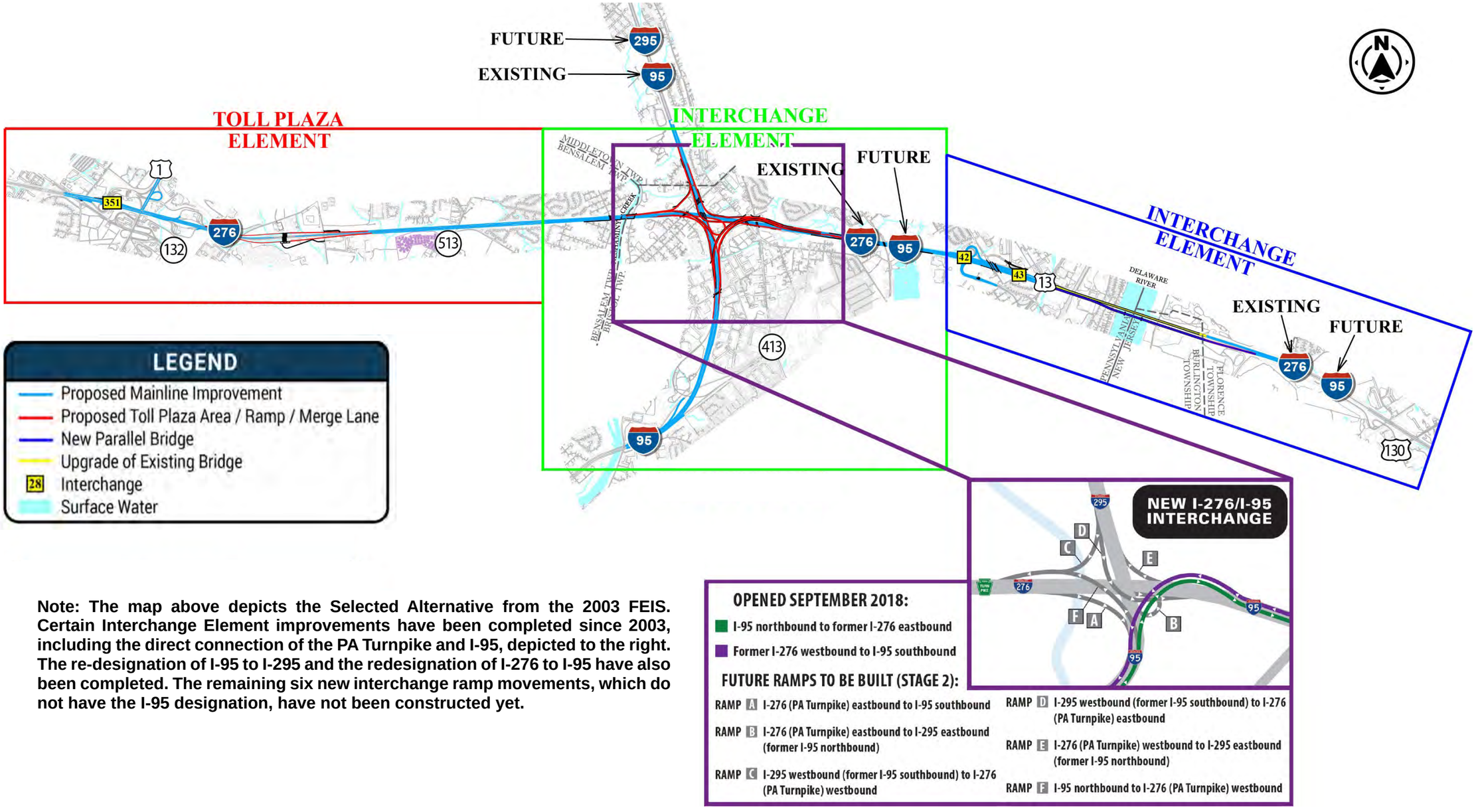
- The Selected Alternative was identified in the December 2003 ROD, **Figure 1**. The Alternative was selected due its ability to address the project needs; the consideration of engineering parameters; the assessment of anticipated environmental effects; and public and resource agency input. The Selected Alternative consists of the combination of Modified Plaza West, Single Loop A Interchange, and Delaware River Bridge South. To further expand, this alternative includes:

- Modified Plaza West is a mainline barrier toll plaza (conventional full width configuration) that incorporates E-ZPass. This plaza would be the new eastern terminus of the Pennsylvania Turnpike Toll System. (Stage 2)
- The Single Loop A Interchange includes ramps to make a direct, high-speed, fully-directional connection between I-95 and I-276.
- The Delaware River Bridge South introduces a second, parallel structure located adjacent to and just south of the existing Delaware River Turnpike Bridge, thus allowing the use of both bridges as a one-way pair in the design year.

Stage 1 as presented in **Figure 2** was completed, opened to traffic in September 2018, and facilitated a revised routing of I-95 in PA and NJ, thereby making I-95 continuous along the east coast from Florida to Maine. Project Elements involved in Stage 1 included the Modified Plaza West and the Single Loop A Interchange.

Stage 2 includes construction of the remaining six new interchange ramp movements which do not have the I-95 designation (see **Figure 1**), and completion of the turnpike mainline widening from two lanes in each direction to three lanes in each direction in addition to the associated reconstruction work on the Turnpike and I-95/I-295. The Project Element involved in Stage 2 included the Single Loop A Interchange. Stage 2 is further broken down into distinct sections:

- **Section A** (mainline Turnpike widening and reconstruction near the Bensalem Interchange (#351) to the Neshaminy Falls Toll Plaza); Section A includes the reconstruction and widening of the Turnpike mainline (I-276) from west of the Bensalem Interchange to the Neshaminy Falls Toll Plaza. Section A is advancing through final design and construction will be scheduled when funding is identified. I-276 will be widened to 6 through lanes with additional auxiliary lanes to/from the Bensalem Interchange (#351). The typical section transitions due to a median width reduction from 26’ to 10’ in the ultimate condition. Included in this project is the replacement and widening of three mainline bridge structures carrying the turnpike over CSX Railroad, Street Road (SR 0132), and Old Lincoln Highway (SR 2037) in addition to 7 retaining walls and 1 noise wall.
- **Section D30** (mainline Turnpike widening and reconstruction between the Bensalem Boulevard and the I-95 flyovers). Section D30 includes the reconstruction and widening of the Turnpike mainline (I-276) from west of the Bensalem Boulevard overpass to the I-95 flyover connection. Within this approximately 1.5-mile section, I-276 will be widened to 6 lanes with up to a 26-foot wide median. D30 is currently under construction into 2026. Tie-ins for future (Section D40) interchange ramps will be part of the contract as follows: Ramp A (I-276 EB to I-95 SB), Ramp C (I-295 WB to I-276 WB), and Ramp F (I-95 NB to I-276 WB). The structure work under this contract includes the reconstruction of one bridge (Turnpike eastbound and westbound mainline over the Neshaminy Creek and Newportville (SR 2027) Road), as well as the construction of four noise walls. Additionally, gated emergency and authorized-vehicle access ramps from Newportville Road (SR 2027) to the Turnpike in both directions will be constructed as well as stormwater management facilities and four (4) noise walls.



Note: The map above depicts the Selected Alternative from the 2003 FEIS. Certain Interchange Element improvements have been completed since 2003, including the direct connection of the PA Turnpike and I-95, depicted to the right. The re-designation of I-95 to I-295 and the redesignation of I-276 to I-95 have also been completed. The remaining six new interchange ramp movements, which do not have the I-95 designation, have not been constructed yet.

Figure 1: 2003 FEIS Selected Alternative & Subsequent Interchange Improvements

- **Section C** (mainline Turnpike widening and reconstruction from the Neshaminy Falls Toll Plaza to the Bensalem Boulevard overpass*).* Section C involves the reconstruction and widening of the Pennsylvania Turnpike (I-276) from a point approximately 1650 feet east of the Galloway Road (SR 2023 / MP 353.0) overhead structure to a point approximately 575 feet west of the Bensalem Boulevard (SR 2015 / MP 355.2) overhead structure (approximately 2.2 miles total). Through this construction, the mainline will be converted from a four-lane divided roadway to a six-lane divided roadway typical section. Included in this project is the construction of eight (8) noise walls. The conversion of the Neshaminy Falls Toll Plaza to Open Road Tolling will also be included in this contract. Section C is advancing through Final Design and will be constructed after Section D30 is completed.
- **Section E** (Turnpike/US 13 mainline interchange reconstruction and mainline widening to the west). This project will include retaining walls and noise walls. The Turnpike mainline bridge replacement over Mill Creek was constructed in Stage 1 to accommodate the required widening to achieve capacity. A Design Field View was completed for the remaining components in Section E. A decision related to the Final Design and Construction of this section will be made following Preliminary Engineering for the Delaware River Bridge.
- **Section D40** (the remaining six ramps of the I-276/I-95/I-295 Interchange and related mainline improvements). This project will include retaining walls, noise walls, and the I-295 bridges over the Turnpike mainline and New Falls Road (SR 2006). Design Field View was completed for the remaining components in Section D40. Final Design and Construction will be programmed when funding becomes available. Section D40, when constructed, will complete the interchange due to completed construction contracts D10, D20, and Section D30, which is currently in construction.

Stage 3, generally aligned with the Delaware River Bridge Element in the 2003 FEIS, considers the rehabilitation of the existing Delaware River Bridge paired with the construction of a new parallel bridge over the Delaware River, or full replacement of the existing structure. This project is intended to connect the six lanes of the Pennsylvania Turnpike (I-95) mainline just east of Exit 42 with six lanes of the New Jersey Turnpike 0.8 miles east of the New Jersey state line.

Due to the amount of time that has elapsed since the ROD (21 years) and a fracture that was discovered on January 20, 2017, repaired, and fully inspected on the Delaware River Bridge, the FHWA has requested that the project team reconsider and update the project purpose and need. Additionally, at the time of the FEIS and ROD, the Delaware River Bridge was not considered historic. The Delaware River Bridge has since been determined eligible for listing in the National Register of Historic Places (NRHP) in 2005 (Key No. 155879). The bridge was determined significant under Criterion C for engineering as an example of a continuous arch bridge.

To expand further on the January 2017 incident, a fracture in a structural steel component of an existing approach span truss on the Pennsylvania side was discovered and repaired. Following the incident, the Commission and Authority decided to consider

alternative options, including replacement of the bridge, in contrast to the ROD Selected Alternative. In addition, the Commission and Authority formalized their decision by entering into a Memorandum of Understanding (dated October 31, 2019) that documented the respective responsibilities of the Parties related to the design, funding, construction, ownership, maintenance, inspection, rehabilitation and insurance for the project.

1.3.1. NEPA ACTIVITIES SINCE THE ROD

In accordance with 23 CFR 771.29, eight (8) individual re-evaluations of the FEIS were conducted between 2006 and 2024, as shown in **Table 1**. When the Commission submitted Re-evaluation #8, the FHWA determined that any future project development activities would require a Supplemental EIS due to the time elapsed since the 2003 ROD.

Table 1: Re-evaluation of the FEIS

FEIS Re-Evaluation	Action	Design Section/Construction Contract	Approval Date
#1	Preliminary DFV Submission	All Sections	1/20/2006
	New JD Results		
	Prepared in advance of ROW acquisitions		
#2	Redesign of the Delaware River Bridge toll area (ORT)	I-95-B	4/5/2011
	Removal of Croydon Park and Ride	I-95-F (Park and Ride)	
	Revised DFV submissions	All Sections	
	General Utility Relocation		
#3	Final Design Refinements	I-95-S (Overhead Bridges)	1/9/2014
		I-95-EIS (Environmental Mitigation)	
		I-95-D10	
#4	Final Design Refinements	I-95-D20	2/6/2015
	Construction Progress	I-95-S (Overhead Bridges)	
		I-95-B	
		I-95-D10	
#5	Final Design Refinements	I-95-A1	7/8/2016
		I-95-E (Route 13 Connector)	
		I-95-F (Park and Ride)	
#6	Final Design Refinements	I-95-D (New Falls Road Bridge)	7/18/2018
#7	Final Design Refinements	I-95-D30	5/2/2023
		I-95-A	
#8	Final Design Refinements	I-95-C	2/29/2024

2. PROJECT STATUS

In 2010, due to funding constraints, the PA Turnpike/I-95 Interchange Project was split into three (3) stages as discussed below and as illustrated in **Figure 2**. Stage 1 was completed in September 2018. Stage 2 is partially constructed, with portions still in or yet to be advanced into Final Design. Stage 3 includes only the Delaware River Bridge.

Stage 1 (completed) included:

- Construction of environmental mitigation sites
- Advanced and work zone Intelligent Transportation Systems (ITS) deployments
- Replacement of four overhead bridges (Richlieu Road (SR 2035), Galloway Road (SR 2023), Bristol-Oxford Valley Road (SR 2029), over Turnpike; Ford Road (SR 2192) over I-95)
- Construction of new a Neshaminy Falls Toll Plaza in Bensalem and a new Delaware River Bridge Cashless Tolling Point (westbound only E-ZPass or Toll by Plate)
- Flyover ramps connecting I-95 to the Turnpike with associated mainline widening of I-95 from the PA 413 Interchange to the flyovers and east of the flyovers to Exit #42 (including the Northbound I-95 off-ramp at Exit #42)
- Reconstruction of the Delaware Valley Interchange Connector Ramp to US 13 with a new at-grade intersection.

Stage 2 (partially completed) includes:

- Replacement of overhead bridges carrying Bensalem Boulevard (SR 2015), Hulmeville Road (SR 0513), and New Falls Road (SR 2006) over I-276 (completed)
- Replacement of the ramp bridge over the Turnpike at the Bensalem Interchange 351 (completed as Section A1)
- Remaining reconstruction at the Bensalem Interchange 351, including associated PA Turnpike widening (Section A)
- Widening along the remaining portions of the PA Turnpike (Sections C & D30)
- Remaining interchange movements (six) connecting I-276 to I-95/I-295, including I-295 bridges over the turnpike and New Falls Road (SR 2006) (Section D40)
- Remaining Delaware Valley Interchange (Exit #42) improvements and Turnpike mainline widening west of the Delaware River Bridge (Section E)

After the 2003 ROD, there were no additional design activities nor field investigations in the FEIS Stage 3 study area. When the subject of a renewed Alternatives Analysis was presented, the Stage 3 study area needed to be examined and re-established. Stage 3 includes only the Delaware River Bridge, and the project study area is shown on **Figure 3**. The Stage 3 study area extends east from the turnpike mainline bridge over Mill Creek through the US 13 (Bristol Pike) Interchange, I-95 Exit #42 in Pennsylvania, to the first

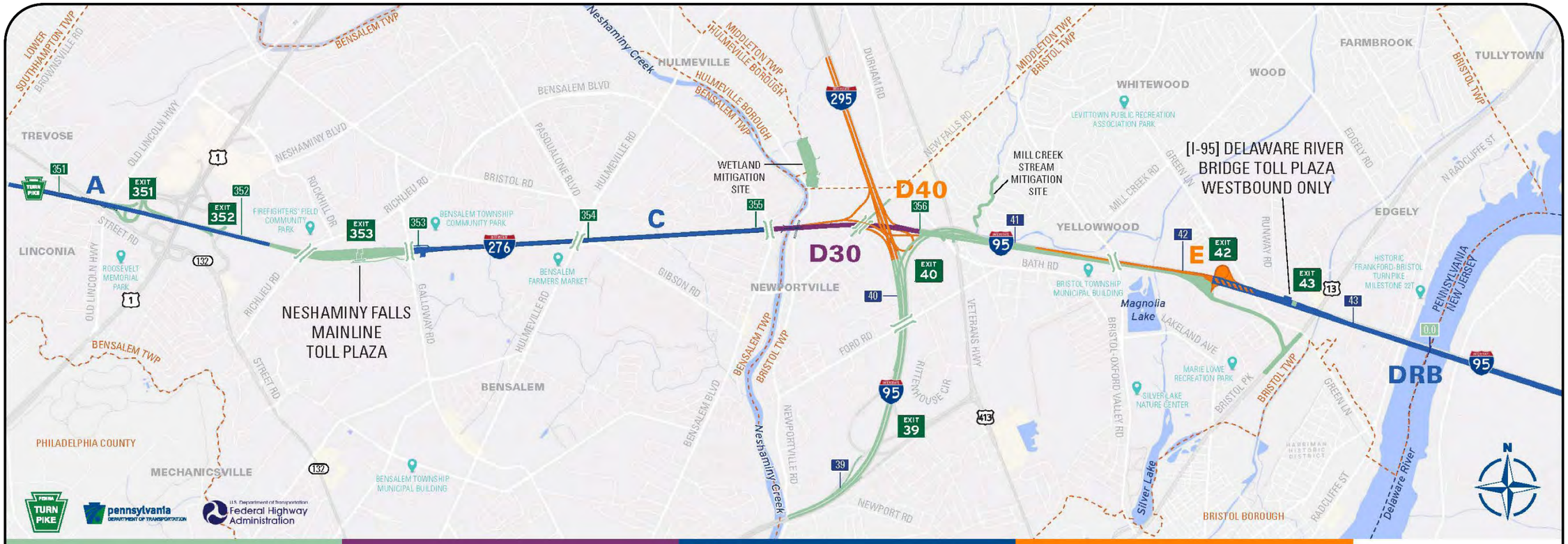


Figure 2: Project Stages and Status

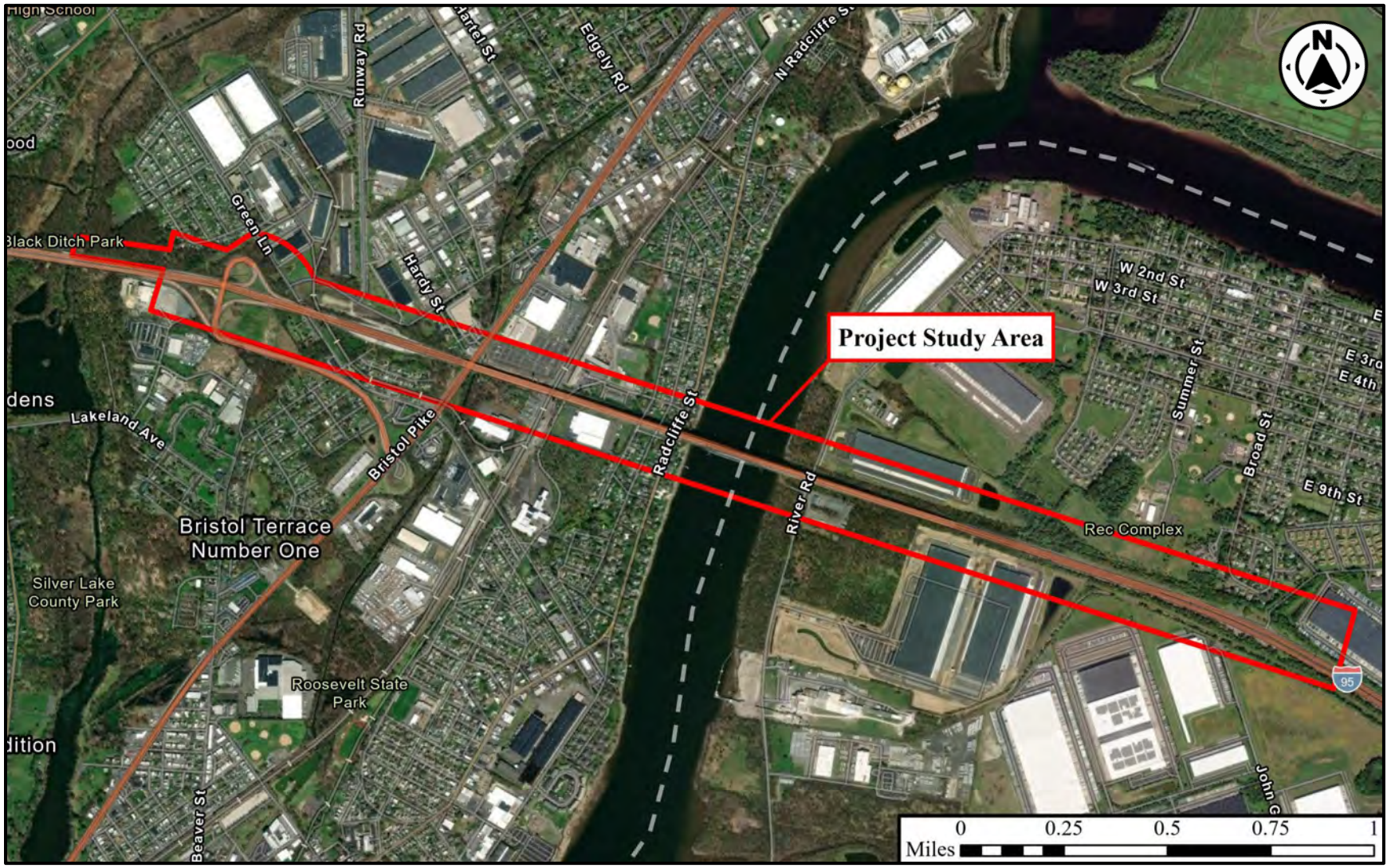


Figure 3: Stage 3 Delaware River Bridge Project Study Area

mainline Turnpike horizontal curve in New Jersey for a total length of approximately 3.2 miles. Measuring from the midpoint of the main span of the Delaware River Bridge, approximately 1.7 miles of the Project is in Pennsylvania and 1.5 miles of the Project is within New Jersey. The existing bridge is 6,571-feet long with a main span of 682-feet over the river channel and carries two travel lanes in each direction. Environmental studies, completed as part of the 2003 EIS, were updated in 2020 and 2021. The study area has a width of 1,000 feet, centered on the existing alignment, except to the west where the study area bumps out around the interchange area to account for potential ramp reconfigurations and then narrows west of the interchange to where the alignment will tie back into the existing mainline.

3. PLANNING CONSISTENCY

3.1 PENNSYLVANIA

The *Transportation and Community Development Initiative (TCDI), Bristol Township, Bucks County Pennsylvania* (Bucks County Planning Commission 2019), describes the economic benefits of the new I-95/Pennsylvania Turnpike Interchange project, including the Delaware River Bridge. The report notes that the project will lower travel costs, increase regional market attractiveness, and job growth, and increase quality of life for Bristol Township residents.

The report states, “Lower Bucks County and the economic region will benefit from the interchange from decreased travel times, clearer route designation, and greater efficiencies in the overall transportation network. Lower Bucks County and Bristol Township will become a more attractive market with direct access to freight corridors that will result in lower travel times to the major markets of the Northeast, Mid-Atlantic, South, and Midwest. Bristol Township residents will also benefit from the project, through decreased truck traffic… and better air quality”.

The plan further discusses the importance of the corridor stating, **“**Interstate 95 and the Pennsylvania Turnpike are critical corridors in our nation’s transportation network. A 3-hour drive from the interchange covers a 4-state market area that includes all of New Jersey, New York City, Harrisburg, Scranton, Baltimore, Maryland, and the northeast portion of Washington, DC. This region is home to over 37 million people, 13.8 million households, and almost 1.4 million employers. Median household income is just over $67,000 and 37 percent of the population over 25 years of age have either a bachelor’s or higher degree. New York State ranks as the third-largest economy in the U.S., followed by Pennsylvania (6th), New Jersey (8th), Maryland (15th), and Delaware (41st).”

The *Delaware Valley Regional Planning Commission (DVRPC) DRAFT FY 2025-2028 Transportation Improvement Program (TIP)* for Pennsylvania includes the remaining portions of Stage 2 of I-95 / I-295 / PA Turnpike Interchange (#119730) project, and also includes Stage 3, the Delaware River Bridge (#119977). The projects are also listed in the *DVRPC’s Long Range Transportation Plan (LRTP) Connections 2050 Plan*.

The *2011 Bucks County Comprehensive Plan* described the Pennsylvania Turnpike/Interstate 95 Interchange Project as a critical improvement and the highest priority for future funding needs. The project will improve mobility and access for both the

county and the region. The project is also listed as part of a sound economic development strategy compatible with efficient movement of goods. The *Bucks County Bucks2040 Vision Plan* notes the criticality of road and bridge infrastructure.

3.2 NEW JERSEY

While the existing six-lane capacity on the NJ Turnpike within the project area segment leading to the DRB from the east, at MP P0.8 southbound and P0.3 northbound can accommodate the DRB's projected design year traffic volumes, rapid freight and logistics facility expansion in Burlington County, NJ in the vicinity of US 130 and Interchange 6A of the NJ Turnpike has received considerable recent examination. This county and regional focus has yielded an examination of truck volumes and movements in this area and their impact on the roadway network. Interchange 6A is critical for the facilitation of commerce and goods throughout the Mid-Atlantic region. The Burlington Township/Haines Industrial Freight Center, a DVRPC "Mega Freight Center," is located in northern Burlington County near NJ Turnpike 6A. Additionally, the Burlington County, NJ Highway Master Plan (October 2021) notes the need for emphasis of "logistics/freight movement around NJ Turnpike Interchanges 6A and 7 and US 130" and the Township of Florence 2022 Master Plan (June 2022) describes the importance of freight access to the NJ Turnpike especially in regard to recent emergence of logistic-based freight centers in the area. Similarly, the 2018 Master Plan Reexamination (May 2018) cites increased warehouse development throughout the region as a need to improve circulation and provide a more balanced routing of trucks.

Recommended actions within the planning efforts and studies noted above involve potential improvements to municipal, county, and state (NJDOT/NJTA) facilities. These potential improvements may involve geometric and associated drainage adjustments and related infrastructures and operation improvements in the vicinity of Interchange 6A and US 130. The timing and extend of the improvements resulting from the efforts summarized above will be coordinated between the DRB Project Team and the respective jurisdictional agencies so that related summaries contained in subsequent SEIS studies and documentation include the latest coordination efforts and actions.

4. PURPOSE

The 2003 project purpose as documented in the Final Environmental Impact Statement included the following:

- Improved I-276 and I-95 linkage for system continuity;
- *Improved I-95 continuity through the Mid-Atlantic Region*;
- Additional capacity for the current I-276 and I-95 connections;
- Additional I-276 and I-95 capacity;
- Improved study area travel times and delay reduction.

The second, italicized project purpose was accomplished with the re-routing of I-95 in Pennsylvania over the new flyovers, east along the PA Turnpike, across the Delaware River Bridge of the NJ Turnpike Connector to New Jersey, east along the connector to NJ Turnpike Exit 6 and then north along the NJ Turnpike. The previous section of I-95 north

of the new interchange continues to serve interstate traffic and be maintained to interstate standards but required a new route designation (I-295).

All of the other 2003 project purpose statements are still applicable to the remaining sections (Stage 2 and Stage 3) of the overall I-95 Interchange Project.

- Improved I-276 and I-95 linkage for system continuity
- Additional capacity for the current I-276 and I-95 connections;
- Additional I-276 and I-95 capacity;
- Improved study area travel times and delay reduction.

Upon re-evaluation of the project purpose, an additional purpose has been added to the project. This additional purpose is to:

- Secure a vital link in the regional and national interstate transportation network across the Delaware River.

Given the fracture that occurred in 2017, and the need to close the bridge, thereby detouring traffic for several weeks, this purpose has been added to the overall project's purpose and need. Interstate I-95 is a major interstate along the East Coast, extending from Maine to Miami, Florida. It's overall length is 1,924 miles and traverses through sixteen states. According to the I-95 Corridor Coalition, I-95 serves 110 million people and facilities 40 percent of the country's gross domestic product. According to FHWA, the entire I-95 corridor sees over 72,000 vehicles daily, with a maximum daily traffic reaching as high as over 300,000[1]. The segment of I-95 in Pennsylvania carries roughly 160,000 vehicles per day, making it one of the busiest interstates in the state[2].

5. NEED

The 2003 project needs as documented in the FEIS included the following:

- Inadequate I-276 and I-95 linkage for system continuity
- *Lack of I-95 continuity through the Mid-Atlantic Region*
- Inadequate capacity for the current I-276 and I-95 connections
- Inadequate capacity on I-276 and I-95
- Prolonged study area travel times and delays

Similar to the project purpose, *Improved I-95 continuity through the Mid-Atlantic Region*, the second project need, *Lack of I-95 continuity through the Mid-Atlantic Region,* has been satisfied with the completion of the flyovers that re-routed I-95 east along the PA Turnpike, across the Delaware River Bridge of the NJ Turnpike Connector to New Jersey, east along the connector to NJ Turnpike Exit 6 and then north along the NJ Turnpike.

The remaining four needs are still considered to be applicable and traffic information has been updated to support these needs. The details to support the other needs is contained

[1] www.fhwa.dot.gov/pressroom/fsi95.cfm
[2] www.pbs.org/newshour/nation/drivers-begin-long-commutes-following-i-95-roadway-collapse

within Chapter 1 (Purpose and Need) of the 2003 FEIS. The supporting information is still relevant and applicable.

Existing, and 2030 and 2050 No Build and Build Average Daily Traffic (ADT) volumes are shown in **Table 2**, **Figure 4**, and **Figure 5.** These traffic numbers confirm the validity of the current needs. Traffic numbers are projected to increase and warrant a bridge with additional capacity. Additionally, both the PA and NJ Turnpike mainlines on either side of the Delaware River bridge are currently three-lanes in each direction.

Overall, the completion of the PA Turnpike/I-95 Interchange project will result in the redistribution of some traffic volumes based on a change in driver behavior. Additionally, other regional projects simultaneously being built will affect travel patterns of some motorists based upon origins and destinations. These effects do not result in a meaningful change to the volumes presented. Traffic volumes are projected to steadily increase in all parts of the corridor in both the Build and No Build scenarios.

Previous trends associated with the ability to keep interstate to interstate traffic on the highways continue to be apparent. This trend is due to the connections being provided at the PA Turnpike/I-95 Interchange, removing traffic from the local road (arterial state route) system. In addition to providing a fully directional high-speed connection where the highways cross, the additional capacity to be provided on the mainline highway segments allows for acceptable Levels of Service in the design year and beyond.

Additionally, numerous logistics-based freight warehouses are located near the confluence of the PA Turnpike, I-95, and I-295. Freight movement still relies on local roads as routing options to navigate between the three highways. Within the study area, Bucks County, Pennsylvania, Burlington County, New Jersey, and local jurisdictions have focused economic development along these highway corridors. This corridor will continue to see increased traffic as a result of these freight warehouses, particularly along I-95 in Burlington, New Jersey.

Further evaluation of the project's purpose and need document led the Project Team to consider the 2017 fracture of the existing Delaware River Bridge structure and the potential impact to traffic throughout the corridor. The Project Team has identified the following additional need:

- **Additional Need:** Lack of service reliability/redundancy of the existing Delaware River Bridge.

Table 2: Traffic Volumes

I-95/PA Turnpike Interchange Stage 2/3 Traffic Volumes April 2024	2023 EXISTING ADT	2030 NO BUILD ADT	2030 BUILD ADT	2050 NO BUILD ADT	2050 BUILD ADT
PA Turnpike Mainline:					
1. EB - Int #343 to Int #351	47,000	53,600	54,000	63,000	64,000
1. WB - Int #343 to Int #351	46,500	52,000	52,700	62,400	62,900
2a. EB - Int #351 to #352	28,300	31,200	34,500	39,100	40,500
2. EB - Int #352 to Int #353	26,200	28,200	31,800	35,500	37,300
2. WB - Int #351 to Int #353	25,000	28,900	33,000	36,400	37,400
I-95 Mainline:					
3. NB - PA Turnpike (Exit #40) to Exit #42	37,800	41,200	42,400	48,000	49,600
3. SB - PA Turnpike (Exit #40) to Exit #42	34,000	38,400	38,500	46,800	47,400
4. NB - Exit #42 to Exit #43	36,100	39,200	39,700	45,300	47,400
4. SB - Exit #42 to Exit #43	31,000	35,000	35,700	44,000	45,000
PA Turnpike Int #351 Ramps:					
PA Turnpike WB Off Ramp to Int #351	2,500	2,400	2,500	2,000	2,100
PA Turnpike EB Off Ramp to Int #351	21,200	25,000	21,500	26,000	25,700
PA Turnpike EB On Ramp from Int #351	2,500	2,600	2,000	2,100	2,200
PA Turnpike WB On Ramp from Int #351	24,000	25,500	22,200	28,000	27,600
PA Turnpike Int #352 Ramps:					
PA Turnpike EB Off Ramp to Int #352	3,300	4,500	4,300	5,200	4,800
PA Turnpike EB On Ramp from Int #352	1,200	1,500	1,600	1,600	1,600
I-95 Exit #42 Ramps:					
I-95 NB Off Ramp to Exit #42	5,600	6,500	6,500	6,700	6,500
I-95 SB Off Ramp to Exit #42	3,100	3,100	3,100	3,400	3,400
I-95 SB On Ramp from Exit #42	6,100	6,500	5,900	6,200	5,800
I-95 NB On Ramp from Exit #42	3,900	4,500	3,800	4,000	4,300
I-95 / Turnpike Ramps:					
I-95 SB (NJ to Phila)	9,000	9,500	10,000	10,400	12,500
I-95 NB (Phila to NJ)	11,600	13,000	13,200	12,500	14,000
I-95 SB to I-295 EB (Ramp E)	--	--	2,800	--	4,000
I-295 WB to PA Turnpike WB (Ramp C)	--	--	3,500	--	3,000
PA Turnpike EB to I-95 SB (Ramp A)	--	--	3,600	--	3,300
PA Turnpike EB to I-295 EB (Ramp B)	--	--	2,300	--	2,000
I-95 NB to PA Turnpike WB (Ramp F)	--	--	3,800	--	3,500
I-295 WB to I-95 NB (Ramp D)	--	--	3,300	--	3,600
I-295 / I-95:					
I-295 WB - NJ to PA Turnpike	26,000	28,500	31,500	33,000	34,800
I-295 EB - PA Turnpike to NJ	26,900	27,000	29,100	31,000	33,500
I-95 NB - Exit #39 to Exit #40	38,500	40,000	41,000	43,500	45,000
I-95 SB - Exit #40 to Exit #39	35,000	38,000	38,300	43,400	44,000
NJ Turnpike (I-95) Int 6A Ramps					
WB (I-95 SB) Off-Ramp to Int 6A (US 130)	2,500	2,600	2,650	3,500	3,800
WB (I-95 SB) On-Ramp from Int 6A (US 130)	4,500	5,000	5,675	6,500	6,800
EB (I-95 NB) Off-Ramp to Int 6A (US 130)	8,400	8,600	9,000	9,600	10,700
EB (I-95 NB) On-Ramp from Int 6A (US 130)	2,300	2,400	2,500	4,300	4,500
NJ Turnpike Mainline:					
WB (I-95 SB) - Int 6 to Int 6A	29,000	32,600	32,675	41,000	42,000
EB (I-95 NB) - Int 6A to Int 6	30,000	33,000	33,200	40,000	41,200

Note: Build Years 2030 and 2050 assume the Stage 2 widening and the PA Turnpike/I-95/I-295 Interchange (including 8 ramp movements) are completed in addition to 6 lanes on the Bridge over the Delaware River to New Jersey.

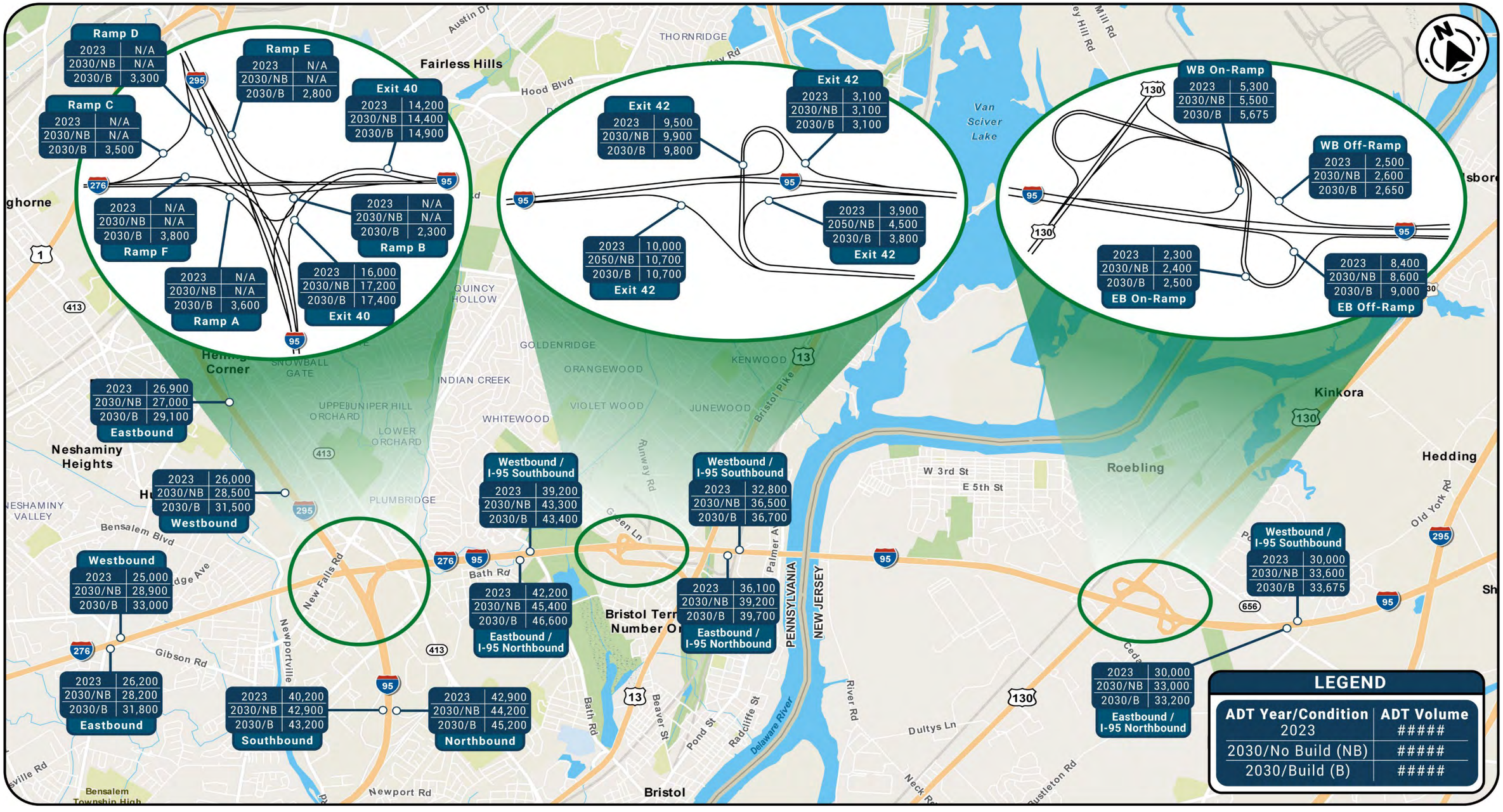


Figure 4: 2023 ADT vs 2030 No Build and Build ADT

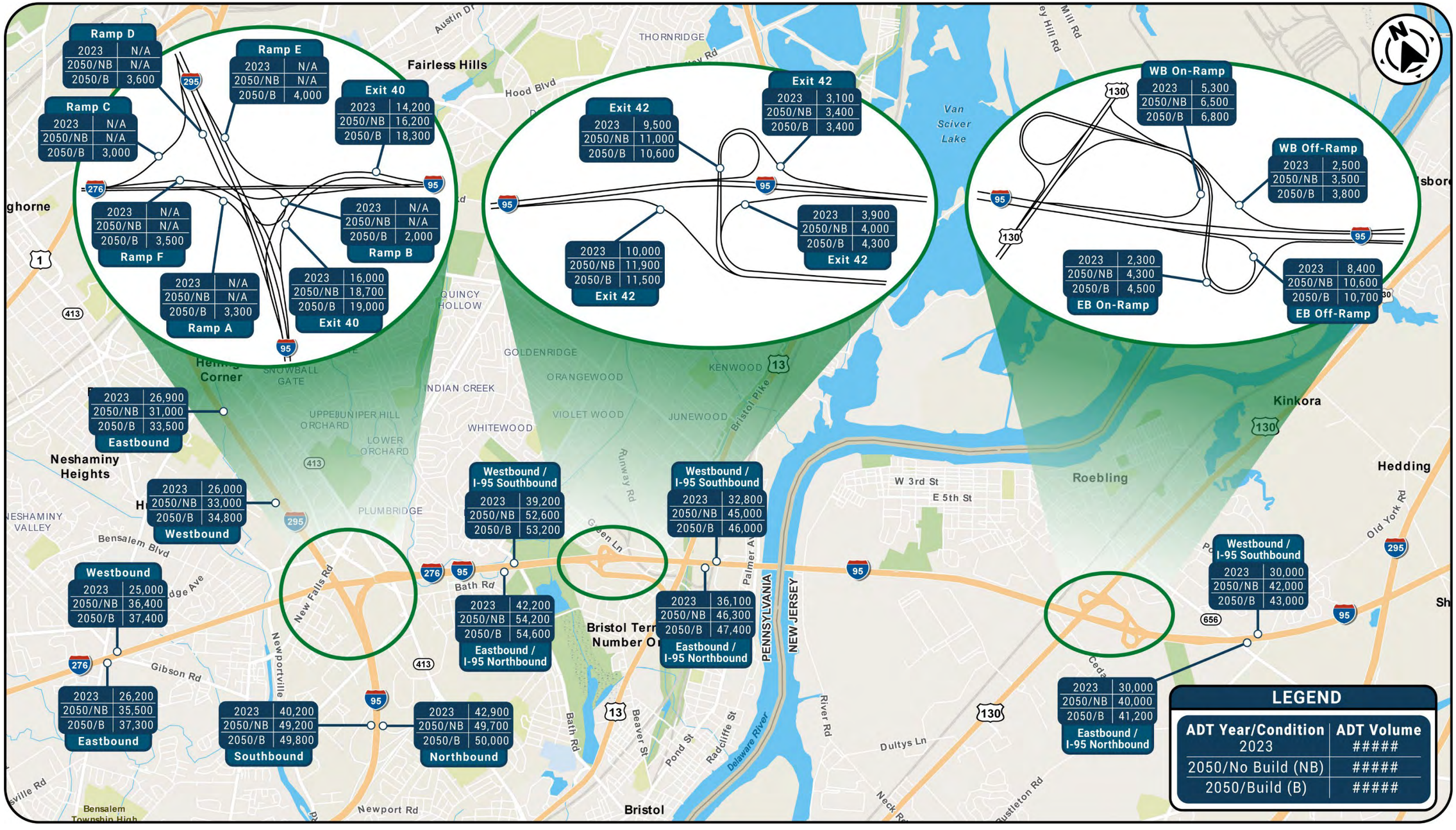


Figure 5: 2023 ADT vs 2050 No Build and Build ADT

5.1 ADDITIONAL NEED

Constructed between 1954 and 1956, the Delaware River Bridge links the Pennsylvania Turnpike and the New Jersey Turnpike. The structure is jointly owned and maintained by the Commission and the Authority. In 2005, the Pennsylvania State Historic Preservation Office determined that the Delaware River Bridge (Resource # 1005RE00744) as eligible for listing in the National Register of Historic Places.

The structure is 6,571 feet long, 80 feet wide, has a main span length of 682 feet, and crosses the 500-foot-wide shipping channel of the Delaware River at a vertical clearance of 135 feet. The bridge also crosses US 13, Amtrak's Northeast Corridor, and River Road in Florence Township, New Jersey. Additionally, it spans over Radcliffe Street, Palmer Avenue, Wood Avenue, and North Wilson Avenue in Bristol Township, Pennsylvania.

The existing Delaware River Bridge, inclusive of main and approach spans, is the single longest structure on either Turnpike. The Bridge is comprised of three different structural steel span types: girder-floorbeam-stringer, deck truss, and through-truss with a suspended deck (see **Figure 6**).

Per the Code of Federal Regulations (23 CFR 650.305) a Nonredundant Steel Tension Member (NSTM) is defined as: *"A primary steel member fully or partially in tension, and without load path redundancy, system redundancy or internal redundancy, whose failure may cause a portion of or the entire bridge to collapse."*

All three structure types contain steel tension elements that are classified as nonredundant because they only contain two main load carrying components. Typically, (load path) redundancy requires at least three separate main load carrying components. Additionally, many of the truss tension members are single elements (wide flange sections), which do not provide the opportunity for internal redundancy considerations where a single element of the member, such as a flange, can fracture but the fracture does not propagate to the rest of the cross-section. Accordingly, the Delaware River Bridge, by definition, contains a large number of NSTMs. **Figures 7**, **8**, and **9** show some of the NSTMs.

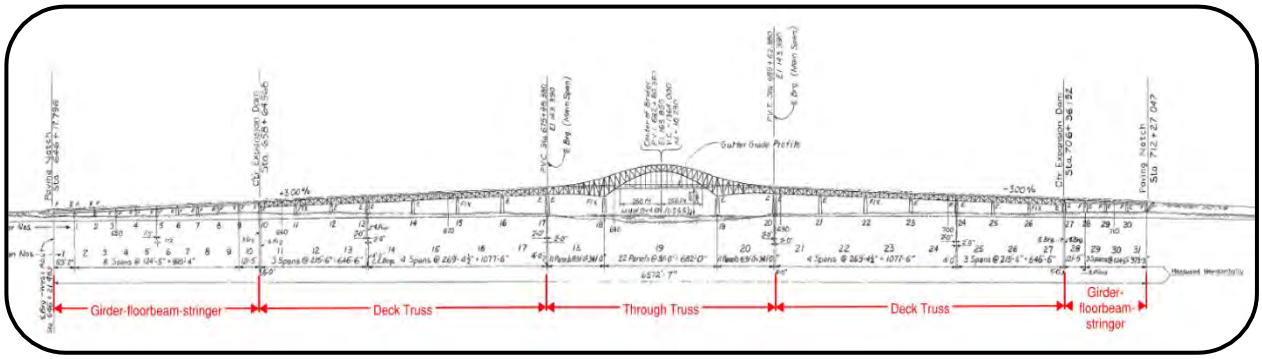


Figure 6: Existing Bridge Elevation

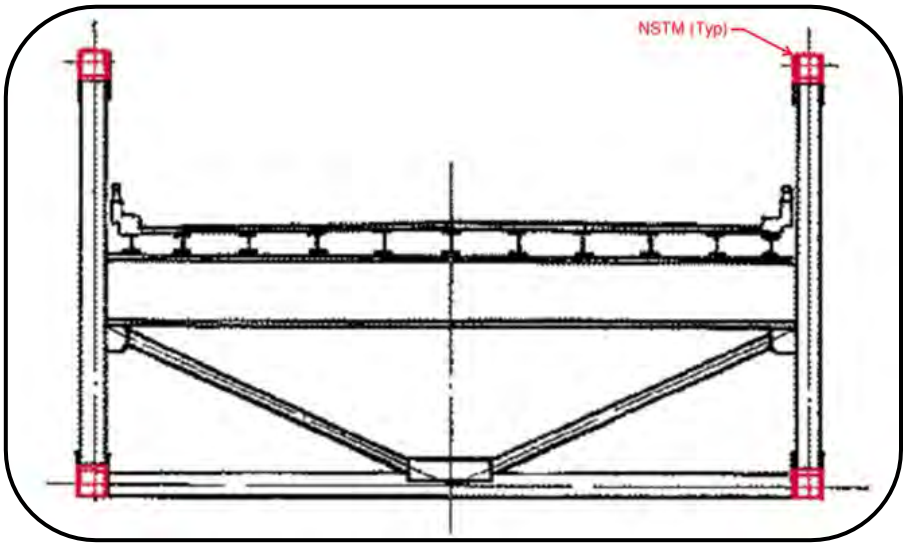


Figure 9: Existing Section at Girder Spans

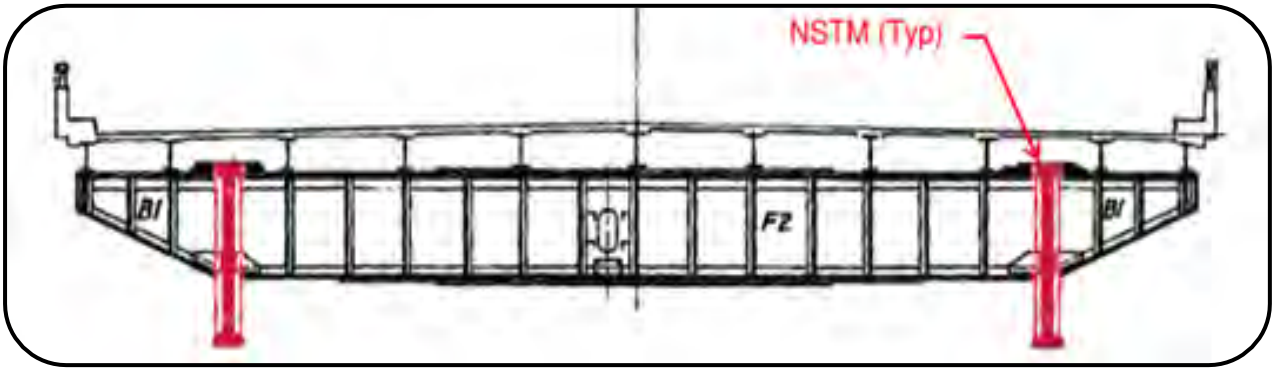


Figure 8: Existing Section at Deck Truss Spans

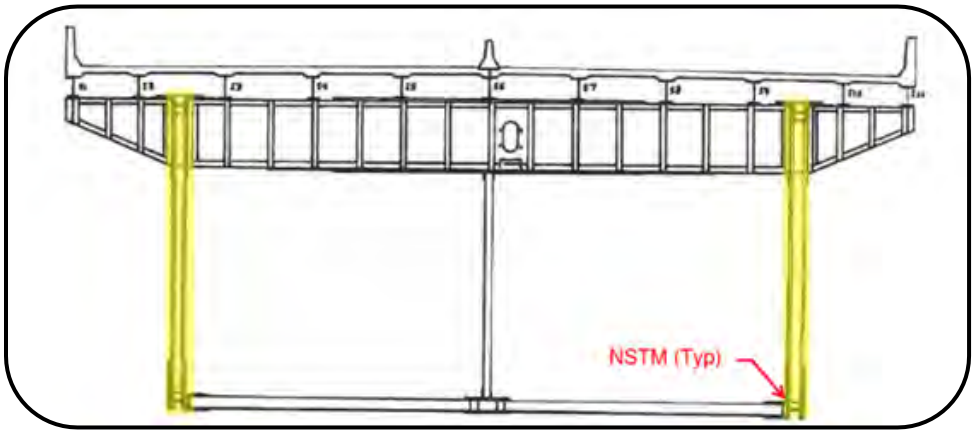


Figure 7: Existing Section at Through Truss Spans

On January 20, 2017, a fracture was identified in a top chord member in one of the deck truss spans (Span 16, located in PA). This member is an NSTM and is the heaviest tension load carrying member on the bridge. The fracture of this NSTM caused significant damage in the surrounding areas of the bridge superstructure causing an immediate bridge closure and approximate 40 mile traffic detour. For 49 days, teams of engineers and contractors, led by the Turnpike agencies, worked 24 hours a day to stabilize the bridge, construct interim and permanent repairs, investigate and determine the cause of the fracture, and take steps necessary to re-open the bridge to traffic at a cost of approximately $20 million dollars.

Through extensive bridge inspection and steel material testing, it was determined that the fracture was caused by an original construction defect that involved the filling of erroneously drilled holes with weld material. This repair procedure caused a weak point in a critical bridge member, which remained present but hidden, until loading caused the truss member to fracture without warning. To help mitigate the risks associated with nonredundant steel bridges, the *AASHTO Guide Specification for Fracture Critical Non-Redundant Steel Bridge Members* (known as the AASHTO Fracture Control Plan), which dictates specific design, material, fabrication, and inspection requirements for bridges with NSTMs, was established and enforced beginning in 1978. Because the existing Delaware River Bridge was designed and fabricated prior to this date, it did not benefit from these risk-mitigating procedures, except for the on-going increased effort expended during the special detailed bridge inspections focusing on idenfication and condition assessment of fracture critical members and details.

A post fracture emergency bridge inspection was performed utilzing advanced non-destructive techniques to determine if any similar defects existed, which if left unaddressed could lead to similar damage, or worse. Suspect areas that were identified had the defects removed.

Currently, the bridge is inspected biennially. As shown in **Table 3,** bridge inspections show the condition of the overall structure worsening between 2014 and 2022.The most recent inspection (2022) of the existing Delaware River Bridge concludes that it is in poor structural condition. The six-week closure of the existing Delaware River Bridge in 2017 required a 42-mile detour for travelers to remain on the interstate system (see **Figure 10**). The closest interstate route between Pennsylvania and New Jersey is I-295, which utilizes the Scudders Falls Bridge, approximately 10 miles north of existing Delaware River Bridge and results in a 42-mile detour. The closest northern alternate bridge is US 1 (Trentron Morrisville Toll Bridge) which is approximately 7 miles from the existing Delaware River Bridge and requires a 40-mile detour.

Table 3: Delaware River Bridge Structural Condition

Year	Overall Structure Condition
2014	Fair
2016	Fair
2018	Fair
2020	Poor
2022	Poor

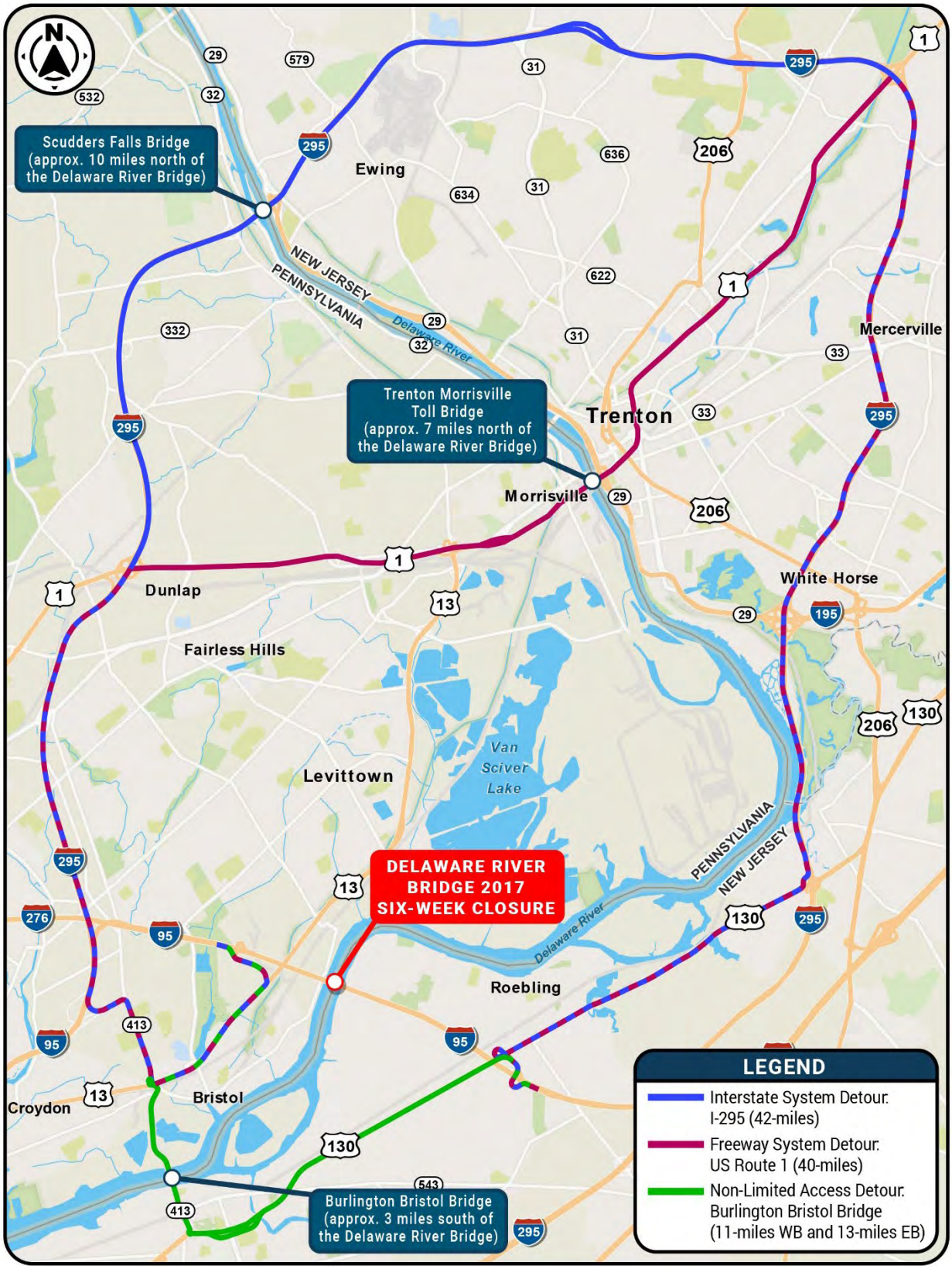


Figure 10: Bridge Closure Detour Routes

Off of the interstate system, the closest bridge over the Delaware River is approximately 3 miles to the south using the Burlington Bristol Bridge, which requires an 11-mile detour westbound and a 13-mile detour eastbound, using local roads (see **Figure 10**). This bridge was constructed in 1931, has a lift span, is 20 feet wide with a width restriction for vehicles over 102” wide, and carries only one lane in each direction. The Burlington Bristol Bridge also has a weight restriction of 36 Tons and is posted for 35 miles per hour.

The 2017 fracture event, the low load ratings, and the presence of NSTMs throughout the entire bridge, make the bridge vulnerable to future deterioration or damage requiring emergency repairs, traffic disruptions, and bridge closures. The low load ratings come from the Load and Resistance Factor Rating (LRFR) updates were last performed in 2017. These LRFR ratings reflect the 2016 existing as-inspected conditions documented on the Standard Inspection Forms for the 2016 cycle inspection. The controlling LRFR as-inspected rating factors for the HL-93 vehicle are 0.57 (Inv.) and 0.74 (Oper.) based on axial loads in Member L0-U1 of the PA 4-Span Deck Truss unit. Truss members in the main spans and other approach units, as well as the girders, floorbeams, and stringers at select locations, also exhibit low LRFR ratings for the HL-93 vehicle. These ratings will also restrict movement of permit loads. See controlling HL-93 rating summary **Table 4** below. Detailed load ratings can be found in NBIS Biennial Bridge Inspection Report dated July 18, 2022.

In addition, the resulting repairs will continue to be disruptive to the residential communities and commercial businesses surrounding the bridge. As the bridge continues to age, more frequent inspections will occur, moving to one year inspections and then possibly six-month inspections. Depending on the inspection results, extensive repairs could be needed until ultimately the bridge will need to be replaced as repair become exceedingly more complex and no longer a viable solution.

Service reliability on this segment of I-95 is important to all interstate system users. The economic result of interrupted service reliability is particularly impactful to the abundant warehouses and distribution centers along this corridor which are sensitive to any disruption of freight movement on the interstate system.

Table 4: Controlling HL-93 Rating Summary

Location	Controlling Member	Vehicle Type	As-Built	As-Insp.
3-Span Through Arch Truss	U7-L8	HL-93 (INV)	0.91	0.64
		HL-93 (OPR)	1.17	0.83
4-Span Deck Truss (PA Approach)	L0-U1	HL-93 (INV)	0.61	0.57
		HL-93 (OPR)	0.79	0.74
3-Span Deck Truss (PA Approach	L0-U1	HL-93 (INV)	0.69	0.69
		HL-93 (OPR)	0.89	0.89
4-Span Deck Truss (NJ Approach)	L0-U1	HL-93 (INV)	0.61	0.61
		HL-93 (OPR)	0.79	0.79
3-Span Deck Truss (NJ Approach	L0-U1	HL-93 (INV)	0.69	0.69
		HL-93 (OPR)	0.89	0.89
3-Span Girder/Floorbeam/Stringer (PA Approach)	G1	HL-93 (INV)	0.61	0.61
		HL-93 (OPR)	0.79	0.79
3-Span Girder/Floorbeam/Stringer (NJ Approach)	G1	HL-93 (INV)	0.61	0.61
		HL-93 (OPR)	0.79	0.79

Appendix B

- Original 1954 Bridge Drawings

PENNSYLVANIA TURNPIKE COMMISSION

THOMAS J. EVANS, CHAIRMAN
JAMES F. TORRANCE, SECRETARY AND TREASURER
DAVID E. WATSON, COMMISSIONER
EDWARD L. SCHMIDT, SECRETARY OF HIGHWAYS (EX OFFICIO)

NEW JERSEY TURNPIKE AUTHORITY

PAUL L. TROAST, CHAIRMAN
GEORGE F. SMITH, VICE CHAIRMAN
MAXWELL LESTER, JR., TREASURER

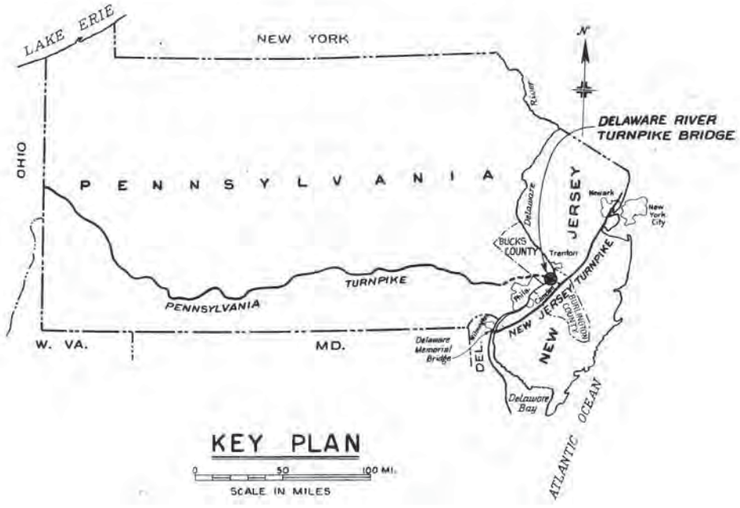
DELAWARE RIVER TURNPIKE BRIDGE

BUCKS COUNTY, PENNSYLVANIA AND BURLINGTON COUNTY, NEW JERSEY

DRAWINGS FOR CONTRACT PN 2

From Sta. 644+60 to Sta. 674+00
Length 2940.00 Feet, 0.55 Miles

SUBSTRUCTURE

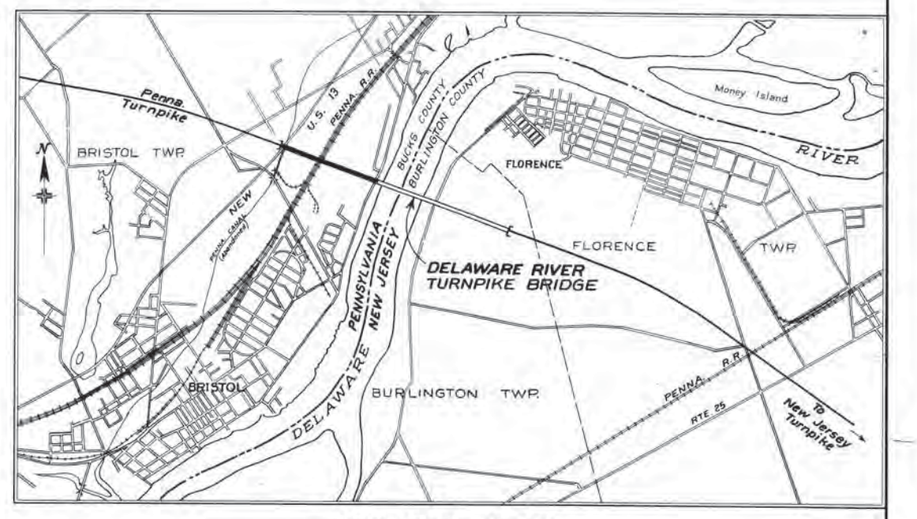


KEY PLAN
0 50 100 MI.
SCALE IN MILES

INDEX OF DRAWINGS

CONTRACT DRAWINGS DRB-2	
SHEET	TITLE
1	Title Sheet
2	Site Plan & Elevation
3	Pier Nos. 15 & 16
4	Pier Nos. 13 & 14
5	Pier Nos. 11 & 12
6	Pier No. 10
7	Pier Nos. 1 to 9
8	West Abutment - Plan & Elevations
9	West Abutment - Sections & Details
10	Miscellaneous Details
11	Details of Culvert

REFERENCE DRAWINGS DRB-10	
SHEET	TITLE
1	Geological Section - Pennsylvania Side
2	Geological Section - New Jersey Side
3	Geological Cross Sections
4	Boring Logs
5	" "
6	" "
7	" "
8	" "
9	" "
10	Test Pile Details
11	Test Pile Results



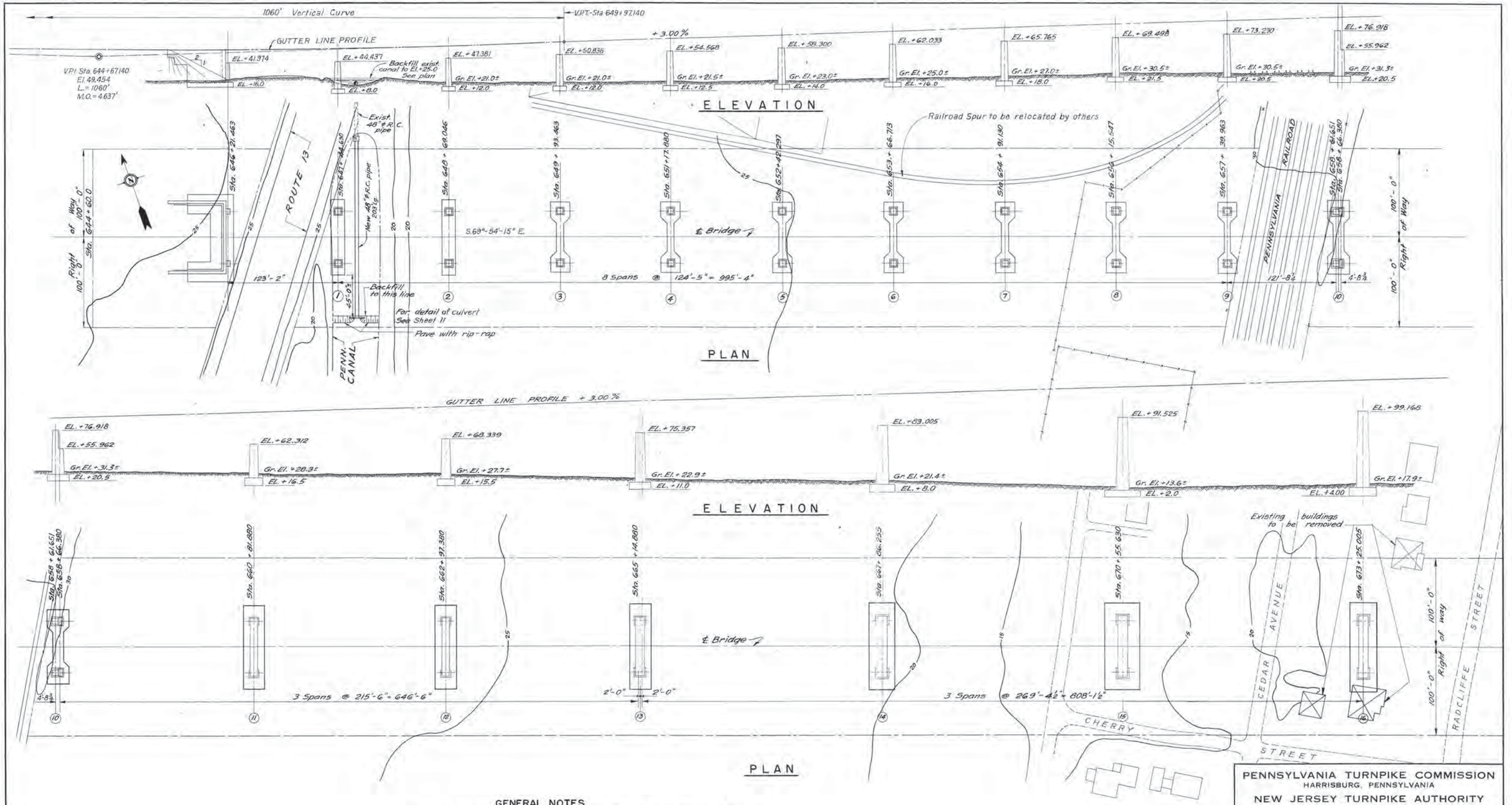
PROJECT PLAN
0 500 1000 2000 4000 6000 8000 10,000
SCALE IN FEET

RECOMMENDED George S. Richardson DATE APRIL 26 1954
GEORGE S. RICHARDSON, CONSULTING ENGINEER
PA. R.E. 3562, N.J. R.E. 7367

APPROVED Charles M. Noble DATE Apr. 27, 1954
CHIEF ENGINEER for W.S.P.D.
NEW JERSEY TURNPIKE AUTHORITY

RECOMMENDED April 27 1954
R.B. Stone
CHIEF ENGINEER
PENNSYLVANIA TURNPIKE COMMISSION

APPROVED April 27 1954
PENNSYLVANIA TURNPIKE COMMISSION
ATTEST James F. Torrance
SECRETARY AND TREASURER



GENERAL NOTES

1. All elevations refer to U.S.C. & G.S. sea level datum 1929. Mean tidal heights, at 11,800 sec. ft. mean annual fresh water flow at Trenton, are approximately as follows: L.W.=-2.1 H.W.=+4.4. Extreme L.W.=-7.4 on Jan. 25, 1945 Extreme H.W.=+9.1 on Aug. 24, 1933. (Above observations made by Corps of Engineers).
2. Stationing according to Pennsylvania Turnpike Commission
3. For boring data see Reference Dwg. DRB-10, Sheets 4 to 9 incl.

NO.	REVISION	DATE	BY
2	Girder Brg. Pier 10 changed	10-26-54	D.P.U.
1	Br. Seat Elev. of Abut & Piers 1, 2 & 3 ch'gd. ℄ Bk. Brg. added	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE
BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

SITE PLAN & ELEVATION

GEORGE S. RICHARDSON
CONSULTING ENGINEER — PITTSBURGH, PENNA.

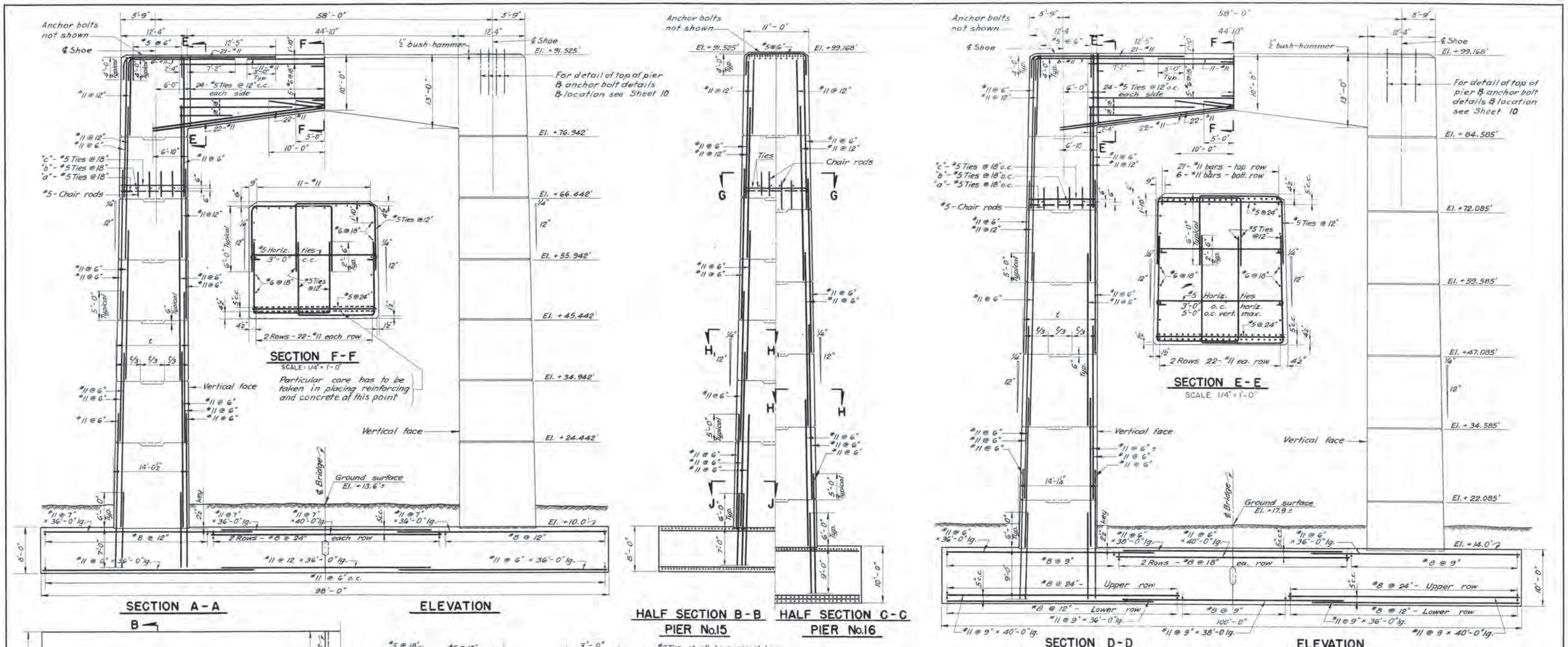
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

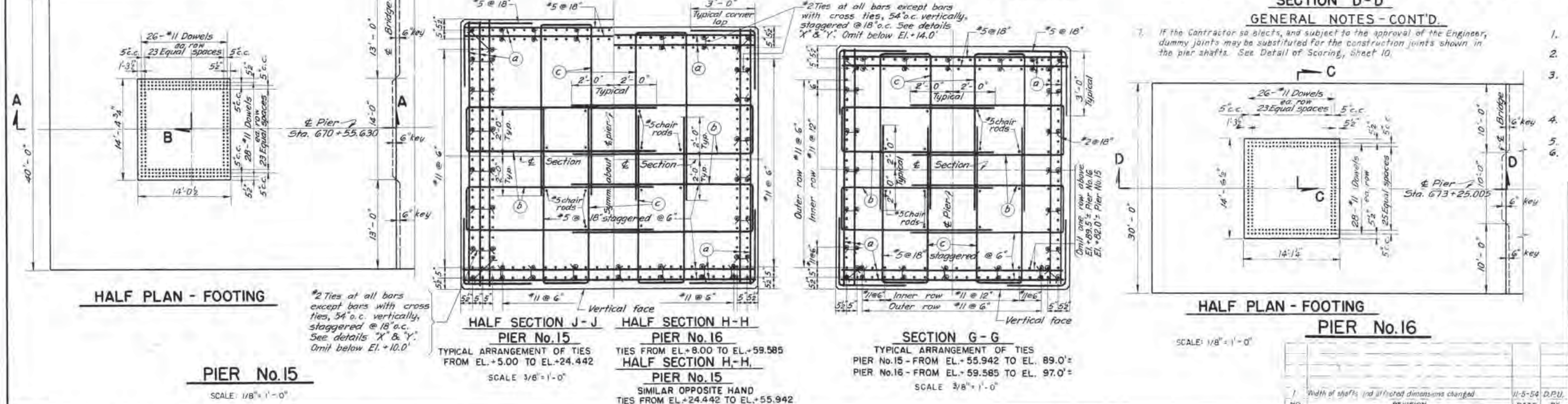
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: S.P.
TRACED BY: A.S.
CHECKED BY: N.K.
SCALE: 1"=50' DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 2 OF 11

M.P.M. & R. FILE No. 1443





GENERAL NOTES - CONT'D.

7. If the Contractor so elects, and subject to the approval of the Engineer, dummy joints may be substituted for the construction joints shown in the pier shafts. See Detail of Scoring, Sheet 10.

GENERAL NOTES

1. Maximum bearing on soil used in design: 6 k/□' for Dead & Live loads; 7.5 k/□' for Dead & Live & Wind loads.
2. All concrete to be controlled concrete having a compressive strength of 3000 psi. at 28 days (Class A).
3. Unless otherwise noted cover over reinforcing bars to be 3".
   Minimum length of lapped splices shall be 40 bar dia. unless otherwise shown.
4. Reinforcing bars to be deformed bars (ASTM - A 305), billet steel of intermediate grade (ASTM - A 15).
5. Front elevations of piers are drawn looking east.
6. For corner detail and detail of scoring on shafts and for anchor bolt details see Sheet 10.

NO.	REVISION	DATE	BY
1	Width of shafts and affected dimensions changed	11-5-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 15 & 16

GEORGE S. RICHARDSON
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MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

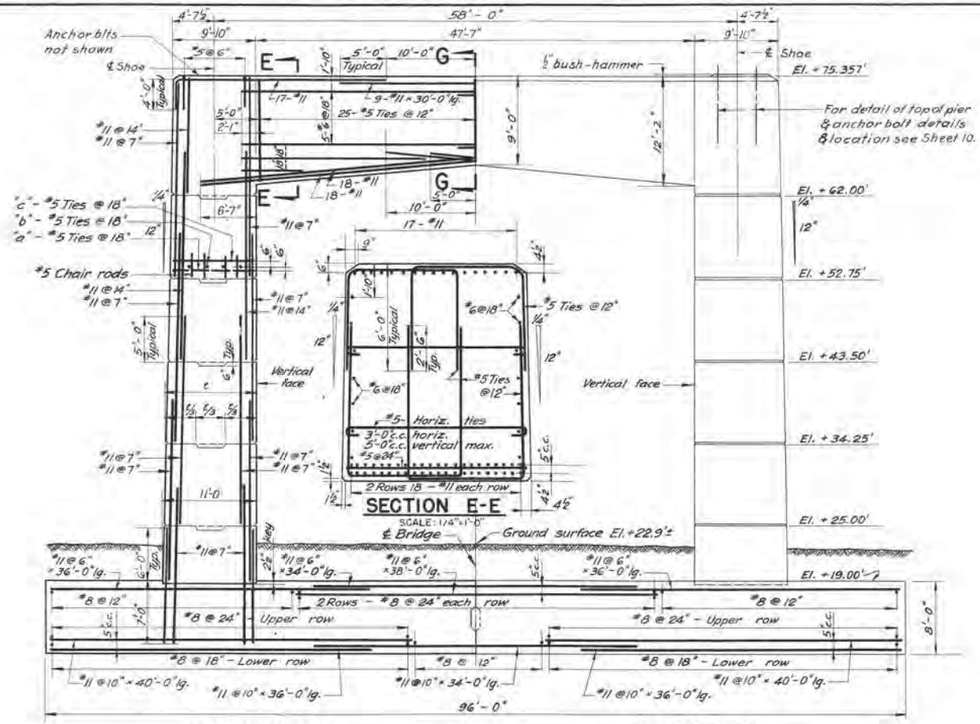
HARBESON, HOUGH
LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: W. J. A.
TRACED BY: S.P. & A.S.
CHECKED BY: N. K.
SCALE: AS NOTED DATE: 4-1-54

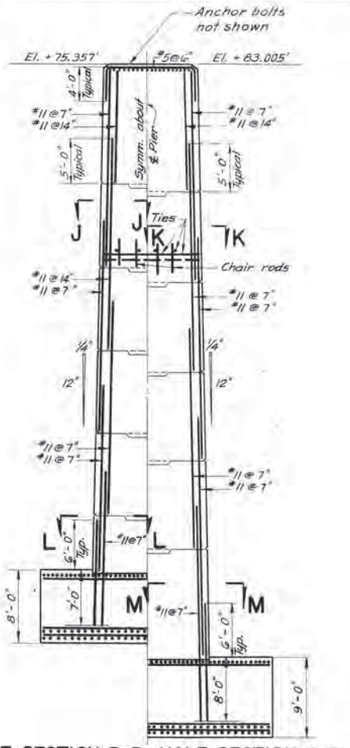
CONTRACT PN 2
DWG. NO. D R B-2
SHEET 3 OF 11

PR 1787-853

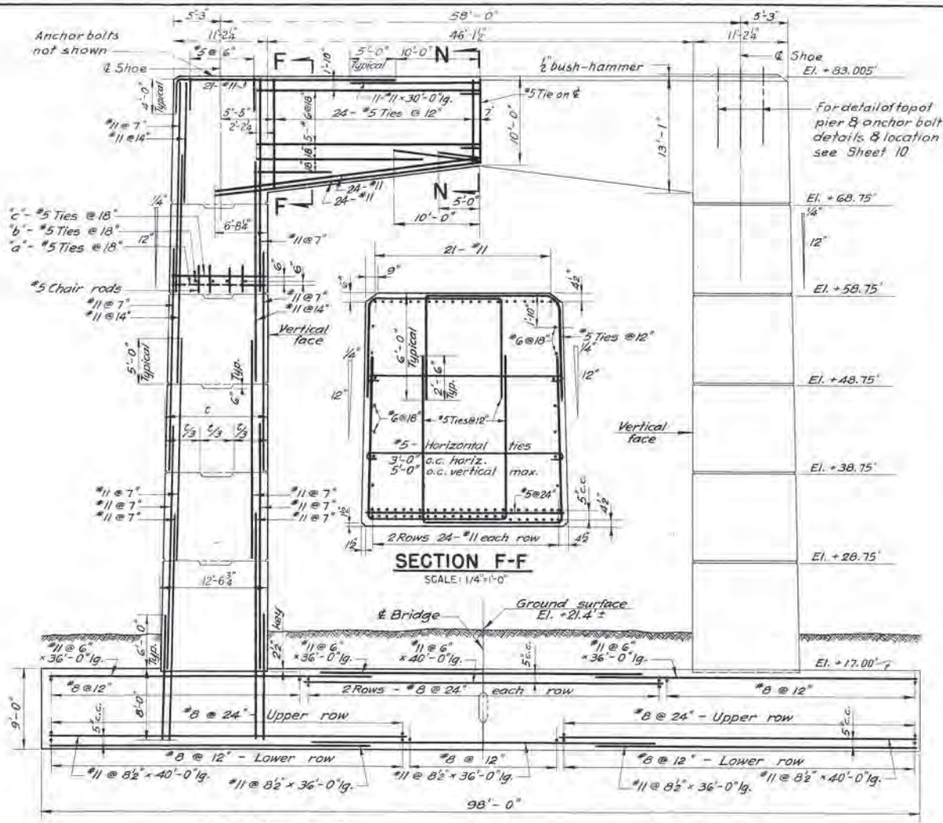
M.P.M. & R. FILE No. 1443



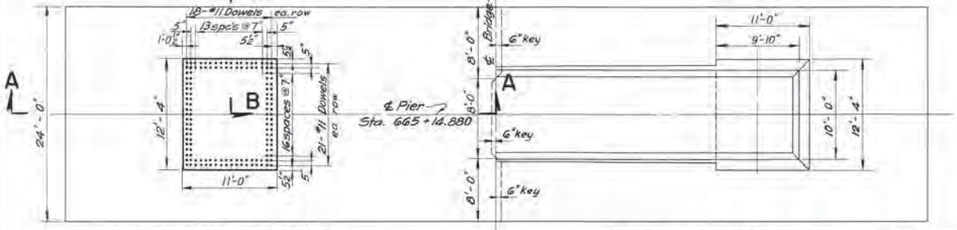
SECTION A-A ELEVATION

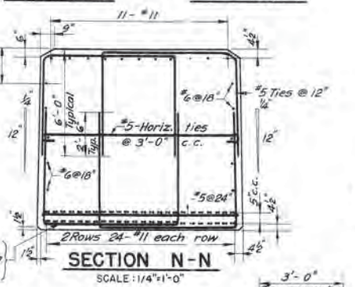


HALF SECTION B-B PIER No. 13 HALF SECTION C-C PIER No. 14

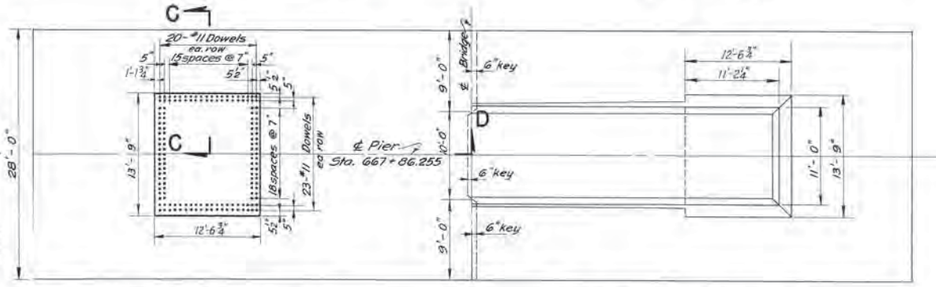


SECTION D-D ELEVATION

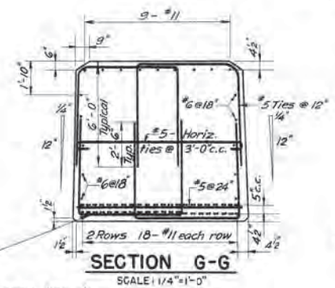




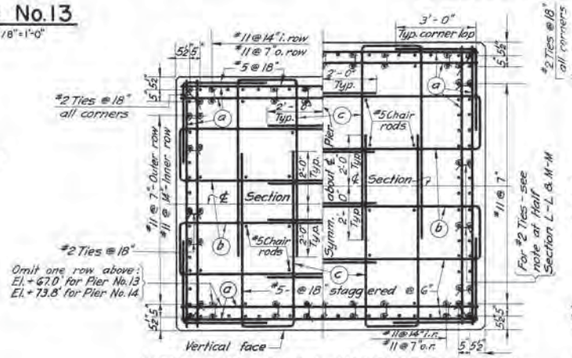
Particular care has to be taken in placing reinforcing and concrete at this point.



PIER No. 13
SCALE: 1/8"=1'-0"



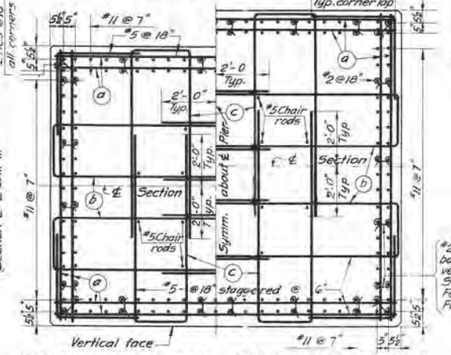
Particular care has to be taken in placing reinforcing and concrete at this point.



HALF SECTION J-J
PIER No. 13
TYPICAL ARRANGEMENT OF TIES FROM EL. +43.5 ± TO EL. +73.00' ±

HALF SECTION K-K
PIER No. 14
TYPICAL ARRANGEMENT OF TIES FROM EL. +48.75' ± TO EL. +80.5' ±

SCALE: 3/8"=1'-0"



HALF SECTION L-L
PIER No. 13
TYPICAL ARRANGEMENT OF TIES FROM EL. +14.0' ± TO EL. +43.5' ±

HALF SECTION M-M
PIER No. 14
TYPICAL ARRANGEMENT OF TIES FROM EL. +11.0' ± TO EL. +48.75' ±

PIER No. 14
SCALE: 1/8"=1'-0"

NOTE

1. For General Notes see Sheet 3.

NO.	REVISION	DATE	BY
1	Width of shafts and affected dimensions changed	11-5-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. - BURLINGTON COUNTY, N. J.

PIER Nos. 13 & 14

GEORGE S. RICHARDSON
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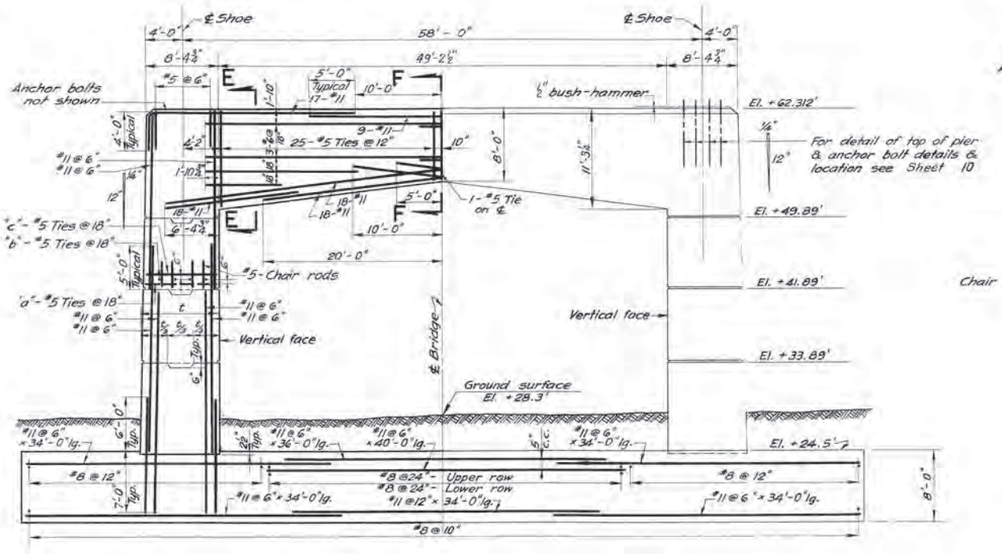
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

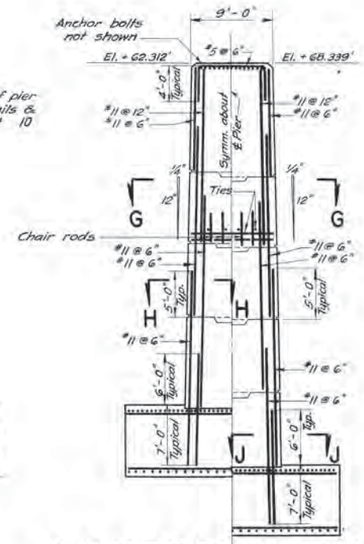
DRAWN BY: W. J. A.
TRACED BY: S.P. & A.S.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 4 OF 11

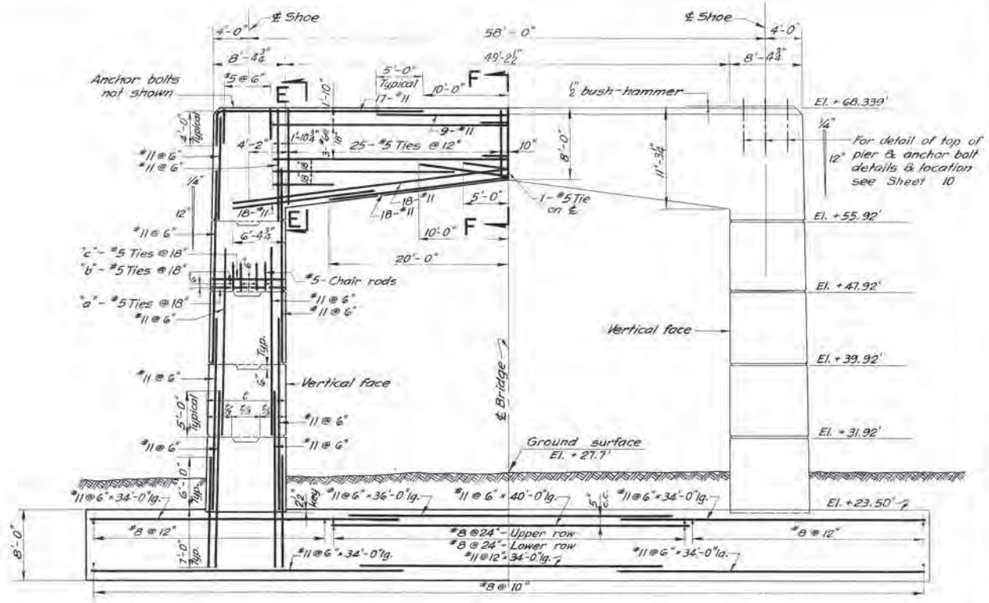
M.P.M. & R. FILE No. 1443



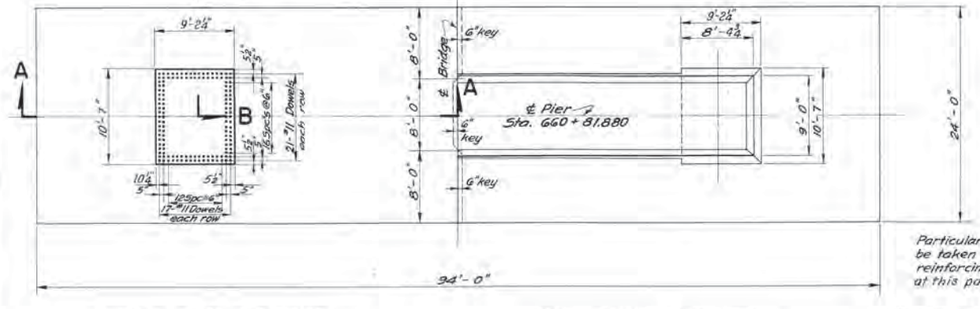
SECTION A-A ELEVATION



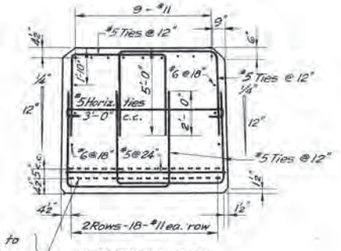
HALF SECTION B-B PIER No.11 HALF SECTION C-C PIER No.12



SECTION D-D ELEVATION

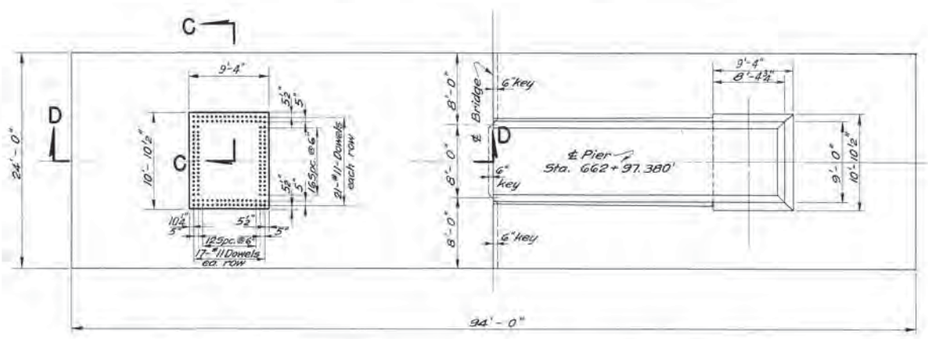


HALF PLAN - FOOTING HALF PLAN - TOP VIEW



SECTION F-F SCALE: 1¼"=1'-0"

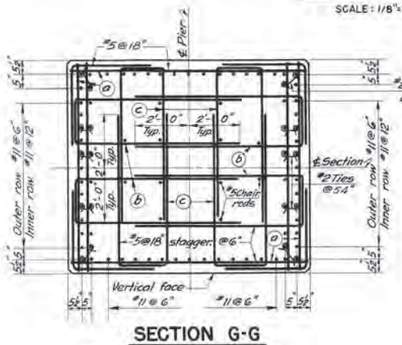
Particular care has to be taken in placing reinforcing and concrete at this point.



HALF PLAN - FOOTING HALF PLAN - TOP VIEW

PIER No. 11
SCALE: 1/8"=1'-0"

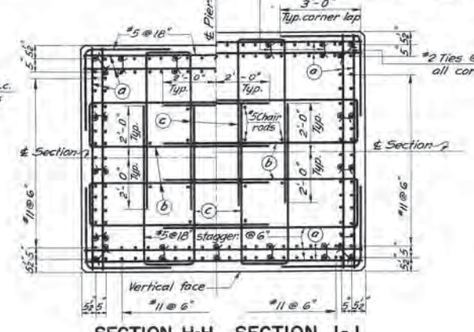
PIER No. 12
SCALE: 1/8"=1'-0"



SECTION G-G

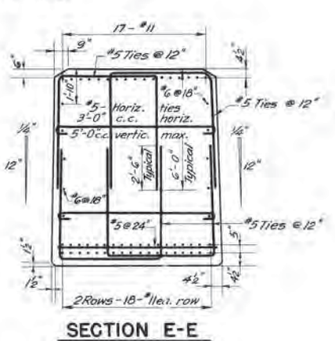
TYPICAL ARRANGEMENT OF TIES
PIER No.11 - FROM EL. +41.89' TO EL. +60.0'±
PIER No.12 - FROM EL. +47.92' TO EL. +66.0'±

SCALE: 3/8"=1'-0"



SECTION H-H SECTION J-J
PIER No.11 PIER No.12

TYPICAL ARRANGEMENT OF TIES
PIER No.11 - FROM EL. +19.5'± TO EL. +41.89'
PIER No.12 - FROM EL. +18.5'± TO EL. +47.92'



SECTION E-E SCALE: 1¼"=1'-0"

NOTE

1. For general notes see Sheet 3

NO.	REVISION	DATE	BY
1	Width of shafts and affected dimensions changed	11-5-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. - BURLINGTON COUNTY, N. J.

PIER Nos. 11 & 12

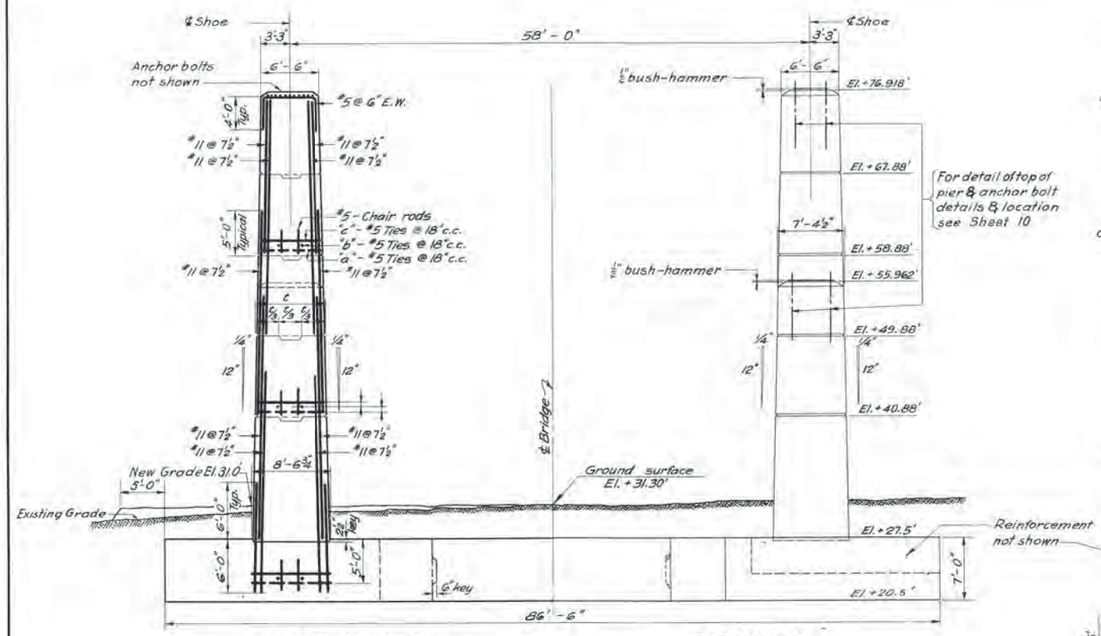
GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. ASSOCIATES
HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA. ARCHITECTS

DRAWN BY: R.C.H.
TRACED BY: S.P. & A.S.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 5 OF 11

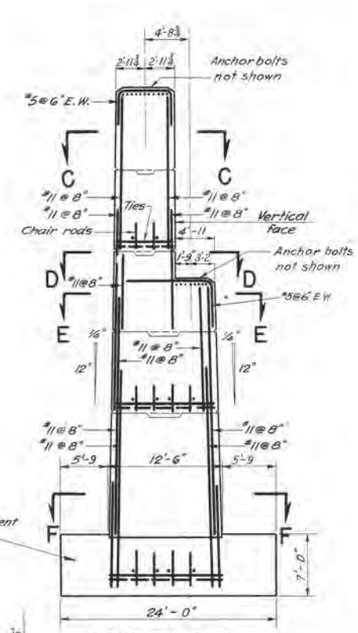
PR 1797-863

M.P.M. & R. FILE No. 1443

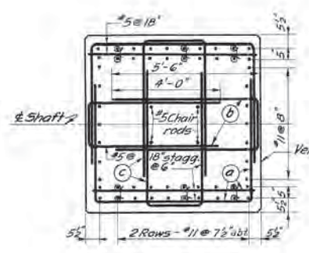


SECTION A-A SCALE: 1/8" = 1'-0"

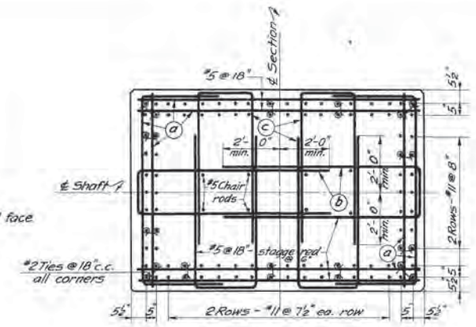
ELEVATION



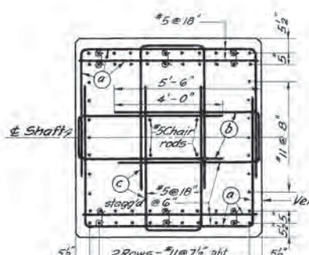
SECTION B-B SCALE: 1/8" = 1'-0"



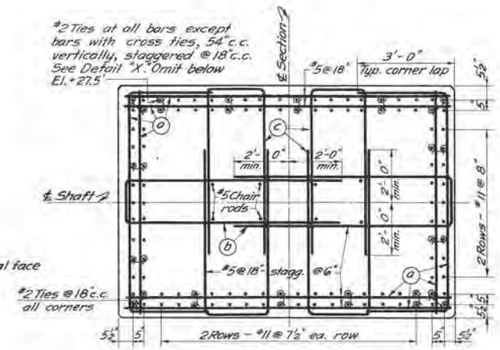
SECTION C-C SCALE: 3/8" = 1'-0"



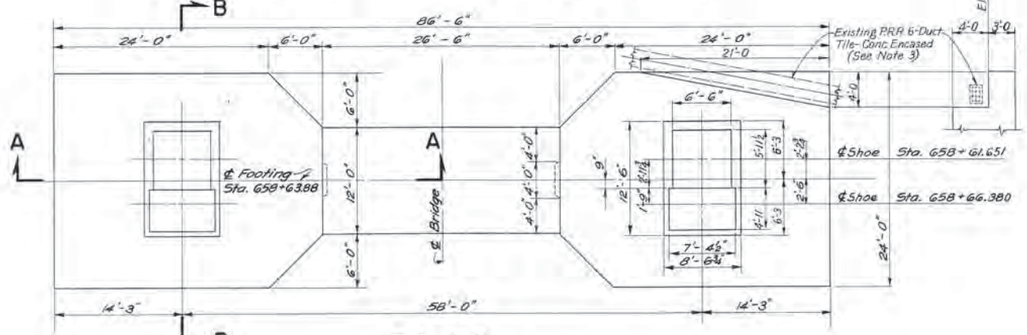
SECTION E-E SCALE: 3/8" = 1'-0"



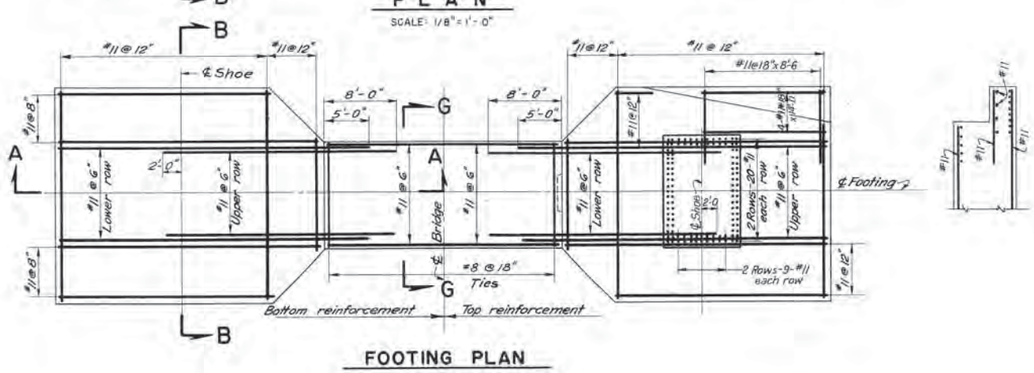
SECTION D-D SCALE: 3/8" = 1'-0"



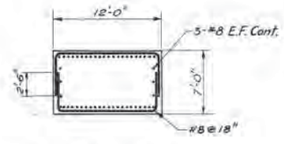
SECTION F-F SCALE: 3/8" = 1'-0"



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



FOOTING PLAN SCALE: 1/8" = 1'-0"



SECTION G-G SCALE: 1/8" = 1'-0"

NOTE

1. For General Notes see Sheet 3, except for Note No. 5.
2. Front elevation of Pier is drawn looking West.
3. Existing P.R.R. 6-duct tile (concrete encased) must be supported every 3 feet during construction of footing. Backfill must be thoroughly compacted around and under duct line.

NO.	REVISION	DATE	BY
2	Changed Shafts & Girder Brgs.	10-26-54	D.P.U.
1	Footing revised to clear P.R.R. duct. Added Note 3	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER No. 10

GEORGE S. RICHARDSON
CONSULTING ENGINEER PITTSBURGH, PENNA.

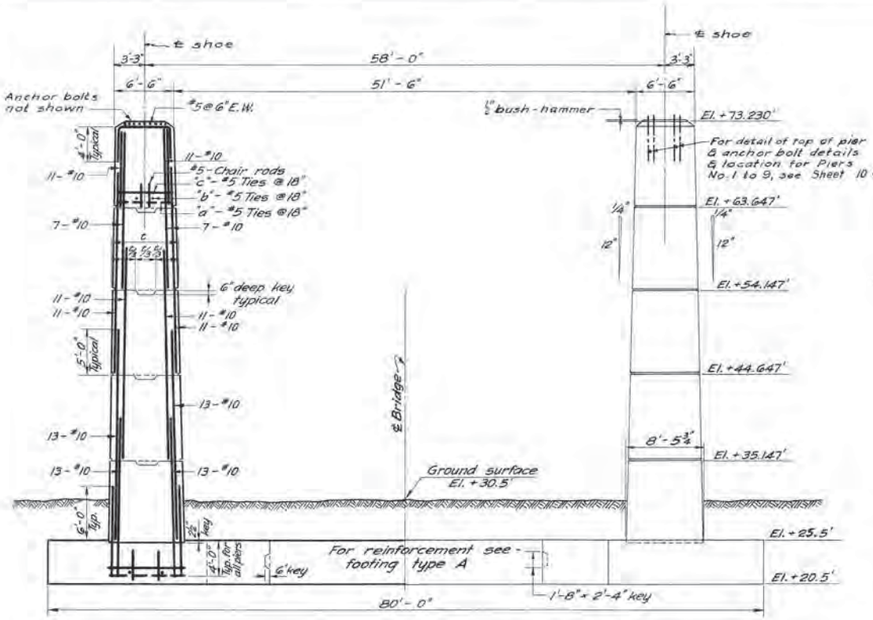
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

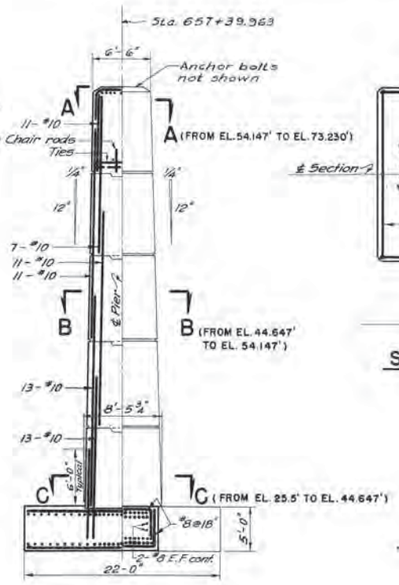
DRAWN BY: E.B.D.
TRACED BY: G.H. & A.S.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 6 OF 11

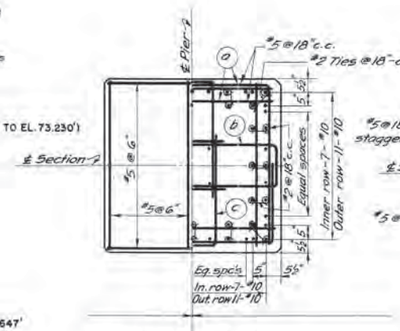
M.P.M. & R. FILE No. 1443



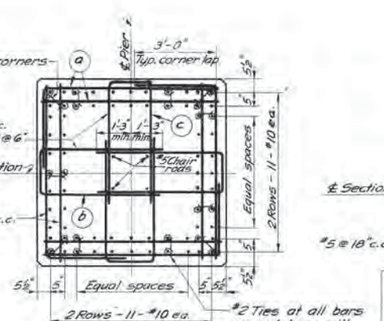
SECTION D-D ELEVATION



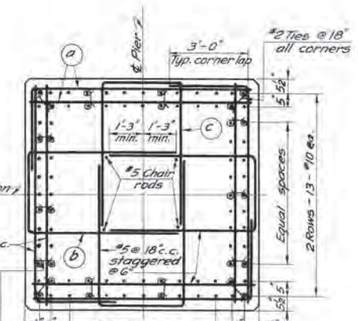
SECTION E-E



SECTION A-A



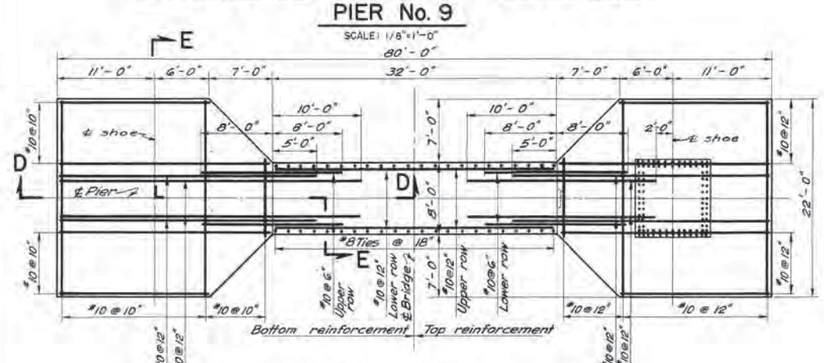
SECTION B-B



SECTION C-C

TYPICAL SECTIONS

SCALE: 3/8"=1'-0"

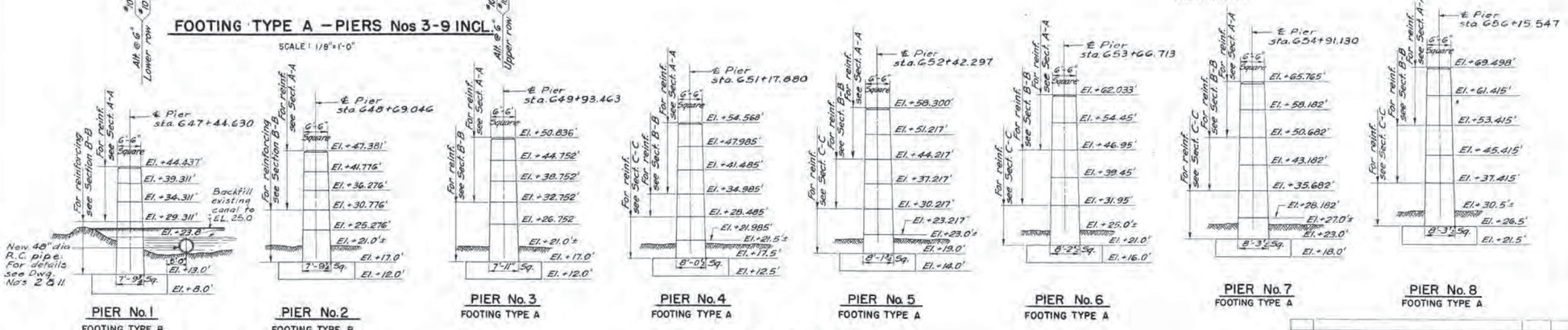


FOOTING TYPE A - PIERS Nos 3-9 INCL.

SCALE: 1/8"=1'-0"

FOOTING TYPE B - PIERS Nos 1 & 2

SCALE: 1/8"=1'-0"



PIER DETAILS

SCALE: 1/16"=1'-0"

NOTE

1. For General Notes see Sheet 3

NO.	REVISION	DATE	BY
1	Revised Elevations of Tops of Piers 1, 2 & 3	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 1 TO 9

GEORGE S. RICHARDSON
CONSULTING ENGINEER PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

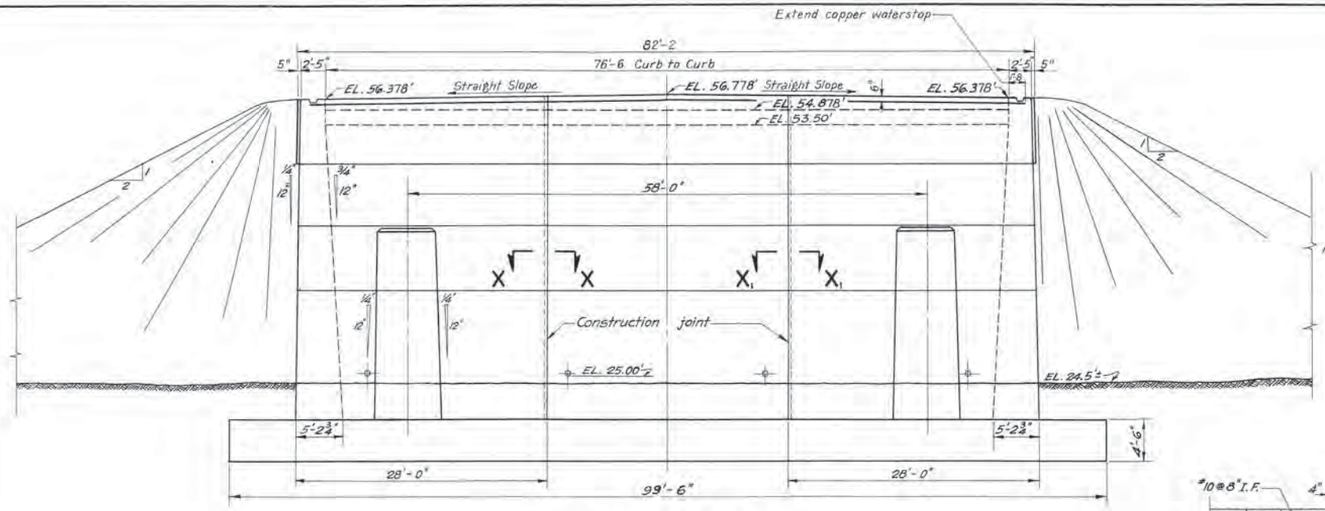
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: F. P. B.
TRACED BY: L. S. & S. P.
CHECKED BY: N. K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 7 OF 11

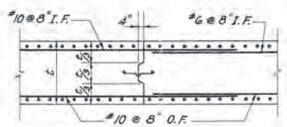
PR 1287-652

M.P.M. & R. FILE No. 1443



For detail of top of pedestal & anchor bolt details & location see Sheet 9.

FRONT ELEVATION

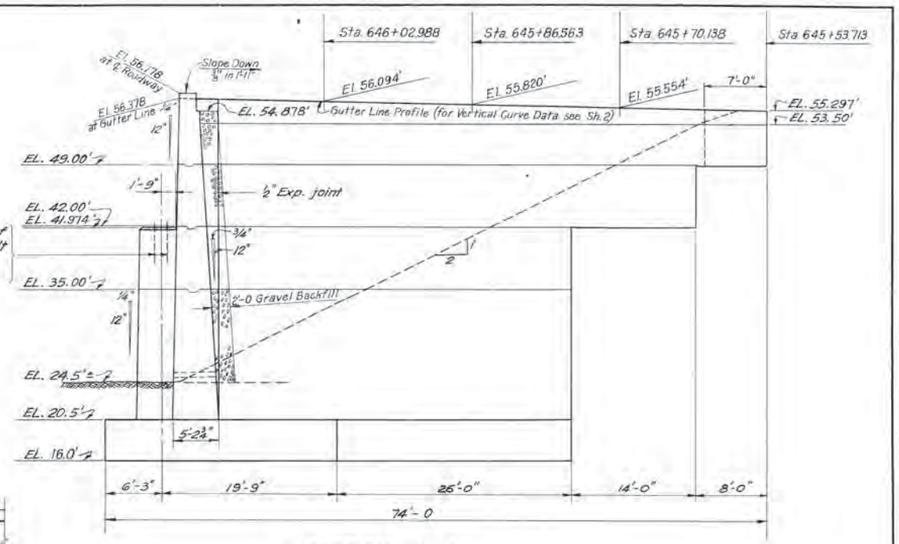


TYPICAL VERTICAL CONSTRUCTION JOINT

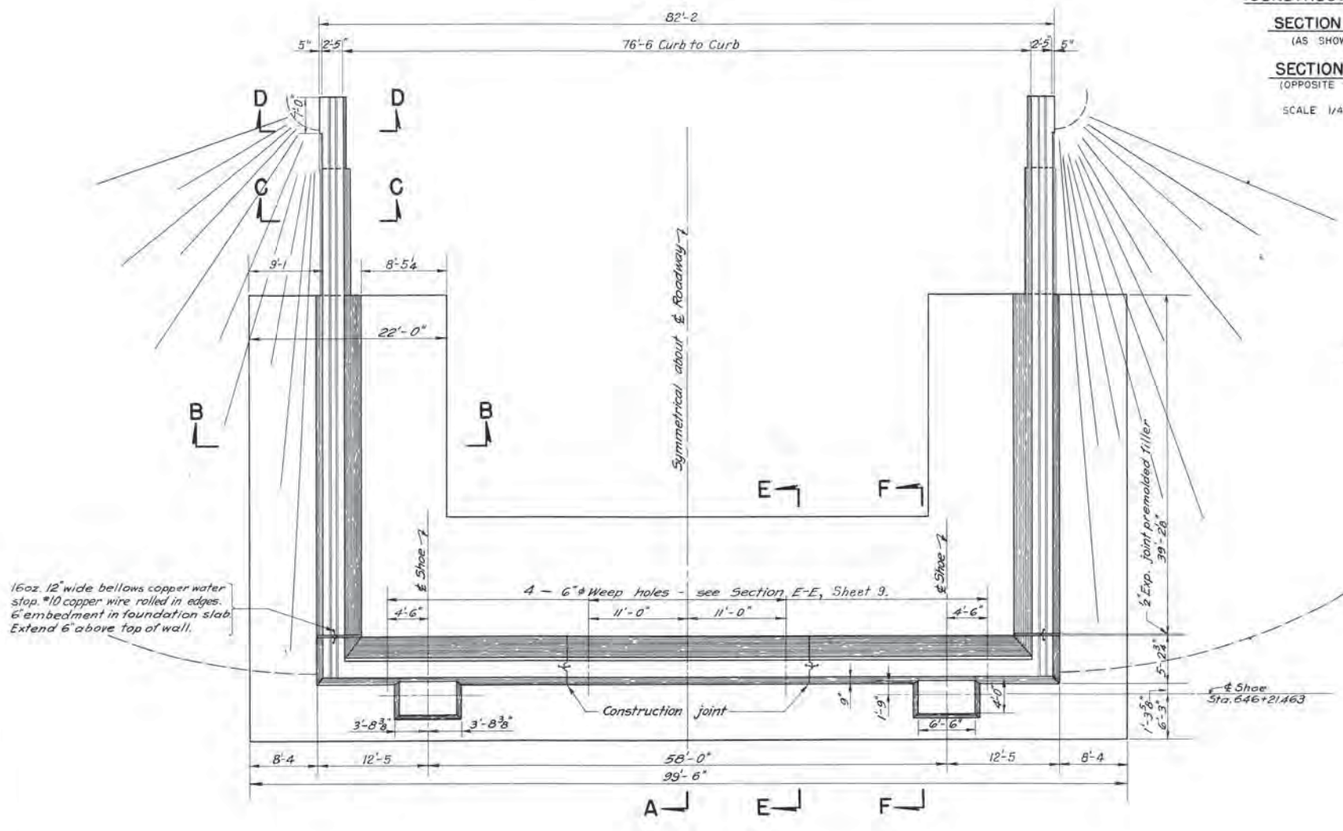
SECTION X - X
(AS SHOWN)

SECTION X1 - X1
(OPPOSITE HAND)

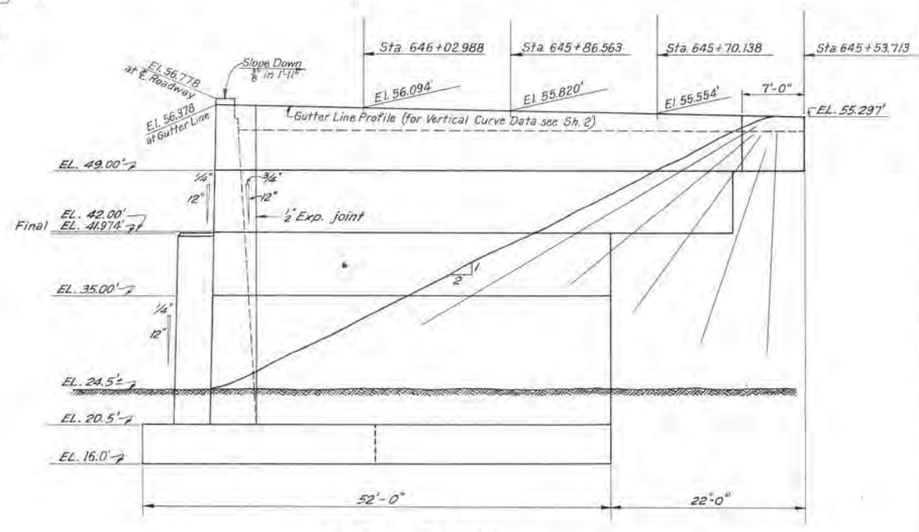
SCALE 1/4" = 1'-0"



SECTION A-A



PLAN



SIDE ELEVATION

NOTES

1. For General Notes see Sheet 3.
2. For Sections & Details of West Abutment see Sheet 9.
3. Pour alternate sections of abutment walls. Adjacent sections are not to be poured until the former sections are at least 7 days old.
4. Embankment above original ground line will be placed by others.
5. For Detail of Scoring see Sheet 10.

NO.	REVISION	DATE	BY
1	General	7-27-54	D.R.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

WEST ABUTMENT - PLAN & ELEVATIONS

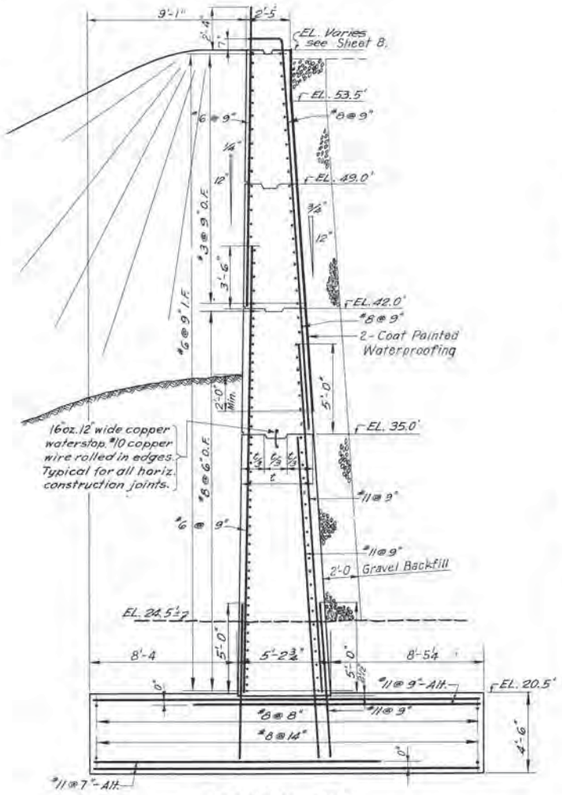
GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

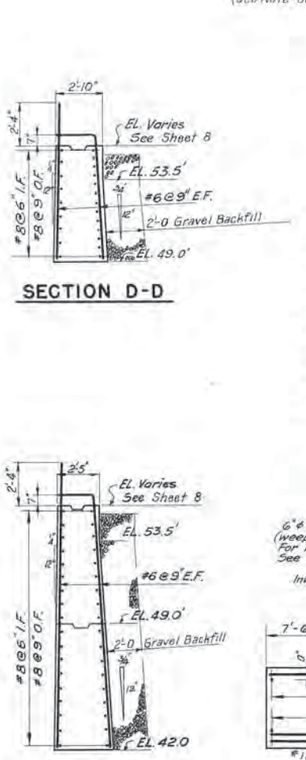
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: L.S.
TRACED BY: S.P. & A.S.
CHECKED BY: N.K.
SCALE: 1/8"=1'-0" DATE: 4-1-54

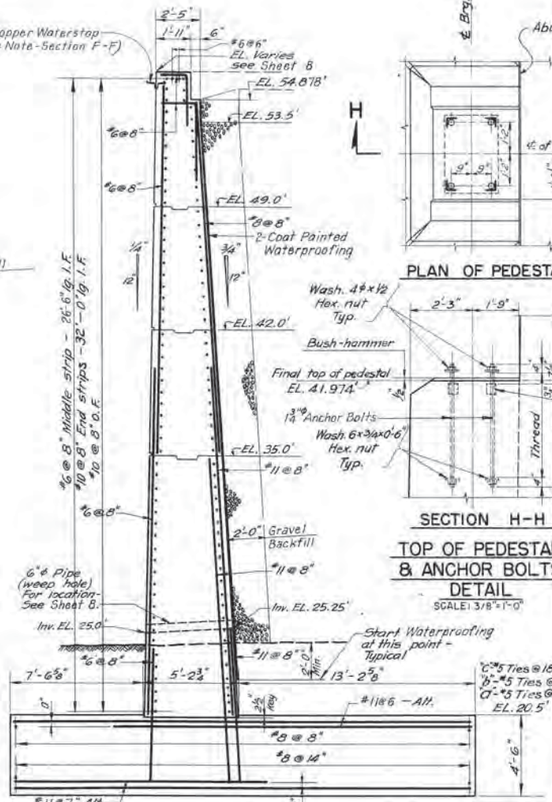
CONTRACT PN 2
DWG. NO. DRB-2
SHEET 8 OF 11



SECTION B-B



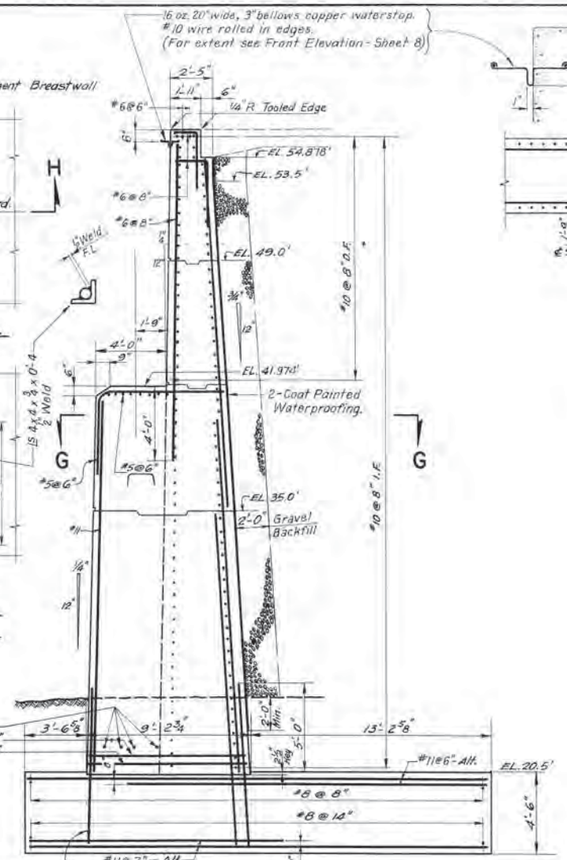
SECTION C-C



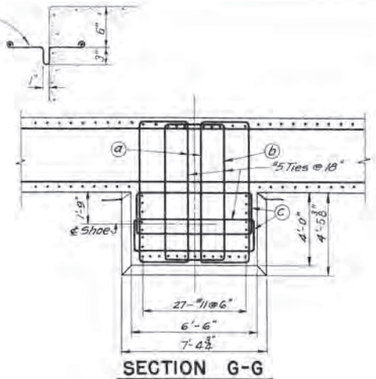
SECTION E-E

TOP OF PEDESTAL & ANCHOR BOLTS DETAIL

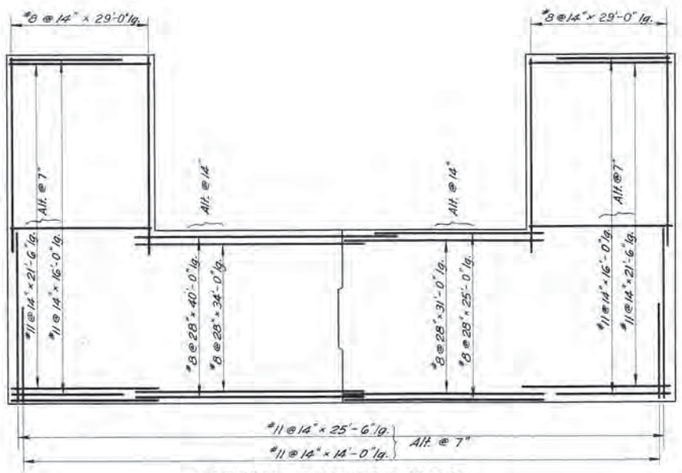
SCALE: 3/8"=1'-0"



SECTION F-F



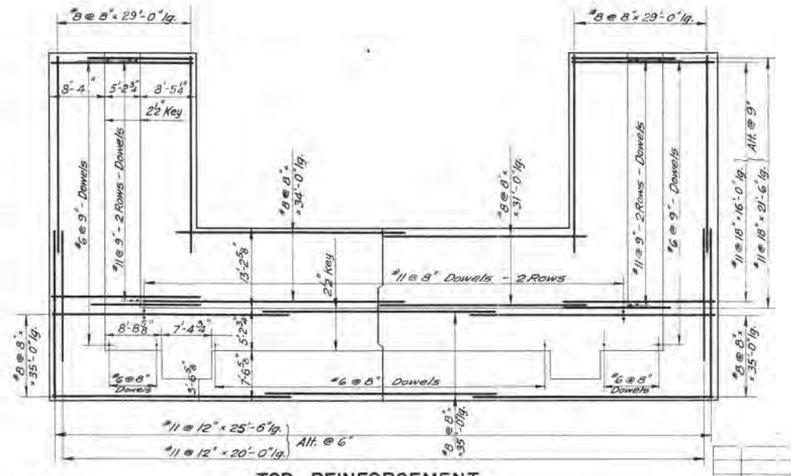
SECTION B-B



BOTTOM REINFORCEMENT

PLAN OF FOOTING

SCALE: 3/32"=1'-0"



TOP REINFORCEMENT

NOTES

1. For General Notes see Sheet 3.
2. For location of Sections see Sheet 8.
3. See Sheet 10 for notes Nos 2, 3 & 4.
4. 2'-0 gravel backfill behind walls to be furnished and placed by others.
5. Compensation for 2-coat painted waterproofing shall be included in the contract unit price for Class A Concrete for Abutments, except Footings.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

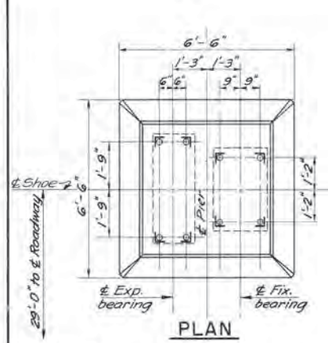
BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

WEST ABUTMENT-SECTIONS & DETAILS

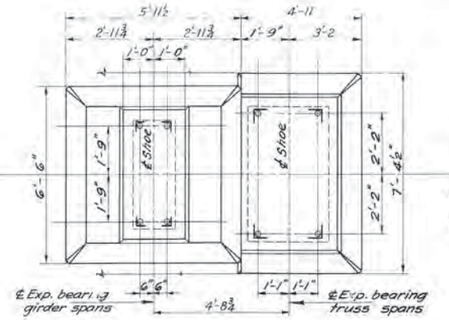
GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.	
MORAN, PROCTOR MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N.Y. ASSOCIATES	HARBESON, HOUGH LIVINGSTON & LARSON, PHILADELPHIA, PENNA. ARCHITECTS
DRAWN BY: L.S.	CONTRACT PN 2
TRACED BY: S.P.	DWG. NO. DRB-2
CHECKED BY: N.K.	
SCALE: 1/4"=1'-0" & AS SHOWN	DATE: 4-1-54
	SHEET 9 OF 11

NO.	REVISION	DATE	BY
1	General	7-27-54	D.P.U.

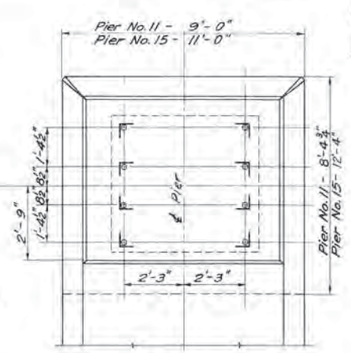
PR 1797-653



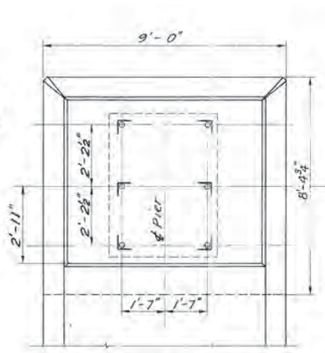
PLAN



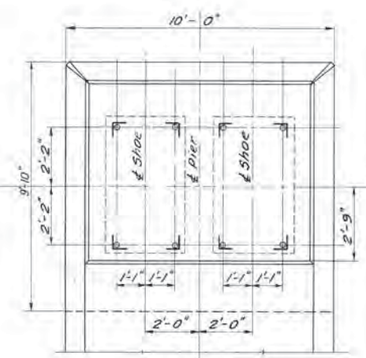
PLAN



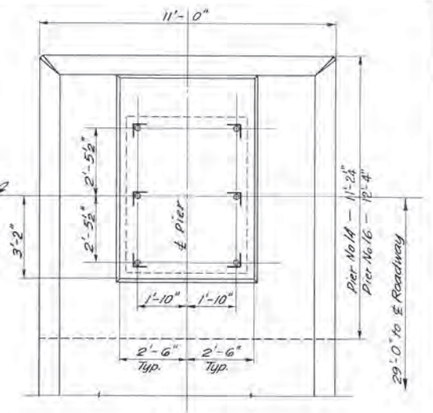
PLAN



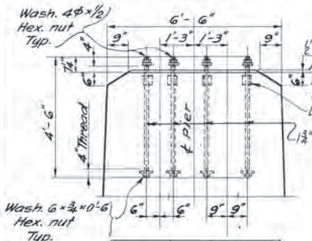
PLAN



PLAN

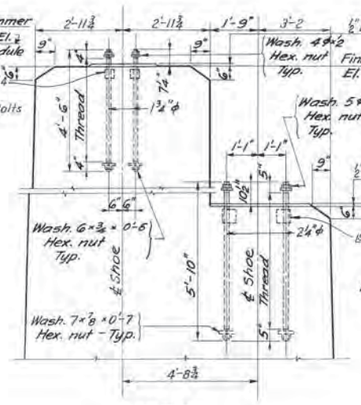


PLAN

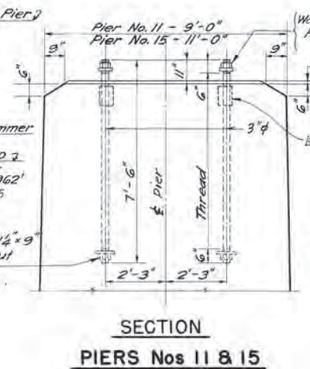


Pier No.	Final top of pier elevation
1	+ 44.437
2	+ 47.381
3	+ 50.836
4	+ 54.568'
5	+ 58.300'
6	+ 62.033'
7	+ 65.765'
8	+ 69.498'
9	+ 73.230'

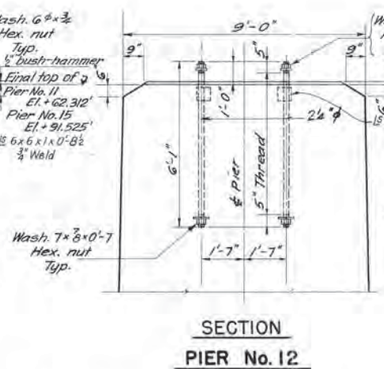
SECTION
PIERS Nos 1 TO 9



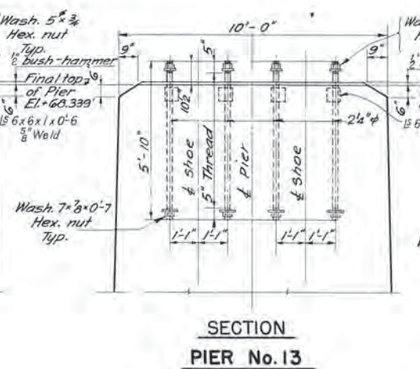
SECTION
PIER No. 10



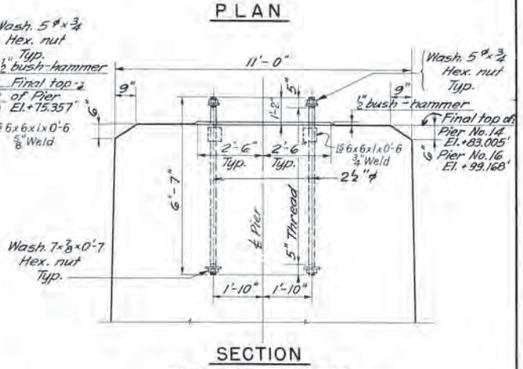
SECTION
PIERS Nos 11 & 15



SECTION
PIER No. 12



SECTION
PIER No. 13



SECTION
PIERS Nos 14 & 16

TOP OF PIERS & ANCHOR BOLT DETAILS

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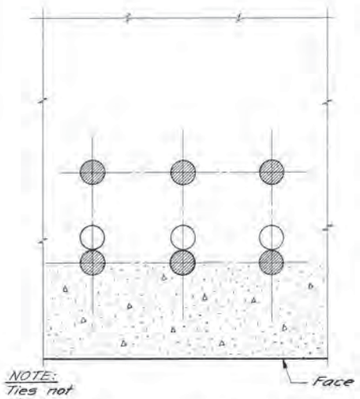
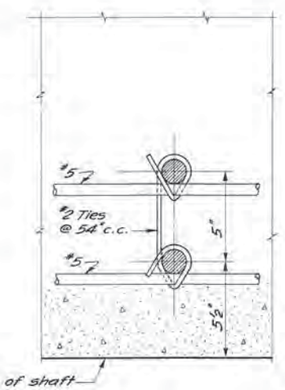


TYPICAL LAP DETAIL OF VERTICAL BARS
SCALE: 3"=1'-0"



DETAIL "X"
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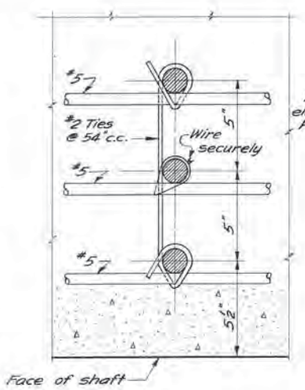

DETAIL "Y"
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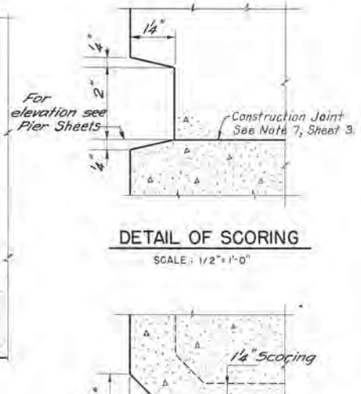
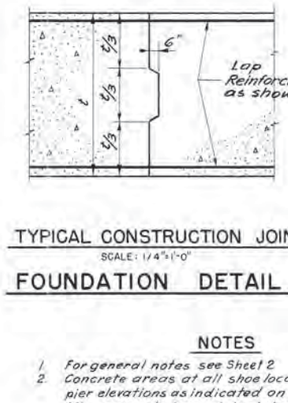


DETAIL OF SCORING
SCALE: 1/2"=1'-0"



TYPICAL CONSTRUCTION JOINT
SCALE: 1/4"=1'-0"

CORNER DETAIL
SCALE: 1/2"=1'-0"

DETAIL OF ANCHOR BOLT ANGLE LUGS
SCALE: 1"=1'-0

FOUNDATION DETAIL

SHAFT DETAILS

NOTES

1. For general notes see Sheet 2.
2. Concrete areas at all shoe locations ½" above final top of pier elevations as indicated on details. After concrete has set, bush-hammer in accordance with the Supplemental Specifications.
3. Provide templates for positioning of anchor bolts. Drawing showing details to be submitted to Consulting Engineer for approval.
4. Following specifications shall be used: For anchor bolts & nuts - ASTM-Designat. A 307. For washers - ASTM - Designation A7.

NO.	REVISION	DATE	BY
1	Width of Shaft, Piers 11 to 16 incl. & affected dimensions chgd.	11-5-54	D.P.U.
2	Changed Shafts & Girder Brgs. for Pier 10	10-28-54	D.P.U.
3	Angle Lugs added to Anchor Bolts, Changed El. Piers 1, 2 & 3	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

MISCELLANEOUS DETAILS

GEORGE S. RICHARDSON
CONSULTING ENGINEER PITTSBURGH, PENNA.

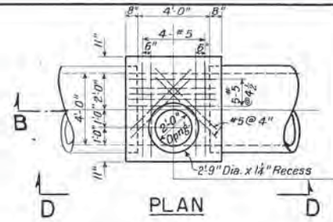
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

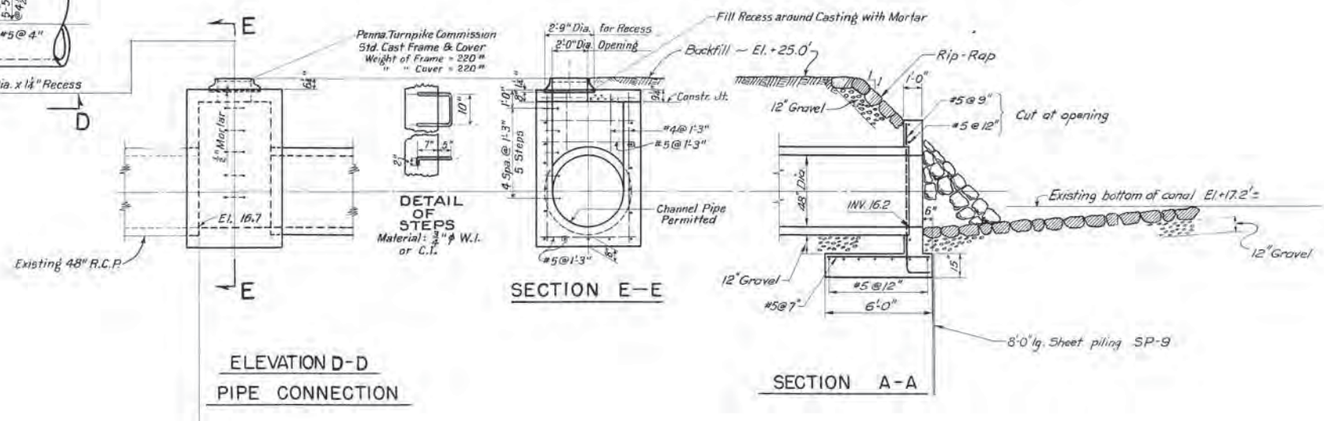
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

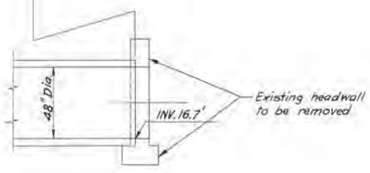
DRAWN BY: L. S.
TRACED BY: G. H.
CHECKED BY: N.K.
SCALE: AS SHOWN DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 10 OF 11

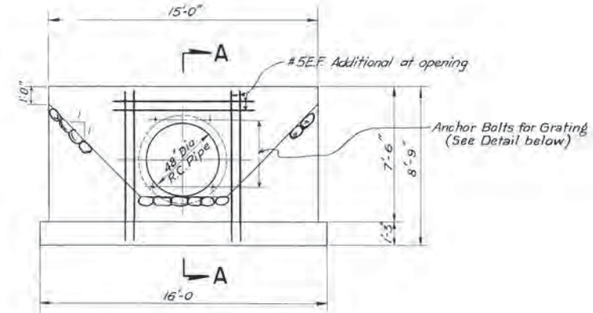
M.P.M. & R. FILE No. 1443



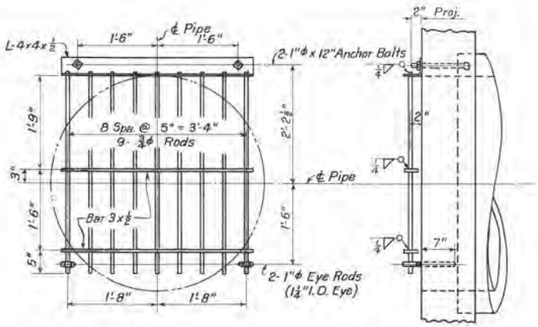




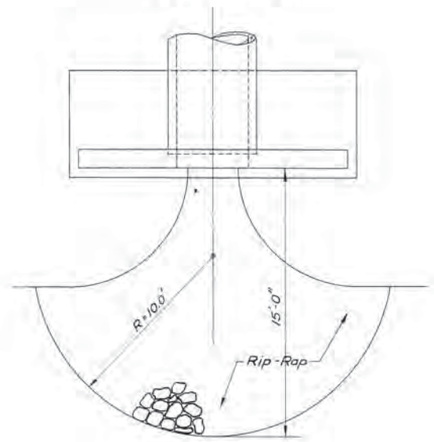
SECTION B
EXISTING HEADWALL



ELEVATION



DETAIL OF GRATING AT OUTFALL
Scale: ¾" = 1'-0"



PLAN

DETAIL AT NORTH END OF NEW PIPE LINE

DETAIL OF SOUTH HEADWALL

NOTES

1. For General Notes see Sheet 3
2. For Location see Sheet 2.
3. For Details of Manhole Frame and Cover See Pennsylvania Turnpike Commission "Standard Details", Drawing NE 12.

NO.	REVISION	DATE	BY
1	Manhole & Outfall Grating Added	8-18-54	J.R.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J

DETAILS OF CULVERT

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. ASSOCIATES
HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA. ARCHITECTS

DRAWN BY: S.P.
TRACED BY: S.P.
CHECKED BY: N.K.
SCALE: 1/4" = 1'-0" DATE: 4-1-54

CONTRACT PN 2
DWG. NO. DRB-2
SHEET 11 OF 11

PR 1797-853

DELAWARE RIVER BRIDGE

SUBSTRUCTURE CONSTRUCTION

PIERS 17-20

PENNSYLVANIA TURNPIKE COMMISSION

THOMAS J. EVANS, CHAIRMAN
JAMES F. TORRANCE, SECRETARY AND TREASURER
DAVID E. WATSON, COMMISSIONER
EDWARD L. SCHMIDT, SECRETARY OF HIGHWAYS (EX OFFICIO)

NEW JERSEY TURNPIKE AUTHORITY

PAUL L. TROAST, CHAIRMAN
GEORGE F. SMITH, VICE CHAIRMAN
MAXWELL LESTER, JR., TREASURER

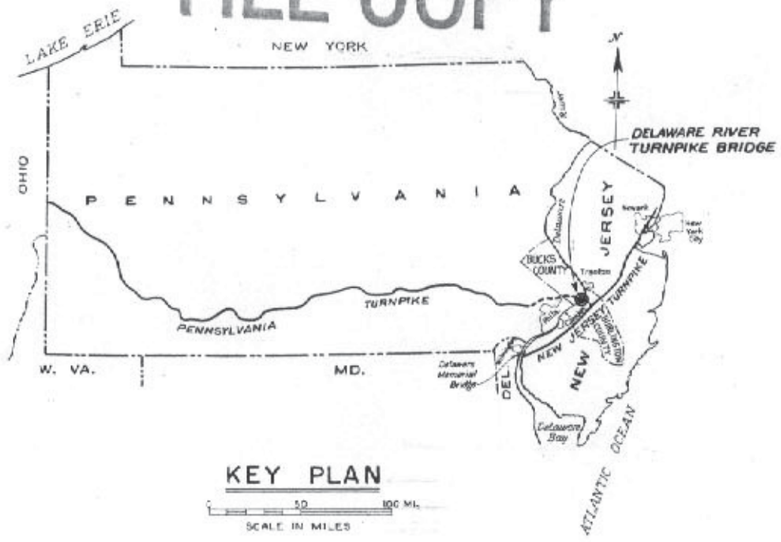
DELAWARE RIVER TURNPIKE BRIDGE

BUCKS COUNTY, PENNSYLVANIA AND BURLINGTON COUNTY, NEW JERSEY

DRAWINGS FOR CONTRACT PN 1

From Sta. 675+00 to Sta. 691+00
Length 1600.00 Feet 0.30 Miles

SUBSTRUCTURE

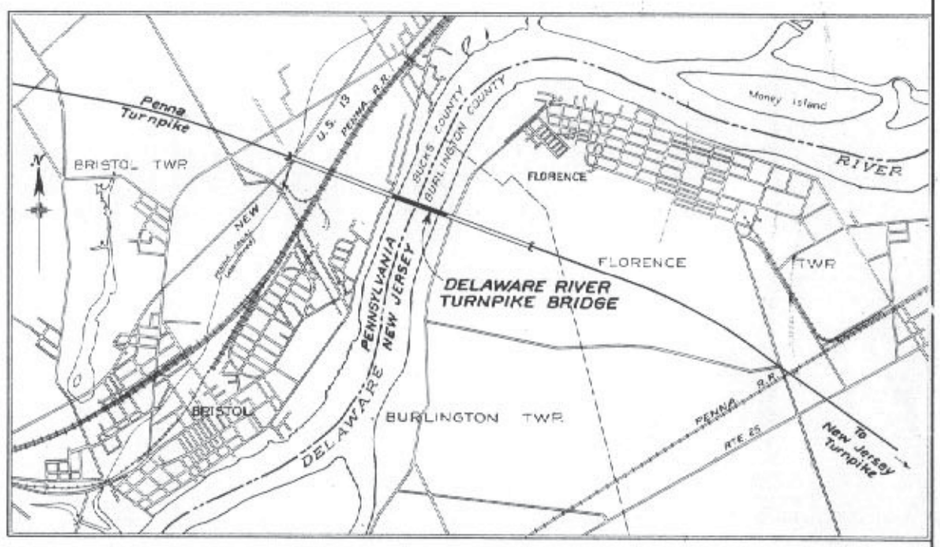


KEY PLAN
0 50 100 MI.
SCALE IN MILES

INDEX OF DRAWINGS

CONTRACT DRAWINGS DRB-1	
SHEET	TITLE
1	Title Sheet
2	General Plan & Elevation
3	Pier Nos. 17, 18, 19 & 20 - Plans, Sections & Elevations
4	Cofferdam for Pier Nos. 18 & 19
5	Cofferdam Details Pier Nos. 18 & 19
6	Pier Nos. 18 & 19
7	Pier Nos. 18 & 19 - Shaft Sections
8	Pier Nos. 18 & 19 - Miscellaneous Details
9	Fender System for Pier Nos. 18 & 19
10	Pier Nos. 17 & 20 - Pile Plan & Footing Details
11	Pier Nos. 17 & 20 - Shaft Details

REFERENCE DRAWINGS DRB-10	
SHEET	TITLE
1	Geological Section – Pennsylvania Side
2	Geological Section – New Jersey Side
3	Geological Cross Sections
4	Boring Logs
5	" "
6	" "
7	" "
8	" "
9	" "
10	Test Pile Details
11	Test Pile Results



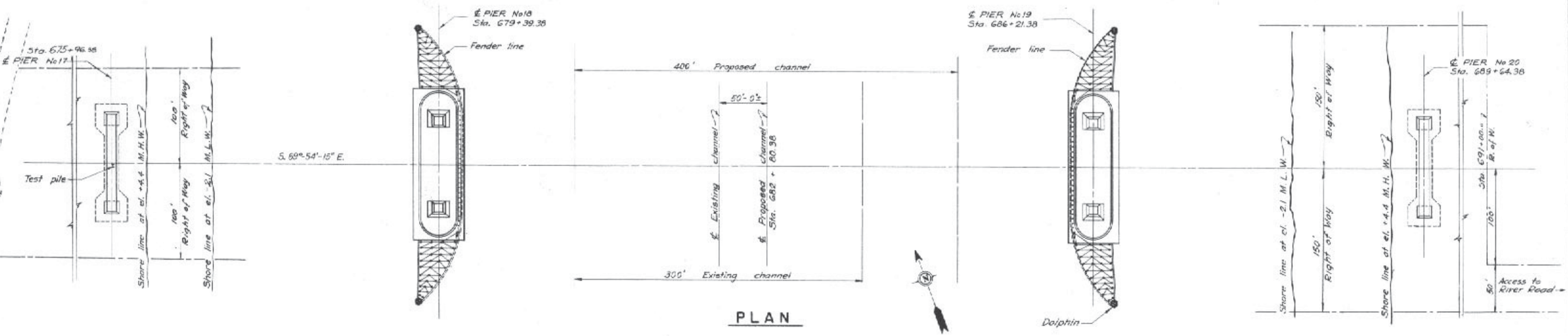
PROJECT PLAN
0 500 1000 2000 4000 6000 8000 10,560
SCALE IN FEET

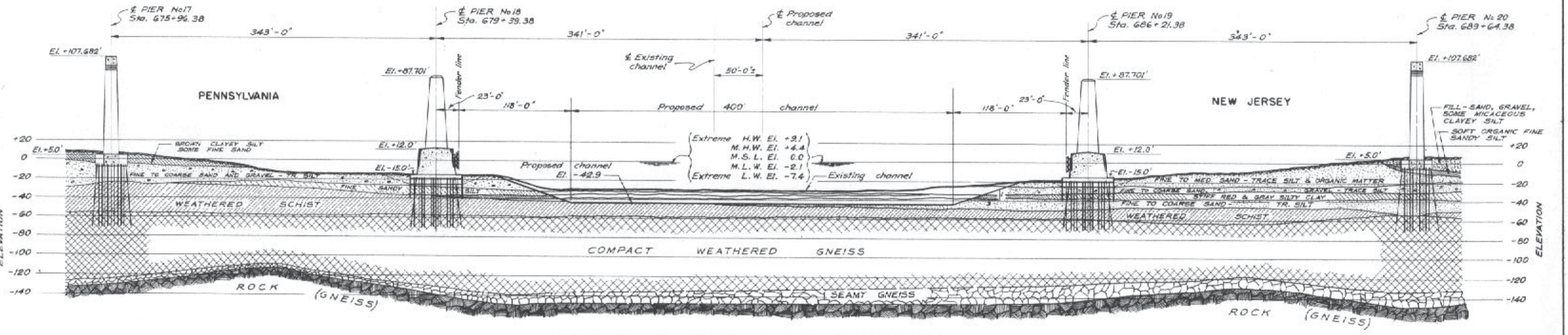
RECOMMENDED George S. Richardson DATE APRIL 26 1954
GEORGE S. RICHARDSON, CONSULTING ENGINEER
PA. I.E. 3567 N.J.P.E. 7767

APPROVED Charles M. Noble per W.S.D. DATE Apr. 27, 1954
CHIEF ENGINEER, NEW JERSEY TURNPIKE AUTHORITY

RECOMMENDED April 27 1954
R.R. Stone
CHIEF ENGINEER, PENNSYLVANIA TURNPIKE COMMISSION

APPROVED April 27 1954
PENNSYLVANIA TURNPIKE COMMISSION
ATTEST James F. Torrance
SECRETARY AND TREASURER





LONGITUDINAL SECTION AT MAIN RIVER SPANS

GENERAL NOTES

1. All elevations refer to U.S.C. & G.S. sea level datum 1929. Mean tidal heights, at 11,800 sec. ft. mean annual fresh water flow at Trenton, are approximately as follows: L.W. = -2.1 H.W. = +4.4. Extreme L.W. = -7.4 on Jan. 25, 1945 Extreme H.W. = +9.1 on Aug. 24, 1933. (Above observations made by Corps of Engineers)
2. Stationing according to Pennsylvania Turnpike Commission.
3. For boring data see Reference Dwg. DRB-10, Sheets 4 to 9 Incl.
4. The subsoil profiles, including rock, shown here have been interpolated from completed borings and do not necessarily indicate actual variations in subsoil conditions between borings. The owner makes no representations regarding the character or extent of the soil or other subsurface conditions, which may affect methods or costs of construction of the work.
5. All shore, river bottom and channel lines shown are approximate and not guaranteed.

NO.	REVISION	DATE	BY
1	℄ Bridge Bearing Added	7-27-54	G.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE
BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

GENERAL PLAN & ELEVATION

GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

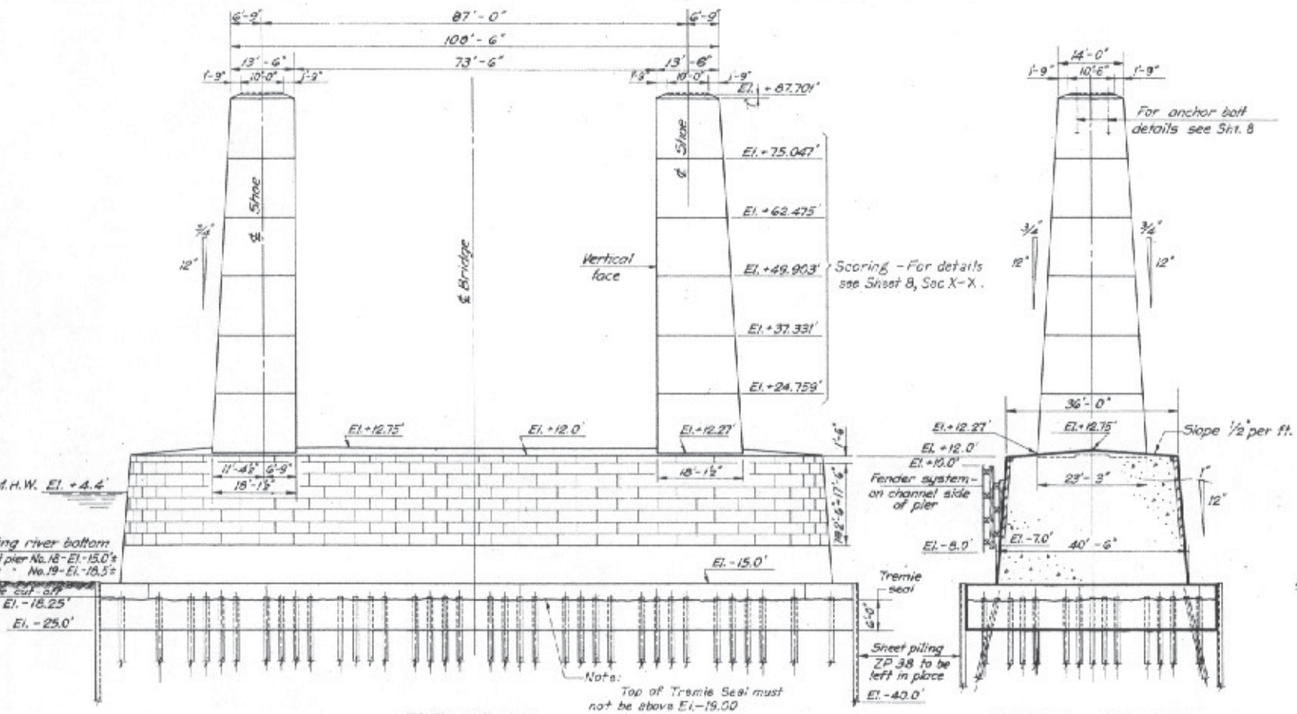
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: A.S.
TRACED BY: S.B.
CHECKED BY: N.K.
SCALE: 1" = 50.0' DATE: 4-1-54

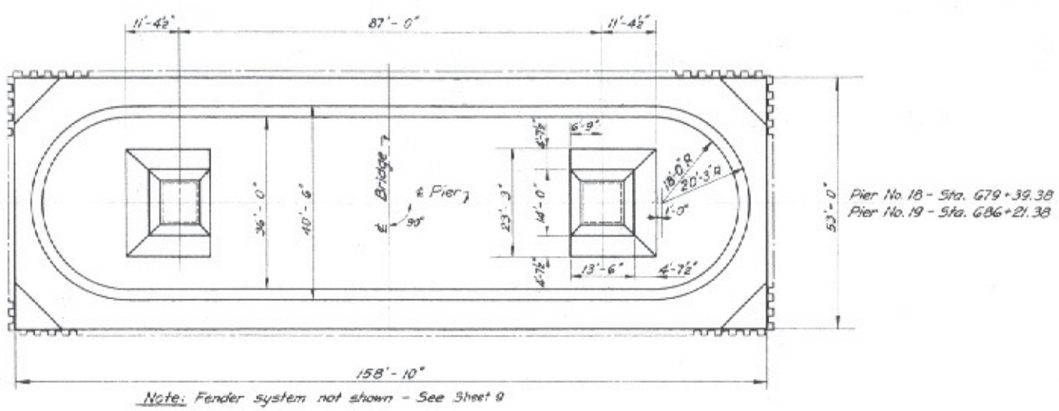
CONTRACT PN 1
DWG. NO. DRB-1
SHEET 2 OF 11

M.P.M. & R. FILE No. 1443



ELEVATION

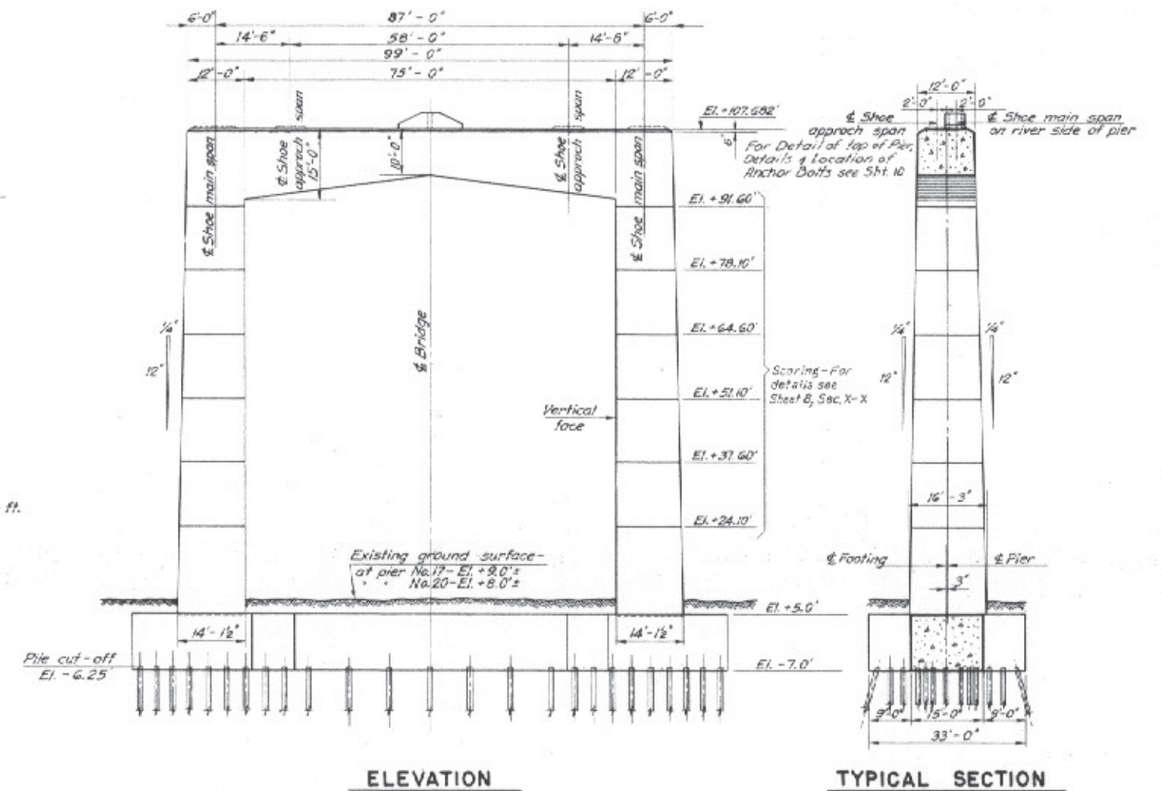
TYPICAL SECTION



Note: Fender system not shown - See Sheet 9

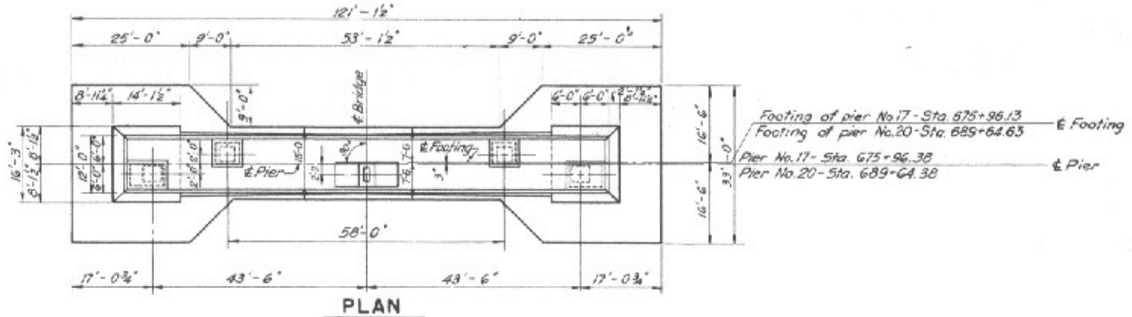
PLAN

PIERS NOS. 18 & 19



ELEVATION

TYPICAL SECTION



PLAN

PIERS NOS. 17 & 20

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE
BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 17, 18, 19 & 20
PLANS, SECTIONS AND ELEVATIONS

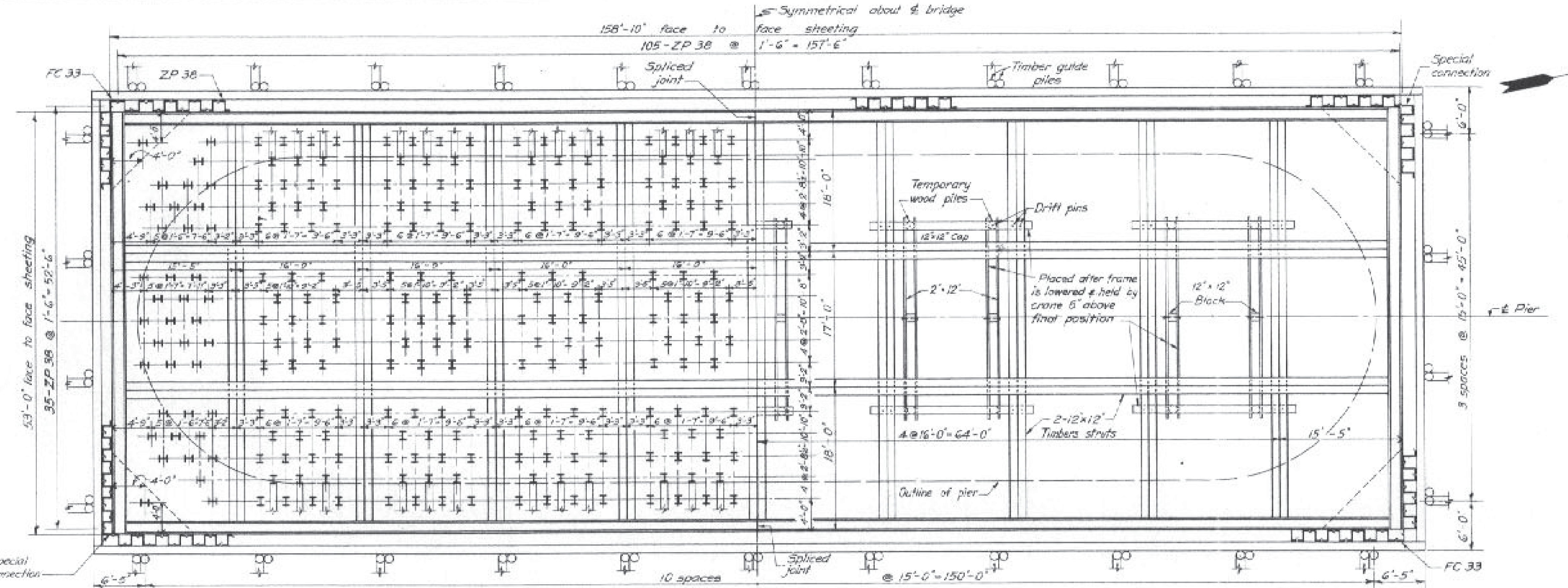
GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. — ASSOCIATES
HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA. — ARCHITECTS

NO.	REVISION	DATE	BY
2	Changed Dimensions at Top of Piers 18 & 19.	1-10-55	O.P.U.
1	Added Shear Lock Pedestal	7-27-54	O.P.U.

DRAWN BY: W.J.A.
TRACED BY: L.S. & S.P.
CHECKED BY: N.K.
SCALE: 1/16"=1'-0" DATE: Sept. 54

CONTRACT P.N. 1
DWG. NO. DRB-1
SHEET 9 OF 11

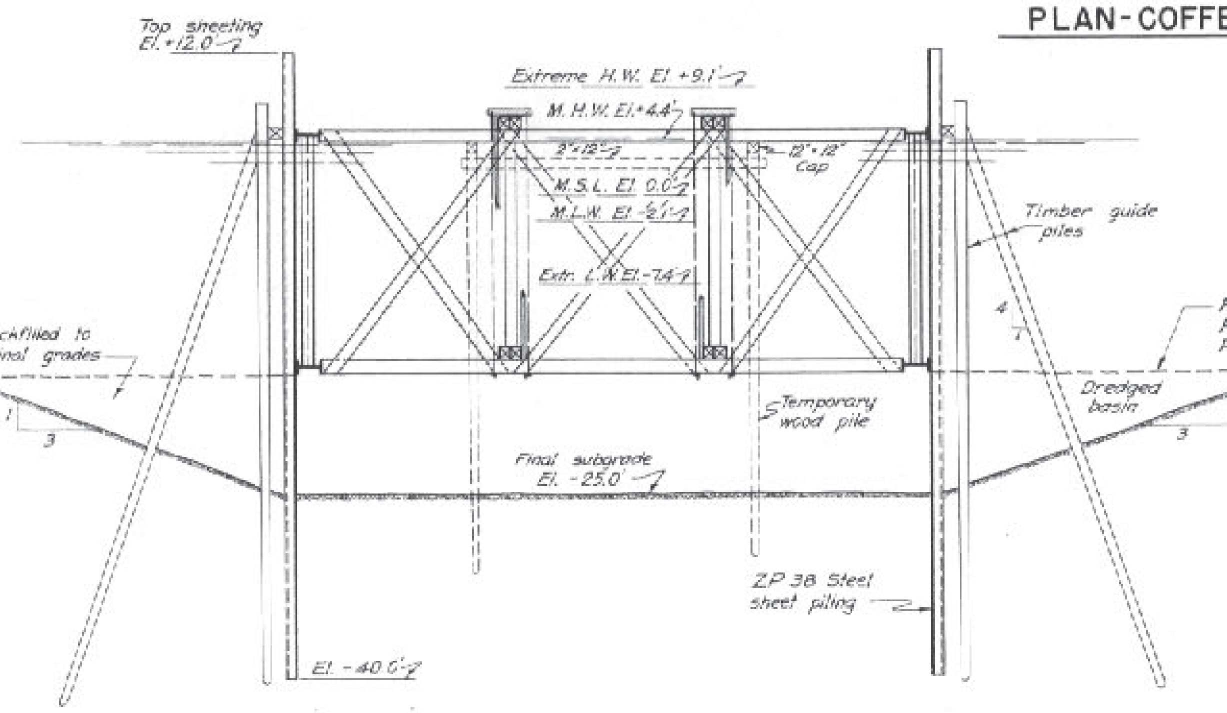
M.P.M. & R. FILE No. 1443



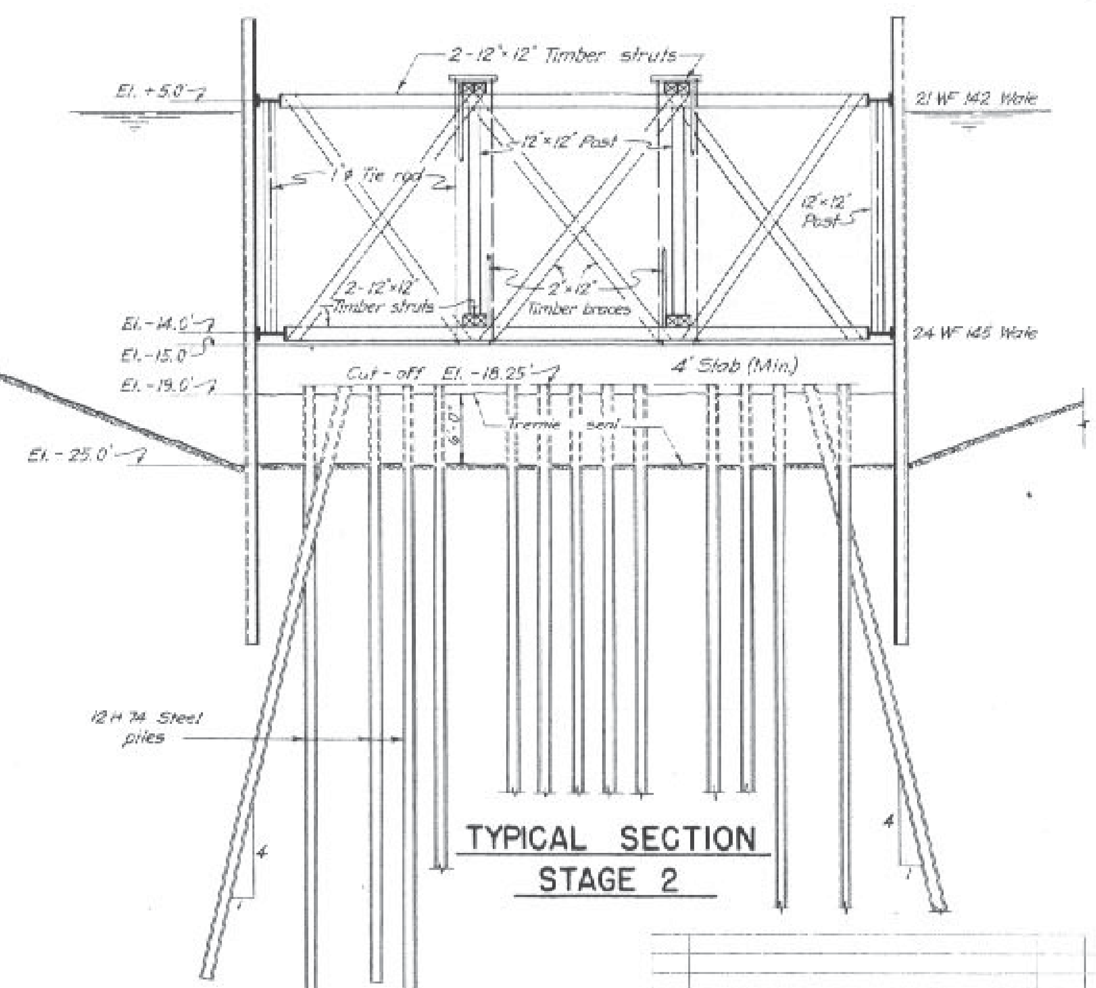
PILE LOCATION PLAN

PLAN-STAGE I

PLAN-COFFERDAM



TYPICAL SECTION
STAGE I



TYPICAL SECTION
STAGE 2

CONSTRUCTION PROCEDURE

1. Dredge to El.-25.0 min. Install upstream & downstream dolphins and use for mooring & construction purposes. See Sht. 9.
2. Construct bracing frame, in two sections on a barge or on land.
3. Drive temporary timber supporting piles.
4. Move bracing frame sections into positions, lower to required elevation, support on temporary timber piles and splice sections together.
5. Install outside guide piles and timber frame for sheet piling.
6. Place steel sheeting, make closure and then drive same in 4 ft. lifts. Attach upper steel wale to sheeting. Remove interior temporary timber piles. Outside guide timber and piles may be used as fender during construction period and subsequently removed.
7. Excavate inside cofferdam if necessary. Make soundings of bottom.
8. Drive steel H piles at locations shown to 100 tons E.N. Formula.
9. Place tremie seal in one continuous operation, commencing at either end. Allow concrete to set 7 days.
10. Pump out cofferdam. Remove laitance.
11. Place reinforcing, fender H piles and weld H pile extensions to support upper tier. Pour 4 ft. footing in the dry. - See Sheet 5.
12. Place 12"x12" continuous timber on H pile extensions and connect to upper tier of bracing. Remove lower tier of bracing system, diagonals and posts.
13. Place forms and granite for pier and pour same in lifts to El.+2.5
14. Place timber blocking at El.-8.50 & El.+2.0. Remove upper tier of bracing system. - See Sheet 5
15. Complete pier to El.+12.0. Place timber blocking at El.+11.5 on channel side only. Remove timber blocking on channel side at El.+2.0.
16. Construct fender system.
17. Flood cofferdam.
18. Burn off sheeting at El.-15.0.
19. Recover timber wales and struts.
20. Construct pier shaft at any time after item 15.

GENERAL NOTES

1. All timber shall be No.1 dense Southern Pine or Douglas Fir.
2. Welding shall be done in accordance with the provisions of the American Welding Society.
3. Contractor shall submit for approval his scheme for picking up and moving bracing frame sections, providing additional bracings if necessary.
4. Contractor may submit an alternate construction scheme subject to the approval of the Engineer.
5. All steel wales, struts and sheet piling designed for 3 ft/sec velocity and hydrostatic pressure to El.+9.0 and 15 kips per linear foot additional ice pressure. Sheet piling is also designed for unbalanced ice pressure of 15 kips per linear foot in longitudinal and 6 kips per linear foot transverse directions. Diagonal members are designed for water pressure only. Additional diagonal bracing is required for ice pressure if cofferdam is to be used when subject to ice conditions. The temporary blocking between sheeting and completed pier is designed for water pressure only.
6. Contractor shall backfill dredged basin to original grades after sheet piling has been burned off.
7. See Sheet 5 for additional details.
8. H Piles shall be driven to 100 tons capacity using Engineering News Formula or as required by Article 4.7.02 of the Specifications.
9. Tremie Seal Concrete projecting above El.-19.00 shall be removed at the Contractors expense prior to pouring the footing.

NO.	REVISION	DATE	BY

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE
BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

COFFERDAM FOR PIER Nos. 18 & 19

GEORGE S. RICHARDSON
CONSULTING ENGINEER — PITTSBURGH, PENNA

MORAN, PROCTOR
MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

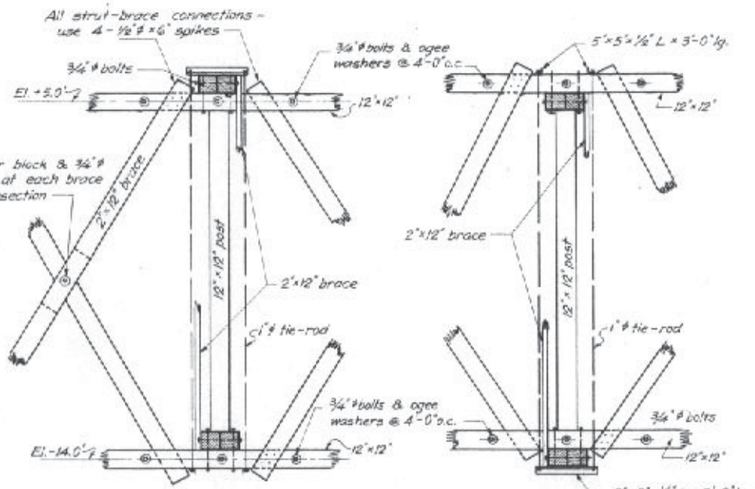
HARBESON, HOUGH
LIVINGSTON & LARSON
PHILADELPHIA, PENNA
ARCHITECTS

DRAWN BY: E.B.
TRACED BY: L.S.
CHECKED BY: N.K.
SCALE: 1/8"=1'-0" DATE: 4-1-54

CONTRACT PN 1
DWG. NO. DRB-1
SHEET 4 OF 11

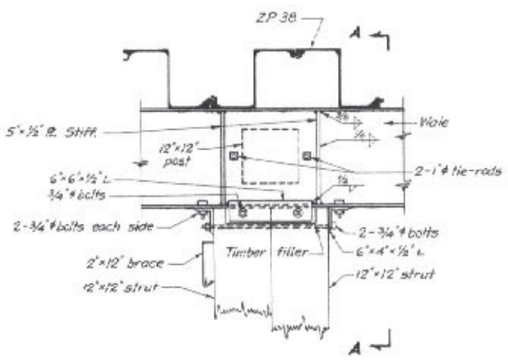
PR 1787-350

MPM B.R. FILE No 1443

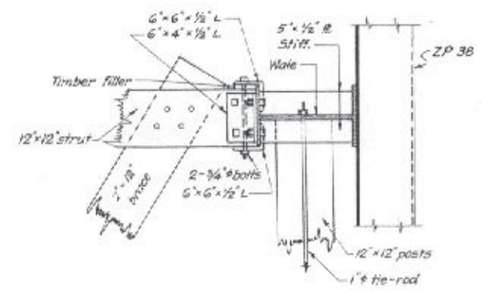


TYPICAL INTERSECTION DETAIL

SCALE: 1/4"=1'-0"



PLAN

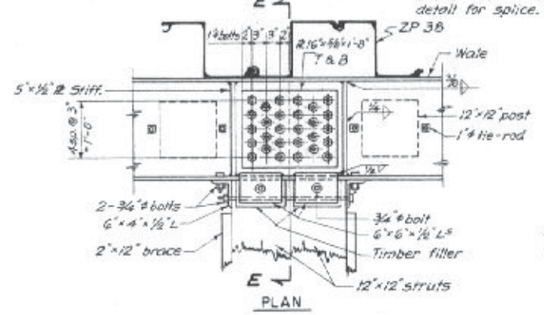


SECTION A-A

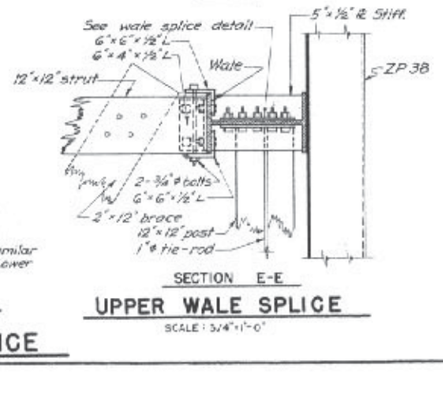
DETAIL INTERSECTION OF WALE & STRUT

SCALE: 3/4"=1'-0"

Note: Contractor may submit alternate welded detail for splice.



PLAN

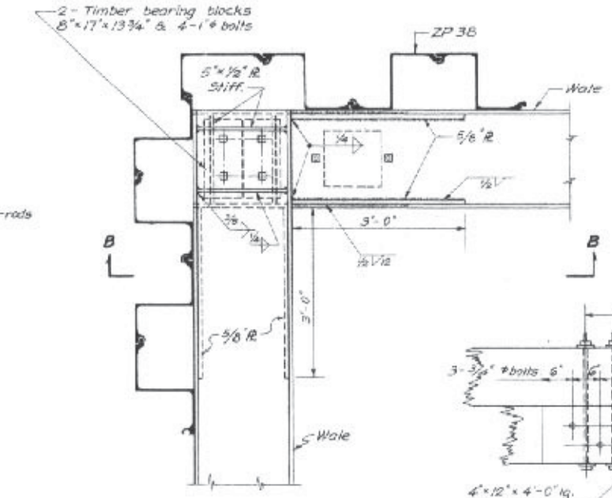


SECTION E-E

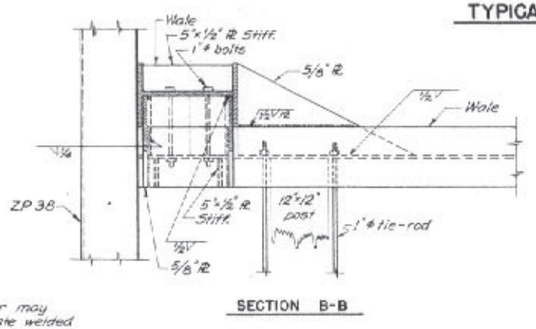
UPPER WALE SPLICE

SCALE: 3/4"=1'-0"

DETAIL INTERSECTION OF WALE & STRUT



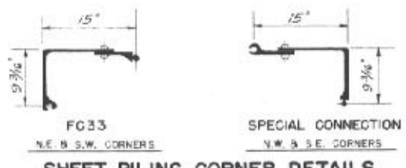
PLAN



SECTION B-B

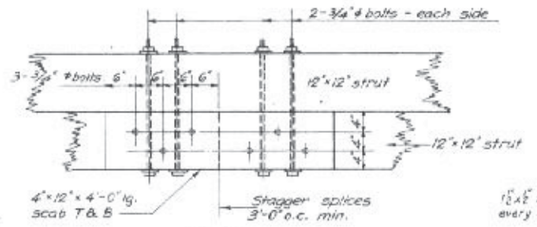
CORNER DETAIL

SCALE: 3/4"=1'-0"



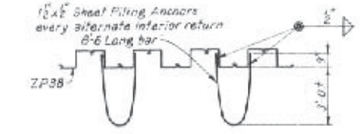
SHEET PILING CORNER DETAILS

SCALE: 1"=1'-0"



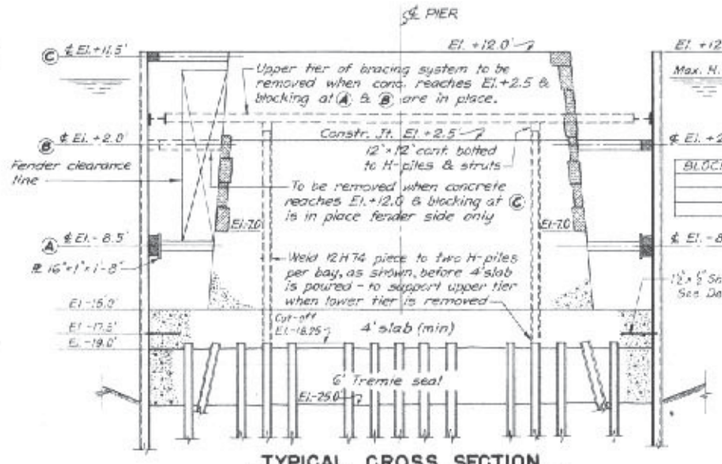
PLAN TYPICAL STRUT SPLICE

SCALE: 3/4"=1'-0"



DETAIL OF SHEET PILING ANCHORS

SCALE: 1/4"=1'-0"

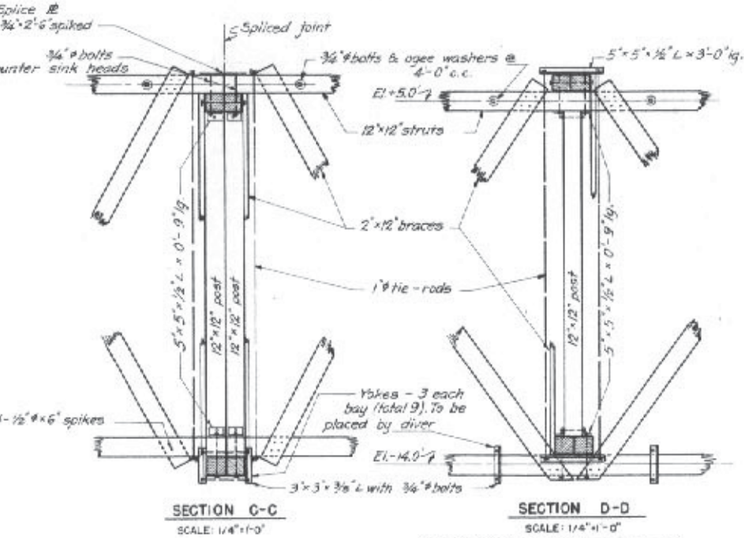


BLOCKING No.	WALE	STRUT	Strut Spcg
A	2-12"x12"	12"x12"	4'-6" c. to c.
B	12"x12"	12"x12"	4'-6" c. to c.
C	12"x12"	12"x12"	9'-0" c. to c.

TYPICAL CROSS SECTION

(Showing suggested retracing & reposting during construction of pier & fender system.)

SCALE: 1/8"=1'-0"

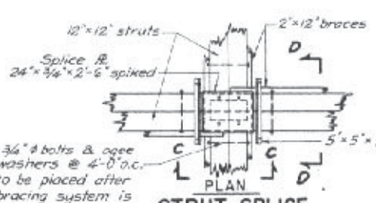


SECTION C-C

SCALE: 1/4"=1'-0"

SECTION D-D

SCALE: 1/4"=1'-0"

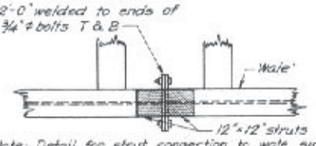


PLAN

STRUT SPLICE

SCALE: 1/4"=1'-0"

℞ 24"x 1"x 2'-0" welded to ends of wales. 4-¾"ø bolts T & B



Note: Detail for strut connection to wale similar to that shown on Upper Wale Splice Detail. Lower splice bolting to be done by diver.

LOWER WALE SPLICE

SCALE: 3/8"=1'-0"

INTERSECTION DETAILS AT SPLICE

NOTES

1. All bolts to have sq. nuts and standard ogee washers for timber framing.
2. For construction procedure and general notes see Sheet 4.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. - BURLINGTON COUNTY, N. J.

COFFERDAM DETAILS - PIER Nos. 18 & 19

GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

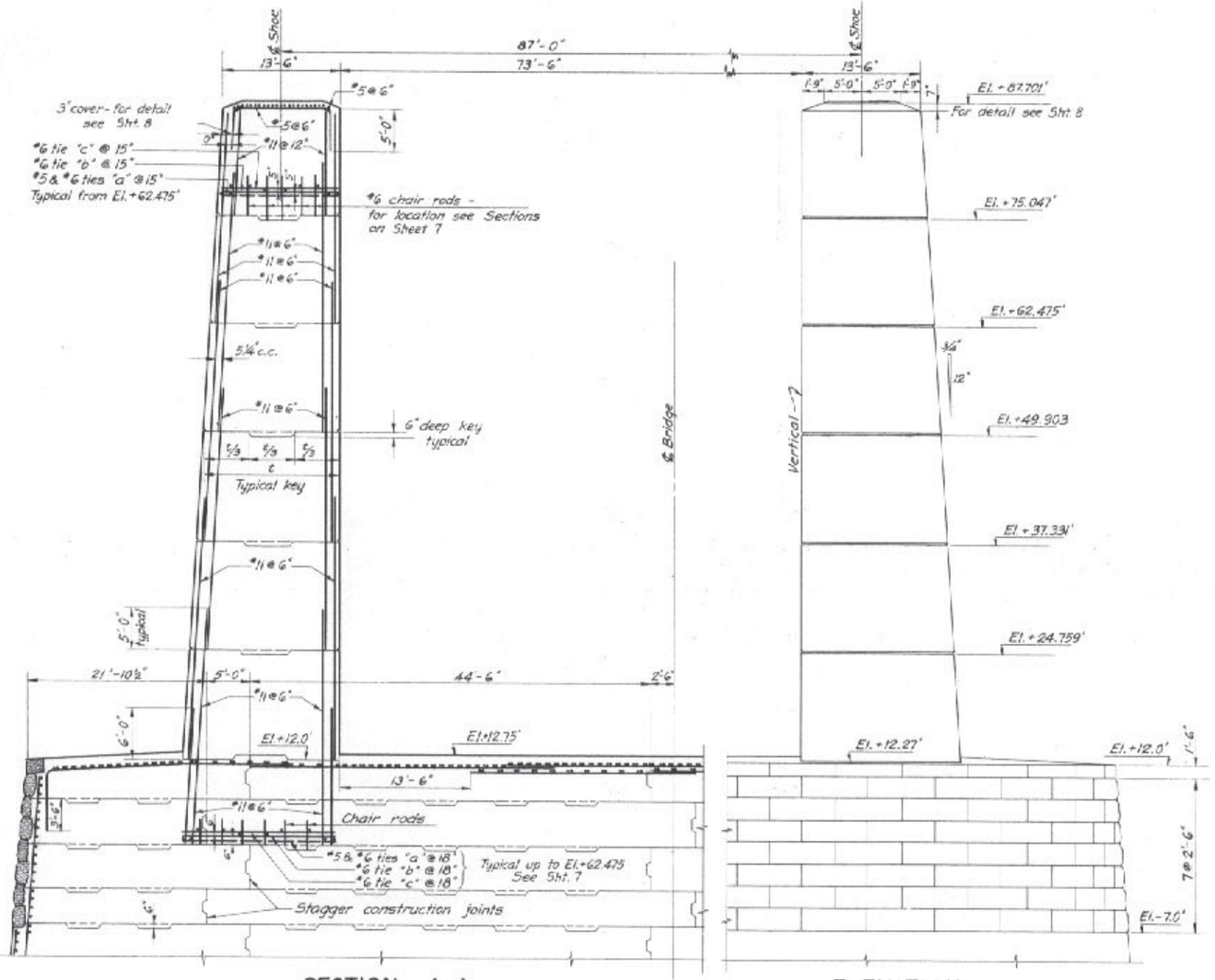
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

NO.	REVISION	DATE	BY

DRAWN BY: E.B.
TRACED BY: L.S.
CHECKED BY: N.K.
SCALE: As shown DATE: 4-1-54

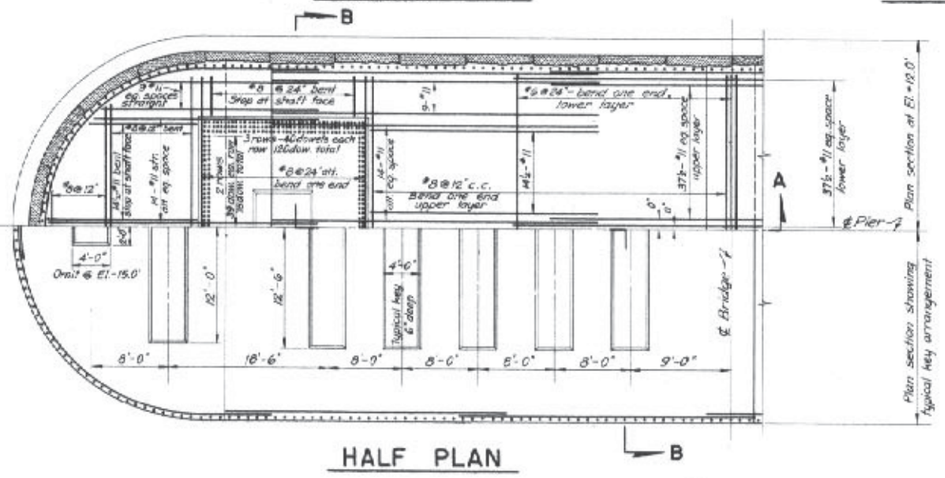
CONTRACT PN 1
DWG. NO. DRB-1
SHEET 5 OF 11

M.P.M. B. R. FILE No. 1443

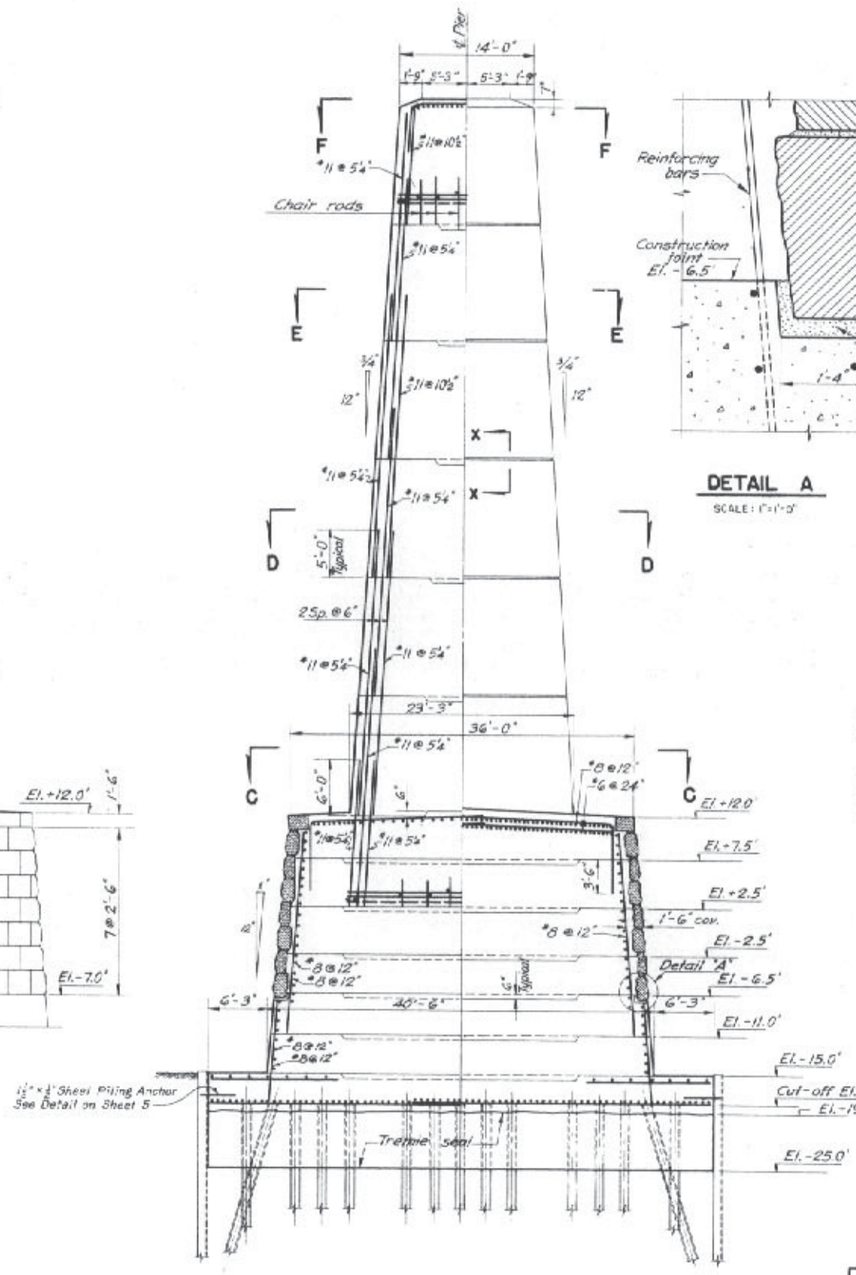


SECTION A-A

ELEVATION



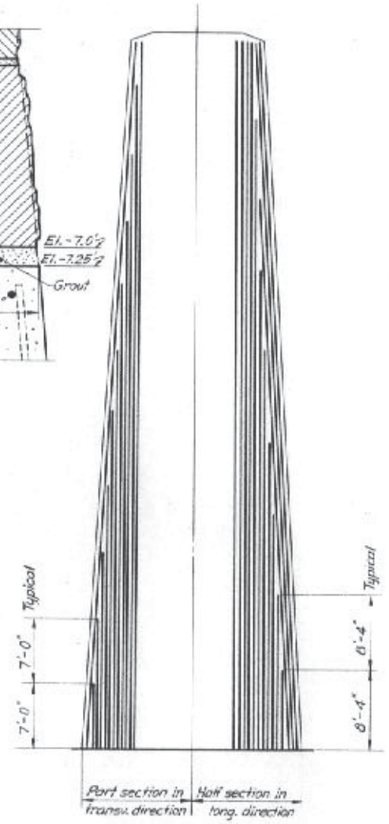
HALF PLAN



SECTION B-B

DETAIL A

SCALE: 1"=1'-0"



DETAILS OF BAR CUT-OFF

DUE TO WALL BATTER

REFERENCE DRAWINGS

1. For sections C-C, D-D, E-E & F-F see Sht. 7.
2. For base slab reinforcing details and miscellaneous details see Sht. 8.

GENERAL NOTES

1. All concrete to be controlled concrete having a compressive strength as follows: Concrete for tremie seal - 2500 psi. at 28 days. All concrete above El.-19.0' - 3000 psi. at 28 days.
2. Unless otherwise noted cover over reinforcing bars to be 3". Minimum length of lapped splices shall be 40 bar dia.
3. Reinforcing bars to be deformed bars (ASTM-A 305), billet steel of intermediate grade (ASTM-A 15).
4. If the Contractor so elects, and subject to the approval of the Engineer, dummy joints may be substituted for the construction joints shown in the pier shafts. See Section X-X, Sheet 8.

NO.	REVISION	DATE	BY
1	Changed Dimensions at Top of Piers	7-10-55	D.E.L.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
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DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 18 & 19

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.

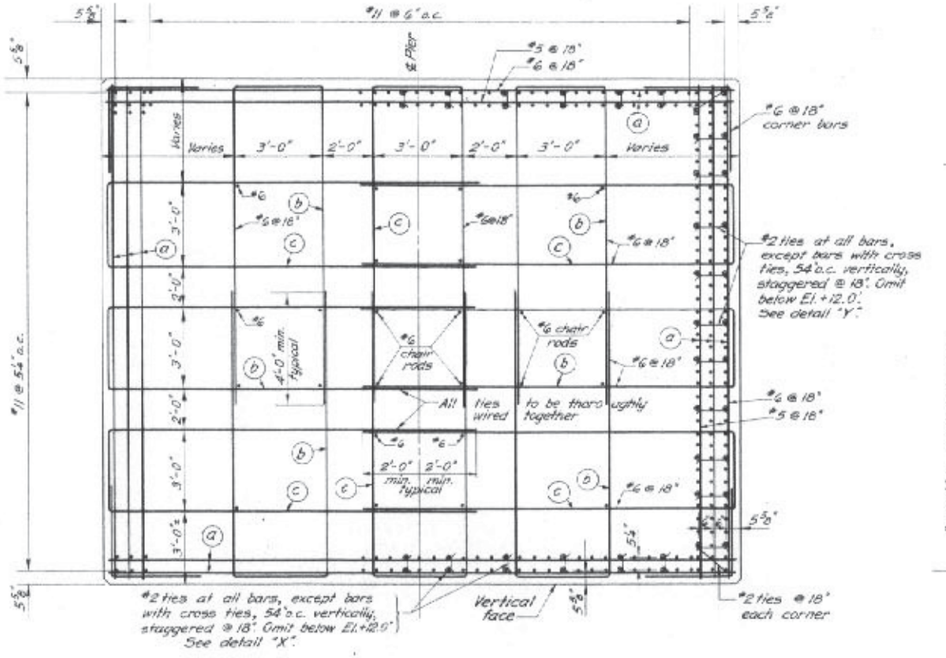
MORAN, PROCTOR MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON, PHILADELPHIA, PENNA. ARCHITECTS

DRAWN BY: W.J.A.
TRACED BY: S.P.
CHECKED BY: N.K.
SCALE: 1/8"=1'-0" DATE: 8-1-54

CONTRACT PN 1
DWG. NO. DRB-1
SHEET 6 OF 11

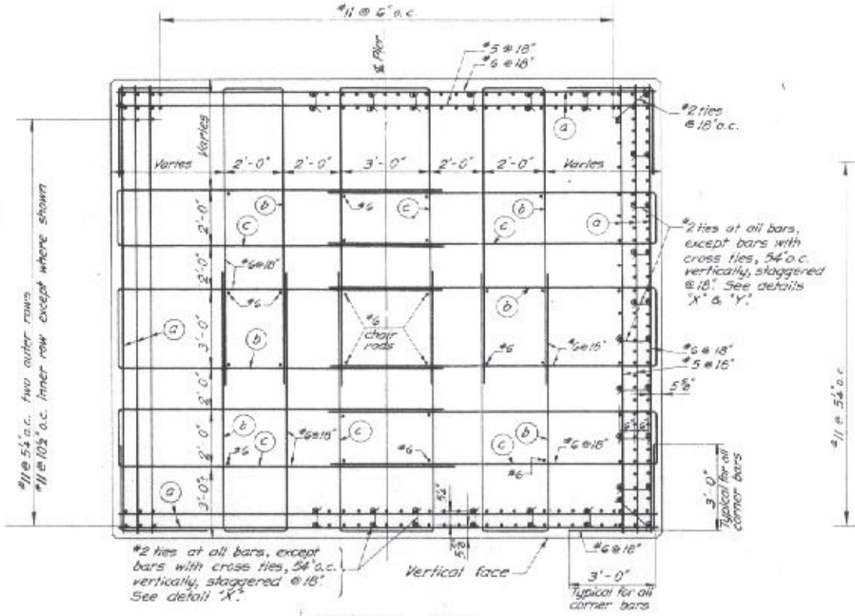
M.P.M. & R. FILE No. 1443



SECTION C-C

TYPICAL ARRANGEMENT OF TIES FROM ELEV.+3.0' TO ELEV.+37.331'

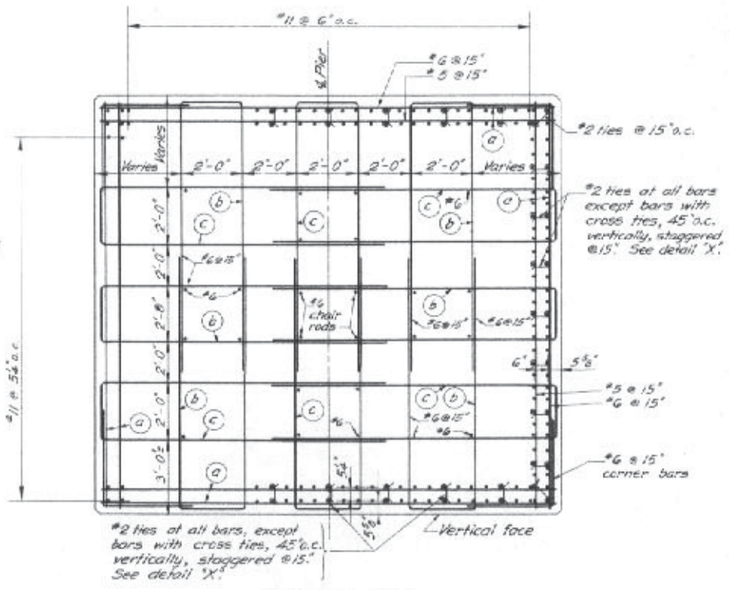
SCALE: 3/8"=1'-0"



SECTION D-D

TYPICAL ARRANGEMENT OF TIES FROM EL.+37.331' TO EL.+62.475'

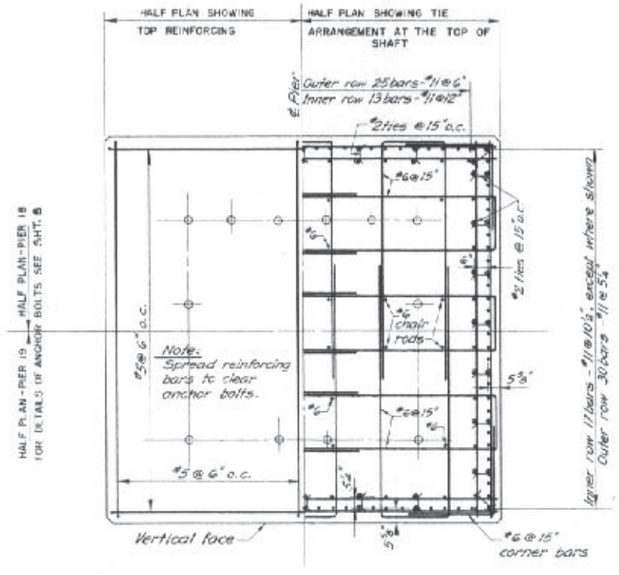
SCALE: 3/8"=1'-0"



SECTION E-E

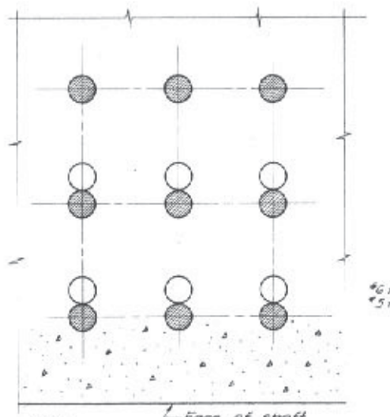
TYPICAL ARRANGEMENT OF TIES FROM EL.+62.475' TO EL.+87.0'

SCALE: 3/8"=1'-0"



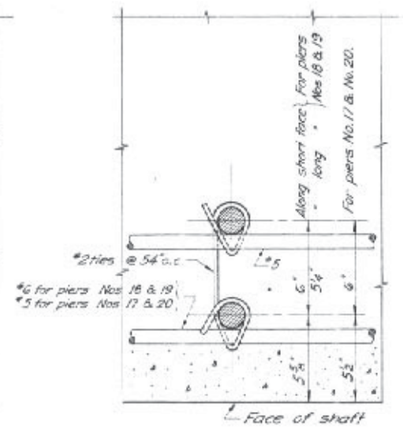
SECTION F-F

SCALE: 3/8"=1'-0"



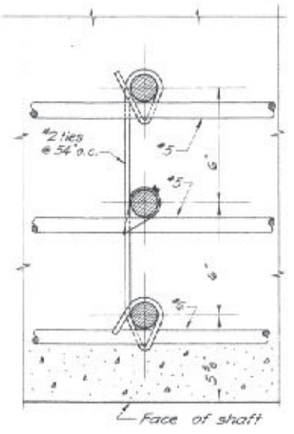
TYPICAL LAP DETAIL OF VERTICAL BARS

SCALE: 3"=1'-0"



DETAIL X

SCALE: 3"=1'-0"



DETAIL Y

SCALE: 3"=1'-0"

NO.	REVISION	DATE	BY

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 18 & 19 - SHAFT SECTIONS

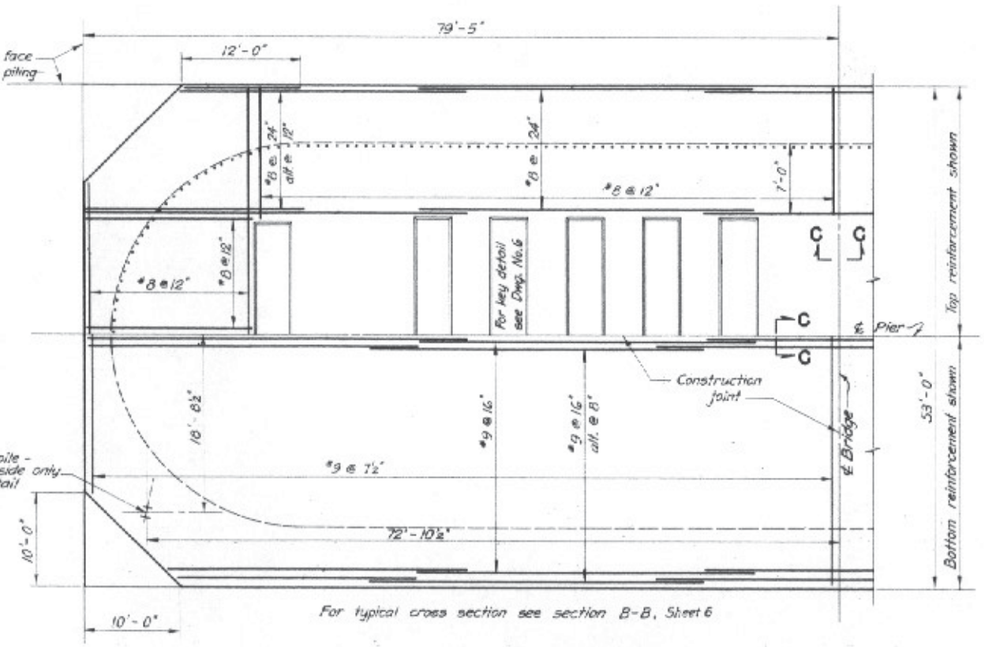
GEORGE S. RICHARDSON
CONSULTING ENGINEER — PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: W.J.A.
TRACED BY: S.P.
CHECKED BY: N.K.
SCALE: As shown DATE: 6-1-54

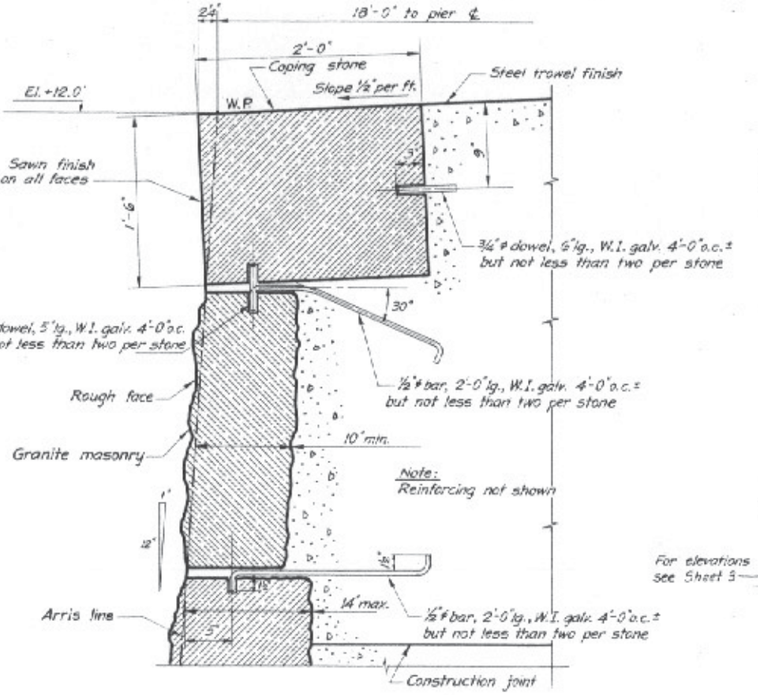
CONTRACT PN 1
DWG. NO. DRB-1
SHEET 7 OF 11



For typical cross section see section B-B, Sheet 6

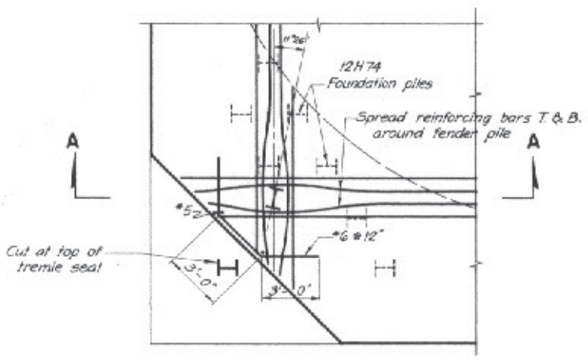
BASE SLAB REINFORCING DETAILS

SCALE: 1/8"=1'-0"



TYPICAL DETAIL OF STONE ANCHORAGE

SCALE: 1½"=1'-0"



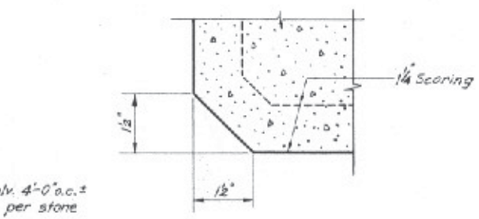
PLAN

For location of fender 12 H 74 pile see "Base slab reinforcing details."

SECTION A-A

DETAIL OF FENDER PILE SUPPORT

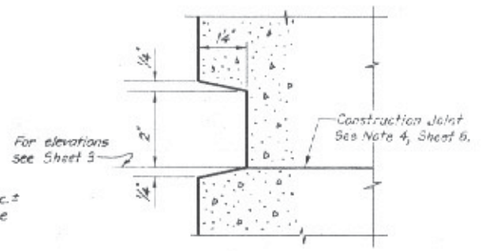
SCALE: 1/4"=1'-0"



CORNER DETAIL

1½" bevel all four corners each shaft

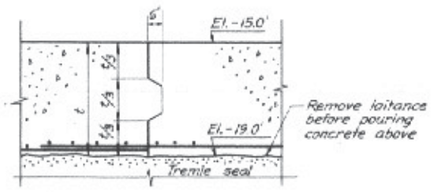
SCALE: 1/2"=1"



SECTION X-X

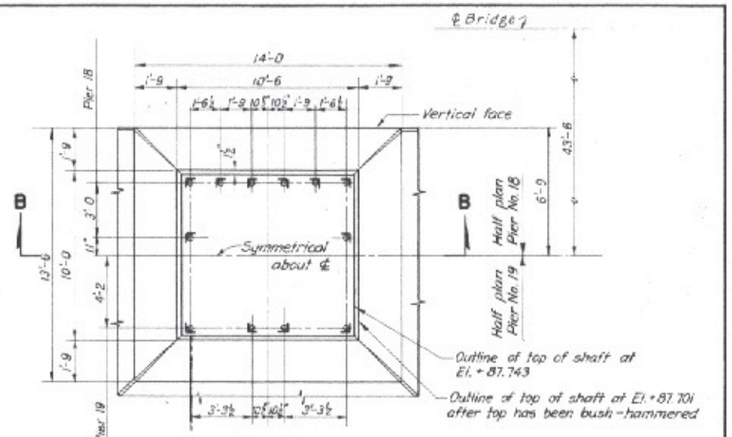
DETAIL OF SCORING

SCALE: 1/2"=1"

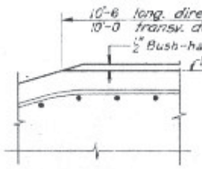


SECTION C-C

SCALE: 3/8"=1'-0"

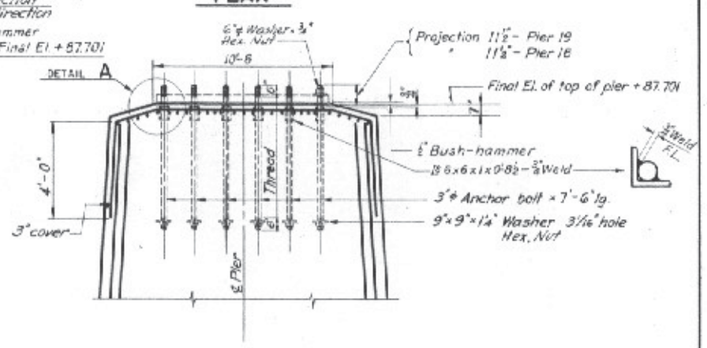


PLAN



DETAIL A

SCALE: 1"=1'-0"

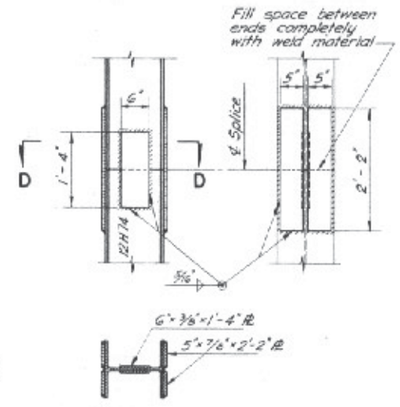


SECTION B-B

Note: Provide template for positioning of anchor bolts. Drawing showing details to be submitted to Consulting Engineer for approval.

ANCHOR BOLT DETAIL

SCALE: 1/4"=1'-0"



SECTION D-D

TYPICAL PILE SPLICE DETAIL

SCALE: 3/4"=1'-0"

NOTES

1. For general notes & details above El. -15.0' see Sheet 6.
2. Following specifications shall be used: For Anchor Bolts and Nuts - ASTM - Designation A 307. For Washers - ASTM - Designation A 7.
3. Concrete areas at all shoe locations ½" above final top of pier elevations as indicated on details. After concrete has set, bush-hammer in accordance with the Supplemental Specifications.

NO.	REVISION	DATE	BY
2	Changed Dimensions at Top of Piers	1-19-55	D.P.W.
1	Angle Lugs Added to Anchor Bolts	7-27-54	D.P.W.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

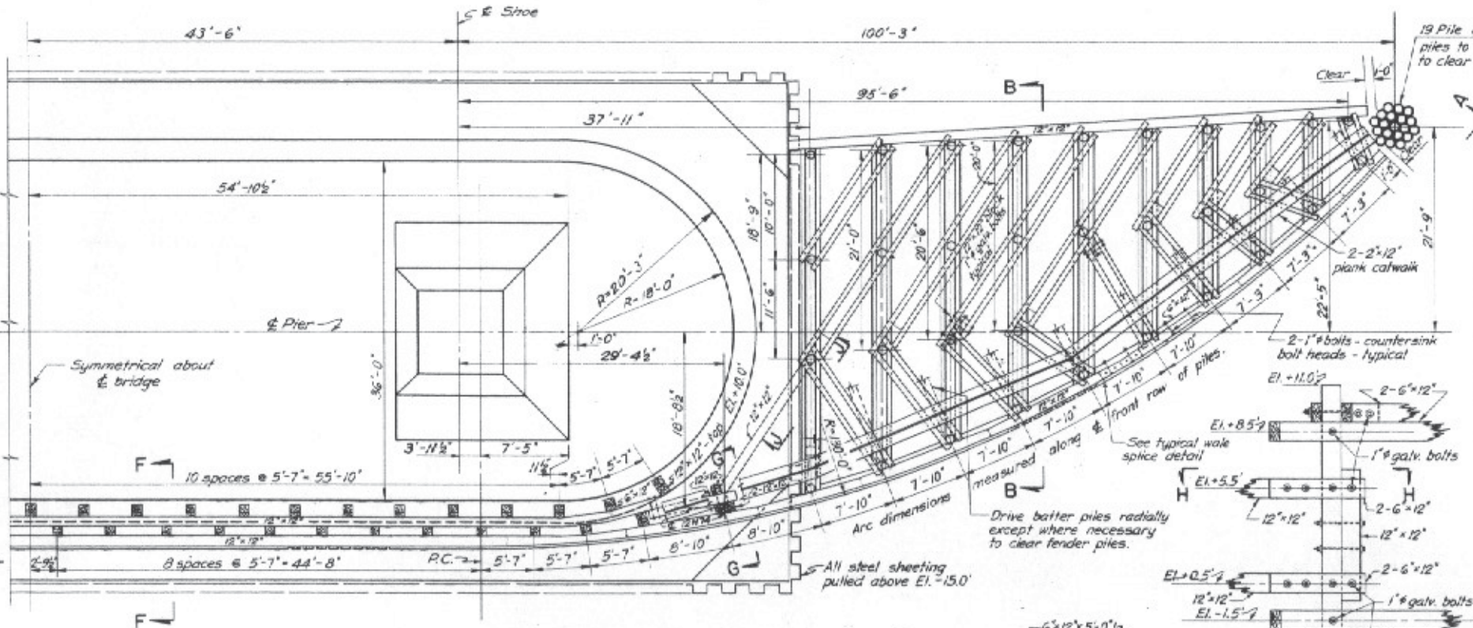
PIER Nos. 18 & 19 - MISCELLANEOUS DETAILS

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N.Y. ASSOCIATES
HARBESON, HOUGH LIVINGSTON & LARSON, PHILADELPHIA, PENNA. ARCHITECTS

DRAWN BY: S.P.
TRACED BY: S.P.
CHECKED BY: N.K.
SCALE: AS SHOWN DATE: 4-1-54

CONTRACT PN 1
DWG. NO. DRB-1
SHEET 8 OF 11

M.P.M. & R. FILE No. 1443



HALF PLAN OF FENDER SYSTEM

FOR PIERS Nos. 18 & 19

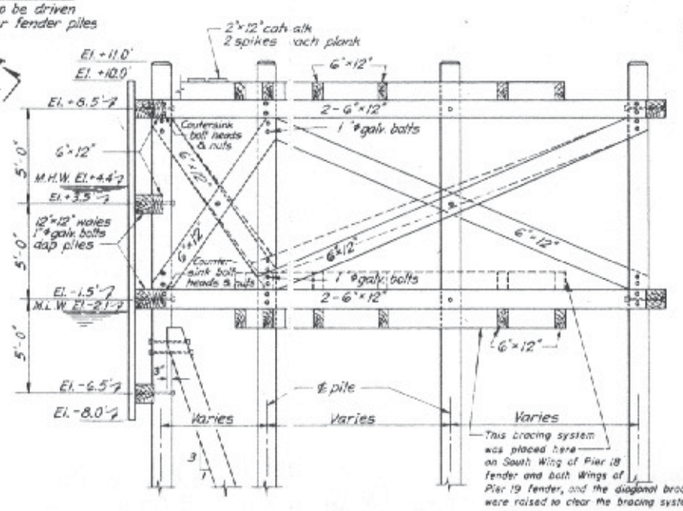
SCALE 1/8"=1'-0"

SECTION J-J

SCALE: 1/4"=1'-0"

SECTION H-H

SCALE: 1/4"=1'-0"

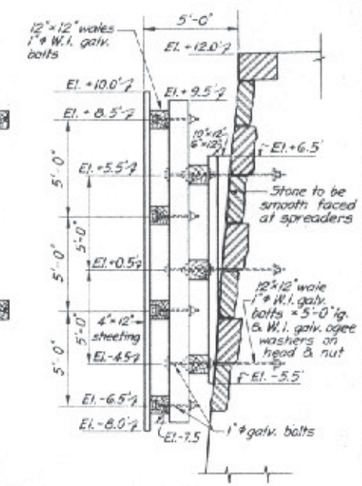


SECTION B-B

SCALE 1/4"=1'-0"

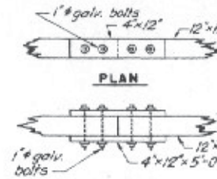
This bracing system was placed here on South Wing of Pier 18 fender and both Wings of Pier 19 fender, and the diagonal braces above were raised to clear the bracing system in its new location.

North Wing of Pier 18 fender was built as designed.



SECTION F-F

SCALE: 1/4"=1'-0"

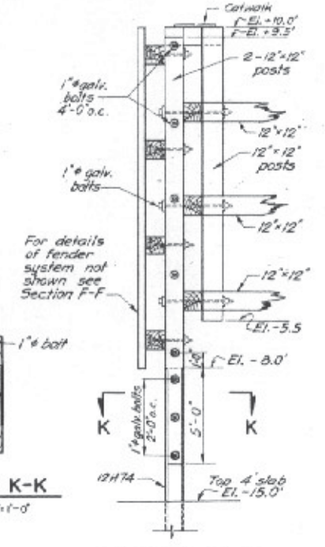


TYPICAL WALE SPLICE

SCALE: 1/4"=1'-0"

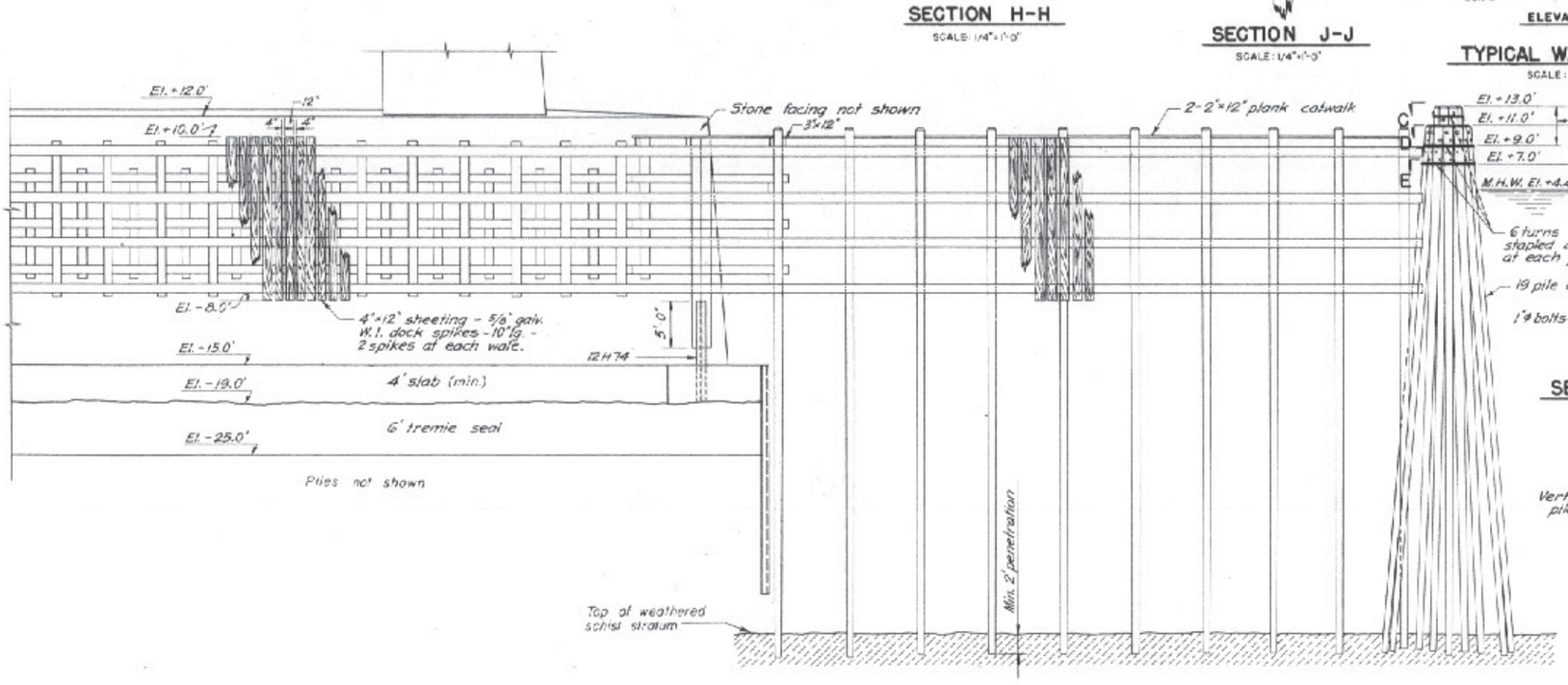
NOTES

1. All spikes, bolts, drifts pins, washers and hardware to be W.I. galvanized.
2. All bolts to be 1"ø unless otherwise shown.
3. Bolts to have sq. heads and ogee washers each end.
4. All piles and other timber shall be treated Southern Yellow Pine.
5. All piles for fender system and dolphin to be driven into weathered schist stratum to at least 2 ft. penetration in same.



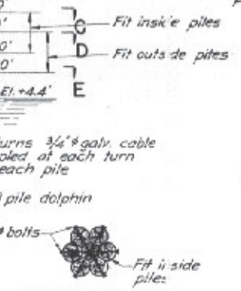
SECTION G-G

SCALE: 1/4"=1'-0"



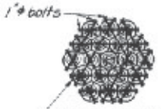
ELEVATION A-A

SCALE: 1/8"=1'-0"



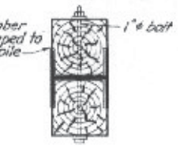
SECTION C-C

SCALE: 1/4"=1'-0"



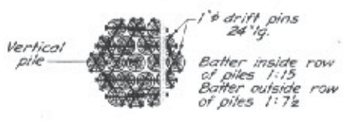
SECTION D-D

SCALE: 1/4"=1'-0"



SECTION K-K

SCALE: 3/4"=1'-0"



SECTION E-E

SCALE: 1/4"=1'-0"

NO.	REVISION	DATE	BY
1	"As Built" Revisions On Sect. B-B, changed vertical and horizontal bracing on Wings	4-10-57	B.B.W.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

FENDER SYSTEM FOR PIER Nos. 18 & 19

GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

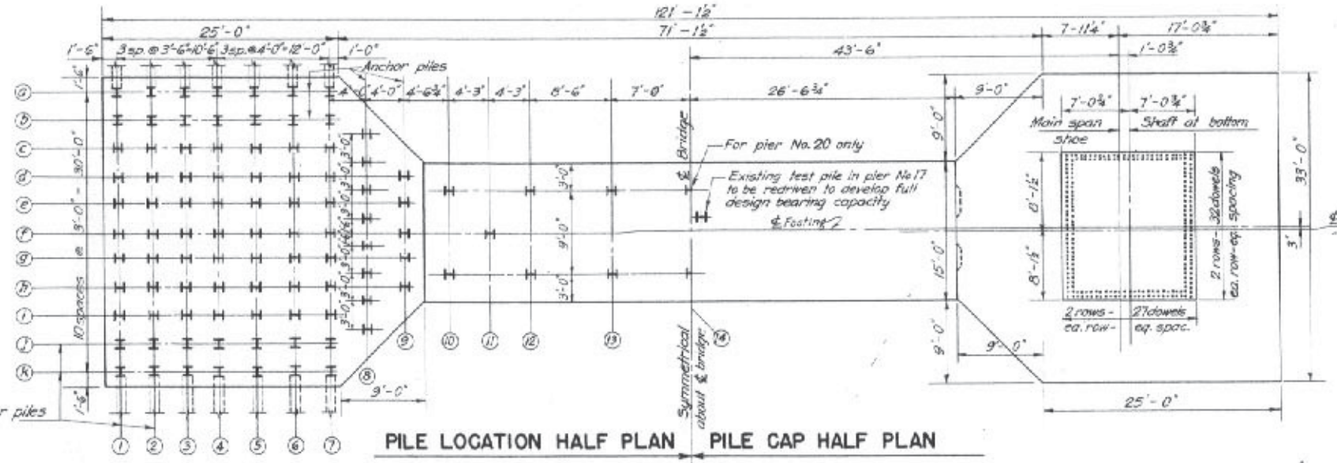
MORAN, PROCTOR, MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

HARBESON, HOUGH, LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

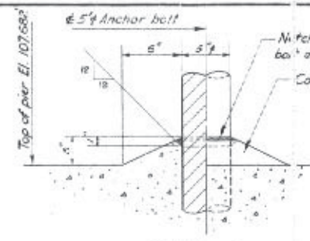
DRAWN BY: L.S.
TRACED BY: S.P.
CHECKED BY: N.K.
SCALE: As shown DATE: 6-1-56

CONTRACT PN 1
DWG. NO. DRB-1
SHEET 9 OF 11

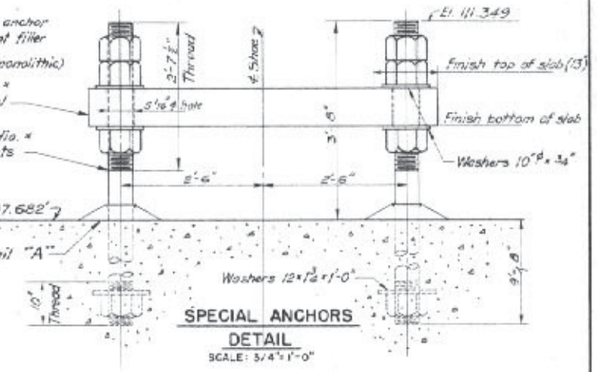
M.P.M. & R. FILE No. 1443



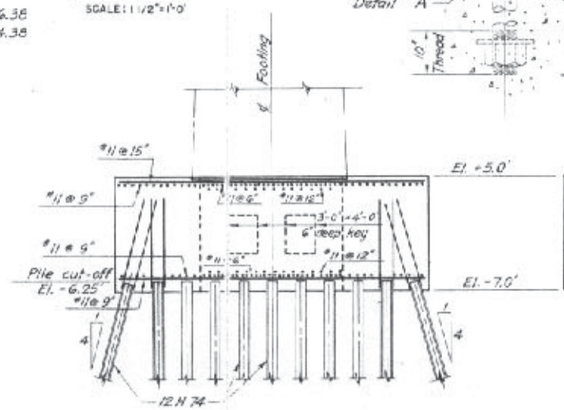
PILE LOCATION HALF PLAN | PILE CAP HALF PLAN



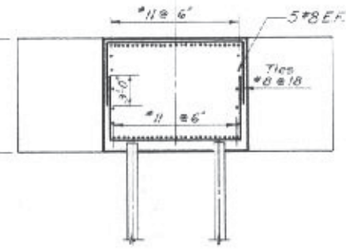
DETAIL A
SCALE: 1 1/2"=1'-0"



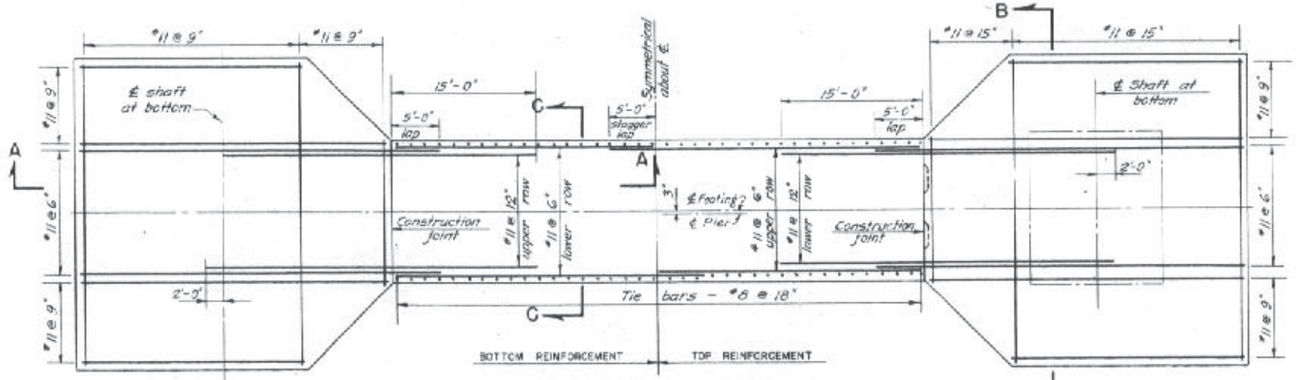
SPECIAL ANCHORS DETAIL
SCALE: 3/4"=1'-0"



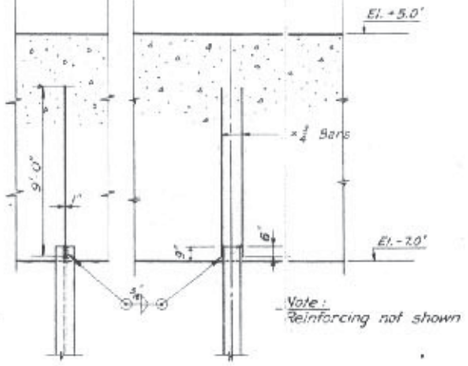
SECTION B-B

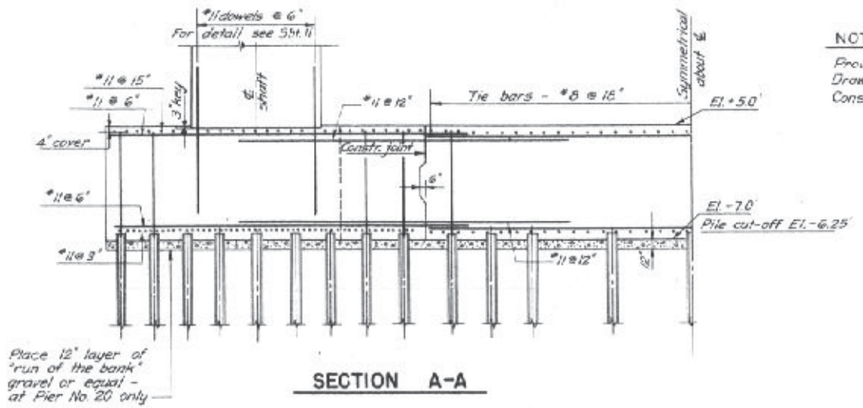


SECTION C-C



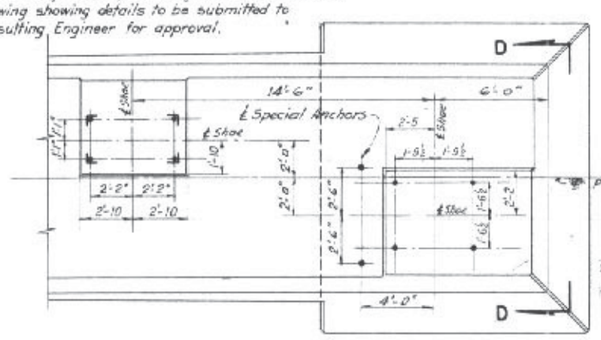
PLAN PILE CAP REINFORCEMENT





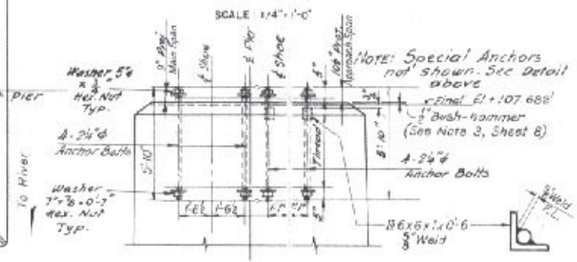
SECTION A-A

NOTE:
Provide template for positioning of all anchor bolts. Drawing showing details to be submitted to Consulting Engineer for approval.



PLAN

DETAIL OF ANCHOR PILE
FOR ALL PILES IN ROWS C, D, J, K, 1, 2, 8, 9 & 10
SCALE: 1/4"=1'-0"



ELEVATION D-D

ANCHOR BOLT DETAIL
SCALE: 1/4"=1'-0"

NOTES

1. For general notes see Sheet 6.
2. For details above El. +5.0' see Sheet 11.
3. 12 H 74 piles shall be driven to 100 tons capacity using Engineering News Formula. See also Art. 4.7.02 of Specs.
4. For pile splice detail see Sheet 6.
5. Following specifications shall be used: For anchor bolts & nuts - ASTM, designation A 307; For washers - ASTM, designation A 7; For silicon slab - ASTM, designation A 94; For special anchors - ASTM, designation A 6 - 52a T or equivalent; For nuts for special anchors - ASTM, designation A 194, Grade 1 or 2 H.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 17 & 20
PILE PLAN & FOOTING DETAILS

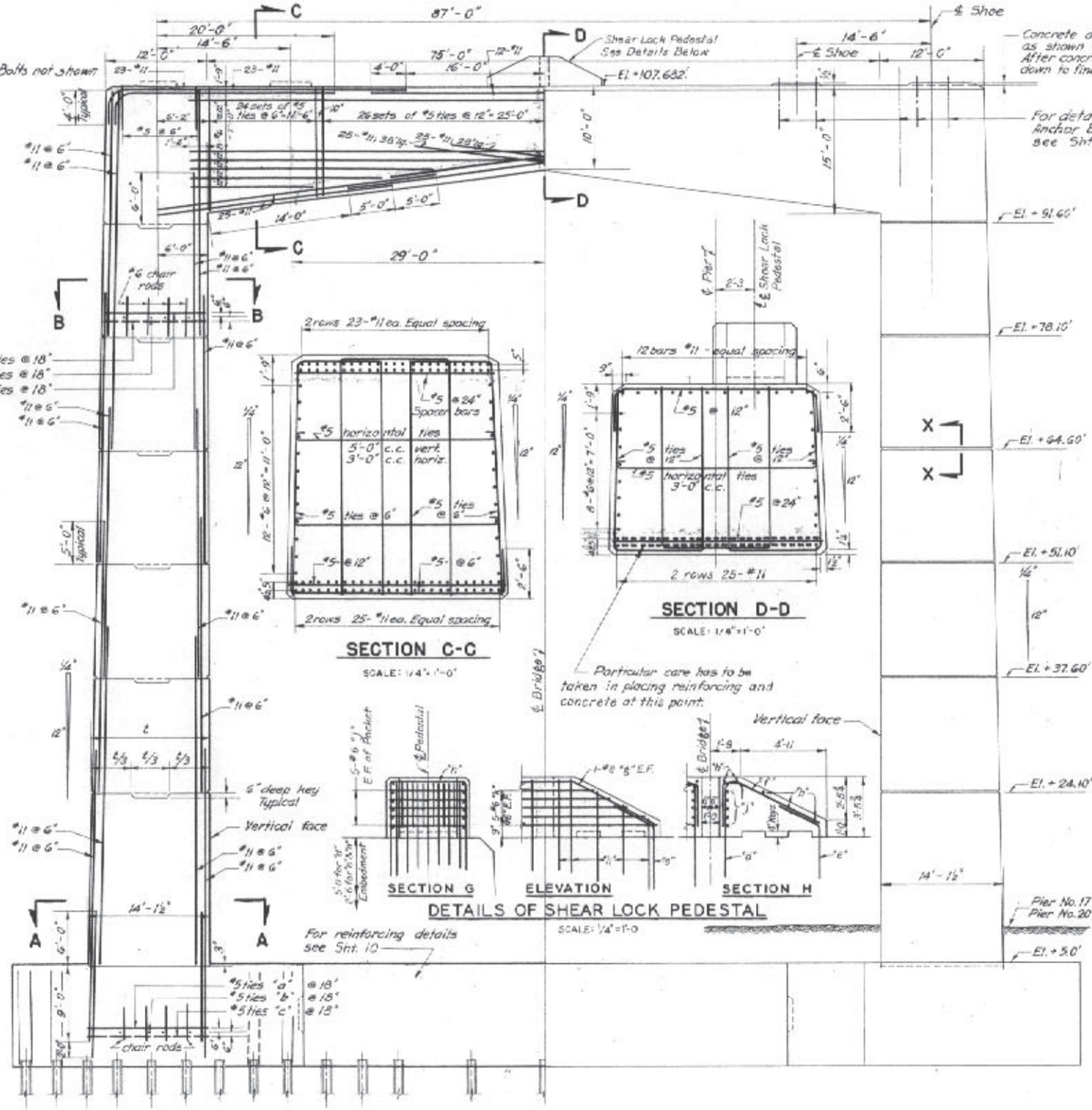
GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. ASSOCIATES
HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA., ARCHITECTS

NO.	REVISION	DATE	BY
1	Anchor bolts Revised	7-27-54	D.P.W.

DRAWN BY: W.J.A.
TRACED BY: A.S.
CHECKED BY: M.K.
SCALE: 1/8"=1'-0" DATE: 4-1-54

CONTRACT PN 1
DWG. NO. D.R.B.-1
SHEET 10 OF 11

M.P.M. & R. FILE No. 1443



NOTES

1. For general notes see Sheet 8.
2. For corner detail & detail of scoring on shafts see Sheet 8.
3. For foundation detail see Sht. 10
4. For anchor bolt details see Sht. 10

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 17 & 20-SHAFT DETAILS

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N.Y., ASSOCIATES
HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA., ARCHITECTS

NO.	REVISION	DATE	BY
1	Added Shear Lock Pedestal	7-27-54	O.P.U.

DRAWN BY: W.J.A.
TRACED BY: A.S.
CHECKED BY: N.K.
SCALE: As Shown DATE: 6-1-54

CONTRACT PN 1
DWG. NO. DRB-1
SHEET 11 OF 11

M.P.M. & R. FILE No. 1443

DELAWARE RIVER BRIDGE

SUBSTRUCTURE CONSTRUCTION

PIERS 21-30
AND
EAST ABUTMENT

PENNSYLVANIA TURNPIKE COMMISSION

THOMAS J. EVANS, CHAIRMAN
JAMES F. TORRANCE, SECRETARY AND TREASURER
DAVID E. WATSON, COMMISSIONER
EDWARD L. SCHMIDT, SECRETARY OF HIGHWAYS (EX OFFICIO)

NEW JERSEY TURNPIKE AUTHORITY

PAUL L. TROAST, CHAIRMAN
GEORGE F. SMITH, VICE CHAIRMAN
MAXWELL LESTER, JR., TREASURER

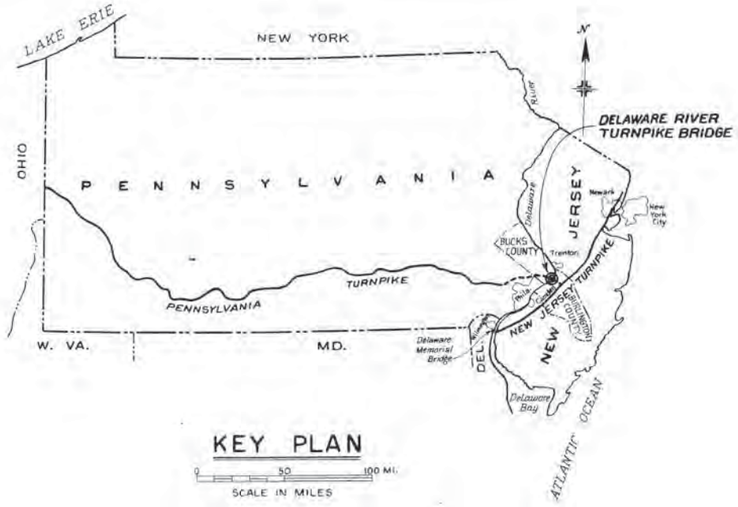
DELAWARE RIVER TURNPIKE BRIDGE

BUCKS COUNTY, PENNSYLVANIA AND BURLINGTON COUNTY, NEW JERSEY

DRAWINGS FOR CONTRACT PN 3

From Sta. 691+00 to Sta. 713+30
Length 2230.00 Feet 0.42 Miles

SUBSTRUCTURE

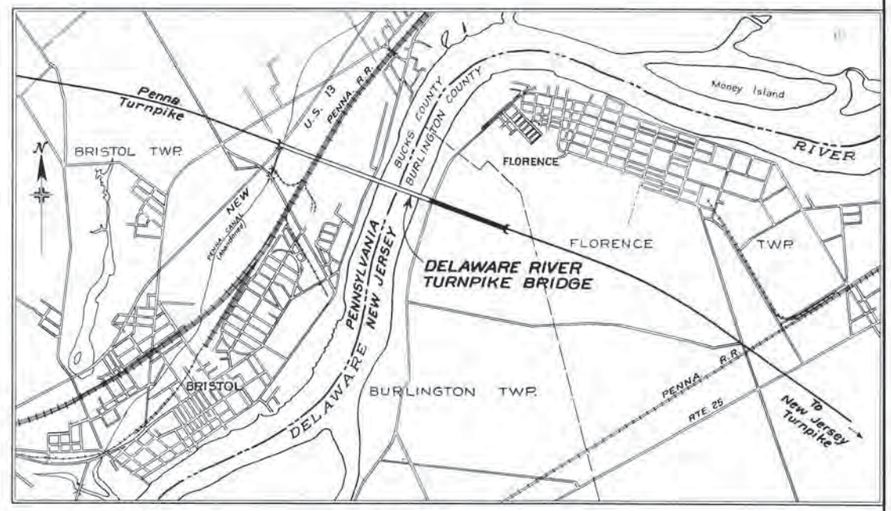


KEY PLAN
0 50 100 MI.
SCALE IN MILES

INDEX OF DRAWINGS

CONTRACT DRAWINGS DRB-3	
SHEET	TITLE
1	Title Sheet
2	Site Plan & Elevation
3	Piers Nos. 21 & 22
4	Pier Nos. 23 & 24
5	Pier Nos. 25 & 26
6	Pier No. 27
7	Pier Nos. 28, 29 & 30
8	East Abutment - Plan & Elevations
9	East Abutment - Sections & Details
10	Miscellaneous Details

REFERENCE DRAWINGS DRB-10	
SHEET	TITLE
1	Geological Section – Pennsylvania Side
2	Geological Section – New Jersey Side
3	Geological Cross Sections
4	Boring Logs
5	" "
6	" "
7	" "
8	" "
9	" "
10	Test Pile Details
11	Test Pile Results



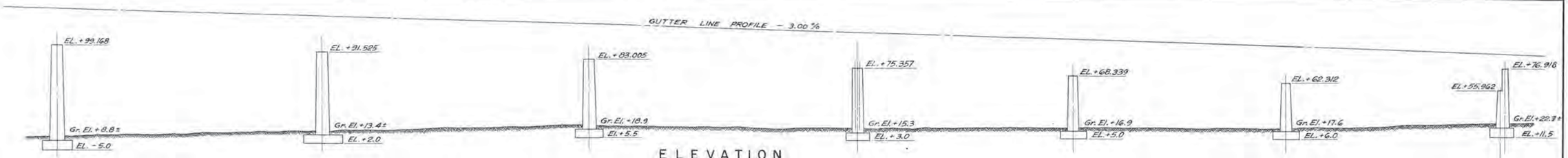
PROJECT PLAN
0 500 1000 2000 4000 6000 8000 10,000
SCALE IN FEET

RECOMMENDED George S. Richardson DATE APRIL 26 1954
GEORGE S. RICHARDSON, CONSULTING ENGINEER
PA. P.E. 3562, N.J. P.E. 7767

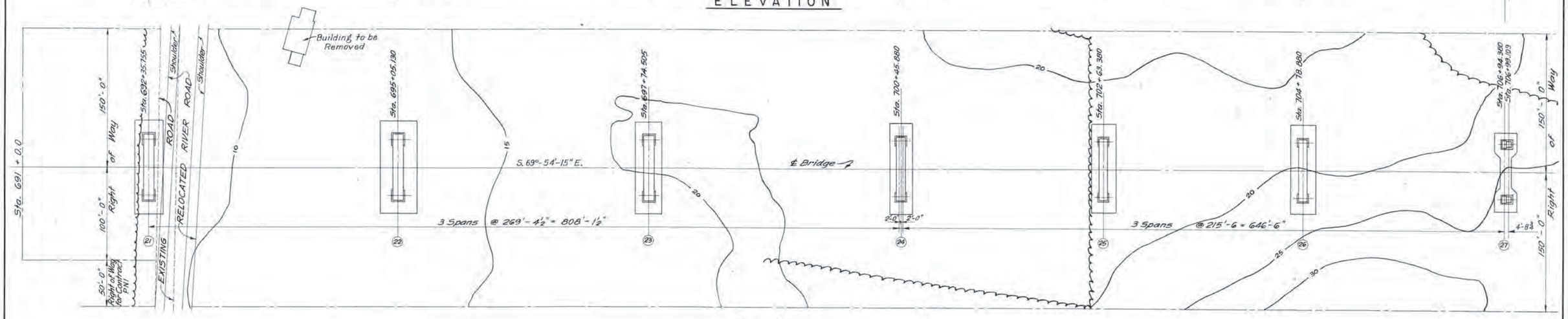
APPROVED Charles M. Noble DATE Apr. 27 1954
CHIEF ENGINEER, NEW JERSEY TURNPIKE AUTHORITY

RECOMMENDED April 27 1954
R.B. Stone
CHIEF ENGINEER, PENNSYLVANIA TURNPIKE COMMISSION

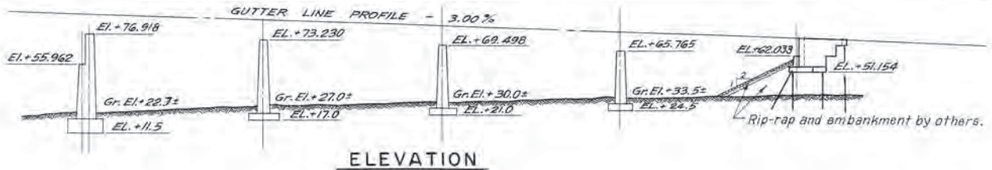
APPROVED April 27 1954
PENNSYLVANIA TURNPIKE COMMISSION
ATTEST James F. Torrance
SECRETARY AND TREASURER



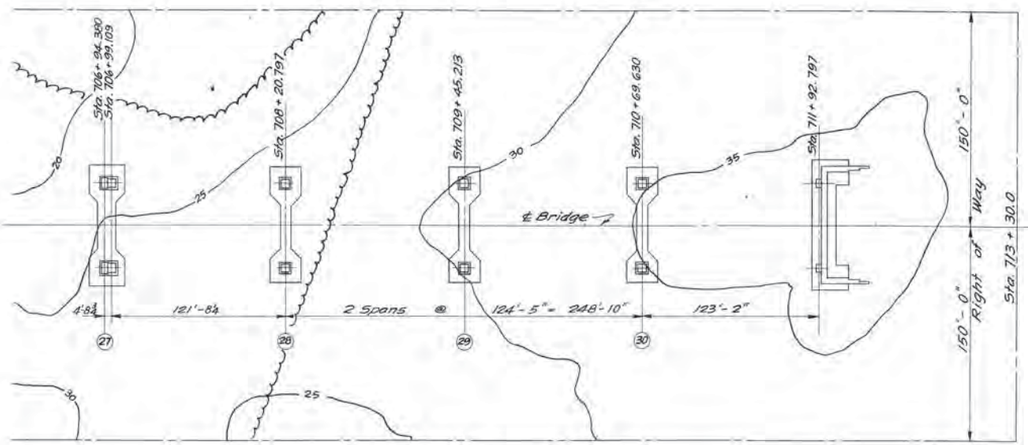
ELEVATION



PLAN



ELEVATION



PLAN

GENERAL NOTES

1. All elevations refer to U.S.C. & G.S. sea level datum 1929. Mean tidal heights, at 11,800 sec. ft. mean annual fresh water flow at Trenton, are approximately as follows: L.W. = –2.1 H.W. = +4.4. Extreme L.W. = –7.4 on Jan. 25, 1945 Extreme H.W. = +9.1 on Aug. 24, 1933. (Above observations made by Corps of Engineers).
2. Stationing according to Pennsylvania Turnpike Commission
3. For boring data see Reference Dwg. DRB-10, Sheets 4 to 9 incl.

NO.	REVISION	DATE	BY
2	Girder Brg. Pier 27 Changed	10-26-54	D.P.U.
1	Revised Top of Abutment & Bearing Added	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

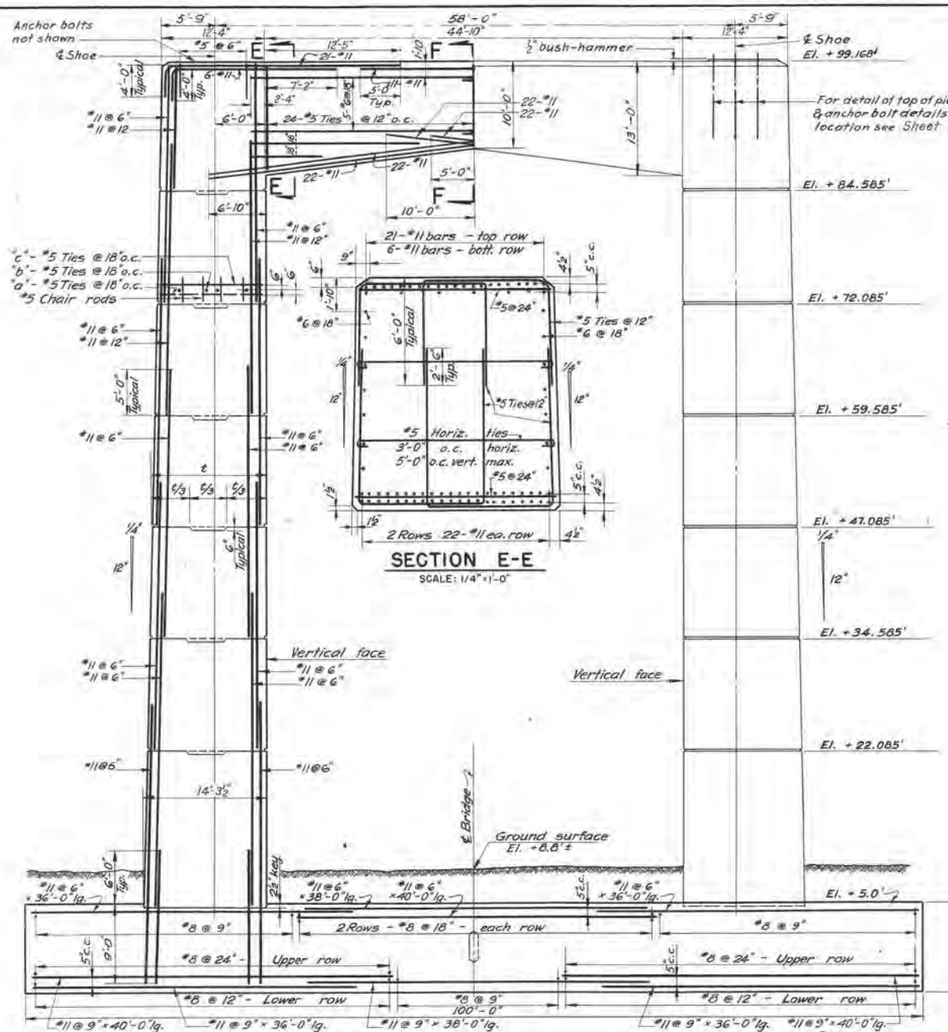
SITE PLAN & ELEVATION

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y.
HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA., ARCHITECTS
ASSOCIATES

DRAWN BY: S.P.
TRACED BY: A.S.
CHECKED BY: N.K.
SCALE: 1" = 50" DATE: 4-1-54

CONTRACT PN 3
DWG. NO. DRB-3
SHEET 2 OF 10

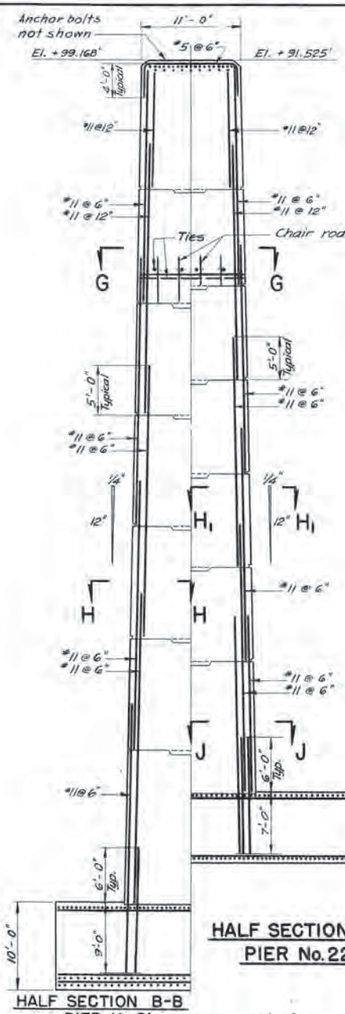
M.P.M. & R. FILE No. 1443



SECTION E-E
SCALE: 1/4"=1'-0"

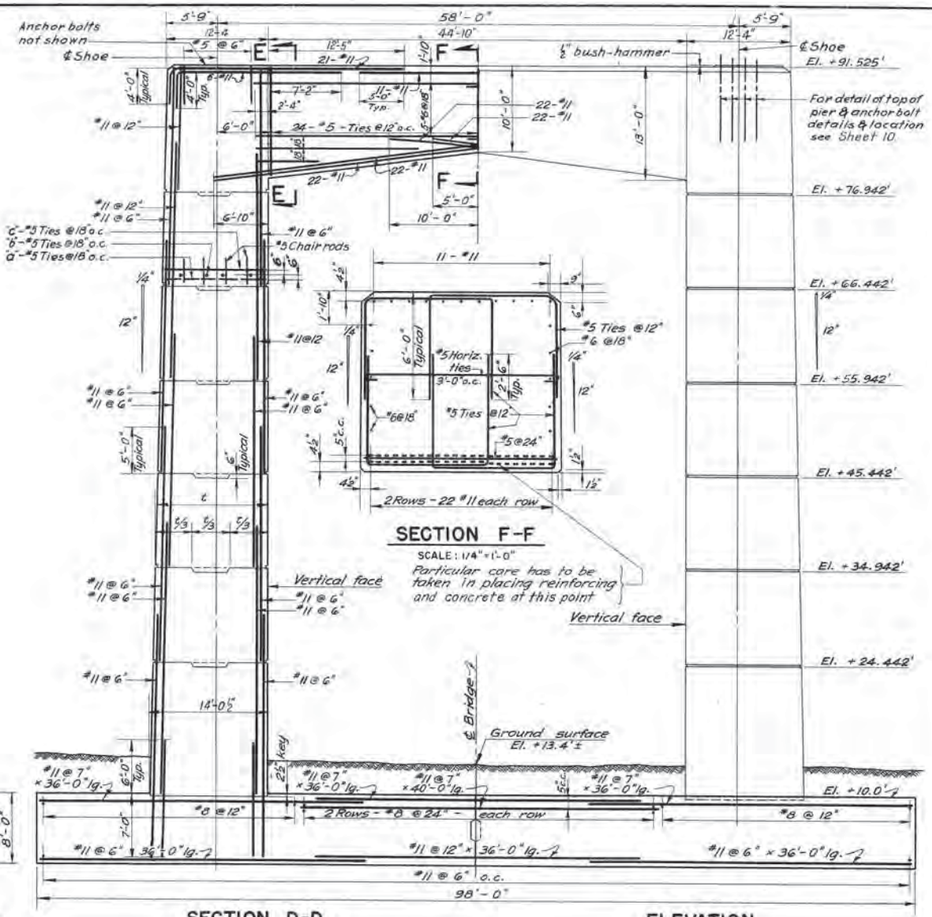
SECTION A-A

ELEVATION



HALF SECTION C-C
PIER No. 22

HALF SECTION B-B
PIER No. 21



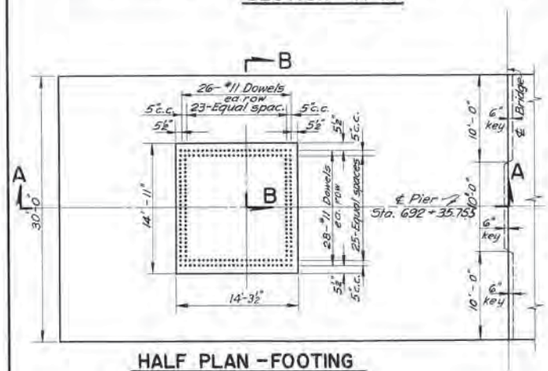
SECTION F-F
SCALE: 1/4"=1'-0"

SECTION D-D

ELEVATION

GENERAL NOTES

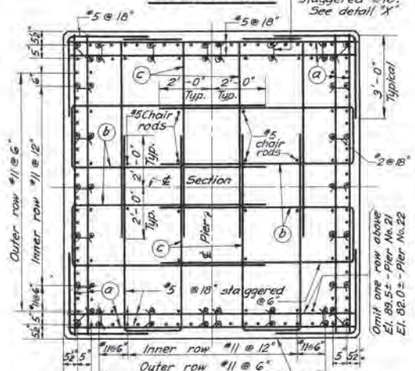
1. Maximum bearing on soil used in design: 6 ½ for Dead & Live loads; 7.5 ½ for Dead & Live & Wind loads.
2. All concrete to be controlled concrete having a compressive strength of 3000 psi. at 28 days (Class A).
3. Unless otherwise noted cover over reinforcing bars to be 3". Minimum length of lapped splices shall be 40 bar dia. unless otherwise shown.
4. Reinforcing bars to be deformed bars (ASTM-A305), billet steel of intermediate grade (ASTM-A15).
5. Front elevations of piers are drawn looking east.
6. For corner detail & detail of scoring on shafts see Sheet 10.
7. For anchor bolt details see Sheet 10.
8. If the Contractor so elects, and subject to the approval of the Engineer, dummy joints may be substituted for the construction joints shown in the pier shafts. See Detail of Scoring, Sheet 10.



HALF PLAN - FOOTING

PIER No. 21

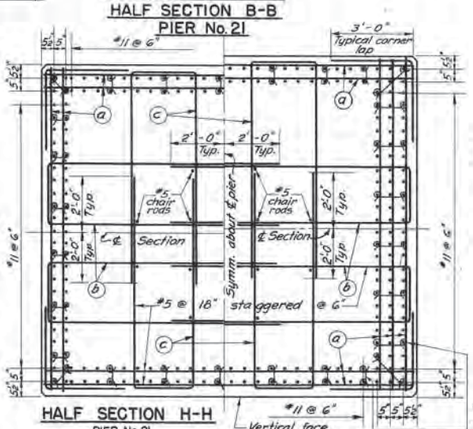
SCALE: 1/8"=1'-0"



SECTION G-G

TYPICAL ARRANGEMENT OF TIES
PIER No. 21 - FROM EL. +59.585' TO EL. +97.0'±
PIER No. 22 - FROM EL. +55.942' TO EL. +89.0'±

SCALE: 3/8"=1'-0"

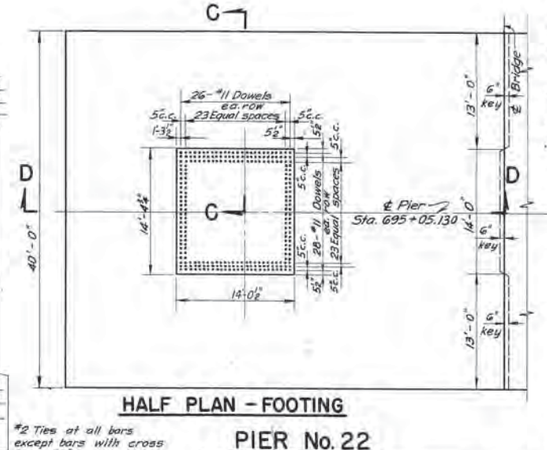


HALF SECTION H-H
PIER No. 21
TIES FROM EL. -1.00' TO EL. +59.585'

HALF SECTION H1-H1
PIER No. 22
SIMILAR OPPOSITE HAND
TIES FROM EL. +24.442' TO EL. +55.9'

HALF SECTION J-J
PIER No. 22
TYPICAL ARRANGEMENT OF TIES FROM EL. +5.00' TO EL. +24.442'

SCALE: 3/8"=1'-0"



HALF PLAN - FOOTING

PIER No. 22

#2 Ties at all bars except bars with cross ties, 54" o.c. vertically, staggered @ 18" o.c. See details "X" & "Y". Omit below El. +10.00.

NO.	REVISION	DATE	BY
1	Width of shafts and affected dimensions changed	11-5-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 21 & 22

GEORGE S. RICHARDSON
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ASSOCIATES

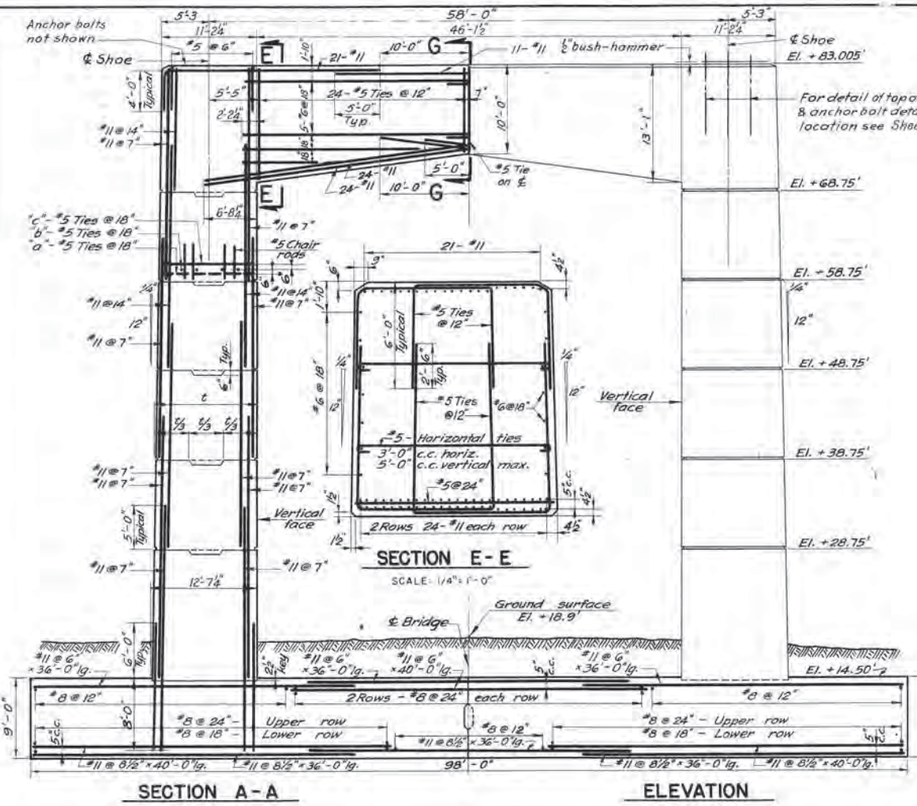
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

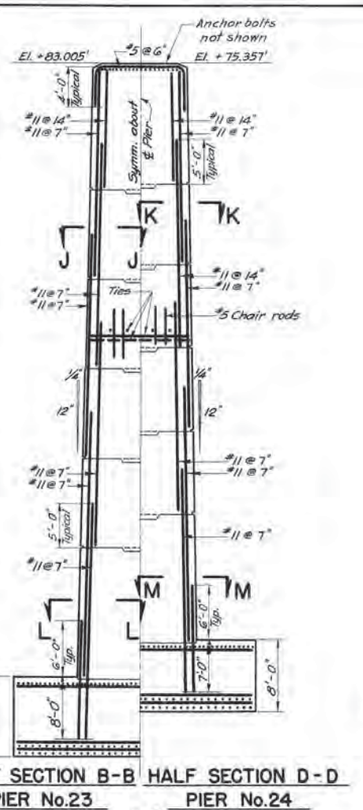
DRAWN BY: W. J. A.
TRACED BY: S. P. & A. S.
CHECKED BY: N. H.
SCALE: AS NOTED DATE: 4-1-54

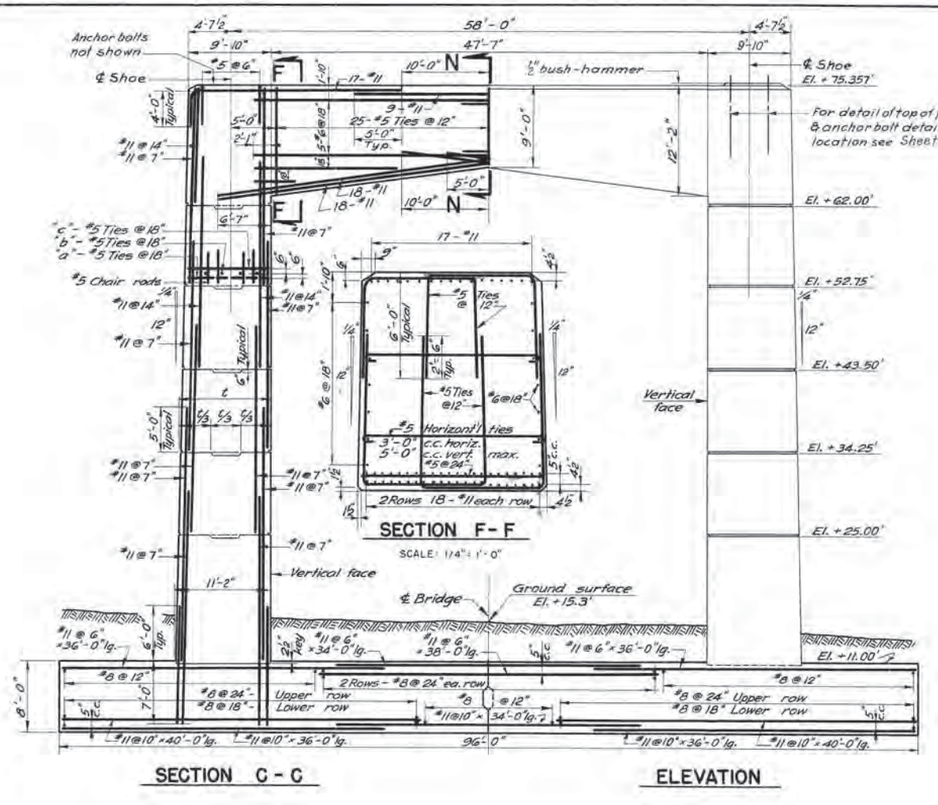
CONTRACT PN 3
DWG. NO. DRB-3
SHEET 3 OF 10

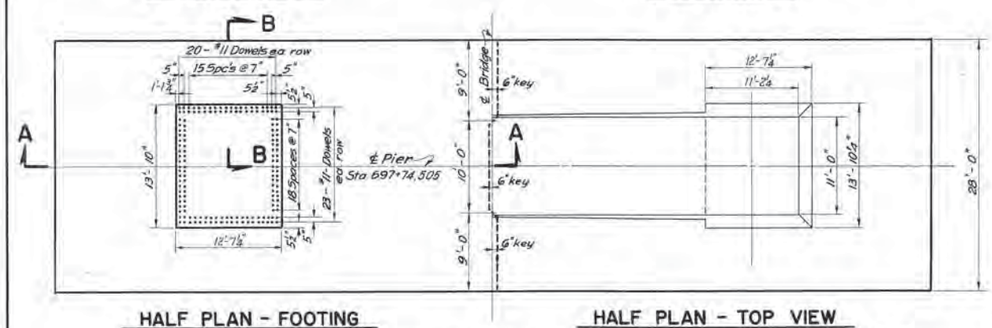
PR 1797-853

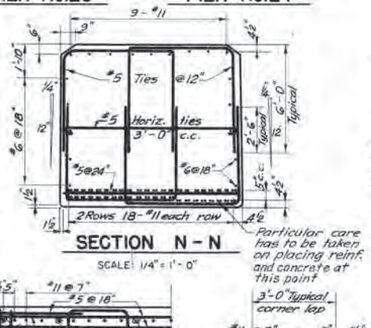
M.P.M. & R. FILE No. 1443

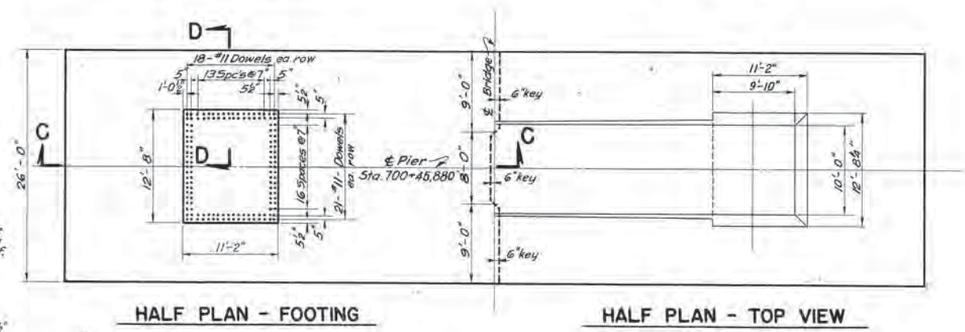


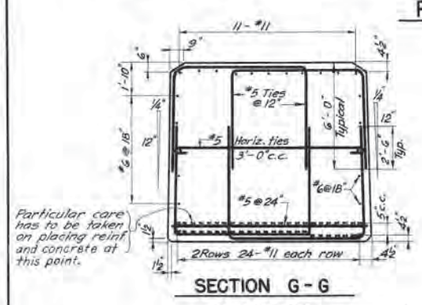






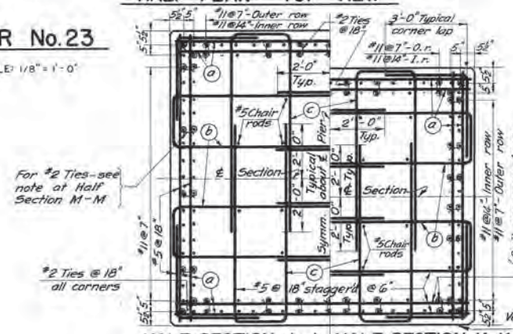


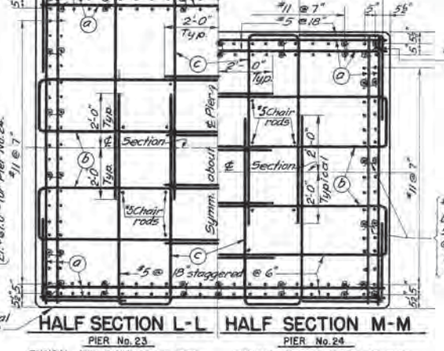




PIER No.23

SCALE: 1/8" = 1'-0"





PIER No.24

SCALE: 1/8" = 1'-0"

NOTE

1. For General Notes see Sheet 3.

NO.	REVISION	DATE	BY
1	Width of shafts and affected dimensions changed	11-5-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 23 & 24

GEORGE S. RICHARDSON
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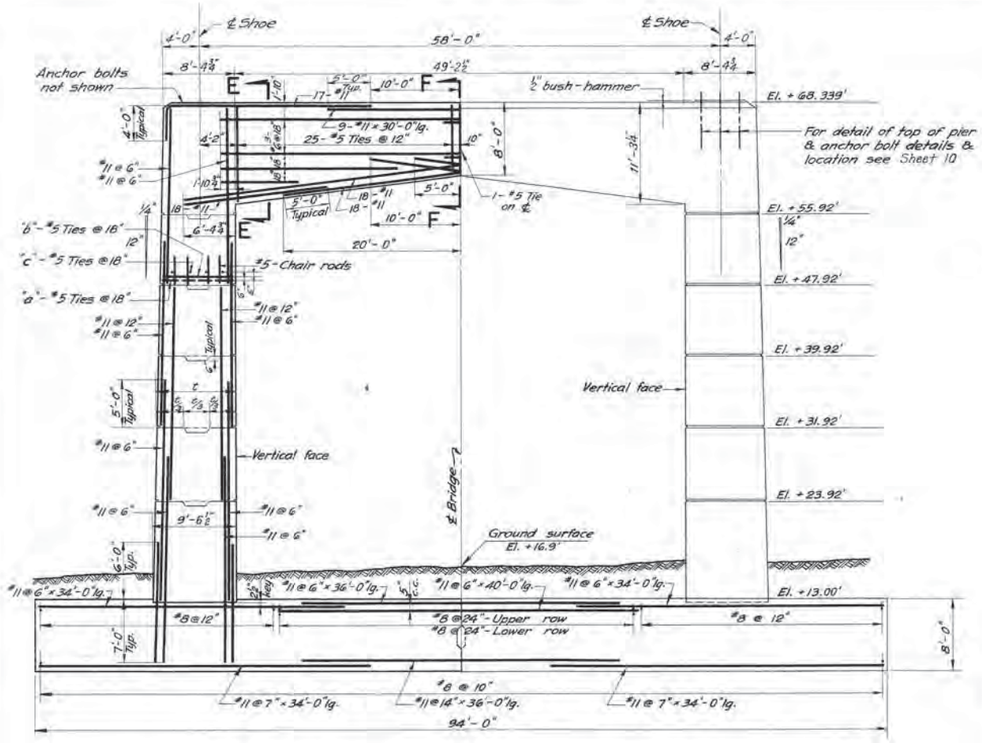
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

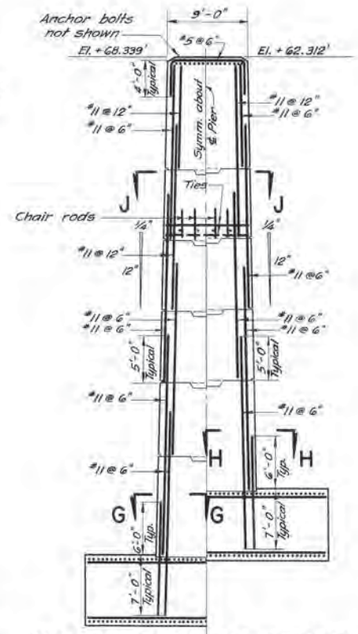
DRAWN BY: W.J.A. & L.S.
TRACED BY: G.H. & A.S.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 3
DWG. NO. DRB-3
SHEET 4 OF 10

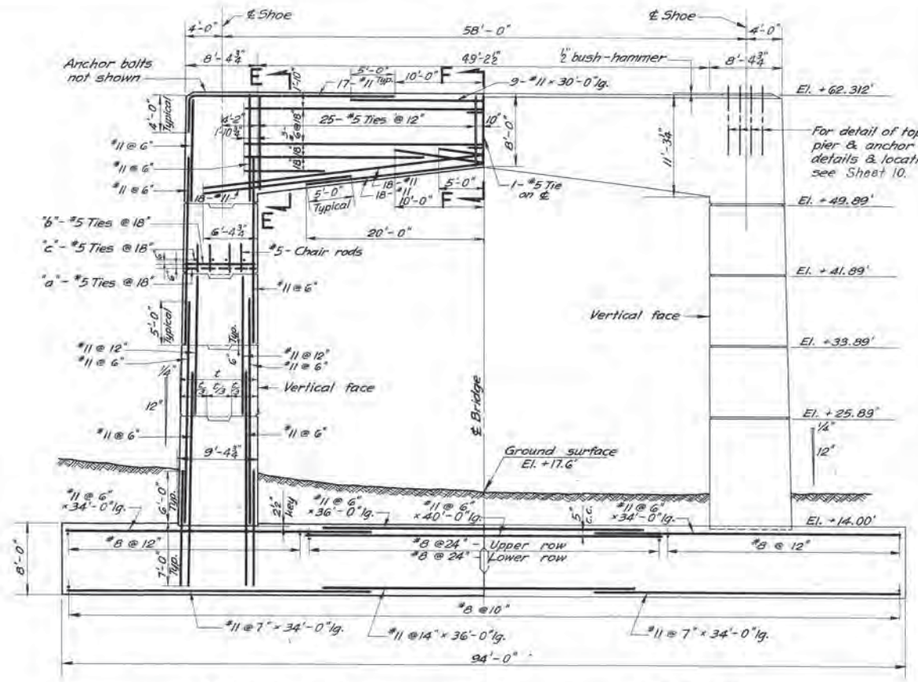
M.P.M. & R. FILE No. 1443



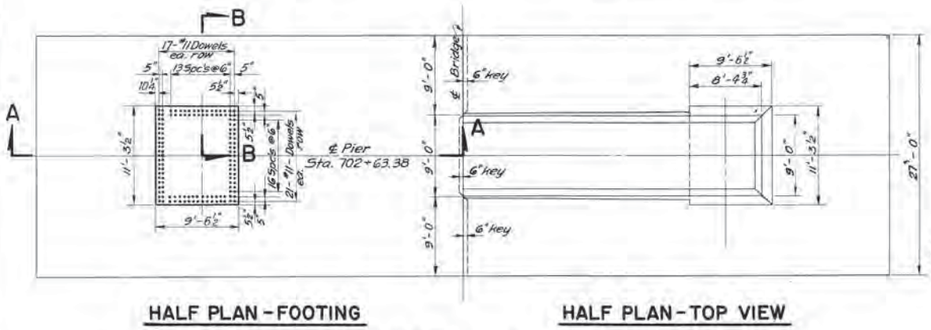
SECTION A-A ELEVATION



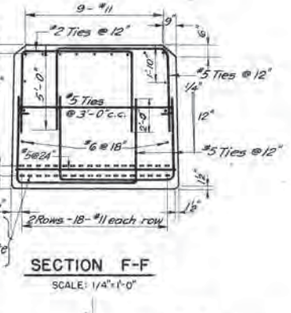
HALF SECTION B-B PIER No.25 HALF SECTION C-C PIER No.26



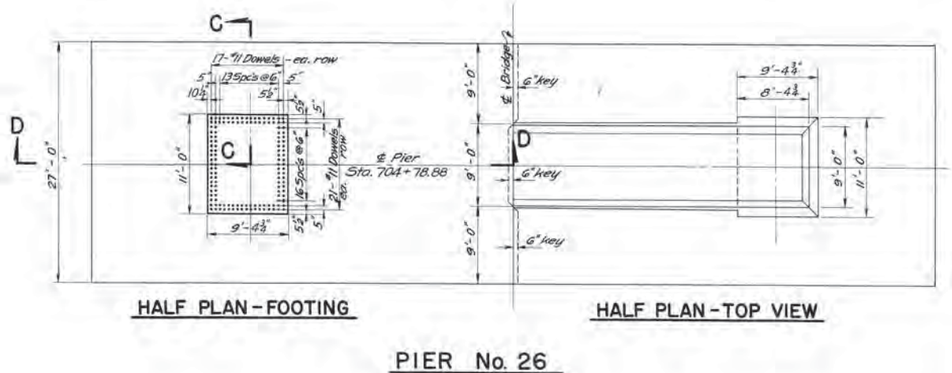
SECTION D-D ELEVATION



HALF PLAN-FOOTING HALF PLAN-TOP VIEW



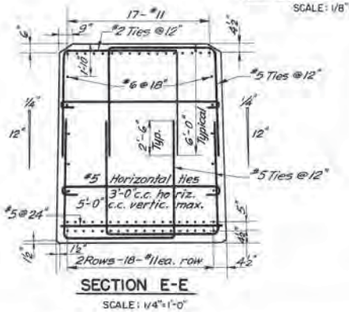
SECTION F-F
SCALE: 1/4"=1'-0"



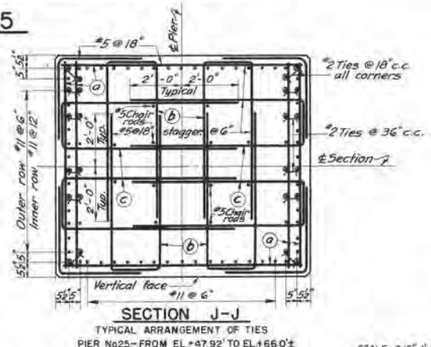
HALF PLAN-FOOTING HALF PLAN-TOP VIEW

PIER No. 26
SCALE: 1/8"=1'-0"

PIER No. 25
SCALE: 1/8"=1'-0"

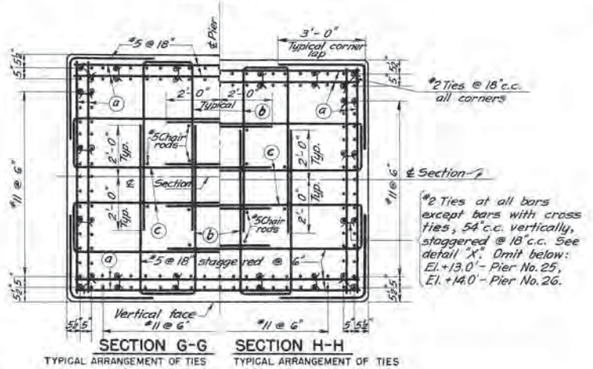


SECTION E-E
SCALE: 1/4"=1'-0"



SECTION J-J
TYPICAL ARRANGEMENT OF TIES
PIER No.25-FROM EL.+47.92' TO EL.+66.0'±
PIER No.26-FROM EL.+41.89' TO EL.+60.0'±

SCALE: 3/8"=1'-0"



SECTION G-G
TYPICAL ARRANGEMENT OF TIES
FROM EL+8.0' TO EL.+47.92'

SECTION H-H
TYPICAL ARRANGEMENT OF TIES
FROM EL+9.0' TO EL+41.89'

NOTES

1. For General Notes see Sheet 3.

NO.	REVISION	DATE	BY
1	With of shafts and affected dimensions changed	11-15-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 25 & 26

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ASSOCIATES

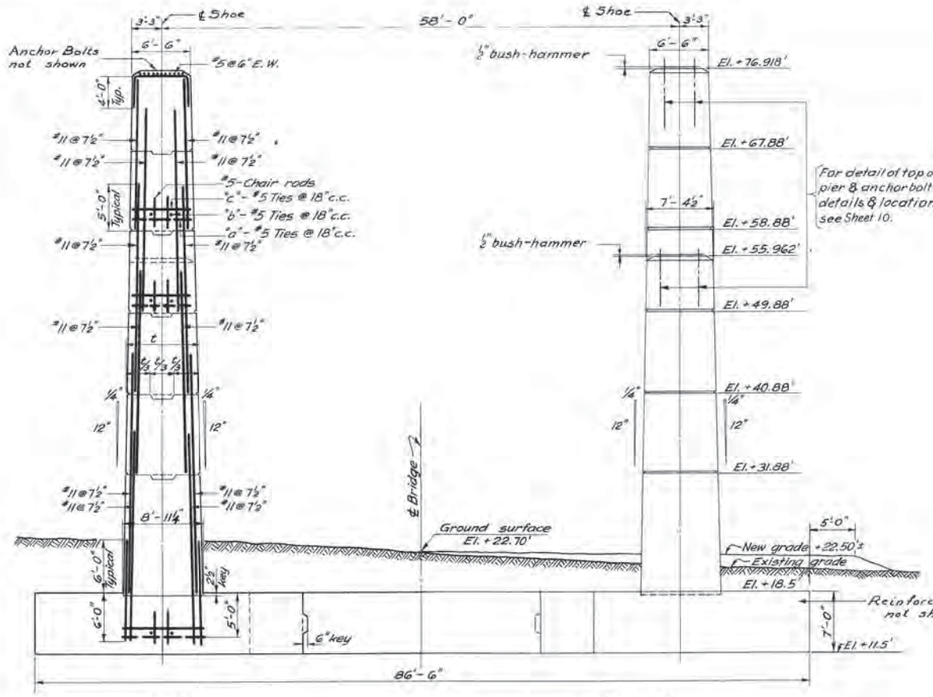
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: R.C.H.
TRACED BY: L.S. & S.P.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

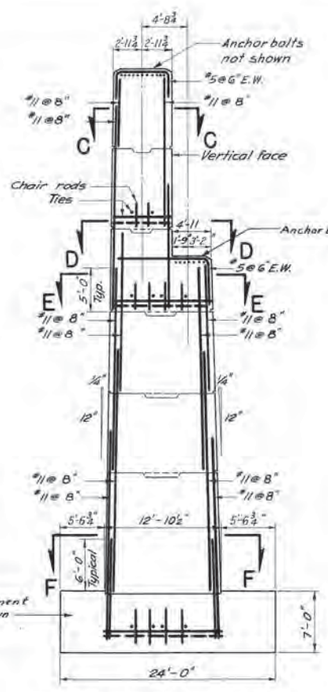
CONTRACT PN 3
DWG. NO. DRB-3
SHEET 5 OF 10

PN 1797-853

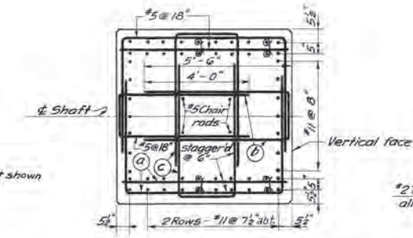
M.P.M. & R. FILE No. 1443



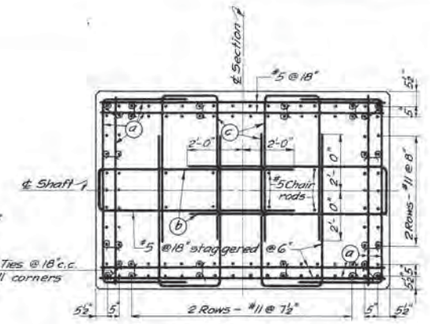
SECTION A-A SCALE: 1/8"=1'-0" ELEVATION



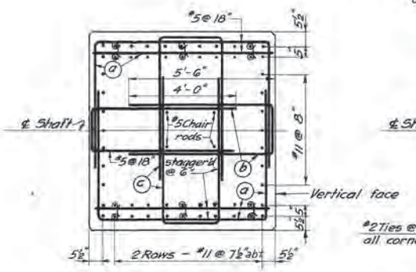
SECTION B-B SCALE: 1/8"=1'-0"



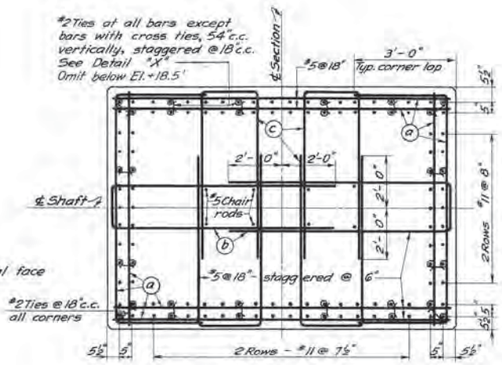
SECTION C-C SCALE: 3/8"=1'-0"



SECTION E-E SCALE: 3/8"=1'-0"



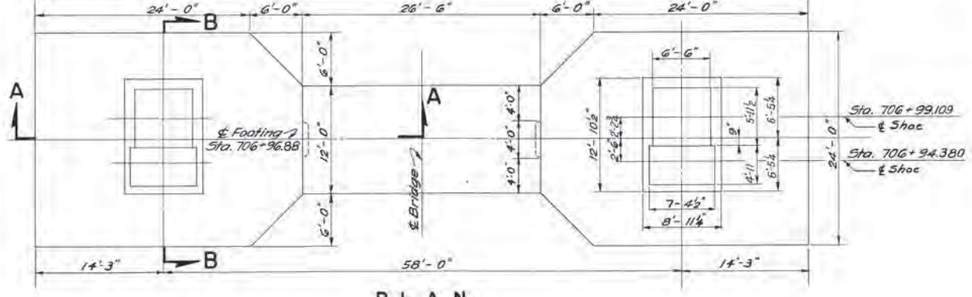
SECTION D-D SCALE: 3/8"=1'-0"



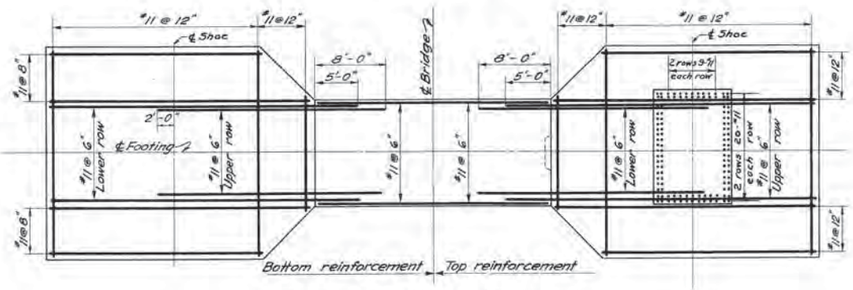
SECTION F-F SCALE: 3/8"=1'-0"

NOTES

1. For General Notes see Sheet 3.



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



FOOTING PLAN SCALE: 1/8"=1'-0"

NO.	REVISION	DATE	BY
1	Changed Shafts & Girder Brgs.	10-26-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER No. 27

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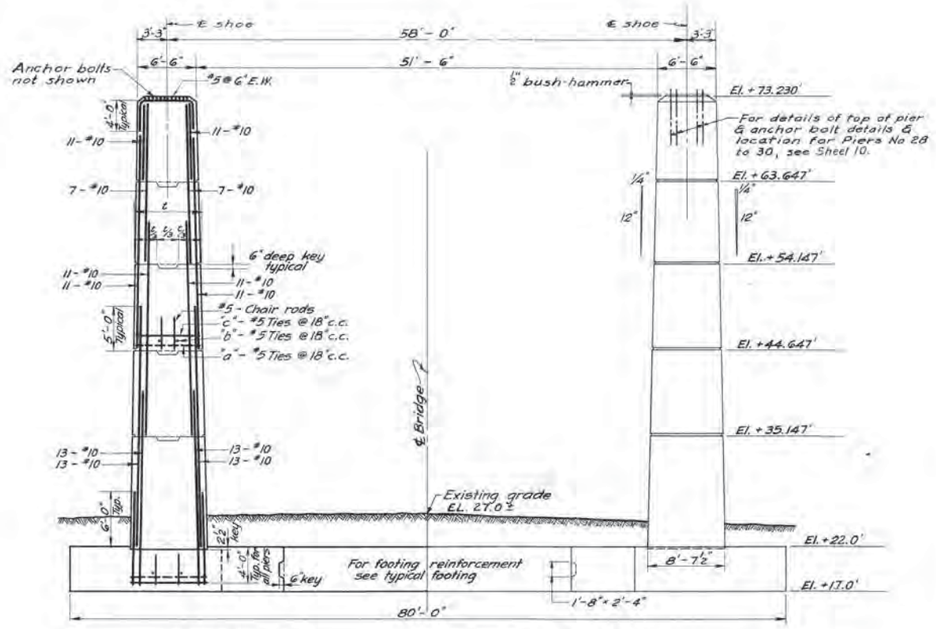
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: F.P.B.
TRACED BY: L.S. & S.P.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

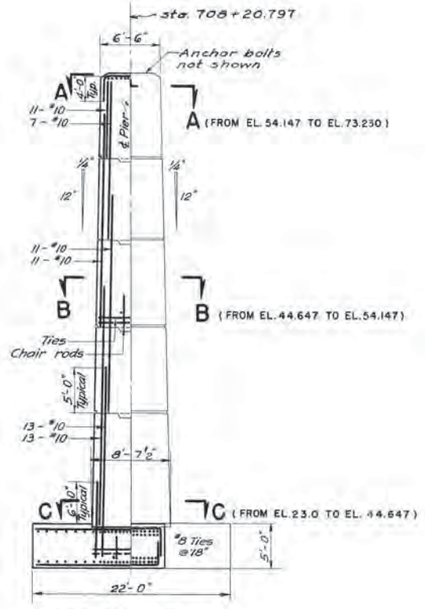
CONTRACT PN 3
DWG. NO. DRB-3
SHEET 6 OF 10

PR 1797-883

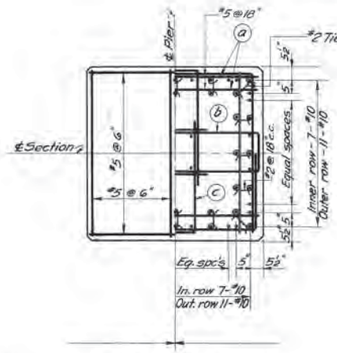
M.P.M.&R. FILE No. 1443.



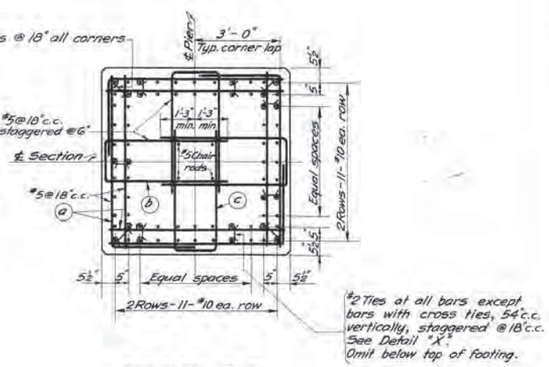
SECTION D-D ELEVATION



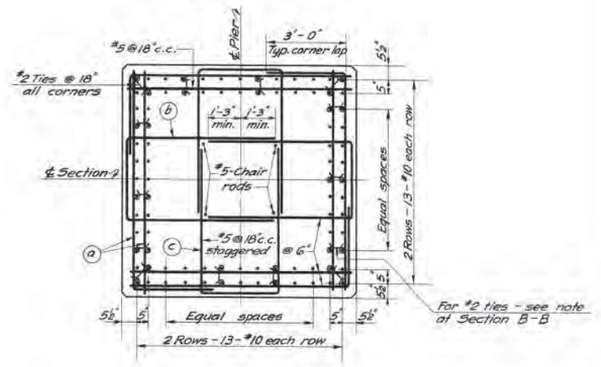
SECTION E-E



SECTION A-A



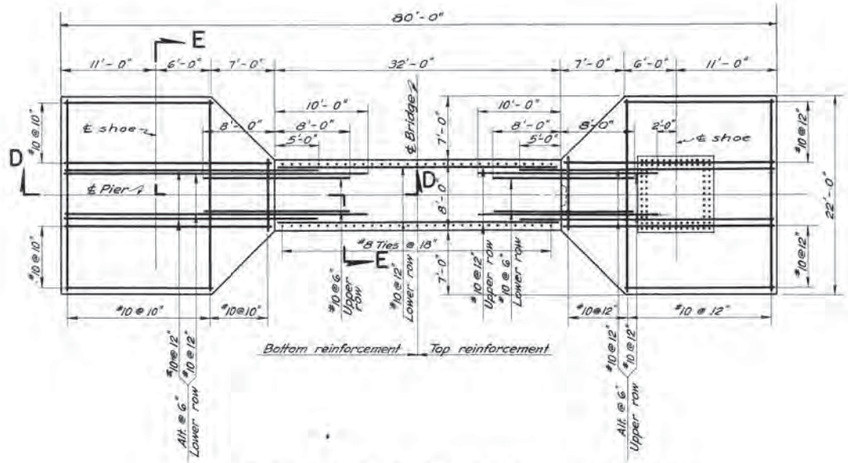
SECTION B-B



SECTION C-C

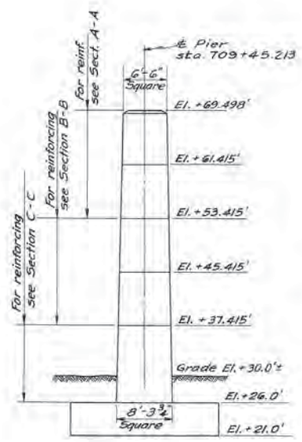
PIER No. 28

SCALE: 1/8"=1'-0"



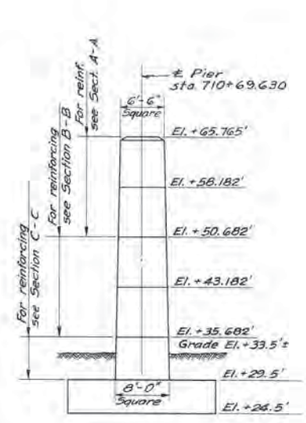
TYPICAL FOOTING FOR PIERS Nos 28,29 & 30

SCALE: 1/8"=1'-0"



PIER No. 29

SCALE: 3/32"=1'-0"



PIER No. 30

SCALE: 3/32"=1'-0"

TYPICAL SECTIONS

SCALE: 3/8"=1'-0"

NOTE

1. For General Notes see Sheet 9.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

PIER Nos. 28, 29 & 30

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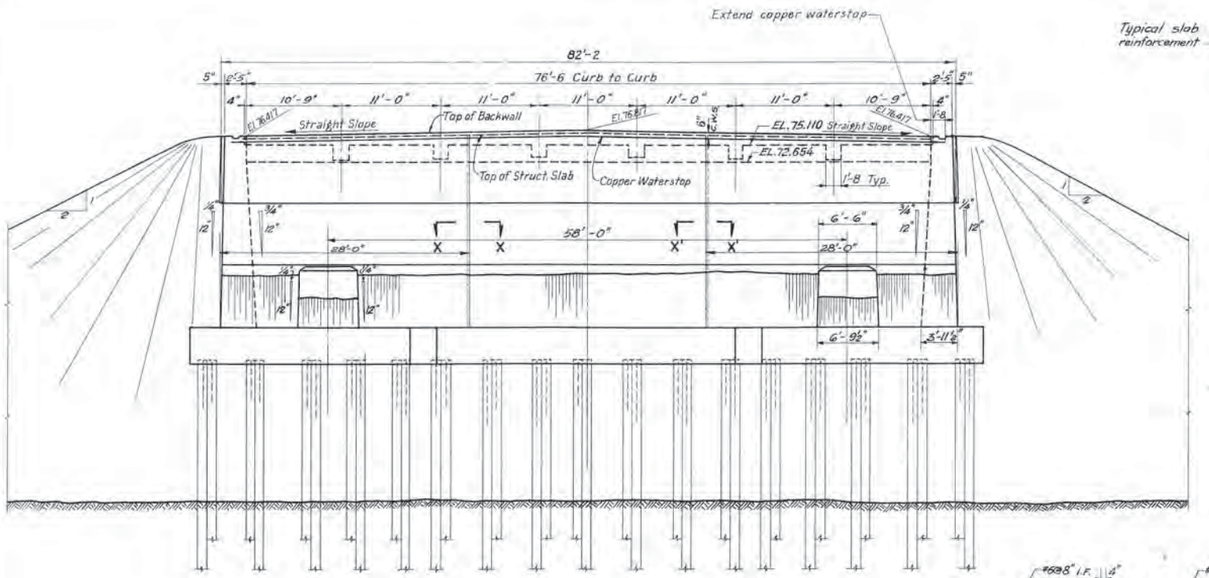
HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

NO.	REVISION	DATE	BY

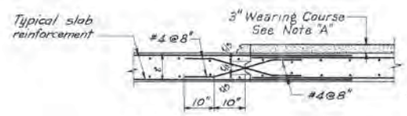
DRAWN BY: F.P.D.
TRACED BY: L.S. & S.P.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 3
DWG. NO. DRB-3
SHEET 7 OF 10

M.P.M. & R. FILE No. 1443



FRONT ELEVATION



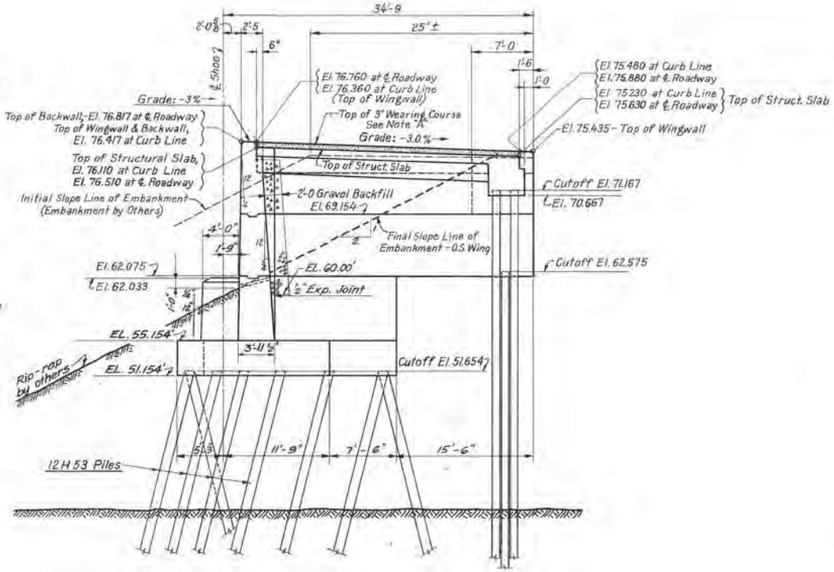
TYPICAL CONSTRUCTION JOINT

SECTION Y-Y (AS SHOWN)
SECTION Y'-Y' (OPPOSITE HAND)

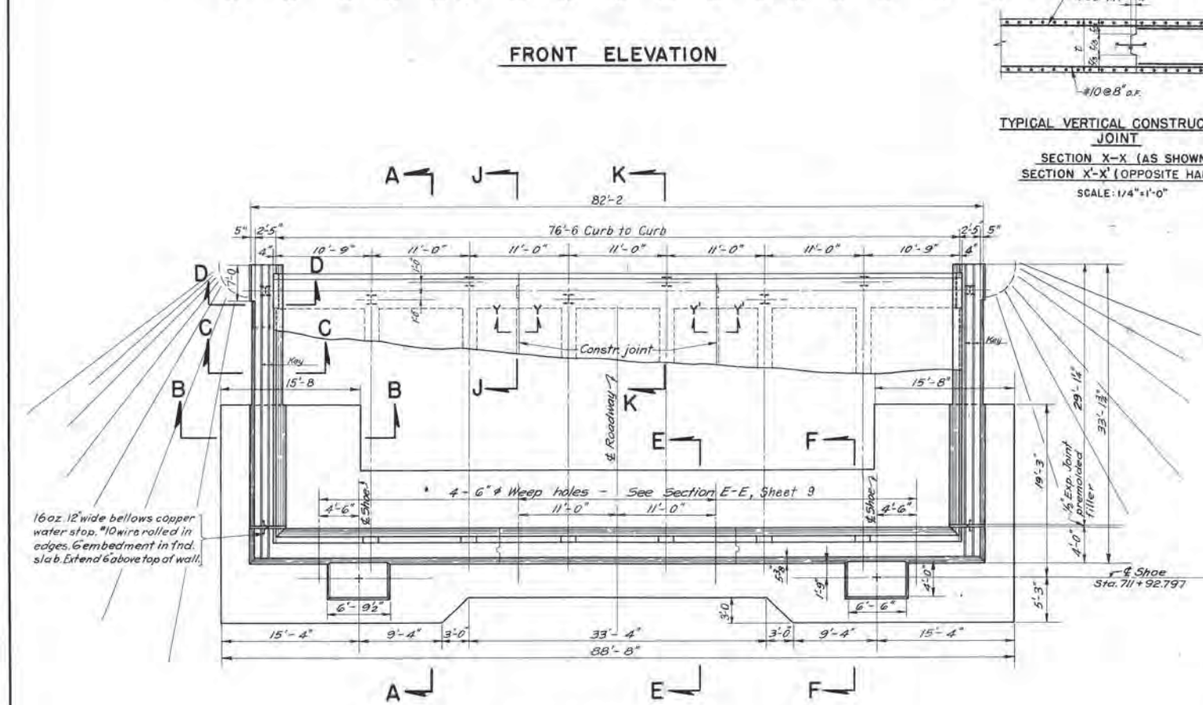
SCALE: 1/2"=1'-0"

NOTE "A"

3" Concrete Wearing Course shall be poured monolithically with the structural deck slab, and finished to true transverse slope and grade with mechanically vibrated screeds.



SECTION A-A

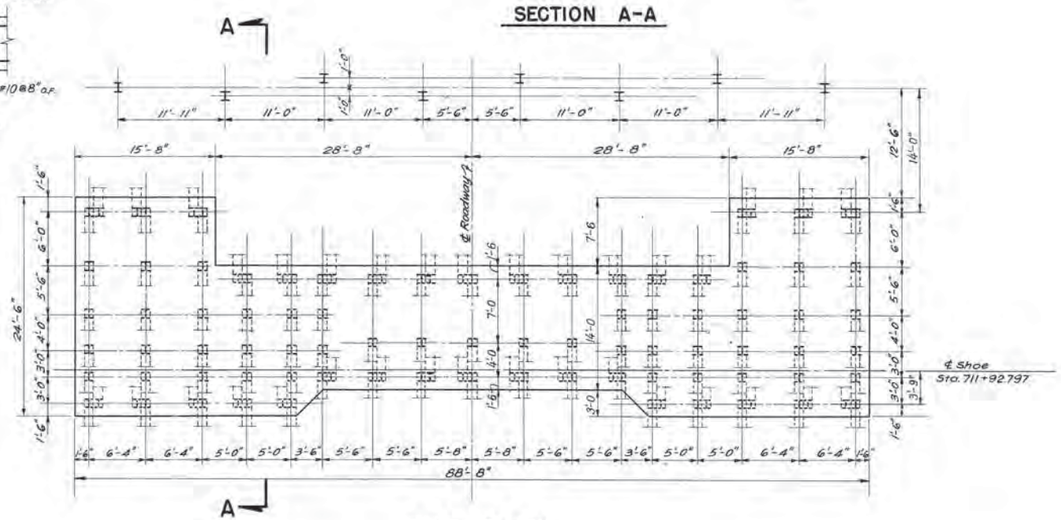


GENERAL PLAN

TYPICAL VERTICAL CONSTRUCTION JOINT

SECTION X-X (AS SHOWN)
SECTION X'-X' (OPPOSITE HAND)

SCALE: 1/4"=1'-0"



PILE PLAN

NOTES

1. For General Notes see Sheet 3.
2. For Sections and Details of East Abutment see Sheet 9.
3. 12 H 53 piles shall be driven to 60 tons capacity using Engineering News Formula.
4. Pour alternate sections of abutment walls. Adjacent sections are not to be poured until the former sections are at least 7 days old.
5. For Detail of Scoring, see Sheet 10.

NO.	REVISION	DATE	BY
2	Deck raised to provide 3" monolithic wearing course.	1-12-55	D.P.U.
1	Revised Copper Waterstop & Top of Abut.	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

EAST ABUTMENT - PLAN & ELEVATIONS

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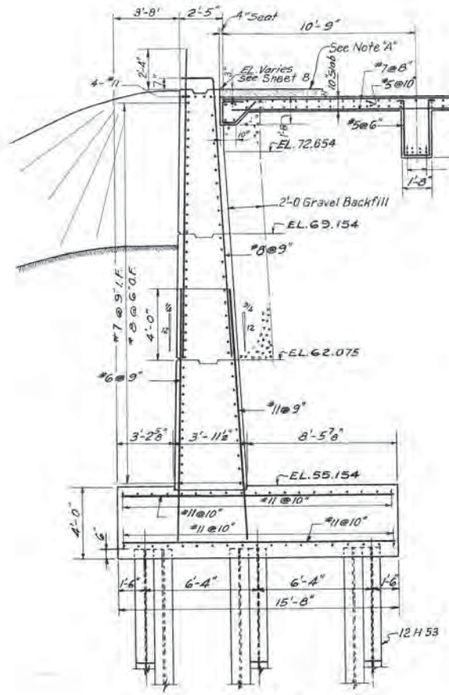
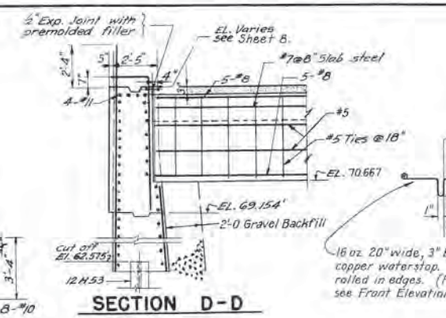
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: L.S.
TRACED BY: C.H.
CHECKED BY: N.K.
SCALE: 1/8"=1'-0" DATE: 4-1-54

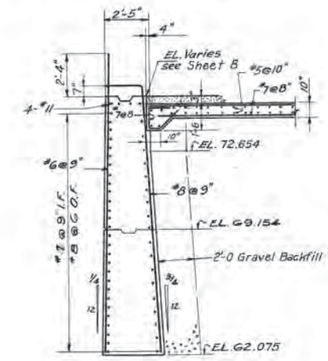
CONTRACT PN 3
DWG. NO. DRB-3
SHEET 8 OF 10



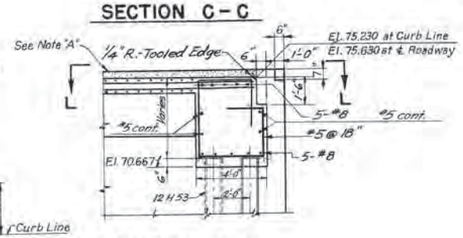
SECTION B-B



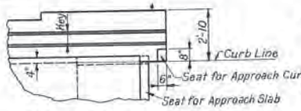
SECTION D-D



SECTION C-C

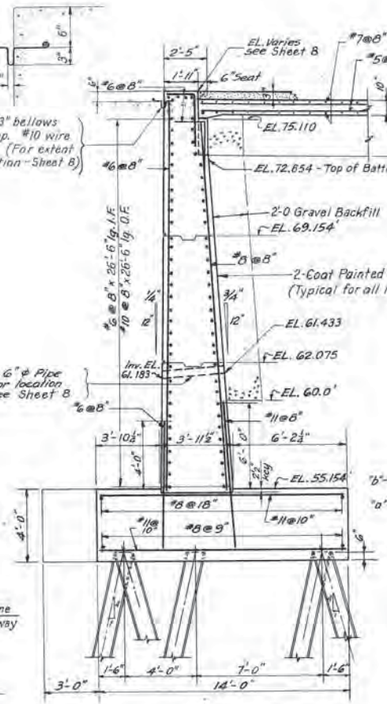


SECTION J-J

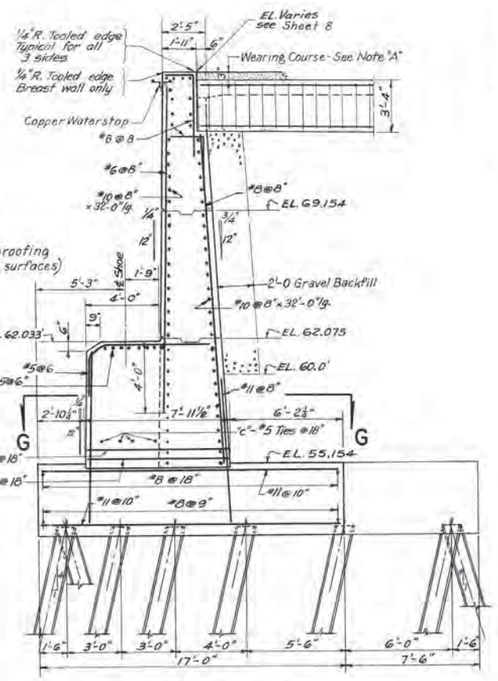


SECTION L-L

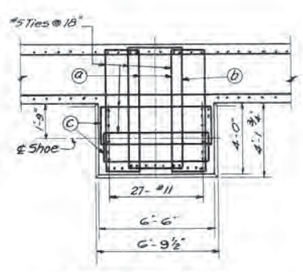
PLAN AT END OF WINGWALLS



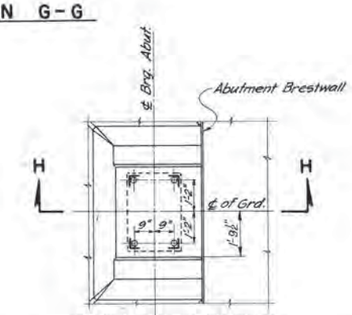
SECTION E-E



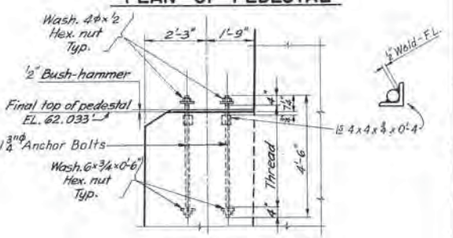
SECTION F-F



SECTION G-G



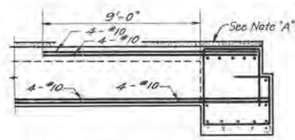
PLAN OF PEDESTAL



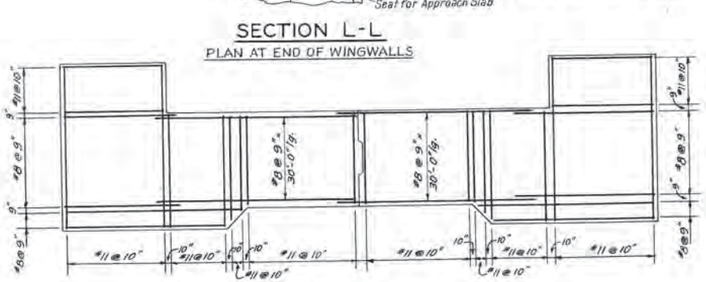
SECTION - H - H

TOP OF PEDESTAL & ANCHOR BOLTS DETAIL

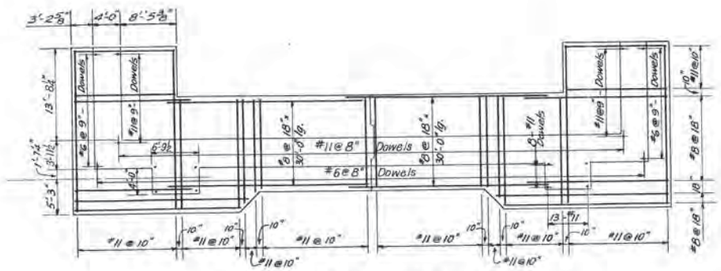
SCALE 3/8" = 1'-0"



SECTION K-K



BOTTOM REINFORCEMENT



TOP REINFORCEMENT

PLAN OF FOOTING

SCALE 3/32" = 1'-0"

NOTES

1. For General Notes see Sheet 3.
2. For location of Sections see Sheet 8.
3. See Sheet 10 for notes Nos 2, 3 & 4.
4. Compensation for 2-coat painted waterproofing shall be included in the contract unit price for Class A Concrete for Abutments, except Footings.
5. See Sheet 8 for Note "A".

NO.	REVISION	DATE	BY
2	Deck raised to provide 3" min. wearing course. Approach curb picked added	1-16-55	D.P.U.
1	General	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. - BURLINGTON COUNTY, N. J.

EAST ABUTMENT - SECTIONS & DETAILS

GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

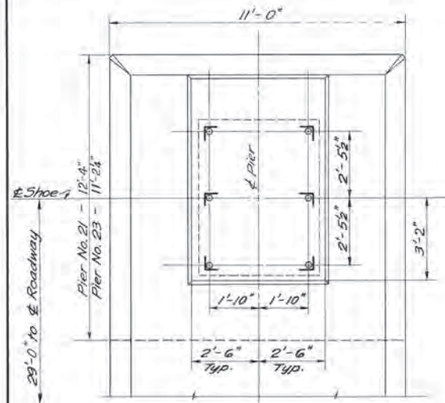
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

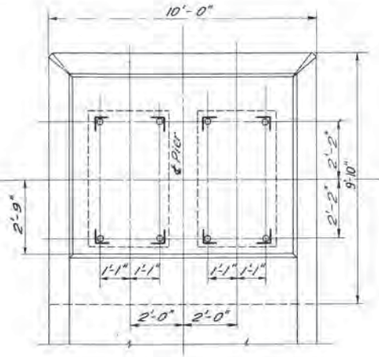
DRAWN BY: L. S.
TRACED BY: L. S. & A. S.
CHECKED BY: N. K.
SCALE: ¼" = 1'-0" & as noted
DATE: 4-1-54

CONTRACT PN 3
DWG. NO. DRB-3
SHEET 9 OF 10

PR 1797-833



PLAN



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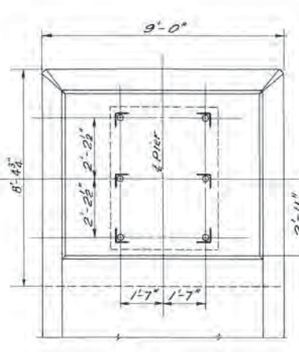

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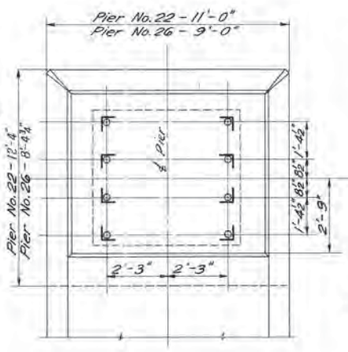

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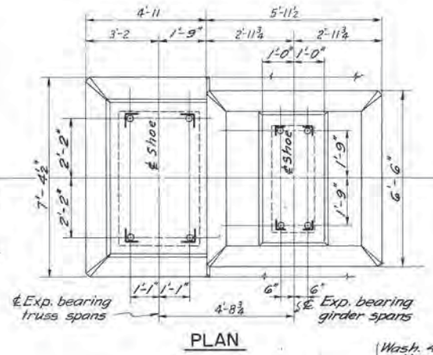

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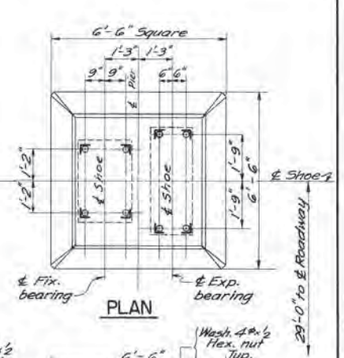

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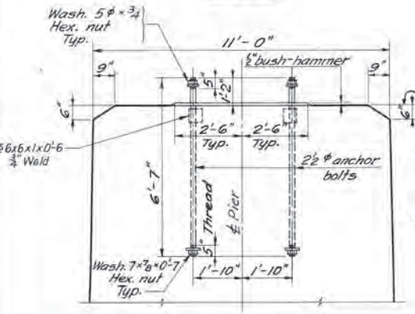
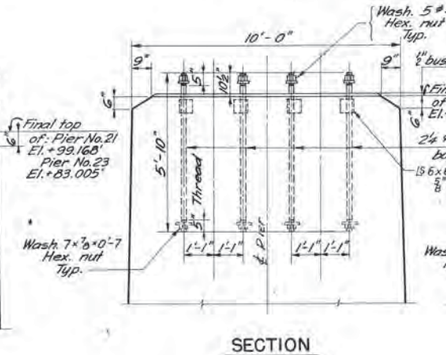


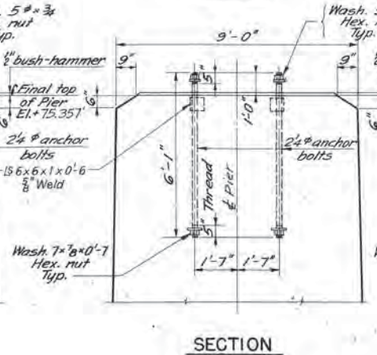
SECTION

PIERS Nos 21 & 23



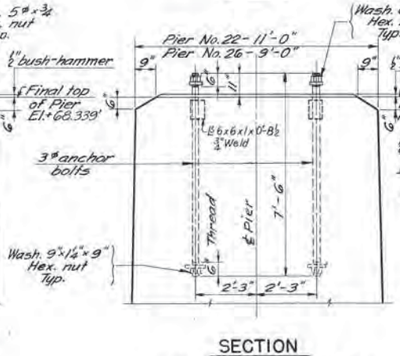
SECTION

PIER No. 24



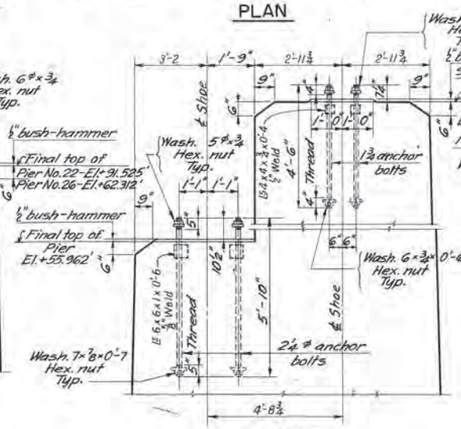
SECTION

PIER No. 25



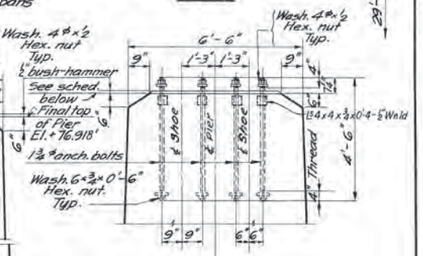
SECTION

PIERS Nos 22 & 26



SECTION

PIER No. 27



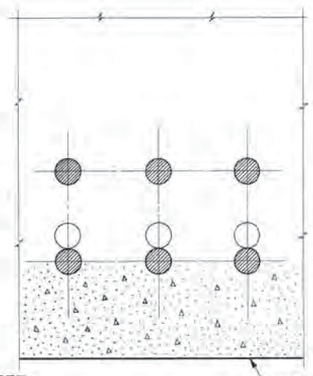
SECTION

Pier No.	Final top of pier elevation
28	+ 73.230'
29	+ 69.498'
30	+ 65.765'

PIERS Nos 28, 29 & 30

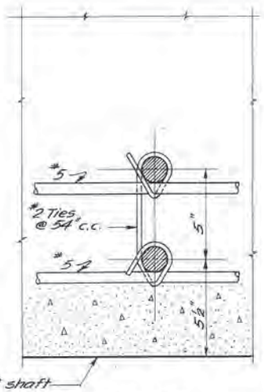
TOP OF PIERS & ANCHOR BOLT DETAILS

SCALE : 3/8"=1'-0"



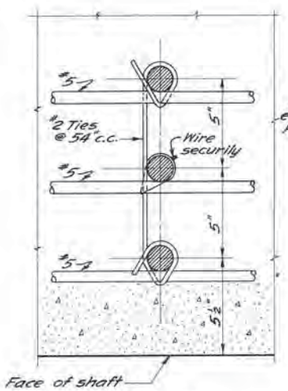
TYPICAL LAP DETAIL OF VERTICAL BARS

SCALE : 3"=1'-0"



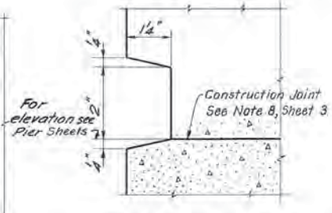
DETAIL "X"

SCALE: 3"=1'-0"



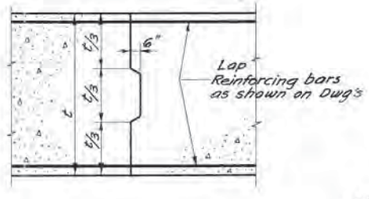
DETAIL "Y"

SCALE: 3"=1'-0"



DETAIL OF SCORING

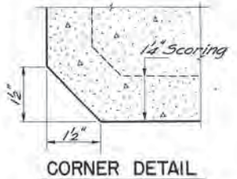
SCALE: 1/2"=1'-0"



TYPICAL CONSTRUCTION JOINT

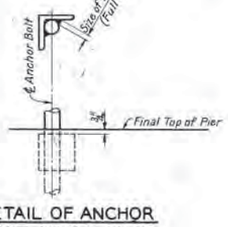
SCALE : 1/4"=1'-0"

FOUNDATION DETAIL



CORNER DETAIL

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



DETAIL OF ANCHOR BOLT ANGLE LUGS

SCALE: 1"=1'-0

SHAFT DETAILS

NOTES

1. For general notes see Sheet 2.
2. Concrete areas at all shoe locations ½" above final top of pier elevations as indicated on details. After concrete has set, bush-hammer in accordance with the Supplemental Specifications.
3. Provide templates for positioning of anchor bolts. Drawing showing details to be submitted to Consulting Engineer for approval.
4. Following specifications shall be used: For anchor bolts & nuts - ASTM - Designation A 307 For washers - ASTM - Designation A 7.

NO.	REVISION	DATE	BY
3	Width of Shafts, Piers 21 to 26 incl. & affected dimensions chgd.	11-5-54	D.P.U.
2	Changed Shafts & Girder Brgs. for Pier 27	10-26-54	D.P.U.
1	Angle Lugs added to Anchor Bolts	7-27-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

MISCELLANEOUS DETAILS

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y., ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON, PHILADELPHIA, PENNA., ARCHITECTS

DRAWN BY: L.S.
TRACED BY: G.H. & A.S.
CHECKED BY: N.K.
SCALE: AS NOTED DATE: 4-1-54

CONTRACT PN 3
DWG. NO. DRB-3
SHEET 10 OF 10

M.P.M. & R. FILE No. 1443

DELAWARE RIVER BRIDGE
SUPERSTRUCTURE CONSTRUCTION
(SELECT SHEETS)

PENNSYLVANIA TURNPIKE COMMISSION

THOMAS J. EVANS, CHAIRMAN
JAMES F. TORRANCE, SECRETARY AND TREASURER
DAVID E. WATSON, COMMISSIONER
EDWARD L. SCHMIDT, SECRETARY OF HIGHWAYS (EX OFFICIO)

NEW JERSEY TURNPIKE AUTHORITY

PAUL L. TROAST, CHAIRMAN
GEORGE F. SMITH, VICE CHAIRMAN
MAXWELL LESTER, JR., TREASURER

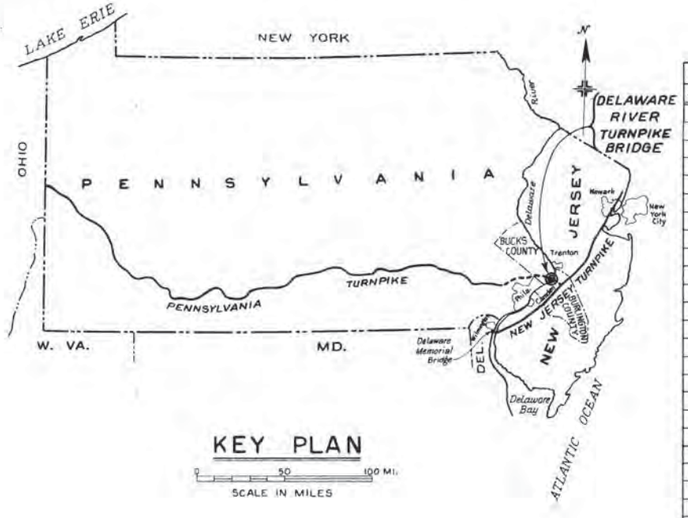
DELAWARE RIVER TURNPIKE BRIDGE

BUCKS COUNTY, PENNSYLVANIA AND BURLINGTON COUNTY, NEW JERSEY

DRAWINGS FOR CONTRACT PN 4

From Sta. 645+53.713 to Sta. 712+27.547
Length 6,673.834 Feet 1.264 Miles

SUPERSTRUCTURE



KEY PLAN

0 50 100 MI.
SCALE IN MILES

INDEX OF DRAWINGS

CONTRACT DRAWINGS DRB-4

SHEET	TITLE	SHEET	TITLE
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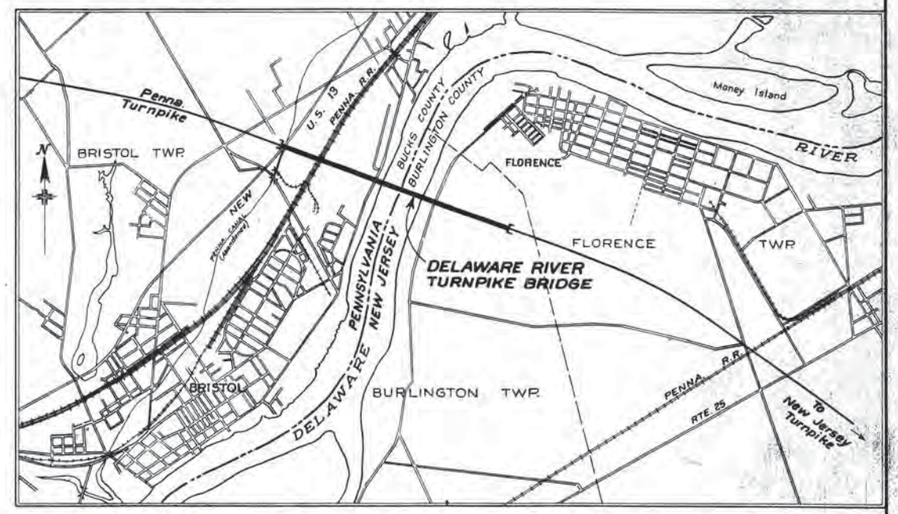
2	General Plan and Quantities	36	Main Span - Truss Joints 6 & 7
3	Girder Spans - Stress Sheet	37	Main Span - Truss Joints 8 & 9
4	Girder Spans - Steel Details	38	Main Span - Truss Joints U10 & L10
5	Girder Spans - Steel Details	39	Main Span - Truss Joint U11 - Portal & Floor Beam Conns.
6	Girder Spans - Expansion Dams at Piers 1 to 9 incl., 28, 29, & 30	40	Main Span - Truss Joint and Bottom Strut at L11
7	3-Span Approach Trusses - Stress Sheet for Trusses	41	Main Span - Truss Joints U12 & L12
8	3-Span Approach Trusses - Stress Sheet for Floor System and Bracing	42	Main Span - Truss Joints U13, U14 & U15
9	3-Span Approach Trusses - Steel Details at Piers 10, 12, 25 & 27	43	Main Span - Truss Joint & Bracing at L13
10	3-Span Approach Trusses - Truss Joints 1, 2 & 3	44	Main Span - Truss Joint at L14
11	3-Span Approach Trusses - Truss Joints 4, 5 & 6	45	Main Span - Floor Beam Conn. to L14 and Typ. Int. Framed Floor Bm.
12	3-Span Approach Trusses - Truss Joints 7, 8 & 9 and Shoe at Piers 11 and 26	46	Main Span - Truss Joints L15 & L16
13	3-Span Approach Trusses - Truss Joints 10, 11 & 12	47	Main Span - Truss Joints U16, U17 & L17
14	Girder Span & 3-Span Approach Truss Span - Expansion Dam at Piers 10 & 27	48	Main Span - Truss Joints U18, L18, U19 & L19
15	3-Span & 4-Span Approach Truss Spans - Typical Details for Floor System	49	Main Span - Truss Joints U20, L20, U21 & L21
16	3-Span & 4-Span Approach Truss Spans - Typical Details for Bracing	50	Main Span - Joints U22 & L22 and Jacking Scheme
17	4-Span Approach Trusses - Stress Sheet for Trusses	51	Main Span - Expansion Dam at Pier 20
18	4-Span Approach Truss Spans - Stress Sheet for Floor System & Bracing	52	Main Span - Expansion Dam at W22
19	3-Span & 4-Span Approach Truss Spans - Truss Joints U and Shoe at Piers 18, 19, 20, 26 & 27	53	Main Span - Floor Beam & Shear Lock at W22
20	4-Span Approach Trusses - Truss Joints 1, 2 & 3	54	Main Span - Typical Suspended Floor Beam & Suspender Details
21	4-Span Approach Trusses - Truss Joints 4, 5 & 6	55	Main Span - Floor Beam & Bracing at L13
22	4-Span Approach Trusses - Truss Joints 7, 8 & 9	56	Main Span - Shoes at Piers 18 & 19
23	4-Span Approach Trusses - Truss Joints L10, L10 and Shoes at Piers 14, 16, 21 & 23	57	Main Span - Lateral and Sway Bracing
24	4-Span Approach Trusses - Truss Joints 11, 12 & 13	58	Main Span - Lateral and Sway Bracing
25	4-Span Approach Trusses - Truss Joints 14, 15 & 16	59	Main Span - Suspended Floor Lateral Bracing
26	4-Span Approach Trusses - Truss Joints 17, 18 & 19	60	Main Span - Portal at U11
27	4-Span Approach Trusses - Truss Joints U20, L20 and Shoe at Piers 15 & 22	61	Approach Spans - Walkways, Ladders & Platforms
28	4-Span Approach Truss Spans and Main Truss Span - Expansion Dam at Piers 13, 17 & 24	62	Approach Spans - Walkways, Ladders & Platforms
29	Main Truss Span - Stress Sheet for Trusses	63	Main Span - Walkways, Ladders & Platforms
30	Main Truss Span - Stress Sheet for Trusses	64	Main Span - Walkways, Ladders & Platforms
31	Main Truss Span - Bracing Systems	65	Main Span - Walkways & Platforms
32	Main Truss Span - Stress Sheet for Floor System	66	Main Span - Walkways & Platforms
33	Main Span - Truss Joints U10 & L0, Shoe, Hold-Down and Shear Lock at Piers 17 & 20	67	All Spans - Pavement Cross Section, Parapet & Parapet Railing
34	Main Span - Truss Joints 1 & 2	68	All Spans - Parapet, Parapet Railing & Drainage Details



PROJECT PLAN

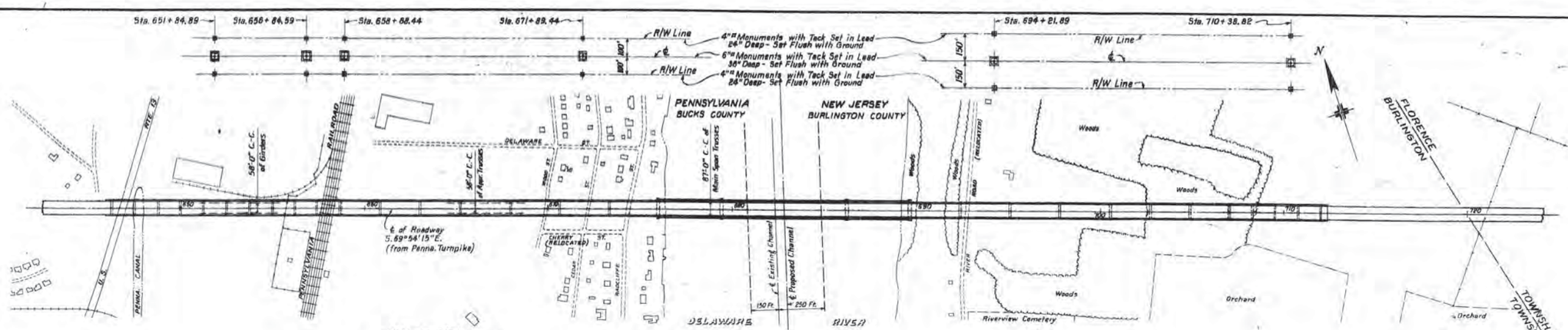
0 500 1000 2000 4000 6000 8000 10,000
SCALE IN FEET

RECOMMENDED George S. Richardson DATE June 9, 1954
GEORGE S. RICHARDSON, CONSULTING ENGINEER — PA. P.E. 3562, N.J. P.E. 7767

RECOMMENDED June 9 1954
R. B. Stone
CHIEF ENGINEER, PENNSYLVANIA TURNPIKE COMMISSION

APPROVED 1954
PENNSYLVANIA TURNPIKE COMMISSION
ATTEST James F. Torrance
SECRETARY AND TREASURER

APPROVED Charles M. Noble DATE June 9, 1954
CHIEF ENGINEER, NEW JERSEY TURNPIKE AUTHORITY



ITEM NO.	DESCRIPTION	UNIT	PENNSYLVANIA APPROACH SPANS			MAIN RIVER SPANS	NEW JERSEY APROACH SPANS			TOTALS
			GIRDER SPANS	3-SPAN CONTINUOUS UNIT	4-SPAN CONTINUOUS UNIT		4-SPAN CONTINUOUS UNIT	3-SPAN CONTINUOUS UNIT	GIRDER SPANS	
1	STRUCTURAL CARBON STEEL - GIRDER SPANS	Lb.	2,496,000	—	—	—	—	—	1,004,000	3,500,000
2	STRUCTURAL CARBON STEEL - APPROACH TRUSS SPANS	Lb.	—	1,532,000	2,423,000	—	2,423,000	1,532,000	—	7,910,000
3	STRUCTURAL CARBON STEEL - MAIN RIVER SPANS	Lb.	—	—	—	5,730,000	—	—	—	5,730,000
4	STRUCTURAL SILICON STEEL - GIRDER SPANS	Lb.	2,727,000	—	—	—	—	—	1,093,000	3,820,000
5	STRUCTURAL SILICON STEEL - APPROACH TRUSS SPANS	Lb.	—	1,324,000	2,736,000	—	2,736,000	1,324,000	—	8,120,000
6	STRUCTURAL SILICON STEEL - MAIN RIVER SPANS	Lb.	—	—	—	10,200,000	—	—	—	10,200,000
7	BRIDGE ROPE SUSPENDERS	Lin. Ft.	—	—	—	1,760	—	—	—	1,760
8	FORGINGS	Lb.	—	—	2,300	134,400	2,300	—	—	139,000
9	STEEL CASTINGS	Lb.	1,900	—	—	190,100	—	—	—	192,000
10	STAINLESS STEEL	Lb.	100	2,250	5,830	1,700	5,830	2,250	40	18,000
11	CLASS A CONCRETE	Cu. Yd.	2,505	1,300	2,165	2,730	2,165	1,300	1,035	13,200
12	REINFORCEMENT BARS	Lb.	698,000	363,000	606,000	764,000	606,000	363,000	280,000	3,680,000
13	PARAPET RAILING	Lin. Ft.	2,620	1,302	2,164	2,737	2,164	1,302	1,061	13,350
14	GRATING (FOR WALKWAYS AND PLATFORMS)	Sq. Ft.	2,510	1,650	2,660	3,860	2,660	1,650	1,010	16,000
15	WALKWAYS AND PLATFORMS	Lb.	83,000	60,000	94,000	146,000	94,000	60,000	33,000	570,000
16	DOWNSPOUTS	Lin. Ft.	100	—	—	—	—	—	—	100

GENERAL NOTES

SPECIFICATIONS — DESIGN: 1953 Standard Specifications for Highway Bridges of the American Association of State Highway Officials, Modified.

CONSTRUCTION: Pennsylvania Turnpike Commission Specifications for Grading, Drainage, Paving and Structures, Oct. 1952, Modified.

℄ PIER STATIONS — See Stress Sheets.

SPECIAL NOTES — For Girder Spans, See Sheet 3. For Approach Truss Spans, See Sheet 7. For Main River Spans, See Sheet 30.

SPECIAL STEELS — See Design Details.

ERECTION — Erection Wind shall be Taken at 30#/sf

NOTE:
For Fabricator's Shop Details See American Bridge Division Drawings Listed in the Following Table.

LIST OF CONTRACTS OF AMERICAN BRIDGE DIVISION OF UNITED STATES STEEL CORPORATION

CONTRACT NO.	PORTION OF STRUCTURE COVERED
Q 5700	Plate Girder Spans No. 1 to 10 Inc. and No. 28 to 31 Incl.
Q 5701	3-Span Continuous Truss Spans No. 11, 12, 13 and 25, 26, 27.
Q 5702	4-Span Continuous Truss Spans No. 14 to 17 Incl. and 21 to 24 Incl.
Q 5703	Main River Spans No. 18, 19, and 20.
Q 5704	Wire Rope Suspenders - Main Span No. 19.
Q 5705	Concrete & Reinf. Bars - All Spans.
Q 5706	Parapet Railing - All Spans.
Q 5707	Walkways, Ladders & Platforms - All Spans.
Q 5708	Downspouts at West Abutment.

For Index of Members See American Bridge Div. "K" Sheets.

NO.	REVISION	DATE	BY
3	"As Built" Revisions: 5 Monuments Changed; Cherry St. Relocated; List of Detail Drawings Added	3-13-56	J.R.
2	Shifted Girder Bearings at Piers 10 & 27.	10-26-54	D.P.U.
1	Added Vertical Curve Data at West End of Bridge	8-2-54	J.R.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

GENERAL PLAN AND ELEVATION

GEORGE S. RICHARDSON
CONSULTING ENGINEER
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MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: J.R.
TRACED BY: J.R.
CHECKED BY: L.B.S.
SCALE: AS NOTED DATE: 6-1-54

CONTRACT P.N. 4
DWG. NO. DRB-1
SHEET 2 OF 68

PLATE GIRDER SCHEDULE

MARK	REACTION (in kips) D+L+I	REACTION (in kips) TOTAL	END STIFF AREA (Silicon Steel) (sq in) REQ'D. @ 36k/sq in	END STIFF AREA (Silicon Steel) (sq in) AREA FURN.	END STIFF AREA (Silicon Steel) (sq in) SECTION FURNISHED	MAX. SHEAR (in kips) D+L+I.	MAX. SHEAR (in kips) TOTAL	ALLOW. SHEAR STRESS	WEB AREA (sq in) REQ'D.	WEB AREA (sq in) FURN.	MOMENT (Kip Ft) D+L+I.	MOMENT (Kip Ft) TOTAL	ALLOW. BENDING STRESS	NET S.M. REQ'D.	NET S.M. FURN.	WEB SECTION	SECTION FURNISHED FLANGE ANGLES	SECTION FURNISHED TOP COVER PL.	SECTION FURNISHED BOTTOM COVER PL.	MAT'L
G1	392 155 31	578	16.0	18.3	4-⌶ 7 x 4 x ⅞	316 121 24	461	14 k/sq.in.	32.9	49.88	11,432 4,790 368	17,190	24 k/sq.in	8595	8760	1-Pl. 114 x ⅞	4-⌶ 8 x 8 x 1⅛	1-Pl. 22 x 1⅜ F.L. 1-Pl. 22 x 1⅛ x 86'-0 1-Pl. 22 x 1⅛ x 51'-0	1-Pl. 22 x 1⅜ x 90'-0 1-Pl. 22 x 1⅛ x 34'-0 1-Pl. 22 x 1⅛ x 51'-0	Ⓢ

DEAD LOAD PANEL CONCENTRATIONS IN KIPS

PANEL POINT	FLOOR STEEL	FLOOR OTHER	GIRDER	BRACING	EXCESS ※	TOTAL
0	27.3	51.5	15.5	0.7	3.3	98.3
1	32.9	141.2	28.1	1.4	8.7	212.3
2	30.6	114.5	22.8	1.4	7.1	176.4
3	32.9	141.2	28.1	1.4	8.7	212.3
4	27.3	51.5	15.5	0.7	3.3	98.3

※ An excess dead load of 0.25 kips per ft. of girder was used.

Note:- Provide diaphragms between stringers as follows:
15 B 33.9 Ⓒ at center of each floor panel, and at abutments. See Sheets 5 and 15.
18 WF 64 Ⓒ at piers. See Sheet 6.
No pavement breaks shall be provided between expansion dams.
Drainage openings in concrete curb shall be omitted on both sides of Span #1 and Span #10. See Sheet 67.

CONSTANT DEAD LOAD OF FLOOR PER GIRDER KIPS PER FOOT

CONCRETE DECK & RAILING	4.05
FLOOR STEEL	1.06
EXCESS	0.25
TOTAL	5.36

SHOE REACTIONS AT PIERS IN KIPS

DEAD LOAD	394
LIVE LOAD	155
IMPACT	31
LONGITUDINAL FRICTION	10
TRACTION	12
TRANSVERSE WIND-50#	H=40 V=11
LONGITUDINAL WIND-50#	H=45 V=7
TOTAL D+L+I	580

SPECIAL NOTES FOR GIRDER SPANS

(Spans 1 to 10 incl., and 28 to 31 incl.)

SPECIFICATIONS — Design: 1953 Standard Specifications for Highway Bridges of the American Association of State Highway Officials, modified.

Material and Workmanship: Pennsylvania Turnpike Commission Specifications for Grading, Drainage, Paving and Structures, Oct., 1952, modified.

DEAD LOAD — No provision has been made in the design for a future wearing surface on the concrete roadway slab. The roadway slab thickness required by the design has been increased ½ inch as an allowance for wear.

LIVE LOAD — H20 - S16 - 49. 2.376 lanes per girder.

MATERIAL — Silicon or Carbon Steel as noted by Ⓢ or Ⓒ in the stress tables or on the details, and special alloy steel details where noted.

RIVETS — Main Girders: 1" ϕ carbon steel, unless noted.

Floor System and Bracing: ⅞" ϕ carbon steel, unless noted.

Maximum Pitch: For sealing, the pitch on a single line adjacent to a free edge of an outside plate or shape shall not exceed $4+4t$, nor 7". If there be a second line of rivets uniformly staggered with those in the line adjacent to the free edge, at a gage less than $1\frac{1}{2}+4t$, the stagger pitch shall not exceed $4"+4t-\frac{3}{4}g$, nor $7"-\frac{1}{4}g$, but need not be less than half the requirement for a single line. t = thickness in inches of thinner outside plate or shape.

Stitch Rivets: In compression members, the pitch in any single line in the direction of stress shall not exceed $12t$; except if rivets on adjacent lines be staggered and the gage is less than maximum of $24t$, the stagger pitch shall not exceed $12t$, nor $15t-\frac{3}{4}g$.

RIVET VALUES

	High Strength Rivets Shop & Field	Carbon Steel Rivets Shop & Field
Shear	20,000 lbs./sq.in.	13,500 lbs./sq.in.
Bearing	40,000 lbs/sq.in. on silicon steel 27,000 lbs/sq.in. on carbon steel	27,000 lbs./sq.in.

REAMING — Main Girders: Holes shall be punched or drilled 1⅛" ϕ and reamed assembled to 1⅛" ϕ, unless noted.

Floor Beams and Brackets: Holes shall be punched or drilled 1⅛" ϕ and reamed assembled to 1⅛" ϕ unless noted, except holes in tension plates shall be punched or drilled 1⅛" ϕ and reamed to size as noted.

Stringers: Holes for splices shall be punched or drilled 1⅛" ϕ and reamed to 1⅛" ϕ with parts assembled, or to a metal templet. Other holes may be punched full size unless noted.

Bracing and Diaphragms: Holes may be punched full size unless noted

Expansion Dams and Supports: Holes shall be drilled, sub-punched and reamed as noted on the design details. Holes not noted may be punched full size.

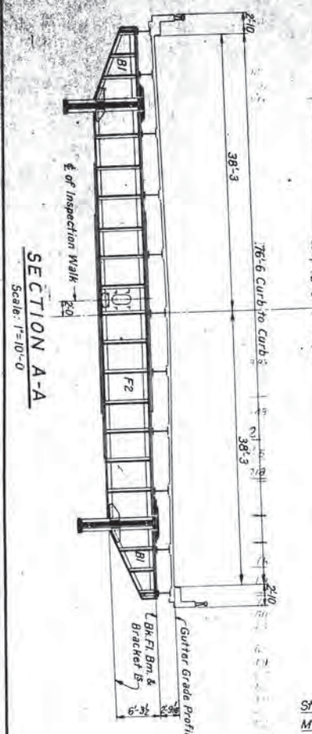
CAMBER — Main girders shall be cambered for full dead load deflection, and in addition for Spans 1, 2 and 3, shall be cambered for the vertical curve. For stringer and floor beam camber see Sheet 4.

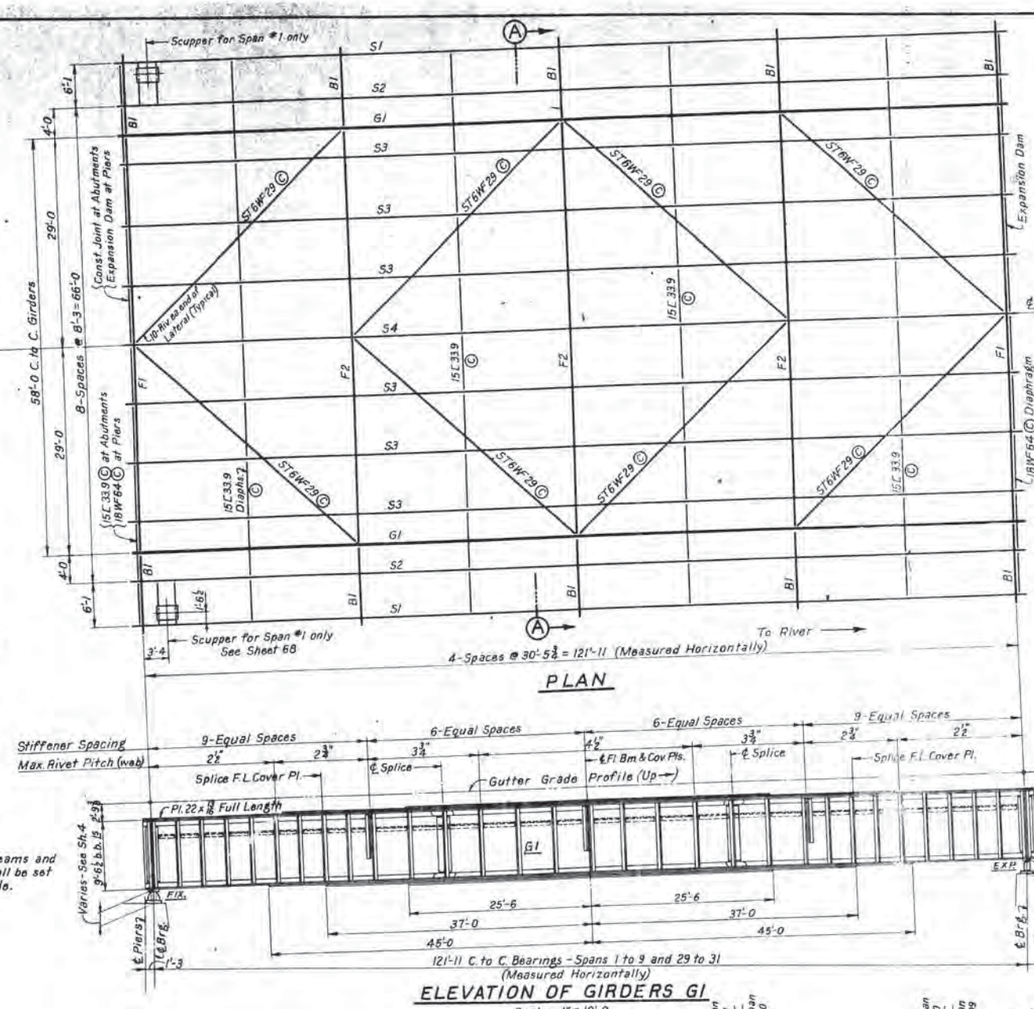
NORMAL TEMPERATURE — Superstructure dimensions shall be attained at 68° F.

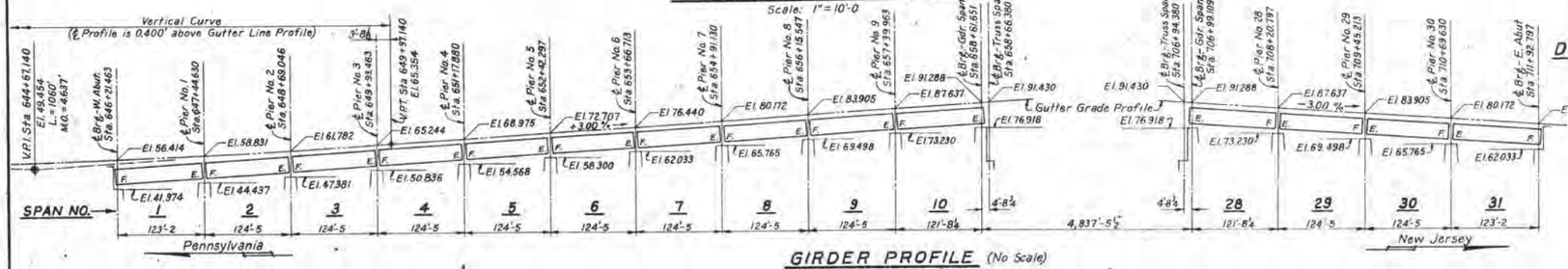
FILLING ANCHOR BOLT HOLES — The clearance between anchor bolts and holes in masonry plates and shoes shall be filled with molten zinc after erection.

EDGE PLANING — Web plates of girders, floor beams and brackets may be sheared and edge planing will not be required.

STRINGER CONN. TO END FLOOR BEAMS — Modify fixed bearing detail shown on Sheet 15 to provide for change in length of top flange of girders under slab dead load, as shown in Detail "A", this sheet. After slab is poured tighten nuts and check threads.

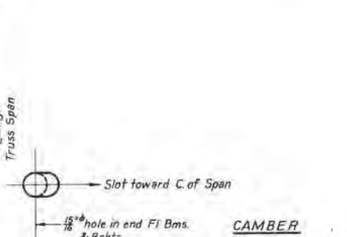


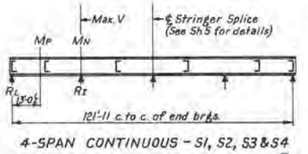




GIRDER PROFILE (No Scale)

Note:- Elevations given at bridge seats are "Bottom of Shoe Elevations."





STRINGER SCHEDULE

MARK	RL (kips) D+L+I	RL (kips) TOTAL	RR (kips) D+L+I	RR (kips) TOTAL	MP (hip ft) D+L+I	MP (hip ft) TOTAL	MN (hip ft) D+L+I	MN (hip ft) TOTAL	V (kips) D+L+I	V (kips) TOTAL	SECTION FURNISHED	MAT'L	S.M. FURNISHED GROSS	S.M. FURNISHED NET	MAX. STRESS (kips/sq.in) BEND'G.	MAX. STRESS (kips/sq.in) SHEAR
S1	12 12 4	28	35 16 5	56	72 60 18	150	99 50 15	164	19 14 4	37	21 WF 62	Ⓒ	126.4	120.5	15.5	4.4
S2	9 33 10	52	25 44 13	82	52 162 69	283	72 134 40	246	13 38 12	63	24 WF 84	Ⓒ	196.3	186.6	17.3	5.6
S3	10 38 11	59	28 51 15	95	60 187 86	303	82 154 46	282	16 44 13	73	24 WF 94	Ⓒ	220.9	210.0	16.5	5.8
S4	10 39 11	60	30 51 15	96	61 187 56	304	84 154 46	284	16 44 13	73	24 WF 94	Ⓒ	220.9	210.0	16.5	5.8

FLOOR BEAM SCHEDULE

MARK	MAX. R. & V. (kips) D+L+I	MAX. R. & V. (kips) TOTAL	MAX. MOM. (hip ft) D+L+I	MAX. MOM. (hip ft) TOTAL	SECTION FURNISHED WEB	SECTION FURNISHED ANGLES	SECTION FURNISHED COVER PLATES	MAT'L	NET S.M. FURNISHED	MAX. STRESS (kips/sq.in) BENDING	MAX. STRESS (kips/sq.in) SHEAR	DETAILS ON SHEET
F1	50 105 29	184	223 1,536 419	2,178	1-Pl. 75 x 7/16	4-⌶ 6 x 6 x ½	1-Pl. 14 x ½ F.L.-Top 1-Pl. 14 x ½ x 16'- Bott.	Ⓢ	1,400	18.7	5.6	4 & 15
F2	115 132 36	283	928 1,920 530	3,378	1-Pl. 75 x 7/16	4-⌶ 6 x 6 x ½	1-Pl. 14 x ½ F.L.-Top 1-Pl. 14 x ½ x 42'-Bott. 1-Pl. 14 x ½ x 30'-T. & B.	Ⓢ	1,845	22.0	8.6	5 & 15
B1	63 65 18	147	473 323 97	893	1-Pl. 75 x 7/16	4-⌶ 6 x 6 x ½	1-Pl. 14 x ½ F.L.-Top	Ⓢ	1,032	10.4	4.5	4, 5 & 15

NO.	REVISION	DATE	BY
	No "As Built" Revisions		
2	Shifted Girder Bearings at Piers 10 & 27	10-26-54	D.P.U.
1	Vertical Curve Data and Girder Tables	8-2-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

GIRDER SPANS STRESS SHEET

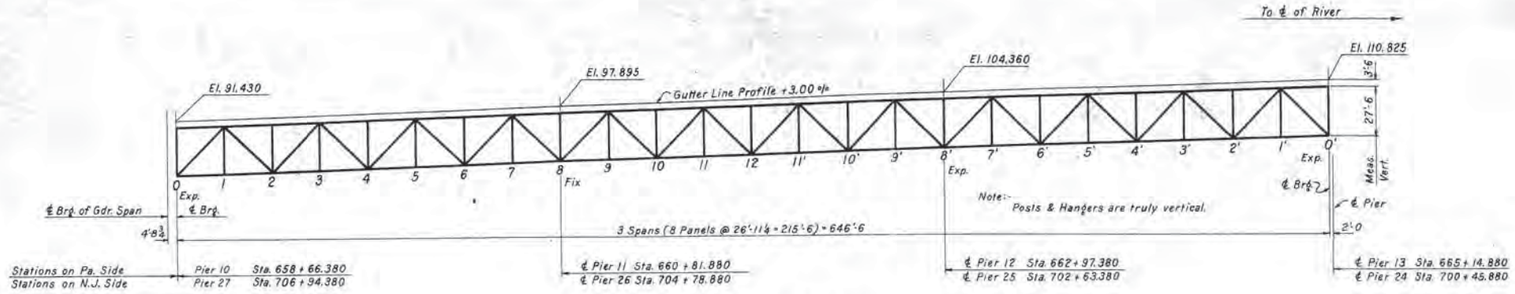
GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N.Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: S.M.U.
TRACED BY: D.P.U.
CHECKED BY: R.R.D.
SCALE: AS NOTED DATE: 8-1-54

CONTRACT PN 4
DWG. NO. DRB-4
SHEET 3 OF 68



ELEVATION

	MEMBER	GEOM. LENGTH IN FT.	DEAD LOAD KIPS	LIVE LOAD KIPS	IMPACT	WIND LOAD KIPS	DESIGN STRESS KIPS	RAD. OF GYRATION r IN.	* l/r	UNIT STRESS ALLOW. K/SQ.IN.	UNIT STRESS ACTUAL K/SQ.IN.	AREA GROSS SQ. IN.	AREA NET SQ. IN.	SECTION	MATERIAL
TOP CHORD	U0-U1	26.9496	0	0	0		IDLE					25.56		14 WF 87	Ⓒ
	U0'-U1'														
	U1-U3	26.9496	-744	-264	-39		-1047	4.08	79.2	-17.12	-16.27	64.36		14 WF 219	Ⓢ
	U1'-U3'														
	U3-U5	26.9496	-823	-345	-51		-1219	4.12	78.4	-17.17	-16.85	72.33		14 WF 246	Ⓢ
	U3'-U5'														
	U5-U7	26.9496	-222	-214	-31		+8 -470	3.72	86.9	+24.00 -16.53	+0.31 -15.53	30.26	25.61	14 WF 103	Ⓢ
	U5'-U7'														
	U7-U9	26.9496	+1044	+356	+52		+1452			+24.00	+23.45	72.33	61.92	14 WF 246	Ⓢ
	U7'-U9'														
	U9-U11	26.9496	+66 +46	+122 -124	+18 -18		+255 -146	3.70	87.4	+18.00 -13.09	+11.79 -5.71	25.56	21.63	14 WF 87	Ⓒ
	U9'-U11'														
	U11-U11'	26.9496	-261	-221	-33		-515	3.73	86.7	-16.54	-15.77	32.65		14 WF 111	Ⓢ
BOTTOM CHORD	L0-L2	26.9496	+454	+165	+24		+643			+24.00	+23.26	32.65	27.64	14 WF 111	Ⓢ
	L0'-L2'														
	L2-L4	26.9496	+867	+336	+50		+1253			+24.00	+23.61	62.07	53.08	14 WF 211	Ⓢ
	L2'-L4'														
	L4-L6	26.9496	+605	+303	+45		+953			+24.00	+22.74	49.09	41.91	14 WF 167	Ⓢ
	L4'-L6'														
	L6-L8	26.9496	-327	-177	-26	Govern	-530	3.73	86.7	-16.54	-16.23	32.65		14 WF 111	Ⓢ
	L6'-L8'														
	L8-L10	26.9496	-471	-187	-28	not	-686	3.97	81.5	-16.95	-16.39	41.85		14 WF 142	Ⓢ
	L8'-L10'														
	L10-L12	26.9496	+177 +124	+196 -122	+29 -18		+410 -24	3.70	87.4	+24.00 -16.49	+18.96 -0.94	25.56	21.63	14 WF 87	Ⓢ
	L10'-L12'														
DIAGONALS	L0-U1	39.0766	-648	-250	-40	do	-938	4.10	114.4	-13.98	-13.99	67.06		14 WF 228	Ⓢ
	L0'-U1'	37.9221													
	U1-L2	37.9221	+415	+188	+33		+636			+24.00	+22.14	32.65	28.72	14 WF 111	Ⓢ
	U1'-L2'	39.0766													
	L2-U3	39.0766	-176	-135	-26	Stresses	-337	3.97	118.1	-11.51	-8.05	41.85		14 WF 142	Ⓒ
	L2'-U3'	37.9221													
	U3-L4	37.9221	-63 -44	-125 +100	-15 +11		+101 -237			+18.00 -11.51	+2.72 -5.66	41.85	37.07	14 WF 142	Ⓒ
	U3'-L4'	39.0766													
	L4-U5	39.0766	+311	+170	+19	Wind	+500			+24.00	+22.26	25.56	22.46	14 WF 87	Ⓢ
	L4'-U5'	37.9221													
	U5-L6	37.9221	-548	-222	-23		-793	4.06	115.5	-13.86	-13.35	59.39		14 WF 202	Ⓢ
	U5'-L6'	39.0766													
	L6-U7	39.0766	+784	+281	+28		+1093			+24.00	+22.83	54.07	47.87	14 WF 184	Ⓢ
	L6'-U7'	37.9221													
	U7-L8	37.9221	-1026	-342	-32		-1400	4.24	110.6	-14.37	-13.92	100.59		14 WF 342	Ⓢ
	U7'-L8'	39.0766													
	L8-U9	39.0766	-819	-321	-88		-1170	4.17	112.5	-14.18	-13.87	84.37		14 WF 287	Ⓢ
	L8'-U9'	37.9221													
	U9-L10	37.9221	+579	+259	+26		+864			+24.00	+23.31	41.85	37.07	14 WF 142	Ⓢ
	U9'-L10'	39.0766													
	L10-U11	39.0766	-347	-201	-21		-569	3.99	117.5	-13.64	-12.91	44.08		14 WF 150	Ⓢ
	L10'-U11'	37.9221													
	U11-L12	37.9221	+119	+151	+17		+307	3.97	118.1	+18.00	+6.28	41.85	37.07	14 WF 142	Ⓒ
	U11'-L12	39.0766	+83	-109	-13		-59			-11.51	-1.41				
VERTICALS	U0-L0	27.5000	-110	-151	-45		-306	3.02	109.3	-14.50	-12.37	24.71		14 WF 84	Ⓢ
	U0'-L0'														
	U8-L8	27.5000	-164	-148	-44		-356	2.71	121.8	-13.17	-12.64	28.22		16 WF 96	Ⓢ
	U8'-L8'														
	OTHER INTERIOR POSTS	27.5000	-165	-148	-44		-357	3.02	109.3	-14.50	-14.48	24.71		14 WF 84	Ⓒ
	HANGERS	27.5000	+10	0	0		+10			+18.00	+0.66	17.94	15.05	14 WF 61	Ⓒ

* l/r ratio based on design lengths: 26.94' for chords
39.08' for diagonals
27.50' for posts

Ⓒ Denotes Carbon Steel
Ⓢ Denotes Silicon Steel

DEAD LOAD PANEL CONCENTRATIONS IN KIPS

PANEL POINT	FLOOR STEEL	FLOOR OTHER	TRUSS	BRACING	EXCESS*	TOTAL
0	39.6	56.6	11.4	7.3	3.5	118.4
1	26.7	109.0	17.2	6.9	6.9	166.7
2	27.6	109.0	20.1	6.9	6.9	170.5
3	26.7	109.0	21.4	6.9	6.9	170.9
4	29.8	112.2	21.6	6.9	6.9	177.4
5	26.7	109.0	19.2	6.9	6.9	168.7
6	27.6	109.0	18.3	6.9	6.9	168.7
7	26.7	109.0	23.3	6.9	6.9	172.8
8	29.8	112.2	30.3	9.6	6.9	188.8
9	26.7	109.0*	22.0	6.9	6.9	171.5
10	27.6	109.0	15.2	6.9	6.9	165.6
11	26.7	109.0	13.6	6.9	6.9	163.1
12	29.8	112.2	14.4	6.9	6.9	170.2
11'	26.7	109.0	13.6	6.9	6.9	163.1
10'	27.6	109.0	15.2	6.9	6.9	165.6
9'	26.7	109.0	22.0	6.9	6.9	171.5
8'	29.8	112.2	30.3	9.6	6.9	188.8
7'	26.7	109.0	23.3	6.9	6.9	172.8
6'	27.6	109.0	18.3	6.9	6.9	168.7
5'	26.7	109.0	19.2	6.9	6.9	168.7
4'	29.8	112.2	21.6	6.9	6.9	177.4
3'	26.7	109.0	21.4	6.9	6.9	170.9
2'	27.6	109.0	20.1	6.9	6.9	170.5
1'	26.7	109.0	17.2	6.9	6.9	166.7
0'	39.6	56.6	11.4	7.3	3.5	118.4

* An excess dead load of 0.25 kips per ft. of truss was used.

SHOE REACTIONS AT PIERS (KIPS)

	PIERS 10 & 27 MAX.	PIERS 10 & 27 MIN.	PIERS 11 & 26 MAX.	PIERS 11 & 26 MIN.	PIERS 12 & 25 MAX.	PIERS 12 & 25 MIN.	PIERS 13 & 24 MAX.	PIERS 13 & 24 MIN.
DEAD LOAD	595	595	1523	1523	1521	1521	592	592
LIVE LOAD	214	-26	511	-36	511	-36	214	-26
IMPACT	32	-4	75	-5	75	-5	32	-4
TRANSVERSE WIND 50#	H=54 V=30	54 -50	136 127	136 -127	136 127	136 -127	54 50	54 -50
LONGITUDINAL WIND 50#	H=		287					
LONGITUDINAL FRICTION	H=14		49		35		14	
TRACTION	H=		36					
TOTALS D+L+I	841	565	2109	1482	2107	1480	838	562

CONSTANT DEAD LOAD OF FLOOR PER TRUSS KIPS PER FOOT

Concrete Deck & Railing	4.05
Floor Steel	1.03
Excess	0.25
TOTAL	5.33

SPECIAL NOTES FOR APPROACH TRUSS SPANS

SPECIFICATIONS — Design: 1953 Standard Specifications for Highway Bridges of the American Association of State Highway Officials, modified.

Material and Workmanship: Pennsylvania Turnpike Commission Specifications for Grading, Drainage, Paving and Structures, Oct. 1952, modified.

DEAD LOAD — No provision has been made in the design for a future wearing surface on the concrete roadway slab. The roadway slab thickness required by the design has been increased ½ inch as allowance for wear.

LIVE LOAD — H 20-S16-44 — 2.376 Lanes per Truss

MATERIAL — Silicon or Carbon Steel as noted by Ⓢ or Ⓒ in the stress tables or on the details, and special alloy steel details where noted.

RIVETS - TRUSSES — 1" ϕ high strength in gusset plates, chord splice plates, and fillers on ends of truss members. Stitch rivets: ⅞" ϕ carbon steel

Floor System and Bracing: ⅞" ϕ carbon steel, unless noted.

All 1" ϕ rivets in Approach Truss Spans regardless of location, and whether shop or field, must be high strength rivets.

Maximum Pitch: For sealing, the pitch on a single line adjacent to a free edge of an outside plate or shape shall not exceed 4 + 4t nor 7". If there be a second line of rivets uniformly staggered with those in the line adjacent to the free edge, at a gage less than 1½ + 4t, the stagger pitch shall not exceed 4 + 4t - ¾ g, nor 7 - ¾ g, but need not be less than ½ the requirement for a single line. t = thickness in inches of thinner outside plate or shape.

Stitch Rivets: In compression members, the pitch in any single line in the direction of stress shall not exceed 12t; except if rivets on adjacent lines be staggered and the gage is less than max. of 24t, the stagger pitch shall not exceed 12t nor 15t - ¾ g.

RIVET VALUES

	High Strength Rivets Shop or Field	Carbon Steel Rivets Shop or Field
Shear	20,000 #/a"	13,500 #/a"
Bearing	40,000 #/a" on Silicon Steel 27,000 #/a" on Carbon Steel	27,000 #/a"

REAMING — Trusses: Holes for truss joints, including gusset plates, splice plates and fillers shall be punched or drilled 13/16" ϕ and reamed to 1 1/16" ϕ as prescribed in the "Supplemental Specifications." Holes for stitch rivets shall be punched or drilled 13/16" ϕ and reamed assembled to 15/16" ϕ.

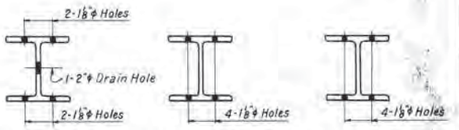
Floor Beams and Brackets: Holes shall be punched or drilled 13/16" ϕ and reamed assembled to 1 1/16" ϕ unless noted, except holes in tension plates shall be punched or drilled 13/16" ϕ and reamed to size as noted.

Stringers: Holes for splices shall be punched or drilled 11/16" ϕ and reamed to 15/16" ϕ with parts assembled or to a metal templet. Other holes may be punched full size unless noted.

Bracing and Diaphragms: Holes may be punched full size unless noted.

Expansion Dams and Supports: Holes shall be drilled, sub-punched and reamed as noted on the design details. Holes not noted may be punched full size.

NET AREAS — "Net Areas" are calculated from "Gross Areas" deducting holes as shown below:



CHORDS — DIAGONALS — VERTICALS

SPECIAL NOTES - Continued

CAMBER — Trusses shall be cambered for full Dead Load. For stringer and floor beam camber see Sheet 8.
Gross Areas, increased 10 % for effect of details, shall be used for calculating cambered lengths.

NORMAL TEMPERATURE — Superstructure dimensions shall be attained at 68° F.

DRAIN HOLES — Wide Flange Sections forming horizontal or nearly horizontal troughs, and other points where water may collect, shall be adequately drained. Drain holes, where indicated in Typical Details, shall be used and drainage at other points may be accomplished by filling with approved water-proof materials.

FILLING ANCHOR BOLT HOLES — The clearance between anchor bolts and holes in masonry plates and shoes shall be filled with molten zinc after erection.

EDGE PLANING — Web plates of girders, floor beams and brackets may be sheared and edge planing will not be required. Sheared edges of other plates, if silicon steel, or if carbon steel over ⅝" thick, shall be edge planed for a depth of ¼" or flame cut by means of a mechanically guided torch. Flame cut edges of silicon steel plates (including manhole peripheries) shall be flame softened.

NO.	REVISION	DATE	BY
1	Shifted Girder Bearing at Pier 10	10-29-54	O.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY
DELAWARE RIVER BRIDGE
BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.
3-SPAN APPROACH TRUSSES
STRESS SHEET FOR TRUSSES

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.
MORAN, PROCTOR MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. — ASSOCIATES
HARBESON, HOUGH LIVINGSTON & LARSON, PHILADELPHIA, PENNA. — ARCHITECTS

DRAWN BY: W.W.S. & R.C.M.
TRACED BY: W.A.G.
CHECKED BY: W.C.H.
SCALE: 1" = 40'-0 DATE: 6-1-54

CONTRACT PN 4
DWG. NO. DRB-4
SHEET 7 OF 68

PA 1797-2R2

SECTION B

SECTION C

SECTION D

61 @ 4½" = 21'-7½"

108 @ 4½" = 38'-3"

47 @ 4½" = 16'-7½"

38'-3" - Curb to ℄ Bridge

Symmetrical about this ℄ except at ℄ as shown

℄ of Bridge

FIN. Ends of Exp. R

Punch Holes ⅞" ϕ and Ream in Field to 1 1/16" ϕ after Adjustment of Parapet

Cut Flg. to 2" Wide

1-Cov. R 6½ x 1, FIN. Top

3" Exp. R

1⅛" ϕ Holes for Turned Tap Bolts Drilled Assembled

Holes for 1" ϕ Rivets RT

Gutter Line to Bk. B See Sec. "A"

Holes for 1" ϕ Rivets – Sub Punch ½" and Ream to Size in Field NOTE "A"

L- 8½ x 4 x ⅝ (Cut 9 x 4)

Conn. L 4 x 4 x 7/16

18 I 70

18 C 58

21 WF

24 WF

24 W

½" Spl. R

29'-0"

58'-0" C.-C. Girders

1'-4½" Normal @ 68° F.
1'-2½" Full Expansion
1'-8" Full Contraction
4" 6½" 4" Normal @ 68° F.
2" 10½" 2" Full Expansion
7½" 5" 7½" Full Contraction

GIRDER SPAN

APPROACH TRUSS SPAN

SECTION A

ENLARGED DETAIL OF TOOTH
Scale: 1½" = 1 Ft.

TYPICAL BEAD WELDING PATTERN
Scale: 1½" = 1 Ft.
Beads to Have Height of ⅛" Min.

NOTE:
Details and Sections not Shown are Similar to those Shown on Sheet 51.

NOTES:
All material listed on this sheet to be carbon steel.
All shop and field rivets shown on this sheet, including rivets in stringers, to be 1" ϕ high strength, except ⅞" ϕ carbon in flanges of 18 I-70.

NO.	REVISION	DATE	BY
	"As Built" Rivision:		
2	Added 1" Normal Shims - in Sec. A and called for ⅞" ϕ Rivets in flange of 18 I-70	3-7-56	A.H.H.
1	Rivets Changed to High Strength & Symmetrical Note Changed	8-2-54	J.R.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

GIRDER SPAN & 3-SPAN APPROACH TRUSS SPAN
EXPANSION DAM AT PIERS 10 & 27

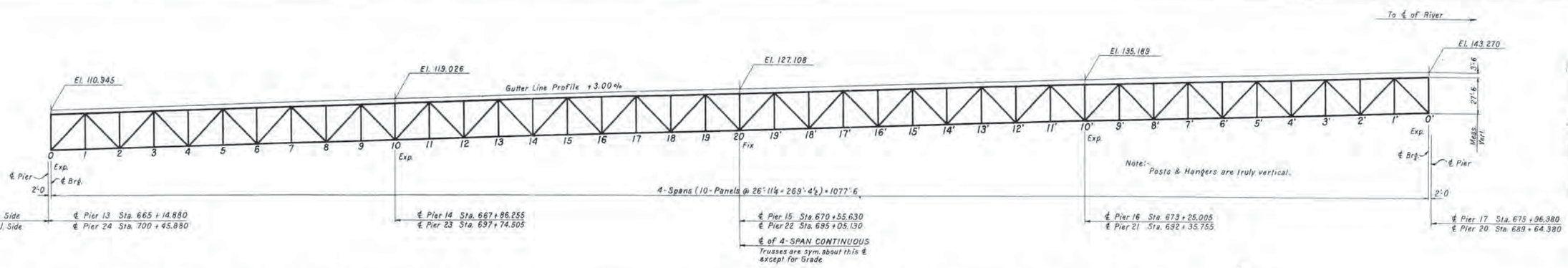
GEORGE, S. RICHARDSON
CONSULTING ENGINEER — PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: L. E. P.
TRACED BY: J. R.
CHECKED BY: S. M. U.
SCALE: AS NOTED DATE: 6-1-54

CONTRACT PN 4
DWG. NO. DRB-4
SHEET 14 OF 68



	MEMBER	GEOM. LENGTH FT.	DEAD LOAD KIPS	LIVE LOAD KIPS	IMPACT KIPS	WIND LOAD KIPS	DESIGN STRESS KIPS	RAD. OF GYRATION r IN.	ℓ/r ⊗	UNIT STRESS ALLOW. K/SQ.IN.	UNIT STRESS ACTUAL K/SQ.IN.	AREA FURN. GROSS SQ. IN.	AREA FURN. NET SQ. IN.	SECTION	MATERIAL
TOP CHORD	U0-U1 U0'-U1'	26.9496	0	0	0		IDLE					25.56		14 WF 87	©
	U1-U3 U1'-U3'	26.9496	-1028	-355	-45		-1428	4.17	77.5	-17.23	-16.93	84.37		14 WF 287	Ⓢ
	U3-U5 U3'-U5'	26.9496	-1367	-511	-65		-1942	4.29	75.5	-17.37	-16.98	114.37		14 WF 287 2-Pls.16×⅞	Ⓢ
	U5-U7 U5-U7'	26.9496	-984	-470	-60		-1614	4.20	77.0	-17.27	-16.40	92.30		14 WF 314	Ⓢ
	U7-U9 U7'-U9'	26.9496	+ 35 + 66	+ 260 - 242	+33 -31		+490 -310	3.71	87.2	+24.00 -16.50	+20.80 -11.10	27.94	23.56	14 WF 95	Ⓢ
	U9-U11 U9'-U11'	26.9496	+1880	+586	+74		+2541			+24.00	+23.17	127.40	103.65	14 WF 342 2-Pls.16½×⅞	Ⓢ
	U11-U13 U11'-U13'	26.9496	+ 411	+211	+27		+649			+24.00	+21.90	34.99	29.64	14 WF 119	Ⓢ
	U13-U15 U13'-U15'	26.9496	- 362	-318	-40		- 720	3.99	81.0	-16.98	-16.33	44.08		14 WF 150	Ⓢ
	U15-U17 U15-U17'	26.9496	- 481	-346	-44	govern	- 871	4.04	80.1	-17.06	-16.11	54.07		14 WF 184	Ⓢ
	U17-U19 U17-U19'	26.9496	+ 65 + 45	+191 -189	+24 -24	not	+364 -251	3.70	87.5	+18.00 -13.08	+16.86 - 9.82	25.56	21.59	14 WF 87	©
	U19-U19'	26.9496	+1277	+509	+65		+1851			+24.00	+23.43	92.30	79.01	14 WF 314	Ⓢ
BOTTOM CHORD	L0-L2 L0'-L2'	26.9496	+ 598	+202	+26	do	+ 826			+24.00	+23.14	41.85	35.69	14 WF 142	Ⓢ
	L2-L4 L2'-L4'	26.9496	+1285	+458	+58		+1801			+24.00	+22.79	92.30	79.01	14 WF 314	Ⓢ
	L4-L6 L4'-L6'	26.9496	+1264	+514	+65	Stresses	+1844			+24.00	+23.34	92.30	79.01	14 WF 314	Ⓢ
	L6-L8 L6'-L8'	26.9496	+ 530	+378	+48		+ 956			+24.00	+22.85	49.09	41.84	14 WF 167	Ⓢ
	L8-L10 L8'-L10'	26.9496	- 837	-347	-44		-1288	4.17	77.5	-17.23	-15.27	84.37		14 WF 287	Ⓢ
	L10-L12 L10-L12'	26.9496	-1055	-353	-45	Wind	-1453	4.20	77.0	-17.27	-15.74	92.30		14 WF 314	Ⓢ
	L12-L14 L12'-L14'	26.9496	+ 57 + 40	+251 -187	+32 -24		+ 425 - 254	3.70	87.5	+24.00 -16.48	+19.69 - 9.94	25.56	21.59	14 WF 87	Ⓢ
	L14-L16 L14'-L16'	26.9496	+ 503	+356	+45		+ 904			+24.00	+22.81	46.47	39.63	14 WF 158	Ⓢ
	L16-L18 L16'-L18'	26.9496	+ 289 + 202	+288 -186	+37 -24		+ 617 - 10	3.73	86.7	+24.00 -16.54	+22.37 - 0.31	32.65	27.58	14 WF 111	Ⓢ
	L18-L20 L18'-L20'	26.9496	- 584	-297	-38		- 919	4.05	79.9	-17.06	-16.20	56.73		14 WF 193	Ⓢ

	MEMBER	GEOM. LENGTH FT.	DEAD LOAD KIPS	LIVE LOAD KIPS	IMPACT KIPS	WIND LOAD KIPS	DESIGN STRESS KIPS	RAD. OF GYRATION r IN.	ℓ/r ⊗	UNIT STRESS ALLOW. K/SQ.IN.	UNIT STRESS ACTUAL K/SQ.IN.	AREA FURN. GROSS SQ. IN.	AREA FURN. NET SQ. IN.	SECTION	MATERIAL
DIAGONALS	L0-U1 L0'-U1'	39.0766 37.9221	-855	- 302	-38		-1195	4.17	112.5	-14.18	-14.16	84.37		14 WF 287	Ⓢ
	U1-L2 U1'-L2'	37.9221 39.0766	+ 615	+ 241	+35		+ 891			+24.00	+22.83	44.08	39.02	14 WF 150	Ⓢ
	L2-U3 L2'-U3'	39.0766 37.9221	- 367	- 187	-30		- 584			-13.64	-13.25	44.08		14 WF 150	Ⓢ
	U3-L4 U3'-L4'	37.9221 39.0766	+117 + 82	+152 -118	+14 -12		+ 307 - 72	3.97	118.1	+18.00 -11.51	+ 8.28 - 1.72	41.85	37.07	14 WF 142	©
	L4-U5 L4'-U5'	39.0766 37.9221	+147 +103	+155 -112	+16 -11		+328 - 30	3.97	118.1	+18.00 -11.51	+ 8.85 - 0.72	41.85	37.07	14 WF 142	©
	U5-L6 U5'-L6'	37.9221 39.0766	-400	-198	-19		- 617	4.00	117.2	-13.68	-13.28	46.47		14 WF 158	Ⓢ
	L6-U7 L6'-U7'	39.0766 37.9221	+ 649	+ 246	+22		+ 917			+24.00	+22.30	46.47	41.13	14 WF 158	Ⓢ
	U7-L8 U7'-L8'	37.9221 39.0766	- 892	- 300	-26	govern	-1218	4.20	111.7	-14.26	-13.20	92.30		14 WF 314	Ⓢ
	L8-U9 L8'-U9'	39.0766 37.9221	+1146	+ 358	+29		+1533			+24.00	+22.25	77.63	68.91	14 WF 264	Ⓢ
	U9-L10 U9'-L10'	37.9221 39.0766	-1406	- 418	-31		- 1855	4.34	108.1	-14.62	-14.33	129.47		14 WF 342 2-Pls.16½×⅞	Ⓢ
	L10-U11 L10'-U11'	39.0766 37.9221	-1179	- 406	-22	not	- 1607	4.28	109.6	-14.47	-14.06	114.30		14 WF 314 2-Pls. 16×½	Ⓢ
	U11-L12 U11'-L12'	37.9221 39.0766	+ 920	+ 346	+20	do	+1286			+24.00	+23.36	62.07	55.04	14 WF 211	Ⓢ
	L12-U13 L12'-U13'	39.0766 37.9221	- 669	- 289	-17		- 975	4.12	113.8	-14.03	-13.48	72.33		14 WF 246	Ⓢ
	U13-L14 U13-L14'	37.9221 39.0766	+ 436	+ 235	+14	Stresses	+ 685			+24.00	+22.26	34.99	30.77	14 WF 119	Ⓢ
	L14-U15 L14'-U15'	39.0766 37.9221	- 202	- 188	-12		- 402	3.97	118.1	-11.51	- 9.61	41.85		14 WF 142	©
	U15-L16 U15'-L16'	37.9221 39.0766	- 32 - 22	-167 +148	-16 +10	Wind	- 283 + 204	3.97	118.1	-11.51 +18.00	- 6.76 + 5.50	41.85	37.07	14 WF 142	©
	L16-U17 L16'-U17'	39.0766 37.9221	+274	+212	+19		+ 505			+24.00	+22.47	25.56	22.47	14 WF 87	Ⓢ
	U17-L18 U17'-L18'	37.9221 39.0766	- 506	- 265	-23		- 794	4.06	115.5	-13.86	-13.37	59.39		14 WF 202	Ⓢ
	L18-U19 L18'-U19'	39.0766 37.9221	+742	+ 322	+26		+1090			+24.00	+22.77	54.07	47.88	14 WF 184	Ⓢ
	U19-L20 U19'-L20'	37.9221 39.0766	- 989	- 383	-29		-1401	4.24	110.6	-14.37	-13.93	100.59		14 WF 342	Ⓢ
VERTICALS	U0-L0 U0'-L0'	27.5000	-110	-151	-45		- 306	3.02	109.3	-14.50	-12.37	24.71		14 WF 84	Ⓢ
	U2-L2, U4-L4, etc.*	27.5000	-164	-148	-44		- 356	2.71	121.8	-13.17	-12.64	28.22		16 WF 96	Ⓢ
	U8-L8, U12-L12, etc.◉	27.5000	-165	-148	-44		- 357	3.02	109.3	-14.50	-14.48	24.71		14 WF 84	Ⓢ
	HANGERS	27.5000	+ 10	0	0		+ 10			+18.00	+0.66	17.94	15.05	14 WF 61	©

DEAD LOAD PANEL CONCENTRATIONS IN KIPS

PANEL POINT	FLOOR STEEL	FLOOR OTHER	TRUSS	BRACING	EXCESS ⊗	TOTAL
0	40.6	56.9	14.0	7.3	3.5	122.3
1	26.7	109.0	22.0	6.9	6.9	171.5
2	27.6	109.0	26.6	6.9	6.9	177.0
3	26.7	109.0	29.4	6.9	6.9	178.9
4	29.8	112.2	32.7	6.9	6.9	188.5
5	26.7	109.0	30.9	6.9	6.9	180.4
6	27.6	109.0	27.7	6.9	6.9	178.1
7	26.7	109.0	24.2	6.9	6.9	173.7
8	29.8	112.2	25.7	6.9	6.9	181.5
9	26.7	109.0	35.8	6.9	6.9	185.3
10	27.6	109.0	44.0	9.6	6.9	197.1
11	26.7	109.0	35.3	6.9	6.9	184.8
12	29.8	112.2	23.4	6.9	6.9	179.2
13	26.7	109.0	17.4	6.9	6.9	166.9
14	27.6	109.0	16.5	6.9	6.9	166.9
15	26.7	109.0	17.6	6.9	6.9	167.1
16	29.8	112.2	17.3	6.9	6.9	173.1
17	26.7	109.0	16.2	6.9	6.9	165.7
18	27.6	109.0	18.3	6.9	6.9	168.7
19	26.7	109.0	27.1	6.9	6.9	176.6
20	29.8	112.2	34.1	9.6	6.9	192.6
19'	26.7	109.0	27.1	6.9	6.9	176.6
18'	27.6	109.0	18.3	6.9	6.9	168.7
17'	26.7	109.0	16.2	6.9	6.9	165.7
16'	29.8	112.2	17.3	6.9	6.9	173.1
15'	26.7	109.0	17.6	6.9	6.9	167.1
14'	27.6	109.0	16.5	6.9	6.9	166.9
13'	26.7	109.0	17.4	6.9	6.9	166.9
12'	29.8	112.2	23.4	6.9	6.9	179.2
11'	26.7	109.0	35.3	6.9	6.9	184.8
10'	27.6	109.0	44.0	9.6	6.9	197.1
9'	26.7	109.0	35.8	6.9	6.9	185.3
8'	29.8	112.2	25.7	6.9	6.9	181.5
7'	26.7	109.0	24.2	6.9	6.9	173.7
6'	27.6	109.0	27.7	6.9	6.9	178.1
5'	26.7	109.0	30.9	6.9	6.9	180.4
4'	29.8	112.2	32.7	6.9	6.9	188.5
3'	26.7	109.0	29.4	6.9	6.9	178.9
2'	27.6	109.0	26.6	6.9	6.9	177.0
1'	26.7	109.0	22.0	6.9	6.9	171.5
0'	40.6	56.9	14.0	7.3	3.5	122.3

NOTE:
For "SPECIAL NOTES FOR APPROACH TRUSS SPANS" and For number of holes deducted for tension members: See Sheet 7

⊗ ℓ/r ratio based on design lengths of: 26.94' for chords, 39.08' for diagonals, 27.50' for posts

© denotes Carbon Steel
Ⓢ denotes Silicon Steel

* includes { U2-L2, U4-L4, U6-L6, U10-L10, U20-L20 / U2'-L2, U4'-L4, U6'-L6, U10'-L10' }

◉ includes { U8-L8, U12-L12, U14-L14, U16-L16, U18-L18 / U8'-L8', U12'-L12', U14'-L14', U16'-L16', U18'-L18' }

⊗ An excess dead load of 0.25 kips per foot of truss was used.

SHOE REACTIONS AT PIERS

	PIERS 13 & 24 MAX.	PIERS 13 & 24 MIN.	PIERS 14 & 23 MAX.	PIERS 14 & 23 MIN.	PIERS 15 & 22 MAX.	PIERS 15 & 22 MIN.	PIERS 16 & 21 MAX.	PIERS 16 & 21 MIN.	PIERS 17 & 20 MAX.	PIERS 17 & 20 MIN.
DEAD LOAD	743	743	2062	2062	1622	1622	2062	2062	743	743
LIVE LOAD	252	-35	626	-45	582	-92	626	-45	252	-35
IMPACT	32	- 5	80	- 6	74	-12	80	- 6	32	- 5
TRANSVERSE WIND 50#	H=66 V=62	66 -62	177 168	177 -168	161 151	161 -151	177 168	177 -168	66 62	66 -62
LONGITUDINAL WIND 50#	H=				470					
LONGITUDINAL FRICTION	H=18		68		86		68		18	
TRACTION	H=				44					
TOTALS D+L+I	1027	703	2768	2011	2278	1518	2768	2011	1027	703

CONSTANT DEAD LOAD OF FLOOR PER TRUSS KIPS PER FOOT

Concrete Deck & Railing	4.05
Floor Steel	1.03
Excess	0.25
TOTAL	5.33

NO.	REVISION	DATE	BY

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

4-SPAN APPROACH TRUSSES
STRESS SHEET FOR TRUSSES

GEORGE S. RICHARDSON
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PITTSBURGH, PENNA.

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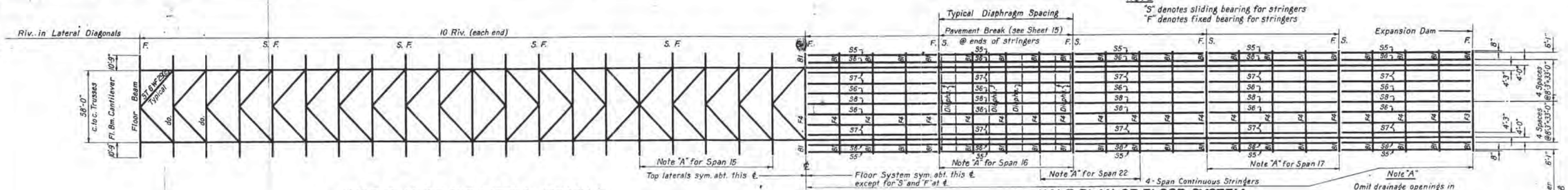
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: W.W.S. & R.C.M.
TRACED BY: W.A.G.
CHECKED BY: W.C.H.
SCALE: 1"=40'-0 DATE: 6-1-54

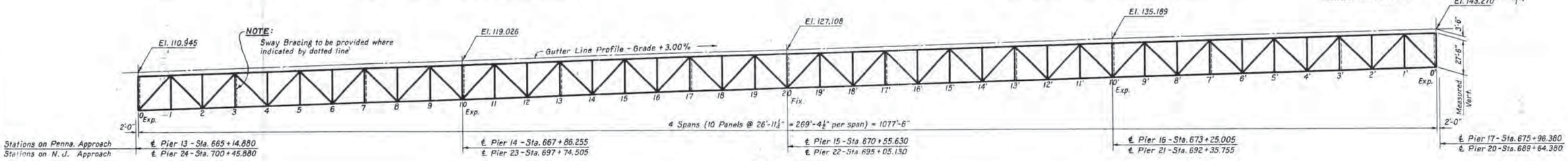
CONTRACT PN 4
DWG. NO. DRB-4
SHEET 17 OF 68



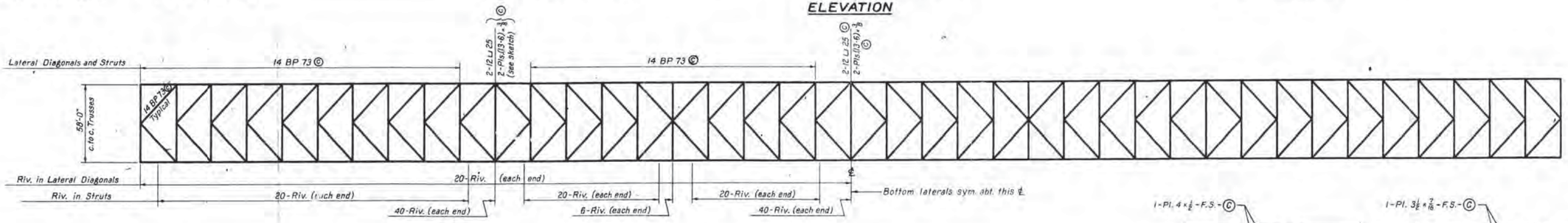
NOTE:
"S" denotes sliding bearing for stringers
"F" denotes fixed bearing for stringers

HALF PLAN OF TOP LATERAL BRACING

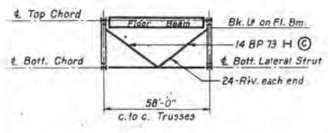
HALF PLAN OF FLOOR SYSTEM



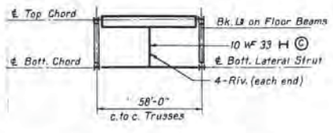
ELEVATION



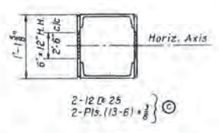
PLAN OF BOTTOM LATERAL BRACING



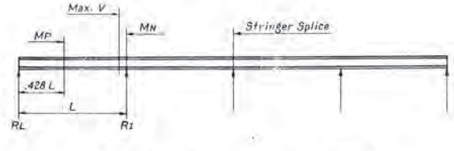
SWAY BRACING AT 0, 3, 7, 10, 13, 17, 20 17', 13', 10', 7', 3' & 0'



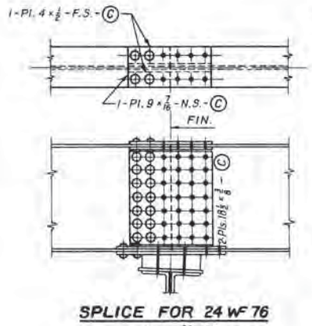
HANGER AT PANEL POINTS HAVING NO SWAY BRACING



BOTTOM STRUT AT PANEL POINTS 10, 20 & 10'

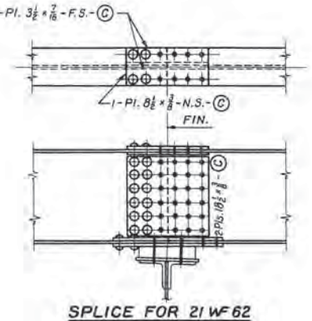


4 SPAN CONTINOUS STRINGER



SPLICE FOR 24 WF 76

Scale: ¾" = 1'-0



SPLICE FOR 21 WF 62

Scale: ¾" = 1'-0

STRINGER SCHEDULE

MARK	RL (K) D+L+I	RL (K) TOTAL	Rt (K) D+L+I	Rt (K) TOTAL	MP (Ft. K) D+L+I	MP (Ft. K) TOTAL	MN (Ft. K) D+L+I	MN (Ft. K) TOTAL	V (K) D+L+I	V (K) TOTAL	SECTION FURNISHED	S. M. FURN. (in³) GROSS	S. M. FURN. (in³) NET	MAX. STRESS K/sq. in. BEND	MAX. STRESS K/sq. in. SHEAR	MAT'L.
S5	11 12 3	26	31 16 5	52	56 50 15	121	78 43 13	134	18 14 4	36	21 WF 62	126.4	120.5	12.8	4.3	©
S6	8 32 9	49	22 42 13	77	40 134 40	214	56 115 34	205	12 37 11	59	24 WF 76	175.4	166.2	14.7	6.0	©
S7	9 36 11	56	25 49 14	88	46 154 46	246	63 132 40	235	13 42 13	68	24 WF 76	175.4	166.2	16.8	6.9	©
S8	9 36 11	56	26 49 14	89	47 154 46	247	65 132 40	237	14 42 13	69	24 WF 76	175.4	166.2	16.9	7.0	©

Ⓢ denotes Silicon steel
© denotes Carbon steel

FLOOR BEAM SCHEDULE

MARK	MAX. REACT. AND SHEAR D+L+I	MAX. REACT. AND SHEAR TOTAL	MAX. MOM. (Ft. K) D+L+I	MAX. MOM. (Ft. K) TOTAL	SECTION FURNISHED WEB	ANGLES	COV. PLATES	NET S M FURNISHED in³	MAX. STRESS K/sq. in. BEND	MAX. STRESS K/sq. in. SHEAR	DETAILS ON SHEET NO.	MAT'L.
F3	56 103 28	187	333 1505 411	2249	1-Pl. 75 x 7/16	4-Ls 6 x 6 x ½	2-Pls. 14 x ½*	1430	19.3	5.7	15	Ⓢ
F4	106 128 35	269	915 1859 507	3281	1-Pl. 75 x 7/16	4-Ls 6 x 6 x ½	4-Pls. 14 x ½*	1845	21.4	8.2	15	Ⓢ
B1	57 61 18	136	419 309 93	821	1-Pl. 75 x 7/16	4-Ls 6 x 6 x ½	1-Pl. 14 x ½*	1033	9.5	4.2	15	Ⓢ

* For cover plate lengths see Sheet 15

NO.	REVISION	DATE	BY
2	"S" & "F" reversed, left half PLAN. Panels added under Note "A"	4-20-55	D.P.U.
1	Diaphragms added at 16'; also cover plate length note added	8-2-54	H.C.D.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

4-SPAN APPROACH TRUSS SPANS
STRESS SHEET FOR FLOOR SYSTEM & BRACING

GEORGE S. RICHARDSON
CONSULTING ENGINEER — PITTSBURGH, PENNA.

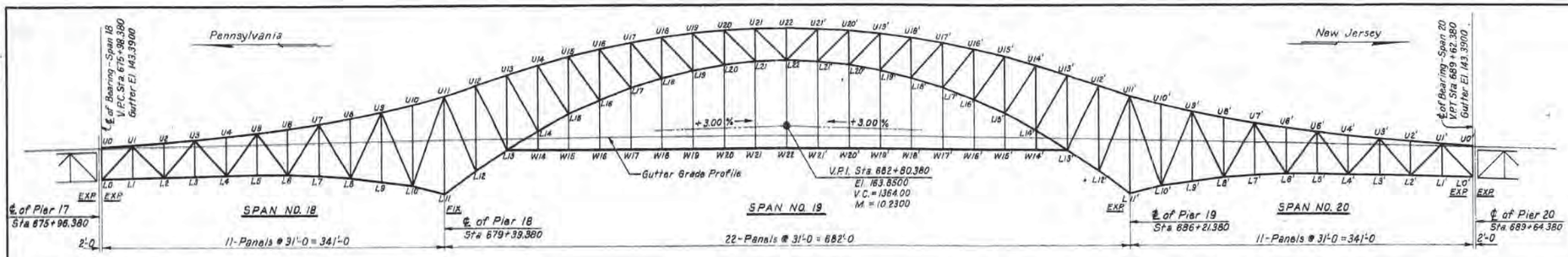
MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: W. W. S. & R. C. M.
TRACED BY: H. C. D.
CHECKED BY: W. C. H.
SCALE: AS NOTED DATE: 6-1-54

CONTRACT PN 4
DWG. NO. DRB-4
SHEET 18 OF 68

PR 1797-603



TOP CHORDS

MEMBER	LENGTH	STRESSES: DEAD LOAD CANTILEVER	DEAD LOAD JACKING	DEAD LOAD CONTINUOUS	DEAD LOAD TOTAL	LIVE LOAD	IMPACT	WIND	DESIGN	r	l/r	UNIT STRESS (k.s.i.) ALLOW.	UNIT STRESS (k.s.i.) ACTUAL	AREA FURN. (Sq. in.) EFFECT GROSS OR NET	AREA FURN. (Sq. in.) FULL GROSS	SECTION: WEBS	SECTION: ANGLES	SECTION: COVER PLATES	MATL.
U0-U1	31.0480			Nominal	Member											2-Pls.34x$\frac{3}{8}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{3}{8}$	C.
U1-U2	31.0708	+627	-368	+42	+301 (+211)	+360 -410	+28 -44		+811 -365	12.59	29.6	+18.00 -14.78	+10.48 -3.91	W. 77.37 G. 93.25	100.75	2-Pls.34x$\frac{11}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{1}{2}$ 1-Pl.(24-12)x$\frac{5}{8}$	C.
U2-U3	31.1015	+627	-370	+42	+299 (+209)	+361 -411	+29 -44		+812 -369	12.59	29.6	+18.00 -14.78	+10.50 -3.95	W. 77.37 G. 93.25	100.75	2-Pls.34x$\frac{11}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{1}{2}$ 1-Pl.(24-12)x$\frac{5}{8}$	C.
U3-U4	31.1418	+1493	-662	+523	+1354	+647	+51		+2052			+24.00	+23.30	N. 88.05	114.44	2-Pls.34x$\frac{3}{4}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{11}{16}$	S.
U4-U5	31.1949	+1496	-664	+524	+1356	+648	+51		+2055			+24.00	+23.34	N.88.05	114.44	2-Pls.34x$\frac{3}{4}$	4-L8 8x6x$\frac{9}{16}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{11}{16}$	S.
U5-U6	31.2651	+2393	-838	+1234	+2795	+820	+65		+3680			+24.00	+23.76	N.154.87	200.26	2-Pls.34x$\frac{1}{2}$ 2-Pls.34x$\frac{3}{4}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{3}{4}$	S.
U6-U7	31.3583	+2406	-840	+1237	+2803	+822	+65		+3690			+24.00	+23.83	N156.84	203.26	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{3}{4}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{13}{16}$	S.
U7-U8	31.4836	+3056	-864	+1857	+4049	+849	+67	Stresses Do Not Govern	+4965			+24.00	+23.91	N.207.63	269.01	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{13}{16}$ 2-Pls.18x$\frac{3}{4}$ 2-Pls.31$\frac{1}{2}$x$\frac{1}{2}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24x$\frac{3}{4}$ 1-Pl.(24-12)x$\frac{7}{8}$	S.
U8-U9	31.6546	+3073	-868	+1867	+4072	+853	+67		+4992			+24.00	+23.82	N.209.60	272.01	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{13}{16}$ 2-Pls.18x$\frac{3}{4}$ 2-Pls.31$\frac{1}{2}$x$\frac{1}{2}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
U9-U10	31.8932	+3369	-786	+2221	+4804	+865	+68	Wind Stresses	+5737			+24.00	+23.95	N.239.53	310.23	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{15}{16}$ 2-Pls.18x$\frac{3}{4}$ 2-Pls.31$\frac{1}{2}$x$\frac{15}{16}$	4-L8 8x6x$\frac{7}{8}$	1-Pl. 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
U10-U11	32.2361	+3406	-794	+2245	+4857	+874	+69		+5800			+24.00	+24.02	N.241.50	313.23	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{13}{16}$ 2-Pls.18x$\frac{3}{4}$ 2-Pls.31$\frac{1}{2}$x$\frac{15}{16}$	4-L8 8x6x$\frac{7}{8}$	1-Pl. 24x$\frac{3}{8}$ 1-Pl.(24-12)x 1	S.
U11-U12	32.7496	+3182	-840	+2087	+4429	+813	+64		+5306			+24.00	+23.79	N.223.03	289.61	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{13}{16}$ 2-Pls.18x$\frac{3}{4}$ 2-Pls.31$\frac{1}{2}$x$\frac{15}{16}$	4-L8 8x6x$\frac{7}{8}$	1-Pl. 24x$\frac{7}{8}$ 1-Pl.(24-12) x1	S.
U12-U13	32.9005	+2857	-952	+1774	+3679	+712	+56		+4447			+24.00	+23.85	N.186.82	252.17	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{13}{16}$ 2-Pls.18x$\frac{3}{4}$	4-L8 8x6x$\frac{7}{8}$	1-Pl 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
U13-U14	32.5303	+2495	-1072	+1395	+2818	+598	+47		+3463			+24.00	+23.79	N.145.58	190.67	2-Pls.34x$\frac{15}{16}$ 2-Pls.18x$\frac{3}{4}$	4-L8 8x6x$\frac{7}{8}$	1-Pl. 24x$\frac{3}{8}$ 1-Pl.(24-12) x$\frac{7}{8}$	S.
U14-U15	32.1977	+2128	-1206	+969	+1891	+480	+38		+2409			+24.00	+23.71	N.101.62	130.51	2-Pls.34x$\frac{15}{16}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{1}{2}$ 1-Pl.(24-12)x$\frac{5}{8}$	S.
U15-U16	31.9038	+1742	-1355	+497	+884	+368	+29	We ※ +69	E+We +2174			+30.00•	+29.42	N. 73.90	96.50	2-Pls.34x$\frac{5}{8}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{1}{2}$ 1-Pl.(24-12)x$\frac{5}{8}$	S.
U16-U17	31.6497	+1346	-1519	- 13	-186 (-130)	-303 +281	-19 +22	We ※ +47	E+We +1701			+22.50•	+20.18	N. 84.30	109.25	2-Pls.34x$\frac{13}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{5}{8}$ 1-Pl.(24-12)x$\frac{5}{8}$	C.
U17-U18	31.4364	+947	-1687	-542	-1282	-429	-27		-1738	12.57	30.0	-19.59	-16.71	G.104.00	112.25	2-Pls.34x$\frac{13}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
U18-U19	31.2647	+571	-1847	-1057	-2333	-589	-37		-2959	12.40	30.3	-19.58	-19.40	G.152.51	162.26	2-Pls.34x$\frac{5}{8}$ 2-Pls.18 x$\frac{3}{4}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
U19-U20	31.1353	+261	-1981	-1513	-3233	-744	-46	Wind Stresses Do Not Govern	-4023	11.78	31.7	-19.54	-19.42	G.207.20	217.70	2-Pls.34x$\frac{15}{16}$ 2-Pls.18x$\frac{3}{4}$ 2-Pls.31$\frac{1}{2}$x$\frac{5}{8}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24x$\frac{3}{8}$ 1-Pl.(24-12) x$\frac{7}{8}$	S.
U20-U21	31.0488	+ 61	-2074	-1837	-3850	-850	-53		-4753	11.60	32.1	-19.53	-19.46	G.244.19	254.69	2-Pls.34x$\frac{15}{16}$ 2-Pls.18x1 2-Pls.31$\frac{1}{2}$x$\frac{13}{16}$	4-L8 8x6x1	1-Pl. 24x$\frac{3}{8}$ 1-Pl.(24-12)x$\frac{7}{8}$	S.
U21-U22	31.0054	0	-2105	-1973	-4078	-867	-55		-5020	11.46	32.5	-19.51	-19.31	G.259.94	270.44	2-Pls.34x$\frac{15}{16}$ 2-Pls.18x1 2-Pls.31$\frac{1}{2}$x$\frac{11}{16}$	6-L8 8x6x1	1-Pl. 24x$\frac{3}{8}$ 1-Pl.(24-12)x$\frac{7}{8}$	S.

E = Erection. ※ We = 30 lb. Erection Wind. • Allowable Increased by 25%.

BOTTOM CHORDS

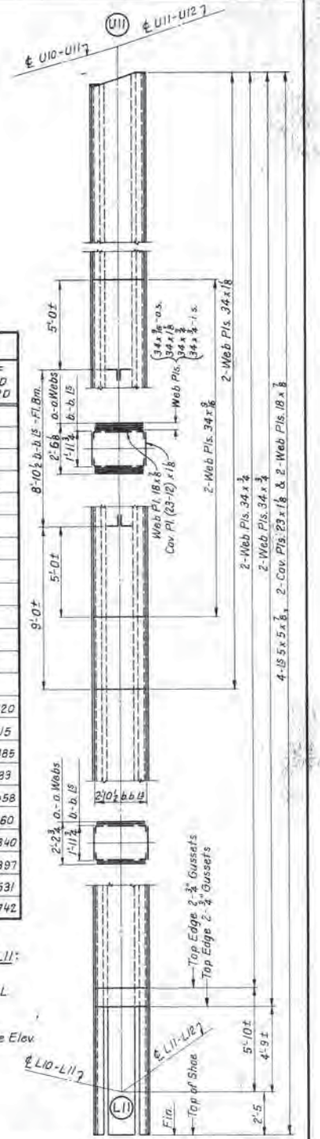
MEMBER	LENGTH	STRESSES (Kips): DEAD LOAD CANTILEVER	DEAD LOAD JACKING	DEAD LOAD CONTINUOUS	DEAD LOAD TOTAL	LIVE LOAD	IMPACT	WIND	DESIGN	r	l/r	UNIT STRESS (k.s.i.) ALLOW.	UNIT STRESS (k.s.i.) ACTUAL	AREA FURN. (sq. in.) EFFECT GROSS OR NET	AREA FURN. (sq. in.) FULL GROSS	SECTION: WEBS	SECTION: ANGLES	SECTION: COVER PLATES	MATL.
L0-L2	62.0254	-274	+191	+ 42	- 41 (-29)	-187 +240	-15 +26		-362 +356	12.59	29.6	-14.78 +18.00	- 3.88 + 9.60	G. 93.25 N. 77.37	100.75	2-Pls.34x$\frac{11}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{1}{2}$ 1-Pl.(24-12)x$\frac{5}{8}$	C.
L2-L4	62.0208	-1038	+525	-238	-751 (-526)	-513 +510	-41 +55		-1325 + 59	12.59	29.6	-14.78 +18.00	-14.21 + 0.76	G. 93.25 N. 77.37	100.75	2-Pls.34x$\frac{11}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{1}{2}$ 1-Pl.(24-12)x$\frac{5}{8}$	C.
L4-L5	31.0057	-1949	+765	-865	-2049	-747	-59		-2855	12.49	29.8	-19.60	-19.50	G.146.42	155.42	2-Pls.34x$\frac{15}{16}$	4-L8 8x6x$\frac{7}{8}$	1-Pl. 24x$\frac{3}{8}$ 1-Pl.(24-12)x$\frac{3}{4}$	S.
L5-L6	31.0000	-1948	+765	-865	-2048	-747	-59		-2854	12.43	29.3	-19.59	-19.20	G.148.67	158.42	2-Pls.34x$\frac{15}{16}$	4-L8 8x6x$\frac{7}{8}$	1-Pl. 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{13}{16}$	S.
L6-L7	31.0160	-2741	+859	-1555	-3437	-840	-66		-4343	12.22	30.5	-19.58	-19.46	G.223.17	233.67	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{11}{16}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{3}{4}$ 1-Pl.(24-12)x$\frac{7}{8}$	S.
L7-L8	31.0772	-2747	+861	-1559	-3445	- 842	-67		-4354	12.22	30.5	-19.58	-19.51	G.223.17	233.67	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{11}{16}$	4-L8 8x6x$\frac{3}{8}$	1-Pl. 24x$\frac{3}{4}$ 1-Pl.(24-12)x$\frac{7}{8}$	S.
L8-L9	31.2071	-3206	+821	-2043	-4428	-840	-66		-5334	11.69	32.0	-19.53	-19.47	G.274.00	286.00	4-Pls.34x$\frac{15}{16}$ 2-Pls.19x1	4-L8 8x6x1	1-Pl. 24x$\frac{7}{8}$ 1-Pl.(24-12)x1	S.
L9-L10	31.4288	-3228	+828	-2057	-4457	-846	-67		-5370	11.76	32.1	-19.53	-19.44	G.276.25	289.00	4-Pls.34x$\frac{15}{16}$ 2-Pls.18x1	4-L8 8x6x1	1-Pl. 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
L10-L11	31.7641	-3377	+719	-2277	-4935	-872	-69	Wind Stresses Do Not Govern	-5876	11.60	32.9	-19.50	-19.50	G.301.28	313.50	4-Pls.34x$\frac{3}{4}$ 2-Pls.34x$\frac{15}{16}$ 2-Pls.18x1	4-L8 8x6x1	1-Pl. 23$\frac{1}{2}$x$\frac{15}{16}$ 1-Pl.(23$\frac{1}{2}$-11$\frac{1}{2}$) x$\frac{1}{16}$	S.
L11-L12	31.9674	-4037	+859	-2722	-5900	-1043	-82		-7025	11.27	40.4	-19.24	-19.17	G.366.50	379.44	4-Pls.34x$\frac{3}{4}$ 2-Pls.34x$\frac{15}{16}$ 2-Pls.18x1 2-Pls.31$\frac{1}{2}$x1	4-L8 8x6x1	1Pl. 23$\frac{1}{2}$x1 1-Pl.(23$\frac{1}{2}$-11$\frac{1}{2}$) x$\frac{15}{16}$	S.
L12-L13	37.2427	-3619	+956	-2374	-5037	-924	-73		-6034	11.55	38.7	-19.31	-19.24	G.313.83	327.13	2-Pls.34x$\frac{15}{16}$ 2-Pls.34x$\frac{11}{16}$ 2-Pls.18x1 2-Pls.31$\frac{1}{2}$x$\frac{3}{8}$	4-L8 8x6x1	1-Pl. 24x1 1-Pl.(24-12)x$\frac{15}{16}$	S.
L13-L14	36.3014	-3183	+1051	-1958	-6060	-786	-62	-334	-4394	11.89	36.6	-24.24•	-21.65	★ G.312.50 Base Section	325.25 Base Section	See Sketch Below	4-L8 8x6x1	1-Pl. 24x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{11}{16}$	S.
L14-L15	35.1963	-2699	+1158	-1509	-3050	-647	-51	-242	-3292	11.69	36.1	-24.25•	-20.98	★ G.270.00 Base Section	286.00 Base Section	See Sketch Below	4-L8 8x6x1	1-Pl. 24x$\frac{7}{8}$ 1-Pl.(24-12) x1	S.
L15-L16	34.2000	-2260	+1280	-1029	-2009	-510	-40	-173	-2182	12.29	33.4	-24.36•	-20.84	★ G.159.25 Base Section	170.50 Base Section	See Sketch Below	4-L8 8x6x1	1-Pl. 24x$\frac{13}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
L16-L17	33.3224	-1820	+1416	-519	-923	-385	-30	We ※ -57	E+We -2256	12.55	31.9	-24.41•	-22.26	•• G.107.24 Base Section	115.49 Base Section	See Sketch Below	4-L8 8x6x$\frac{9}{16}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
L17-L18	32.5730	-1385	+1563	+ 13	+191 (+134)	+312 -289	+19 -23	We ※ -40	E+We -1742	12.57	31.1	-24.45•	-17.76	G.104.00	112.25	2-Pls.34x$\frac{13}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
L18-L19	31.9608	-963	+1714	+350	+1301	+436	+27	Wind Stresses Do Not Govern	+1764			+24.00	+20.45	N. 86.27	112.25	2-Pls.34x$\frac{13}{16}$	4-L8 8x6x$\frac{1}{2}$	1-Pl. 24x$\frac{9}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.
L19-L20	31.4939	-575	+1859	+1065	+2349	+593	+37		+2979			+24.00	+23.55	N.126.50	165.52	2-Pls.34x1 2-Pls.18x$\frac{3}{8}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24x$\frac{5}{8}$ 1-Pl.(24-12)x$\frac{3}{4}$	S.
L20-L21	31.1787	-261	+1985	+1515	+3239	+745	+46		+4030			+24.00	+23.78	N.169.47	220.51	2-Pls.34x1 2-Pls.34x$\frac{15}{16}$ 2-Pls.18x$\frac{3}{4}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24 x$\frac{3}{4}$ 1-Pl.(24-12) x$\frac{7}{8}$	S.
L21-L22	31.0199	-61	+2072	+1835	+3846	+850	+53		+4749			+24.00	+23.73	N.200.14	259.67	2-Pls.34x1 2-Pls.34x$\frac{11}{16}$ 2-Pls.18x$\frac{3}{4}$	4-L8 8x6x$\frac{3}{4}$	1-Pl. 24 x$\frac{15}{16}$ 1-Pl.(24-12)x$\frac{15}{16}$	S.

★ Includes Lateral Bending from 50 lb. Wind and Buckling. •• Includes Lateral Bending from 30 lb. Erection Wind.

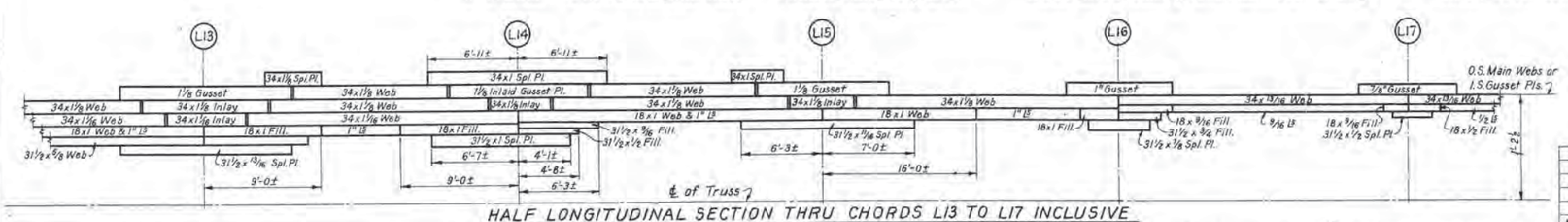
ELEVATIONS

PANEL POINT	GUTTER GRADE LINE	℄ OF LOWER CHORD	℄ OF WIND CHORD
0	143.3900	113.1400	
1	144.2989	114.0278	
2	145.1655	114.9155	
3	145.9898	115.7186	
4	146.7718	116.5218	
5	147.5116	117.1172	
6	148.2091	117.0744	
7	148.8643	116.0790	
8	149.4773	113.8895	
9	150.0480	110.2998	
10	150.5764	105.1260	
11	151.0625	98.2010	
12	151.5064	120.1218	
13	151.9080	140.7620	140.7620
14	152.2673	159.6509	141.1215
15	152.5843	176.3176	141.4385
16	152.8591	190.7620	141.7133
17	153.0916	202.9842	141.9458
18	153.2818	212.9842	142.1360
19	153.4298	220.7620	142.2840
20	153.5355	226.3176	142.3897
21	153.5989	229.6509	142.4531
22	153.6200	230.7620	142.4742

Main Material for U11-L11:
4-L8 5x5x$\frac{7}{8}$ ⑤ F.L.
2-Cov Pls.(23-12)x$\frac{1}{8}$ ⑤ F.L.
2-Web Pls.15x$\frac{5}{8}$ ⑤ F.L.
4-Web Pls.34x$\frac{7}{16}$ ⑤
2-Web Pls.34x$\frac{1}{8}$ ⑤ See Elev.
2-Web Pls.34x$\frac{5}{16}$ ⑤



ELEVATION OF POST U11-L11
Showing Main Material



HALF LONGITUDINAL SECTION THRU CHORDS L13 TO L17 INCLUSIVE

NO.	REVISION	DATE	BY
1	Corrected Allowable Unit Stress for U16-U17	3-9-56	E.Q.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
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BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.
MAIN TRUSS SPAN
STRESS SHEET FOR TRUSSES

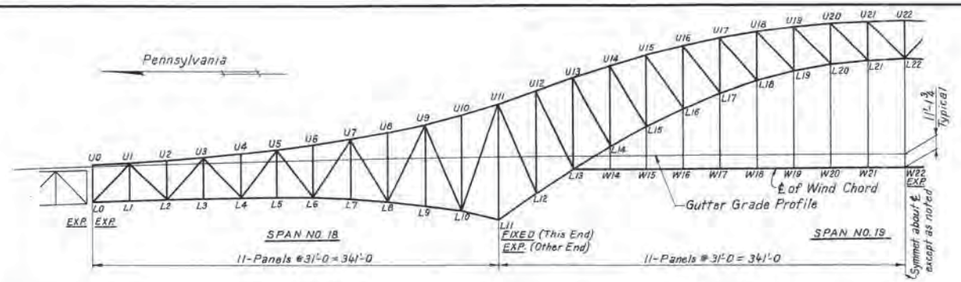
GEORGE S. RICHARDSON
CONSULTING ENGINEER
PITTSBURGH, PENNA.

MORAN, PROCTOR MUESER & RUTLEDGE
CONSULTING ENGINEERS, NEW YORK, N. Y.
ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON
PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY: M.W.B. & W.W.S.
TRACED BY: D.P.U.
CHECKED BY: W.C.H.
SCALE: NONE DATE: 6-1-54

CONTRACT PN 4
DWG. NO. DRB-4
SHEET 29 OF 68



SUSPENDERS

PANEL POINT	STRESSES (KIPS) DEAD LOAD	LIVE LOAD	IMPACT	WIND	DESIGN	UNIT STRESS (k.s.i.) ALLOW	ACTUAL	AREA FURN. (Sq. in.) EFFECT. GROSS OR NET	FULL GROSS	SECTION WEBS	ANGLES	COVER PLATES See Sheet 44	MAT'L.
14	+182	+128	+30	+166	+348	+30.00	+27.61*	N. 169.13	G. 249.50	2-Pls. 26 x 5/8	4-L's 8 x 8 x 1 1/8	4-Pls. 24 x 1 1/2, 2-Pls. 24 x 5/8	S.
15,17,19,21	+207	+186	+39	Wind Stresses Do not Govern	+412	4"ø Bridge Rope – Breaking Strength 730 T. See Supplemental Specifications							
16,20	+178	+162	+38		+378	Do.							
18	+164	+128	+30		+322	Do.							
22	+190	+128	+30		+348	Do.							

*Includes lateral bending from 50 lb. wind and buckling.

VERTICALS

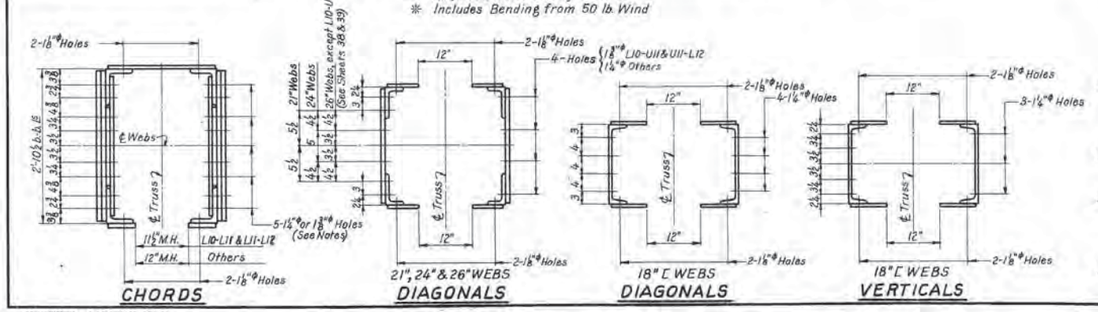
MEMBER	LENGTH	STRESSES (KIPS) DEAD LOAD CANTI-LEVER	JACK-ING	CONTIN-UOUS	TOTAL	LIVE LOAD	IMPACT	WIND	DESIGN	r	l/r	UNIT STRESS (k.s.i.) ALLOW	ACTUAL	AREA FURN. (Sq. in.) EFFECT. GROSS OR NET	FULL GROSS	SECTION WEBS	ANGLES	COVER PLATES	MAT'L.
U0-L0	31.2500	-10	0	0	-10	0	0		-10										
		-78	0	-67	-145	-144	-34		-323	9.16	40.8	-14.58	-5.70	G. 56.62	67.12	2-Pls. 23 x 9/16	4-L's 6 x 6 x 7/16	2-Pls. (24-12) x 1/16	C.
U1-L1	32.0874	+81	0	+133	+214	+144	+34		+392			+18.00	+14.02	N. 27.96	45.96	2-18ø 42.7	——	2-Pls. (28-12) x 5/8	C.
		+22	0	0	+22	0	0		+22										
U2-L2	33.2981	-8	-5	+1	-12	-5	-1		-18										
		-69	-5	-132	-206	-147	-35		-388	7.68	52.0	-14.32	-9.07	G. 42.76	54.76	2-18ø 45.8	——	2-Pls. (28-12) x 1/2	C.
U3-L3	35.0056	+82	0	+133	+215	+144	+34		+393			+18.00	+14.06	N. 27.96	45.96	2-18ø 42.7	——	2-Pls. (28-12) x 5/8	C.
		+22	0	0	+22	0	0		+22										
U4-L4	37.1708	+6	-11	+8	+3 (+2)	+11 -10	+1 -1		+20 -14			+18.00	+0.61	N. 32.70	54.76	2-18ø 45.8	——	2-Pls. (28-12) x 1/2	C.
		-57	-11	-128	-196	-150	-35		-381	7.68	58.1	-14.18	-8.91	G. 42.76					
U5-L5	40.0572	+52	+16	+116	+184	+150	+36		-370	7.68	62.6	-14.02	-8.65	G. 42.76	54.76	2-18ø 45.8	——	2-Pls. (28-12) x 1/2	C.
		-8	+16	-17	-9 (-6)	-16 +12	-1 +1		-30 +11			+18.00	+0.34	N. 32.70					
U6-L6	44.1627	+20	-18	+26	+28	+18	+1		+47			+18.00	+1.44	N. 32.70	54.76	2-18ø 45.8	——	2-Pls. (28-12) x 1/2	C.
		-41	-18	-107	-166	-150	-35		-351	7.68	69.0	-13.80	-8.21	G. 42.76					
U7-L7	49.8848	-1	+33	+73	+105	+152	+36		+293			+18.00	+8.96	N. 32.70	54.76	2-18ø 45.8	——	2-Pls. (26-12) x 1/2	C.
		-61	+33	-60	-88	-33	-3		-124	7.68	78.0	-13.48	-2.90	G. 42.76					
U8-L8	57.5713	+47	-25	+54	+76	+25	+2		+103			+18.00	+3.15	N. 32.70	54.76	2-18ø 45.8	——	2-Pls. (28-12) x 1/2	C.
		-16	-25	-83	-124	-148	-35		-307	7.68	90.0	-12.97	-7.18	G. 42.76					
U9-L9	67.5651	-48	+42	+30	+24 (+17)	+148 -44	+35 -4		+223 -47			+18.00	+5.39	N. 41.41	63.63	2-Pls. 21 x 1/2	4-L's 5 x 5 x 1/2	2-Pls. (27-12) x 7/16	C.
		-108	+42	-103	-169	-44	-4		-217	8.73	92.9	-12.84	-4.08	G. 53.13					
U10-L10	80.2339	+90	-33	+94	+151	+38	+3		+192			+18.00	+3.84	N. 50.00					
		+29	-33	-39	-43 (-30)	-146 +38	-34 +3		-229 +17	10.45	92.1	-12.87	-3.69	G. 62.00	74.00	2-Pls. 26 x 1/2	4-L's 7 x 6 x 1/2	2-Pls. (27-12) x 1/2	C.
U11-L11	96.0000	-802	-455	-714	-1971	-410	-21	-237	-2208	11.26	102.3	-18.97*	-15.64*	G. 266.67	293.67	For Main Material see Sheet 29 "Elevation of Post U11-L11"			S.
		-865	-455	-847	-2167	-466	-23		-2656	11.65	98.9	-15.40	-13.97	G. 190.17	217.17				
U12-L12	84.6402	-826	-259	-706	-1791	-315	-20		-2126						174.44	4-Pls. 28 x 1	4-L's 7 x 6 x 7/8	2-Pls. (24-12) x 9/16	S.
		-891	-259	-844	-1994	-367	-23		-2384	9.72	104.5	-14.98	-14.81	G. 160.94					
U13-L13	75.0200	-854	-228	-792	-1874	-356	-22		-2232	9.20	97.8	-15.59	-15.47	G. 144.32	156.32	2-Pls. 26 x 9/16, 2-Pls. 26 x 5/8	4-L's 7 x 6 x 7/8	2-Pls. (25-12) x 9/16	S.
U14-L14	65.9911	-773	-224	-791	-1788	-332	-21		-2141	9.26	86.5	-16.63	-16.48	G. 129.89	143.39	4-Pls. 26 x 1/16	4-L's 7 x 6 x 3/4	2-Pls. (25-12) x 9/16	S.
U15-L15	58.0244	-721	-215	-777	-1713	-323	-24		-2060	9.51	73.2	-17.54	-17.38	G. 118.51	133.51	4-Pls. 26 x 1/16	4-L's 7 x 6 x 3/4	2-Pls. (25-12) x 5/8	S.
U16-L16	51.1200	-662	-199	-740	-1601	-308	-25		-1934	9.78	67.7	-18.19	-18.12	G. 106.76	121.76	2-Pls. 26 x 1/8	4-L's 7 x 6 x 3/4	2-Pls. (26-12) x 5/8	S.
U17-L17	45.2778	-600	-174	-681	-1455	-297	-16		-1768	9.90	54.9	-18.62	-18.56	G. 95.26	108.76	2-Pls. 26 x 15/16	4-L's 7 x 6 x 3/4	2-Pls. (26-12) x 9/16	S.
U18-L18	40.4978	-520	-137	-590	-1247	-276	-15		-1538	9.92	49.0	-18.90	-18.72	G. 82.17	94.17	2-Pls. 26 x 13/16	4-L's 7 x 6 x 5/8	2-Pls. (26-12) x 1/2	S.
U19-L19	36.7800	-411	-88	-464	-963	-246	-14		-1223	9.59	46.0	-19.03	-18.86	G. 65.48	77.48	2-Pls. 26 x 3/8	4-L's 7 x 6 x 7/16	2-Pls. (27-12) x 1/2	S.
U20-L20	34.1244	-274	-28	-288	-590	-210	-13		-813	7.60	53.8	-18.67	-16.81	G. 48.36	61.86	2-18ø 51.9	——	2-Pls. (26-12) x 9/16	S.
U21-L21	32.5311	-124	+42	- 75	-157 (-110)	+159	-11 +10		-369 +89	7.67	50.9	-14.35 +18.00	-8.63 +2.72	G. 42.76 N. 32.70	54.76	2-18ø 45.8	——	2-Pls. (26-12) x 1/2	C.
U22-L22	32.0000	- 58	+79	+ 74	+ 95	+ 32	+ 2		+129			+18.00	+4.62	N. 27.96	45.96	2-18ø 42.7	——	2-Pls. (28-12) x 7/16	C.

Wind Stresses Do Not Govern

For Verticals U0-L0 to U12-L12 incl. {Stresses in upper part of each Vertical (above fl beam connection) are shown above dotted lines. {Stresses in lower part of each Vertical (below fl beam connection) are shown below dotted lines.

• Allowable increased by 25%

* Includes Bending from 50 lb. Wind



DIAGONALS

MEMBER	LENGTH	STRESSES (KIPS) DEAD LOAD CANTI-LEVER	JACK-ING	CONTIN-UOUS	TOTAL	LIVE LOAD	IMPACT	WIND	DESIGN	r	l/r	UNIT STRESS (k.s.i.) ALLOW.	ACTUAL	AREA FURN. (Sq. in.) EFFECT. GROSS OR NET	FULL GROSS	SECTION WEBS	ANGLES	COVER PLATES	MAT'L.
L0-U1	45.2589	+399	-279	-62	+58 (+41)	+281 -374	+17 -24		+534 -535	7.67	70.8	+18.00 -13.74	+16.33 -12.51	N. 32.70 G. 42.76	54.76	2-18ø 45.8	——	2-Pls. (28-12) x 1/2	C.
U1-L2	43.9821	-499	+250	-120	-369 (-258)	-276 +277	-17 +19		-681 +57	7.46	70.8	-13.74 +18.00	-13.11 +1.44	G. 51.96 N. 33.61	65.46	2-18ø 58.0	——	2-Pls. (28-12) x 5/8	C.
L2-U3	47.3631	+629	-240	+298	+687	+300	+17		+1004			+24.00	+22.92	N. 43.81	64.88	2-Pls. 21 x 9/16	4-L's 7 x 4 x 1/2	2-Pls. (27-12) x 5/8	S.
U3-L4	46.1606	-669	+200	-422	-891	-295	-17		-1203	9.47	58.5	-18.42	-18.23	G. 66.00	78.00	2-Pls. 24 x 5/8	4-L's 7 x 4 x 1/2	2-Pls. (27-12) x 1/2	S.
L4-U5	51.1237	+762	-174	+566	+1154	+321	+17		+1492			+24.00	+23.92	N. 62.37	89.48	2-Pls. 26 x 3/8	4-L's 7 x 4 x 9/16	2-Pls. (27-12) x 1/2	S.
U5-L6	50.6854	-704	+111	-587	-1180	-295	-15		-1490	9.80	62.0	-18.23	-17.96	G. 82.98	94.98	2-Pls. 26 x 7/8	4-L's 7 x 4 x 9/16	2-Pls. (26-12) x 1/2	S.
L6-U7	57.8893	+674	-50	+619	+1243	+291	+15		+1549			+24.00	+23.52	N. 65.85	94.17	2-Pls. 26 x 15/16	4-L's 7 x 4 x 5/8	2-Pls. (26-12) x 1/2	S.
U7-L8	60.6031	-527	-17	-538	-1077	-263	-30		-1370	9.94	73.1	-17.54	-16.97	G. 60.73	92.73	2-Pls. 26 x 15/16	4-L's 7 x 4 x 9/16	2-Pls. (27-12) x 1/2	S.
L8-U9	71.0904	+402	+80	+463	+945	+297	+34		+1276			+24.00	+23.10	N. 55.24	80.50	2-Pls. 26 x 5/8	4-L's 7 x 4 x 1/2	2-Pls. (27-12) x 1/2	S.
U9-L10	79.0693	-231	-134	-328	-693	-310	-20		-1023	10.32	92.0	-16.11	-15.68	G. 65.26	77.26	2-Pls. 26 x 3/16	4-L's 7 x 4 x 1/2	2-Pls. (27-12) x 1/2	S.
L10-U11	94.3152	+63	+187	+194	+444	+316	+20		+780			+24.00	+18.75	N. 41.61	61.68	2-Pls. 26 x 7/16	4-L's 7 x 4 x 7/16	2-Pls. (27-12) x 3/8	S.
U11-L12	80.3040	+734	+244	+637	+1615	+288	+18		+1921			+24.00	+23.74	N. 80.91	116.69	2-Pls. 26 x 1	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 9/16	S.
U12-L13	71.1126	+734	+233	+698	+1665	+306	+20		+1991			+24.00	+23.43	N. 84.97	119.94	2-Pls. 26 x 1 1/16	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 9/16	S.
U13-L14	64.1225	+652	+254	+709	+1615	+311	+20		+1946			+24.00	+23.63	N. 82.35	116.69	2-Pls. 26 x 1	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 9/16	S.
U14-L15	58.2572	+618	+263	+745	+1626	+322	+21		+1969			+24.00	+23.91	N. 82.35	116.69	2-Pls. 26 x 1	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 9/16	S.
U15-L16	53.4810	+613	+271	+776	+1660	+331	+21		+2012			+24.00	+23.68	N. 84.97	119.94	2-Pls. 26 x 1 1/16	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 3/8	S.
U16-L17	49.7397	+601	+273	+793	+1667	+336	+23		+2026			+24.00	+23.84	N. 84.97	119.94	2-Pls. 26 x 1 1/16	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 5/8	S.
U17-L18	46.9630	+583	+267	+790	+1640	+335	+28		+2003			+24.00	+23.57	N. 84.97	119.94	2-Pls. 26 x 1 1/16	4-L's 7 x 4 x 7/8	2-Pls. (26-12) x 5/8	S.
U18-L19	45.0733	+535	+244	+749	+1528	+337	+19		+1884			+24.00	+23.89	N. 78.85	112.01	2-Pls. 26 x 1	4-L's 7 x 4 x 3/4	2-Pls. (26-12) x 5/8	S.
U19-L20	43.9996	+434	+202	+649	+1285	+322	+19		+1626			+24.00	+23.69	N. 68.83	98.76	2-Pls. 24 x 7/8	4-L's 7 x 4 x 3/4	2-Pls. (26-12) x 1/2	S.
U20-L21	43.6932	+281	+137	+462	+880	+293	+18		+1191			+24.00	+23.41	N. 50.88	76.74	2-Pls. 21 x 5/8	4-L's 7 x 4 x 9/16	2-Pls. (27-12) x 1/2	S.
U21-L22	44.1386	+86	+48	+198	+332	+250	+16		+598			+18.00	+16.94	N. 35.30	58.36	2-18ø 51.9	——	2-Pls. (28-12) x 1/2	C.

Wind Stresses Do Not Govern

SPECIAL NOTES (Continued)

CAMBER

Trusses shall be cambered for total dead load deflection. Cambered lengths shall be calculated from areas determined in accordance with Art. 3.6.10, A.A.S.H.O. Specifications, increased 10% for the effect of details. For stringer and floor beam camber see Sheet 32.

AREAS FOR TRUSS MEMBERS

"Effective Gross Area" is "Full Gross Area" minus the cross-sectional area of manholes.

"Effective Net Area" is "Full Gross Area" with deductions as shown in sketches on this sheet.

MANHOLE SPACING

The spacing shown on the design details is approximate. In web members of the trusses and bracing members, manholes shall be alternated on opposite sides of member.

NORMAL TEMPERATURE

Superstructure dimensions shall be attained at 68° F.

DRAIN HOLES

Wide Flange Sections forming horizontal or nearly horizontal troughs, and other points where water may collect, shall be adequately drained. Drain holes, where indicated in Typical Details, shall be used, and drainage at other points may be accomplished by filling with approved water-proof materials.

FILLING ANCHOR BOLT HOLES

The clearance between anchor bolts and holes in masonry plates and shoes shall be filled with molten zinc after erection.

NO.	REVISION	DATE	BY

SPECIAL NOTES FOR MAIN SPAN

(Spans 18, 19 and 20)

SPECIFICATIONS

Design: 1953 Standard Specifications for Highway Bridges of the American Association of State Highway Officials, modified.

Material and Workmanship: Pennsylvania Turnpike Commission Specifications for Grading, Drainage, Paving and Structures, Oct., 1952, modified.

DEAD LOAD

No provision has been made in the design for a future wearing surface on the concrete roadway slab. The roadway slab thickness required by the design has been increased 1/2 inch as an allowance for wear.

LIVE LOAD

H20 - S16 - 44. 2.321 lanes per truss.

MATERIAL

Silicon or Carbon Steel as noted by Ⓢ or Ⓒ in the stress tables or on design details, except castings, forgings and special alloy steel where noted on the design details.

RIVETS

Truss Chords – Joints U6 to U13 incl., U20, U21, U22, L6 to L15 incl., L20, L21 and L22: 1 1/8"ø high strength to connect chord webs to gusset plates, splice plates and fillers.

Joints U0 to U5 incl., U14 to U19 incl., L0 to L5 incl., and L16 to L19 incl.: 1 1/8"ø high strength rivets to connect chord webs to gusset plates, splice plates and fillers.

All Cover Plate Splices: 1 1/8"ø high strength rivets.

Truss Verticals and Diagonals: 1 1/8"ø high strength rivets for these members to gussets, except 1 1/4"ø for both ends of U11-L11, and the U11 end of L10-U11 and U11-L12.

All Truss Members: 1"ø carbon steel stitch rivets, unless noted.

Floor System: 7/8"ø carbon steel rivets, unless noted.

Bracing: All rivets in bracing gusset plates shall be 1"ø carbon steel, unless noted. Stitch rivets, 7/8"ø carbon steel.

All 1 1/8"ø and 1 1/4"ø Rivets regardless of location, and whether shop or field, must be high strength rivets.

Maximum Pitch: For sealing, the pitch on a single line adjacent to a free edge of an outside plate or shape shall not exceed 4 + 4t, nor 7". If there be a second line of rivets uniformly staggered with those on the line adjacent to the free edge, at a gage less than 1 1/2 + 4t, the stagger pitch shall not exceed 4" + 4t – 3/4 g, nor 7" – 3/4 g, but need not be less than half the requirement for a single line. t = thickness in inches of thinner outside plate or shape.

Stitch Rivets: In compression members, the pitch in any single line in the direction of stress shall not exceed 12t; except if rivets on adjacent lines be staggered and the gage is less than maximum of 24t, the stagger pitch shall not exceed 12t, nor 15t – 3/4 g.

RIVET VALUES

	High Strength Rivets Shop & Field	Carbon Steel Rivets Shop & Field
Shear	20,000 lbs./sq. in.	13,500 lbs./sq. in.
Bearing	{40,000 lbs./sq. in. on silicon steel / 27,000 lbs./sq. in on carbon steel}	27,000 lbs./sq. in.

REAMING

Trusses: Holes for truss joints, including gusset plates, splice plates and fillers shall be punched or drilled 1 5/16"ø and reamed to size, as prescribed in the Supplemental Specifications. Holes for stitch rivets shall be punched or drilled 1 1/16"ø and reamed assembled to 1 1/8"ø.

Floor Beams: Holes shall be punched or drilled 1 1/16"ø and reamed assembled to 1 1/8"ø unless noted.

Stringers: Holes for splices shall be punched or drilled 1 1/16"ø and reamed to 1 5/16"ø with parts assembled, or to a metal templet. Other holes may be punched full size unless noted.

Bracing and Diaphragms: Holes may be punched full size unless noted.

Expansion Dams and Supports: Holes shall be drilled, sub-punched, and reamed as noted on the design details. Holes not noted may be punched full size.

Edge Planing: See Sheet 33.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA

NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

MAIN TRUSS SPAN

STRESS SHEET FOR TRUSSES

GEORGE S. RICHARDSON
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PHILADELPHIA, PENNA.
ARCHITECTS

DRAWN BY:	M.W.B. & W.W.S.
TRACED BY:	D.P.U.
CHECKED BY:	W.C.H.
SCALE:	NONE
DATE:	6-1-54

CONTRACT PN-4
DWG. NO. DRB-4
SHEET 30 OF 68

PR 1792-853

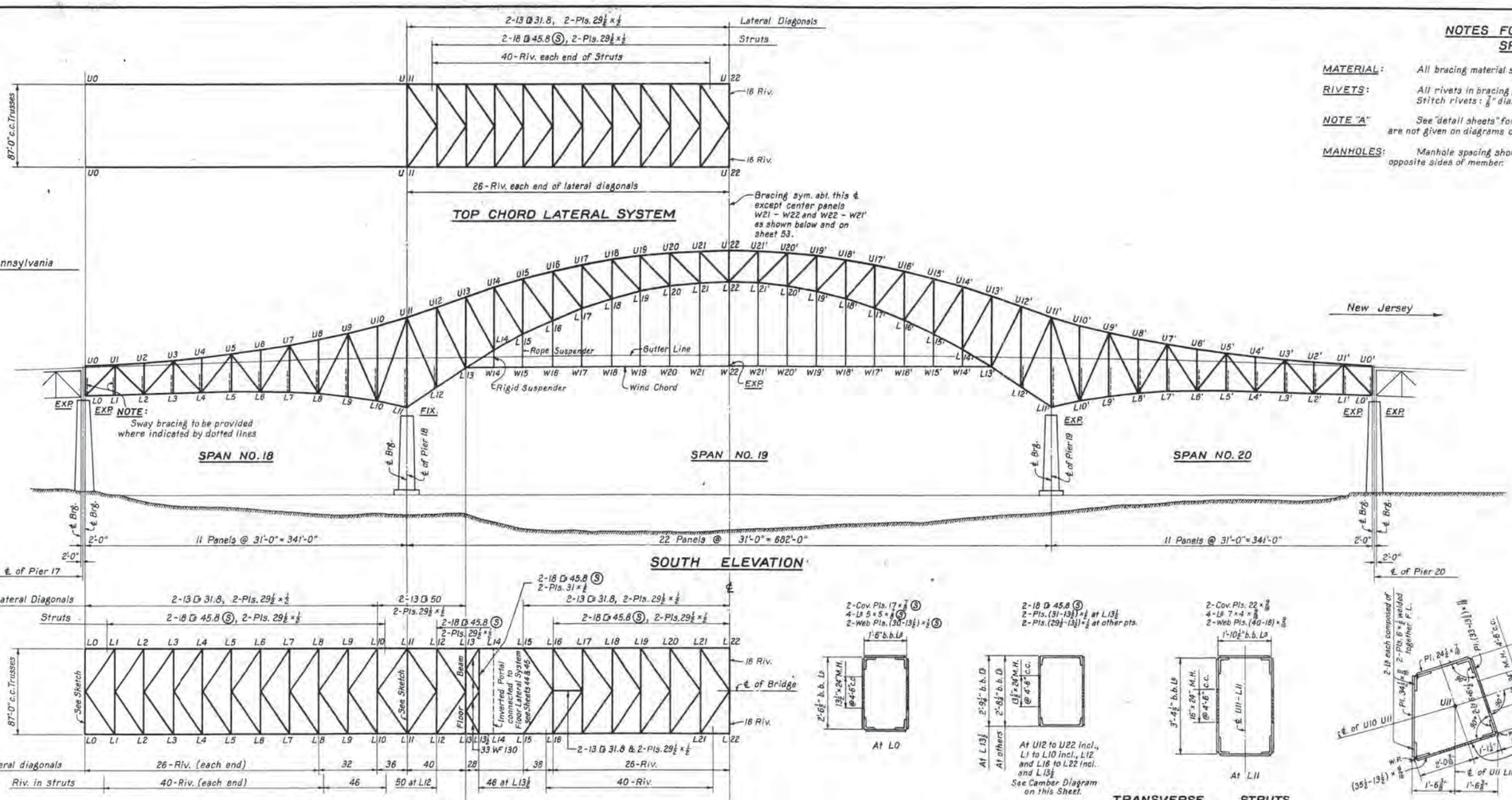
NOTES FOR MAIN SPAN BRACING
SPANS 18, 19 & 20

MATERIAL: All bracing material shall be Carbon Steel except Silicon Steel where noted thus: (S)

RIVETS: All rivets in bracing gusset plates shall be 1" dia., carbon steel, unless noted. Stitch rivets: $\frac{7}{8}$" dia., carbon steel.

NOTE "A" See "detail sheets" for number of rivets to be used in ends of bracing members, if they are not given on diagrams on this sheet.

MANHOLES: Manhole spacing shown on details is approximate. Manholes are to be alternated on opposite sides of member.



NO.	REVISION	DATE	BY
3	"As Built" Revision: Main Mat'l. changed for Panel L13-W14 Floor Laterals	6-3-57	D.P.U.
2	L12 removed from Camber Diagram.	3-3-56	E.R.
1	Changed no. rivets, W21-W21', Floor Lateral System	8-2-54	D.P.U.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. - BURLINGTON COUNTY, N. J.

MAIN TRUSS SPAN BRACING SYSTEMS

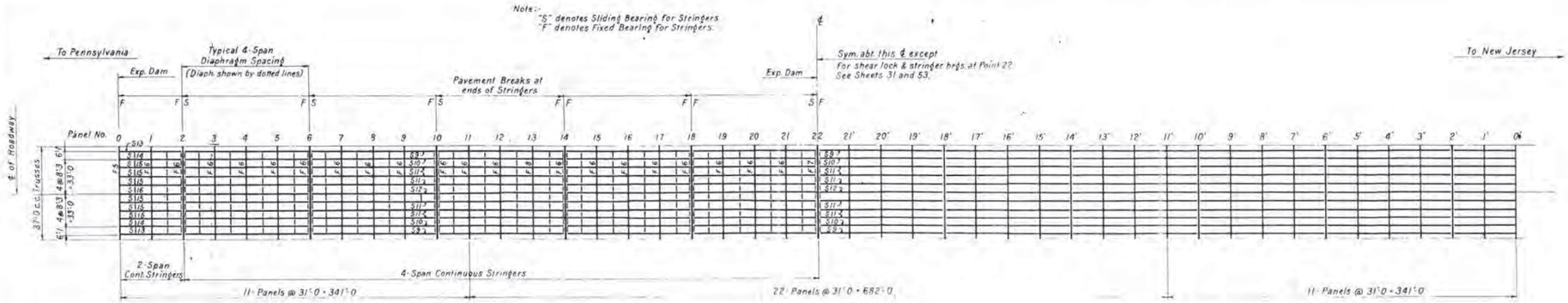
GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.

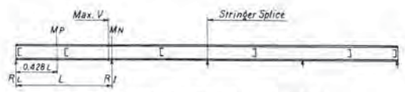
MORAN, PROCTOR MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y., ASSOCIATES

HARBESON, HOUGH LIVINGSTON & LARSON, PHILADELPHIA, PENNA., ARCHITECTS

DRAWN BY: S.M.U.
TRACED BY: H.C.D.
CHECKED BY: M.W.B.
SCALE: NONE DATE: 6-1-54

CONTRACT PN 4
DWG. NO. DRB-4
SHEET 31 OF 68





4-SPAN CONTINUOUS S9, S10, S11, S12

2-SPAN CONTINUOUS S13, S14, S15, S16

STRINGER TYPES

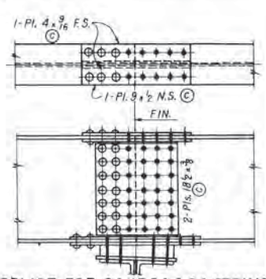
STRINGER SCHEDULE

MARK	RL (k) D+L+I	RL (k) TOTAL	Rl (k) D+L+I	Rl (k) TOTAL	MP (ft.-k) D+L+I	MP (ft.-k) TOTAL	MN (ft.-k) D+L+I	MN (ft.-k) TOTAL	MAX. V (k) D+L+I	MAX. V (k) TOTAL	SECTION FURNISHED	S.M. FURNISHED (in³) GROSS	S.M. FURNISHED (in³) NET	MAX. STRESS (k/sq. in.) BEND	MAX. STRESS (k/sq. in.) SHEAR	MAT'L
S9	12 12 4	28	35 17 5	57	74 62 19	155	103 51 15	169	19 15 4	38	21 WF 62	126.4	120.5	16.1	4.5	Ⓒ
S10	9 33 10	52	26 45 13	84	54 166 50	270	75 136 41	252	14 39 10	63	24 WF 84	196.3	186.6	16.5	5.6	Ⓒ
S11	10 39 12	61	30 51 15	96	62 192 58	312	86 157 47	290	16 44 13	73	24 WF 94	220.9	210.0	16.9	5.8	Ⓒ
S12	10 39 12	61	31 51 15	97	63 192 58	313	88 157 47	292	16 45 13	74	24 WF 94	220.9	210.0	17.0	5.9	Ⓒ
S13,	12 13 4	29	39 16 5	60	66 63 19	148	120 53 16	199	20 14 4	38	21 WF 62	126.4	120.5	17.9	4.5	Ⓒ
S14	8 34 10	52	28 44 13	85	48 168 51	267	88 142 43	273	14 38 12	64	24 WF 84	196.3	186.6	16.7	5.7	Ⓒ
S15	10 39 12	61	32 51 15	98	55 194 58	307	100 164 49	313	16 44 13	73	24 WF 94	220.9	210.0	17.0	5.8	Ⓒ
S16	10 39 12	61	33 51 15	99	57 194 58	309	103 164 49	316	17 44 13	74	24 WF 94	220.9	210.0	17.2	5.9	Ⓒ

Ⓒ denotes Carbon Steel
Ⓢ denotes Silicon Steel

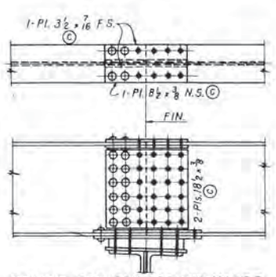
FLOOR BEAM SCHEDULE

MARK	MAX. REACT. AND SHEAR (k) D+L+I	MAX. REACT. AND SHEAR (k) TOTAL	MAX. MOM. (ft. k) D+L+I	MAX. MOM. (ft. k) TOTAL	SECTION FURNISHED WEB	SECTION FURNISHED ANGLES	SECTION FURNISHED COV. PLATES	NET S.M. FURN'D (in³)	MAX. STRESS (k/sq. in.) BEND	MAX. STRESS (k/sq. in.) SHEAR	DETAILS ON SHEET NO.	MAT'L
F5	102 135 32	269	2235 3230 763	6228	1-Pl. 106 × 5/8	4-L8 × 8 × 3/4	1-Pl. 18 × 1/2 F.L. Top 1-Pl. 18 × 1/2 × 40'0 Bot.	3465	21.6	5.98	45	Ⓢ
F6	199 166 39	404	4323 3970 935	9228	1-Pl. 106 × 5/8	4-L8 × 8 × 1	2-Pls 18 × 3/4 × 46'0 1-Pl. 18 × 3/4 F.L. Top 1-Pl. 18 × 3/4 × 60'0 Bot.	4700	23.6	9.12	45 55	Ⓢ
F7	201 135 32	368	4928 3240 764	8932	2-Pls. 106 × 7/16	4-L8 × 4 × 3/4	2-Pls 25 × 3/4 × 40'0 2-Pls 25 × 3/4 × 56'0 2-Pls. 25 × 7/16 × F.L.	6190	23.9	8.22	54	Ⓢ
F8	215 166 39	420	4697 3970 935	9602	1-Pl. 106 × 5/8	4-L8 × 8 × 3/4 F.L. 2-L8 × 9 × 1 × F.L. 2-L8 × 7 × 1 × F.L. 2-L8 × 8 × 1 × 76'0	1-Pl. 18 × 3/4 × 46'0 Top 1-Pl. 18 × 3/4 × 76'0 Bot. 2-Pls. 18 × 3/4 × F.L.	4950	19.8	9.47	56	Ⓢ



SPLICE FOR 24 WF 84 & 94 STRINGERS

Scale 3/4" = 1'0



SPLICE FOR 21 WF 62 STRINGER

Scale 3/4" = 1'0

DEAD LOAD PANEL CONCENTRATIONS - KIPS

PANEL POINTS	CANTILEVER TRUSS LOADS FLOOR STEEL	CANTILEVER TRUSS LOADS TRUSS	CANTILEVER TRUSS LOADS BRACING	CANTILEVER TRUSS LOADS TOTAL	CONTINUOUS TRUSS LOADS FLOOR STEEL	CONTINUOUS TRUSS LOADS FLOOR CONC.	CONTINUOUS TRUSS LOADS BRACING	CONTINUOUS TRUSS LOADS EXCESS	CONTINUOUS TRUSS LOADS TOTAL
0	52.0	25.7	28.1	105.8		62.8		3.9	66.7
1	46.0	37.8	21.5	105.3		125.4		7.9	133.3
2	47.1	42.6	21.5	111.2		125.4		7.9	133.3
3	46.0	43.8	21.5	111.3		125.4		7.9	133.3
4	49.4	53.5	21.5	124.4		128.6		7.9	136.5
5	46.0	68.2	21.5	135.7		125.4		7.9	133.3
6	47.1	80.1	21.5	148.7		125.4		7.9	133.3
7	46.0	92.3	21.6	159.9		125.4		7.9	133.3
8	49.4	101.7	21.6	172.7		128.6		7.9	136.5
9	46.0	115.0	22.3	183.3		125.4		7.9	133.3
10	47.1	124.5	22.3	193.9		125.4		7.9	133.3
11	48.0	229.8	69.9	347.7		125.4		7.9	133.3
12	49.4	181.8	40.3	271.5		128.6		7.9	136.5
13	57.5	154.2	42.5	254.2		125.4		7.9	133.3
14	51.6	146.5	31.1	229.2		125.4		7.9	133.3
15	47.1	108.1	28.2	183.4		125.4		7.9	133.3
16	50.7	82.6	42.8	176.1		128.6		7.9	136.5
17	47.1	71.5	42.2	160.8		125.4		7.9	133.3
18	48.2	69.2	39.8	157.2		125.4		7.9	133.3
19	47.1	76.7	39.5	163.3		125.4		7.9	133.3
20	40.4	82.7	39.8	162.9	10.3	128.6		7.9	146.8
21	29.5	92.9	36.2	158.6	17.6	125.4	3.8	7.9	154.7
(½) 22	—	47.5	16.2	63.7	50.0	53.9	4.2	3.9	112.0
0'	53.9	25.7	28.1	107.7		62.8		3.9	66.7

SHOE REACTIONS AT PIERS (KIPS)

		PIER 17 MAX.	PIER 17 MIN.	PIER 18 MAX.	PIER 18 MIN.	PIER 19 MAX.	PIER 19 MIN.	PIER 20 MAX.	PIER 20 MIN.
DEAD LOAD	CANTILEVER	-167	-167	4129	4129	4169	4169	-169	-169
	JACKING	198	198	-198	-198	-198	-198	198	198
	CONTINUOUS	110	110	2916	2916	2916	2916	110	110
	TOTAL	141	141	6847	6847	6887	6887	139	139
LIVE LOAD		296	199	1139	-61	1139	-61	296	-199
IMPACT		32	-13	90	-6	90	-6	32	-13
TRANSVERSE 50# WIND		H+ 121 • V- 96	- 96	584 975	-975	584 975	-975	121 • 96	- 96
LONGITUDINAL 50# WIND		H+ V+ 242	-242	1226 174	-174	221	-221	153	-153
LONGITUDINAL FRICTION		H+ 7		41		34		7	
TRACTION		H+		79					
TOTALS (D+L+I)		469	- 71	8076	6780	8116	6820	467	- 73

• Taken by Shear Lock at ℄ of Bridge.

CONSTANT DEAD LOAD OF FLOOR PER TRUSS KIPS PER FOOT

Concrete Deck & Railing	4.05
Floor Steel	1.52
Excess	0.25
TOTAL	5.82

CAMBER — Floor beams shall be cambered for full dead load. End connections of framed floor beams shall be detailed so as to be truly vertical under full dead load. Stringers need not be cambered. Natural mill camber shall be turned in the most advantageous direction.

NO.	REVISION	DATE	BY
2	Corrected length of cover plate on F8.	3-3-54	E.R.
1	Floor Plan corrected for Pavement Break Changes	8-2-54	W.A.G.

PENNSYLVANIA TURNPIKE COMMISSION
HARRISBURG, PENNSYLVANIA
NEW JERSEY TURNPIKE AUTHORITY
NEW BRUNSWICK, NEW JERSEY

DELAWARE RIVER BRIDGE

BUCKS COUNTY, PENNA. • BURLINGTON COUNTY, N. J.

MAIN TRUSS SPAN

STRESS SHEET FOR FLOOR SYSTEM

GEORGE S. RICHARDSON, CONSULTING ENGINEER, PITTSBURGH, PENNA.

MORAN, PROCTOR, MUESER & RUTLEDGE, CONSULTING ENGINEERS, NEW YORK, N. Y. — ASSOCIATES

HARBESON, HOUGH, LIVINGSTON & LARSON, PHILADELPHIA, PENNA. — ARCHITECTS

DRAWN BY: M.W.B. & R.R.D.
TRACED BY: W.A.G.
CHECKED BY: W.C.H.
SCALE: NONE
DATE: 6-1-54

CONTRACT P.N. 4
DWG. NO. DRB-4
SHEET 32 OF 68

Appendix C

- Photos of The Delaware River Bridge Key Features

Photo 1: South elevation, Spans 18 to 20, looking north (Photo: ATANE Consulting, 2022)

Photo 2: North elevation, Spans 18 to 20, looking south (Photo: ATANE Consulting, 2022)

Photo 3: Top of Deck (Spans 1 to 18 shown), looking west (Photo: ATANE Consulting, 2022)

Photo 4: Three-span Steel Continuous Warren Through Truss spans (Spans 18 to 20 shown), looking east (Photo: ATANE Consulting, 2022)

Photo 5: Steel Continuous Deck Truss spans (Span 14 shown), looking northeast (Photo: ATANE Consulting, 2022)

Photo 6: Steel Girder/Floorbeam/Stringer spans, looking west (Photo: ATANE Consulting, 2022)

Photo 7: Main spans, looking west from New Jersey (Photo: HDR, 2024)

Photo 8: Deck truss approach spans, Pennsylvania side, looking northeast (Photo: ATANE Consulting, 2022)

Photo 9: Girder/Floorbeam/Stringer spans, Pennsylvania side, looking north (Photo: Google Streetview, 2023)

Photo 10: Pier 19, looking west (Photo: ATANE Consulting, 2022)

Photo 11: Pier 21, looking east (Photo: ATANE Consulting, 2022)

Photo 12: Replaced Suspender, looking north (ATANE Consulting, 2022)

Appendix D

- Bridge Load Ratings

Note: 2017 Load Ratings from 2022 Biennial Bridge Inspection Report

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Main Span Truss)
Span Type:	3 Span Cont. Thru Arch Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	1.01 (U15-L15)
Past Operating Rating (HL93):	1.30 (U15-L15)
Last Load Rating Date:	2/26/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None
Overlay Depth (in.):	0"
Was Overlay Depth Measured (Y/N):	N/A
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating:	1	1
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	10%	10%
Condition Factor:	1.00	0.95
System Factor:	0.85	0.85
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - TRUSS MEMBERS

Vehicle Type	Vehicle GVW (kips)	Controlling Diagonal Rating Factor U7-L8		Controlling Upper Chord Rating Factor U19-U20		Controlling Lower Chord Rating Factor L12-L13		Controlling Vertical Rating Factor U15-L15	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.91	0.64	2.27*	1.88*	2.03	1.61	1.07	0.75
HL-93 (OPR)	N/A	1.17	0.83	2.94*	2.44*	2.63	2.08	1.38	0.97
NJ Type 3	50	3.64	2.56	14.35	12.70	16.46	13.05	5.55	3.91
NJ Type 3S2	80	2.40	1.69	9.18	8.13	10.33	8.19	3.56	2.50
NJ Type 3-3	80	2.46	1.73	9.32	8.24	10.36	8.21	3.61	2.54
Lane-Type LL	N/A	2.30	1.62	6.47*	5.37*	5.43	4.31	2.88	2.02
SU4	54	3.34	2.35	13.25	11.72	15.23	12.07	5.13	3.60
SU5	62	2.93	2.06	11.57	10.23	13.27	10.52	4.48	3.15
SU6	69.5	2.62	1.84	10.33	9.14	11.84	9.39	4.00	2.81
SU7	77.5	2.36	1.66	9.28	8.21	10.62	8.42	3.59	2.53

Notes:

1. Truss members identified by panel point locations as designated in the original drawings (see additional rating calcs for details).
2. Rating program used: CSiBridge v16.1 model used for LL effects, with supplemental member capacity and load rating calculations.
3. Lane-Type LL = Lane-Type Legal Load.

*Ratings controlled by upper chord member U14-U15

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (4-Span NJ Approach Truss)
Span Type:	4 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	1.16 (42 tons, U13U15)
Past Operating Rating (HS20):	1.97 (71 tons, U13U15)
Last Load Rating Date:	1995

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

Spans 21-24

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None
Overlay Depth (in.):	0"
Was Overlay Depth Measured (Y/N):	N/A
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	10%	10%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - TRUSS MEMBERS

Vehicle Type	Vehicle GVW (kips)	Controlling Diagonal Rating Factor L0-U1		Controlling Upper Rating Factor U1-U2		Controlling Lower Rating Factor L5-L6		Controlling Vertical Rating Factor U10-L10	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.61	0.61	0.95	0.95	1.04	1.04	1.16	1.16
HL-93 (OPR)	N/A	0.79	0.79	1.23	1.23	1.35	1.35	1.50	1.50
NJ Type 3	50	2.36	2.36	3.67	3.67	4.23	4.23	3.38	3.38
NJ Type 3S2	80	1.58	1.58	2.46	2.46	2.80	2.80	2.94	2.94
NJ Type 3-3	80	1.64	1.64	2.56	2.56	2.90	2.90	3.45	3.45
Lane-Type LL	N/A	1.55	1.55	2.41	2.41	**2.67**	**2.67**	3.56	3.56
SU4	54	2.16	2.16	3.37	3.37	3.89	3.89	3.00	3.00
SU5	62	1.90	1.90	2.96	2.96	3.41	3.41	2.69	2.69
SU6	69.5	1.70	1.70	2.64	2.64	3.04	3.04	2.43	2.43
SU7	77.5	**1.53**	**1.53**	**2.39**	**2.39**	2.74	2.74	**2.22**	**2.22**

Notes:

1. Truss members identified by panel point locations as designated in the original drawings (see additional rating calcs for details).
2. Rating program used: CSiBridge v16.1 model used for LL effects, with supplemental member capacity and load rating calculations.
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling members have been selected based on the overall minimum legal load rating factor for each member type (shown in bold). Non-controlling vehicle rating factors may not be the overall minimum rating for that vehicle. See the truss member rating summary for details. Also note that these ratings represent the 4 lane loaded case (current striped condition of structure).

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (3-Span NJ Approach Truss)
Span Type:	3 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	1.19 (43 tons, Vertical)
Past Operating Rating (HS20):	2.02 (73 tons, Vertical)
Last Load Rating Date:	1995

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

Spans 25-27

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None
Overlay Depth (in.):	0"
Was Overlay Depth Measured (Y/N):	N/A
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	10%	10%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - TRUSS MEMBERS

Vehicle Type	Vehicle GVW (kips)	Controlling Diagonal Rating Factor L0-U1		Controlling Upper Rating Factor U1-U2		Controlling Lower Rating Factor L2-L3		Controlling Vertical Rating Factor U12-L12	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.69	0.69	1.06	1.06	0.99	0.99	1.54	1.37
HL-93 (OPR)	N/A	0.89	0.89	1.37	1.37	1.28	1.28	2.00	1.78
NJ Type 3	50	2.47	2.47	3.75	3.75	3.62	3.62	4.21	3.76
NJ Type 3S2	80	1.67	1.67	2.55	2.55	2.44	2.44	3.76	3.36
NJ Type 3-3	80	1.74	1.74	2.67	2.67	2.54	2.54	4.40	3.92
Lane-Type LL	N/A	1.72	1.72	2.65	2.65	2.49	2.49	4.74	4.23
SU4	54	2.26	2.26	3.44	3.44	3.32	3.32	3.72	3.32
SU5	62	1.98	1.98	3.02	3.02	2.91	2.91	3.35	2.99
SU6	69.5	1.78	1.78	2.70	2.70	2.61	2.61	3.02	2.70
SU7	77.5	**1.60**	**1.60**	**2.44**	**2.44**	**2.35**	**2.35**	**2.77**	**2.47**

Notes:

1. Truss members identified by panel point locations as designated in the original drawings (see additional rating calcs for details).
2. Rating program used: CSiBridge v16.1 model used for LL effects, with supplemental member capacity and load rating calculations.
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling members have been selected based on the overall minimum legal load rating factor for each member type (shown in bold). Non-controlling vehicle rating factors may not be the overall minimum rating for that vehicle. See the truss member rating summary for details. Also note that these ratings represent the 4 lane loaded case (current striped condition of structure).

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (4-Span PA Approach Truss)
Span Type:	4 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.57 (L0-U1)
Past Operating Rating (HL93):	0.74 (L0-U1)
Last Load Rating Date:	2/26/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

Spans 14-17

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth (in.):	1.25"
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating:	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	10%	20%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - TRUSS MEMBERS

Vehicle Type	Vehicle GVW (kips)	Controlling Diagonal Rating Factor L0-U1		Controlling Upper Rating Factor U1-U2		Controlling Lower Rating Factor L5-L6		Controlling Vertical Rating Factor U10-L10	Controlling Vertical Rating Factor U0-L0
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.61	0.57	0.95	0.95	1.04	1.04	1.16	0.99
HL-93 (OPR)	N/A	0.79	0.74	1.23	1.23	1.35	1.35	1.50	1.28
NJ Type 3	50	2.36	2.03	3.67	3.37	4.23	3.88	3.38	2.21
NJ Type 3S2	80	1.58	1.37	2.46	2.26	2.80	2.57	2.94	2.19
NJ Type 3-3	80	1.64	1.42	2.56	2.34	2.90	2.66	3.45	2.60
Lane-Type LL	N/A	1.55	1.37	2.41	2.27	**2.67**	**2.52**	3.56	2.95
SU4	54	2.16	1.87	3.37	3.09	3.89	3.56	3.00	1.96
SU5	62	1.90	1.64	2.96	2.71	3.41	3.12	2.69	**1.83**
SU6	69.5	1.70	1.46	2.64	2.42	3.04	2.79	2.43	1.84
SU7	77.5	**1.53**	**1.32**	**2.39**	**2.19**	2.74	2.51	**2.22**	1.84

Notes:

1. Truss members identified by panel point locations as designated in the original drawings (see additional rating calcs for details).
2. Rating program used: CSiBridge v16.1 model used for LL effects, with supplemental member capacity and load rating calculations.
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling members have been selected based on the overall minimum legal load rating factor for each member type (shown in bold). Non-controlling vehicle rating factors may not be the overall minimum rating for that vehicle. See the truss member rating summary for details. Also note that these ratings represent the 4 lane loaded case (current striped condition of structure).

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (3-Span PA Approach Truss)
Span Type:	3 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	1.19 (43 tons, Vertical)
Past Operating Rating (HS20):	2.02 (73 tons, Vertical)
Last Load Rating Date:	1995

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

Spans 11-13

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth (in.):	1.25"
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating:	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	10%	20%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - TRUSS MEMBERS

Vehicle Type	Vehicle GVW (kips)	Controlling Diagonal Rating Factor L0-U1		Controlling Upper Rating Factor U1-U2		Controlling Lower Rating Factor L2-L3		Controlling Vertical Rating Factor U12-L12	U8L8
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.69	0.69	1.06	1.06	0.99	0.99	1.54	1.49
HL-93 (OPR)	N/A	0.89	0.89	1.37	1.37	1.28	1.28	2.00	1.93
NJ Type 3	50	2.47	2.26	3.75	3.44	3.62	3.32	4.21	3.49
NJ Type 3S2	80	1.67	1.53	2.55	2.33	2.44	2.23	3.76	3.25
NJ Type 3-3	80	1.74	1.59	2.67	2.45	2.54	2.33	4.40	4.07
Lane-Type LL	N/A	1.72	1.61	2.65	2.48	2.49	2.33	4.74	4.46
SU4	54	2.26	2.07	3.44	3.15	3.32	3.05	3.72	3.05
SU5	62	1.98	1.82	3.02	2.77	2.91	2.67	3.35	2.81
SU6	69.5	1.78	1.63	2.70	2.48	2.61	2.39	3.02	2.52
SU7	77.5	**1.60**	**1.47**	**2.44**	**2.24**	**2.35**	**2.15**	**2.77**	**2.34**

Notes:

1. Truss members identified by panel point locations as designated in the original drawings (see additional rating calcs for details).
2. Rating program used: CSiBridge v16.1 model used for LL effects, with supplemental member capacity and load rating calculations.
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling members have been selected based on the overall minimum legal load rating factor for each member type (shown in bold). Non-controlling vehicle rating factors may not be the overall minimum rating for that vehicle. See the truss member rating summary for details. Also note that these ratings represent the 4 lane loaded case (current striped condition of structure).

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Girders-NJ Girder Spans)
Span Type:	Girder-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.61 (G1, Sp 29-31, Flexure)
Past Operating Rating (HL93):	0.79 (G1, Sp 29-31, Flexure)
Last Load Rating Date:	5/14/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth-NJ Sp., Fascia str. bays only (in.):	2
Overlay Depth-PA Sp. (in.)	1.25
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Surface Roughness Rating (PA Sp.):	2	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	10%	10%
Condition Factor:	1.00	1.00[4]
System Factor:	0.90	0.90
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor G1, Spans 29-31		Controlling Shear Rating Factor G1, Spans 29-31	
		As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.61	0.61	0.93	0.93
HL-93 (OPR)	N/A	0.79	0.79	1.20	1.20
NJ Type 3	50	1.87	1.87	2.84	2.84
NJ Type 3S2	80	1.33	1.33	1.98	1.98
NJ Type 3-3	80	1.42	1.42	2.06	2.06
Lane-Type LL	N/A	N/A	N/A	N/A	N/A
SU4	54	1.71	1.71	2.60	2.60
SU5	62	1.51	1.51	2.29	2.29
SU6	69.5	1.36	1.36	2.11	2.11
SU7	77.5	1.25	1.25	1.93	1.93

Notes:

1. Legend: SP = span; G or S = Girder or Stringer
2. Rating program used: BRASS, Version 7.4
3. Lane-Type LL = Lane-Type Legal Load.
4. Since the girders are generally in good condition with minimal section loss noted, a condition factor of 1.00 has been used for the As-Inspected load ratings for these members.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Girders-PA Girder Spans)
Span Type:	Girder-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.61 (G1, Sp 1-9, Flexure)
Past Operating Rating (HL93):	0.79 (G1, Sp 1-9, Flexure)
Last Load Rating Date:	5/14/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth-NJ Sp., Fascia str. bays only (in.):	2
Overlay Depth-PA Sp. (in.)	1.25
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Surface Roughness Rating (PA Sp.):	2	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	20%	20%
Condition Factor:	1.00	1.00[4]
System Factor:	0.90	0.90
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor G1, Spans 1-9		Controlling Shear Rating Factor G1, Spans 1-9	
		As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.61	0.61	0.93	0.93
HL-93 (OPR)	N/A	0.79	0.79	1.20	1.20
NJ Type 3	50	1.72	1.72	2.60	2.60
NJ Type 3S2	80	1.22	1.22	1.81	1.81
NJ Type 3-3	80	1.30	1.30	1.89	1.89
Lane-Type LL	N/A	N/A	N/A	N/A	N/A
SU4	54	1.57	1.57	2.38	2.38
SU5	62	1.39	1.39	2.10	2.10
SU6	69.5	1.25	1.25	1.93	1.93
SU7	77.5	1.15	1.15	1.77	1.77

Notes:

1. Legend: SP = span; G or S = Girder or Stringer
2. Rating program used: BRASS, Version 7.4
3. Lane-Type LL = Lane-Type Legal Load.
4. Since the girders are generally in good condition with minimal section loss noted, a condition factor of 1.00 has been used for the As-Inspected load ratings for these members.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Main Span Floorbeams)
Span Type:	3 Span Cont. Thru Arch Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	1.10 (FB6, As-I, Flexure)
Past Operating Rating (HL93):	1.43 (FB6, As-I, Flexure)
Last Load Rating Date:	6/5/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None
Overlay Depth (in.):	0
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating:	1	1
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
System Factor (Interior FB):	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor (End) Type FB6		Controlling Shear Rating Factor (End) Type FB6		Controlling Flexural Rating Factor (Int.) Type FB2		Controlling Shear Rating Factor (Int.) Type FB2	
		As-Built	As-Insp. FB27, Sp19	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	1.42	1.10	3.30	3.10	1.32	1.32	3.06	2.87
HL-93 (OPR)	N/A	1.84	1.43	4.28	4.02	1.72	1.72	3.97	3.72
NJ Type 3	50	2.74	1.97	7.29	6.85	2.37	2.37	6.79	6.36
NJ Type 3S2	80	2.37	1.71	6.32	5.94	1.99	1.99	5.69	5.33
NJ Type 3-3	80	2.86	2.07	7.63	7.17	2.36	2.36	6.75	6.32
Lane-Type LL	N/A	3.2	2.31	8.52	8.00	2.66	2.66	7.63	7.15
SU4	54	2.43	1.75	6.47	6.08	2.12	2.12	6.08	5.69
SU5	62	2.18	1.57	5.82	5.47	1.90	1.90	5.43	5.09
SU6	69.5	1.97	1.42	5.25	4.93	1.71	1.71	4.90	4.59
SU7	77.5	1.80	1.30	4.80	4.51	1.56	1.56	4.48	4.19

Notes:

1. Legend: SP = span; G or S = Girder or Stringer; FB = Floorbeam
2. Rating program used: BRASS, Version 7.4
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling ratings shown above are based on 4 lanes loaded (current striped condition of the roadway). See the BRASS output files for rating results based on 6 lanes loaded.
5. Note that FB6 (and others) are conservatively analyzed as end floorbeams despite stringer continuity modifications.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name:	Rahul Luhar / HNTB
Load Rating Reviewer (LRR) Name / Firm Name:	Scott Cavanaugh, P.E. / HNTB
LRR Signature:	Scott Cavanaugh
Load Rating Date:	12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Main Span Truss)
Span Type:	3 Span Cont. Thru Arch Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	---
Past Operating Rating (HS20):	---
Last Load Rating Date:	N/A

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None
Overlay Depth (in.):	0"
Was Overlay Depth Measured (Y/N):	N/A
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating:	1	1
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	1.00[4]
System Factor:	1.00	1
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - MAIN SPAN FLOORBEAM CONNECTIONS

Vehicle Type	Vehicle GVW (kips)	Controlling Shear Rating Factor FB to TRUSS		Controlling Shear Rating Factor FB to SUSPENDER ROPE	
		As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	2.95	2.95	7.15	7.15
HL-93 (OPR)	N/A	3.83	3.83	9.27	9.27
NJ Type 3	50	6.55	6.55	15.86	15.86
NJ Type 3S2	80	5.49	5.49	13.30	13.30
NJ Type 3-3	80	6.50	6.50	15.76	15.76
Lane-Type LL	N/A	7.36	7.36	17.82	17.82
SU4	54	5.86	5.86	14.21	14.21
SU5	62	5.24	5.24	12.69	12.69
SU6	69.5	4.72	4.72	11.45	11.45
SU7	77.5	4.32	4.32	10.46	10.46

Notes:

1. Controlling ratings shown above are based on 4 lanes loaded (current striped configuration of roadway). See the load rating calculations for ratings based on 6 lanes loaded.
2. Rating program used: BRASS v2.1.5.
3. Lane-Type LL = Lane-Type Legal Load.
4. The connections are generally in good condition with minimal section loss noted, therefore a condition factor of 1.00 has been used for As-Inspected load ratings.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name:	Rahul Luhar / HNTB
Load Rating Reviewer (LRR) Name / Firm Name:	Scott Cavanaugh, P.E. / HNTB
LRR Signature:	Scott Cavanaugh
Load Rating Date:	12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Main Span Truss)
Span Type:	3 Span Cont. Thru Arch Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	1.17 (42 tons)
Past Operating Rating (HS20):	1.94 (70 tons)
Last Load Rating Date:	1994

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None
Overlay Depth (in.):	0"
Was Overlay Depth Measured (Y/N):	N/A
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating:	1	1
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	1.00[4]
System Factor (End FB, Box):	0.85	0.85
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - BOX GIRDER

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor Box Girder FB8		Controlling Shear Rating Factor Box Girder FB8	
		As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	2.04	2.04	5.14	5.14
HL-93 (OPR)	N/A	2.64	2.64	6.67	6.67
NJ Type 3	50	4.50	4.50	11.38	11.38
NJ Type 3S2	80	3.90	3.90	9.86	9.86
NJ Type 3-3	80	4.71	4.71	11.90	11.90
Lane-Type LL	N/A	5.26	5.26	13.29	13.29
SU4	54	4.00	4.00	10.10	10.10
SU5	62	3.59	3.59	9.08	9.08
SU6	69.5	3.24	3.24	8.19	8.19
SU7	77.5	2.96	2.96	7.48	7.48

Notes:

1. Controlling ratings shown above are based on 4 lanes loaded (current striped configuration of roadway). See the load rating calculations for ratings based on 6 lanes loaded.
2. Rating program used: BRASS v2.1.5 for live load and dead load effects. Member resistance and ratings calculated using a spreadsheet.
3. Lane-Type LL = Lane-Type Legal Load.
4. The box girder is generally in good condition with minimal section loss noted, therefore a condition factor of 1.00 has been used for As-Inspected load ratings.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Approach Truss Span Floorbeams)
Span Type:	3 & 4 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.94 (Int FB, Flexure)
Past Operating Rating (HL93):	1.22 (Int FB, Flexure)
Last Load Rating Date:	9/26/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None (NJ); Latex Modified Concrete (PA)
Overlay Depth (in.):	0" (NJ); 1.25" (PA)
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ):	1	1
Surface Roughness Rating (PA):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
System Factor (Interior FB):	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - APPROACH DECK TRUSS FLOORBEAMS

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor (End) Type AFB_1		Controlling Shear Rating Factor (End) Type AFB_1		Controlling Flexural Rating Factor (Int.) Type AFB_4		Controlling Shear Rating Factor (Int.) Type AFB_4	
		As-Built	As-Insp. FB1, Sp25	As-Built	As-Insp. FB1, Sp25	As-Built	As-Insp. FB13, Sp22	As-Built	As-Insp. FB13, Sp22
HL-93 (INV)	N/A	1.17	0.98	3.22	3.04	1.09	0.94*	2.48	2.43
HL-93 (OPR)	N/A	1.52	1.28	4.17	3.94	1.42	1.22*	3.21	3.15
NJ Type 3	50	2.20	1.64*	6.03	5.70	1.95*	1.53*	4.97	4.87
NJ Type 3S2	80	2.13	1.59*	5.85	5.53	1.90*	1.49*	4.85	4.75
NJ Type 3-3	80	2.83	2.11*	7.76	7.34	2.47*	1.93*	6.30	6.17
Lane-Type LL	N/A	2.93	2.19*	8.04	7.60	2.80*	2.20*	7.16	7.02
SU4	54	1.93	1.43*	5.27	4.99	1.68*	1.32*	4.29	4.21
SU5	62	1.83	1.39*	5.02	4.75	1.56*	1.22*	3.98	3.90
SU6	69.5	1.83	1.36*	5.02	4.75	1.41*	1.10*	3.59	3.52
SU7	77.5	1.83	1.36*	5.02	4.75	1.31*	1.03*	3.35	3.28

*Rating controlled by the Service II Limit State

Notes:

1. Legend: SP = span; G or S = Girder or Stringer; FB = Floorbeam
2. Rating program used: BRASS, Version 7.4
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling ratings shown above are based on 4 lanes loaded (current striped condition of the roadway). See the BRASS output files for rating results based on 6 lanes loaded.
5. As-Built NJ and PA approach deck truss FB ratings are identical since full impact must be used for all transverse members (riding surface of NJ and PA approaches does not affect FB rating results).

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Approach Truss Span Floorbeams)
Span Type:	3 & 4 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	2.42 (Int FB, Shear, As-I)
Past Operating Rating (HL93):	3.14 (Int FB, Shear, As-I)
Last Load Rating Date:	9/26/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None (NJ); Latex Modified Concrete (PA)
Overlay Depth (in.):	0" (NJ); 1.25" (PA)
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ):	1	1
Surface Roughness Rating (PA):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
System Factor (Interior FB):	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - APPROACH DECK TRUSS FLOORBEAM OVERHANG BRACKETS

Vehicle Type	Vehicle GVW (kips)	Type AFB_1 Controlling Flexural Rating Factor End FB Bracket		Type AFB_1 Controlling Shear Rating Factor End FB Bracket		Type AFB_3 Controlling Flexural Rating Factor Interior FB Bracket		Type AFB_3 Controlling Shear Rating Factor Interior FB Bracket	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp. FB9, Sp14	As-Built	As-Insp. FB9, Sp14
HL-93 (INV)	N/A	7.29	7.29	6.42	6.09	5.64	5.13	4.29	4.06
HL-93 (OPR)	N/A	9.45	9.45	8.32	7.89	7.32	6.64	5.56	5.26
NJ Type 3	50	13.66	13.66	12.04	11.41	12.04	10.93	9.15	8.66
NJ Type 3S2	80	13.25	13.25	11.67	11.07	11.47	10.42	8.72	8.25
NJ Type 3-3	80	17.59	17.59	15.50	14.69	14.32	13.01	10.89	10.30
Lane-Type LL	N/A	18.22	18.22	16.05	15.22	16.24	14.75	12.35	11.68
SU4	54	11.95	11.95	10.53	9.99	10.57	9.60	8.04	7.61
SU5	62	11.38	11.38	10.02	9.50	9.56	8.68	7.27	6.88
SU6	69.5	11.38	11.38	10.02	9.50	8.64	7.85	6.57	6.21
SU7	77.5	11.38	11.38	10.02	9.50	7.95	7.22	6.04	5.72

Notes:

1. Legend: SP = span; G or S = Girder or Stringer; FB = Floorbeam
2. Rating program used: BRASS, Version 7.4
3. Lane-Type LL = Lane-Type Legal Load.
4. Controlling ratings shown above are based on 4 lanes loaded (current striped condition of the roadway). See the BRASS output files for rating results based on 6 lanes loaded.
5. As-Built NJ and PA approach deck truss FB ratings are identical since full impact must be used for all transverse members (riding surface of NJ and PA approaches does not affect FB rating results).

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Approach Truss Span Floorbeams)
Span Type:	3 & 4 Span Cont. Deck Truss
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	---
Past Operating Rating (HS20):	---
Last Load Rating Date:	N/A

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	N

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	None (NJ); Latex Modified Concrete (PA)
Overlay Depth (in.):	0" (NJ); 1.25" (PA)
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	See Calcs.

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ):	1	1
Surface Roughness Rating (PA):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	1.00[5]
System Factor (End FB):	0.85	0.85
System Factor (Interior FB):	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - APPROACH DECK TRUSS FLOORBEAM CONNECTIONS

Vehicle Type	Vehicle GVW (kips)	Controlling Shear Rating Factor Conn Type 1		Controlling Shear Rating Factor Conn Type 2		Controlling Flexural Rating Factor Conn Type 2	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	1.56	1.56	2.13	2.13	2.44	2.44
HL-93 (OPR)	N/A	2.03	2.03	2.76	2.76	3.16	3.16
NJ Type 3	50	3.38	3.38	4.60	4.60	5.28	5.28
NJ Type 3S2	80	3.10	3.10	4.22	4.22	4.84	4.84
NJ Type 3-3	80	3.70	3.70	5.03	5.03	5.78	5.78
Lane-Type LL	N/A	4.16	4.16	5.66	5.66	6.49	6.49
SU4	54	2.98	2.98	4.05	4.05	4.65	4.65
SU5	62	2.69	2.69	3.66	3.66	4.20	4.20
SU6	69.5	2.42	2.42	3.30	3.30	3.73	3.73
SU7	77.5	2.23	2.23	3.03	3.03	3.48	3.48

Notes:

1. Connection Type 1: Inboard side of FB to truss connection; Connection Type 2: Outboard (overhang) connection
2. Controlling ratings shown above are based on 4 lanes loaded (current striped configuration of roadway) for Type 1, and based on 6 lanes loaded for Type 2.
3. Rating program used: BRASS v2.1.5.
4. Lane-Type LL = Lane-Type Legal Load.
5. Since the connections are generally in good condition with minimal section loss noted, a condition factor of 1.00 has been used for the As-Inspected load ratings.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Girder Span Floorbeams)
Span Type:	Girder-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.96 (Int FB, Flexure, As-I)
Past Operating Rating (HL93):	1.25 (Int FB, Flexure, As-I)
Last Load Rating Date:	9/26/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	Y

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth (in.):	2" (NJ, fascia str. Bays only); 1.25" (PA)
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ):	1	1
Surface Roughness Rating (PA):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor (End FB):	0.85	0.85
System Factor (Interior FB):	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - GIRDER SPAN FLOORBEAMS

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor End FB		Controlling Shear Rating Factor End FB		Controlling Flexural Rating Factor Int FB[5]		Controlling Shear Rating Factor Int FB	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	1.12	1.12	3.00	2.83	1.03	0.99	1.51	1.39
HL-93 (OPR)	N/A	1.45	1.45	3.88	3.66	1.34	1.28	1.95	1.81
NJ Type 3	50	2.08	2.08	5.56	5.25	1.85	1.85	3.33	3.08
NJ Type 3S2	80	2.05	2.05	5.49	5.18	1.57	1.57	2.82	2.61
NJ Type 3-3	80	2.66	2.66	7.10	6.69	1.86	1.86	3.34	3.09
Lane-Type LL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SU4	54	1.82	1.82	4.87	4.59	1.65	1.65	2.97	2.75
SU5	62	1.70	1.70	4.55	4.29	1.48	1.48	2.67	2.47
SU6	69.5	1.71	1.71	4.56	4.30	1.33	1.33	2.40	2.22
SU7	77.5	1.71	1.71	4.56	4.30	1.22	1.22	2.19	2.03

(All controlling floorbeam ratings are located between girders, i.e., not within the floorbeam cantilever brackets)

Notes:

1. Legend: SP = span; G or S = Girder or Stringer; FB = Floorbeam; Lane-Type LL = Lane-Type Legal Load.
2. Rating program used: BRASS, Version 7.4. Note that due to Version 7.4 limitations regarding old .DAT file conversion, files with 2 unique travelways previously defined were simplified to conservatively utilize 1 travelway. This resulted in loading of the median area of the structure and generally resulted in less than a 0.10 rating factor decrease when compared to past ratings. The original 2 travelways can be added back to the model when Version 7.4 is improved.
3. Controlling ratings shown above are based on 4 lanes loaded (current striped condition of the roadway). See the BRASS output files for rating results based on 6 lanes loaded.
4. Live load factors used in the floorbeam analysis are representative of the 2013 Interim Revisions to the MBE, Second Edition.
5. All ratings except for HL-93 (As-I) are controlled by the Service II Limit State.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Girder Span Floorbeams)
Span Type:	Girder-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HS20):	N/A
Past Operating Rating (HS20):	N/A
Last Load Rating Date:	N/A

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	N

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth (in.):	2" (NJ, fascia str. bays only); 1.25" (PA)
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ):	1	1
Surface Roughness Rating (PA):	2	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	1.00[7]
System Factor (End FB):	0.85	0.85
System Factor (Interior FB):	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - GIRDER SPAN FLOORBEAM CONNECTIONS

Vehicle Type	Vehicle GVW (kips)	End Floorbeam Rating Factor OH Bracket Conn.		End Floorbeam Rating Factor FB-Girder Conn.		Inter. Floorbeam Rating Factor OH Bracket Conn.		Inter. Floorbeam Rating Factor FB-Girder Conn.	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	1.29	1.29	2.09	2.09	1.00	1.00	1.00	1.00
HL-93 (OPR)	N/A	1.67	1.67	2.71	2.71	1.30	1.30	1.30	1.30
NJ Type 3	50	2.39	2.39	3.89	3.89	2.21	2.21	2.21	2.21
NJ Type 3S2	80	2.36	2.36	3.84	3.84	1.87	1.87	1.87	1.87
NJ Type 3-3	80	3.04	3.04	4.96	4.96	2.22	2.22	2.22	2.22
Lane-Type LL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SU4	54	2.09	2.09	3.40	3.40	1.97	1.97	1.97	1.97
SU5	62	1.95	1.95	3.18	3.18	1.77	1.77	1.77	1.77
SU6	69.5	1.95	1.95	3.18	3.18	1.59	1.59	1.59	1.59
SU7	77.5	1.95	1.95	3.18	3.18	1.46	1.46	1.46	1.46

Notes:

1. Rating program used: BRASS, Version 2.1.4
2. Load Rating Factors for connection computed by spreadsheet.
3. Lane-Type LL = Lane-Type Legal Load.
4. Legend: SPx=Span Number; FBx-Floorbeam number; Fx-Failure Mode, S-Slip Critical, V-Fastener Shear, B-Bearing, P-Connection Plate
5. Controlling ratings reported apply to End and Intermediate floorbeams located in the Girder Spans of the structure (Spans 1-10 & 28-31).
6. Live Load factors used in the connection analysis are representative of the 2013 Interim Revisions to the MBE, Second Edition.
7. The connections are generally in good condition with minimal section loss noted, therefore a condition factor of 1.00 has been used for As-Inspected load ratings.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Stringers-Girder Spans)
Span Type:	Girder-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.82 (Sp. 28, S1, Flexure)
Past Operating Rating (HL93):	1.07 (Sp. 28, S1, Flexure)
Last Load Rating Date:	5/14/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	N (Stringers)

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth-NJ Sp., Fascia str. bays only (in.):	2
Overlay Depth-PA Sp. (in.)	1.25
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Surface Roughness Rating (PA Sp.):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor:	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor (Interior) G6 (Sp. 28-31)		Controlling Flexural Rating Factor (Exterior) G1 (Sp. 28-31)[5]		Controlling Shear Rating Factor (Interior) G6 (Sp. 28-31)		Controlling Shear Rating Factor (Exterior) G1 (Sp. 28-31)	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	1.15	1.06	0.82	0.77	1.48	1.39	1.71	1.62
HL-93 (OPR)	N/A	1.49	1.38	1.06	1.00	1.92	1.80	2.22	2.10
NJ Type 3	50	2.40	2.37	1.69	1.59	2.85	2.67	3.30	3.11
NJ Type 3S2	80	1.61	1.59	1.46	1.36	2.78	2.61	3.22	2.96
NJ Type 3-3	80	2.18	2.15	1.97	1.84	3.39	3.18	3.92	3.70
Lane-Type LL	N/A	2.52	2.49	2.28	2.13	N/A	N/A	N/A	N/A
SU4	54	2.32	2.29	1.42	1.33	2.52	2.36	2.92	2.74
SU5	62	1.97	1.94	1.34	1.26	2.32	2.18	2.69	2.54
SU6	69.5	1.76	1.74	1.24	1.16	2.28	2.14	2.64	2.49
SU7	77.5	1.63	1.61	1.18	1.11	2.26	2.12	2.62	2.47

Notes:

1. Legend: SP = span; G or S = Girder or Stringer
2. Rating program used: AASHTOWare BrR, Version 6.6
3. Lane-Type LL = Lane-Type Legal Load.
4. Live Load factors used in the stringer analysis are representative of the 2013 Interim Revisions to the MBE, Second Edition.
5. Strength limit state ratings have been reported for this member. See the following load rating summary sheet for Service limit state rating results.

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Stringers-Girder Spans)
Span Type:	Girder-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.82 (Sp. 28, S1, Flexure)
Past Operating Rating (HL93):	1.07 (Sp. 28, S1, Flexure)
Last Load Rating Date:	5/14/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	N (Stringers)

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth-NJ Sp., Fascia str. bays only (in.):	2
Overlay Depth-PA Sp. (in.)	1.25
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Surface Roughness Rating (PA Sp.):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor:	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - SERVICE LIMIT STATE

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor (Exterior) G1 (Sp. 28-31)	
		As-Built	As-Insp.
HL-93 (INV)	N/A	0.77	0.77
HL-93 (OPR)	N/A	1.00	1.00
NJ Type 3	50	1.28	1.28
NJ Type 3S2	80	1.09	1.06
NJ Type 3-3	80	1.47	1.47
Lane-Type LL	N/A	1.71	1.70
SU4	54	1.07	1.07
SU5	62	1.02	1.02
SU6	69.5	0.94	0.94
SU7	77.5	0.89	0.89

Notes:

1. Legend: SP = span; G or S = Girder or Stringer
2. Rating program used: AASHTOWare BrR, Version 6.6
3. Lane-Type LL = Lane-Type Legal Load.
4. Live Load factors used in the stringer analysis are representative of the 2013 Interim Revisions to the MBE, Second Edition.

QC/QA

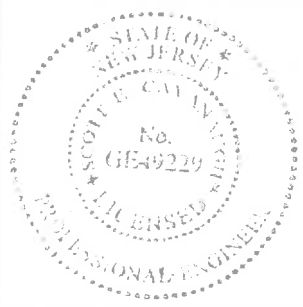
Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected



NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Stringers-Truss Spans)
Span Type:	Truss-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.80 (Sp. 19-20, S1, Flexure)
Past Operating Rating (HL93):	1.04 (Sp. 19-20, S1, Flexure)
Last Load Rating Date:	5/14/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	N (Stringers)

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth-NJ Sp., Fascia str. bays only (in.):	2
Overlay Depth-PA Sp. (in.)	1.25
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Surface Roughness Rating (PA Sp.):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor:	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor (Interior) G6, Sp 20(FB43-45)		Controlling Flexural Rating Factor (Exterior) G1, Sp 20(FB39-43)[5]		Controlling Shear Rating Factor (Interior) G6, Sp 14&15(FB9-13)		Controlling Shear Rating Factor (Exterior) G1, Sp 20(FB39-43)	
		As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.	As-Built	As-Insp.
HL-93 (INV)	N/A	0.96	0.88	0.80	0.75	1.40	1.32	1.69	1.48
HL-93 (OPR)	N/A	1.25	1.14	1.03	0.97	1.81	1.71	2.20	1.92
NJ Type 3	50	2.17	2.11	1.64	1.53	2.66	2.51	3.27	2.86
NJ Type 3S2	80	1.34	1.30	1.24*	1.15*	2.59	2.43	3.19	2.79
NJ Type 3-3	80	1.80	1.74	1.66*	1.54*	3.20	3.01	3.89	3.39
Lane-Type LL	N/A	2.09	2.02	1.93*	1.79*	N/A	N/A	N/A	N/A
SU4	54	2.14	2.08	1.37	1.29	2.33	2.19	2.90	2.53
SU5	62	1.82	1.76	1.30	1.22	2.18	2.05	2.67	2.33
SU6	69.5	1.63	1.58	1.20	1.13	2.17	2.04	2.61	2.28
SU7	77.5	1.51	1.46	1.15	1.07	2.14	2.01	2.59	2.26

Notes:

1. Legend: SP = span; G or S = Girder or Stringer
2. Rating program used: AASHTOWare BrR, Version 6.6
3. Lane-Type LL = Lane-Type Legal Load.
4. Live Load factors used in the stringer analysis are representative of the 2013 Interim Revisions to the MBE, Second Edition.
5. Strength limit state ratings have been reported for this member. See the following load rating summary sheet for Service limit state rating results.

* Rating factors are controlled by G1, Sp 20(FB43-45) (2-span continuous unit)

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

NEW JERSEY TURNPIKE AUTHORITY

BRIDGE LOAD RATING SUMMARY

EXISTING BRIDGE DATA

Bridge Number:	P0.00 (Stringers-Truss Spans)
Span Type:	Truss-Floorbeam-Stringer
Bridge Plans Available:	Contracts PN-4(Original), 97-021-RM05(Main Sp. PA), 97-021-RM41(Deck Truss Sp. PA), 97-021-RM64(Girder Sp. PA), R-1433(NJ Appr. Sp. Rehab.)
Design Loading:	H20-S16
Past Inventory Rating (HL93):	0.80 (Sp. 19-20, S1, Flexure)
Past Operating Rating (HL93):	1.04 (Sp. 19-20, S1, Flexure)
Last Load Rating Date:	5/14/2013

Last Inspection Date:	7/22/2016
Inspected By (Firm):	GPI
Fracture Critical Members (Y/N):	N (Stringers)

BRIDGE LOAD RATING SUMMARY

Dead Load Data

Overlay Type:	Latex Modified Concrete
Overlay Depth-NJ Sp., Fascia str. bays only (in.):	2
Overlay Depth-PA Sp. (in.)	1.25
Was Overlay Depth Measured (Y/N):	N
Weight of Utilities:	N/A
Weight of other Non-Structural Attachments:	N/A

LRFR Evaluation Factors	As-Built	As-Insp.
Surface Roughness Rating (NJ Sp.):	1	1
Surface Roughness Rating (PA Sp.):	1	2
Dyn. Load Allow. (IM - HL-93):	33%	33%
Dyn. Load Allow. (IM - Legal):	33%	33%
Condition Factor:	1.00	0.95
System Factor:	1.00	1.00
ADTT (one way):	4,129	4,129

SUPERSTRUCTURE/DECK RATING SUMMARY - SERVICE LIMIT STATE

Vehicle Type	Vehicle GVW (kips)	Controlling Flexural Rating Factor (Exterior) G1, Sp 20(FB39-43)	
		As-Built	As-Insp.
HL-93 (INV)	N/A	0.74	0.74
HL-93 (OPR)	N/A	0.97	0.97
NJ Type 3	50	1.24	1.24
NJ Type 3S2	80	0.91*	0.91*
NJ Type 3-3	80	1.23*	1.23*
Lane-Type LL	N/A	1.42*	1.42*
SU4	54	1.04	1.04
SU5	62	0.98	0.98
SU6	69.5	0.91	0.91
SU7	77.5	0.87	0.87

Notes:

1. Legend: SP = span; G or S = Girder or Stringer
2. Rating program used: AASHTOWare BrR, Version 6.6
3. Lane-Type LL = Lane-Type Legal Load.
4. Live Load factors used in the stringer analysis are representative of the 2013 Interim Revisions to the MBE, Second Edition.

* Rating factors are controlled by G1, Sp 20(FB43-45) (2-span continuous unit)

QC/QA

Load Rating Engineer (LRE) Name / Firm Name: Rahul Luhar / HNTB

Load Rating Reviewer (LRR) Name / Firm Name: Scott Cavanaugh, P.E. / HNTB

LRR Signature: Scott Cavanaugh

Load Rating Date: 12/22/17

☐ Previous LRFR Load Ratings have been Updated and/or Corrected

Appendix E

- NJTA History of Construction Contracts

Note: Contract History taken from 2022 Biennial Bridge Inspection Report

NEW JERSEY TURNPIKE AUTHORITY

CONTRACT HISTORY

TYPE	CONTRACT NO.	DESCRIPTION OF WORK	YEAR
Original Construction	PN-1	(NJTA / PTC) SUBSTRUCTURE CONSTRUCTION	1956
Original Construction	PN-2	(NJTA / PTC) SUBSTRUCTURE CONSTRUCTION	1956
Original Construction	PN-3	(NJTA / PTC) SUBSTRUCTURE CONSTRUCTION	1956
Original Construction	PN-4	(NJTA / PTC) SUPERSTRUCTURE CONSTRUCTION	1956
Other	PN-5	(NJTA / PTC) RIVER RD. RELOCATED IN BURLINGTON COUNTY (UNDER BRIDGE)	1956
Other	PN-6	(NJTA / PTC) ELECTRICAL	1956
Other	PN-7	(NJTA / PTC) CHERRY LANE RELOCATED IN PA	1956
Other	R-194	(NJTA) RELOCATION OF NAVIGATION LIGHTING	1965
Other	6911-72-676	(PTC) REPAIRS TO SUBSTRUCTURE	1972
Other	6930-77-729	(PTC) REPAIRS TO BRIDGE	1977
Other	R-599	(NJTA) SIGNAL BRIDGE REMOVAL	1978
Miscellaneous Structural Repair	R-591-1	(NJTA) SUBSTRUCTURE REPAIRS AT PIERS 15, 17, 18 AND WEST ABUTMENT	1979
Specialized Structural Repair	R-727	(NJTA) SUBSTRUCTURE AND SLOPE	1981
Other	R-940	(NJTA) PIER SPALL REPAIR, RESET & REPAIR PIER BEARING	1987
Other	R-976	(NJTA) FENDER REPAIRS	1987
Specialized Structural Repair	R-986	(NJTA) SUBSTRUCTURE REPAIRS	1988

Deck Repair	R-1040	(NJTA) JOINT RECONSTRUCTION AT PIER 11, 12, BTW 17 AND 18, BTW 20 AND 21, 22, BTW 22 AND 23, 25, 26, AND EAST ABUTMENT OF THE PEW ROADWAY AND BTW PIERS 22 AND 23, 26, AND EAST ABUTMENT OF THE PWE ROADWAY; HEADBLOCK REPAIRS AT THE WEST ABUTMENT OF BOTH ROADWAYS; DECK HAUNCH REPAIRS ALONG THE WEST ABUTMENT; CONCRETE DECK PANEL REPLACEMENT IN SPAN 1, 5, 6, 7, 19, 23, AND 29 OF THE PWE ROADWAY AND SPANS 19, 23, AND 29 OF THE PEW ROADWAY; AREAS OF RESURFACING AT THE WEST APPROACH, SPANS 1, 23, 26, 27, 31, AND EAST APPROACH OF THE PWE ROADWAY AND WEST APPROACH, SPANS 1, 11, 12, 18, 21, 22, 23, 25, 26, 27, 31, AND EAST APPROACH OF THE PEW ROADWAY; NEW DIAPHRAGMS IN SPANS 1, 6, 7, AND 19	1989
Other	R-1066	(NJTA) FENDER	1990
Specialized Structural Repair	R-1144	(NJTA) LIGHTING STANDARD POLE REPAIR; ACCESS LADDER, PARAPET FENCING AND SIGNS INSTALLATION	1993
Painting	R-1173	(NJTA) PARTIAL REPAINTING OF THE DELAWARE RIVER TURNPIKE	1993
Other	R-1312	(NJTA) TIMBER FENDER SYSTEM REPAIRS	1997
Deck Repair	97-021-RM05	(PTC) DECK RECONSTRUCTION AND STEEL REPAIRS	1998
Deck Repair	97-021-RM41	(PTC) REDECKING OF DECK TRUSS SPANS AND STEEL REPAIRS	2000
Deck Repair	97-021-RM44	(PTC) WEST APPROACH REBUILDING AND REDECKING WORK IN SPANS 1 TO 10, STRUCTURE/FB BEARING REPLACEMENT	2001
Miscellaneous Structural Repair	R-1455	(NJTA) DECK JOINT REALIGNMENT AT PIERS 20, 24, 28, 29, AND 30; REPAIR CATWALK GRATING AT PIERS 20, 24, 27, 28, 29, AND 30; GRIND TOOTH JOINT AT PIERS 20 AND 28; STEEL REPAIRS AT PIER 30	2002
Major Rehabilitation	R-1433	(NJTA) DECK RECONSTRUCTION, STRUCTURAL, ROADWAY AND LIGHTING IMPROVEMENTS	2005

Other	A100.122	(NJTA) REMOVE EXISTING FENCE AROUND WEST ABUTMENT AREA; INSTALLED CHAIN LINK FENCE ON RIVER ROAD	2009
Specialized Structural Repair	T100.115	(NJTA) TRUSS GUSSET PLATE RETROFIT	2009
Other	A100.183	(NJTA) AREAS OF REMOVED EXISTING FENCING, GUIDE RAIL, AND RAZOR RIBBON THROUGHOUT SUBSTRUCTURE; NEW INSTALLATION OF SECURITY VEHICULAR GATE (SINGLE LEAF), SECURITY FENCE, BEAM GUIDE RAIL AND ANCHORAGE, TANGENT TERMINALS, SECURITY PEDESTRIAN GATE, AND BERM AND NON-VEGETATIVE SURFACING THROUGHOUT SUBSTRUCTURE	2011
Deck Repair	T100.197	(NJTA) MICRO MILLING DECK SURFCACE IN SPANS 22 THROUGH 31; THIN POLYMER OVERLAY (EPOXY / MMA) IN SPANS 22 AND 23 IN THE WESTBOUND LANES	2011
Specialized Structural Repair	A100.196 P1	(NJTA) SUSPENDER ROPE REPLACEMENT AND PROTECTION	2012
Specialized Structural Repair	A100.196 P2	(NJTA) PIER 21 STRUCTURE HARDENING	2012
Specialized Structural Repair	A100.196 P3	(NJTA) PIERS 20 AND 21 STAND-OFF ENHANCEMENT	2012
Specialized Structural Repair	A100.196 P4	(NJTA) MAIN SPAN STRUCTURE HARDENING, SPAN MOUNTED NAVIGATION LIGHT REPAIRS	2013
Specialized Structural Repair	T100.216	(NJTA) REPAINTING STRUCTURAL STEEL, SEISMIC RETROFIT, CATWALK, LIGHTING, AND MISCELLANEOUS IMPROVEMENTS	2014
Bridge Repair	T100.379	(NJTA) THIN POLYMER OVERLAY REMOVAL IN SPAN 23 OF THE PEW ROADWAY	2016
Specialized Structural Repair	T100.449	(NJTA) EMERGENCY REPAIRS; CONSTRUCTION OF MICRO-PILES FOR THE TEMPORARY SUPPORT TOWERS USED TO PERFORM THE REPAIRS	2017
Specialized Structural Repair	T100.450	(NJTA) EMERGENCY REPAIRS; CHORD REPAIR AND STRENGTHENING, STRINGER AB AND WEB, GUSSET PLATE AND LATERAL BRACING REPAIRS.	2017

Other	T3718	(NJTA) INSTALLATION OF STRUCTURAL HEALTH MONITORING SYSTEM (FIBER OPTIC) – MONITORING FROM PIER 10-17 AND PIER 20-27	2019
Roadway Resurfacing (Approach)	Unknown Contract	(NJTA) RIGHT LANE RESURFACING ALONG EAST APPROACH OF THE PWE ROADWAY	2020
Roadway Resurfacing (Approach)	T200.574	(NJTA) FULL PWE/PEW ROADWAYS RESURFACING ALONG EAST APPROACH	2021
Roadway Resurfacing (Approach)	EN-00277	(PTC) RIGHT LANE RESURFACING ALONG WEST APPROACH OF THE PEW ROADWAY	2021