2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT

CUY-480-1842 R
SFN 1812548

Eastbound Valley View Bridge Over the Cuyahoga River Valley

Ohio Department of Transportation

District 12

August 25 – 29, 2014

RICHLAND ENGINEERING LIMITED

2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT OF ODOT BRIDGE NO. CUY-480-1842 R EASTBOUND VALLEY VIEW BRIDGE OVER THE CUYAHOGA RIVER VALLEY

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Inspected between August 25 and August 29, 2014

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Ohio Department of Transportation
District 12

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2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT

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2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT

CUY-480-1842 R
SFN 1812548

BRIDGE DESCRIPTION

Bridge No. CUY-480-1842 R, also known as the Eastbound Valley View Bridge, is located on Interstate 480 in Cuyahoga County, Ohio. The CUY-480-1842 L&R, Valley View Bridge was opened to traffic in 1978. The twin structures are 4,155 feet long and spaced 92 feet apart. The fifteen span superstructure is divided into 5 units with four seated hinges. Unit 1 is 795 feet; Units 2 to 4 are 900 feet; and Unit 5 is 655 feet. Span 1 is 220 feet; spans 2 through 12 are 300 feet; spans 13 and 14 are 225 feet; and span 15 is 180 feet. The bridge carries four lanes of traffic over the CSX Railroad, the Cuyahoga River, Cleveland Metroparks, Ohio and Erie Canal Reservation, Towpath Trail, West Canal Road, the Ohio Canal, and Canal Road.

The superstructure consists of a 73 foot wide black steel reinforced concrete deck with concrete New Jersey shaped safety barriers and chain link fence on each side; and a superplasticized dense concrete overlay. Steel finger type deck expansion joints are located at the hinges and elastomeric strip seal type expansion joints are located at the abutments. The concrete deck is supported by continuous rolled steel stringers and built-up haunched continuous steel plate girders. Two intermediate stringers are supported by trussed steel floorbeams between the steel plate girders. The four main girders are spaced at 22’-4”. The main girders are ASTM A588 steel. The remaining steel superstructure members are ASTM A36 steel.

An acceleration lane extends from the IR 77 Interchange onto the eastbound bridge. The lane tapers from a width of 15.5 feet at the rear abutment to zero feet at the deck expansion joint, about 25 feet west of pier 3, located in span 3.

The steel plate girders are supported on 75 to 185 feet tall reinforced concrete tee type piers and spill through abutments. The abutments and piers 1 through 12 are supported on piles. Piers 13 and 14 are founded on spread footings in shale.

The existing bridge deck grade is approximately 2.62%. The current traffic on the CUY-480-1842 L&R Bridge is estimated at 146,000 vehicles per day with 8% trucks.

PROJECT HISTORY

An extensive history of bridge projects is detailed in the 2013 Physical Conditions Report. No contractor-bid bridge repair projects have taken place since the 2013 inspection other than finishing the abutment and parapet rehabilitation project.

The structure is inspected annually by ODOT or consultants. Burgess and Niple, HNTB, Parsons Brinckerhoff, HDR Engineering, and TranSystems have inspected the structure in the past. Richland Engineering Limited inspected the bridge in 1989, 1990 and 1991; 1998, 1999, and 2000; 2013 and 2014.

SUMMARY

The following Physical Conditions Report details the findings from Richland Engineering Limited's 2014 routine inspection of CUY-480-1842 R, Eastbound Valley View Bridge. The report is an update to Richland Engineering Limited's 2013 Physical Conditions Report, dated December 13, 2013. The 2014 Update documents general conditions of the various bridge components and the changes observed since the previous year's inspection. **Changes in condition from the 2013 Report are highlighted in bold red font throughout this report.**

The overall condition of this bridge is rated a **6**, meaning that it is in **satisfactory** condition. Construction of the proposed deck replacement and rehabilitation project on the Eastbound Valley View Bridge may begin between 2017 and 2021. Therefore any recommendations addressed in this report are to maintain serviceability of this structure over this time period.

Significant findings include:

- The abutment expansion joints continue to leak and deteriorate. The elastomeric strip seals are torn and pushing out of the joints at several locations. This leaking has caused corrosion on the steel elements below, and in turn has caused spalling and deterioration to the abutment backwalls. **The expansion joint headers (top of backwalls) are breaking up and a section of joint armor at the forward abutment is now loose and banging with traffic.**

- The underside of the deck exhibits widespread spalls with exposed reinforcing steel throughout the bridge. There is a section of subdecking missing in span 9 directly over Canal Road with delaminated concrete above.

- Areas of delaminations and large spalls with exposed corroded reinforcing steel are typical throughout piers 3, 6, 9, and 12 under the leaking transverse drainage troughs. The bearing masonry plates at pier 4 girder H, pier 5 girder E, and pier 11 girder H are being undermined up to 1-inch due to pier seat deterioration.

- The forward abutment expansion joint is closing indicating the backwall is failing or the entire abutment has moved to the west. The backwalls below the end floorbeams were

recently patched, but the top four feet are in poor condition with large spalls and exposed corroded reinforcing steel.

- The majority of the transverse drainage troughs under the finger expansion joints are plugged and continue to spill drainage onto the steelwork and piers below. **Four of the 56 deck scupper downspouts are also currently plugged.**

- **There are active cracks at the top of the vertical stiffener in the web of Girder G in spans 2, 6 and 7, and the bottom of the vertical stiffener in the web of Girder F in span 4.**

- The floorbeam lower chord copes have cracks and overcuts at the connections to the girder transverse stiffeners in several locations. These cracks can be monitored in future inspections until the proposed rehabilitation project.

GENERAL

The data for this Physical Condition Inspection Report was obtained August 25 through August 29, 2014. The field inspection was performed by personnel from Richland Engineering Limited (REL) and Barr & Prevost (B&P). The inspection team members were as follows:

Jason D. Burgholder, PE	Richland Engineering Limited
Robert W. Cunning, EI	Richland Engineering Limited
Richard J. Harding, Technician	Richland Engineering Limited
Jim E. Prevost, PE	Barr & Prevost
Greg Johnson, EI	Barr & Prevost
Corey Wisniewski, Technician	Barr & Prevost

The inspection of this bridge was performed in accordance with the following documents:

1. *Manual of Bridge Inspection,* Ohio Department of Transportation (ODOT), 2014.
2. *Manual for Bridge Evaluation,* American Association of State Highway and Transportation Officials (AASHTO), 2010.
3. *Bridge Inspector's Reference Manual,* U.S. Department of Transportation, 2012.
4. *Inspection of Fracture Critical Bridge Members,* U.S. Department of Transportation, 1986.
5. *National Bridge Inspection Standards,* U.S. Department of Transportation, 1988.

The project scope involved a routine inspection of the structure. Previously documented comments have been updated to reflect current conditions. Inspection team members used a combination of traditional access methods (walking the deck/ground) and alternative access methods (industrial roped access, climbing with fall protection) to access the superstructure. The bridge substructure received a visual inspection from the girders, tops of the pier caps, and from the ground. No snooper or traffic control was used for this inspection.

Inspection findings were documented with sketches, color photographs, and field notes. No destructive testing was performed as part of this project.

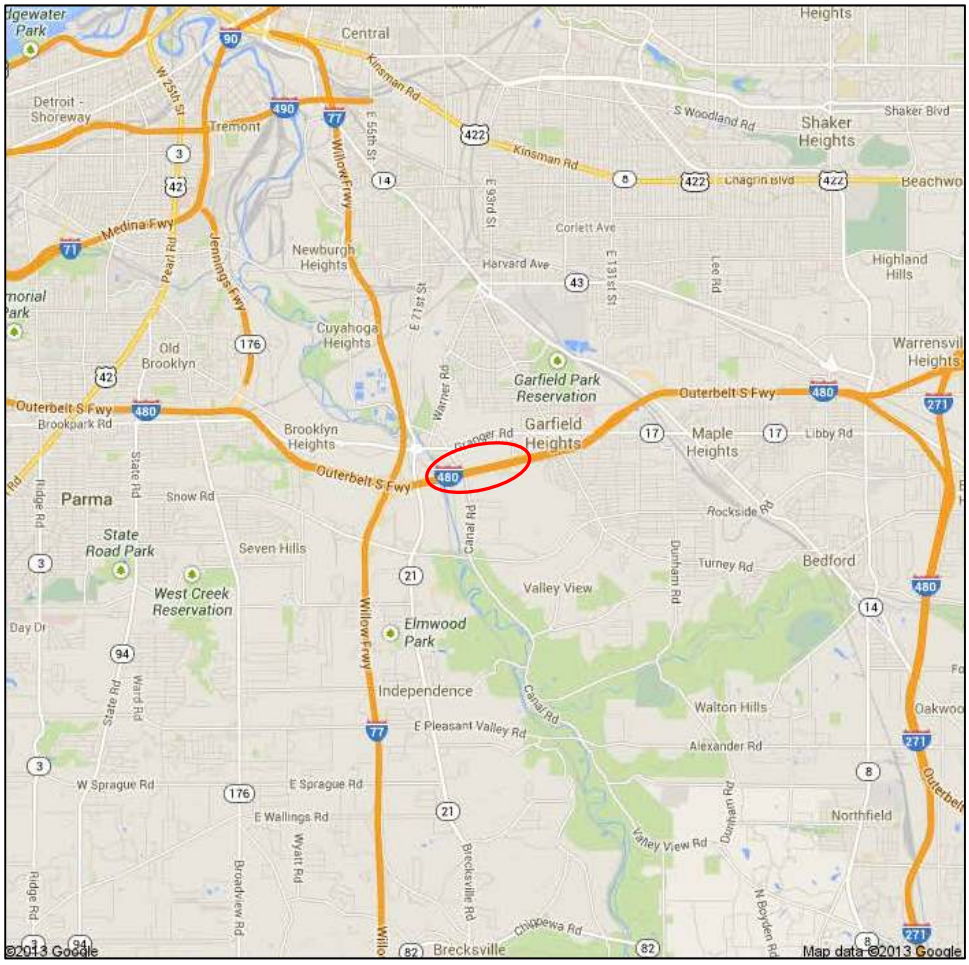
The condition ratings used in this report are based on the 2014 ODOT *Manual of Bridge Inspection* Condition Rating Guidelines.

Condition Rating Guide				
1-4 Individual Component	9-0 NBIS Summary		Inspector Guidelines (Quantitative comments include the Location, Extent & Severity of the deficiency)	
1-GOOD	**9 - Excellent**	No problems noted: no section loss, general deterioration.	Make brief comments as necessary. Communicate the predominant deficiency.	
	8 - Very Good			
	7 - Good	Some minor problems (ex. extent of concrete deterioration is up to 1% spalling or up to 5% saturation)		
2-FAIR	**6 – Satisfactory**	**Structural elements show some minor deterioration** (ex. extent of concrete deterioration is up to 5% spalling or up to 10% saturation)		
	5 -Fair	**Structural elements show deterioration but are sound** (ex. extent of concrete deterioration is up to 10% spalling or up to 20% saturation)	Document deficiencies quantitatively. Consider taking photos or making sketches.	
3-POOR	**4 - Poor**	**Advanced*** (ex. extent of concrete deterioration is more than 10% spalling or more than 20% saturation). Usually the load path appears to be affected for primary members or there are obvious structural changes since the as-built condition that are advanced.	Candidate to establish monitoring benchmarks to track the rate-of -change. Take photos, make sketches and document quantitatively in order to determine if a re-load rating is possible. Include in-service conditions to verify capacity	**Poor Structurally Deficient****
	3 - Serious	4-Poor. . . *And* **local failures possible**.	*Above*. . . *And* discuss the deficiency immediately with Control Authority.	
4-CRITICAL	**2 - Critical**	3-Serious. . . *And* Unless closely monitored it **may be necessary to close the bridge** until corrective action is taken.	*Above*. . . *And* the bridge is a candidate to dispatch road closure and/or immediate repairs and/or increased monitoring (Interim Inspections). Confirm in writing, critical finding.	
	1 -Imminent Failure	2-Critical. . . *And* Major deterioration is affecting stability. Bridge or lane(s) **shall be closed** to traffic but corrective action may put bridge back into light service.	*Above*. . . *And* Dispatch immediate lane or bridge closure. Contact the Control Authority. Stay at the bridge until the safety of the traveling public is achieved. Confirm in writing.	
	0 - Failed	1-Imm Failure. . . *And* Out of service - beyond corrective action.		

* ***Advanced*** –widespread deficiencies **or** a likely reduction to capacity **(more examples on following page).**

** ***Structurally Deficient (SD)*** –Bridge Deck, Superstructure, or Substructure Summary rated 4-Poor or below. A bridge can also be classified as structurally deficient if its load carrying capacity is significantly below current design standards or if a waterway below frequently overtops the bridge during floods.

LOCATION MAP



GENERAL APPRAISAL AND OPERATING STATUS

The overall condition rating of the bridge is **6**, meaning that it is in **satisfactory** condition.

The ratings of the summary items are as follows:

Item	Rating
Approach Summary	7 – Good Condition
Deck Summary	5 – Fair Condition
Superstructure Summary	6 – Satisfactory Condition
Substructure Summary	6 – Satisfactory Condition
Channel Summary	7 – Good Condition
Sign/Utility Summary	6 – Satisfactory Condition

APPROACH ITEMS

The approaches are rated a **7**, meaning that they are in **good** condition.

The individual items are rated as follows:

Item	Rating
Approach Wearing Surface	2 – Fair
Approach Slabs	1 – Good
Embankment	1 – Good
Guardrail	1 – Good

Approach Wearing Surface

The approach pavement is rated **fair**. The rear approach pavement has a few patches and potholes in lanes 1S and 2S (see Picture #1). The forward approach pavement is generally in good condition.

Picture #1: Rear approach wearing surface looking south.

Approach Slabs

The approach slabs are rated **good**. The approach slabs are covered with asphalt overlays. No significant deficiencies were noted.

Embankment

The embankment for this bridge is rated **good**. No significant deficiencies were noted in the embankment.

Guardrail

The guardrail is rated **good** with no deficiencies noted.

DECK

The deck is rated a **5**, meaning that it is in **fair** condition.

The individual deck items are as follows:

Item	Rating
Floor/Slab	2 – Fair
Edge of Floor/Slab	2 – Fair
Wearing Surface	1 – Good
Railing	2 – Fair
Drainage	2 – Fair
Expansion Joints	3 – Poor

Floor/Slab

The floor is in **fair** condition. Cracking in the wearing surface and top of the deck allows moisture to penetrate the concrete, which in turn corrodes the black reinforcing steel. There are cracks, large spalls, scaling, delaminations, efflorescence, and exposed reinforcing steel on about 5% of the bottom of the deck (see Picture #2). There is a section of metal subdecking either missing or never installed in span 9 on the west side of floorbeam 6 between girders E and F. This is directly over Canal Road and the deck is continuing to deteriorate in this area.

The non-composite deck was noted to deflect differently than the stringers in a few locations. This is apparent in the fretting corrosion between the top flanges and deck haunches and can even be seen when a truck passes over in some locations.

Picture #2: Typical deck cracks and delaminations in span 15.

Edge of Floor/Slab

The edge of floor/slab is in **fair** condition. The entire deck edges were inspected from a snooper during the 2013 inspection. No significant changes were noted viewing from the ends of the bridge and looking up from the ground during the 2014 inspection.

Wearing Surface

The wearing surface was visually inspected and was found to be in **good** condition. Sounding the wearing surface was not included in the scope for this inspection. The superplasticized dense concrete overlay wearing surface is generally smooth with random cracks throughout and minor spalls around deck joints.

Railing

The reinforced concrete parapets are in **fair** condition. The concrete parapet roadway faces were patched and sealed in 2012 and 2013. There is horizontal and vertical cracking visible in the

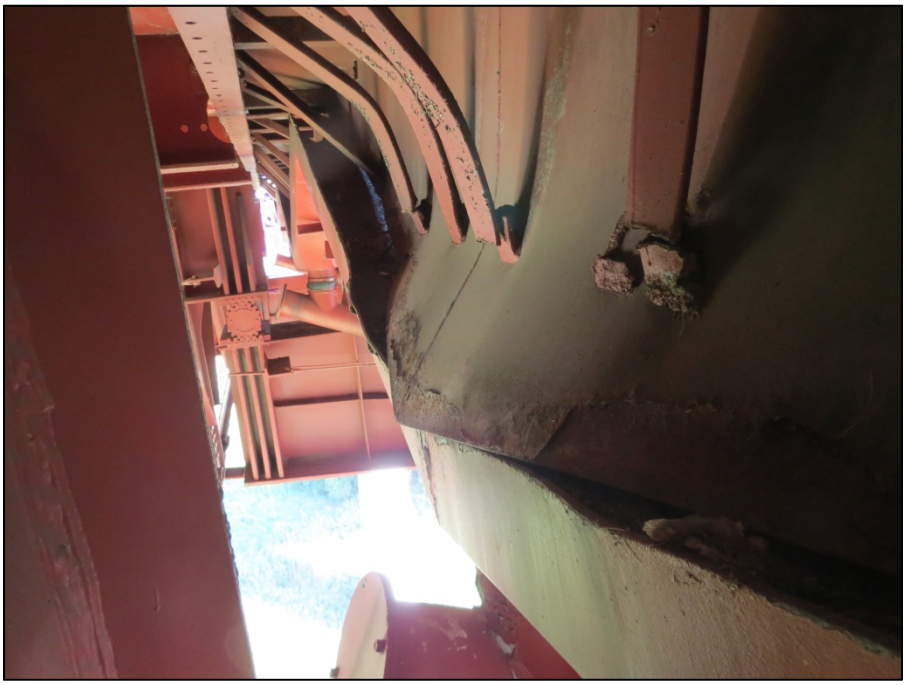
parapets as well as some rust staining and failing sealant. The exterior face of the concrete parapets are cracked and spalling along the entire length of the bridge.

Drainage

The drainage system is in **fair** condition. The system removes water from the bridge, but several elements exhibit consistent problems and there are isolated problems throughout the system. The crowned deck drains the water to the parapet faces. The only ponding noted was at the eastbound bridge rear abutment.

The scuppers in the deck are typically open and functional. Only 4 of the 56 total bridge vertical scupper pipes are clogged and do not drain the deck. There are two located near the joint between units 2 and 3 and two located near the joint between units 3 and 4; all on the outside shoulder. The remaining vertical scupper pipes are fully functional. Most of the scupper collection grates on the deck surface have some degree of debris built-up within them.

The drainage troughs running transversely beneath the finger joints are typically clogged and overflowing with dirt and debris. The problematic location is the coupling between the hopper and the 10-inch diameter collector pipe that is supposed to carry the drainage back to the pier. There is a constriction here at the interface of the hopper and 10-inch vertical pipe. Water in the 10-inch vertical pipe is immediately turned and enters a relatively shallow horizontal pipe run to the piers. The steel plate flashing pushes against the debris in the troughs as the bridge thermally expands. This has caused the support angles for the flashing to buckle in several locations and even punch through the steel plate in a few locations (see Picture #3).



Picture #3: Steel flashing bent out of trough. Support angles bent and broken Looking north from girder G in span 3.

There are a few locations where the welds connecting the drainage trough support angles to the girders have cracked (see Picture #4). None of these cracks have extended into the base metal of the girders. **Two broken bolts connecting the drainage trough to the joint support armor between girders E and F, near pier 12, were also found during the 2014 inspection** (see Picture #5).

Picture #4: Cracked weld connecting drainage trough support angle to girder G in span 12, looking north.

Picture #5: Two broken bolts connecting drainage trough to joint support armor between girders E and F near pier 12, looking west.

The superstructure drainage is transferred to the conveyance system on the piers, which takes the water to the ground. The pier drainage system at each pier is functional; however, there are consistent problems at each pier. Some of neoprene couplers between pipe segments leak, causing the pipe ends at the couplers to rust. The rusting is moderate surface rust, without appreciable section loss to the pipe section at this time.

The downspouts carrying the water to the ground on the pier legs have been cut near the ground line to allow the water to exit the pipes. The underground drainage system from the piers to the storm sewer is non-functional. The water now spills out around the bases of the piers.

Expansion Joints

The expansion joints are rated **poor** due to the condition of the abutment joints.

The intermediate finger joints have minor misalignments, but are generally in good condition. The strip seal joint at the forward abutment is nearly closed at normal temperature. The abutment strip seals are leaking in a few areas, which is accelerating the deterioration of the bridge deck, backwalls and corrosion of the structural steel under the joints.

Expansion joint details and comments are tabulated below.

Joint Location	Type	Opening at 79°F	Condition
West (Rear) Abutment	Elastomeric Strip Seal	North = 2 1/4” South = 1 5/8”	Approach pavement has pot holes and patches around joint. Minor leakage. The expansion joint header (top of backwall) continues to break up (see Picture #6 and #7).
Unit 1 / Unit 2	Finger Joint	North = 7 1/4” South = 7”	Good condition.
Unit 2 / Unit 3	Finger Joint	North = 6 3/4” South = 7”	Good condition.
Unit 3 / Unit 4	Finger Joint	North = 7 1/2” South = 7 7/16”	Good condition.
Unit 4 / Unit 5	Finger Joint	North = 6 1/2” South = 6 7/16”	Good condition.
East (Forward) Abutment	Elastomeric Strip Seal	North = 1 3/8” South = 2 1/2”	Joint nearly closed. Seal bulging, torn, pushing up out of joint, and leaking. **Joint armor breaking up in lane 2 and banging with traffic** (see Picture #8).

Picture #6: Rear abutment joint header breaking up, looking south.

Picture #7: Rear abutment joint header breaking up in lane 3, looking north.

Picture #8: Forward abutment joint armor breaking up in lane 2. Banging with traffic.

SUPERSTRUCTURE

The superstructure for the bridge is rated a **6**, meaning that it is in **satisfactory** condition.

The individual items are rated as follows:

Item	Rating
Alignment	1 – Good
Beams/Girders	2 – Fair
Diaphragms/Crossframes	1 – Good
Stringers	1 – Good
Floorbeams	1 – Good
Lateral Bracing	1 – Good
Bearing Devices	2 – Fair
Protective Coating System	1 – Good
Pins/Hangers/Hinges	1 – Good
Fatigue	2 – Fair

Alignment

The alignment of the structure and members is **good**. For this inspection the alignment was checked by sighting along the bridge members and parapets. Several of the wind shear guides on the bottom of the girder bottom flanges at the hinges were noted during the 2013 snooper

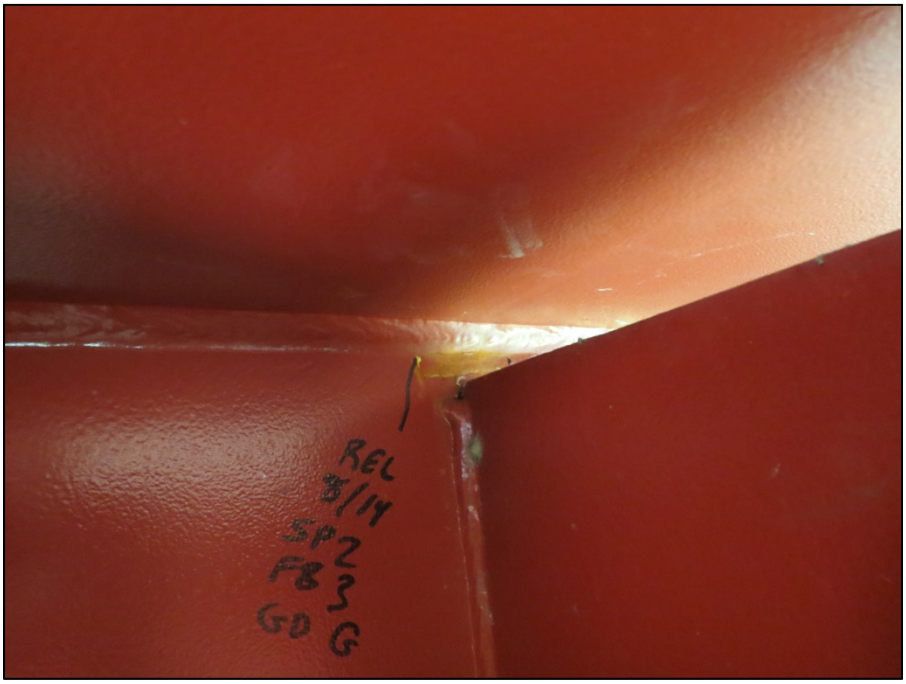
inspection to have slight misalignment and were wearing against their keeper plates. No change in alignment could be noticed this year compared to recent inspections.

Girders

The girders are in **fair** condition. The top portions of the interior girders above the metal subdecking could not be inspected in spans 8 and 9. Some isolated corrosion exists on the girders, mostly around the top flange or on the girder ends under the deck joints. This has caused some minor spalling of the deck haunch around the top flange. There is minor pack rust between the fascia girder splice plates. No section loss in the base metal was noted on the girders.

There are several "dogbone" retrofits of fatigue prone details in the girder webs that have overcuts beyond the drilled holes. These are located at lower lateral bracing horizontal plate connections to the girder webs. No active cracks were found in this detail in the girder webs. Existing cracks have not extended past the crack arresting holes. See Figure No. 1 "Dogbone" Overcuts in the Appendix for specific locations.

A new 2.25" active crack was found during the 2014 inspection in the web of girder G in span 2 at the top of the floorbeam 3 transverse stiffener (see Picture #9).



Picture #9: New 2.25" active crack on south face of girder G, span 2.

A new 1.5" active crack was found during the 2014 inspection in the web of girder F in span 4 at the bottom of the floorbeam 7 transverse stiffener (see Picture #10).

Picture #10: New 1.5” active crack on north face of girder F, span 4.

There is an active crack in the web of girder G in span 6 at the top of the floorbeam 3 transverse stiffener. **The crack grew from 1 3/4- inches long during the 2013 inspection to 3 1/4- inches long during the 2014 inspection** (see Picture #11).

Picture #11: Active 3.25” crack on south face of girder G, span 6.

A new 1.75" active crack was found during the 2014 inspection in the web of girder G in span 7 at the top of the floorbeam 9 transverse stiffener (see Picture #12).

Picture #12: New 1.75" active crack on south face of girder G, span 7.

There is a 10-inch long crack in the weld between the lower lateral bracing connection plate and the girder G web that propagated from the saw cut between the stress relief holes. The crack is located on the south face of girder G on the west side of floorbeam 7 in span 10. The crack has not extended into the girder web base metal and has not changed in length since 2002.

Crossframes

The crossframes are in **good** condition. On this structure the girder crossframes are also the floorbeams supporting the interior stringers. See the "Floorbeams" section below for details.

Stringers

The continuous rolled steel stringers are in **good** condition. The top portions of the stringers above the metal subdecking could not be inspected in spans 8 and 9. Fretting corrosion exists along the top flange of the stringers where the deck moves independently of the stringers as described in the "Floor/Slab" section.

There are 24 cracked stringer to floorbeam welds in Unit 1 (see Picture #13). None of the cracks extend into base metal of the stringers. See Figure No. 2 Cracked Floorbeam-Stringer Welds in the Appendix for specific locations. There are also a few locations that were previously retrofit with a bolted connection to address similar conditions.

Picture #13: Cracked stringer 11 welded connection to floorbeam 8 in span 3, looking south.

Floorbeams

The floorbeams and their connections are in **good** condition. The floorbeams under the deck joints typically have minor spots of active corrosion resulting from the leaking joints, but no significant section loss was noted.

The contractor rehabilitating the abutment backwalls left concrete wedged between the forward abutment end floorbeam and the backwall (see Picture #14). **This needs to be cleaned out as soon as possible to prevent unwanted thermal forces bending the floorbeam out of plane.**

There are 24 cracked stringer to floorbeam welds in Unit 1 (see Picture #13). None of the cracks extend into base metal of the floorbeams. See Figure 2 in the Appendix for specific locations.

There are seven (7) active cracks in the trussed floorbeam lower chord copes at the connections to the girder transverse stiffeners. There are also eight (8) locations where the cope was overcut, but a crack has not formed. See Figure 3 in the Appendix for specific locations. There are also a few locations that were previously retrofit with a bolted connection to address similar conditions.

Several of the floorbeam gusset connection plates are bent, most likely from the original construction. There is pack rust building between connected members at several locations.

Other than the welded stringer connection and lower chord cope cracks, the floorbeams away from deck joints have no significant deficiencies or corrosion.

Picture #14: Large chunk of backwall concrete wedged between center bay end floorbeam and the forward abutment backwall, looking south.

Lateral Bracing

The lower lateral bracing is in **good** condition. There is a 10-inch long crack in the weld between the lower lateral bracing connection plate and the girder G web that propagated from the saw cut between the stress relief holes. The crack is located on the south face of girder G on the west side of floorbeam 7 in span 10. The crack has not changed in length since 2002.

Bearing Devices

The bearings on this bridge are in **fair** condition with minor surface rust.

There is debris and rust around the roller bearings at the piers. None of the pier expansion bearings show signs of movement. This is likely due to the relative flexibility of the tall piers. The rollers at the seated hinges in the girders are operating normally.

The bearing masonry plates at pier 4 girder H, pier 5 girder E, and pier 11 girder H are being undermined up to 1-inch due to pier seat deterioration. This should be monitored in future inspections.

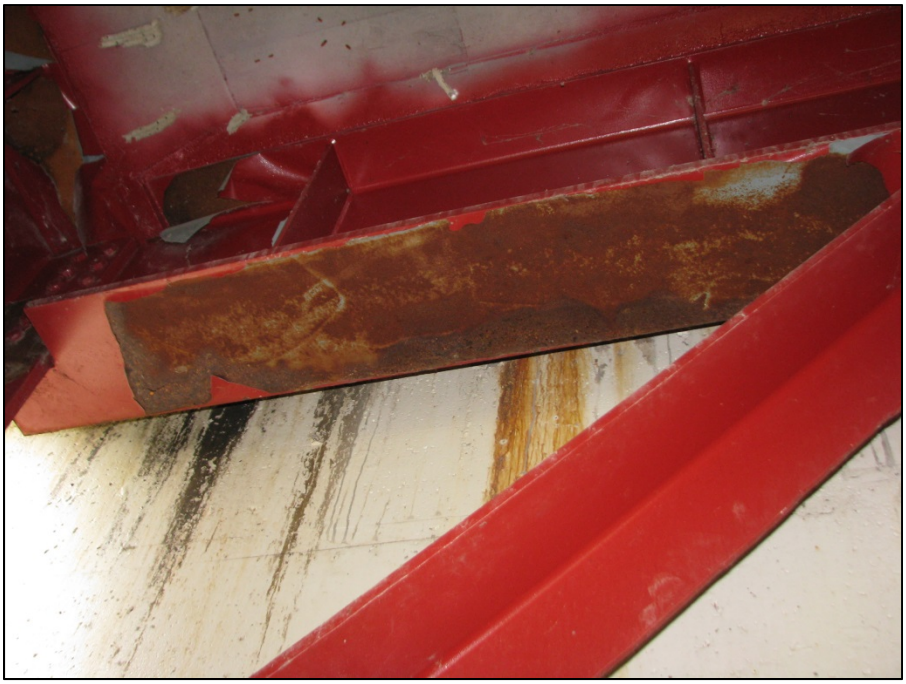
The contractor rehabilitating the abutment backwalls left all of the debris on the abutment seats. Concrete is wedged in between the rocker bearings and the backwall preventing

expansion of the bridge (see Picture #15). **This needs to be cleaned out as soon as possible to prevent unwanted thermal stresses in the girders.**

Picture #15: Forms and concrete debris blocking expansion of girder G rocker at forward abutment, looking south.

Protective Coating System

The organic zinc - epoxy - urethane paint system completed in 2000 is in **good** condition. There is active pack rust and corrosion at several fascia girder splices and sign supports. The paint is beginning to fail under the deck joints (see Picture #16) and on the fascia girder bottom flange. There are isolated areas of top coat peeling failure. The exterior fascia girder color is not consistent for the length of the bridge.



Picture #16: Paint failure on rear abutment end floorbeam near girder H.

Hinges

The seated hinges are rated in **good** condition. The rollers have debris building up around them, but were all operating normally under thermal changes (see Picture #17). No cracks were noted in the tri-axial welds.

Picture #17: Girder E hinge rocker near pier 12 tilted 12° East at 90°F.

Fatigue

The fatigue-prone details for this bridge are rated **fair**.

The lateral bracing connection plate to girder web welds are a Category E detail. Two 2-inch diameter stress relief holes connected by a saw cut (dogbone) were added as a retrofit to the girder web at the lateral bracing weld terminations in the girder positive bending moment regions. A 10-inch crack has propagated from the saw cut into the weld material on the south face of girder G on the west side of floorbeam 7 in span 10. The crack does not extend into the girder base metal and has not changed in length since 2002.

The stringer bottom flange to floorbeam top flange weld connections are a Category E detail (see Picture #13). 24 locations were noted to have cracks in the weld in unit 1. None of the cracks extend into the base metal of the stringers or floorbeams.

The roller seat flange connection tri-axial welds to the girder webs at the expansion hinges are a Category E' detail. No signs of distress were noted at these locations.

The longitudinal web stiffener to girder web welds, where the ends of the stiffeners do not have a radius with the weld ends ground out, are Category E details. No signs of fatigue cracking were noted in these details.

The transverse stiffener to girder web welds are a Category C' detail. There are numerous locations with cracks in the girder web at the top and/or bottom of the stiffeners. The majority of these cracks occurred during transport to the site for the original construction. All of the cracks have had their ends drilled out with the exception of the four active cracks described in the "Girders" section.

SUBSTRUCTURE

The substructure for this bridge is rated a **6**, meaning that it is in **satisfactory** condition.

The individual items are rated as follows:

Item	Rating
Abutment Walls	2 – Fair
Abutment Caps	1 – Good
Pier Walls	2 – Fair
Pier Caps	2 – Fair
Backwalls	2 – Fair
Wingwalls	1 – Good
Scour	1 – Good
Slope Protection	1 – Good

Abutment Walls/Caps

The abutment walls are in **fair** condition and the abutment caps are in **good** condition. The majority of the previously deteriorated concrete was recently repaired by a contractor and is now in good condition. There are still areas of unsound and spalling concrete (see Picture #18). The abutment seats have hairline cracks propagating from isolated bearings. The seats are also covered with construction debris as described in the "Bearing Devices" section above.

The reinforced concrete stub abutments are founded on piling. The closing of the forward abutment expansion joint indicates the abutment may be moving or the backwall is failing. The abutment movement measurements started in 1993 were repeated during this inspection. (See Figure No. 4 Abutment Movement Measurements in the Appendix.) The measurements do not indicate any movement or rotation between the abutments and wingwalls since the 1995 measurements taken by REL. The majority of the closing of the forward abutment expansion joint is likely due to the backwall failing or the entire abutment/wingwall unit moving to the west.

Picture #18: Spalls and deterioration at south end of forward abutment. Note debris on seat.

Pier Walls/Caps

The pier walls and pier caps are in **fair** condition. The piers were given a visual inspection from the ground, pier caps, and girders.

There are spalls with exposed reinforcing steel and delaminations on the pier seats, caps, and stems. The piers under deck joints are in worse condition due to clogged and leaking drainage collection.

There is severe deterioration undermining bearing masonry plates up to 1-inch deep at pier 4 girder H (see Picture #19); pier 5 girder E (see Picture #20); and pier 11 girder H (see Picture #21).

Picture #19: South end of pier 4 cap deterioration undermining edge of girder H bearing.

Picture #20: North end of pier 5 cap deterioration undermining edge of girder E bearing.

Picture #21: South end of pier 11 cap deterioration undermining edge of girder H bearing.

Backwalls

The backwalls are in **fair** condition. The majority of the previously deteriorated concrete was repaired by a contractor in 2013 and is now in good condition. Deteriorated concrete near the tops of both backwalls was removed by the contractor, but these areas were not able to be repaired due to lack of access for placing concrete (see Picture #22). **During the 2014 inspection several of the recent repairs were already failing.**

Picture #22: Top of rear abutment backwall continuing to deteriorate behind girder E.

Wingwalls

The wingwalls are in **good** condition with isolated areas of minor spalls, cracks and efflorescence. No significant deficiencies were noted on the wingwalls.

Scour

Scour is rated **good** for this structure. Piers are located outside of the waterway and are above the normal high-water level for the channel. There is an erosion hole approximately 6 feet deep on the east side of pier 3. This was caused by the downspout emptying onto the ground since the underground system is plugged. The erosion is currently not affecting the pier.

Slope Protection

Slope protection for this bridge is rated **good**. The rear abutment slope protection was recently repaired where it was previously washed out with large ruts. All-terrain vehicle tracks go up and

down the east slope which has caused some minor erosion. The forward abutment slope protection was never restored after the 2013 abutment rehabilitation project (see Picture #23).

Picture #23: Top of forward abutment slope protection never restored after 2013 rehab.

CHANNEL

The channel is rated **7**, meaning that it is in **good** condition.

The individual items are rated as follows:

Item	Rating
Alignment	1 – Good
Protection	1 – Good
Hydraulic Opening	1 – Good

Alignment

The alignment of the Cuyahoga River and the Ohio Canal is **good**. No deficiencies are noted.

Protection

The channel protection of the Cuyahoga River and the Ohio Canal is **good**.

Hydraulic Opening

The hydraulic opening of the Cuyahoga River and the Ohio Canal is **good**. There is no restriction in flow through the channels under the structure.

SIGN/UTILITY

Signs

The signs are rated **good**.

Sign Supports

The sign supports are rated **fair**. The sign supports were inspected from a snooper during the 2013 inspection, but were not able to be accessed during this inspection.

Utilities

The utilities are rated **good**.

An electrical junction box cover plate is missing in the south parapet face at the fourth light pole from the rear abutment (see Picture #24). The junction box cover plate in the south parapet at the fifth light pole from the rear abutment is broken.

The superstructure grounding wire is broken at pier 1.

Picture #24: Electrical junction box cover missing from south parapet in span 5.

GENERAL

Inspection Access

The inspection handrails and cables along the interior faces of each girder are generally in good condition. There are a few deficiencies such as broken welds on the solid handrails (see Framing Plans in Appendix for locations). The inspection cables at the piers with expansion joints are typically too short due to running under the downspouts and support brackets. This has caused the cables in a few locations to start to wear through. **The cable along girder G is now broken at pier 6 and pier 9. Several other cables have section loss due to deterioration caused by the plugged drainage above. Future inspectors should be warned not to trust the inspection cables at the expansion joints due to their poor condition.**

RECOMMENDATIONS

Preliminary design activities for a proposed rehabilitation project are under way. Currently, the eastbound deck replacement project may begin construction between 2017 and 2021. Due to this short time frame, extensive deck repair is not needed. To maintain this structure, recommendations have been divided into three categories: Priority, Maintenance, and Monitor. "Priority" repairs are work which should be completed as soon as possible to address an immediate safety hazard. "Maintenance" repairs are on-going maintenance items which can be accomplished either by an ODOT maintenance crew or a construction contract. "Monitor" items are tasks which should be investigated and recorded in subsequent inspections.

PRIORITY

- Replace the missing section of subdecking to the west of floorbeam 6 in span 9, between stringers E and F. This area of deck is deteriorating and located directly over Canal Road.
- **Repair the expansion joint armor at the forward abutment that is loose and banging with traffic. Repair expansion joint headers (top of backwalls) at both abutments that are continuing to break up.**
- **Drill out active crack at the top of the vertical stiffener in the web of Girder G in span 2 to prevent additional propagation.**
- **Drill out active crack at the bottom of the vertical stiffener in the web of Girder F in span 4 to prevent additional propagation.**
- Drill out active crack at the top of the vertical stiffener in the web of Girder G in span 6 to prevent additional propagation.
- **Drill out active crack at the top of the vertical stiffener in the web of Girder G in span 7 to prevent additional propagation.**

MAINTENANCE

Maintenance recommendations are intended to maintain the current level of service of the bridge until the proposed rehabilitation project. The following recommendations fall into the "Maintenance" category:

- Scuppers and downspouts should be cleaned to make sure the deck stays properly drained.
- Patch wearing surface.
- Clean the drainage troughs and hoppers under the finger joints to keep water off the steelwork.
- Repair erosion hole at pier 3 until the underground drainage system is repaired with the rehabilitation project.

MONITOR

The following items should be noted during future inspections of this structure:

- Monitor the cracked weld connecting the wind shear guide on girder H, span 3, floorbeam 11 for additional propagation.
- Monitor the bearing masonry plates at pier 4 girder H, pier 5 girder E, and pier 11 girder H that are being undermined up to 1-inch due to pier seat deterioration.
- Monitor active crack in the lower lateral bracing connection plate weld in span 10 of for propagation into the girder G base metal.
- Monitor the cope cracks in the floorbeam lower chords.
- Monitor the stringer to floorbeam connection weld cracks in unit 1.

- Monitor the deterioration to the structural steel under leaking deck joints for accelerated corrosion.
- Monitor existing cracks in girder webs for propagation beyond stress relief holes.
- Monitor the movement of the abutments and repeat measurements during future inspections.
- Monitor the end slopes and around pier 3 for additional erosion.

PROPOSED REHABILITATION PROJECT

1. The project is a complete deck replacement. The new deck should be made composite in the positive and negative moment areas with the stringers and girders by adding welded stud shear connectors.

2. Deck expansion joints. The strip sealed abutment joints and armor should be completely replaced. The intermediate steel finger expansion joints are in good condition and may be reused.

3. Remove and replace access manholes in the south shoulder of the right bridge at piers 3, 6, 9, and 12.

4. New 42" tall single slope reinforced concrete barriers per Standard Construction Drawing SBR-1-99 should be constructed.

5. The barriers should be topped with 6 feet tall vandal protection fence per Standard Construction Drawing VPF-1-90.

6. The 25 feet long approach slabs and concrete parapet transitions should be replaced.

<u>Superstructure Repairs</u>

7. Retrofit drilling of girder web cracks identified by inspection.

8. Retrofit stringer to floorbeam cracked welds. The connection should be retrofit by installing four 3/4-inch diameter connection bolts between the stringer bottom flange and the floorbeam top flange similar to the retrofit in the 1998 repair project.

9. Repair "dogbone" overcut holes in girder webs. The overcuts should be ground smooth similar to the retrofit in the 1998 repair project.

10. Retrofit cracked floorbeam lower chord copes. The end of the crack should be drilled with a 1-inch diameter hole and the ST member should be reinforced with added bolted plates. The retrofit is similar to the retrofit in the 1998 repair project.

11. Repair the inspection handrails and safety cables. There are a few specific locations where inspection handrails have broken welds that need repair, and inspection cables are

deteriorating and need replacement. The inspection cables at all of the girder expansion joints need to be replaced due to inadequate length.

12. Painting. Steel retrofit and repair areas should be spot painted.

    The outside of the fascia girders need to have a top coat to provide a uniform red color. The outside girder splice plates and sign supports have active rust and pack rust that should be blast cleaned and painted at the same time.

13. Remove subdecking. The metal subdecking in spans 8 and 9 should be removed after the decks are replaced. The subdecking is supported from stringer bottom flanges, girder longitudinal stiffeners, and angles bolted to girder webs where there are no longitudinal stiffeners.

Substructure Repairs

14. Concrete deterioration patching of concrete piers. The spalls with exposed reinforcing steel and delaminations on the pier seats and vertical surfaces should be patched.

15. Sealing of concrete surfaces. The concrete patching areas, pier cap shear strengthening area, graffiti, and areas with deteriorated sealer should be sealed with a matching color.

16. The top 4 feet of the abutment backwalls should be replaced to anchor the new strip seal expansion joints and remove deteriorated concrete.

Bridge Drainage Collection Above Ground

The following repairs are needed to restore the bridge drainage system to good condition and improve its effectiveness:

17. The scuppers should be replaced at the existing locations with the new bridge decks.

18. Drainage troughs, flashing, and hoppers beneath finger expansion joints should be cleaned. Repair where angles punched through transverse trough flashing.

19. New larger hoppers collecting drainage from the troughs beneath the finger joints should be designed and detailed with larger openings to convey the drainage to the collection pipes below. The pipes from the joints to the piers should be replaced with larger diameter pipes to prevent clogging.

20. The vertical downspout running to the ground along the pier stem can be reused, except that the bottom 15 feet or so should be modified to deposit the water onto aprons that lead to new catch basins and a rehabilitated underground storm sewer.

21. New neoprene connector boots between existing pipe segments should be installed because many of the existing boots are allowing some leakage outside the drainage pipes. Mechanical connections should be specified where new pipe is installed wherever possible.

22. The downspouts on the faces of the piers should also be painted as they have surface rusting and staining from the leaking pipe joints.

APPENDIX

2014 ROUTINE BRIDGE INSPECTION
BRIDGE INSPECTION FIELD REPORT

Structure File Number: 1812548 Inventory Bridge Number: CUY 00480 18.420 R Bridge Type: 3 - STEEL/6 - GIRDER (FLOOR SYSTEM)/3 - DECK

Sufficiency Rating: 84.0 Date Built: 7/1/1975

District: 12 Place Code (FIPS): INDEPENDENCE I-480 E.B. over CUYAHOGA RIVER-OHIO CANAL Type of Service on: HIGHWAY

APPROACH ITEMS

	QTY.	1	2	3	4	TR
c1. Approach Wearing Surface (EA)	2					2
c2. Approach Slabs (SF)	3994					1
c3. Relief Joint (LF)						
c4. Embankment (EA) d	4					1
c5. Guardrail (EA)	3					1

N36. Safety Features: Tr, Gr, Tm

36)B 1 36)C 1 36)D 1

c6. Approach Summary (9-0) 7

DECK ITEMS

	QTY.	1	2	3	4	TR
c7.1 Floor/Slab (SF)	292856					2
c7.2 Edge of Floor/Slab (LF)	8310					2
c8. Wearing Surface (SF)	294934					1
c9. Curb/Sidewalk/Walkway (LF)						
c10. Median (LF)						
c11. Railing (LF)	8310					2

N36. Safety Features: Rail

36)A 0

c12. Drainage (EA) d	56					2
c13. Expansion Joint (LF) d	432.5					3
N58. Deck Summary					(9-0)	5

SUPERSTRUCTURE ITEMS

	QTY.	1	2	3	4	TR
c14. Alignment (EA) d	15					1
c15.1 Beams/Girders (LF)	16612					2
c15.2 Slab (SF)						
c16. Diaphragm/X-Frames (EA)	516					1
c17. Stringers (LF)	24918					1
c18. Floorbeams (LF)						1
c19. Truss Verticals (EA)						
c20. Truss Diagonals (EA)						
c21. Truss Upper Chord (EA)						
c22. Truss Lower Chord (EA)						
c23. Truss Gusset Plate (EA) d						
c24. Lateral Bracing (EA)	334					1
c25. Sway Bracing (EA)						
c26. Bearing Devices (EA) d	64					2
c27. Arch (LF)						
c28. Arch Column/Hanger (EA)						
c29. Arch Spandrel Walls (LF)						
c30. Prot. Coating System (LF) d						1
c31. Pins/Hangers/Hinges (EA) d	16					1
c32. Fatigue (LF) d						2
N59. Superstructure Summary					(9-0)	6

SUBSTRUCTURE ITEMS

	QTY.	1	2	3	4	TR
c33. Abutment Walls (LF)	161.5					2
c34. Abutment Caps (LF)	161.5					1
c35. Abut. Columns/Bents (EA)						
c36. Pier Walls (LF)	420					2
c37. Pier Caps (LF)	1033.2					2
c38. Pier Columns/Bents (EA)						
c39. Backwalls (LF)	161.5					2
c40. Wingwalls (EA)	4					1
c42. Scour (EA) d	16					1
c43. Slope Protection (EA) d	2					1
N60. Substructure Summary					(9-0)	6

CULVERT ITEMS

	QTY.	1	2	3	4	TR
c44. General (LF)						
c45. Alignment (LF) d						
c46. Shape (LF) d						
c47. Seams (LF) d						
c48. Headwall/Endwall (LF)						
c49. Scour (LF) d						
c50. Abutments (LF)						
N62. Culvert Summary					(9-0)	N

CHANNEL ITEMS

	QTY.	1	2	3	4	TR
c51. Alignment (LF) d	200					1
c52. Protection (LF) d						1
c53. Hydraulic Opening (EA) d	16					1
c54. Navigation Lights (EA) d						
N61. Channel Summary					(9-0)	7

SIGN/UTILITY ITEMS

	QTY.	1	2	3	4	TR
c55. Signs (EA) d	2					1
c56. Sign Supports (EA) d	3					2
c57. Utilities (LF) d	8310					1
General Appraisal					(9-0)	6
N41. Operating Status						A

Inspector Name: Burgholder, Jason

Inspection Date/Type: 08/29/2014 Routine

PE Number: 69829

Reviewer Name: Rinehart, David

Review Date: 11/25/2014

PE Number: 55967

Structure File Number: 1812548 Inventory Bridge Number: CUY 00480 18.420 R Bridge Type: 3 - STEEL/6 - GIRDER (FLOOR SYSTEM)/3 - DECK

Sufficiency Rating: 84.0 Date Built: 7/1/1975

District: 12 Place Code (FIPS): INDEPENDENCE I-480 E.B. over CUYAHOGA RIVER-OHIO CANAL Type of Service on: HIGHWAY

Key: "Qty" = Quantity for Element Level inspection; "(LF)" = Linear Feet; "(SF)" = Square Feet; "(EA)" = Each or count; "CR" = 1-4 Condition Rating or average of worst span unless Summary item 9-0, then the average of entire bridge influenced by the bold boxes; "TR" = Transition Rating or weighted average of condition states; "d" = dedicated or specific chart and guidance, all others use Material specific chart/guidance; "c" = condition prefix; "N" = NBIS rating

Inspection Procedures

Next Insp Cycle is in 2015 and Est. Hours is and TTC is MT-95.30 and other TT notes include. . . VERIFY_PLCVERIFY_PLC . . . with 2014 lead insp. EF and truck req'd . . . 62

Comments

APPROACH

c1. Approach Wearing Surface

Rear approach pavement has a few patches and potholes in lanes 1 and 2 south.

DECK

c7.1 Floor/Slab

Cracks with efflorescence throughout. Large spalls, scaling and exposed reinforcement on ~ 5% of deck underside. Sub-decking covers West Canal Road, Towpath Trail and Canal Road in spans 8 and 9.

c7.2 Edge of Floor/Slab

Inspected from snooper in 2013 inspection and found to be in fair condition. Only accessed in end spans in 2014 inspection, but no significant changes noted.

c8. Wearing Surface

Random cracks throughout deck. Minor spalls around deck joints. Several raised pavement markers missing.

c11. Railing

Parapet faces were rehabbed in 2012 and 2013. Horizontal and vertical cracking as well as rust staining throughout both parapets.

c12. Drainage

Deck scuppers typically full of debris, but only 4 of 56 scupper downspouts plugged. Majority or the transverse drainage troughs below the deck are plugged with dirt and debris. Drainage is spilling onto steelwork at hinges. Several downspout connections leak going down the piers. Ponding along south parapet at rear abutment extends to lane line due to approach pavement being higher than bridge deck. Underground drainage plugged. Downspouts cut off above ground and drain to base of piers. This has caused a large washout at pier 3.

c13. Expansion Joint

Both abutment joint headers are patched throughout and breaking up. Forward abutment joint is closing indicating movement of the forward abutment. Forward abutment joint seal failing and joint armor breaking up in lane 2. BANGING WITH TRAFFIC. Finger joints have minor misalignments, but are generally in good condition.

SUPERSTRUCTURE

c14. Alignment

Windlock on girder H bottom flange at span 3 floorbeam 11 has a cracked weld, but is still functioning. Several windlocks have slight misalignment and are wearing against the keeper plates.

c15.1 Beams/Girders

Active 2.25" long web crack at top of floorbeam 3 transverse stiffener on girder G in span 2 found in 2014. Active 1.5" crack at bottom of floorbeam 7 transverse stiffener on girder F in span 4 found in 2014. Active crack in girder G web at top of floorbeam 3 transverse stiffener in span 6 grew 1.5" from 2013 inspection to a total length of 3.25". Active 1.75" long web crack at top of floorbeam 9 transverse stiffener in span 7 found in 2014. Minor corrosion near deck joints. Minor pack rust between fascia girder splice plates. Holes drilled in girder webs throughout structure to arrest cracks. Majority of cracks due to transport of girders to site during original construction. Several "dogbone" retrofits have overcuts beyond drill holes. See physical conditions report for specific locations.

c16. Diaphragm/Cross Frames

Minor corrosion under leaking deck joints.

c17. Stringers

Cracks in connection welds to floorbeam top chords in Unit 1. Cracks do not extend into base metal.

c18. Floorbeams

Cracks in floorbeam lower chord copes; see physical conditions report appendix for locations.
Several floorbeam gusset/connection plates are bent; likely due to original construction. No additional distress was noted. Pack rust building between connections in several locations.

c24. Lateral Bracing

No change in 10" weld crack between south face of girder G in span 10 and floorbeam 7 lower lateral bracing connection plate.

c26. Bearing Devices

Debris and rust around roller bearings at piers. None of the expansion pier bearings show signs of movement; likely due to flexibility of piers. Bearings in fair condition with minor surface rust. Isolated anchor bolts not tightened down.

c30. Protective Coating System

Active pack rust and corrosion at several fascia girder splices. Paint beginning to fail under deck joints. Isolated areas of top coat failure (peeling).

c31. Pins/Hangers/Hinges

Rollers at seated hinges operating normally.

c32. Fatigue

Lower lateral bracing connections previously retrofit with "dogbones" have several overcuts, but no active cracks in girder webs. Existing cracks have not extended

past crack arrest holes. Four active cracks need to be drilled as described under Beams/Girders section.

SUBSTRUCTURE

c33. Abutment Walls

Closed abutment expansion joints indicate the abutments may be moving/rotating or the backwalls are failing. Spalls and deterioration at south end of forward abutment. All other deteriorated concrete was repaired by contractor in 2013 and is in good condition.

c34. Abutment Caps

Spalls and deterioration at south end of forward abutment. All other deteriorated concrete was repaired by contractor in 2013 and is in good condition.

c36. Pier Walls

Spalls and delaminations with exposed reinforcing. Piers under deck joints in worse condition due to clogged and leaking drainage spilling onto piers.

c37. Pier Caps

Typical spalls and delaminations. More severe deterioration undermining bearing masonry plates up to 1" at pier 4 girder H, pier 5 girder E, and pier 11 girder H. Active peregrine falcon nest in deteriorated concrete on pier 9.

c39. Backwalls

The majority of deteriorated concrete was repaired by contractor in 2013. Large areas of concrete were removed from the backwall compression face and the reinforcement was observed bowing outward. Some wooden forms left in place on forward abutment backwall. Tops of backwalls unable to be patched below deck joints leaving the top 3 feet± in poor condition. Several of the repairs have already spalled off. There are chunks of concrete now wedged between the ends of the girders and crossfames and the backwall at the forward abutment blocking expansion of the bridge.

c40. Wingwalls

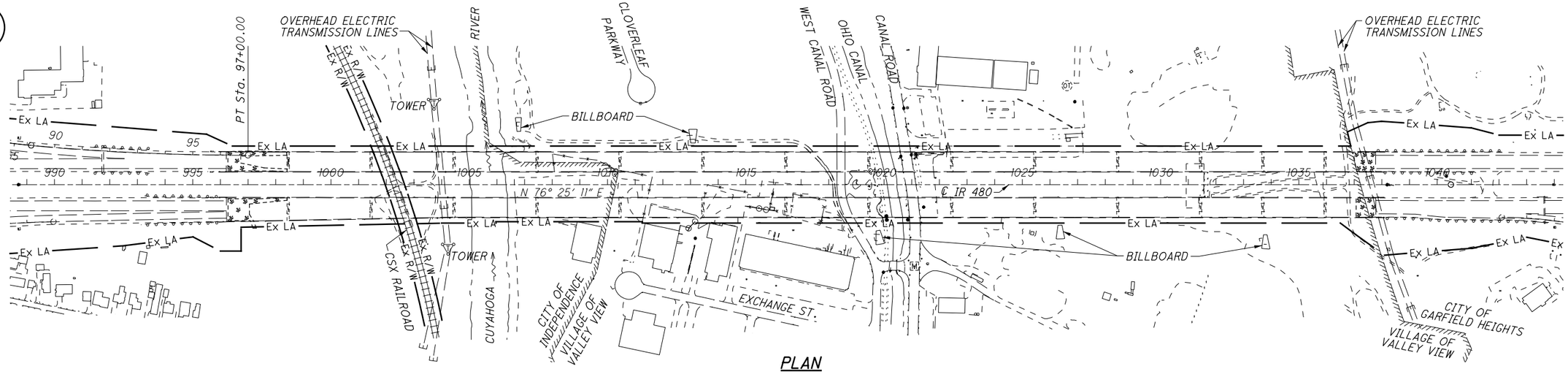
The forward abutment north wingwall has a few cracks with efflorescence and minor spalls.

c42. Scour

Cuyahoga River channel is away from all substructure units.

c43. Slope Protection

The rear abutment slope protection was repaired in 2013 where previously washed out and is now in good condition. Top of forward abutment slope protection was never restored after 2013 abutment patching.



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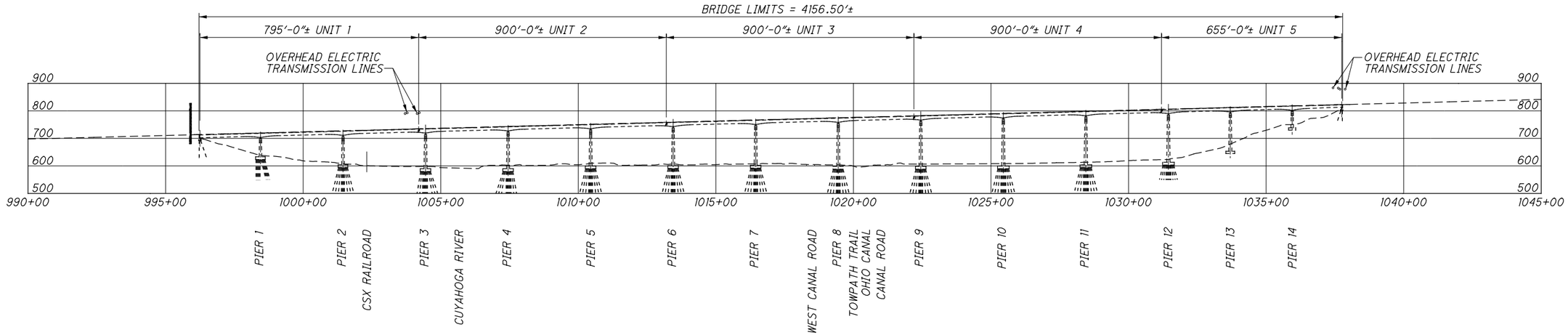

ELEVATION

EXISTING STRUCTURE

TYPE: CONTINUOUS WELDED STEEL GIRDERS WITH FLOOR SYSTEM AND REINFORCED CONCRETE DECK AND SUBSTRUCTURE.

SPANS: UNIT 1 - 220'±, 300'±, AND 275'±
UNIT 2, 3 AND 4 - 25'± CANTILEVER, 2 @ 300'± AND 275'±
UNIT 5 - 25'± CANTILEVER, 2 @ 225'± AND 180'±

ROADWAY: UNIT 1 L - VARIES 69'-6"±" TO 69'-10"± FACE TO FACE OF PARAPETS
UNIT 1 R - VARIES 69'-6"± TO 85'-0"± FACE TO FACE OF PARAPETS
UNITS 2, 3, 4 AND 5 - 69'-6"± FACE TO FACE OF PARAPETS

LOADING: HS 20-44 AND INTERSTATE ALTERNATE LOADING
SKEW: NONE
WEARING SURFACE: 2½"± SUPERPLASTICIZED DENSED CONCRETE (1990)
APPROACH SLABS: AS-1-67 (25' LONG)
ALIGNMENT: TANGENT
CROWN: 0.188±
DATE BUILT: 1975
DISPOSITION:

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

DESIGNED	DRAWN	REVIEWED	DATE
KAK	RB		
CHECKED	REVISED	STRUCTURE FILE NUMBER 1325527 (L) 1812548 (R)	

CUYAHOGA COUNTY
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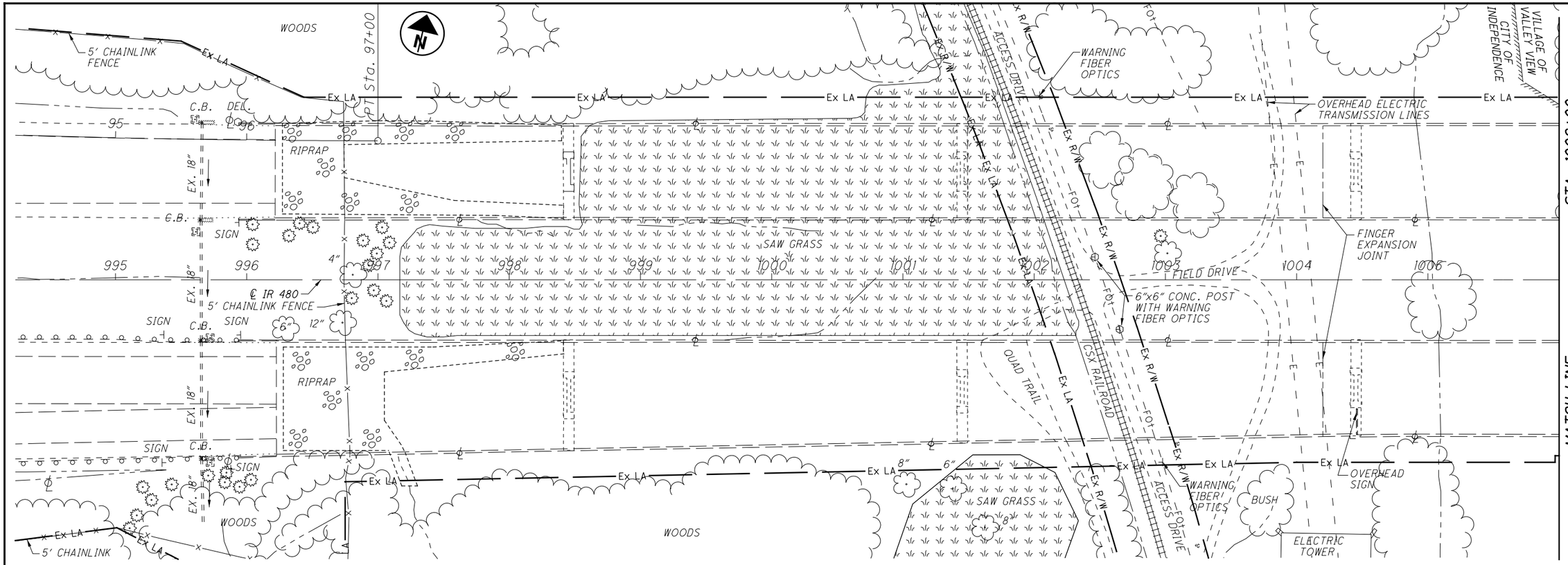
KEY PLAN
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591



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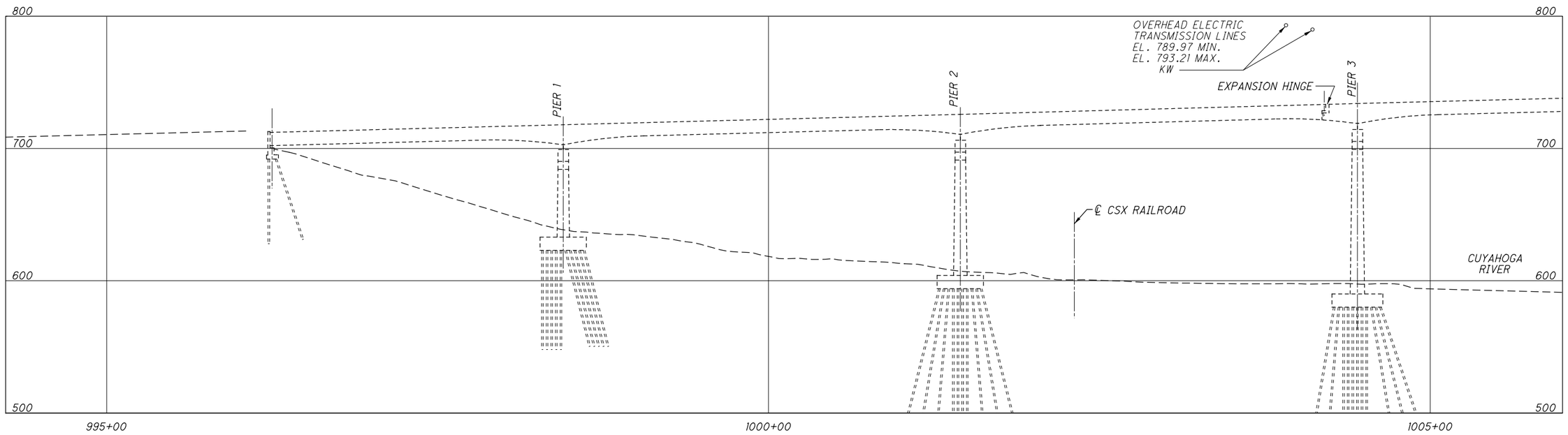

ELEVATION

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

DESIGNED	DRAWN	REVIEWED	DATE
KAK	RB		
CHECKED	REVISED	STRUCTURE FILE NUMBER 1325211 (L) 182548 (R)	

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GENERAL PLAN -1
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591

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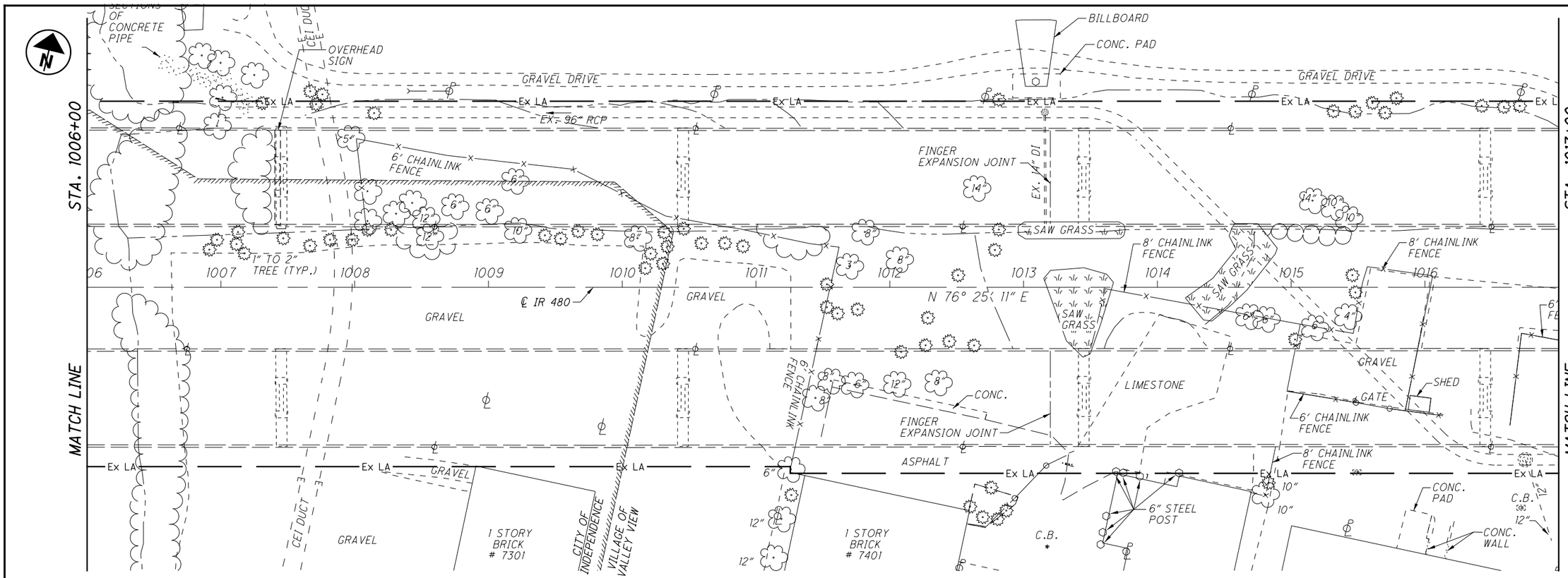

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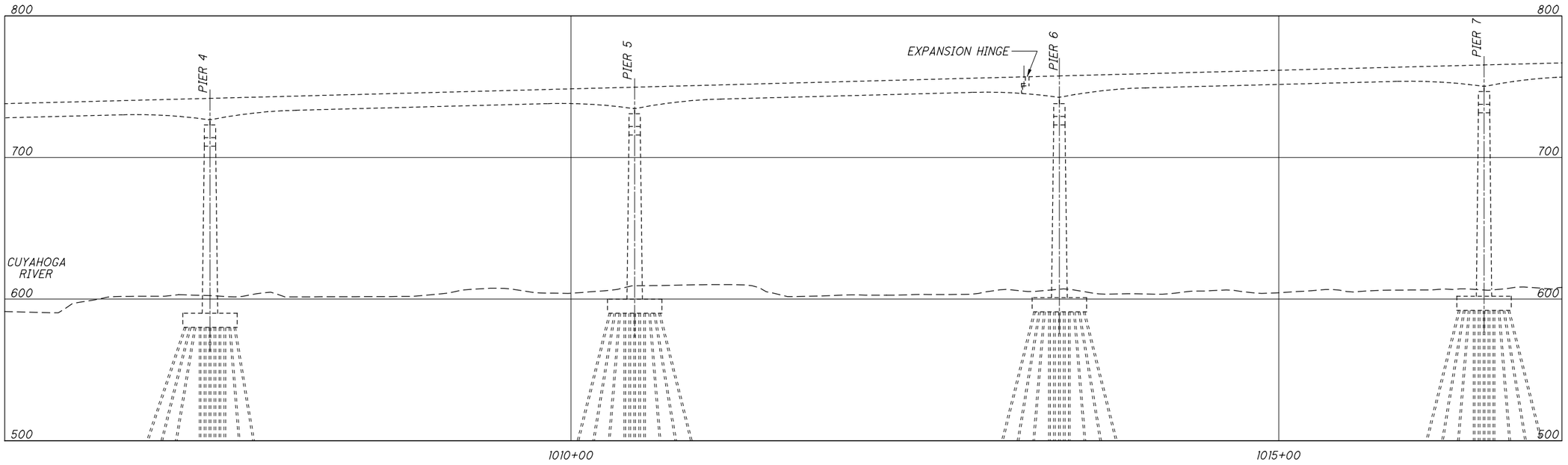

ELEVATION

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

DESIGNED	DRAWN	REVIEWED	DATE
KAK	RB		
CHECKED	REVISED	STRUCTURE FILE NUMBER 1825511 (L) 1812548 (R)	

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GENERAL PLAN - 2
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591

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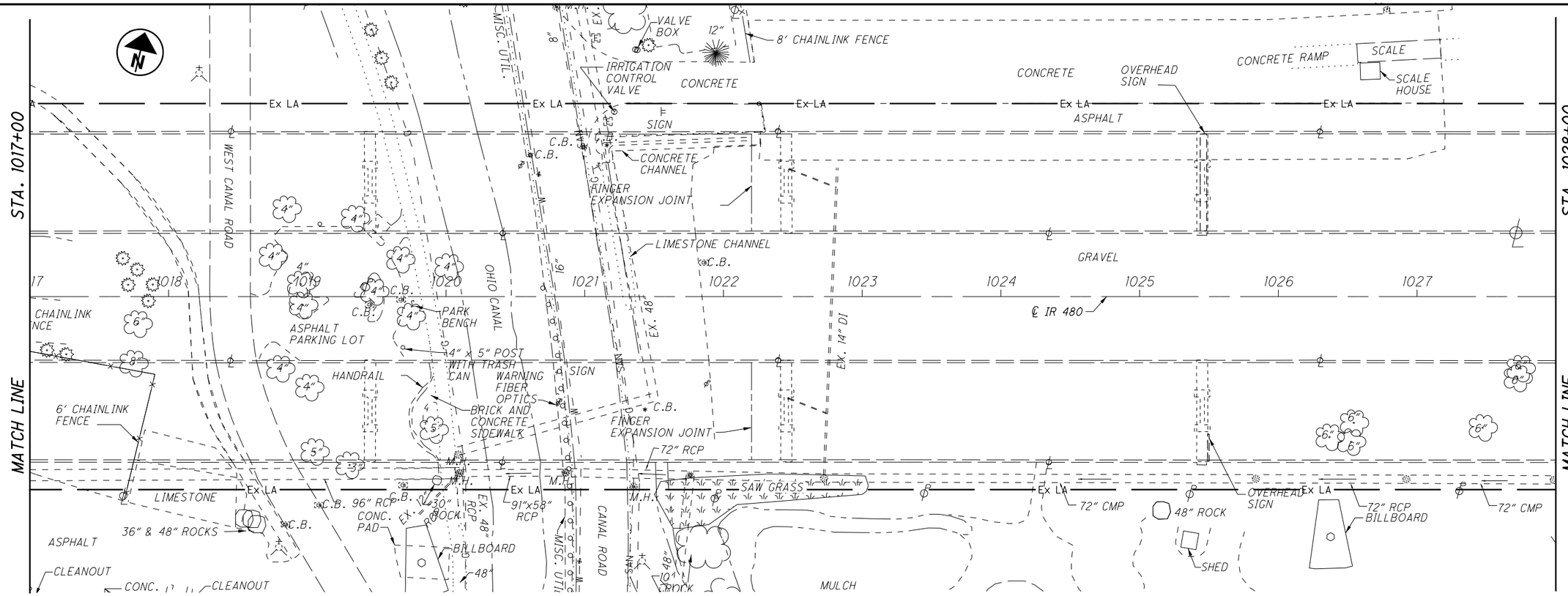

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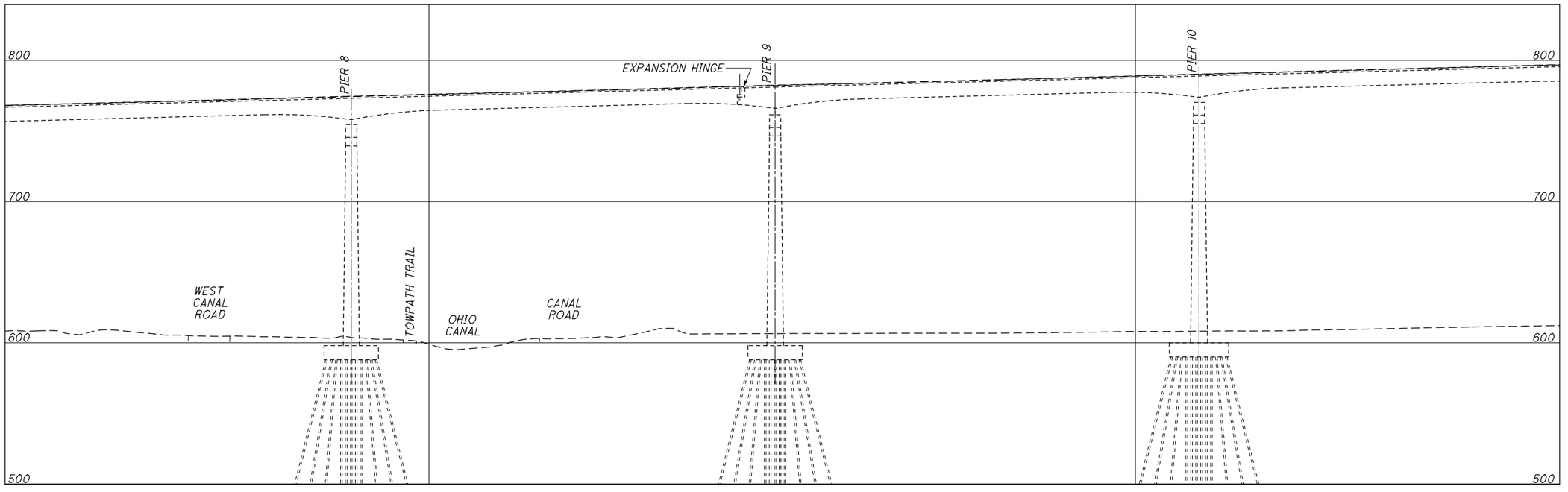

ELEVATION

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

REVIEWED	DATE
DRAWN RB	REVISED
DESIGNED KAK	CHECKED

STRUCTURE FILE NUMBER
182567 (T)
182548 (R)

CUYAHOGA COUNTY
STA. 995+00.00
STA. 1000+00.00

GENERAL PLAN - 3
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591

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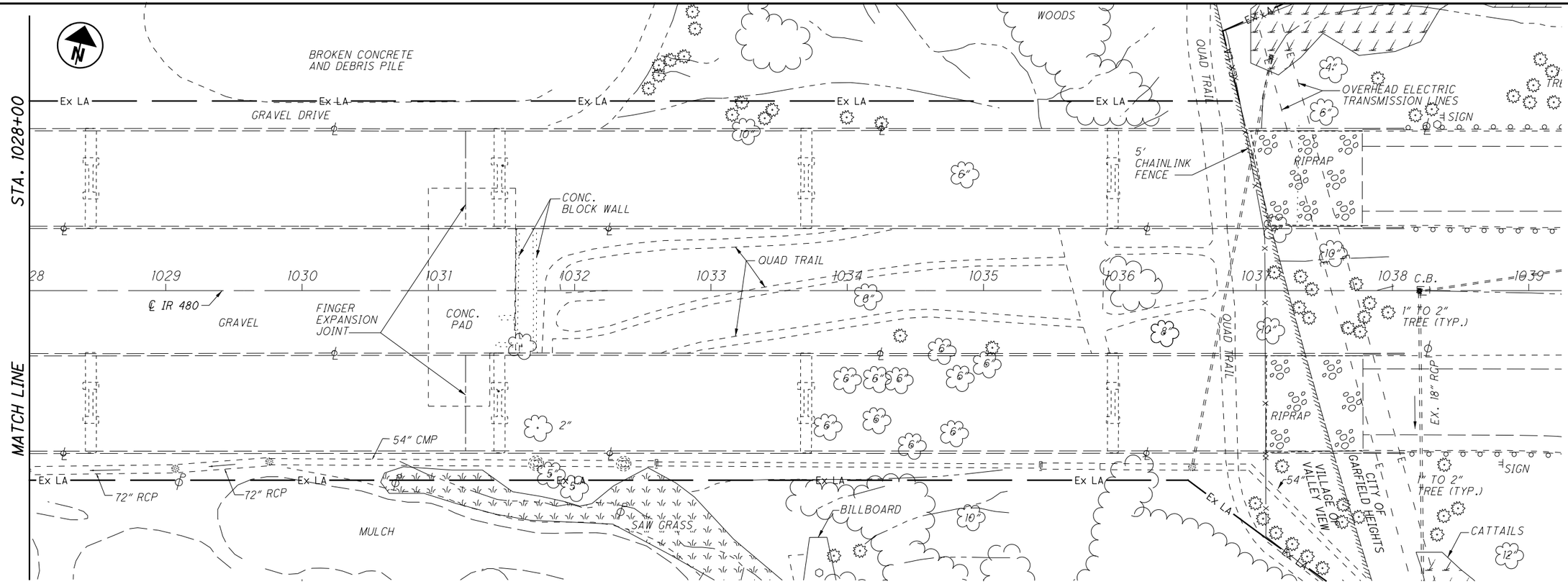

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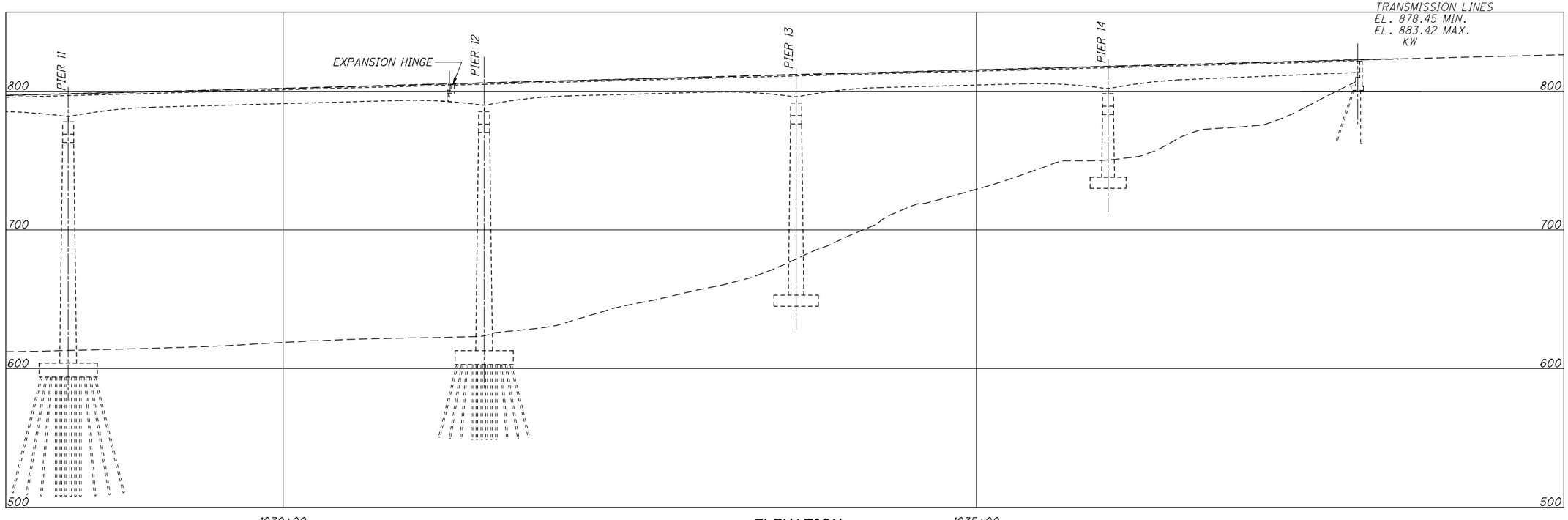

ELEVATION

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

REVIEWED	DATE
DRAWN RB	REVISED
DESIGNED KAK	CHECKED

STRUCTURE FILE NUMBER
182567 (L)
182548 (R)

CUYAHOGA COUNTY
STA. 995+00.00
STA. 1000+00.00

GENERAL PLAN - 4
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591

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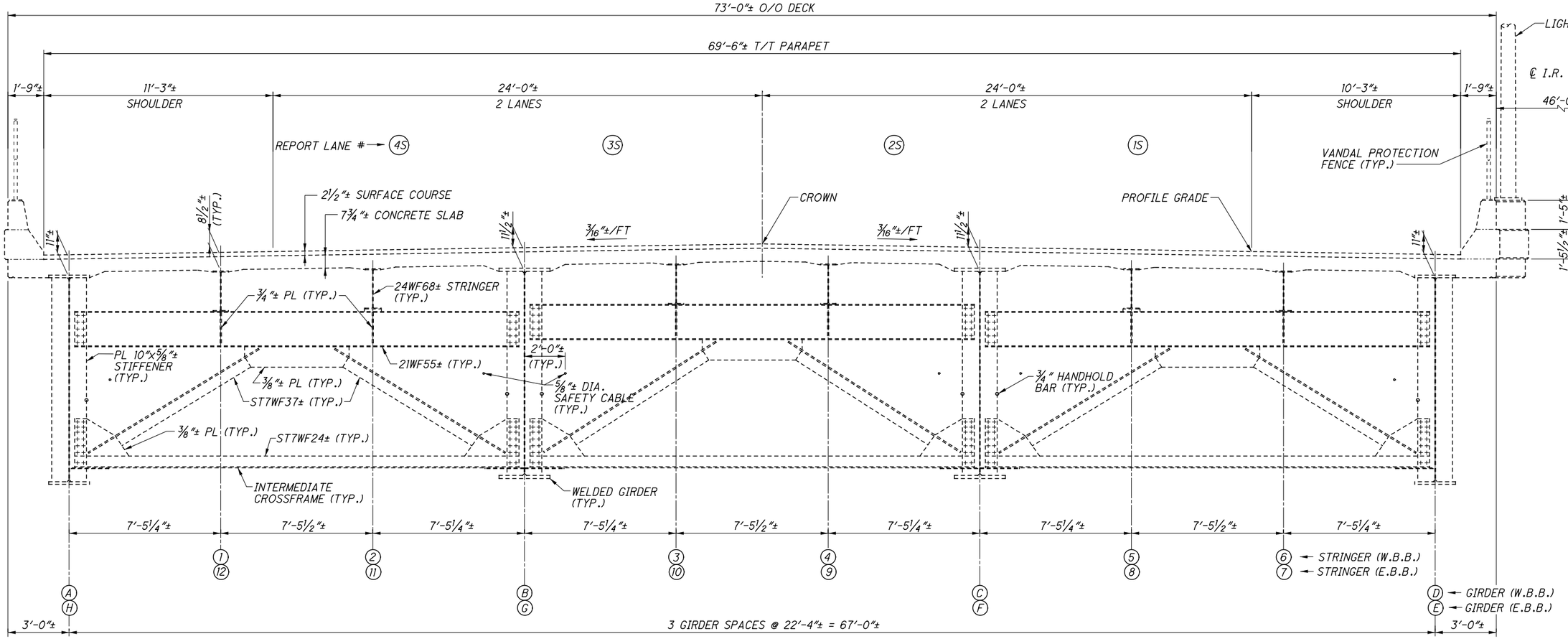


EXISTING TRANSVERSE SECTION - UNITS 2 TO 5

WESTBOUND BRIDGE - AS SHOWN
EASTBOUND BRIDGE - OPPOSITE HAND

NOTES

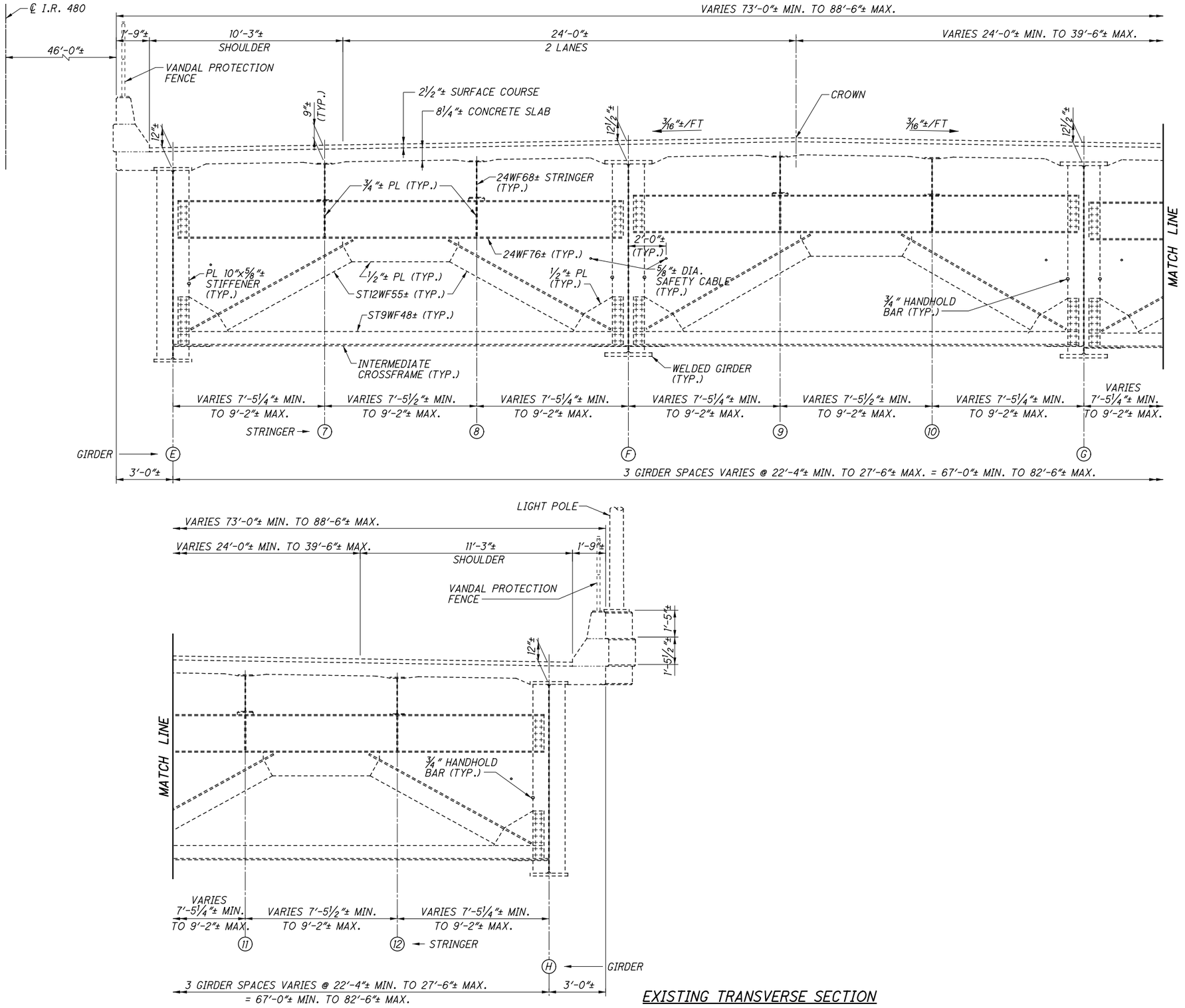
NOTATION: W.B.B. - WESTBOUND BRIDGE
E.B.B. - EASTBOUND BRIDGE

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

DESIGNED	DRAWN	REVIEWED	DATE
KAK	KH		
CHECKED	REVISED	STRUCTURE FILE NUMBER 1812521 (L) 1812548 (R)	

EXISTING TRANSVERSE SECTION - 1
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAQHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591



EXISTING TRANSVERSE SECTION

EASTBOUND BRIDGE - UNIT 1

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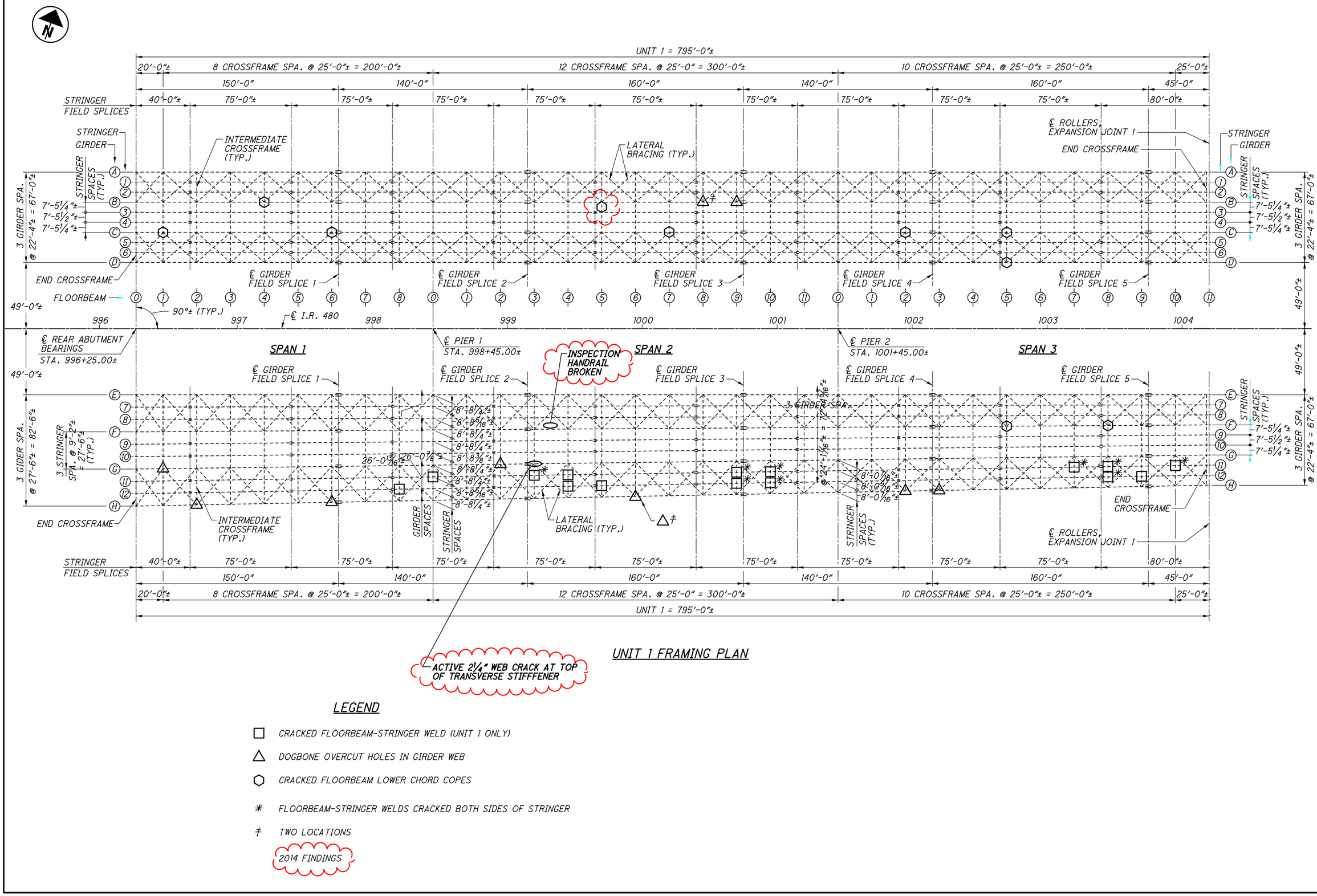
KAK	KH		
CHECKED	REVISED	STRUCTURE FILE NUMBER 1812521 (L) 1812548 (R)	

EXISTING TRANSVERSE SECTION - 2

BRIDGE NO. CUY-480-1842 R
OVER CUYAOHOGA RIVER VALLEY

CUY-480-18.42

PID No. 90591



UNIT 1 FRAMING PLAN

LEGEND

- □ CRACKED FLOORBEAM-STRINGER WELD (UNIT 1 ONLY)
- △ DOGBONE OVERCUT HOLES IN GIRDER WEB
- ⬡ CRACKED FLOORBEAM LOWER CHORD COPES
- ✳ FLOORBEAM-STRINGER WELDS CRACKED BOTH SIDES OF STRINGER
- ≠ TWO LOCATIONS

2014 FINDINGS

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

DESIGNED	DRAWN	CHECKED	REVIEWED	DATE
KAK	KH	ALP		

REVISED | STRUCTURE FILE NUMBER

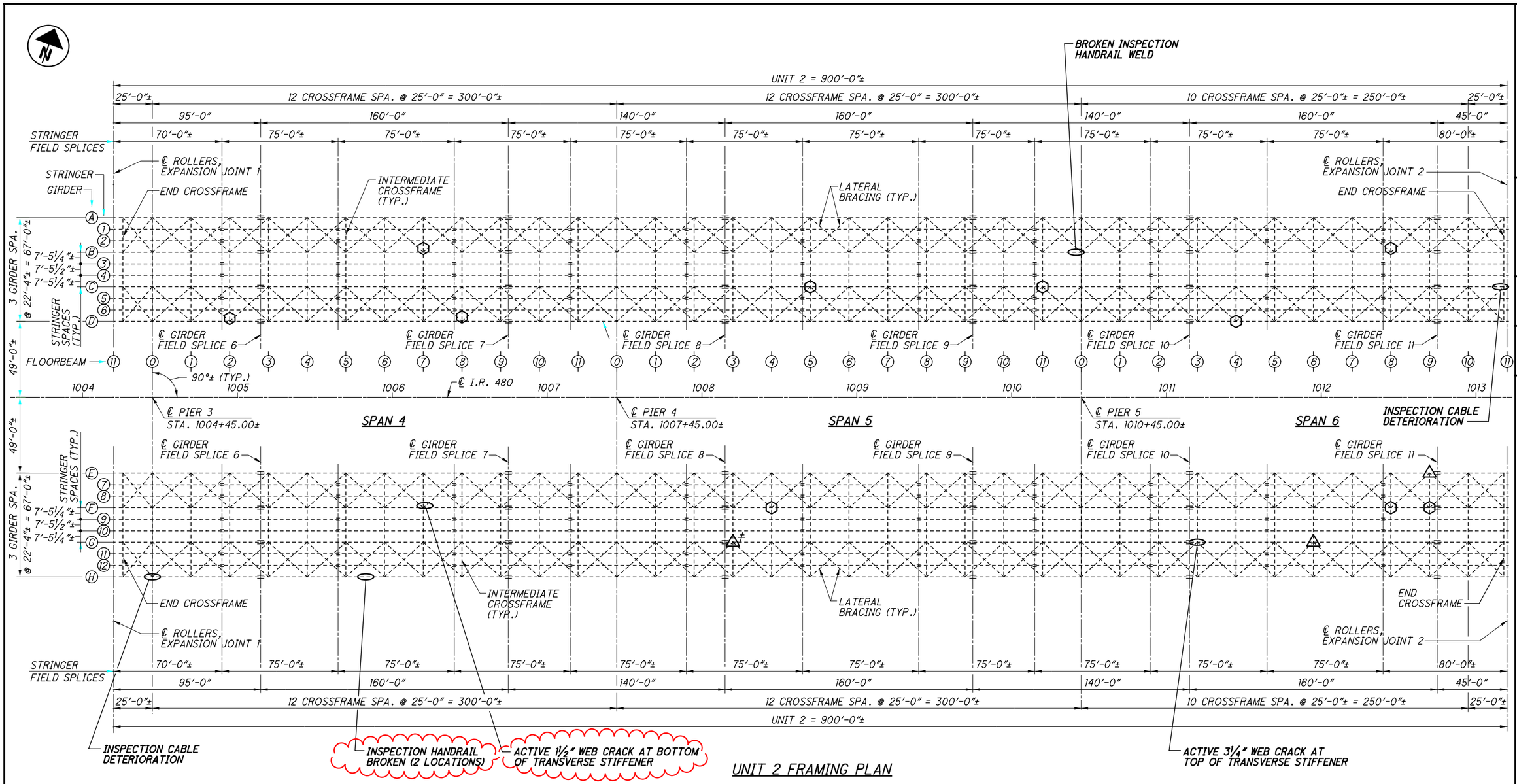
UNIT 1 FRAMING PLAN

BRIDGE NO. CUY-480-1842 L&R
OVER CUYAQHOGA RIVER VALLEY

CUY-480-18.42

PID No. 90591

1



UNIT 2 FRAMING PLAN

LEGEND

△ DOGBONE OVERCUT HOLES IN GIRDER WEB

⬡ CRACKED FLOORBEAM LOWER CHORD COPES

ǂ TWO LOCATIONS

2014 FINDINGS

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

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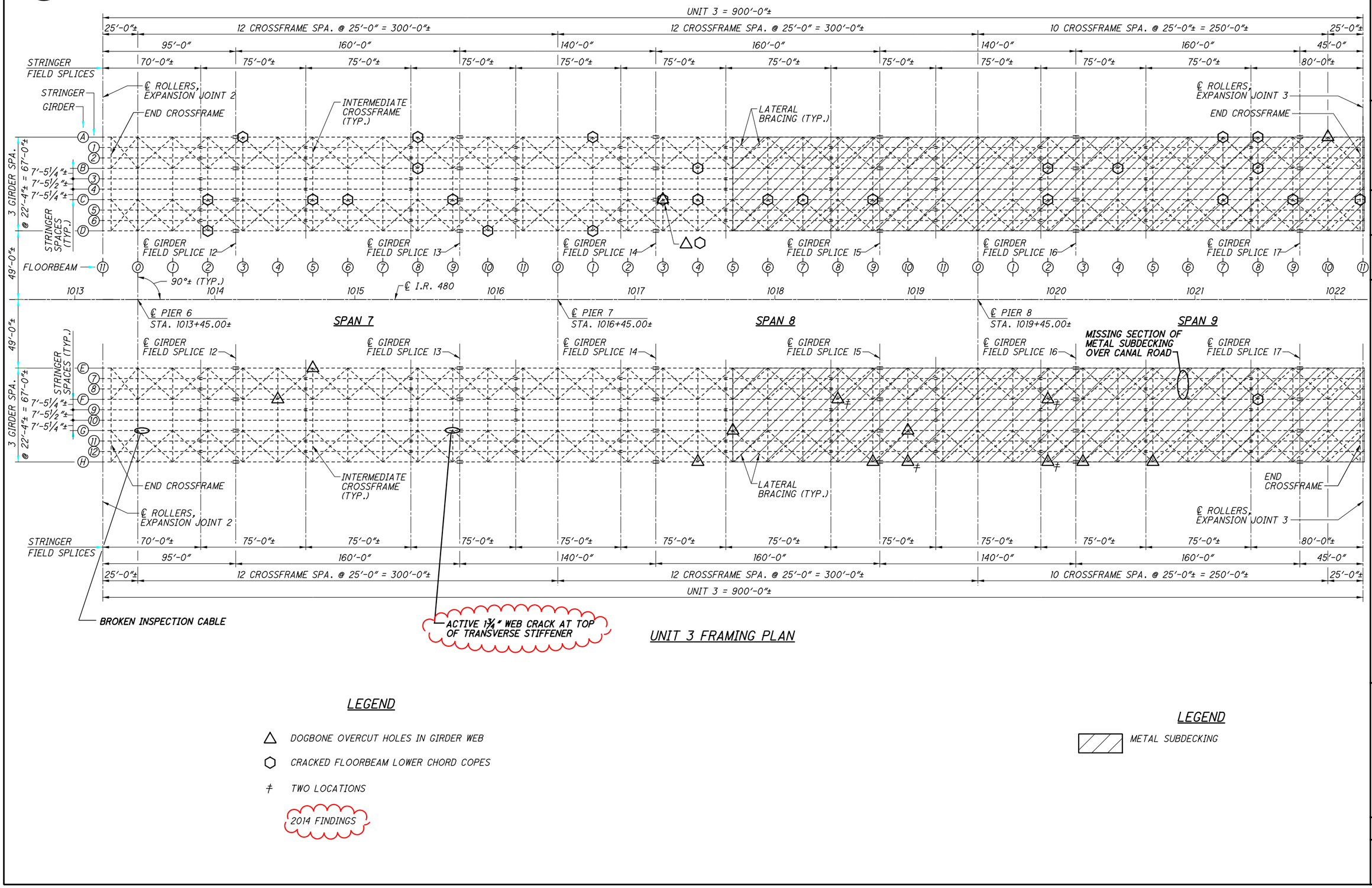
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

UNIT 2 FRAMING PLAN
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAOHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591



UNIT 3 FRAMING PLAN

LEGEND

△ DOGBONE OVERCUT HOLES IN GIRDER WEB

⬡ CRACKED FLOORBEAM LOWER CHORD COPES

≠ TWO LOCATIONS

2014 FINDINGS

LEGEND

▨ METAL SUBDECKING

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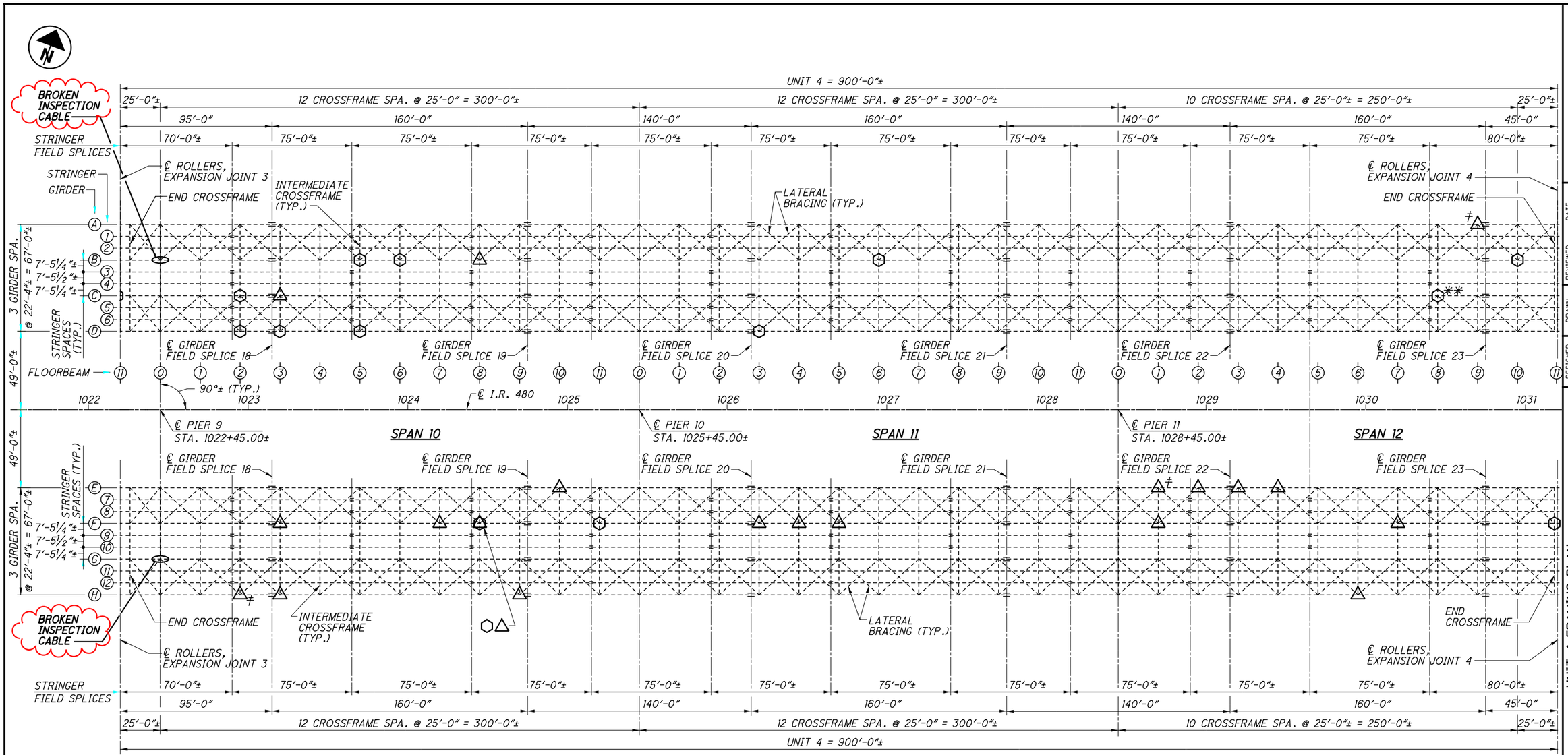
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

UNIT 3 FRAMING PLAN

BRIDGE NO. CUY-480-1842 L&R
OVER CUYAOHOGA RIVER VALLEY

CUY-480-18.42

PID No. 90591



UNIT 4 FRAMING PLAN

LEGEND

△ DOGBONE OVERCUT HOLES IN GIRDER WEB

⬡ CRACKED FLOORBEAM LOWER CHORD COPES

** CRACKED FLOORBEAM LOWER CHORD COPES BOTH SIDES OF GIRDER

‡ TWO LOCATIONS

2014 FINDINGS

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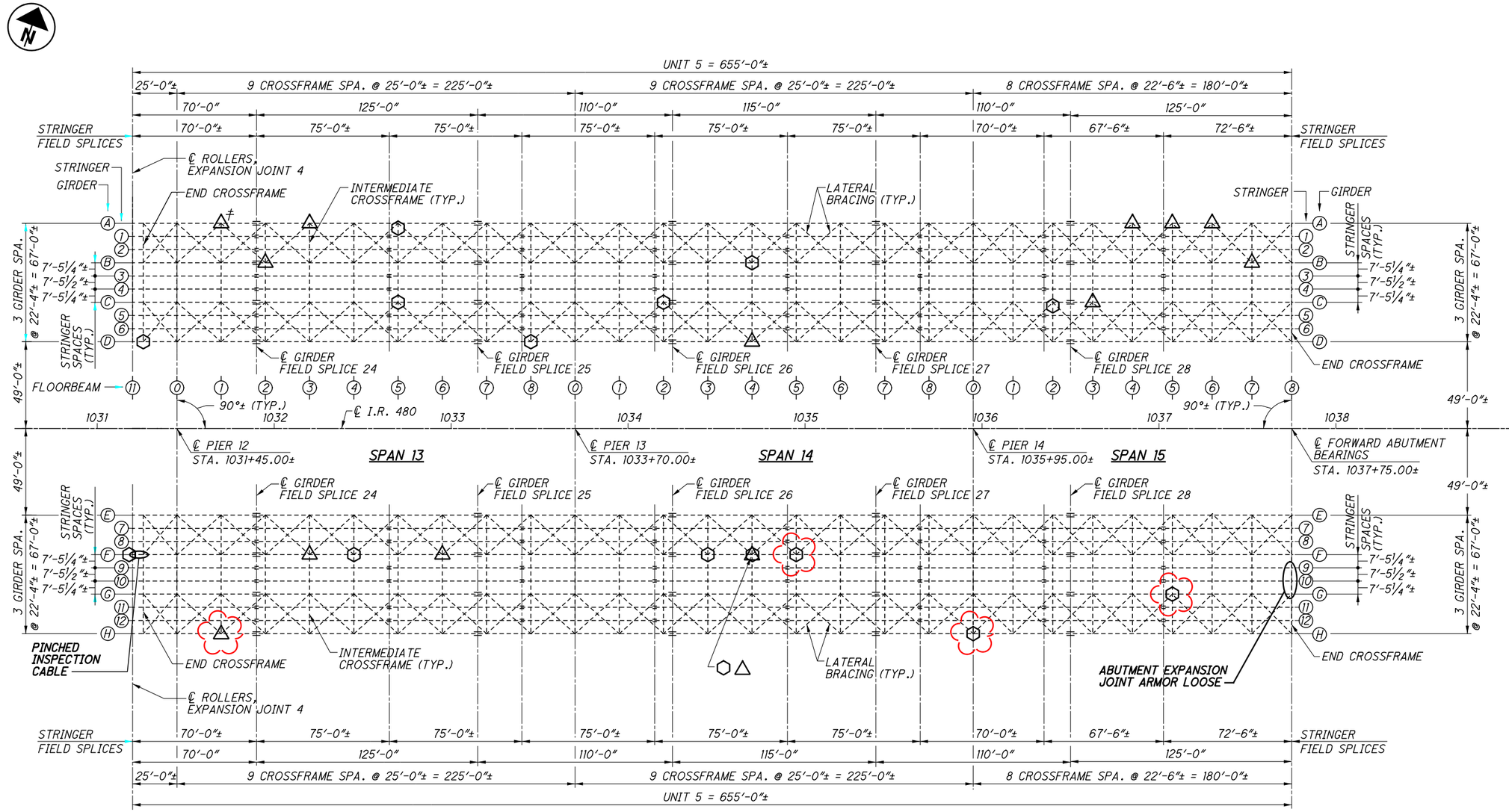
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

UNIT 4 FRAMING PLAN

BRIDGE NO. CUY-480-1842 L&R
OVER CUYAOHOGA RIVER VALLEY

CUY-480-18.42

PID No. 90591



UNIT 5 FRAMING PLAN

LEGEND

△ DOGBONE OVERCUT HOLES IN GIRDER WEB

⬡ CRACKED FLOORBEAM LOWER CHORD COPES

‡ TWO LOCATIONS

2014 FINDINGS

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

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KAK	KH		
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

UNIT 5 FRAMING PLAN
BRIDGE NO. CUY-480-1842 L&R
OVER CUYAOHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591

EXPANSION JOINT OPENINGS

EASTBOUND BRIDGE
CUY-480-1842 R

						R.E.L.				R.E.L.			TranSystems		R.E.L.	
Location	**Type**	**Length**	**Design**	**1983**	**1985**	**Apr. 1989**	**Dec. 1990**	**Oct. 1991**	**1996**	**Oct. 1998**	**Sept. 1999**	**Oct. 2000**	**July 2011**	**Nov. 2012**	**May 2013**	**August 2014**
	Temp.		60° F	70° F	84° F	48° F	35° F	55° F	50° F	51° F	70° F	55° F	75° F	55° F	70° F	79° F
Rear Abutment	Strip Seal	220'	3"	*2 5/8"*	*2 9/16" @ 55° F*	*2 9/16"*	2 1/2"	2 3/8"	2 1/2"	2 1/4"	2"	1 1/2"	Not Taken	Not Taken	2"	1 5/8"
Near Pier 3R	Fingers	1050'	9"	8 1/2"	8"	9 5/16"	10 1/4"	10 1/8"	10 1/4"	9 3/8"	7 1/4"	8 3/8"	6 1/2"	10 1/2"	7 3/8"	7"
Near Pier 6R	Fingers	900'	9"	7 7/8"	7"	8 5/8"	9 3/8"	9 5/8"	9 1/2"	9"	8 3/8"	8 1/2"	6 3/4"	11"	7 3/8"	7"
Near Pier 9R	Fingers	900'	9"	8 5/8"	7 3/4"	9 3/8"	10 1/8"	10"	10 3/8"	9 3/16"	7 11/16"	7 1/2"	6 3/4"	10 1/2"	7 13/16"	7 7/16"
Near Pier 12R	Fingers	900'	9"	8 3/4"	7 3/4"	9 1/4"	10"	10"	10"	8 7/8"	7 7/16"	8 1/16"	6"	11 1/2"	6 13/16"	6 7/16"
Forward Abut.	Strip Seal	180'	3"	*2 1/2"*	*1 7/8"*	*2 7/16"*	2" @ 46° F	2 3/8"	2 1/2"	1 7/8"	1 3/4"	1 1/2"	Not Taken	Not Taken	2"	2 1/2"

Notes

Measurements are at fascia curbline of joint.
In 1989, the sliding plate abutment joints were replaced with strip seals. Measurements taken prior to the replacement are shown in italicized type.

Figure No. 1 "Dogbone" Overcuts

Bridge	Span	Girder	Floorbeam	Side of FB	Location	
Right	1	G (South Face)	1	West	Top	
Right	1	H (North Face)	2	East	Top	
Right	1	H (North Face)	6	West	Top	
Right	2	G (North Face)	2	East	Top	
Right	**2**	**F (North Face)**	**6**	**West**	**Top**	
Right	2	H (North Face)	6	East	Top	
Right	2	H (North Face)	6	West	Top	
Right	3	H (North Face)	2	West	Top	
Right	3	H (North Face)	3	West	Top	
Right	5	G (North Face)	3	East	Top	
Right	5	G (North Face)	3	West	Top	
Right	6	G (North Face)	6	East		** NO sawcut between holes
Right	6	E (South Face)	9	East	Top	
Right	7	F (South Face)	4	East	Top	
Right	7	E (South Face)	5	West	Top	
Right	8	H (North Face)	4	West	Top	
Right	8	G (North Face)	5	West	Top	
Right	8	F (North Face)	8	East	Top	
Right	8	F (North Face)	8	West	Top	
Right	8	H (North Face)	9	West	Top	
Right	8	G (South Face)	10	East	Top	** Double Overcut
Right	8	H (North Face)	10	East	Top	
Right	8	H (North Face)	10	West	Top	
Right	9	F (South Face)	2	East	Top	
Right	9	F (South Face)	2	West	Top	
Right	9	H (North Face)	2	East	Top	
Right	9	H (North Face)	2	West	Top	
Right	9	H (North Face)	3	West	Top	
Right	9	H (North Face)	5	West	Top	
Right	10	H (North Face)	2	East	Top	
Right	10	H (North Face)	2	West	Top	
Right	10	F (North Face)	3	West	Top	
Right	10	H (North Face)	3	East	Top	
Right	10	F (North Face)	7	West	Top	
Right	10	H (North Face)	7	West	Top	
Right	10	F (North Face)	8	West	Top	
Right	10	H (North Face)	9	West	Top	
Right	10	E (South Face)	10	East	Top	
Right	11	F (North Face)	3	West	Top	
Right	11	F (North Face)	4	East	Bottom	
Right	11	F (North Face)	5	West	Top	
Right	12	E (South Face)	1	East	Top	
Right	12	E (South Face)	1	West	Top	
Right	12	F (North Face)	1	West	Bottom	
Right	12	E (South Face)	2	West	Top	
Right	12	E (South Face)	3	West	Top	
Right	12	E (South Face)	4	East	Top	
Right	12	H (North Face)	6	East	Bottom	
Right	12	F (North Face)	7	East	Top	
Right	13	F (North Face)	3	West	Top	
Right	13	F (South Face)	6	East	Bottom	
Right	**13**	**H (North Face)**	**1**	**East**	**Top**	
Right	14	F (South Face)	4	West	Top	

Documented in 2014 Inspection.

Total Overcut Top Locations	**48**
Total Overcut Bottom Locations	**4**

Figure No. 2 Cracked Floorbeam - Stringer Welds

					Crack Length		
Bridge	**Span**	**Stringer**	**Floorbeam**	**Side of Stringer**	**2013**	**2014**	
Right	1	12	8	North	<0.25"	<0.25"	
Right	2	11	0	North	<0.25"	<0.25"	
Right	2	11	3	North	0.75"	0.75"	** Both Sides
Right	2	11	3	South	1.5"	1.5"	
Right	2	11	4	North	2.5"	2.5"	
Right	2	12	4	North	1.75"	1.75"	
Right	2	12	5	South	0.5"	0.5"	
Right	2	11	9	South	6.25"	6.25"	** Both Sides
Right	2	11	9	North	2.25"	2.25"	
Right	2	12	9	South	6"	6"	** Both Sides
Right	2	12	9	North	1.25"	1.25"	
Right	2	11	10	South	5.5"	5.5"	** Both Sides
Right	2	11	10	North	-	-	
Right	2	12	10	South	5.75"	5.75"	** Both Sides
Right	2	12	10	North	0.25"	0.25"	
Right	3	11	7	South	<0.125"	<0.125"	** Both Sides
Right	3	11	7	North	<0.125"	<0.125"	
Right	3	11	8	South	2.5"	2.5"	** Both Sides
Right	3	11	8	North	1.5"	**2.75"**	
Right	3	12	8	South	1.75"	1.75"	
Right	3	12	8	North	2"	2"	
Right	3	12	9	North	0"	0"	Possible start of crack
Right	3	11	10	North	0.25"	0.25"	** Both Sides
Right	3	11	10	South	0.25"	0.25"	

Figure No. 3 Floorbeam Lower Chord Cope Cracks

Bridge	Span	Floorbeam	Connecting Girder	Crack Length	
Right	3	5	F (North Face)	0.5"	** overcut only, no crack **
Right	3	8	F (North Face)	0.75"	
Right	5	4	F (South Face)	0.75"	
Right	6	8	F (North Face)	0.5"	** overcut only, no crack **
Right	6	9	F (South Face)		** overcut only, no crack **
Right	9	8	F (North Face)	0.25"	
Right	10	8	F (North Face)	0.25"	
Right	10	11	F (North Face)	0.375"	** overcut only, no crack **
Right	12	11 (West)	F (North Face)	0.25"	** overcut only, no crack **
Right	13	4	F (South Face)	0.25"	
Right	14	3	F (South Face)	0.25"	
Right	14	4	F (South Face)	0.625"	
Right	**14**	**5**	**F (North Face)**	**0.375"**	**** overcut only, no crack ****
Right	**15**	**0**	**H (North Face)**	**0.375"**	**** overcut only, no crack ****
Right	**15**	**5**	**G (South Face)**	**1"**	**** overcut only, no crack ****

Documented in 2014 Inspection.

Total Cope Crack Locations	**7**
Total Cope Overcut Locations	**8**

Figure No. 4 Abutment Movement Measurements

EASTBOUND BRIDGE
CUY-480-1842 R

EAST ABUTMENT (FORWARD)

Dimension		1993	1995	1998	1999	2000	2013	2014
A	North Face		1 1/2"	1 9/16"	2"	1 3/8"	1 9/16"	1 9/16"
	South Face		1 3/4"	2 1/16"	1 3/4"	1 1/4"	1 15/16"	1 15/16"
B	North Face		7/8"	13/16"	3/4"	3/4"	3/4"	3/4"
	South Face		1 1/8"	1 3/16"	1"	3/4"	1 1/16"	1 1/16"
D	North Face		13'-2"	13'-2"	13'-2"	13'-2"	13'-2"	13'-2"
	South Face		13'-5"	13'-5"	13'-5"	13'-5"	13'-5"	13'-5"
Tilt (A-B) / D	North Face	0.0048	0.0040	0.0047	0.0079	0.0040	0.0051	0.0051
	South Face	0.0048	0.0039	0.0054	0.0047	0.0031	0.0054	0.0054

WEST ABUTMENT (REAR)

Dimension		1993	1995	1998	1999	2000	2013	2014
A	North Face		1 3/8"	1 3/8"	1 5/8"	1 11/16"	1 1/2"	1 1/2"
	South Face		1 1/4"	1 1/4"	1 11/16"	1 11/16"	1 5/16"	1 3/16"
B	North Face		5/8"	3/4"	5/8"	1 1/8"	13/16"	3/4"
	South Face		7/8"	7/8"	7/8"	1 1/8"	1"	1"
D	North Face		12'-0"	12'-0"	12'-0"	12'-0"	12'-0"	12'-0"
	South Face		12'-0"	12'-0"	12'-0"	12'-0"	12'-0"	12'-0"
Tilt (A-B) / D	North Face	0.0052	0.0052	0.0043	0.0069	0.0039	0.0048	0.0052
	South Face	0.0026	0.0026	0.0026	0.0056	0.0039	0.0022	0.0013