2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT

CUY-480-1842 L
SFN 1812521

Westbound 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 L WESTBOUND VALLEY VIEW BRIDGE OVER THE CUYAHOGA RIVER VALLEY

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Inspected between August 25 and August 29, 2014

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Prepared for

Ohio Department of Transportation
District 12

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2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT

CUY-480-1842 L

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2014 UPDATE TO THE 2013 PHYSICAL CONDITIONS INSPECTION REPORT

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SFN 1812521

BRIDGE DESCRIPTION

Bridge No. CUY-480-1842 L, also known as the Westbound 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.

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 L, Westbound 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 Westbound Valley View Bridge may begin between 2018 and 2022. Therefore any recommendations addressed in this report are to maintain serviceability of this structure over this projected 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. This will likely not be a structural issue before the rehabilitation project is complete and can be monitored in future inspections.

- The underside of the deck exhibits widespread spalls with exposed reinforcing steel throughout the bridge. The subdecking installed in spans 8 and 9 protects roadways and public areas from falling delaminated concrete above.

- The front faces of the concrete parapets were recently patched, but deterioration on the exterior faces continues to advance. No additional repairs to the parapets are anticipated before the proposed rehabilitation project.

- 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 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 faces of the top four feet are in poor condition with large spalls and exposed corroded reinforcing steel. The tops of the backwalls (expansion joint headers) are also beginning to break up in the roadway. **A**

section of joint armor is now loose in the two northern lanes at the forward abutment. This may require repairs prior to the rehabilitation project.

- 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. One of the deck scuppers is also plugged.

- Currently, there are no active cracks in the girders or stringers. All cracks have been drilled with arrest holes and can be monitored in future inspections until the proposed rehabilitation project.

- 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.

- The roller bearings at the piers are frozen. Paint applied to the rollers in 2000 is not even cracked in most locations. The expansion and contraction of the superstructure is accommodated by the flexibility of the tall piers. No adverse effect on the structure was noticed from the lack of movement in the bearings.

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.

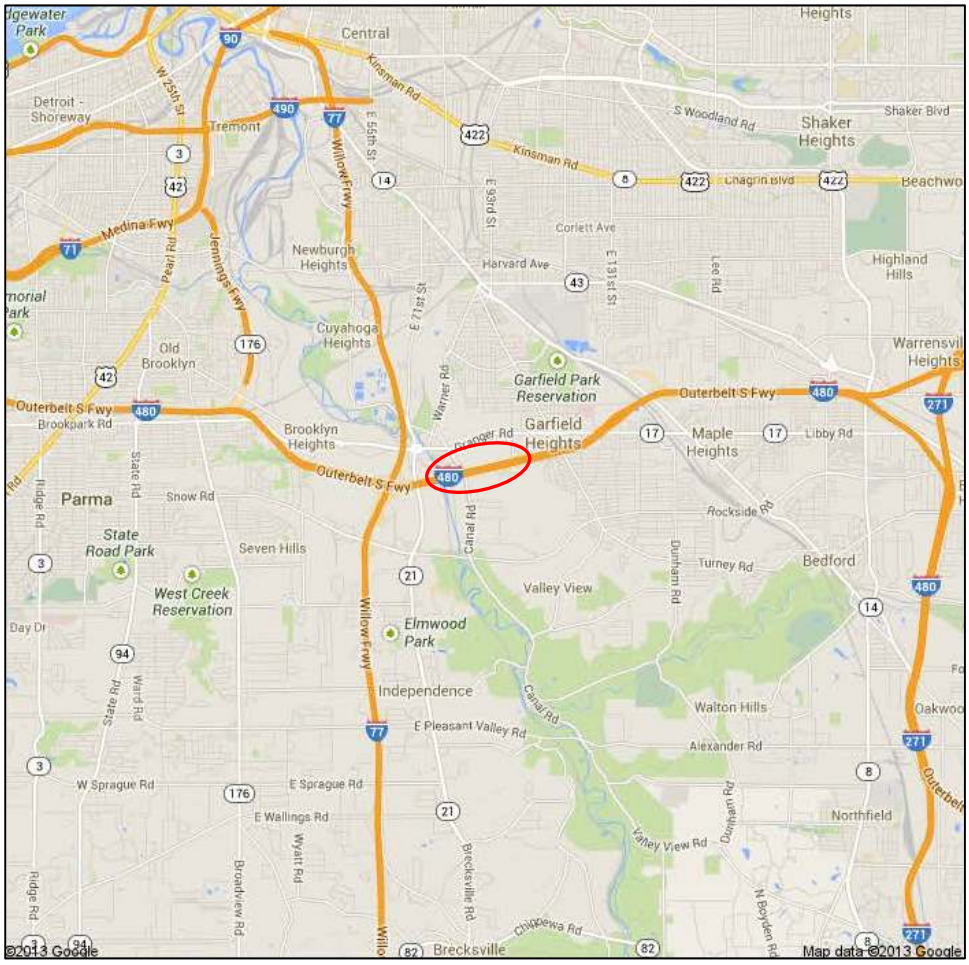
The condition ratings used in this report are based on the 2014 ODOT *Manual of Bridge Inspection* Condition Rating Guidelines.

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 approach pavement has a few patches and potholes, primarily near the abutment joints. The forward approach pavement has minor rutting.

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**. The is minor collision damage to the north rail at the rear abutment. The bridge terminal assembly retrofit connections to the parapets are spalled and deteriorated.

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 #1).

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 #1: Leaking and cracks around holes drilled through deck in span 2, center bay, near floorbeam 8.

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. **These patches and sealing are already failing in a few locations; primarily in spans 11 through 15 on the south parapet** (see Picture #2). There is horizontal and vertical cracking visible in the parapets and there is some rust staining. The exterior face of the concrete parapets are cracked and spalling along the entire length of the bridge.

Picture #2: South parapet repairs and sealing failing in span 15, looking south.

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.

Most of the scupper collection grates on the deck surface have some degree of debris built-up within them, but only one of the 56 scupper downspouts are currently plugged (see Picture #3).

The drainage troughs running transversely beneath the finger joints are typically clogged and overflowing with dirt and debris. The neoprene couplers between the hopper and the 10-inch diameter collector pipe are stretched and even pulled apart in a few locations due to the connections not lining up. 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 #4). **The drainage trough near the south face of girder B is cracked in span 12** (see Picture #5).

Picture #3: Typical debris in scupper grates and one plugged downspout along the north parapet at pier 9, looking west.

Picture #4: Support angle punched through drainage trough flashing next to south face of girder B in span 9, looking east.

Picture #5: Crack in drainage trough next to south face of girder B in span 12, looking east.

There are a few locations where the welds connecting the drainage trough support angles to the girders have cracked. The welds connecting the support angle to girder B in span 9 are now completely broken and the angle is laying on the girder seat (see Picture #6). None of these cracks have extended into the base metal of the girders.

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.

Picture #6: Broken drainage trough support angle next to girder B in span 9, looking east.

Expansion Joints

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

The rear abutment strip seal joint armor that was detached from the backwall at the south lane line of lane 4N during the 2013 inspection has been repaired (see Picture #7). The strip seal joint at the forward abutment is nearly closed at normal temperatures and is bulging out of the joint. 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.

The intermediate finger joints have minor misalignments, but are generally in good condition. The expansion joints 2 and 3 fingers are misaligned horizontally and are rubbing against each other (see Picture #8).

Expansion joint details and comments are tabulated below.

Joint Location	Type	Opening at 79°F	Condition
West (Rear) Abutment	Elastomeric Strip Seal	North = 1 3/4” South = 2”	Approach pavement has pot holes and patches around joint. Minor leakage.

Joint Location	Type	Opening at 79°F	Condition
Unit 1 / Unit 2	Finger Joint	North = 6 3/16” South = 6 1/8”	Good condition.
Unit 2 / Unit 3	Finger Joint	North = 6 5/8” South = 6 1/2”	Fingers have slight horizontal misalignment and are rubbing (see Picture #8).
Unit 3 / Unit 4	Finger Joint	North = 5 3/16” South = 5 5/8”	Fingers have slight horizontal misalignment and are rubbing.
Unit 4 / Unit 5	Finger Joint	North = 5 1/2” South = 5 5/8”	Good condition.
East (Forward) Abutment	Elastomeric Strip Seal	North = 3/4” South = 1 3/8”	Joint closed. Seal bulging, torn, pushing up out of joint, and leaking. **Joint armor broken in lane 2N. Joint header (top of backwall) breaking up in all four lanes.**

Picture #7: Rear abutment expansion joint header repair, looking north.

Picture #8: Finger joint in span 6 misaligned transversely, looking south.

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.

There are a few locations where the girder webs are bent/bowed out of plane. The worst locations noted were 1-inch bows on girder D in span 11 to the east of floorbeam 7, girder B in span 14 to the west of floorbeam 1 (see Picture #9), and girder D in span 14 to the east of floorbeam 4. These locations are likely from original construction and no other distress was noted in the areas.

Picture #9: 1" bow near top of girder B web, west of span 14 floorbeam 1, looking north.

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.

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.

There are forty-two (42) cracks in the trussed floorbeam lower chord copes at the connections to the girder transverse stiffeners (see Picture #10). There are also eighteen (18) 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 lower chord cope cracks, the floorbeams away from deck joints have no significant deficiencies or corrosion.

Picture #10: Active 3/4-inch cope crack on floorbeam 10 at connection to south face of girder B in span 12, looking east.

Lateral Bracing

The lower lateral bracing is in **good** condition. There are several bent flanges on the members, likely from original construction, but none of the damage is affecting the performance of the bracing.

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 and rockers at the abutments (see Picture #11). 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.

Picture #11: Dirt and deterioration on forward abutment girder A bearing, looking north.

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 and on the fascia girder bottom flange. There are isolated areas of top coat peeling failure (see Picture #12). The exterior fascia girder color is not consistent for the length of the bridge.

Picture #12: Top coat paint failure on south face of girder B in span 7, looking east.

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. No cracks were noted in the tri-axial welds.

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.

The stringer bottom flange to floorbeam top flange weld connections are a Category E detail. No cracks were found in these connections on the westbound structure.

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.

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	3 – Poor
Wingwalls	1 – Good
Scour	1 – Good
Slope Protection	3 – Poor

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 repaired by a contractor concurrently with this inspection and is now in good condition. The abutment seats have hairline cracks propagating from isolated bearings.

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.)

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 (see Picture #13).

Picture #13: Deterioration on west face of pier 6, looking east.

Backwalls

The backwalls are in **poor** 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 #14). **During the 2014 inspection several of the recent repairs were already failing.**

The top of the rear abutment backwall (expansion joint header) that was previously breaking up in the high speed lane (4N) has been repaired. The asphalt patches in lane 2 are starting to break up. The top of the forward abutment backwall is breaking up in lanes 1N and 2N (see Picture #15).

Picture #14: Top 3 feet of forward abutment backwall not patched and some patches already failing, looking east.

Picture #15: Top of the forward abutment backwall breaking up in lane 1N and 2N, looking south.

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 **poor**. The rear abutment slope protection was recently repaired where it was previously washed out with large ruts. There are still areas of active erosion to the south of the repairs. All-terrain vehicle tracks go up and down the forward slope which has caused some minor erosion. There is an erosion ditch approximately 10 feet wide by 3 feet deep in span 15.

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**. **During this inspection it was noted that the overhead sign truss in span 11 had approximately half the connection clips missing from the sign sheet over lane 4** (see Picture #16). **ODOT was immediately contacted and had the clips replaced later that same afternoon.**

Picture #16: Sign clips missing from bottom half of overhead sign in span 11, looking south.

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 **fair**.

An electrical junction box cover plate in the north parapet at the sixth light pole from the rear abutment is broken and the covers at the seventh, eighth, and ninth light poles are now missing (see Picture #17).

The superstructure grounding wires are broken at pier 7, pier 10 and pier 11.

Picture #17: Missing electrical junction box cover in north parapet in unit 3.

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. Several other cables have section loss due to deterioration caused by the plugged drainage above. **The safety cable on the south face of girder B in span 9 snapped while an inspector was using it to get around the drainage system during the 2014 inspection** (see Picture #18, #19 and #20). **Future inspectors should be warned not to trust the inspection cables at the expansion joints due to their serious condition.**

Picture #18: Deteriorated safety cable along south face of girder B near pier 9 prior to snapping, looking east.

Picture #19: Inspector passing under deteriorated cable prior to snapping, looking north.

Picture #20: After safety cable snapped at pier 9, looking south.

RECOMMENDATIONS

Preliminary design activities for a proposed rehabilitation project are under way. Currently, the westbound deck replacement project may begin construction between 2018 and 2022. 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

- **Repair the expansion joint armor breaking away from the abutment joint headers.**

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 cope cracks in the floorbeam lower chords.
- 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 north shoulder of the left 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. Repair "dogbone" overcut holes in girder webs. The overcuts should be ground smooth similar to the retrofit in the 1998 repair project.

9. 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.

10. 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.

11. 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 could be blast cleaned and painted at the same time.

12. 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

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

14. 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.

15. The top 4 feet of the rear abutment backwall should be replaced to anchor the new strip seal expansion joints and remove deteriorated concrete. The forward abutment backwall should be completely replaced to the level of the abutment seat. There is indication of rotation of the backwall. The porous backfill and drainage should be replaced behind the backwall.

16. Repair end slope erosion and slope protection.

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.

23. The failed concrete anchors supporting the downspouts on the piers should be replaced with new material. The downspout at pier 12 that has shifted should be reset.

APPENDIX

2014 ROUTINE BRIDGE INSPECTION
BRIDGE INSPECTION FIELD REPORT

Structure File Number: 1812521 Inventory Bridge Number: CUY 00480 18.420 L Bridge Type: 3 - STEEL/6 - GIRDER (FLOOR SYSTEM)/3 - DECK

Sufficiency Rating: 83.7 Date Built: 7/1/1975

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

APPROACH ITEMS

	QTY.	condition state 1	2	3	4	cr TR
c1. Approach Wearing Surface (EA)	2					2
c2. Approach Slabs (SF)	3550					1
c3. Relief Joint (LF)						
c4. Embankment (EA) d	4					1
c5. Guardrail (EA)	2					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.	condition state 1	2	3	4	cr TR
c7.1 Floor/Slab (SF)	286695					2
c7.2 Edge of Floor/Slab (LF)	8310					2
c8. Wearing Surface (SF)	288772.5					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	417					3
N58. Deck Summary					(9-0)	5

SUPERSTRUCTURE ITEMS

	QTY.	condition state 1	2	3	4	cr 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)	11524					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	53054					1
c31. Pins/Hangers/Hinges (EA) d	16					1
c32. Fatigue (LF) d	53054					2
N59. Superstructure Summary					(9-0)	6

SUBSTRUCTURE ITEMS

	QTY.	condition state 1	2	3	4	cr TR
c33. Abutment Walls (LF)	146					2
c34. Abutment Caps (LF)	146					1
c35. Abut. Columns/Bents (EA)						
c36. Pier Walls (LF)	420					2
c37. Pier Caps (LF)	1022					2
c38. Pier Columns/Bents (EA)						
c39. Backwalls (LF)	146					3
c40. Wingwalls (EA)	4					1
c42. Scour (EA) d	16					1
c43. Slope Protection (EA) d	2					3
N60. Substructure Summary					(9-0)	6

CULVERT ITEMS

	QTY.	condition state 1	2	3	4	cr 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.	condition state 1	2	3	4	cr TR
c51. Alignment (LF) d	200.0					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.	condition state 1	2	3	4	cr TR
c55. Signs (EA) d	2					1
c56. Sign Supports (EA) d	4					2
c57. Utilities (LF) d	8310					2
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: 1812521 Inventory Bridge Number: CUY 00480 18.420 L Bridge Type: 3 - STEEL/6 - GIRDER (FLOOR SYSTEM)/3 - DECK

Sufficiency Rating: 83.7 Date Built: 7/1/1975

District: 12 Place Code (FIPS): INDEPENDENCE I-480 W.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

Approach pavement has a few minor cracks, patches and potholes. Minor rutting in forward approach pavement.

c5. Guardrail

Good condition.

DECK

c7.1 Floor/Slab

Cracks with efflorescence throughout. Large spalls, scaling and exposed reinforcement on ~ 5% of deck underside. Subdecking covers West Canal Road, Towpath Trail and Canal Road in spans 8 and 9. 10 holes were previously drilled through center bay of deck in span 2 over floorbeam 3 allowing drainage onto steelwork below. The deck in this area is now cracked with rust stains and appears to be getting punky.

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. Asphalt patches at expansion joints beginning to deteriorate.

c11. Railing

Both parapet faces were rehabbed in 2012 (north) and 2013 (south). Horizontal and vertical cracking throughout both parapets. Rust staining is already prevalent on both parapets. Epoxy urethane sealant blistered and peeling throughout south railing in spans 11-15.

c12. Drainage

Deck scuppers typically full of debris, but only 1 of 56 scupper downspouts plugged. Several anchors are sheared off on pier 12 downspout support brackets allowing the downspout to move down 1" and 1/2" to the north. Majority of 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 piers. Underground drainage is plugged. Downspouts cut off above ground and drain to base of piers. Large washout at pier 3.

c13. Expansion Joint

Rear abutment joint header appears to have been repaired in lanes 3 and 4 since 2013 inspection. Joint header in lane 2 is filled with asphalt and breaking up.
Expansion joints 2 and 3 fingers are misaligned horizontally and rubbing against each other.
Strip seal joint at the forward abutment closed tight and smashing out of the joint indicating movement of the forward abutment. Joint armor is broken in lane 2. Joint header is breaking up in all 4 lanes.

SUPERSTRUCTURE

c14. Alignment

Several windlocks have slight misalignment and are wearing against keeper plates.

c15.1 Beams/Girders

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 locations.
There is a 1" bow at the top of girder B web (south face) located in the 1st stiffener space west of floorbeam 1 in span 14. This is not a new condition.
Safety cables under deck joints are severely deteriorated and dangerous. The safety cable on the south face of girder B in span 9 snapped while an inspector was using it to get around the drainage system during the 2014 inspection. Future inspectors should use extreme caution.

c16. Diaphragm/Cross Frames

Minor corrosion under leaking deck joints.

c17. Stringers

Stringers are in good condition.

c18. Floorbeams

Cracks in floorbeam lower chord copes (1 new crack found in 2014 bringing total to 35 crack locations); see Physical Conditions Report appendix for locations. Minor corrosion under leaking deck joints. Several floorbeam gusset/connection plates are bent. No additional distress was noted. Likely due to original construction. Pack rust building between connections in several locations.

c24. Lateral Bracing

Lower lateral braces are in good condition.

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 leaking 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.

SUBSTRUCTURE

c33. Abutment Walls

Closed abutment expansion joints indicate the abutments may be moving/rotating or the backwalls are failing. Deteriorated concrete was repaired by contractor in 2013 and is generally in good condition. Top 6" of forward abutment footing is exposed.

c34. Abutment Caps

Deteriorated concrete was repaired by contractor in 2013 and is in good condition.

c36. Pier Walls

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

c37. Pier Caps

Typical spalls and delaminations.

c39. Backwalls

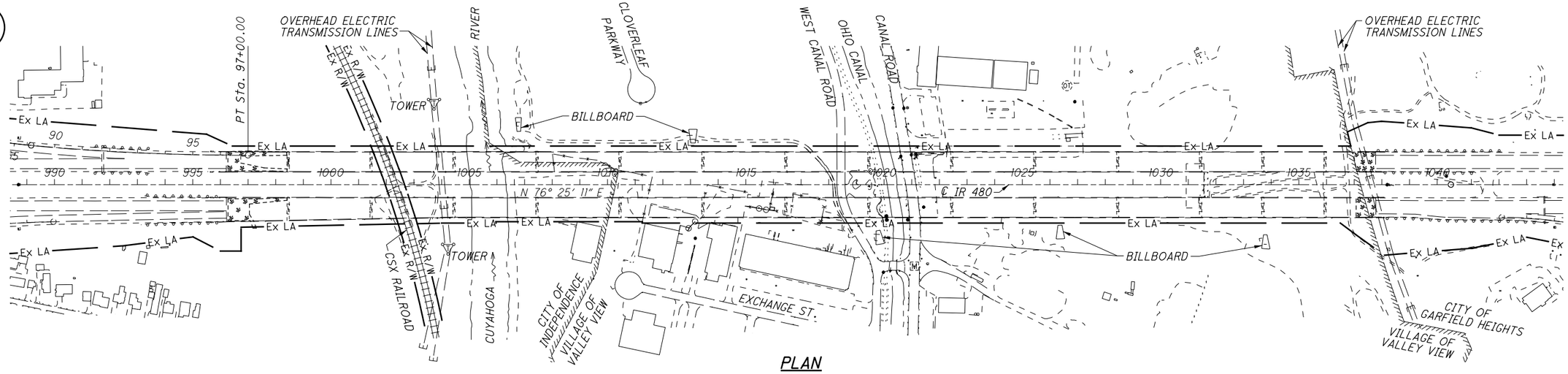
Majority of deteriorated concrete was repaired by contractor in 2013 and is in good condition. Large areas of concrete were removed from the backwall compression face and the reinforcement was observed bowing outward. Tops of backwalls unable to be patched below deck joints. A few of the patches are already beginning to fail.

c42. Scour

Cuyahoga River channel is away from all substructure units.

c43. Slope Protection

Rear abutment slope protection repaired in 2013 where washed out. Downspout drainage has cut a deep channel between the base of pier 3 and the river. Top of pier 3 footing has not been exposed. Crushed aggregate slope protection at forward abutment has slid down hill leaving top 6" of footing exposed.



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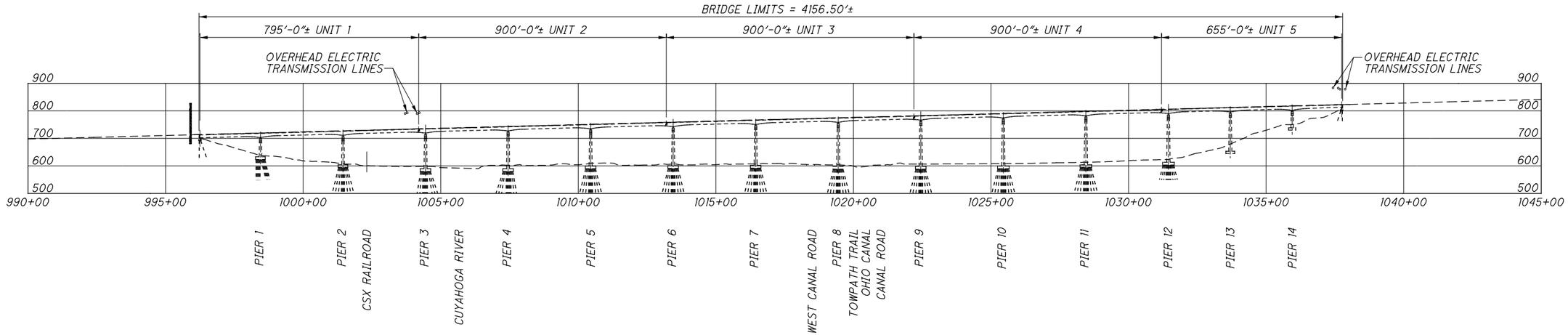


ELEVATION

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:

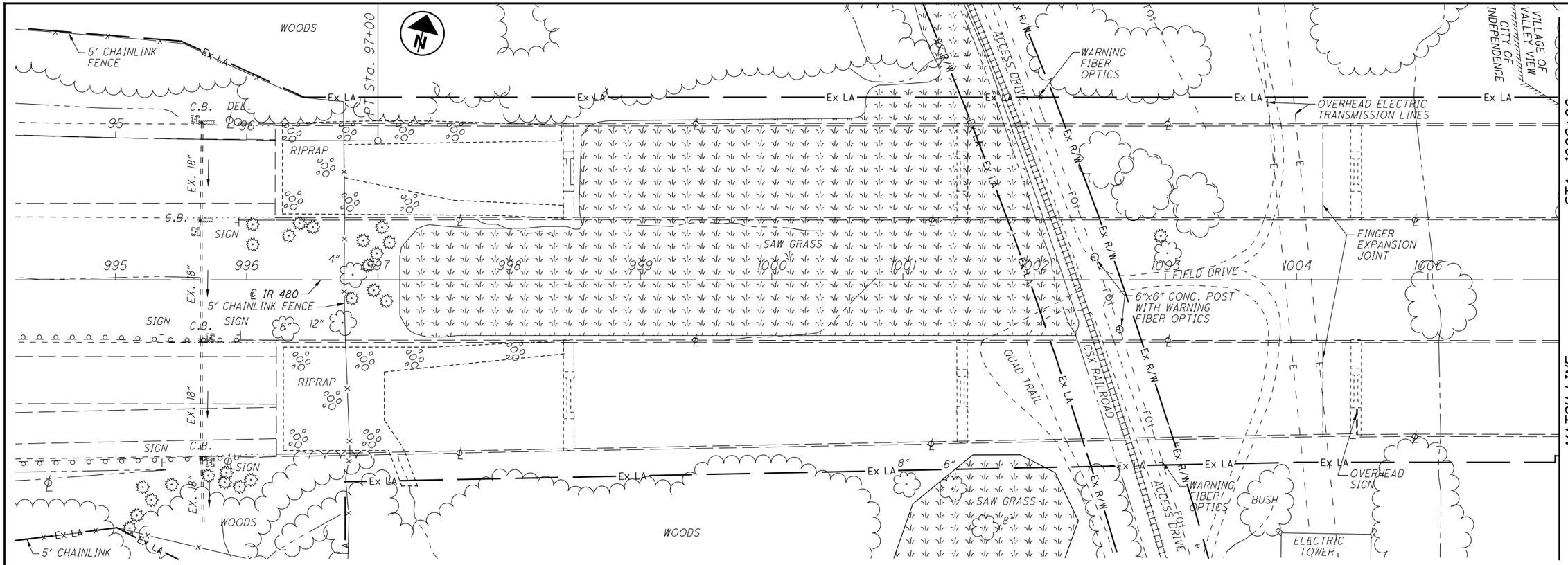
RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

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

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

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

CUY-480-18.42
PID No. 90591



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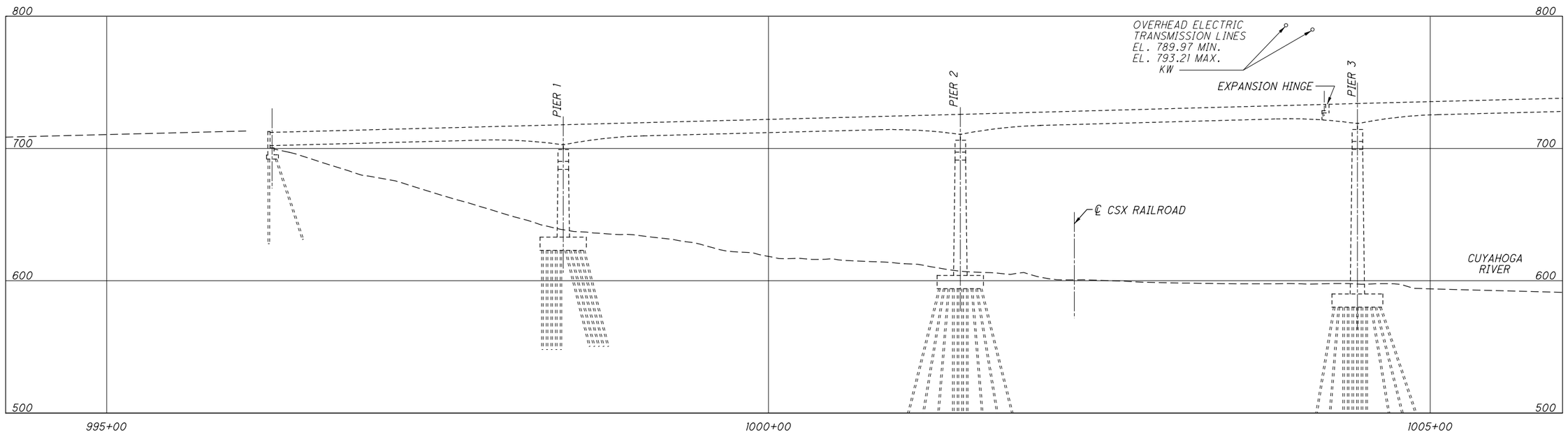

ELEVATION

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

CUY-480-18.42
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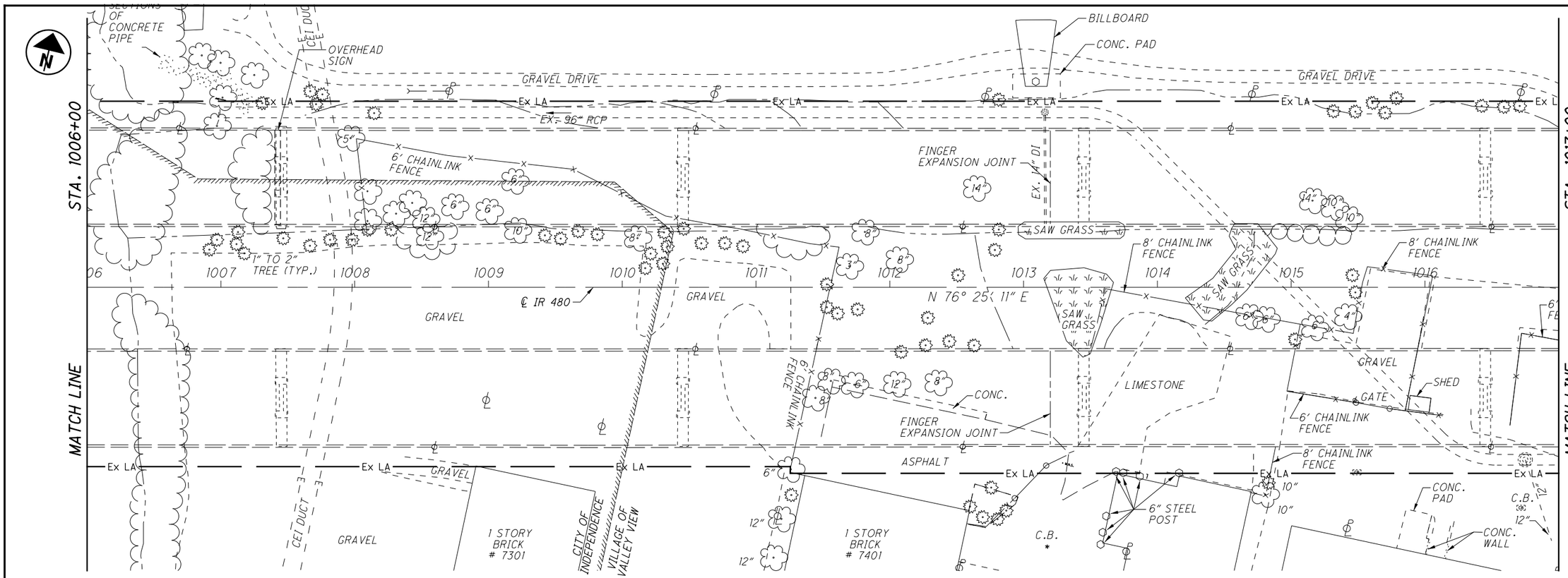

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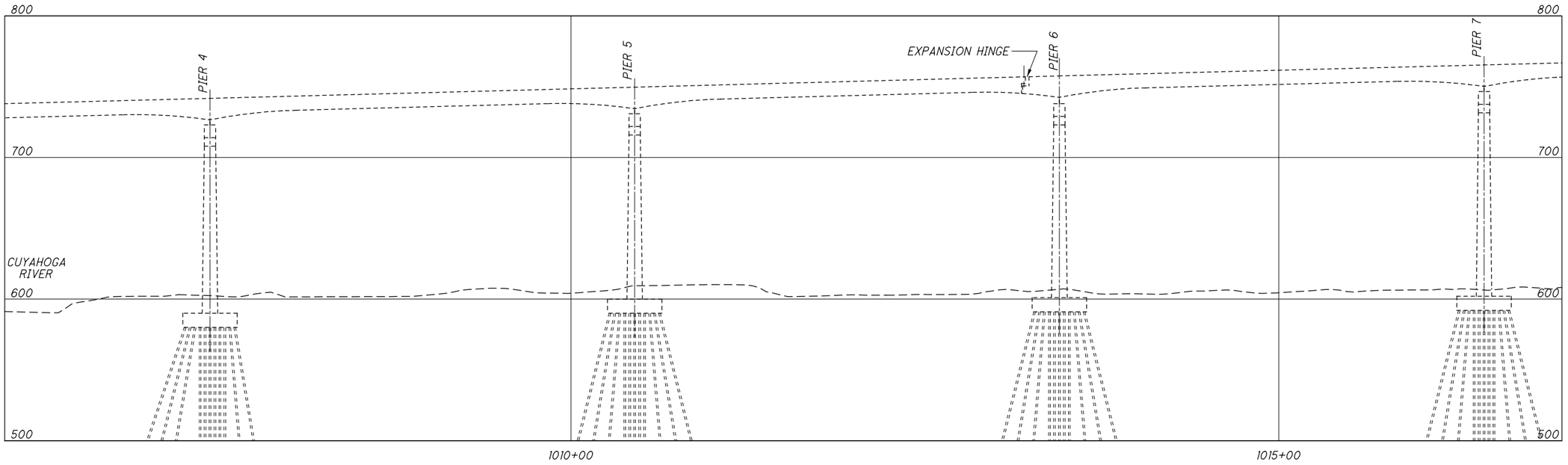

ELEVATION

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CUYAHOGA COUNTY
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STA. 1000+00.00

GENERAL PLAN - 2
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OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
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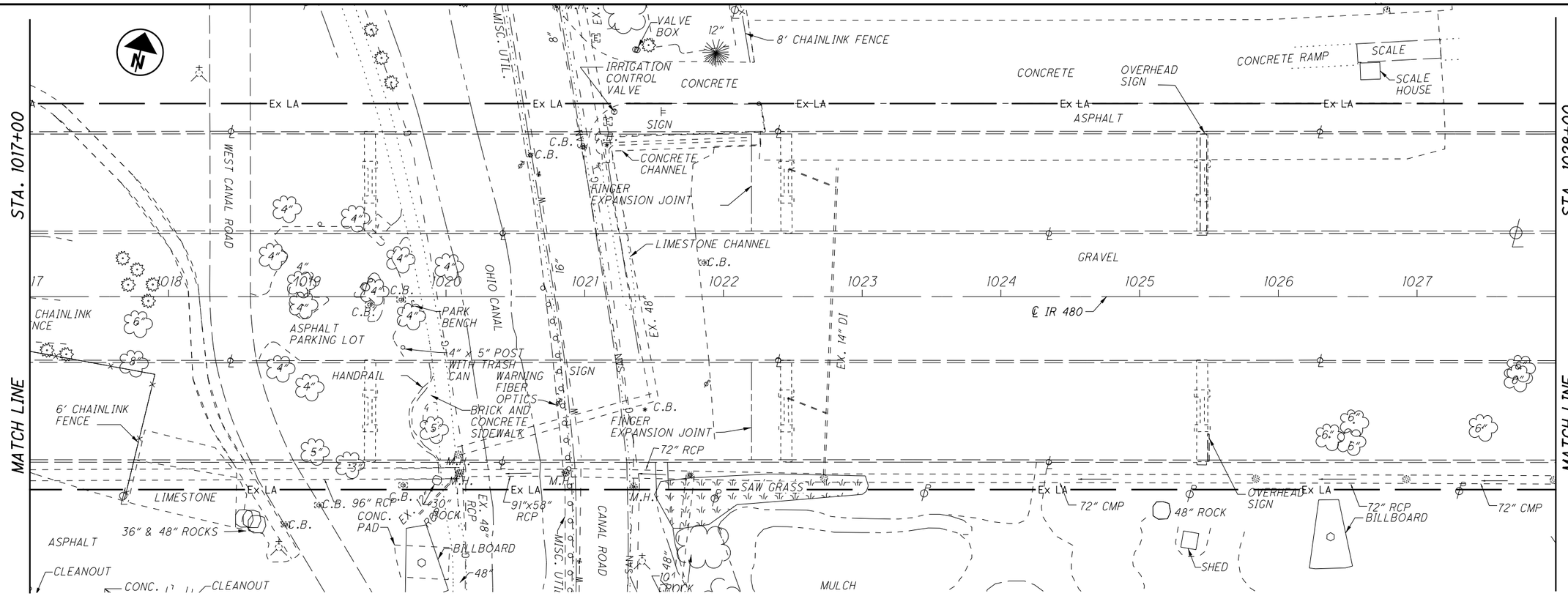

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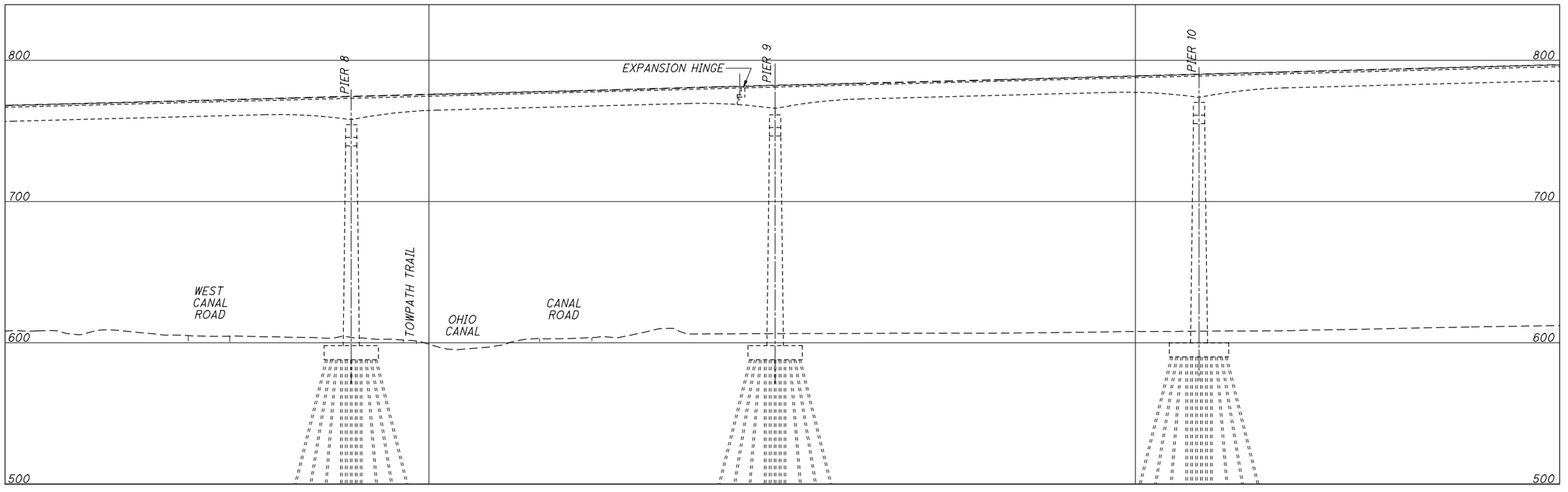

ELEVATION

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29 NORTH PARK STREET
MANSFIELD, OHIO 44902

REVIEWED	DATE
DRAWN RB	REVISED
DESIGNED KAK	CHECKED

STRUCTURE FILE NUMBER
182567 (T)
182548 (R)

CUYAHOGA COUNTY
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GENERAL PLAN - 3
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OVER CUYAHOGA RIVER VALLEY

CUY-480-18.42
PID No. 90591

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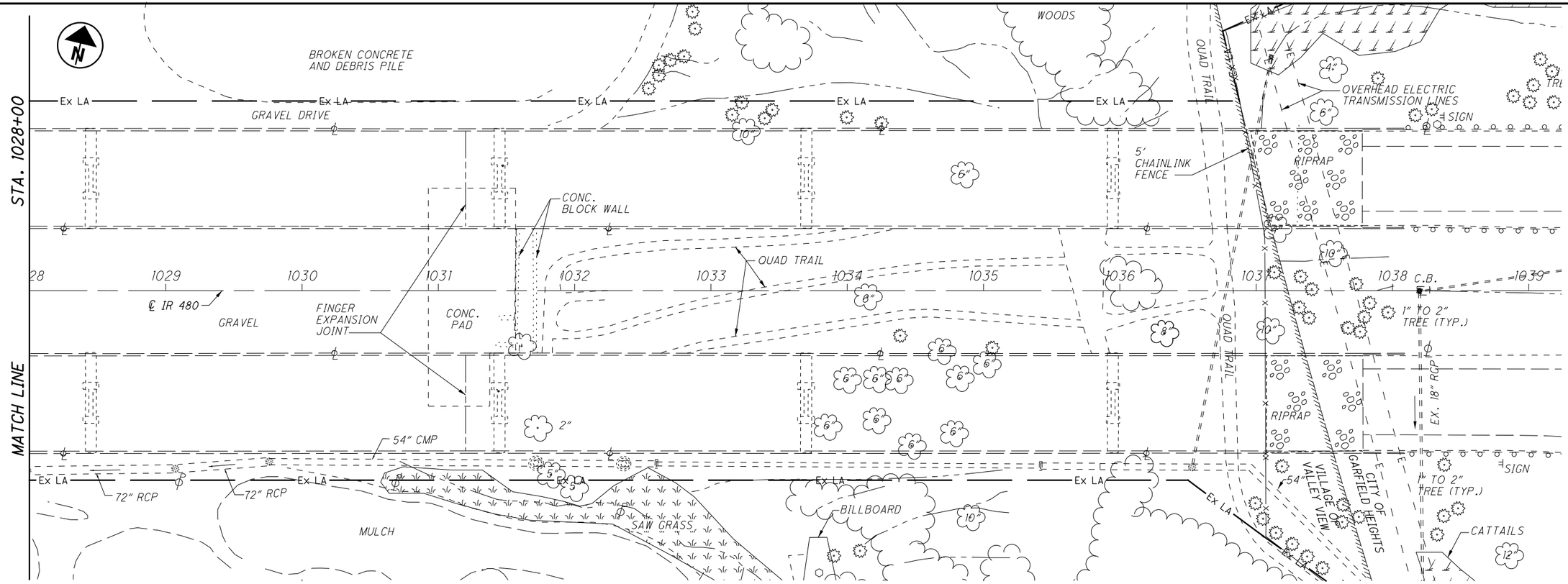

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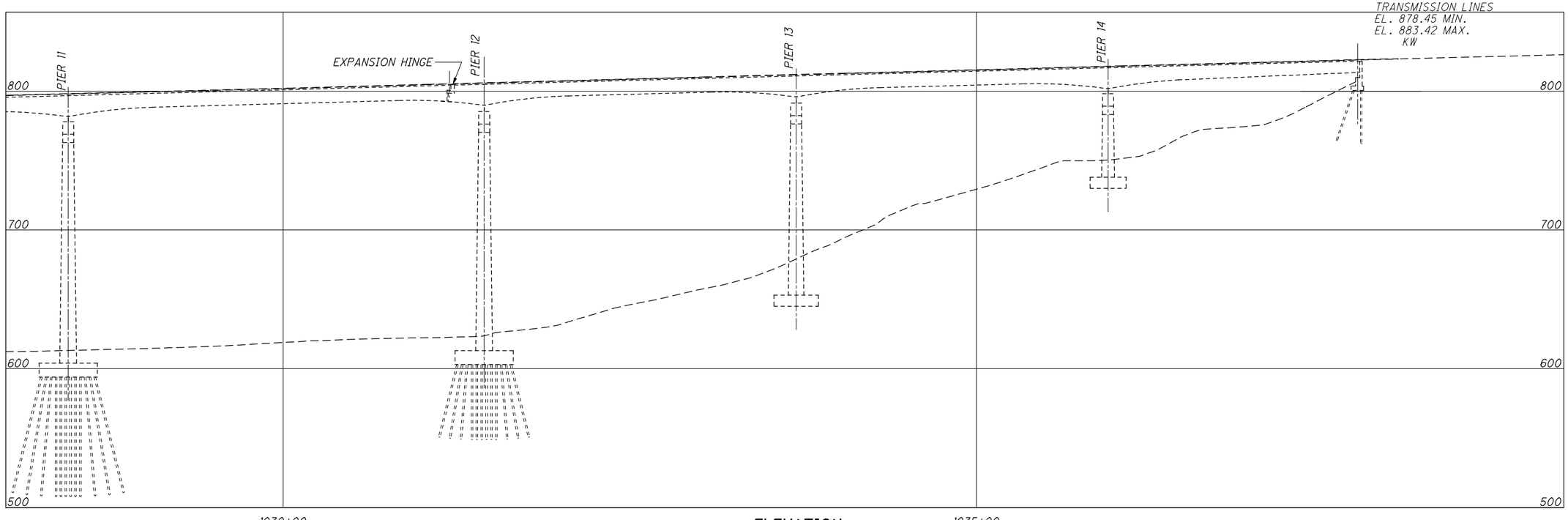

ELEVATION

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

REVIEWED	DATE
DRAWN RB	REVISED
DESIGNED KAK	CHECKED

STRUCTURE FILE NUMBER
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182548 (R)

CUYAHOGA COUNTY
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STA. 1000+00.00

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

CUY-480-18.42
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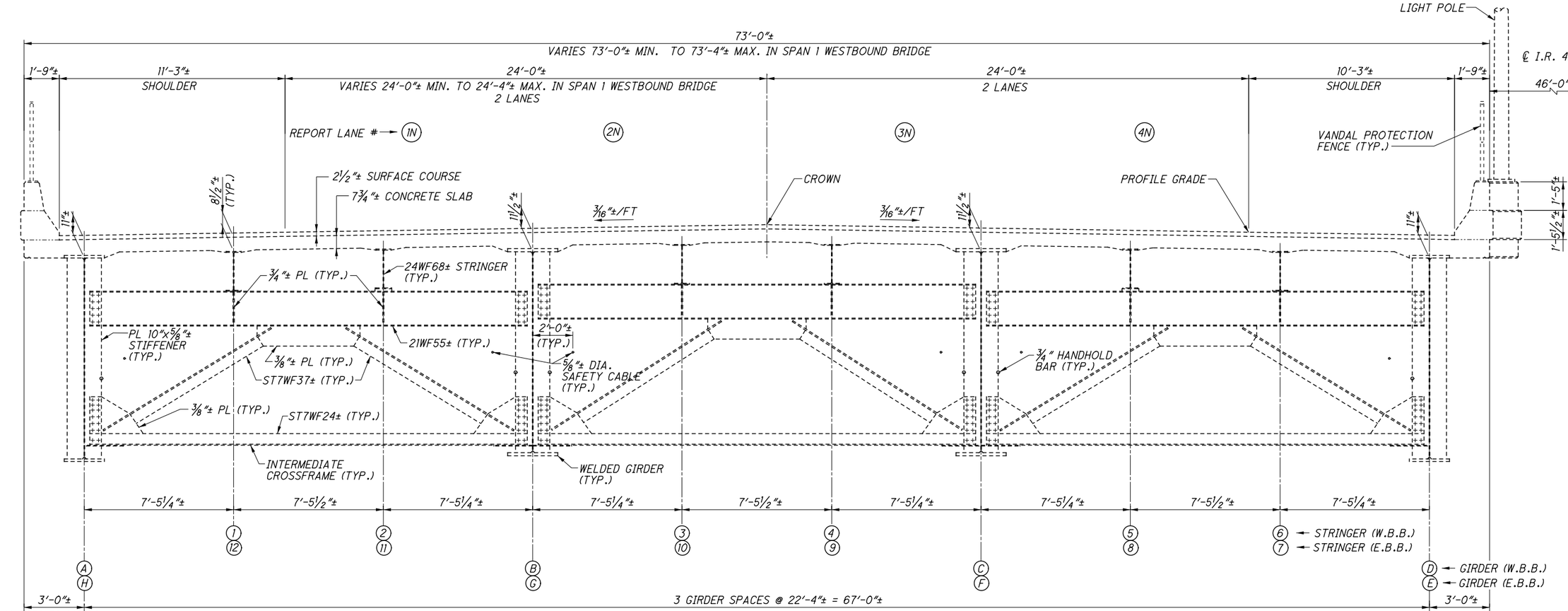

EXISTING TRANSVERSE SECTION

WESTBOUND BRIDGE - AS SHOWN
EASTBOUND BRIDGE EXCEPT UNIT 1 - OPPOSITE HAND

NOTES

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

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MANSFIELD, OHIO 44902

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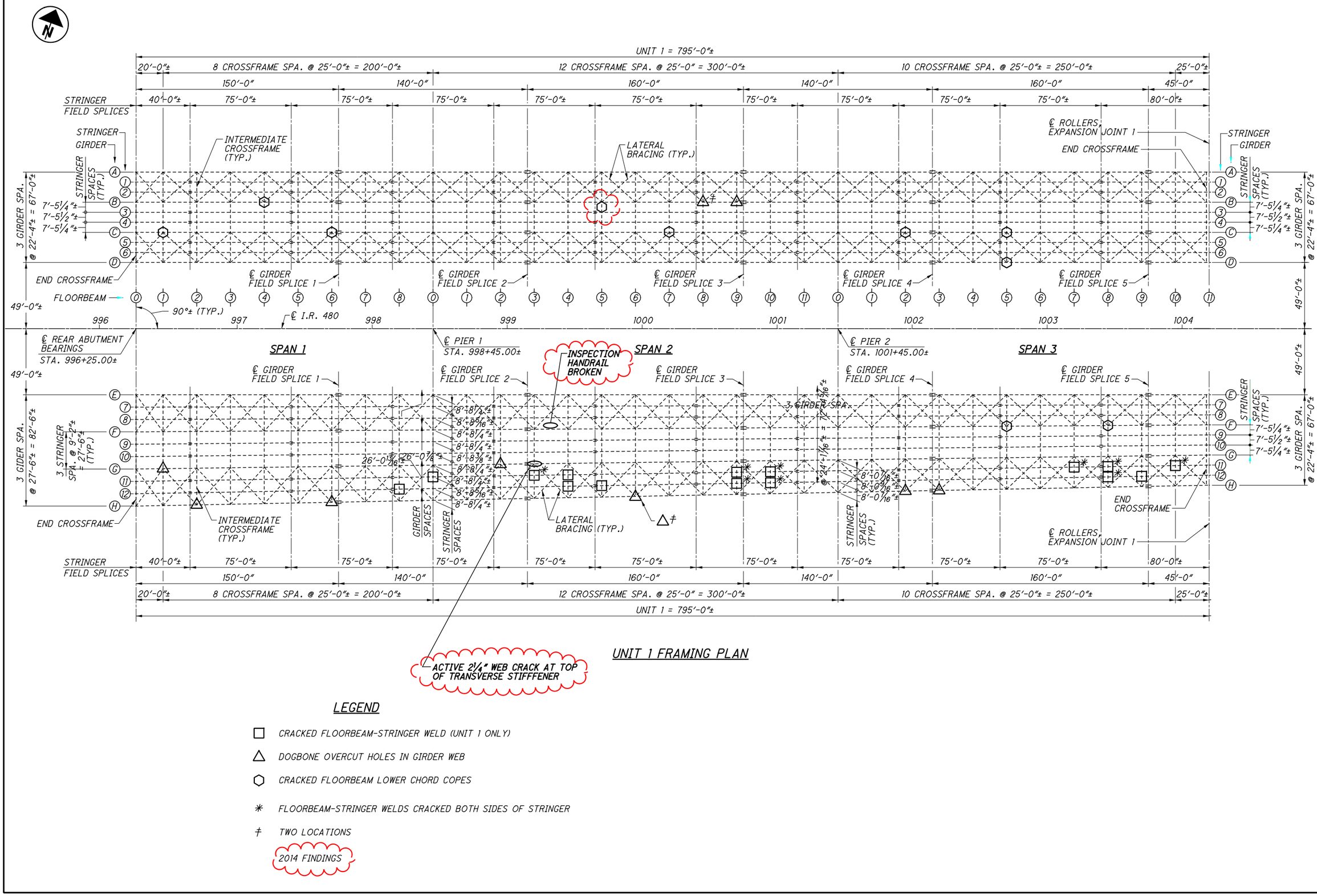
CHECKED	REVISED	STRUCTURE FILE NUMBER 1812521 (L) 1812548 (R)	

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

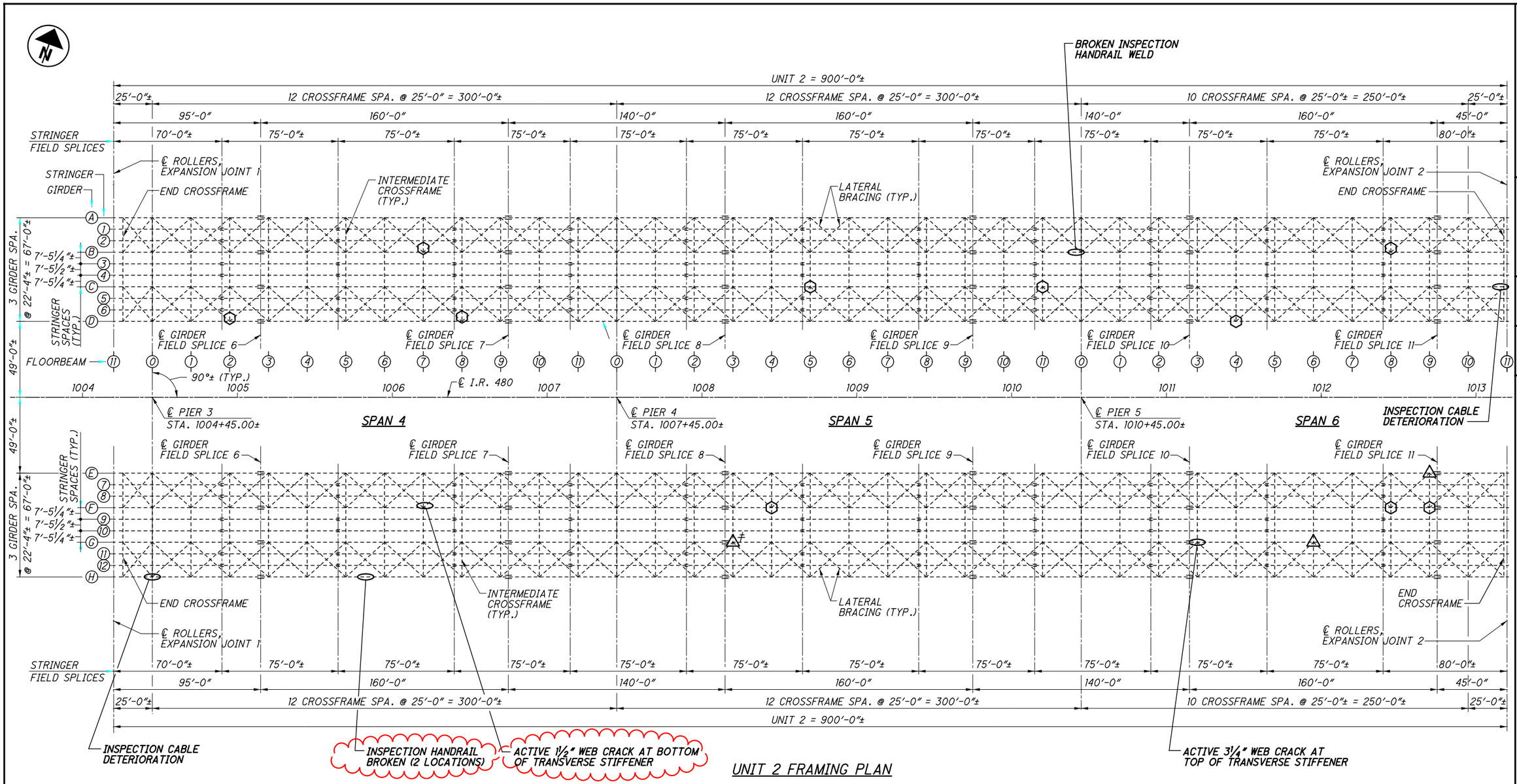
UNIT 1 FRAMING PLAN

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

DESIGNED	DRAWN	REVIEWED	DATE
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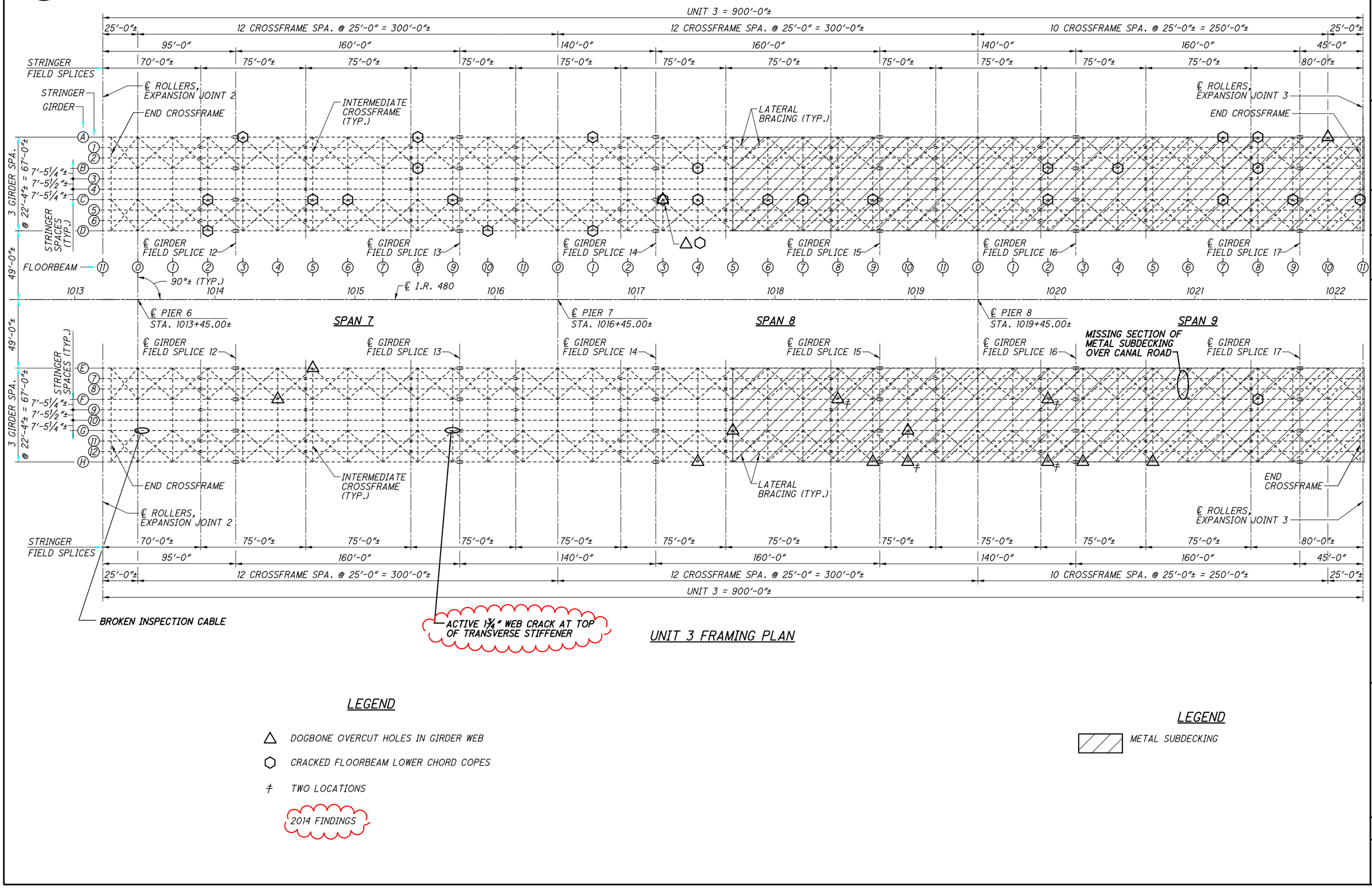
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

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

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

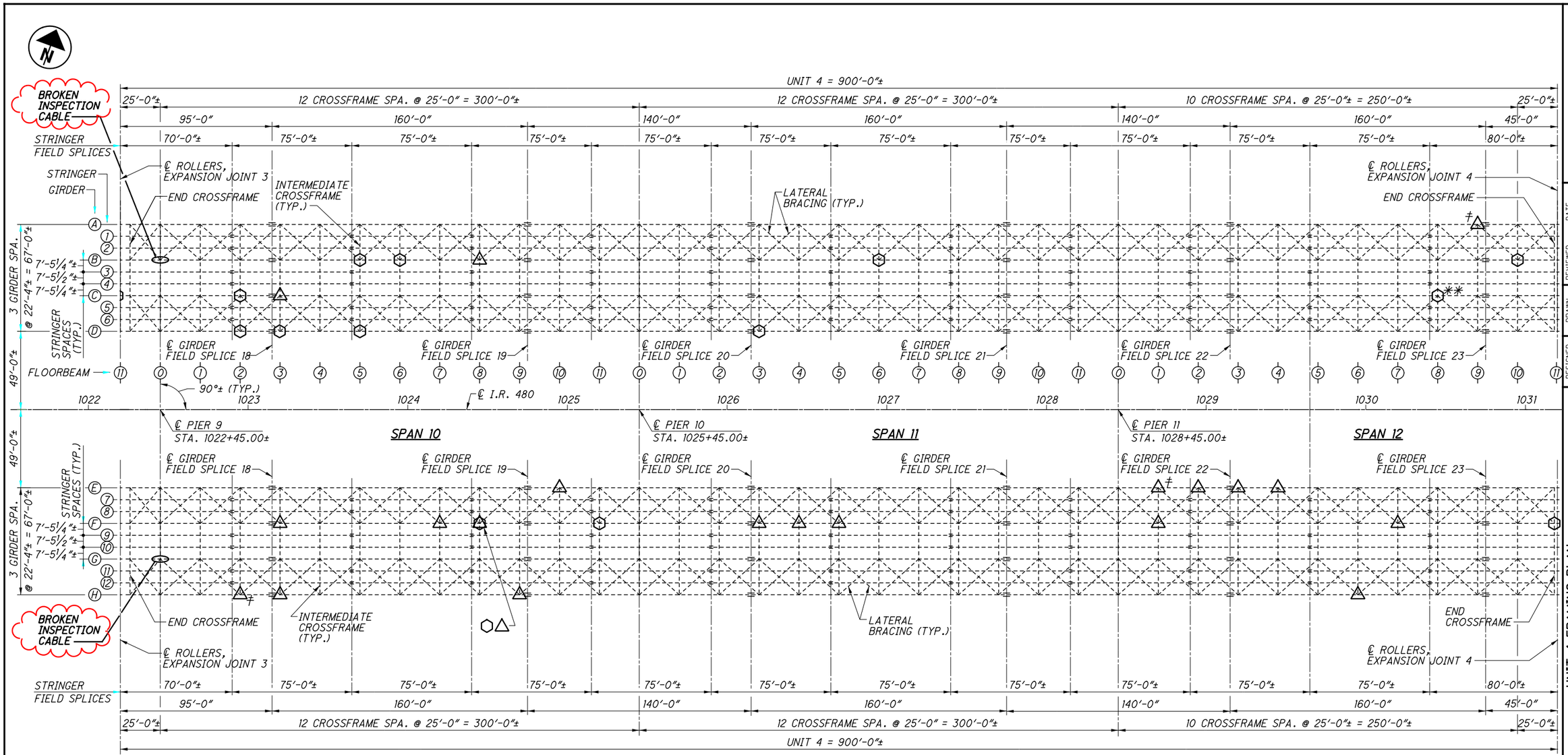
DESIGNED	DRAWN	REVIEWED	DATE
KAK	KH		
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

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

RICHLAND ENGINEERING LIMITED
29 NORTH PARK STREET
MANSFIELD, OHIO 44902

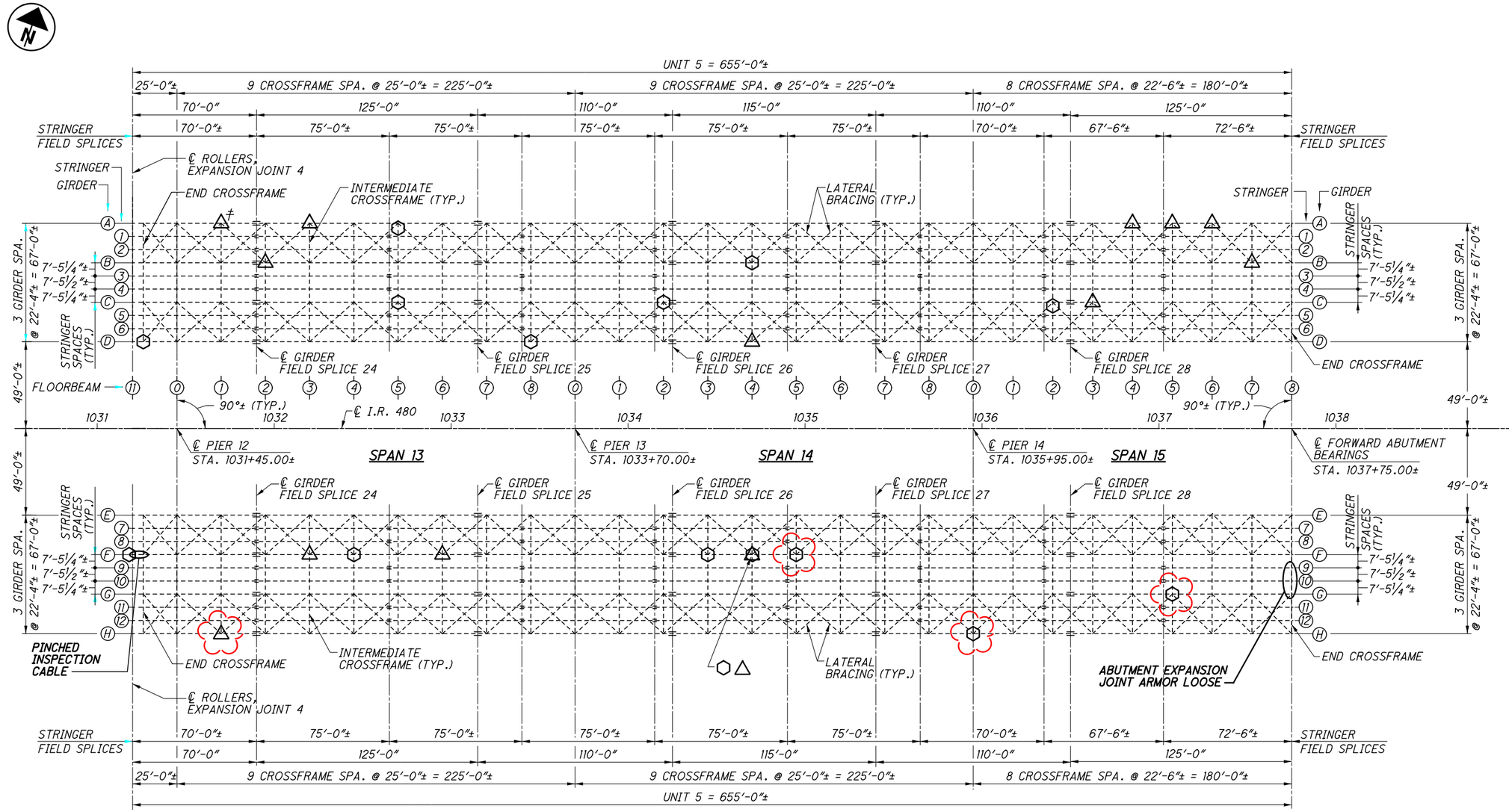
DESIGNED	DRAWN	REVIEWED	DATE
KAK	KH		
CHECKED	REVISED	STRUCTURE FILE NUMBER	
ALP			

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

DESIGNED	DRAWN	REVIEWED	DATE
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

WESTBOUND BRIDGE
CUY-480-1842 L

						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	70° F	50° F	34° F	45° F	40° F	55° F	70° F	55° F	75° F	55° F	67° F	79° F
Rear Abutment	Strip Seal	220'	3"	*2 3/8"*	*1 3/4"*	*2 9/16"*	2 3/8"	2 1/16"	2 1/4"	2"	2"	1 1/2"	Not Taken	Not Taken	1 11/16"	1 3/4"
Near Pier 3L	Fingers	1050'	9"	8 3/8"	8 3/8"	9 1/2"	10 3/8"	9 1/4"	9 1/4"	9"	8 1/8"	8 1/2"	6 3/4"	10 3/4"	6 7/8"	6 3/16"
Near Pier 6L	Fingers	900'	9"	8 1/4"	8 1/16"	8 7/8"	9 3/4"	9 1/4"	9 1/2"	8 15/16"	8"	9"	7 1/8"	9"	7"	6 5/8"
Near Pier 9L	Fingers	900'	9"	7 1/2"	7 3/8"	8"	9 1/4"	8 3/8"	8 3/4"	8 1/4"	7 1/2"	8"	6"	12 1/2"	6 1/4"	5 13/16"
Near Pier 12L	Fingers	900'	9"	8 3/4"	8 3/4" @ 65° F	9 1/2"	9 3/4"	9 1/2"	9 7/8"	8 5/8"	7 13/16"	7 13/16"	6 1/2"	11 1/2"	6"	5 1/2"
Forward Abut.	Strip Seal	180'	3"	*2 1/2"*	*2 1/2" @ 55° F*	*2 9/16"*	2 1/8"	1 3/8"	2"	1 11/16"	1 3/8"	1 5/8"	Not Taken	Not Taken	1 1/8"	3/4"

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	
Left	2	B (South Face)	8	East	Top	
Left	2	B (South Face)	8	West	Top	
Left	2	B (South Face)	9	West	Top	
Left	8	C (South Face)	3	West	Top	
Left	9	A (South Face)	10	West	Bottom	
Left	10	C (South Face)	3	East	Top	
Left	10	B (South Face)	8	West	Bottom	
Left	12	A (South Face)	9	East	Bottom	
Left	12	A (South Face)	9	West	Bottom	
Left	13	A (South Face)	1	East	Bottom	
Left	13	A (South Face)	1	West	Bottom	
Left	13	B (South Face)	2	East	Bottom	
Left	13	A (South Face)	3	West	Bottom	
Left	14	D (North Face)	4	West	Top	
Left	15	C (South Face)	3	East	Top	
Left	15	A (South Face)	4	Both		** Incomplete cuts between top and bottom holes
Left	15	A (South Face)	5	Both		** Incomplete cuts between top and bottom holes
Left	15	A (South Face)	6	Both		** Incomplete cuts between top and bottom holes
Left	15	B (South Face)	7	West		

Total Overcut Top Locations **7**
Total Overcut Bottom Locations **8**

Figure No. 3 Floorbeam Lower Chord Cope Cracks

Bridge	Span	Floorbeam	Connecting Girder	Crack Length	
Left	1	1	C (North Face)	0.25"	
Left	1	4	B (South Face)	0.375"	
Left	1	6	C (North Face)	0.5"	
Left	**2**	**5**	**B (South Face)**	**0.5"**	
Left	**2**	**7**	**C (North Face)**		
Left	3	2	C (North Face)	0.75"	
Left	3	5	C (North Face)	0.125"	
Left	3	5	D (North Face)	0.25"	** overcut only, no crack **
Left	**4**	**2**	**D (North Face)**	**0.25"**	
Left	**4**	**7**	**B (North Face)**	**0.5"**	** overcut only, no crack **
Left	**4**	**8**	**D (North Face)**	**0.25"**	
Left	5	5	C (North Face)	0.75"	
Left	5	11	C (North Face)	0.25"	
Left	6	4	D (North Face)	0.25"	** overcut only, no crack **
Left	**6**	**8**	**B (North Face)**	**0.375"**	
Left	7	2	C (North Face)	0.625"	
Left	7	2	D (North Face)	0.375"	
Left	7	3	A (South Face)	0.25"	
Left	7	5	C (North Face)	0.5"	
Left	7	6	C (North Face)	0.25"	
Left	7	8	A (South Face)	0.125"	** overcut only, no crack **
Left	7	8	B (South Face)	0.125"	** overcut only, no crack **
Left	7	9	C (North Face)	0.375"	
Left	7	10	D (North Face)	0.4375"	
Left	8	1	A (South Face)	0.125"	
Left	8	1	D (North Face)	0.25"	** overcut only, no crack **
Left	8	3	C (South Face)	0.125"	** overcut only, no crack **
Left	8	4	B (South Face)	0.50"	
Left	8	4	C (North Face)	0.25"	** overcut only, no crack **
Left	8	6	C (North Face)	0.25"	
Left	8	7	C (North Face)	0.25"	
Left	8	9	C (South Face)	0.5"	
Left	9	2	B (South Face)	0.50"	
Left	9	2	C (North Face)	0.25"	
Left	9	4	B (South Face)	<0.25"	
Left	9	7	A (South Face)	0.75	
Left	9	7	C (North Face)	0.75"	
Left	9	8	A (South Face)		
Left	9	8	B (South Face)	0.25"	
Left	9	9	C (North Face)	0.5"	
Left	9	11 (West)	C (North Face)	0.25"	
Left	10	2	C (North Face)	0.125"	
Left	10	2	D (North Face)	0.25"	** overcut only, no crack **
Left	**10**	**3**	**D (North Face)**	**0.25"**	
Left	10	5	B (South Face)	0.1875"	
Left	10	5	D (North Face)	0.75"	** overcut only, no crack **
Left	10	6	B (South Face)	0.25"	
Left	11	3	D (North Face)	0.375"	** overcut only, no crack **
Left	11	6	B (South Face)	0.25"	
Left	**11**	**11**	**B (North Face)**	**0.5"**	
Left	12	8	C (North Face)	0.5"	** overcut only, no crack **
Left	12	8	C (South Face)	0.25"	** overcut only, no crack **
Left	12	10	B (South Face)	0.75"	
Left	12	11 (East)	D (North Face)	0.25"	** overcut only, no crack **
Left	**13**	**5**	**A (South Face)**	**0.5"**	** overcut only, no crack **
Left	13	5	C (South Face)		** overcut only, no crack **
Left	13	8	D (North Face)	0.125"	** overcut only, no crack **
Left	14	2	C (North Face)	0.25"	** overcut only, no crack **
Left	14	4	B (South Face)	0.375"	
Left	**15**	**2**	**C (South Face)**	**0.375"**	

Documented in 2014 Inspection.

Total Cope Crack Locations **42**

Total Cope Overcut Locations **18**

Figure No. 4 Abutment Movement Measurements

WESTBOUND BRIDGE
CUY-480-1842 L

EAST ABUTMENT (FORWARD)

Dimension		1993	1995	1998	1999	2000	2013	2014
A	North Face		1 7/8"	2 1/8"	2 1/8"	1 1/2"	2 13/16"	2 3/8"
	South Face		2"	2 1/8"	2 1/8"	1 3/4"	2 1/8"	2 1/8"
B	North Face		1 1/8"	1 1/8"	1 1/4"	3/4"	1 1/8"	1 1/4"
	South Face		1 1/8"	1 1/8"	1 1/4"	1"	1 1/8"	1 3/16"
D	North Face		12'-7"	12'-7"	12'-7"	12'-7"	12'-7"	12'-7"
	South Face		13'-4"	13'-4"	13'-4"	13'-4"	13'-4"	13'-4"
Tilt (A-B) / D	North Face	0.0048	0.0050	0.0066	0.0058	0.0050	0.0112	0.0075
	South Face	0.0056	0.0055	0.0063	0.0055	0.0047	0.0063	0.0059

WEST ABUTMENT (REAR)

Dimension		1993	1995	1998	1999	2000	2013	2014
A	North Face		1 1/2"	1 3/4"	1 3/8"	2 1/16"	1 3/4"	1 3/4"
	South Face		1 5/8"	1 3/4"	1 11/16"	2 3/16"	1 3/4"	1 3/4"
B	North Face		1"	1 1/8"	5/8"	1 5/16"	1 3/16"	1 1/4"
	South Face		1 1/8"	1 3/16"	7/8"	1 3/16"	1 1/4"	1 1/4"
D	North Face		12'-6"	12'-6"	12'-6"	12'-6"	12'-6"	12'-6"
	South Face		11'-6"	11'-6"	11'-6"	11'-6"	11'-6"	11'-6"
Tilt (A-B) / D	North Face	0.0033	0.0033	0.0042	0.0050	0.0050	0.0038	0.0033
	South Face	0.0036	0.0036	0.0041	0.0059	0.0072	0.0036	0.0036