CUY-10-1613

PHYSICAL CONDITION REPORT
ROUTINE INSPECTION
HOPE MEMORIAL/LORAIN CARNEGIE BRIDGE OVER THE CUYAHOGA RIVER
SFN: 1801503

Inspection Date:
November 28-29, 2017

Submitted to:

Ohio Department of Transportation
District 12
5500 Transportation Boulevard
Garfield Heights, OH 44125
United States of America

Inspection Team:

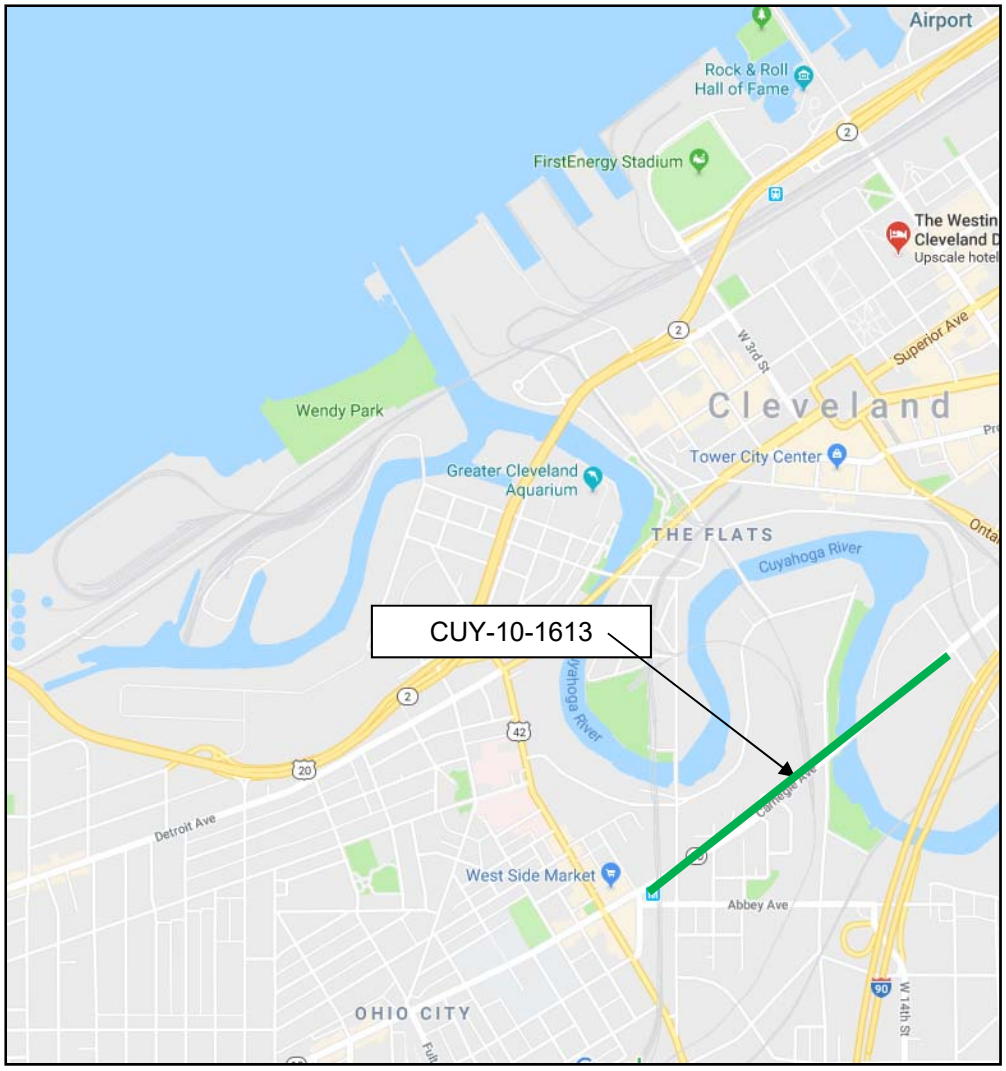
Brian D. Dietrich, P.E.
Frank Novak, E.I.
Andrew D. Zwolinski, E.I.
Matt A. Riesenberg, E.I.

INFRASTRUCTURE ENGINEERS, INC.
Infrastructure Engineers, Inc.
300 East Business Way
Suite 200
Cincinnati, OH 45241

Dustin W. Noel, P.E.

TABLE OF CONTENTS

LOCATION MAP



Structure: CUY-10-1613
Hope Memorial/Lorain Carnegie over Cuyahoga River
Cleveland, Ohio

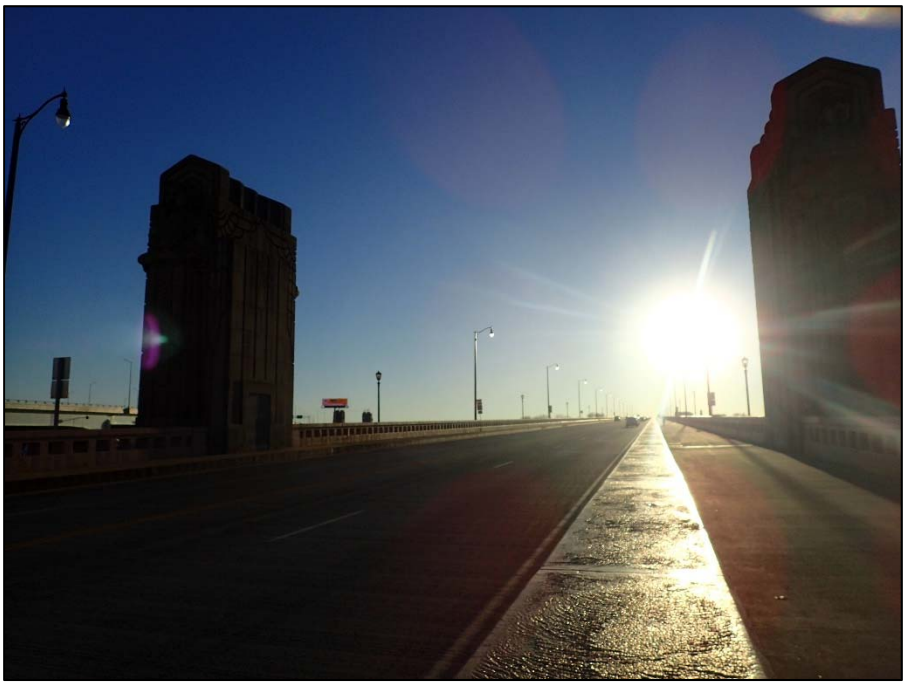
GENERAL DESCRIPTION

The Hope Memorial/Lorain Carnegie Bridge (CUY-10-1613, SFN 1801503) was built in 1932 and carries four lanes of traffic over the Cuyahoga River Valley, local streets, parking lots and RTA railroad tracks. The structure is approximately 3,515 feet long and carries State Route 10 and pedestrian traffic over the Cuyahoga River Valley. The 13 main spans of the bridge are composed of four lines of cantilever Pratt deck trusses supported by cast-in-place concrete piers on spread footings. W & LE Span at the East Abutment is a single span 131-foot long Pratt deck truss span containing three truss lines.

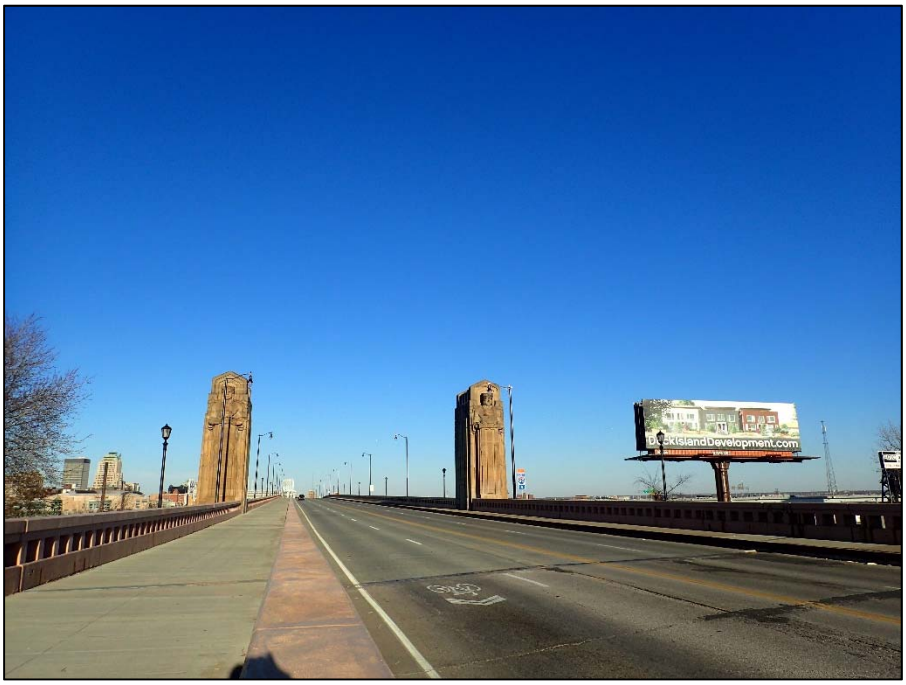
The calculated quantities from the 2014 Element Level Inspection were used when populating the 2015 and 2017 Bridge Inspection Field Reports. The span units are numbered per the original shop drawings, beginning at Unit 13 at the West Abutment and decrementing to Unit 1 at the East Pylon. The easternmost span from the East Pylon to the East Abutment over RTA line is denoted as W & LE Span. Gusset plates are numbered increasing from West to East locally to each span unit.

Main spans: Thirteen (13) spans of four (4) lines of cantilever Pratt deck style trusses totaling 2,916'-1". Truss spans vary from 161'-2" to 299'-0".
West Approach: Five (5) multi beam spans sitting on concrete piers and steel bents. Total length of approach spans totaling 157'-8".
East Approach: Concrete cellular construction approximately 307'-0" L with three (3) 131'-0" L Pratt deck truss spans.

Plan views of the Hope Memorial/Lorain Carnegie Bridge with the units and sections identified are shown in Drawings A-1 and A-2.



East end view looking West



West end view looking East

South elevation

North elevation

INSPECTION PROCEDURE

Infrastructure Engineers, Inc. conducted a routine inspection on the structural elements using a combination of equipment and technical access techniques. The inspection was performed by a crew of four (4) members recording inspection notes and verifying any new or previously reported areas of deterioration or structural distress.

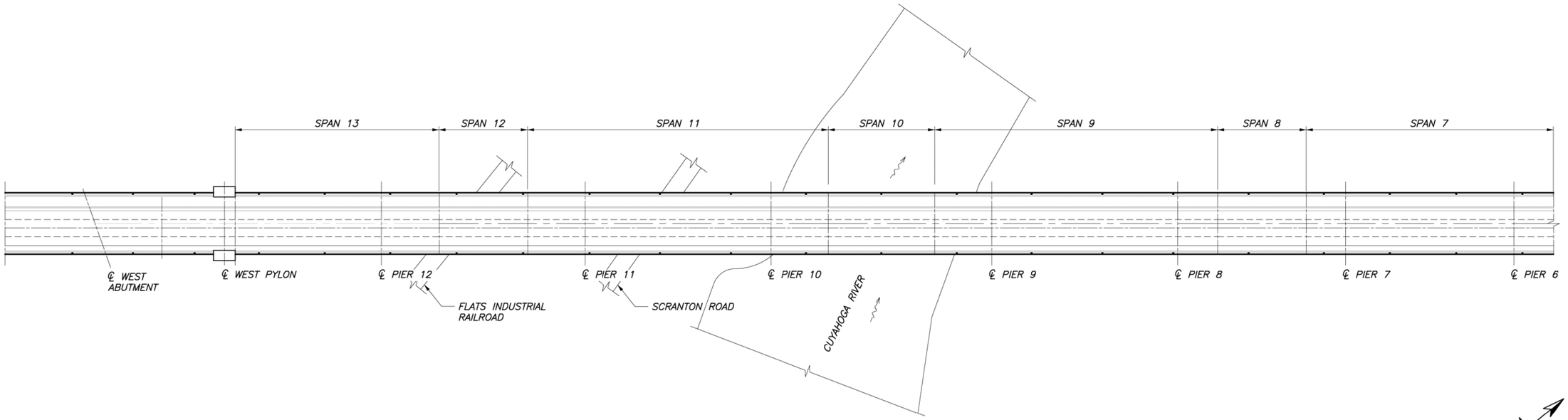
Condition and Element Rating Guidelines

The table below contains the bridge inspection rating matrix established by the Federal Highway Administration (FHWA), using a 0-Failure through 9-Excellent scale, and used by the Ohio Department of Transportation (ODOT). In this report, component conditions will generally be discussed based on the ODOT rating guidelines for individual components, 1-Good through 4-Critical.

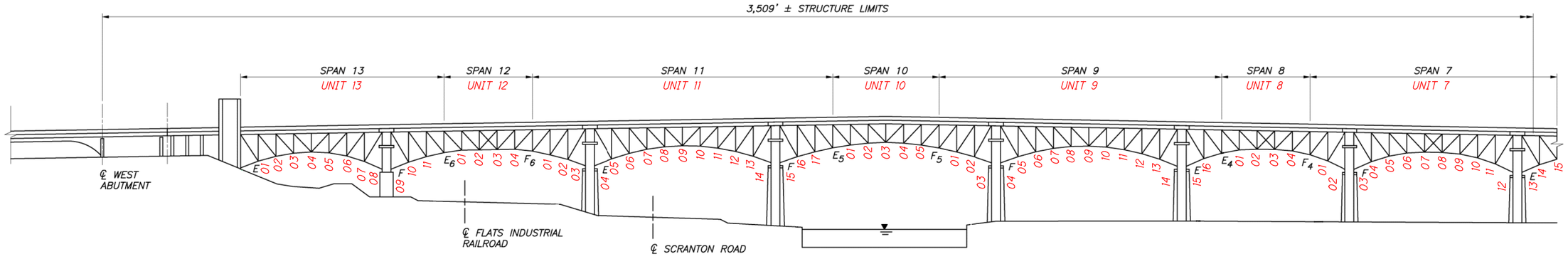
The General Appraisal, the Deck, Superstructure, Substructure, Channel and Approach Summaries, and the Protective Coating System rating will follow the NBIS/ODOT 0 through 9 rating guidelines.

Individual Items (ODOT)	Summary Items (NBIS)	Condition	Defect
1 GOOD	9	Excellent	Excellent condition.
	8	Very Good	No problems noted.
	7	Good	Some minor problems
2 FAIR	6	Satisfactory	Structural elements show some minor deterioration.
	5	Fair	All primary structural elements are sound but may have minor section loss, cracking, spalling, or scour.
3 POOR	4	Poor	Advanced section loss, deterioration, spalling, or scour.
	3	Serious	Loss of section, deterioration, spalling or scour has seriously affected primary structural components. Local failures are possible. Fatigue cracks in steel or shear cracks in concrete may be present.
4 CRITICAL	2	Critical	Advanced deterioration of primary structural elements, Fatigue cracks in steel or shear cracks in concrete may be present or scour may have removed substructure report. Unless closely monitored it may be necessary to close the bridge until corrective action is taken.
	1	"Imminent Failure"	Major deterioration or section loss present in critical structural components or obvious vertical or horizontal movement affecting structure stability. Bridge is closed to traffic but corrective action may be put it back in light service.
	0	Failed	Out of service – beyond corrective action.

Manual of Bridge inspection, Ohio Department of Transportation (ODOT), 2014
Bridge Inspector's Reference Manual, Federal Highway Administration (FHWA), 2015
Manual for Condition Evaluation of Bridges, 2nd Edition, AASHTO, 2010 (rev 2011)
National Bridge Inspection Standards, U.S. Department of Transportation, 2004
Inspection of Fracture Critical Bridge Members, U.S. Department of Transportation, 1986



PLAN



SOUTH ELEVATION

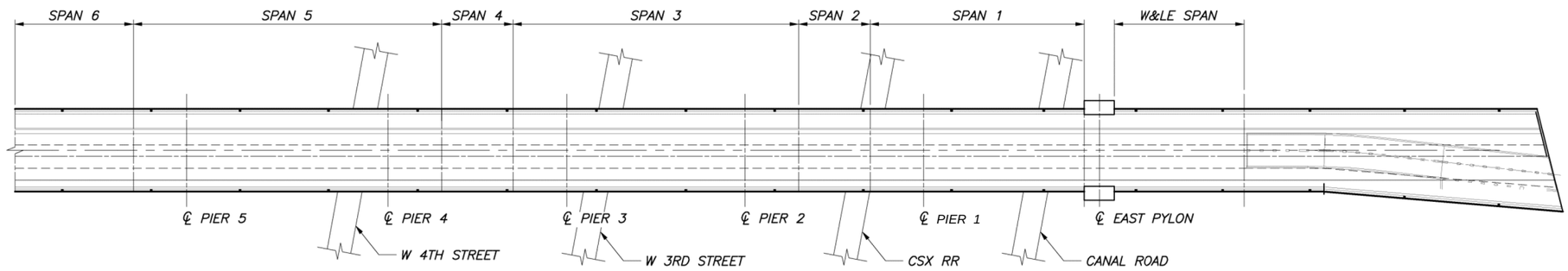
LEGEND

F = FIXED BEARING/HINGE
E = EXPANSION BEARING/HINGE

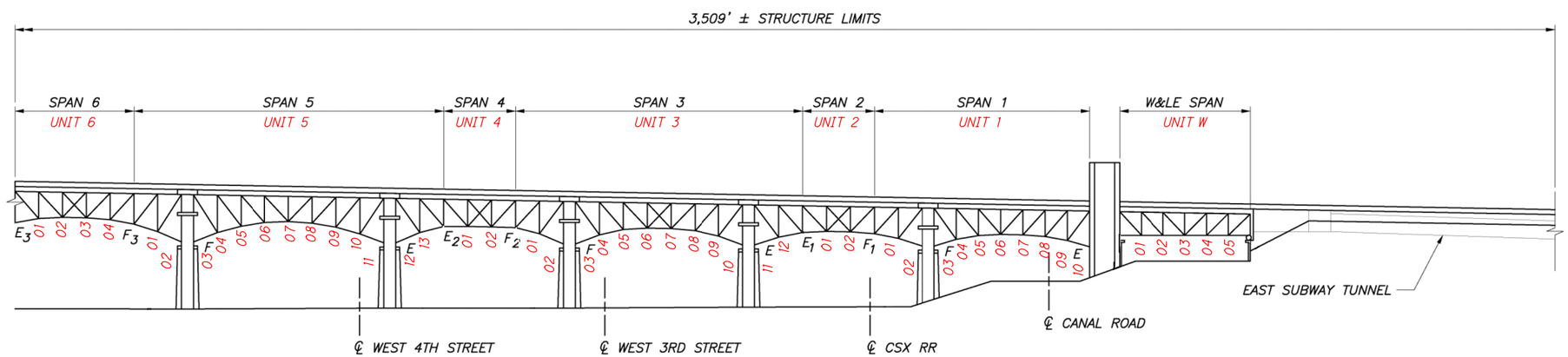
NOTE

SPANS AND PIERS ARE NUMBERED EAST TO WEST IN ORDER TO REMAIN CONSISTENT WITH ORIGINAL CONSTRUCTION AND REHABILITATION DRAWINGS.

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION PAGE A - 1



PLAN



SOUTH ELEVATION

LEGEND

F = FIXED BEARING/HINGE
E = EXPANSION BEARING/HINGE

NOTE

SPANS AND PIERS ARE NUMBERED EAST TO WEST IN ORDER TO REMAIN CONSISTENT WITH ORIGINAL CONSTRUCTION AND REHABILITATION DRAWINGS.

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION PAGE A - 2

Inspection Findings:

Item N58 – Deck (6, Satisfactory Condition)

The deck is in overall ***satisfactory*** condition, a rating of a 6 on the NBIS condition rating guidelines.

The deck findings and summary of deck conditions for individual deck items are as follows:

Item 7.1 – Floor (5, Fair Condition)
The deck floor is in overall ***Fair*** condition. The underside of the deck has random spalling with exposed rebar, areas of delaminations, and cracking with efflorescence noted throughout (Photos 1 and 2). Heavier concrete deterioration is noted near the joints and scuppers. Many of the previous spalls appear to have been coated with rust inhibitor but areas still exhibit active corrosion. Netting or wood form boards are in place over the roadway and parking lots to catch loose concrete from falling. The underside of the East approach tunnel deck has large spalled areas in all bays with several consecutive transverse bars exposed and broken.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
263,774 SF	240,800 SF	12,000 SF	12,000 SF		

Item 7.2 – Edge of Floor (7, Good Condition)
The edge of floor is in overall ***Good*** condition. The edge of the deck has a few isolated spalls throughout with minor cracking adjacent to expansion joints and floorbeam extensions.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
6,415 LF	6,094 LF	321 LF			

Item 8– Wearing Surface (7, Good Condition)
The concrete wearing surface is in ***Good*** condition. There are no significant defects noted (Photo 3).

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
178,959 SF	178,959 SF				

The lower deck wearing surface is not considered in this quantity. Random areas of delaminated concrete with a few areas of spalling were noted throughout (Photo 4). Since the lower deck is not open to the public and does not present a public safety concern, it was not considered with the rating.

Item 9 – Curb/Sidewalk (6, Satisfactory Condition)
The concrete curb and sidewalk are in ***Satisfactory*** condition. The North walk has been previously

repaired at the expansion joints. Both walks have minimal areas of delamination or light cracking with moisture. The South walk shows more deterioration and has vegetation growing in many of the cracked areas adjacent to the curb.

Component	Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
Curb/Sidewalk	7,018 LF	6,948 LF	70 LF			

Item 11 – Railing (5, Fair Condition)
The concrete median and railings are in ***Fair*** condition. The lower 2/3 of the concrete railing exhibits cracking, a few random small delaminations and corrosion staining throughout (Photo 6). The bikeway railing is in good condition with a few minor deteriorated areas throughout.

Component	Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
Railing	7,018 LF	1,404 LF	5,614 LF			

Item 12 – Drainage (7, Good Condition)
The deck drainage is in ***Good*** condition. There is minor debris in the deck scuppers and some isolated surface corrosion below the deck in the drainage downspouts.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
28 EA	27 EA		1 EA		

Item 13 – Expansion Joints (6, Satisfactory Condition)
The expansion joints are in ***Satisfactory*** condition. The majority of the joint armor is in good condition and level with the wearing surface, but there is evidence of leakage through the joint membranes (Photo 7). Minor debris accumulation was also noted throughout the joints, but does not appear to be affecting the serviceability.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
1,494 LF	1,419 LF	75 LF			

Deck deficiencies and specific locations are noted in the following table:

Deck Deficiencies and Locations				
Main Unit	**Secondary Unit**	**Span**	**Note**	**Photo**
Sidewalk	South Side	1	18' L x up to 1/4" W longitudinal crack with associated minor edge spalling in the sidewalk	5
Expansion Joint	Upper Deck Joint	3	The South end of the joint at Panel Point 13 is damaged/deboned with hanging material.	8
Bridge Railing	North Rail	8	Surface spalling along the top of the railing, just East of joint.	
Sidewalk	North sidewalk	9	There is hairline transverse cracking.	

Item N59 – Superstructure (4, Poor Condition)

The superstructure is overall ***Poor*** condition, or 4 on the NBIS condition rating guidelines (Photos 9 and 10).

The superstructure findings and summary of conditions for individual items are as follows:

Item 14 – Alignment of Members (1, Good Condition)
The alignment of the primary superstructure members is ***Good***.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
17 EA	17 EA				1.00

Item 15.1 Beams/Girders (7, Good Condition)
The beams that are part of the West approach superstructure are in overall ***Good***. No significant defects were noted (Photo 11).

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
1,207 LF	1,207 LF				

Item 16 – Diaphragms or Cross Frames (7, Good Condition)
The cross frames that are part of the West approach superstructure are in ***Good*** condition. No significant defects were noted.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
55 EA	55 EA				

Item 17 – Stringers (5, Fair Condition)
The stringers are in ***Fair*** condition. There are isolated areas of corrosion at the floorbeam connections. Some of these locations have minor web loss in areas and isolated through holes

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
36,709 LF	33,038 LF	3,671			

Item 18 – Floorbeams and Floorbeam Connections (6, Satisfactory Condition)
The floorbeams and floorbeam connections are in overall ***Satisfactory*** condition. There is minor section loss and surface corrosion along the floorbeams below the deck joint locations.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
11,218 LF	10,318 LF	900 LF			

Item 19 – Truss Vertical (6, Satisfactory Condition)
The truss verticals are in ***Satisfactory*** condition. The verticals are generally in good condition, with the verticals below the deck joint locations having moderate painted over pitting and reactivating corrosion throughout the full height.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
529 EA	501 EA	28 EA			

Item 20 – Truss Diagonals (6, Satisfactory Condition)
The truss diagonals are in ***Satisfactory*** condition. The diagonals are generally in good condition. Areas of active pack rust along the exterior angles of the North Exterior Truss and South Exterior Truss diagonal members. Exterior diagonals, adjacent to abandoned utility supports, have remnants of a bracket welded to the web plates. Elsewhere, several diagonals have lower stay plates with deep section losses or perforations.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
506 EA	481 EA	25 EA			

Item 21 – Truss Upper Chord (7, Good Condition)
The truss upper chords are in overall ***Good*** condition. Junction box drains drip onto the upper chord members and are causing light corrosion to several exterior upper chord members. Below the expansion joints there is dirt and construction debris present inside some upper chord connections with the verticals.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
522 EA	512 EA	10 EA			

Item 22 – Truss Lower Chord (4, Poor Condition)
The truss lower chords are in ***Poor*** condition. Various degrees of sections loss and pack rust are located between the flange angles and the web plates. Portions of the flange angles and webs of the exterior lower chords have pockets of deep pitting or perforations. The greatest section loss generally is located in Spans 11 and 13. In these spans, twelve (12) lower chord members have between 5% and 22% net section loss as previously reported by the 2014 inspection report. The lower chord in spans 12 and 13 have members that are also cracked in the flange angles.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
522 EA	465 EA	52 EA	5 EA		

Item 23 – Truss Gusset Plates (4, Poor Condition)
The truss gusset plates are in ***Poor*** condition. The truss gusset plates below the deck joints exhibit the most distress. Section loss is most prevalent at these locations. A previously documented laminar tear in the South gusset at Unit 7 lower chord Panel Point 7 shows no growth. Advanced section loss commonly occurs just above the lower chord and along the edges and ends of the diagonal connections. Also, minor bows are noted along the free edges of the gussets due to pack rust. The upper chord gusset plates are in good condition with little corrosion observed. Areas of heavy corrosion occur below the deck expansion joints. The gussets at the upper chord floorbeam connections below the junction box drains are also pitted.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
2,116 EA	1,840 EA	199 EA	76 EA	1 EA	

Item 24 – Lateral Bracing (6, Satisfactory Condition)
The lateral bracing is in ***Satisfactory*** condition. Many of the lateral bracing gussets have minor section loss and pack rust causing their corners to peel away from the lateral bracing members. This was most prevalent below the deck joints. The members themselves are in Good condition.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
240 EA	228 EA	12 EA			

Item 25 – Sway Bracing (7, Good Condition)
The sway bracing is in ***Good*** condition. Minor pack rust and corrosion is noted at the connections to the verticals below the deck joints.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
202 EA	200 EA	2 EA			

Item 26 – Bearing Devices (5, Fair Condition)
The bearings are in ***Fair*** condition. Moderate surface corrosion with areas of section loss is noted around the pins. There is debris and water accumulation in some of the truss bearings.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
164 EA		164 EA			

The bearings for the lower deck are not considered in this quantity. The majority of these bearings are out of alignment and have notable section loss. The bearings appear to be frozen at some location, causing some of the bearings to be in contraction and some to be in expansion at the same panel point. A few of the bearings are extended past their limits. All lower deck bearings at expansion joints should be reset or repaired. Since the lower deck is not open to the public and does not present a public safety concern, these bearing were not considered with the rating.

Item 30 – Protective Coating System (5, Fair Condition)
The protective coating system (PCS) is in ***Fair*** condition (Photo 12). An estimated 60% of the PCS quantity is in Good condition. 20% is in Fair, and the remainder is in Poor condition. There are scattered areas of peeling and bubbling, especially at expansion joints where water infiltration and active corrosion is occurring. There are several areas on the superstructure with active pack rust between gussets, web plates, angles, and lacing, with the worst areas noted below or downstream of the deck joints.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
60,961 LF	36,577 LF	12,192 LF	12,192 LF		

Item 31 – Pins, Hangers and Hinges (5, Fair Condition)
The pins, hangers and hinges are in ***Fair*** condition. Minor section loss is noted to the pins and the adjacent plates. The South Interior Truss line pin to zero-force member is dislodged at Unit 13, lower chord, Panel Point 12. This is connected to a zero-force member and is not considered with the rating of

the pin, however, it should be monitored, and repaired.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
192 EA		192 EA			

Item 32 – Fatigue Prone Details (7, Good Condition)
The fatigue prone details are in ***Good*** condition. No fatigue distress was noted at any of the field tack welded utility or drainage attachments.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
60,691 LF	60,961 LF				

Superstructure deficiencies and specific locations are noted in the following tables:

Superstructure Deficiencies and Locations			
Span	**Member**	**Note**	**Photo**
1	Verticals	North Exterior Truss L10-U10 - 50% section loss to the outstanding legs of the East flange angles and up to 100% section loss at the ends of the angles at L10	
1	Verticals	South Interior Truss L10-U10 - Deep pitting up to full height along both sides of the webs	
3	Gusset plates	South Exterior Truss L13 - Heavy pitting and corrosion due to the leaking joint above	
3	Upper chord	South Exterior Truss U13 - Below the leaking deck joint, heavy surface corrosion with corrosion holes	
5	Gusset Plates	South Interior Truss L14 - Lower chord gusset plate has heavy painted over section loss.	
7	Gusset Plates	South Interior Truss L7 - South lower chord gusset plate has a 10-1/2" H x up to 1” W laminar tear	13
Spans 7, 9, 11, 13	Lower Chord	Interior lower chords – Three (3) panel points extending from each pier have up to 2" T pack rust between the upper flange angles	14
11	Lower Chord	Deep pitting and sections of perforations throughout the bottoms of the webs and bottom flange angles	
12	Lower Chord	South Exterior Truss L3-L4 at L3 - 23" L longitudinal crack in the top North flange angle.	15

Superstructure Deficiencies and Locations			
Span	**Member**	**Note**	**Photo**
12	Lower Chord	South Interior Truss at L3 - Possible 35" L crack in the bottom North flange angle.	16
12	Lower Chord	North Interior Truss at L2 - Approximately 7'-3" L crack with arrestor holes drilled at either end in the bottom South flange angle.	
12	Lower Chord	North Interior Truss at L3 - Approximately 6'-4" L crack with arrestor holes drilled at either end in the bottom South flange angle.	
12	Lower Chord	North Interior Truss at L4 - Approximately 30" L crack with an arrestor hole drilled at the West end in the bottom South flange angle.	17
13	Lower Chord	Deep pitting and sections of perforations throughout the bottoms of the webs and bottom flange angles	18
13	Lower Chord	South Interior Truss at L12 - The pin for the zero-force member is dislodged. South end of the pin no longer extends through south pin plate due to 2-1/2" T pack rust between South web for lower chord and South vertical gusset plate.	

Item N60 – Substructure (6, Satisfactory Condition)

The substructure is in overall ***Satisfactory*** condition, or 6 on the NBIS condition rating guidelines (Photos 19 through 22).

The substructure findings and summary of conditions for individual items are as follows:

Item 33 – Abutment Walls (7, Good Condition)
The abutment walls are in overall ***Good*** condition. There is minimal staining and hairline cracks in the abutment faces.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
171 LF	151 LF	20 LF			

Item 36 – Pier Walls (6, Satisfactory Condition)
The Pier walls are in ***Satisfactory*** condition. Minor cracking, staining, and previously patched areas are noted throughout.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
166 LF	124 LF	42 LF			

Item 37 – Pier Caps (5, Fair Condition)
The Pier caps are in ***Fair*** condition. The nonstructural portions of the pier towers were not considered in the rating but are in poor condition and pose a risk to public safety as they continue to deteriorate. Many of the pier tower roofs have been removed, but those that remain show active degradation with debris accumulating on the pier cap below. The inspection manholes in the pier caps are in poor condition. There is little remaining lip to support the lid and care should be taken when walking around or opening them.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
1,079 LF	539 LF	540 LF			

Item 38 – Pier Columns/Bents (7, Good Condition)
The pier columns are in ***Good*** condition with minor areas of staining, cracking, or delamination concentrated around previously patched areas.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
70 EA	65 EA	5 EA			

Item 39 – Backwalls (5, Fair Condition)
The backwalls are in ***Fair*** condition. Cracking and spalling is noted in some of the backwalls.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
171 LF	120 LF	34 LF	17 LF		

Item 40 – Wingwalls (7, Good Condition)
The wingwalls are in ***Good*** condition with scattered areas of light efflorescence staining.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
4 EA	4 EA				

Item 42 – Scour (7, Good Condition)
The scour is in ***Good*** condition.
The bridge had an underwater bridge inspection on July 14, 2015 by GPI. They found a change in the

exposure of the footing at Pier 10 (West Pier), Column D, where the exposure of the footing has advanced since the 2010 underwater inspection. “The maximum vertical exposure was measured to be 3.7 feet. 9.5 horizontal feet of footing are exposed along the South side and 18 horizontal feet are exposed on the East face of the footer.” No change significant change was noted at other locations. Pier 9 (East Pier), Column A exhibited less exposure to the footing. Timber debris is still lodged at the Northeast corner of Pier 10.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
2 EA	2 EA				

Item 43 – Slope Protection (7, Good Condition)
The concrete slope protection is in ***Good*** condition.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
1 EA	1 EA				

Substructure deficiencies and specific locations are noted in the following table:

Location	Member	Note	Photo
All piers	Pier caps	General Note - The underside of the pier caps is deteriorated with delaminations and spalling. The majority of the spalling has exposed reinforcing.	23
All piers	Access hatches	General Note - The access manholes in the pier caps are in poor condition with the lips heavily deteriorated.	
East pylon	Backwall	The backwall has a 12' H x up to 12" W spall/delamination behind the North Exterior Truss	24
Pier 4	Pier walls	The East and West faces of Pier 4 have large painted over spalls with exposed reinforcing along the top behind the truss lines.	25
Pier 8	Pier columns	A rebar cage has been added to the 2' x 3' opening in the West face of the North Column. The hole has been filled with trash	

Item N61 – Channel (4, Poor Condition)

The channel is in ***Poor*** condition, or a 4 on the NBIS condition rating guidelines.

The channel findings and summary of conditions for individual items are as follows:

Item 51 – Alignment (5, Fair Condition)
The alignment is in ***Fair*** condition. Water is flowing along the Southern most three columns of Pier 10 and the Northern most column of Pier 9. The channel meanders sharply.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
200 LF		200 LF			

Item 52 – Protection (4, Poor Condition)
The channel protection is in ***Poor*** condition. The West bank channel protection is in Good condition and the East bank channel protection is in Poor condition.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
200 LF	100 LF		100 LF		

Item 53 – Hydraulic Opening (8, Very Good Condition)
The hydraulic opening is in ***Very Good*** condition. The hydraulic opening is sufficient.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
2 EA	2 EA				

Item 54 – Navigation Lights (4, Poor Condition)
The navigation lights are in ***Poor*** condition. One of the navigation lights appears to be operating. The remainder appear to be without power or the bulbs are burned out.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
6 EA	1 EA			5 EA	

Channel deficiencies and specific locations are noted in the following table:

Location	Channel	Note	Photo
Pier 9	Protection	The bulkhead has failed along the East bank	26

Sign/Utility Items

Item 55 – Signs (7, Good Condition)
The 15 signs on the structure are in ***Good*** condition. The two speed limit signs facing West bound traffic are mounted to light poles behind the new bike path and bike path railing with limited visibility.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
15 EA	15 EA				

Item 56 – Utilities (4, Poor Condition)
The utilities are in ***Poor*** condition. The gas main appears recently rehabilitated with new pedestals, rollers, and restraints along the full length of the lower deck (Photo 27). The PVC telecom conduits are damaged, and cables are exposed, especially in the East approach tunnel (Photo 28). The telecom structural supports, sheds, and corrugated roofs/walls are heavily corroded. Many steel pieces are hanging or have fallen on to the utility deck below. Only six (6) street lights were found nonoperational. The architectural lighting is not considered as part of the rating. Concrete debris has filled the upward facing lighting which shines on the West face of the Southeast pylon. Lighting at both East pylons is nonoperational as are half the lights at the West pylons.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
9,054 LF	6,036 LF	3,018 LF			

Sign/Utility deficiencies and specific locations are noted in the following table:

Location	Secondary Unit	Note	Photo
All spans	Junction boxes	General Note - The junction boxes between the decks typically have larger sections of corrosion and deterioration	
All spans	Telecom conduits	General Note - The PVC telecom conduits are damaged with areas of broken and/or missing pipe sections in random areas throughout. The most severe damage is noted in the East Tunnel.	29
Pier 2	Light poles	The previously noted light pole with spalling along the South side has been removed.	
Span 10	Navigation Lights	General Note – One (1) channel navigation light is working	
Pier 10	Navigation electric	There is a small open electrical box along the lower deck catwalk at the North column	

Item 6 – Approaches Summary (7, Good Condition)

The approaches are in ***Good*** condition, or a 7 on the NBIS condition rating guidelines.

The approach findings and summary of conditions for individual items are as follows:

Item 1 – Approach Wearing Surface (6, Satisfactory Condition)
The approach wearing surfaces are in ***Satisfactory*** condition. The east approach pavement is in Good condition and the west approach pavement is in satisfactory condition with about 20% spalls, patches, or cracks.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
2 EA	1 EA	1 EA			

Item 2 – Approach Slabs (7, Good Condition)
The approach slabs are in ***Good*** condition. The approach slabs are in Good condition with no signs of settlement or shifting. Due to surface deficiencies within the West approach, 5% of the total 2075 square feet of approach slab was rated a 2.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
2,075 SF	1,971 SF	104 SF			

Item 4 – Embankment (7, Good Condition)
The approach embankments are in ***Good*** condition. Embankments are starting to show signs of erosion.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
4 EA	4 EA				

Item 5 –Guardrail (6, Satisfactory Condition)
The approach guardrails are in ***Satisfactory*** condition. The concrete guardrail that extends off all four corners of the bridge exhibits minor surface spalling and staining particularly concentrated in the lower third of the interior faces.

Total Quantity	CS 1	CS 2	CS 3	CS 4	Transition Rating
4 EA		4 EA			

Approach deficiencies and specific locations are noted in the following table:

Approach	Member	Note	Photo
East	Wearing Surface	Typical map cracking throughout	
East	East Tunnel Subway	East approach tunnel has large spalled areas with exposed rebar in all bays	30
West	Wearing Surface	The pavement has spalling, cracking and bituminous patching over 20% of the pavement	31
Pier 1		The embankment at Pier 1 is steep and encroaching into the gravel lot on the East side of the pier	
Span 3		There are several slope depressions throughout	
Pier 4	Catch basin	The South catch basin is completely clogged	
Pier 6	Access hatches	There is an open manhole near the South column on the West face.	32

Security Items

There are numerous areas of easy access for non-bridge personnel to enter the lower level.

Recommendations

The Hope Memorial/Lorain Carnegie Bridge over the Cuyahoga River is in overall Fair condition, or 5 on the NBIS rating guideline. The substructure components are the governing element for this condition rating.

Immediate:

- Repair and clean areas of the deteriorated substructure concrete
- Replace and/or repair the concrete railings
- Repair areas of leaking and dislodge joint materials
- Secure all access points to the bridge lower level
- Spot paint areas of active corrosion along the truss spans
- Repair areas of section loss to the truss gusset members.
- Reset the dislodged pin at the South Interior Truss, Panel Point L12.
- Repair the access manholes in the pier caps.
- Repair the East bank channel protection and bulkhead.
- Fix the areas of broken and deteriorated utility supports.
- Replace corroded junction boxes.
- Replace and/or repair the navigation lights
- Patch the spalling within the East Approach Tunnel
- Replace the missing manhole cover at Pier 6, West face.

- Monitor areas of fatigue cracking and fatigue crack repairs during future inspections.

Photos

Deck Photos

Photo 1 - Typical upper and lower deck soffits

Photo 2 - Typical underside of deck spalling with exposed rebar and delaminations

Photo 3 – Typical wearing surface condition

Photo 4 – Typical lower deck wearing surface; Cracking and delaminations with isolated spalling

Photo 5 - South sidewalk; 18' L x up to 1/4" W longitudinal crack with associated minor edge spalling

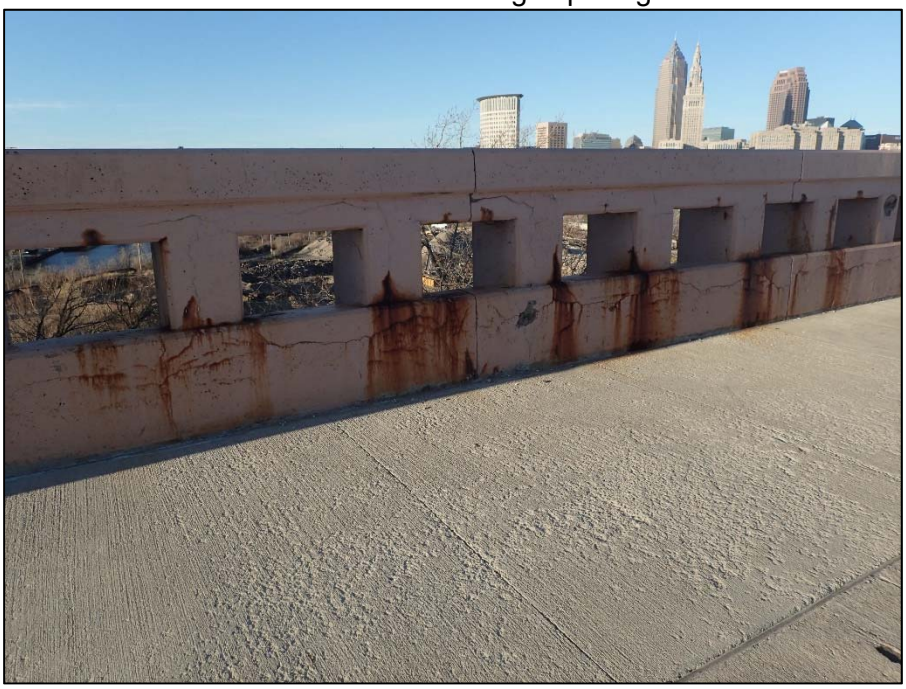


Photo 6 – Typical bridge rail condition

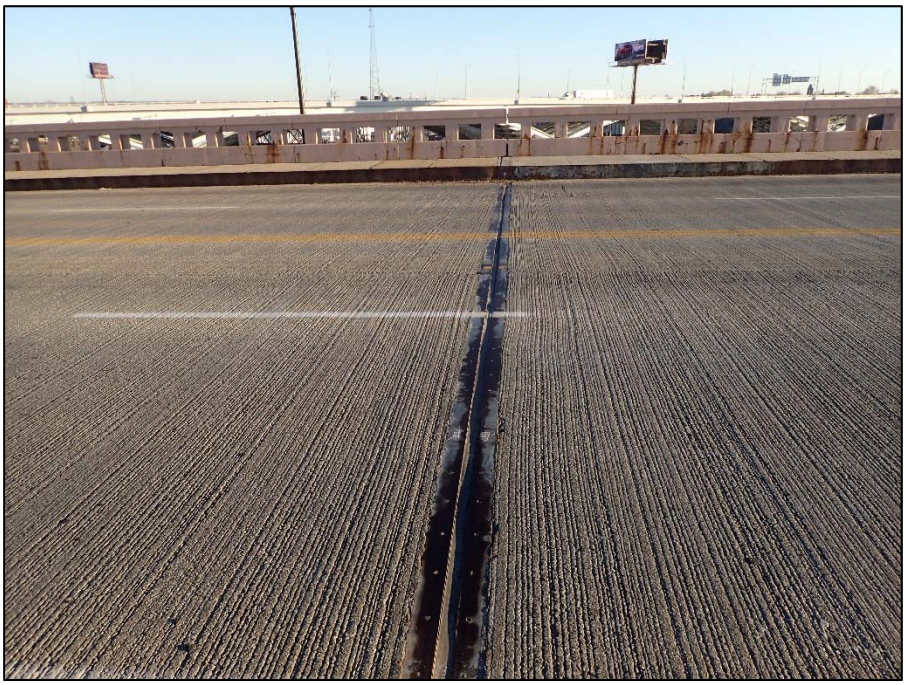


Photo 7 – Typical expansion joint condition

Photo 8 – Span 3 at panel point 13, South end of the joint; damaged/deboned with hanging material

Superstructure Photos

Photo 9 – Typical superstructure condition

Photo 10 – Typical truss condition

Photo 11 – Typical West approach superstructure

Photo 12 – Typical paint condition at panel points

Photo 13 - South Interior Truss, L7; South lower chord gusset plate has a 10-1/2" H x up to 1” W laminar tear

Photo 14 - Span 9 Interior lower chords; Up to 2" T pack rust between the upper flange angles

Photo 15 - Span 12, South Exterior Truss L3-L4 at L3; 23" L longitudinal crack in the top North flange angle

Photo 16 – Span 12, South Interior Truss at L3; Possible 35" L crack in the bottom North flange angle

Photo 17 – Span 12, North Interior Truss at L4; Approximately 30" L crack with an arrestor hole drilled at the West end in the bottom South flange angle.

Photo 18 – Span 13; Typical lower chord section loss with perforations

Substructure Photos

Photo 19 – East Abutment typical condition

Photo 20 – East Pylon, Eat face; Typical condition

Photo 21 – Pier typical condition

Photo 22 – West Abutment typical condition

Photo 23 – Underside of Pier 12 cap, Typical condition

Photo 24 – East pylon backwall has a 12' H x up to 12" W spall/delamination behind the North Exterior Truss

Photo 25 – West faces of Pier 4 have large painted over spalls with exposed reinforcing along the top behind the South truss line

Photo 26 – Pier 9 bulkhead has failed along the East bank

Sign / Utility Photos

Photo 27 – Typical gas line on lower deck

Photo 28 – Typical Telecom conduits

Photo 29 – Span 13, damaged area of conduit

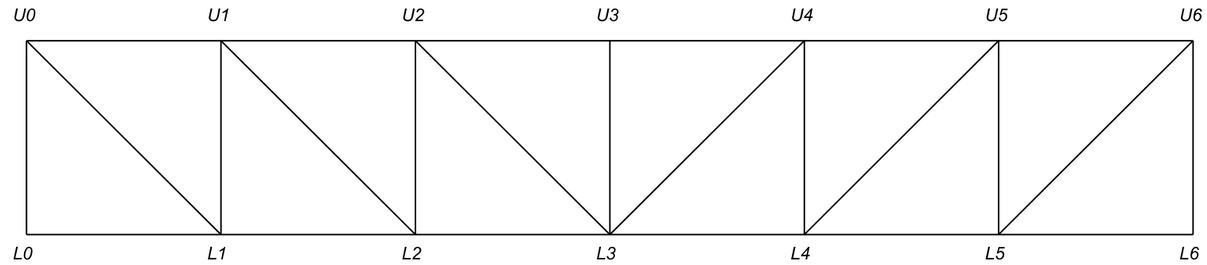
Approach Photos

Photo 30 – East approach tunnel has large spalled areas with exposed rebar in all bays

Photo 31 – West approach pavement has spalling, cracking and bituminous patching over 20% of the pavement

Photo 32 – Embankment on West face of Pier 6 has an open manhole

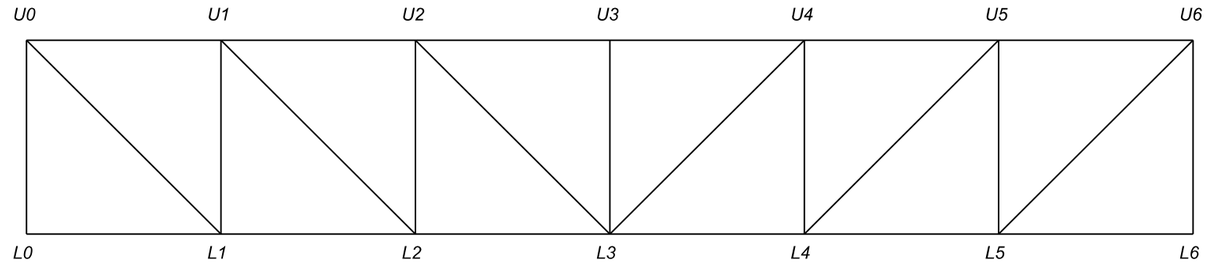
TRUSS SPAN CADD DRAWINGS AND DEFICIENCIES



EAST PYLON

NORTH EXTERIOR TRUSS
SOUTH ELEVATION

EAST ABUTMENT

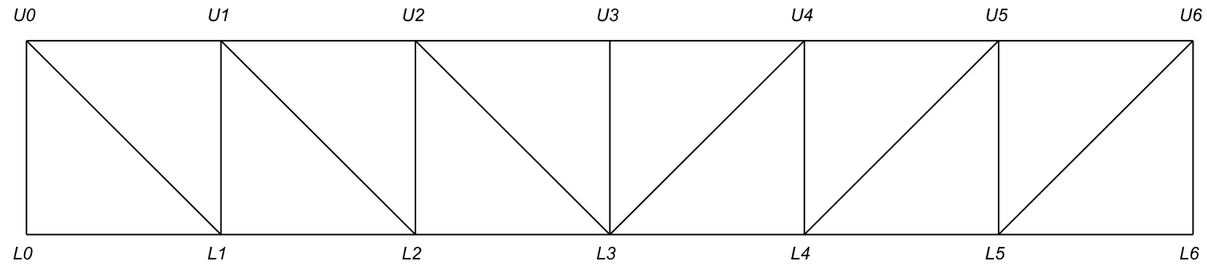


EAST PYLON

NORTH INTERIOR TRUSS
SOUTH ELEVATION

EAST ABUTMENT

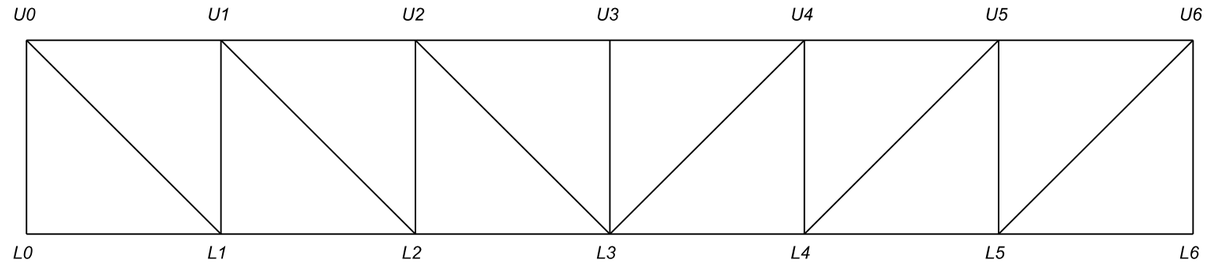
GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - W & LE SPAN / PAGE A - 3



EAST PYLON

SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

EAST ABUTMENT

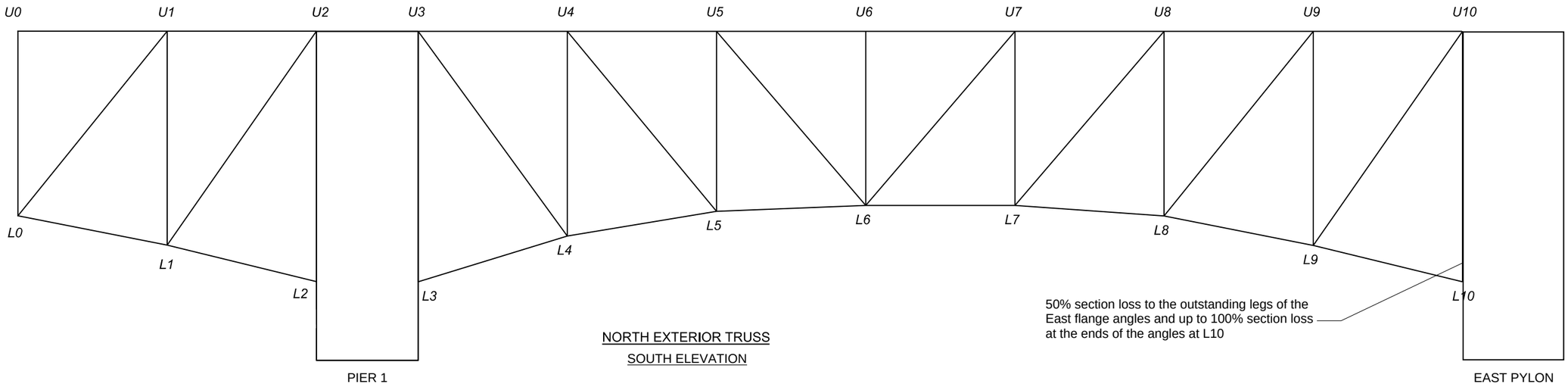


EAST PYLON

SOUTH INTERIOR TRUSS
SOUTH ELEVATION

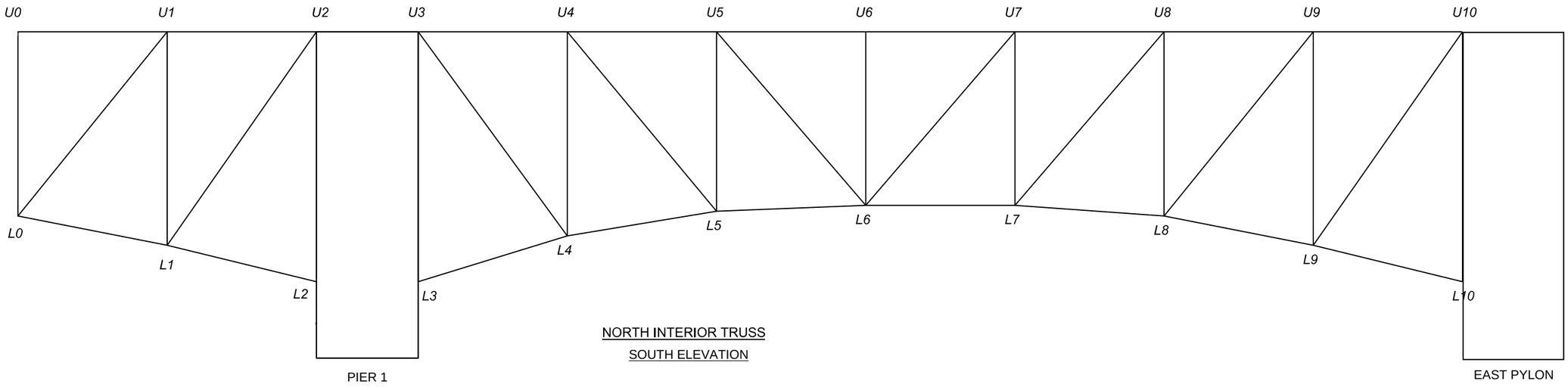
EAST ABUTMENT

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION - W & LE SPAN PAGE A - 4



NORTH EXTERIOR TRUSS

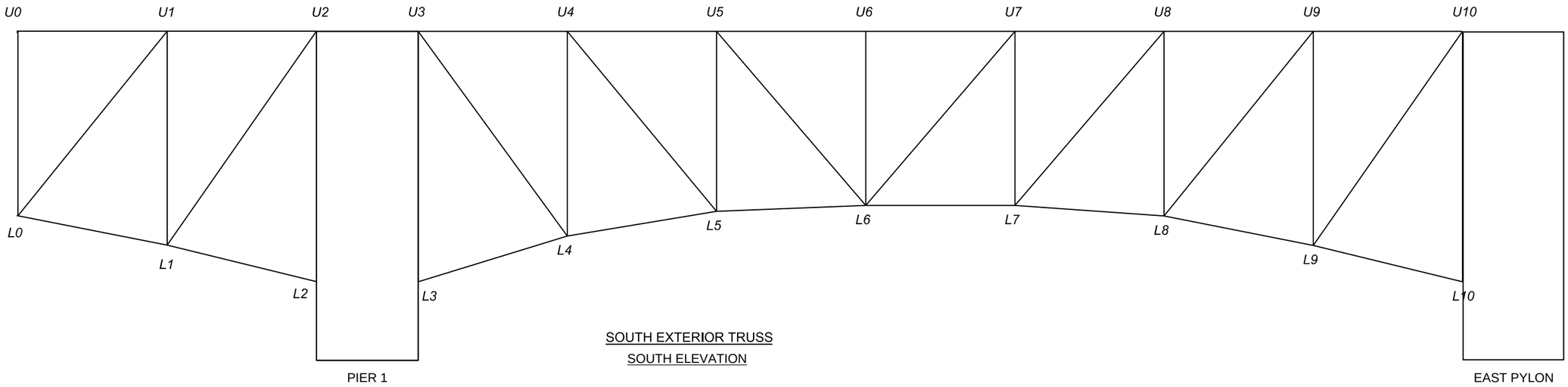
SOUTH ELEVATION



NORTH INTERIOR TRUSS

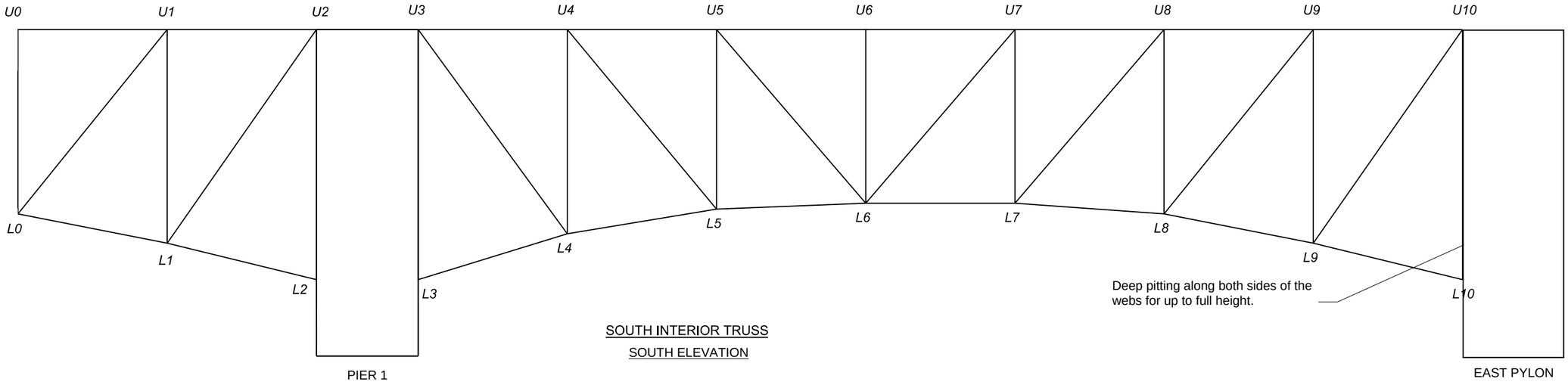
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way, Suite 200, Cincinnati, OH 45241, PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 1 / PAGE A - 5



SOUTH EXTERIOR TRUSS

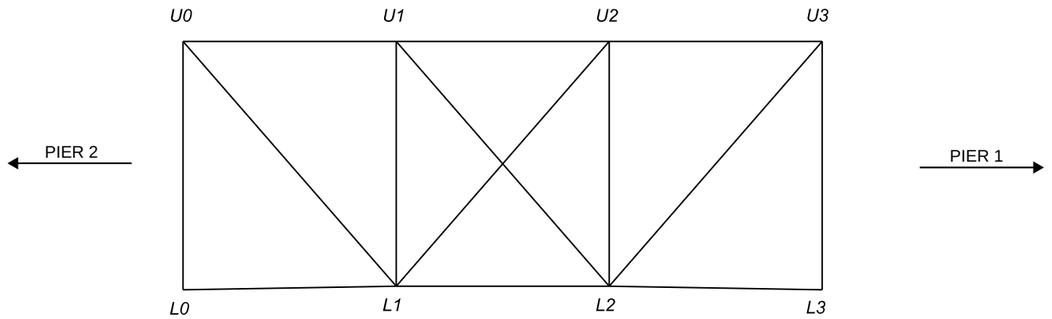
SOUTH ELEVATION



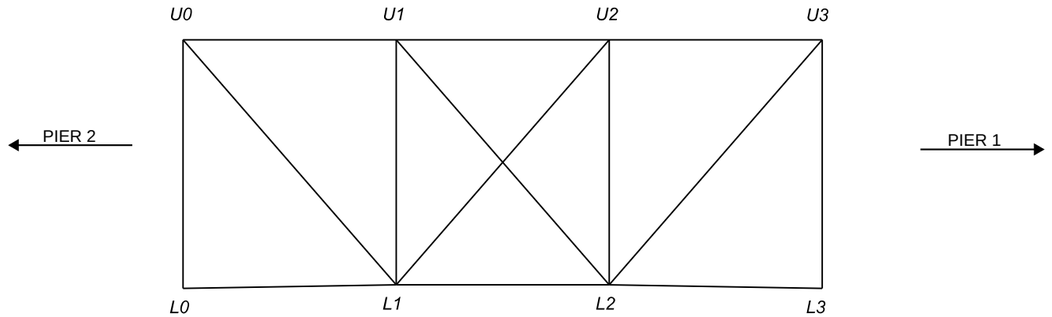
SOUTH INTERIOR TRUSS

SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way, Suite 200, Cincinnati, OH 45241, PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 1 / PAGE A - 6

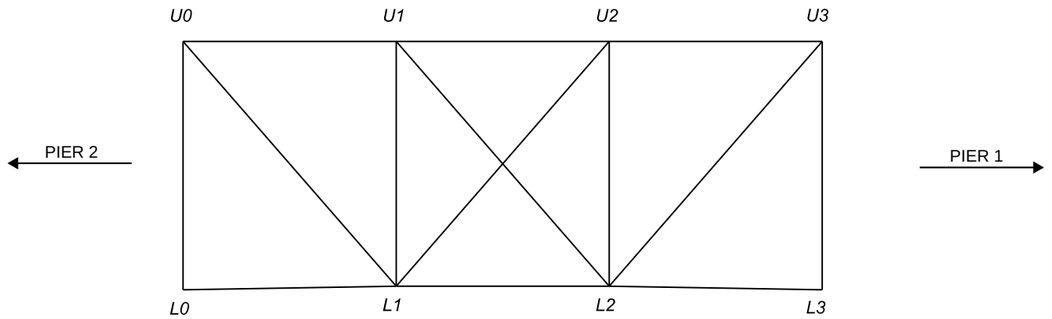


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

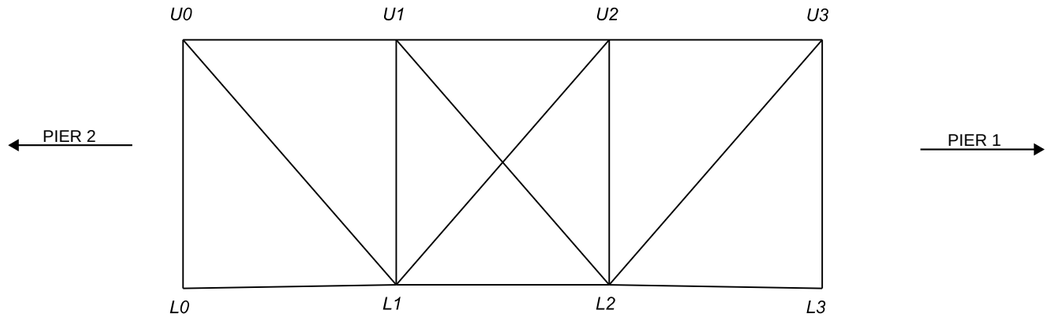


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 2	PAGE A - 7

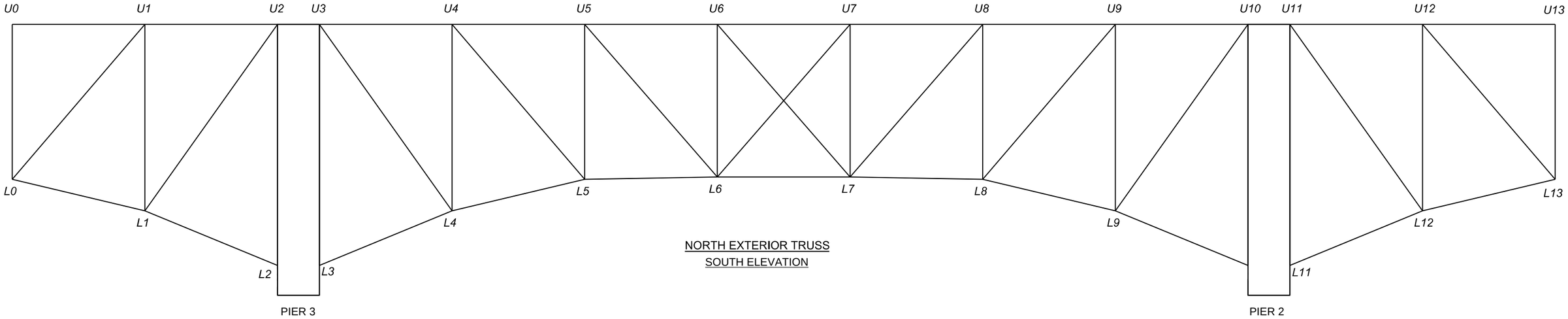


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

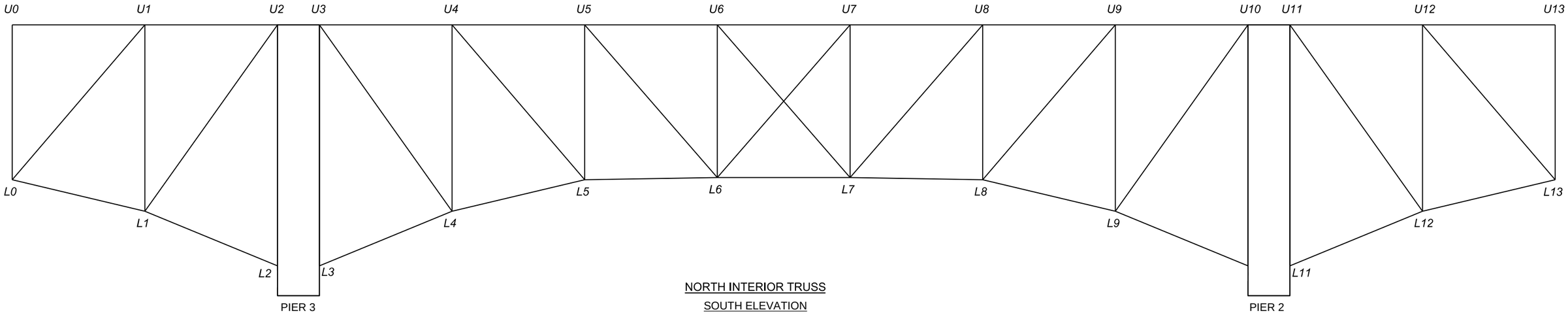


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 2	PAGE A - 8

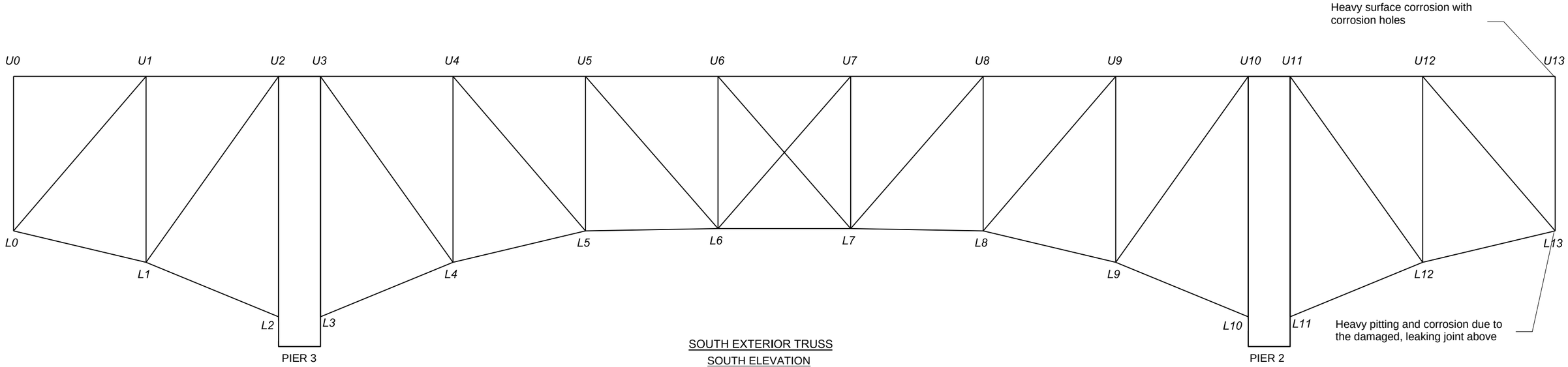


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

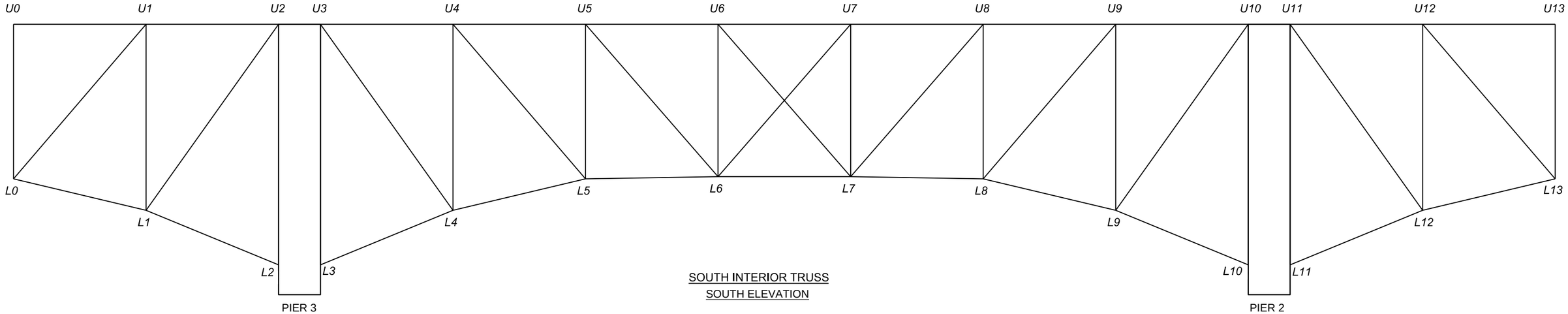


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 3	PAGE A - 9

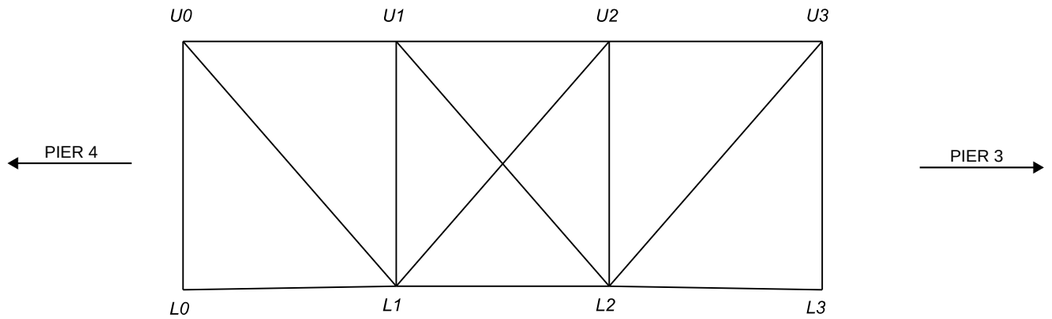


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

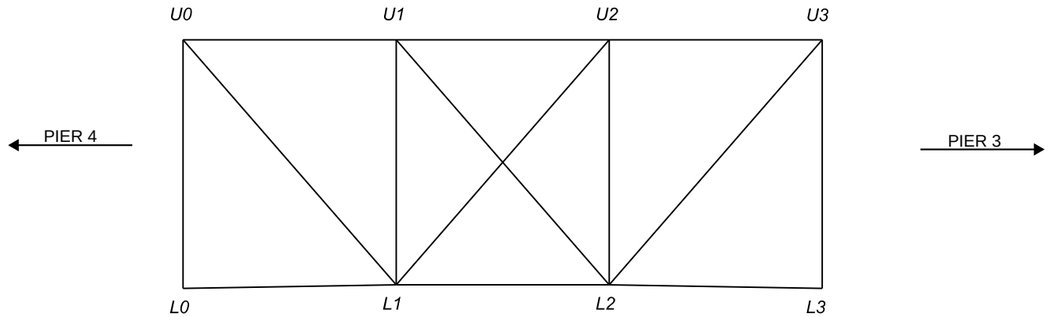


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION - SPAN 3

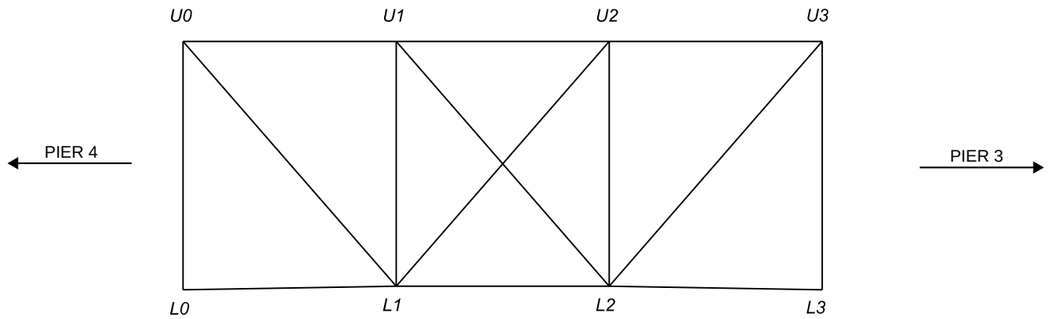


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

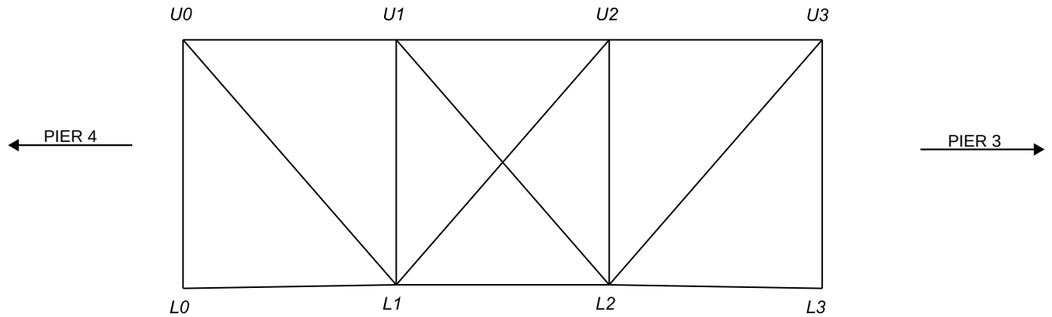


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 4	PAGE A - 11

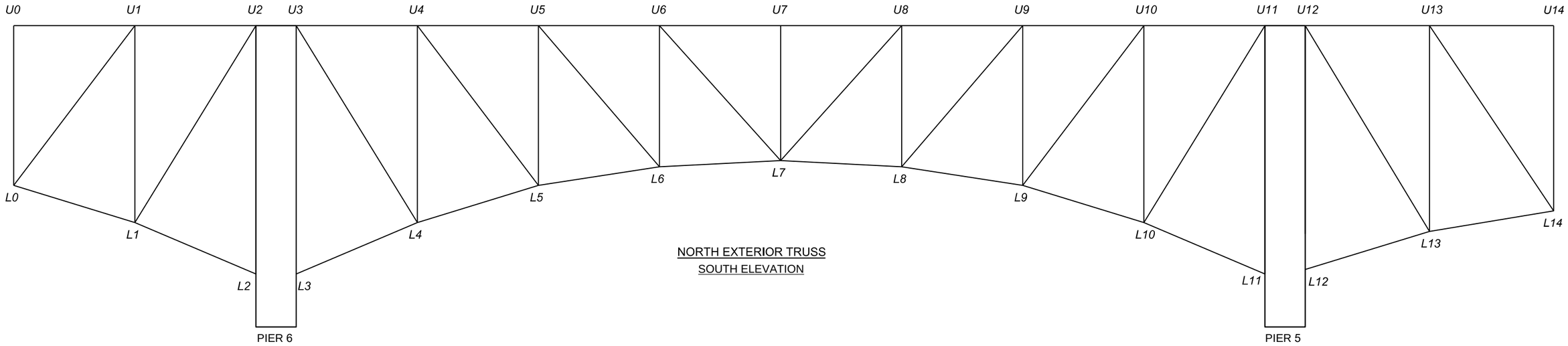


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

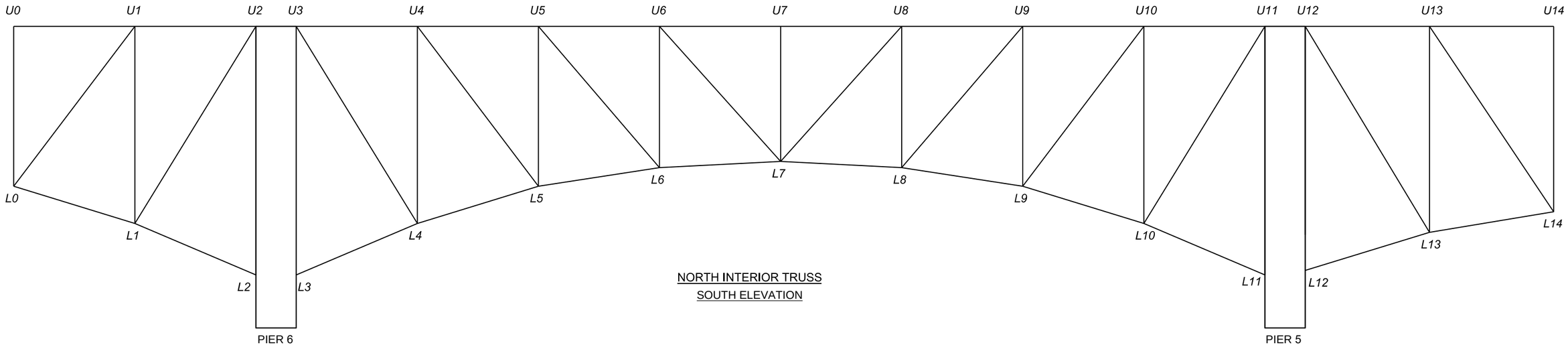


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 4	PAGE A - 12

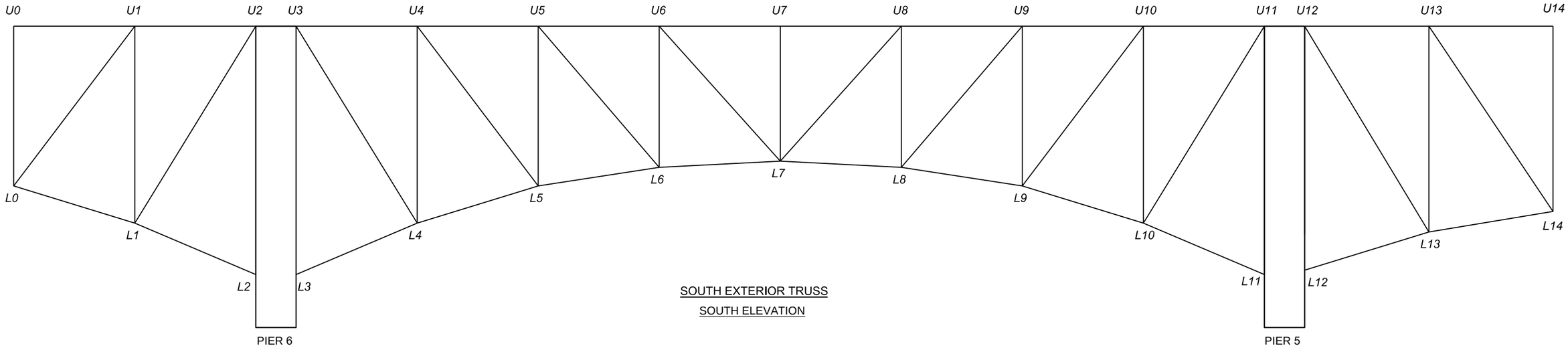


NORTH EXTERIOR TRUSS
SOUTH ELEVATION



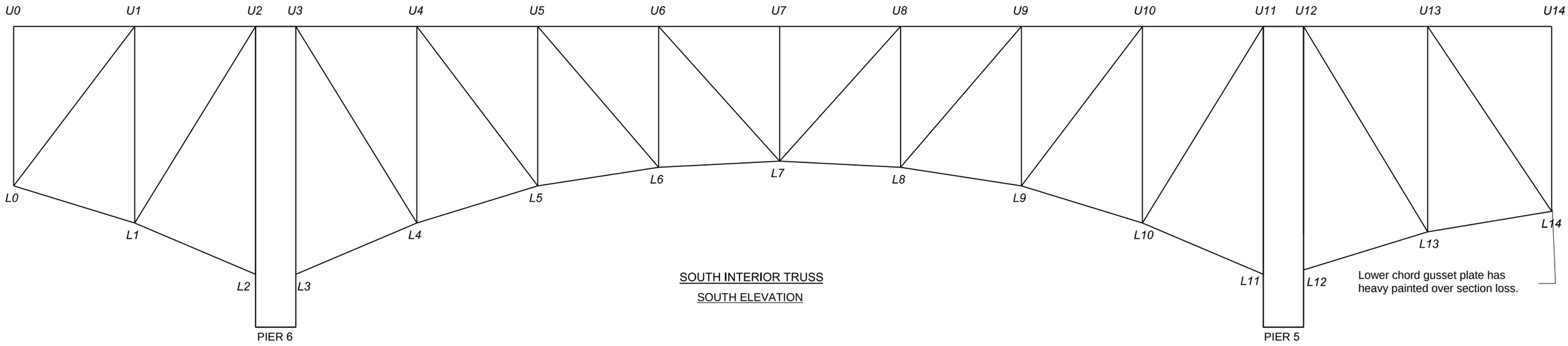
NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 5	PAGE A - 13



SOUTH EXTERIOR TRUSS

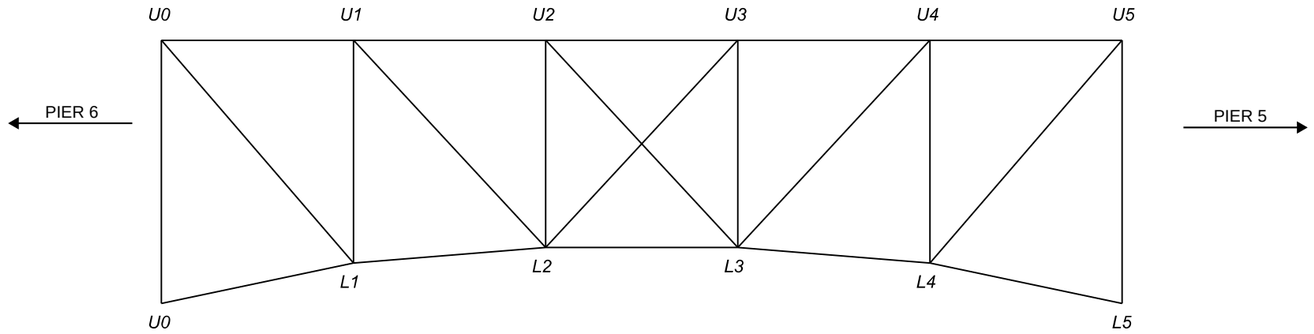
SOUTH ELEVATION



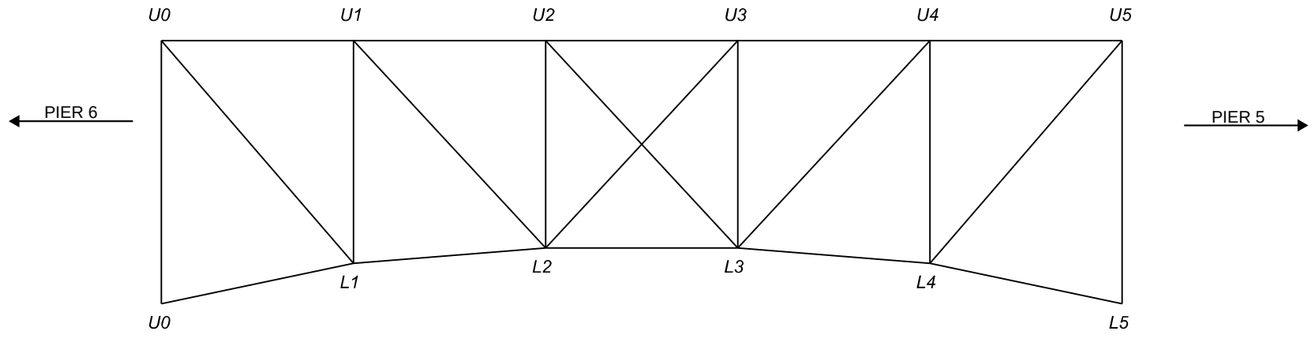
SOUTH INTERIOR TRUSS

SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 5 / PAGE A - 14

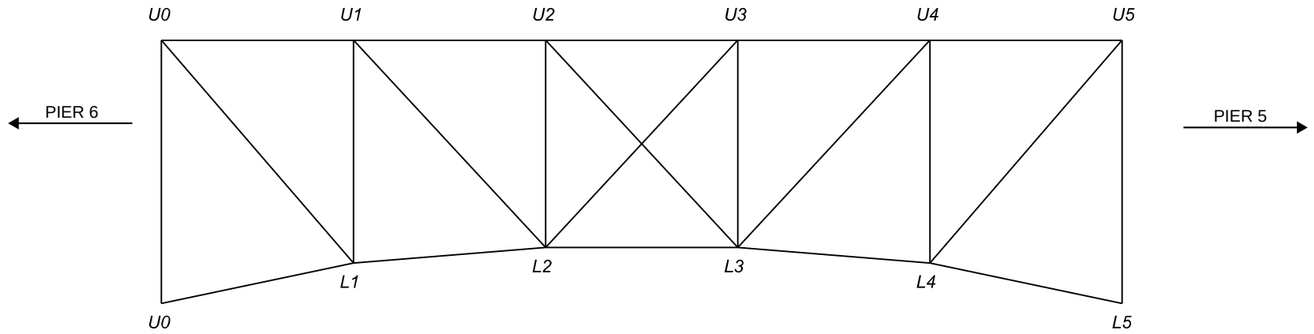


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

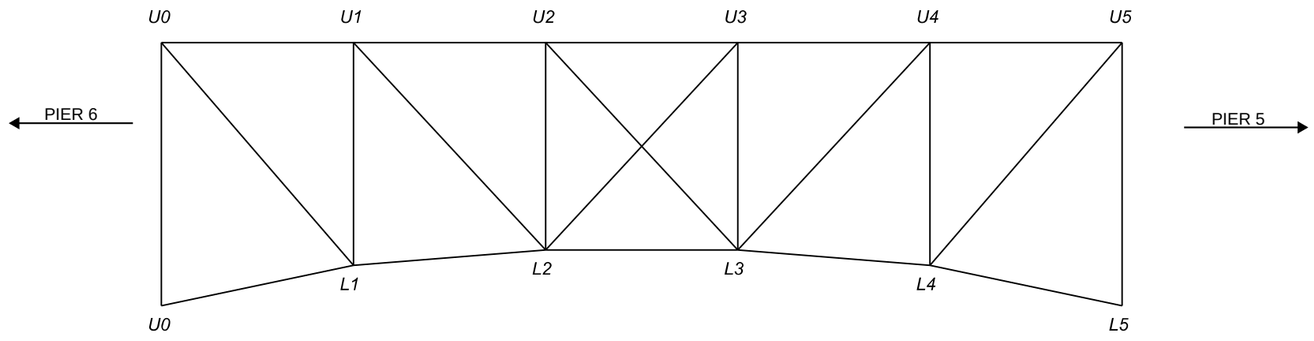


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 6	PAGE A - 15

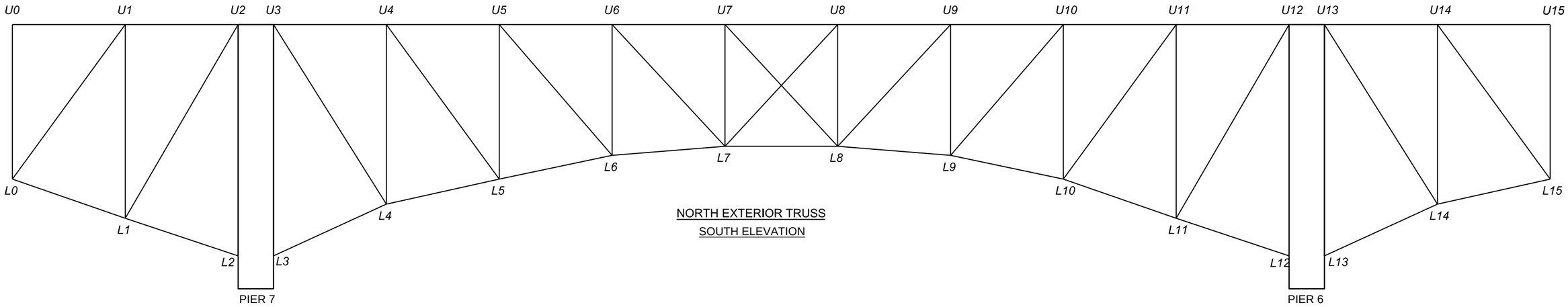


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

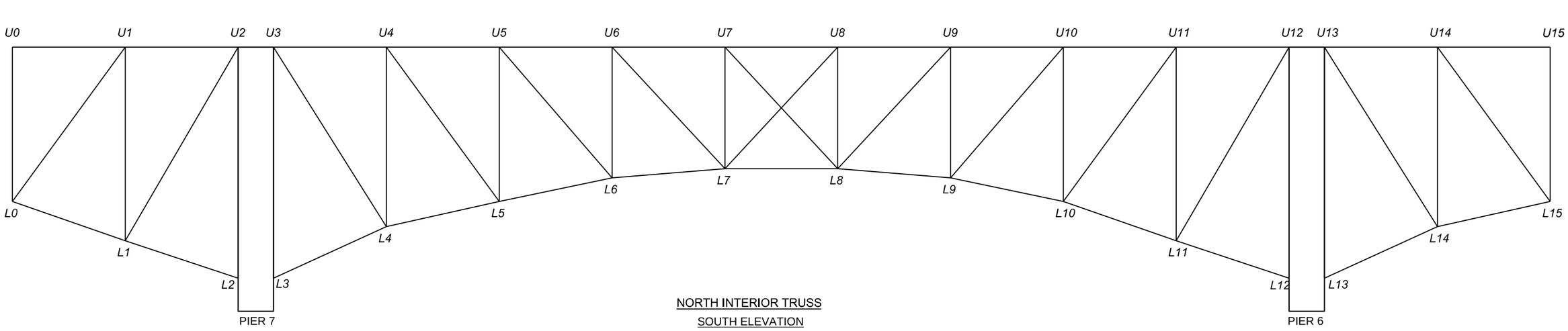


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 6	PAGE A - 16



NORTH EXTERIOR TRUSS
SOUTH ELEVATION

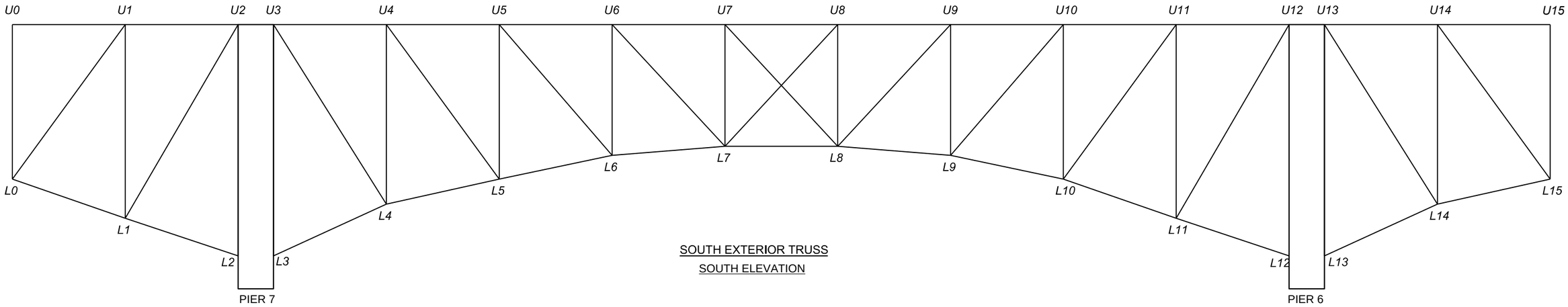


NORTH INTERIOR TRUSS
SOUTH ELEVATION

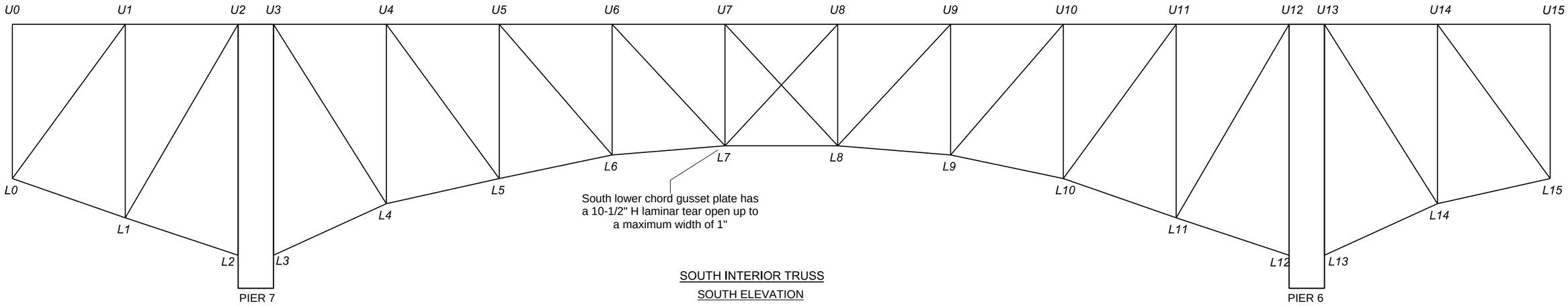
General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 7 / PAGE A - 17



SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

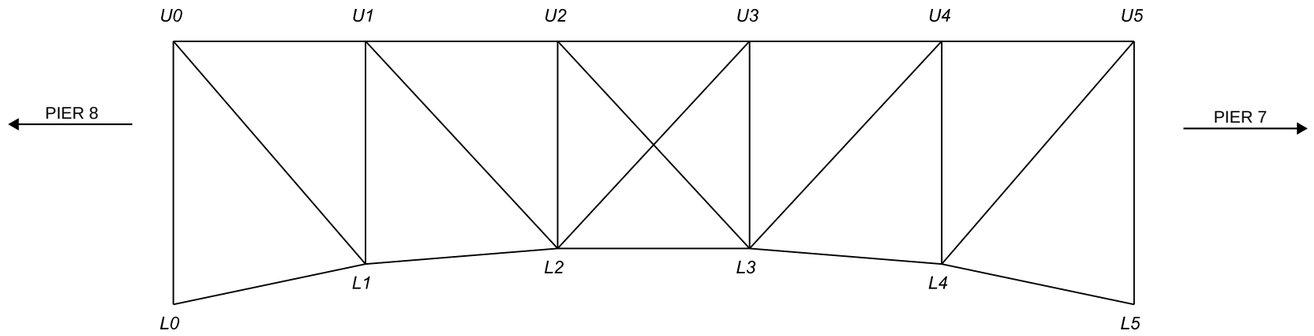


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

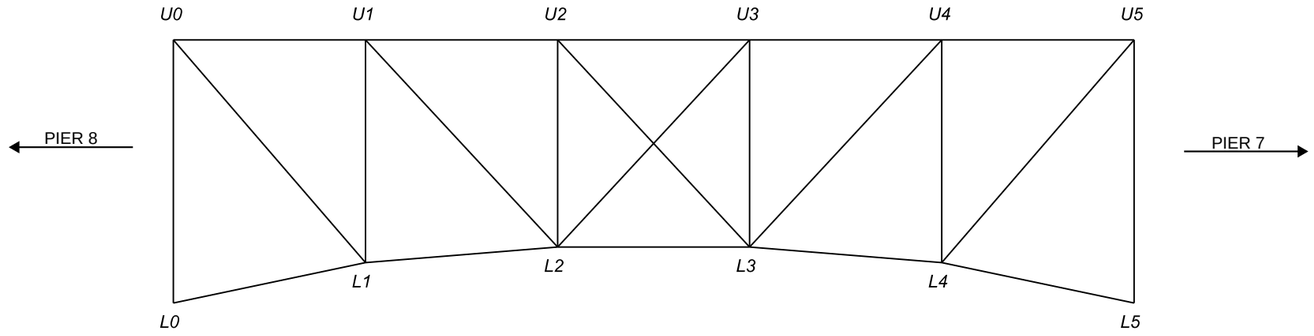
General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION - SPAN 7 PAGE A - 18

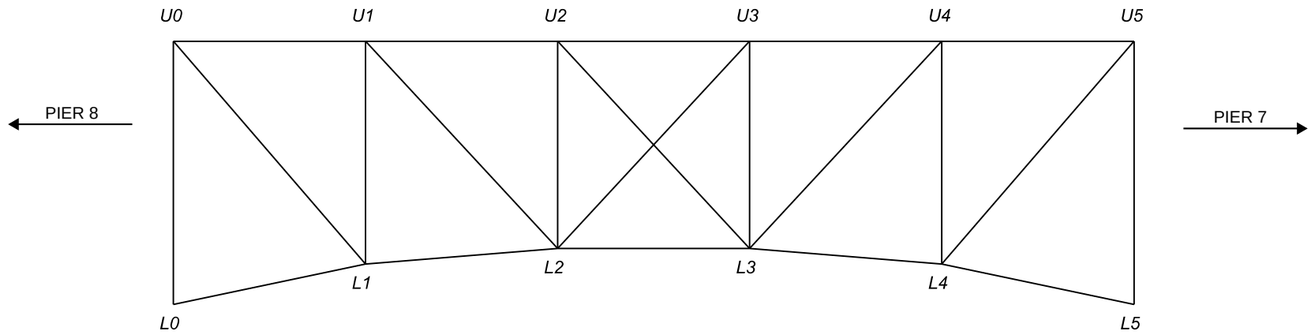


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

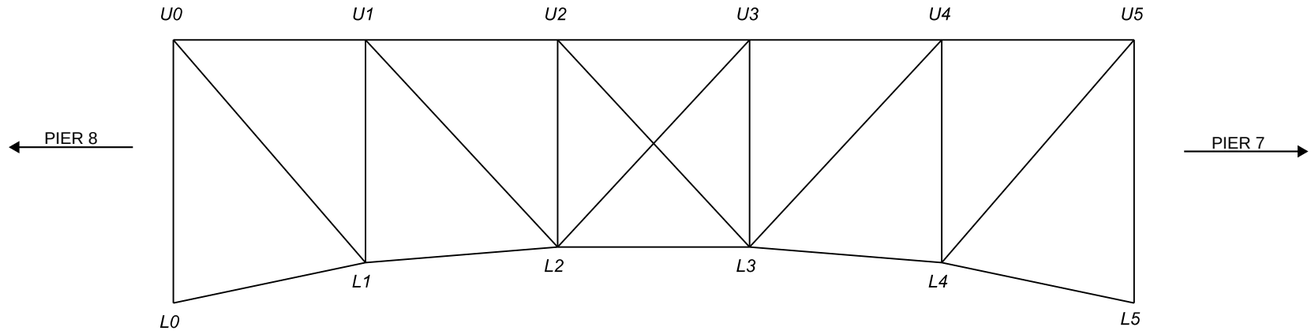


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 8	PAGE A - 19

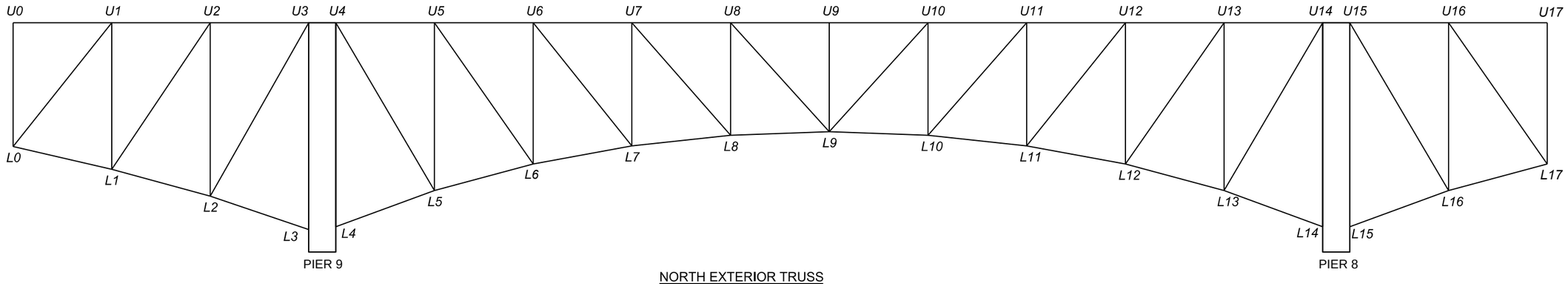


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

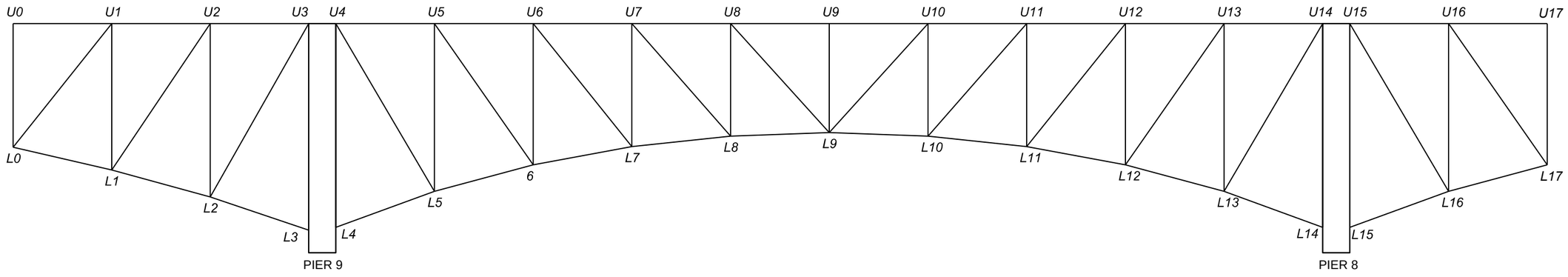


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 8	PAGE A - 20



NORTH EXTERIOR TRUSS
SOUTH ELEVATION

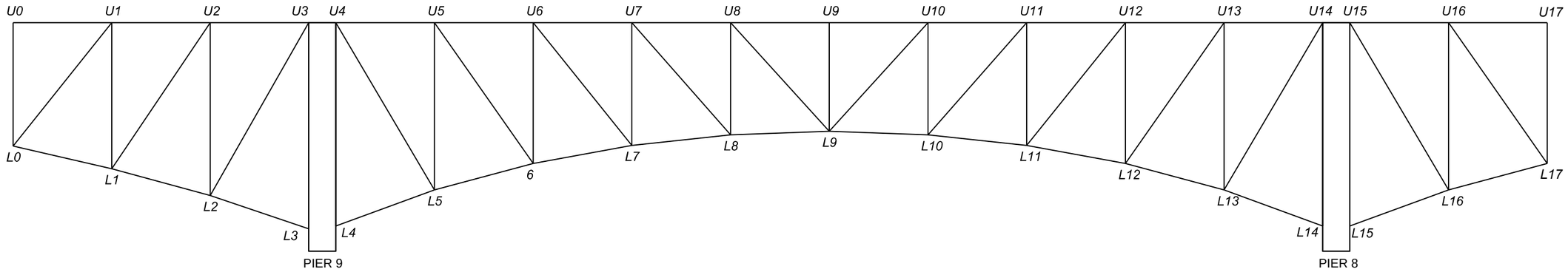


NORTH INTERIOR TRUSS
SOUTH ELEVATION

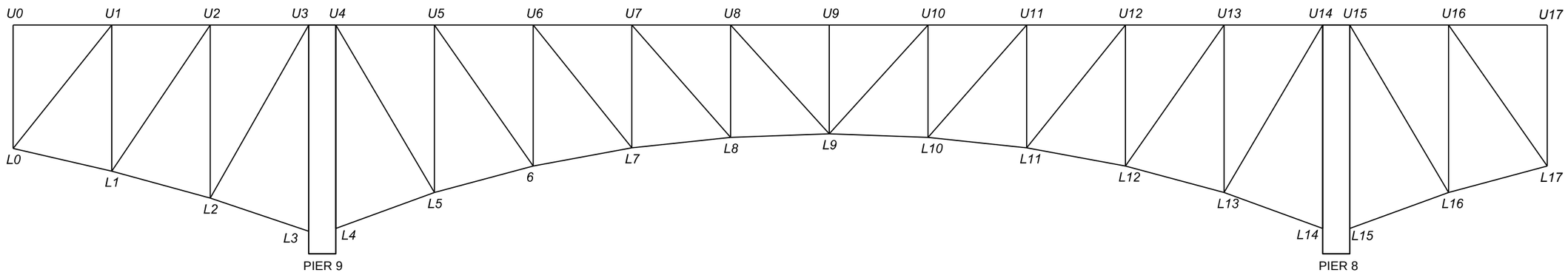
General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 9 / PAGE A - 21



SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

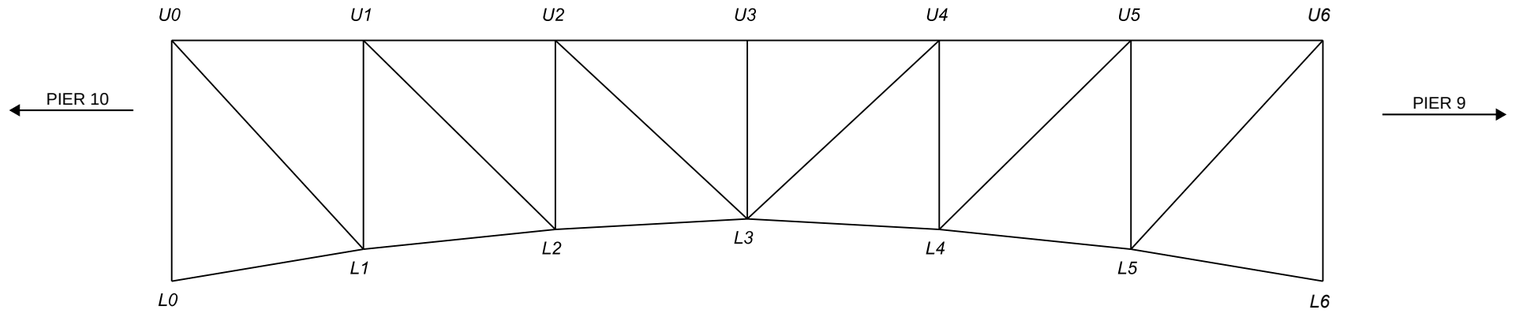


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

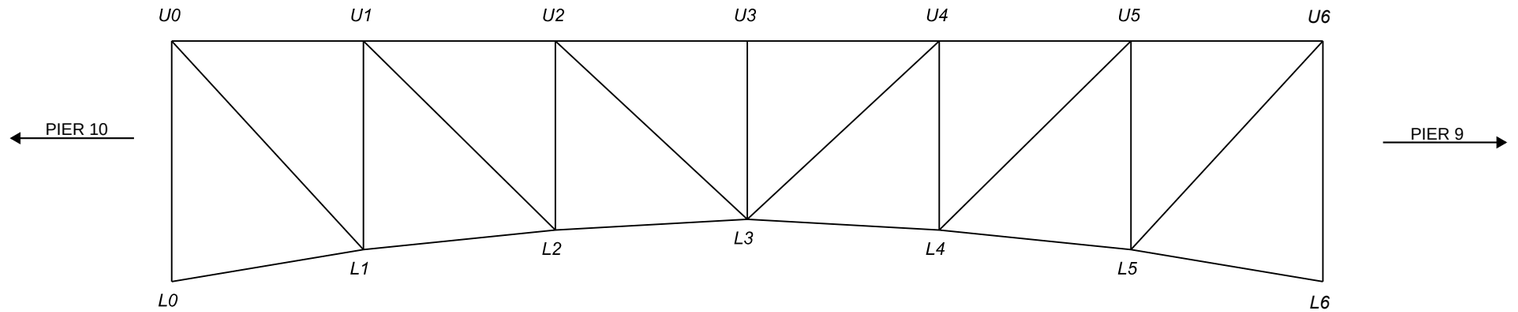
General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION - SPAN 9

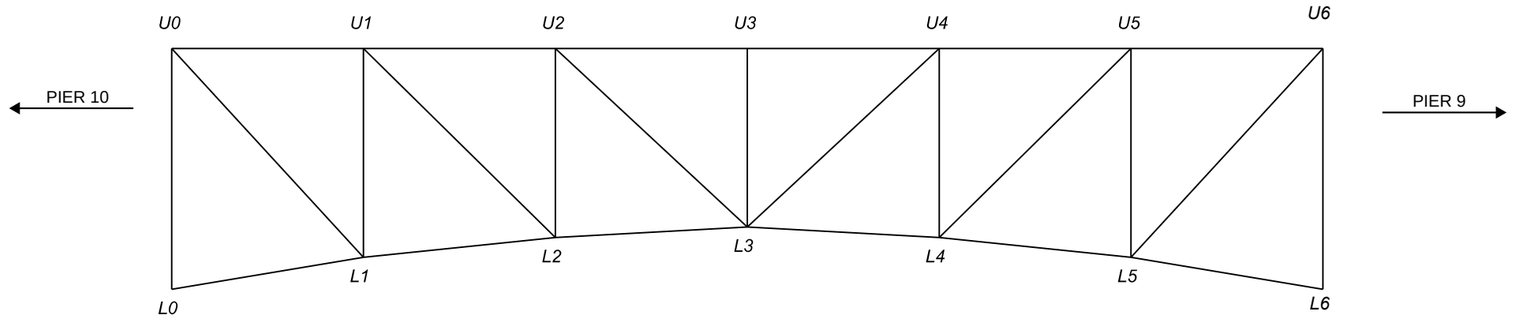


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

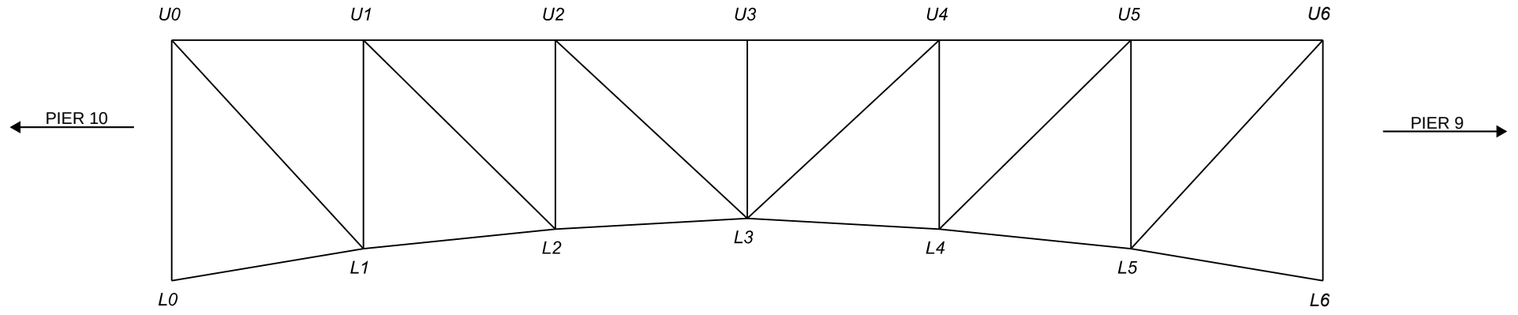


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 10	PAGE A - 23

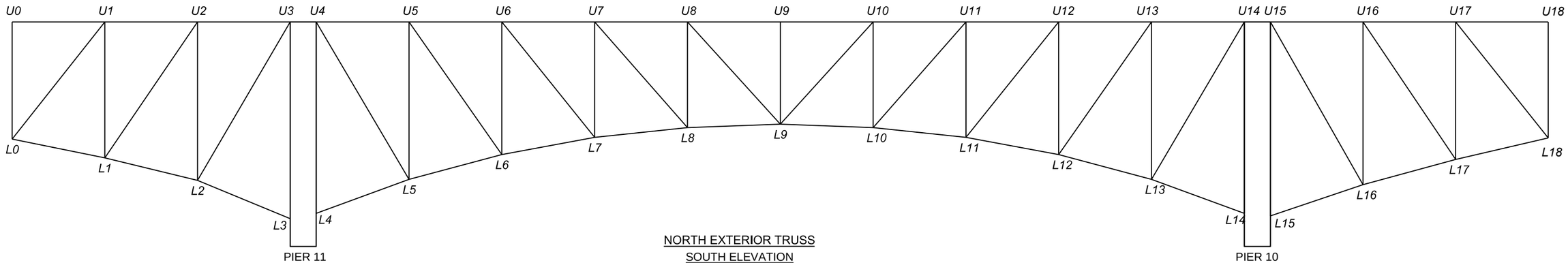


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

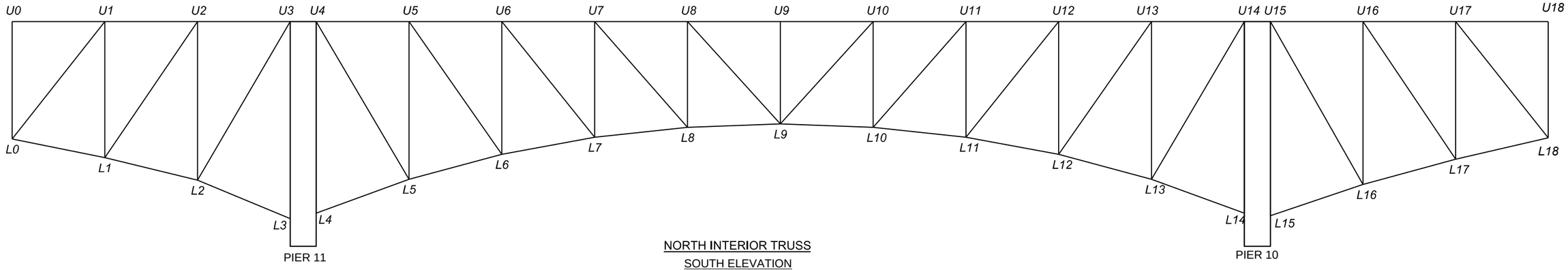


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 10 / PAGE A - 24



NORTH EXTERIOR TRUSS
SOUTH ELEVATION

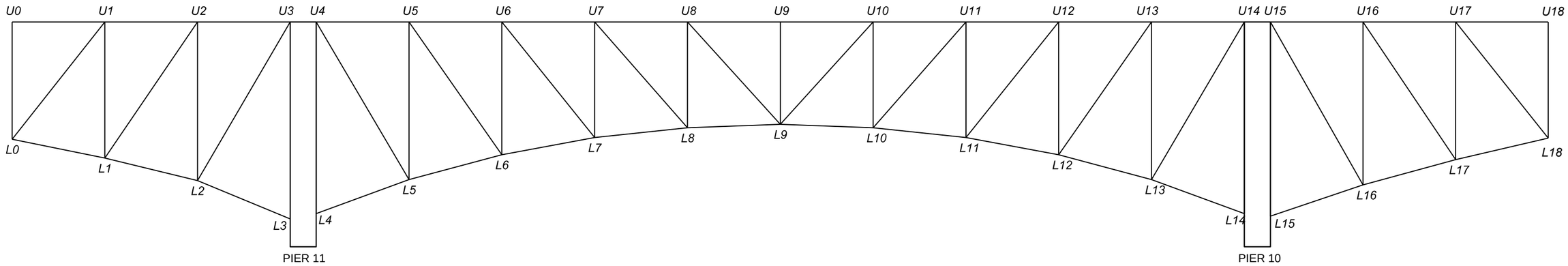


NORTH INTERIOR TRUSS
SOUTH ELEVATION

General Notes:

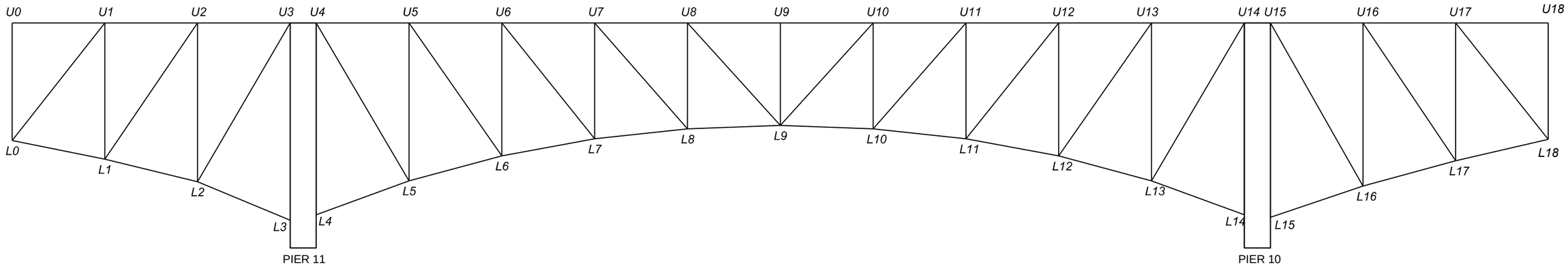
- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.
- Deep pitting and sections of perforations throughout the bottom of the lower chord webs and flange angles.

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 11
			PAGE A - 25



SOUTH EXTERIOR TRUSS

SOUTH ELEVATION



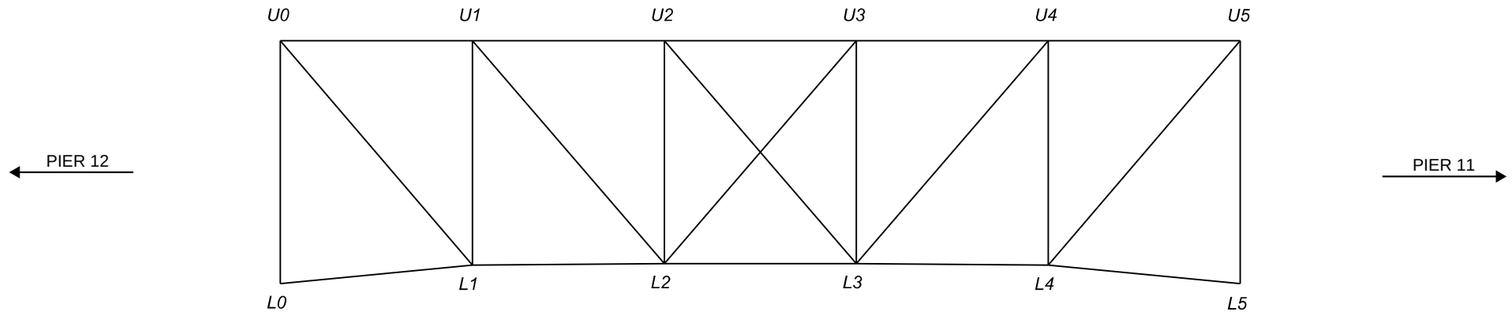
SOUTH INTERIOR TRUSS

SOUTH ELEVATION

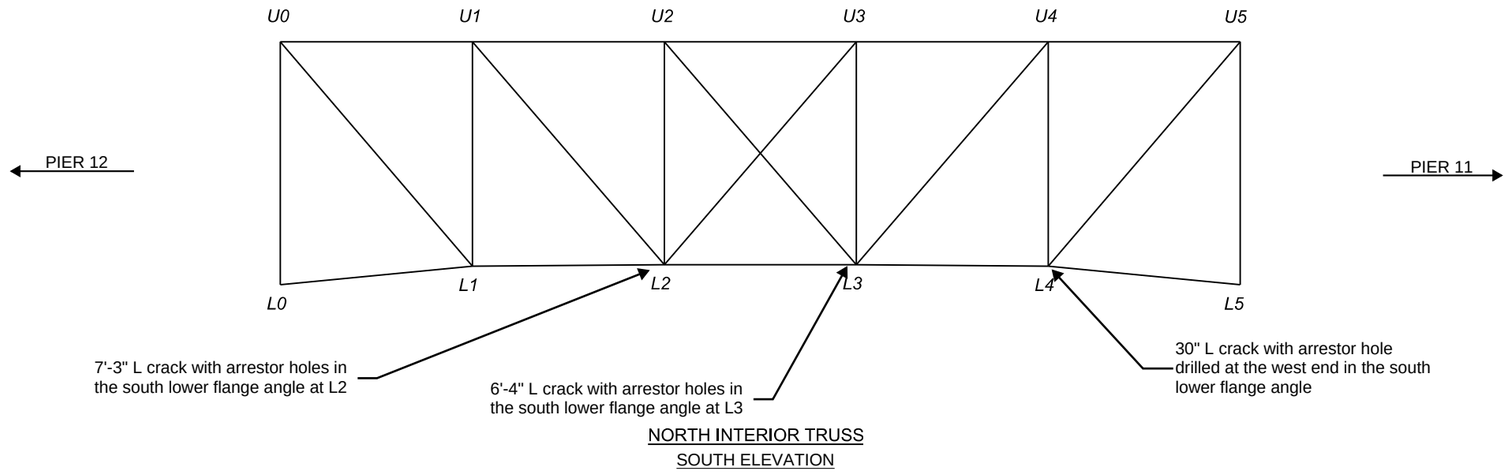
General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 11

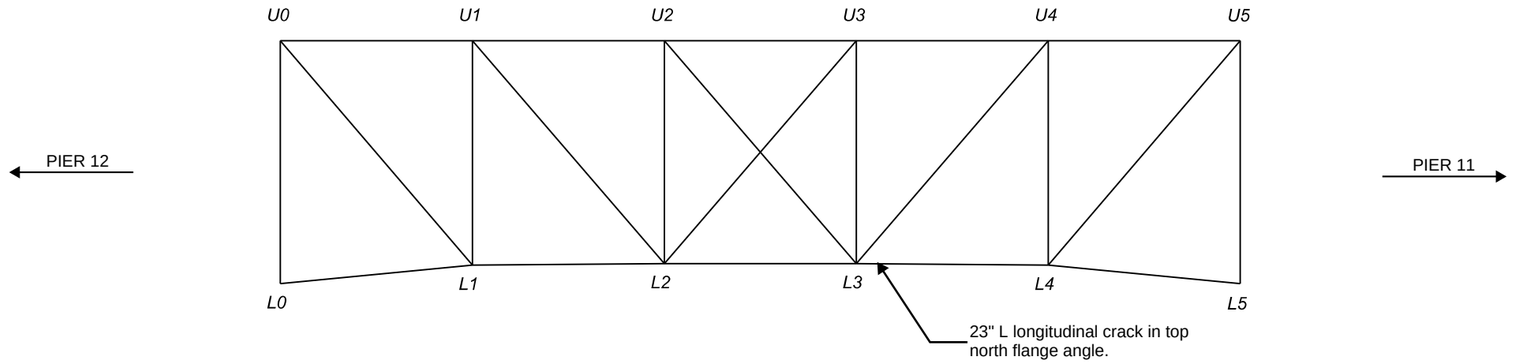


NORTH EXTERIOR TRUSS
SOUTH ELEVATION

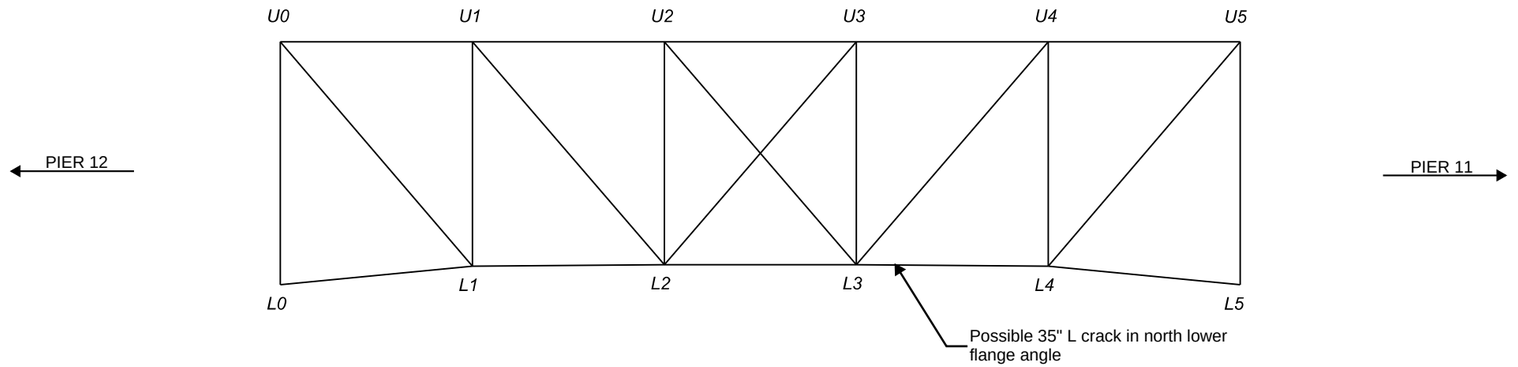


NORTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION - SPAN 12

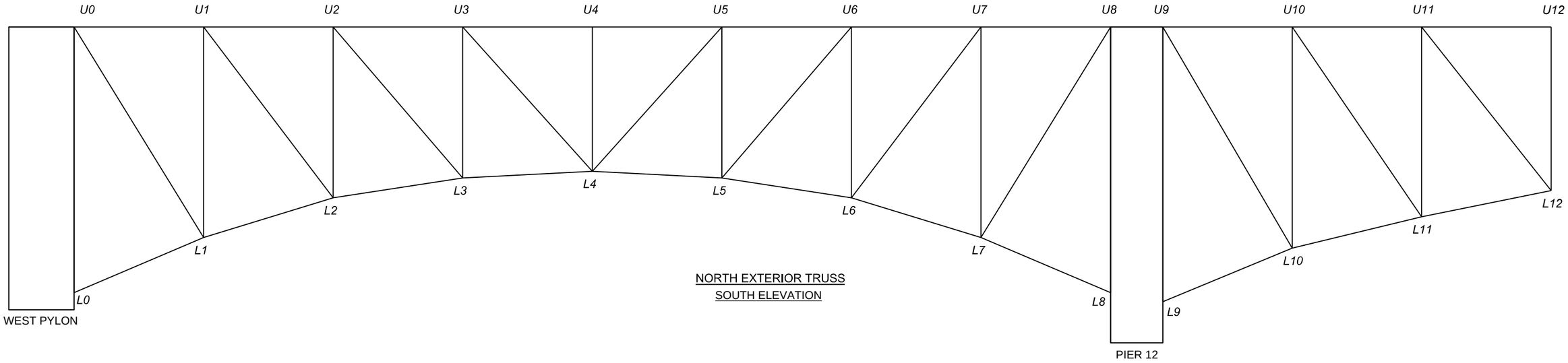


SOUTH EXTERIOR TRUSS
SOUTH ELEVATION

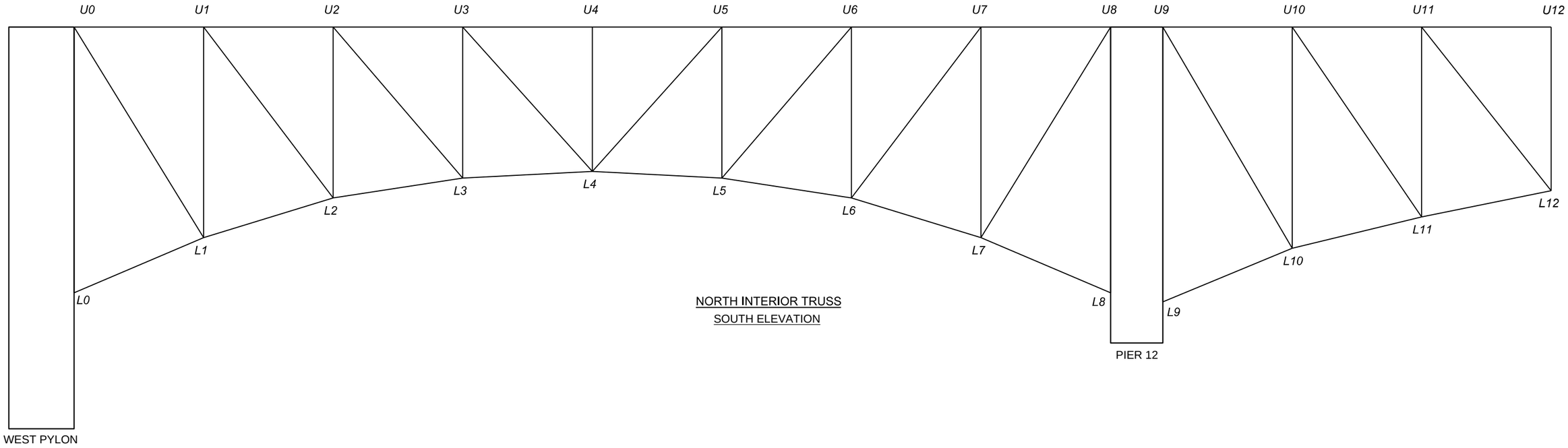


SOUTH INTERIOR TRUSS
SOUTH ELEVATION

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613	
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 12	PAGE A - 28



NORTH EXTERIOR TRUSS
SOUTH ELEVATION

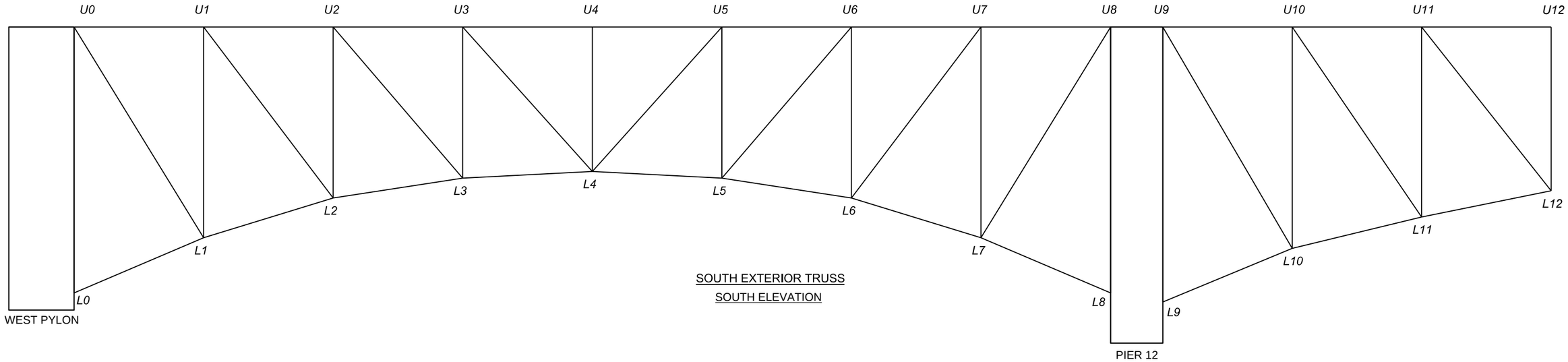


NORTH INTERIOR TRUSS
SOUTH ELEVATION

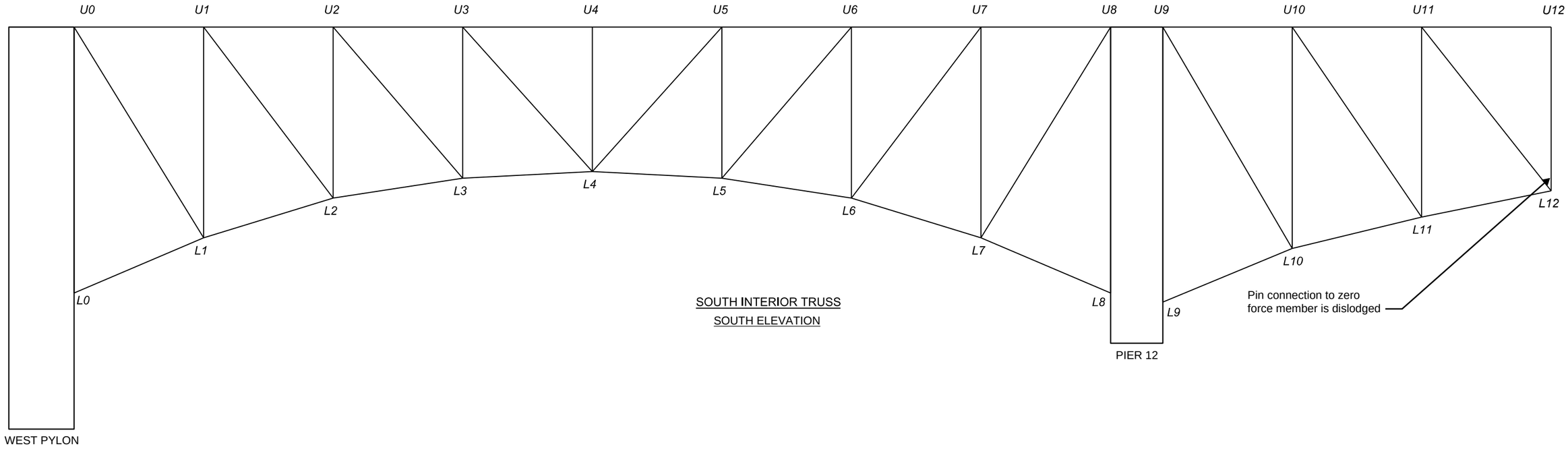
General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET	DATE	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613
NOT TO SCALE	DEC, 2017	INFRASTRUCTURE ENGINEERS, INC.	TRUSS ELEVATION - SPAN 13 / PAGE A - 29



SOUTH EXTERIOR TRUSS
SOUTH ELEVATION



SOUTH INTERIOR TRUSS
SOUTH ELEVATION

General Notes:

- Interior lower chords, for 3 panel points extending from each pier exhibit up to 2" T pack rust between the upper flange angles.

GRAPHIC SCALE MEASURED IN FEET NOT TO SCALE	DATE DEC, 2017	300 East Business Way Suite 200 Cincinnati, OH 45241 PH.: 614.699.5000 INFRASTRUCTURE ENGINEERS, INC.	HOPE MEMORIAL BRIDGE OVER CUYAHOGA RIVER BRIDGE NO. CUY-10-1613 TRUSS ELEVATION - SPAN 13 PAGE A - 30