



Design Support for Section 4(f) Analysis for Historic Bridges

Structure No. 7413 0165 X
SH-123 over the Caney River
Washington County, Oklahoma

ODOT Engineering Contract Number: 1658A

October 2015

Report Prepared By:



EXPERIENCE | Transportation

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Introduction

Section 4(f) regulations (CRF 23 774) state that FHWA (Federal Highway Administration) may not approve an action that uses public park and recreation land, or historic properties, when there is a feasible and prudent alternative to the action. In most cases, actions that use an historic bridge are those that result in demolition/removal of the historic structure or that reconstruct it to such an extent that the character defining features that give it historic significance are eliminated or substantially impaired. To simplify the 4(f) process, FHWA has established a nationwide Programmatic 4(f) evaluation for historic bridges that specifies a limited set of avoidance alternatives that must be evaluated and rejected before an action that uses an historic bridge can be approved. Programmatic 4(f) evaluations also expedite the 4(f) process because they are approved at the state level by FHWA Division Offices without national legal sufficiency review. To reject an avoidance alternative, FHWA must demonstrate that it cannot be constructed as a matter of sound engineering practice (not feasible) and that it is not a reasonable expenditure of public funds (not prudent). This evaluation must be made in light of the preservation intent of the law and the definition of “feasible and prudent avoidance alternative” in 23 CFR 774.17. If an avoidance alternative exists that is both feasible and prudent, it must be selected by FHWA. ODOT and FHWA will assess the feasibility and prudence of avoidance alternatives based in part on the information generated in this report. This information may also be used by the agencies to evaluate and incorporate measures to minimize harm resulting from use of an historic bridge that cannot be avoided.

Existing Conditions¹

Located in the City of Bartlesville, the bridge carrying two lanes of SH-123 over the Caney River (Structure No. 7413 0165X, NBI No. 05521) is a 418 feet long, three span bridge consisting of a 210 feet long through truss main span flanked on each end by a 100 feet long pony truss span. The bridge roadway horizontal clearance is 24 feet curb to curb, which matches the approach roadway, and there is a minimum vertical clearance of 15 feet 6 inches at the main span. The bridge has 4 feet wide sidewalks outboard of the truss lines. The bridge was built in 1937 and the spans appear to be state standard design riveted trusses. The truss spans are supported by two column reinforced concrete intermediate piers and reinforced concrete abutments. See Figure 1 for a location map and Figures 2 and 3 for photos of the existing bridge, at the end of this section of the report.

The posted speed for the roadway at the bridge, classified as an urban minor arterial, is 35 miles per hour. The current Average Daily Traffic (ADT) is 7,800 vehicles per day²; the future ADT was not provided.

¹ The bridge information included in this section is taken from the April 2013 and April 2015 ODOT Bridge Inspection Reports and from a field review performed by Infrastructure Engineers, Inc. in January 2014. Information taken from other documents is referenced separately.

² Final Project Initiation Report, ODOT, July 2011.

The bridge is both functionally obsolete and structurally deficient. The functional obsolescence is caused by the existing bridge deck width and the existing vertical clearance across the bridge being below current minimum design standards. The existing roadway width is 24 feet; the current minimum design standard roadway width is 32 feet for a new bridge. The existing vertical clearance on the main span through truss is 15 feet 6 inches; the AASHTO minimum vertical clearance for arterial routes is 16 feet for a new bridge.³ The bridge shows no signs of impact damage.

Based on the April 10, 2015 inspection report, the bridge has a sufficiency rating of 29.9 and is classified as structurally deficient. The bridge deck, superstructure, and substructure are in poor condition. The poor superstructure rating is due to corrosion-related section losses and holes at the stringers, impacted rust at the stringer top flanges, section losses with holed areas on the floorbeam webs and top flanges, impacted rust at the connection of the deck and the top flanges of the floorbeams, and distortion, corrosion holes and cracks at gusset plates. See Figures 4 through 7 for examples of these conditions. These pictures were taken during a field review, performed by engineer inspectors from Infrastructure Engineers, Inc. who were on-site January 7-10, 2014 to document current conditions and confirm the sizes of existing truss members. The 2015 inspection report recommended that the bridge be posted for 10 tons until gusset plate repairs are made; a subsequent field review confirmed that signage to this effect had been installed. The 2013 and 2015 ODOT bridge inspection reports and the findings from the 2014 Infrastructure Engineers, Inc. field review are included in Appendix A.

The trusses and floorbeams for all three spans are classified as fracture critical members, which is defined as a steel member in tension or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse⁴.

Distinguishing Characteristics That Convey Historic Significance

The bridge has been documented as individually eligible for the National Register of Historic Places (NRHP) under NRHP Criterion A as a Works Progress Administration (WPA) project and its association with New Deal-era programs, as well as NRHP Criterion C for its engineering significance in the area of transportation.

While all truss members are type defining, not all are equally important to conveying historic significance. The distinguishing characteristics that convey historic significance are linked to historic context, particularly the technological context.

While not possessing early or innovative details, the 1937 Cherokee Avenue bridge is historic as an example of a state-standard bridge design utilizing period construction details, like rigid field connections and rolled, as well as built-up, I-shape sections. The K-truss was a state standard

³ A Policy on Geometric Design of Highways and Streets, AASHTO, 2011. This document is commonly known as the AASHTO Green Book and provides minimum standards for design nationwide.

⁴ Fracture Critical Inspection Techniques for Steel Bridges, Participant Workbook, NHI.

design for span lengths between 140 feet and 210 feet by 1933 and was used into the early 1950s. The K-form that offers strength and economy for longer span lengths was introduced in 1917. The design was a workhorse for long spans on state highways through the 1930s and 1940s.

With its 24'-wide roadway, 15'-6" vertical clearance for the thru truss main span, and cantilevered sidewalks, it represents late-1930s geometric design used for state highways and use of Depression-era, federal work relief funding for its construction. Both the geometric design and how the bridge was paid for are typical nationally.

The distinguishing characteristics that convey the historic significance of the bridge are the K truss pattern of the main span, the pony truss approach spans, state standard construction details, like rigid connections and use of I-shape, built-up box section members, and cantilevered sidewalks. Maintaining the design of all truss spans and in-kind replacement of members, meaning mechanical connections and use of I-shape steel sections, will preserve the distinctive characteristics that convey the historic significance of the bridge. Adding material to the bridge to strengthen it or make needed repairs to deteriorated portions of members will not adversely affect the bridge as the distinguishing characteristics will remain. Features or elements that are not distinctive characteristics are the flooring system members, as long as how they are connected to the trusses is maintained.

Eliminating fracture critical elements will introduce new elements to the underside of the bridge, but they are reversible and the distinctive characteristics of the bridge will remain. The bridge is large enough that it could accommodate widening the truss lines up to 12 feet and widening the sidewalks. What is important is to connect the wider in-kind replacement floorbeams, brackets, and bracing using mechanical connections. This way the truss designs and truss lines themselves, which are the key distinctive elements of the bridge, will be preserved and remain in use. Placing traffic barriers that meet current safety requirements is also a reversible addition that does not alter the distinguishing characteristics.

The Bartlesville Water Company Dam has been identified as eligible for the NRHP as a contributing resource to the bridge due to its location almost directly under the bridge and the need to consider the dam in the design of the bridge, making it an integral part of the bridge. The water crossing was raised prior to 1900, again in 1914 by two feet and finally in 1937 by an additional three feet to its current height.⁵

The Carr/Bartles' Mill (34WN114) archaeological site, NRHP eligible on its own merits, is located at the narrows of the meander of the Caney River and extends through the narrows, about 1,000 feet north of the bridge.

⁵ Cultural Resources Survey Report, J/P No. 24348(10), ODOT, October 2013.

**Design Support for Section 4(f) Analysis for Historic Bridges
STRUCTURE NO. 7413 0165 X - SH 123 OVER CANEY RIVER**

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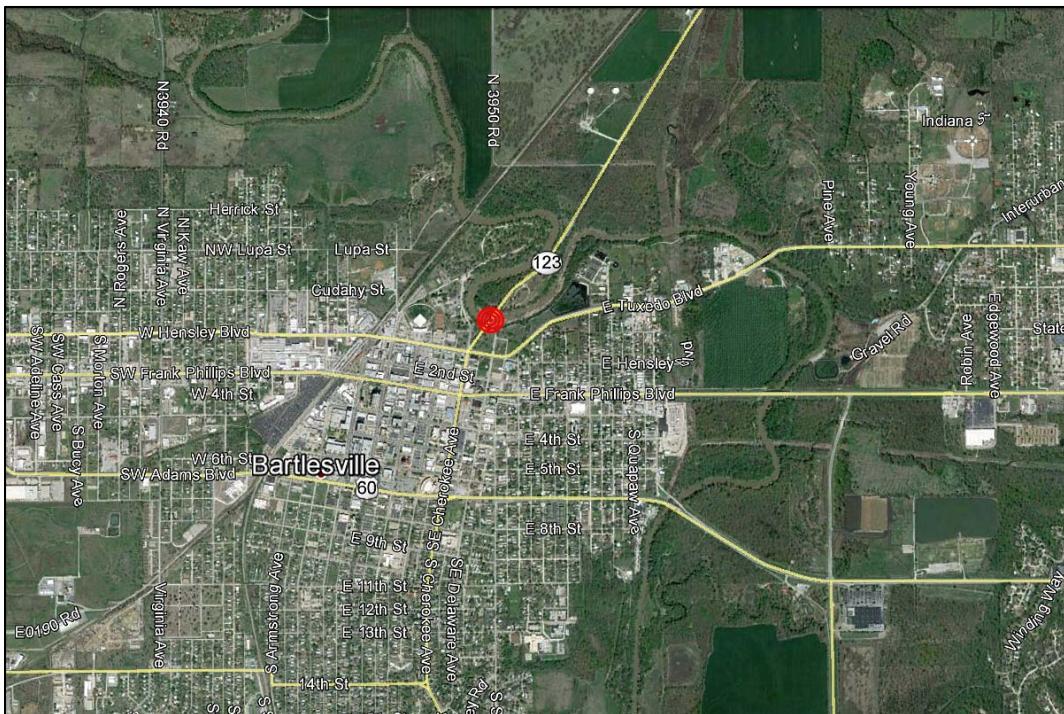


Figure 1 – Location Map



Figure 2 – East Elevation, Main Span



Figure 3 – East Elevation, Typical Approach Span



Figure 4 – Corrosion Holes in Stringer



Figure 5 – Corrosion and Impacted Rust on Stringer Flanges



Figure 6 – Section Loss at Web of Floorbeam



Figure 7 – Corrosion and Impacted Rust at Floorbeam Top Flange

Purpose & Need for the Project

The following purpose and need for the project were provided by ODOT:

The purpose of the project is to provide a safe crossing and preserve transportation continuity over the Caney River. The need of the project is to address the current structural and functional deficiencies of the existing bridge and approach roadway. Currently, the deck, superstructure and substructure are rated poor. At 24 feet in width with separate sidewalks on both sides, the structure is narrow and is classified as functionally obsolete. In addition the overhead truss has a substandard vertical clearance of only 15 feet 6 inches. The structure does not meet current design recommendations, recommended to be 32 feet at minimum and 40 feet wide for the desirable width.

Alternatives Analysis

Alternatives that would avoid replacement of the existing bridge have been evaluated to determine probable costs and the extent of work required to satisfy the project purpose and need. To that end, the following alternatives have been evaluated:

- Alternative 1: Do Nothing
- Alternative 2: Rehabilitation Without Affecting Historic Integrity of the Bridge
 - Alternative 2(a): Rehabilitation of existing bridge, bridge remains fracture critical
 - Alternative 2(b): Rehabilitation of existing bridge, eliminating fracture critical designation
- Alternative 3: Build on New Location
 - Alternative 3(a): Retain existing bridge in vehicular service as part of a one-way pair, bridge remains fracture critical
 - Alternative 3(b): Retain existing bridge in vehicular service as part of a one-way pair, eliminating fracture critical designation
 - Alternative 3(c): Retain existing bridge in place, either as a non-functional "monument" or as a non-motorized pedestrian or bicycle facility

All analyses have been performed in accordance with the American Association of State Highway and Transportation Officials (AASHTO) Manual for Bridge Evaluation, 2nd Edition and AASHTO Standard Specifications for Highway Bridges, 17th Edition. Models were prepared using available state design standard drawings from the era of construction⁶, compared with the results of the field review performed in January 2014. Opinions of probable cost for each alternative were completed using ODOT bid history information and engineering judgment, based on review of engineer's estimates and contractor bid tabulations for truss rehabilitation projects completed by TranSystems⁷.

Alternative 1 - Do Nothing

The do nothing alternative consists of no improvements to correct the structural deficiencies or the functionally obsolete aspects of the bridge. The do nothing alternative includes maintenance related to the existing bridge to keep the bridge open to traffic with no load posting needed. The bridge is currently not load posted, so it is a reasonable assumption that in the near term the structural deficiencies can be addressed by cleaning and painting the bridge. Because much of the bridge structure is above the roadway level, the bridge may require periodic closures (lane closures with flagging operations or full bridge closure) to perform needed maintenance, like painting the top chords, diagonals, verticals and top chord bracing and bolting supplemental plates to strengthen members with section loss. The cost for maintenance and inspection of the bridge over 20 years (the commonly considered design life for bridge rehabilitation, used for cost comparisons between the various alternatives) for this alternative is \$2 million (in 2014 dollars).

⁶ ODOT Standard Drawings E-100 and E-210, various sheets dated between 1935 and 1945.

⁷ TranSystems projects reviewed included the Mark Road truss bridge rehabilitation (1 span, 107 ft. long, Ohio, 2008), Centre Bridge truss rehabilitation (6 spans ranging from 100 ft. to 152 ft. long, New Jersey-Pennsylvania, 2007), Warren County truss rehabilitation (1 span, 82 ft. long, New Jersey, 2007) and Calhoun Street truss bridge rehabilitation (7 spans, each 180 ft. long, Pennsylvania-New Jersey, 2009).

Substandard vertical clearance caused by the top chord lateral bracing, 15 feet 6 inches versus a required minimum clearance of 16 feet, could be addressed by non-construction techniques, like detouring permitted over height vehicles to US-75, which would add approximately 1.83 miles for the detour. See Figure 8 for the possible detour route. There are few non-construction methods to address the existing substandard horizontal clearance across the bridge. Available bridge inspection reports and the field review did not identify impact damage to the bridge, so the substandard width may not be a significant problem at this time.

The existing sidewalks are only 4 feet wide. This does not meet the current ADA requirement of 5 feet.

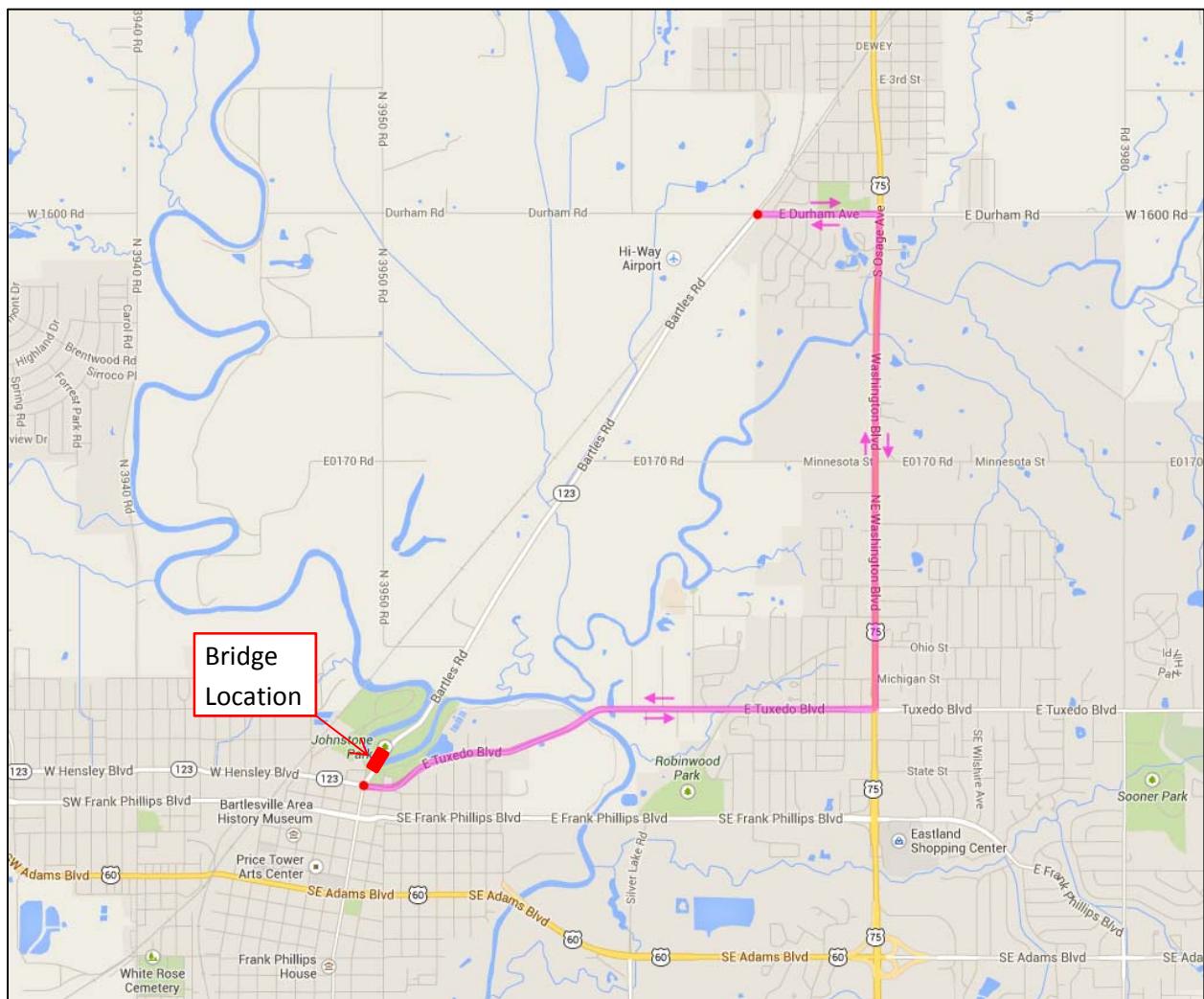


Figure 8 – Potential Detour Route using US-75. This detour adds 1.83 miles to the trip.

As the bridge gets older, it will require more frequent inspections. Eventually, the bridge will require load restrictions and closure. If the bridge was closed to traffic in the future due to

deteriorating conditions, the detour for residents to access the park at the northeast corner of the bridge, via US-75, is about 7.2 miles.

The do nothing alternative has the following advantages:

- No roadway construction or utility impact costs
- Minimal environmental impacts, including no adverse effects to the NRHP-eligible bridge
- Minimal engineering costs

The do nothing alternative has the following disadvantages:

- Does not address structural and functional deficiencies
- Periodic bridge closures (lane or complete) for maintenance
- Anticipated future load restrictions and eventual closure of the bridge
- Many elements not up to current design standards for a new bridge
- Does not meet the project purpose and need

Alternative 2 - Rehabilitation Without Affecting Historic Integrity of the Bridge

The bridge was constructed in 1937. Design specifications in place at the time of construction are generally considered to provide a 50 year service life⁸, which has long since been exceeded. Rehabilitation of the bridge includes the cost of performing repairs, strengthening and replacing bridge components as needed. It is important to note that rehabilitation work is commonly considered to have a 20 year design life. As described in the purpose and need provided by ODOT, the following criteria are required for any rehabilitation:

- Widen the bridge to provide minimum 32 feet horizontal clearance
- Improve vertical clearance to 16 feet.

ODOT has also requested that solutions that would eliminate the fracture critical nature of the bridge be described, including whether it is feasible to do such a thing without affecting the bridge's historic significance. To accomplish both goals, the following options are considered within this alternative:

- 2(a): Widening existing bridge to provide 32 feet roadway width, retaining truss as primary load carrying element so that bridge remains fracture critical
- 2(b): Widening existing bridge to provide 32 feet roadway width, providing additional means of load path redundancy to eliminate fracture critical nature of bridge

A similar pair of alternatives were evaluated for Alternative 3, use as part of a one-way couplet.

⁸ Bridge Preservation Guide, FHWA, August 2011.

Alternative 2(a) – Rehabilitation of existing bridge, bridge remains fracture critical

The bridge is both functionally obsolete and structurally deficient due to substandard geometry and corrosion-related section loss, respectively, but does not require load posting. The superstructure is rated in poor condition overall, due to the condition of stringers and floorbeams, which are considered to be in poor condition due to section loss, pack rust and scattered holes in members. The truss chords, diagonals and verticals are in fair to satisfactory condition. The deck and substructure are rated in poor condition due to cracks and repaired spalls in the deck overlay and spalls and cracks in the concrete piers and abutments.

A three-dimensional model was created using STAAD.Pro V8i to evaluate member forces in the trusses after improving the geometry of the bridge to eliminate functional obsolescence by widening the curb to curb width from 24 feet to 32 feet. Only main members were reviewed as part of the analyses; adequacy of gusset plates was not considered and is not necessary to determine the likely cost to rehabilitate, since the other work is significant. See Figures 9 and 10. In order to provide this minimum width, the deck, stringers and floorbeams require replacement. The deck is not considered to be a significant feature of the historic bridge, so it can be replaced, along with the stringers and floorbeams, without having an adverse effect on the structure's historic significance – the trusses remain intact.⁹

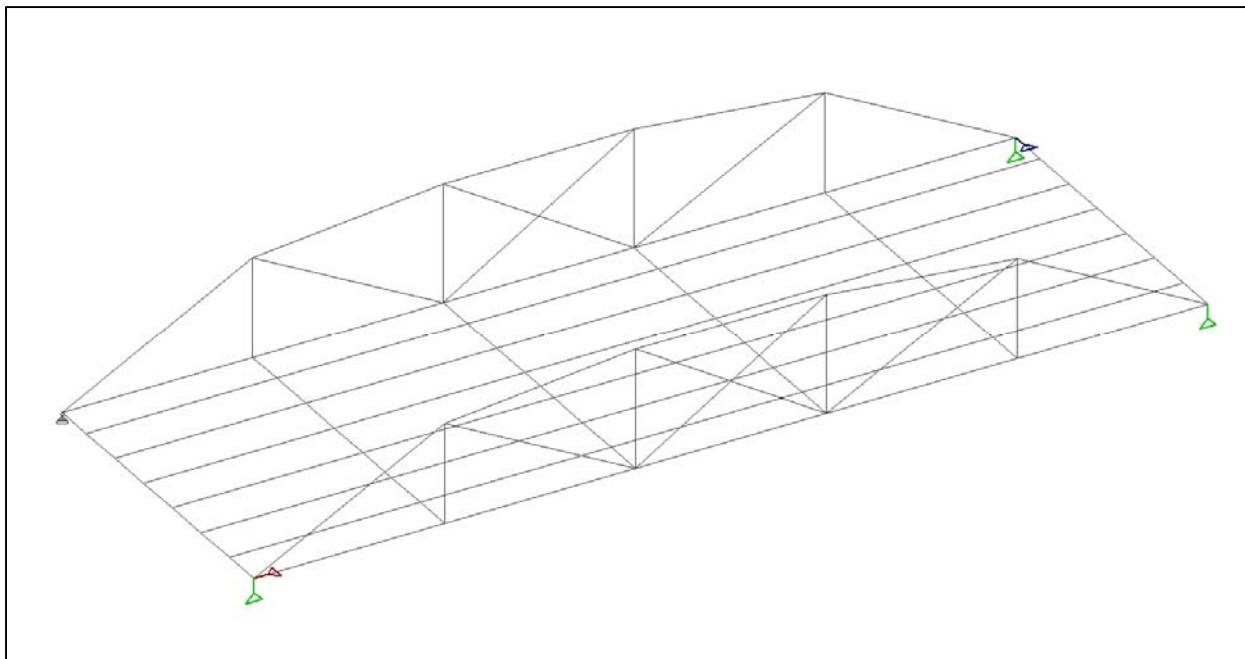


Figure 9 –STAAD.Pro Model of Pony Truss Approach Span

⁹ Guidelines for Historic Bridge Rehabilitation and Replacement, AASHTO, November 2008.

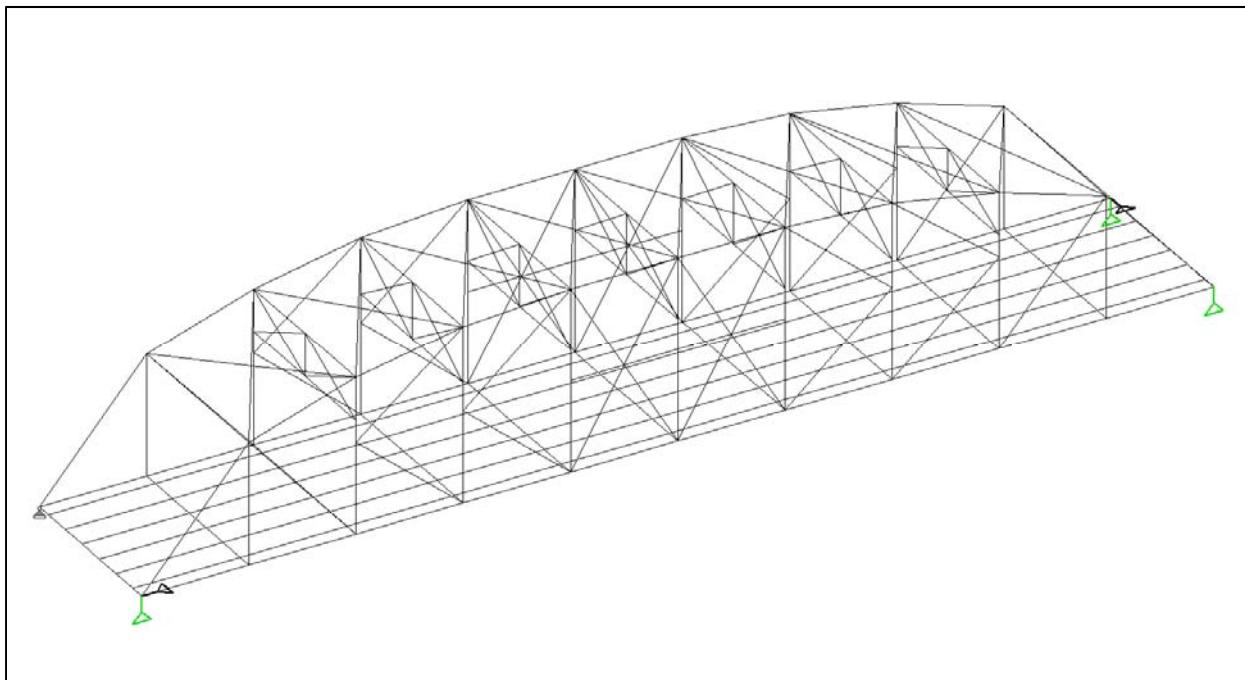


Figure 10 –STAAD.Pro Model of Main Through Truss Span

The dead load and live load due to the increased roadway width will cause several truss members to be overstressed. See Figures 11 and 12. In the pony truss approach spans, the top chord is overstressed. In the main through truss span, the majority of the top chord is overstressed, as are the diagonals at mid-span. Strengthening the top chord members can be accomplished by supplementing the built-up member with additional steel, typically another plate. Diagonal members with insufficient capacity can be strengthened by supplementing with steel sections. The members are wide flange sections riveted to gusset plates. Any supplemental steel bolted to the web needs to be sized to sit flush on the web between the flange fillets. Bolting supplemental steel on existing members is considered an acceptable treatment to historic bridges because the process is reversible.

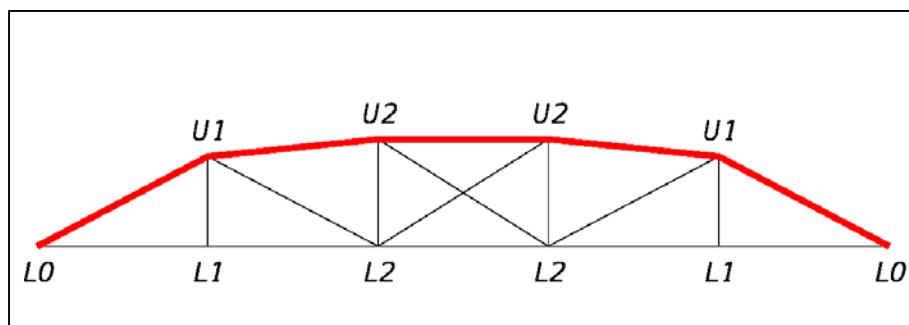


Figure 11 – Overstressed Members in Pony Truss Approach Span

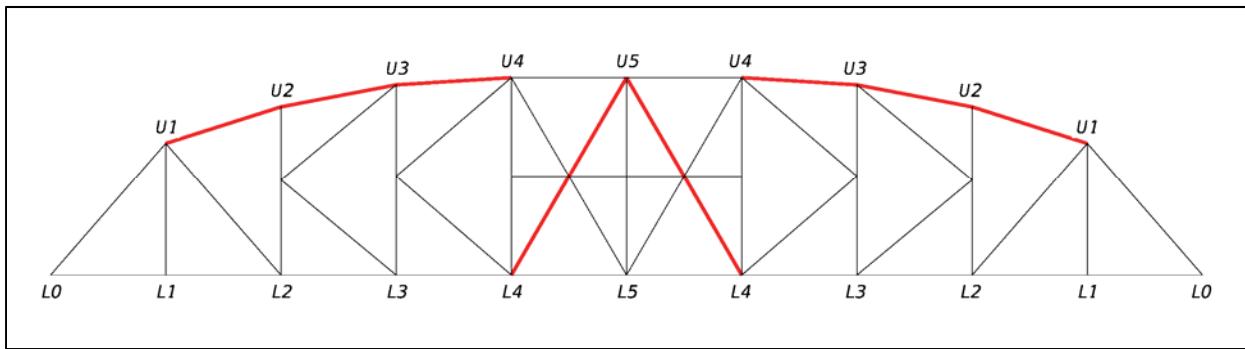


Figure 12 – Overstressed Members in Main Through Truss Span

Moving the truss lines out to provide the required roadway width will require replacement of the portal bracing, cross frames and lateral bracing in the main through truss span, and any lateral bracing below the decks for all truss spans. Replacement may affect related gusset plates, since the geometry of the bracing will be changing. The substandard vertical clearance can be addressed by installing new bracing that is similar in appearance to the existing, but with modifications at the low members to provide at least 6 inches of additional vertical clearance to meet minimum requirements.

Other superstructure work to be performed includes the following:

- Replacement of the lower chord gusset plates. The 2015 inspection report noted that gusset plates are distorted due to pack rust. A detailed analysis of the gusset plates may reveal more deterioration, so it is reasonable to consider replacement during extensive bridge rehabilitation. Because the truss requires removal to construct wider piers, this work will not require temporary supports of the truss at the panel points while replacement is done. For the purposes of preliminary evaluation, it has been assumed that half of the lower chord gusset plates will require replacement.
- Replacement of the existing sidewalks and supports in their current location outboard of the trusses. Because the sidewalks are only 4 feet wide, the new sidewalks and supports should provide at least 5 feet width to meet ADA requirements and eliminate the need for passing spaces every 200 feet.¹⁰
- Replacement of the truss bearings.
- Upgrading the roadway barriers and pedestrian railings to meet current criteria. The new railings should be designed to be attached to the new stringers, new floorbeams, or new deck and have a similar open look to the original railing. AASHTO LRFD Bridge Design Specifications includes discussion of the types of loads that such a railing should be designed to. Crash tested and approved railing types and configurations, as well as a host of other useful information, can be found on the FHWA Safety website for bridge railings:

¹⁰ Designing Sidewalks and Trails for Access, FHWA, updated February 10, 2014.

http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/barriers/bridge_railings/

- Cleaning and painting the entire structure. Given the age of the bridge, it is likely that the bridge has lead-based paint and that special containment will be required. The existing paint system should be tested to determine the presence of hazardous materials. It is recommended that a coatings specialist be retained to perform the tests and make recommendations for the containment, surface preparation and coating work required. In order to ensure the best quality paint application, the existing steel will need to be cleaned to bare metal per Structural Steel Painting Council (SSPC) Standard SP10, Near White Blast Cleaning. It should be noted that, even if the bridge were to be demolished, the presence of hazardous materials in the paint system should be verified and appropriate steps taken to ensure a safe environment for workers.

Modification of the existing substructures will be required in order to shift the truss lines out. Although not specifically designed, it is envisioned that the columns at the main piers would be widened using similar dimensions, with additional piles installed for support.

Following is a possible sequence to perform the work:

1. Close roadway and remove truss spans from supports after flooring system is removed. Provide level truss lay-down area adjacent to bridge or dismantle into sections for transport to steel fabrication facility. Make necessary modifications to trusses and gusset plates.
2. Install piles for widened abutments and intermediate piers.
3. Widen abutments and piers by splicing into existing structure.
4. Install new bearings.
5. Reinstall trusses on new supports.
6. Install new flooring system and sidewalks.
7. Reopen bridge to traffic.

Crane access to remove the truss spans will require incursion into Johnstone Park and could require a trestle bent placed in the river or some temporary fill within the river for placement of the crane. A hydraulic investigation will be needed to evaluate the effect of placing fill in the waterway on channel flow and the possibility of upstream flooding.

It appears that the historic Bartlesville Water Company Dam under the bridge is far enough away from the existing piers to avoid an adverse effect to them; however, not enough details were available regarding the width of the structure underwater to confirm this to be the case. An underwater survey of the river in the vicinity of the bridge is needed to identify the width of the dam structure as it crosses the bridge and confirm the proximity of the dam from the bridge piers. Care will need to be taken during construction to ensure that adding new piles or drilled shaft foundation elements does not damage the adjacent dam due to vibrations caused by driving piles or by downdrag forces induced by drilled shaft installation.

Review of a cultural resources survey report for the proposed bridge replacement¹¹ did not identify any other potential significant historic resources that would be impacted; Johnstone Park is considered “not eligible” due to a lack of integrity caused by numerous changes within the park since its creation and the eligible Carr/Bartles’ Mill is well north of the bridge, where work would occur. Impact of work on endangered species is unknown; however, a biological assessment performed in 2012¹² noted that the bridge is within the historic range of the endangered American burying beetle and within probable migratory pathways for the endangered Interior Least Tern and Whooping Crane, the threatened Piping Plover and the candidate Neosho mucket. Suitable habitat for the beetle was found within the study area that extended from Hensley Blvd. at the south (the T intersection south of the bridge) to about 1,700 feet north of the bridge. No suitable habitat was observed for the other species during the study. Any incursion into the park for construction access will need to evaluate whether any protected species is present in that area. Care must be taken during construction to ensure that accommodations are made for any protected species found to be on the site including, if needed, scheduling the work to occur outside of normal migratory periods.

The Project Initiation Report identified required permits for a new bridge from the following agencies: Federal Aviation Administration, US Army Corps of Engineers, and the Oklahoma Water Resources Board. The work detailed above for this alternative is likely to require permits from the same identified agencies, since work will include construction in the river and use of cranes.

The effect of rehabilitation on the overall bridge ratings is as follows:

- Deck overall rating – deck will be all new, so overall rating will improve, from poor to good or very good condition.
- Superstructure overall rating – the lower chord, noted to be in serious condition, will have gusset plates replaced and repairs made, if needed, and stringers and floorbeams, components in poor condition, will be replaced. Overall rating should improve, from poor to fair or satisfactory condition.
- Substructure overall rating – substructure elements will remain, but be repaired and supplemented by new columns to support the widened structure. The overall rating is likely to improve to fair or satisfactory condition.

Note that the bridge is still considered fracture critical, even after all work is performed. The probable cost to complete the work as described above is approximately \$7.7 million. This cost does not include any work to the roadway approaches to the bridge, which was not part of this scope of work. A more detailed breakdown of costs and the results of the analyses performed are included in Appendix B. The cost for maintenance and inspection of the bridge over 20 years for this alternative is \$250,000 (in 2014 dollars).

¹¹ Cultural Resources Survey Report, J/P No. 24348(10), ODOT, October 2013.

¹² Threatened, Endangered, and Candidate Species, Designated Critical Habitat, Bald Eagle and Swallow Assessment, J/P No. 24348(10), ODOT, August 2012.

The work described in this alternative is not anticipated to adversely affect the distinguishing characteristics of the truss spans.

Alternative 2(b) – Rehabilitation of existing bridge, eliminating fracture critical designation

In order to make the bridge non-fracture critical, it is necessary to provide load path redundancy within each truss, which is an inherently non-redundant structure. To that end, concepts that would retain the truss lines in some fashion, while providing redundant load paths, were considered. The most reasonable option, in order to retain the truss lines in some fashion, is removal of the truss spans and installation of a new three-span continuous multi-beam steel superstructure with a concrete deck, to which the existing trusses would be re-attached using diaphragms at the lower chord panel points. The cantilevered sidewalks would be retained on the final structure. It is important that the truss continue to function as a truss, so the design would incorporate the trusses generally supporting their own weight and that of the sidewalk.

The new girders would likely be deeper than the location of the bottom chord, causing a reduction in the low member clearance in all spans. This may impact the park access road under the south end span. An analysis of the ability to raise the roadway profile and keep the low member elevation the same was not conducted as part of this study. Hydraulic study may be needed to confirm that such a reduction will not have a negative impact on the structure. As an alternative, the roadway profile could be raised, since the trusses are moving off their supports.

Additionally, the intermediate piers would require changes, to widen them for installation of the trusses, and to install foundations between the end columns to support the new steel beams.

Work required to rehabilitate the trusses for inclusion would include:

- Replacement of the existing sidewalks and brackets outboard of the trusses.
- Upgrading the pedestrian railings to current criteria.
- Replacement of truss bearings.
- Cleaning and painting of the trusses.

See Alternative 2(a) for additional information regarding these items. The gusset plates have not been identified for replacement because the loads on the trusses will be minimal after they are attached to the new superstructure.

Crane access to remove the truss spans will require incursion into Johnstone Park and could require a trestle bent placed in the river or some temporary fill within the river for placement of the crane. A hydraulic investigation will be needed to evaluate the effect of placing fill in the waterway on channel flow and the possibility of upstream flooding.

It appears that the historic Bartlesville Water Company Dam under the bridge is far enough away from the existing piers to avoid an adverse effect to them; however, not enough details were available regarding the width of the structure underwater to confirm this to be the case. An underwater survey of the river in the vicinity of the bridge is needed to identify the width of the dam structure as it crosses the bridge and confirm the proximity of the dam from the bridge piers. Care will need to be taken during construction to ensure that adding new piles or drilled shaft foundation elements does not damage the adjacent dam due to vibrations caused by driving piles or by downdrag forces induced by drilled shaft installation.

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The Project Initiation Report identified required permits for a new bridge from the following agencies: Federal Aviation Administration, US Army Corps of Engineers, and the Oklahoma Water Resources Board. The work detailed above for this alternative is likely to require permits from the same identified agencies, since work will include construction in the river and use of cranes.

The effect of rehabilitation on the overall bridge ratings is as follows:

- Deck overall rating – deck will be all new, so overall rating will improve, from poor to good or very good condition.
- Superstructure overall rating – the main load carrying support system will be all new, so overall rating will improve, from poor to good or very good condition. The truss reattached to the new structure would not be a primary load carrying element and thus its condition would not affect the overall rating.
- Substructure overall rating – substructure elements supporting the new beams will be new, so overall rating will improve, from poor to good or very good condition.

In order to evaluate this option, square foot costs for new bridges were used and additional costs included to account for truss attachment to the new beams, new top chord lateral

bracing, new truss bearings, and cleaning and painting the trusses. Because this option is essentially creating a new bridge, supporting the existing truss structure, it is anticipated that the bridge will have a 75 year design life, similar to that of a new bridge. The probable cost to complete the work as described above is approximately \$6.5 million. This cost does not include any work to the 24 feet wide roadway approaches to the bridge, which was not part of this scope of work. A more detailed breakdown of costs and the results of the analyses performed are included in Appendix C. The cost for maintenance and inspection of the bridge over 20 years for this alternative is \$140,000 (in 2014 dollars).

There is a savings associated with no longer having the bridge classified as fracture critical. Fracture critical truss bridges require hands-on inspection of the floor beams, bottom chords, and diagonals. Accessing these members generally requires specialized equipment, such as high-reach bucket lifts or under bridge inspection vehicles. Alternatively, free climbing / rope access techniques can be used. Both of these options are costly, take more time and personnel than non-fracture critical bridges to inspect, and often require traffic control. The cost to perform inspections every other year on a non-fracture critical bridge at this location is estimated to save \$5,000 annually when compared to the effort need to inspect the existing bridge annually and with increasing frequency as it continues to deteriorate.

The work described in this alternative is not anticipated to adversely affect the distinguishing characteristics of the truss spans.

Alternative 3 - Build on New Location

The options considered within this alternative are threefold:

- 3(a): Retaining the existing bridge in vehicular service as part of a one-way couplet, with bridge remaining fracture critical
- 3(b): Retaining the existing bridge in vehicular service as part of a one-way couplet, eliminating fracture critical designation
- 3(c): Leaving the bridge in place for pedestrian use or as a monument

The scope of work for this project does not include assessment of any new build alignments. Refer to a concept study prepared by others in 2012¹³ for discussion of new build alignments.

Alternative 3(a) - Retain existing bridge in vehicular service as part of a one-way couplet, bridge remains fracture critical

The bridge is not load posted, so current member capacities are considered adequate for current bridge use. It is not necessary to supplement bridge elements with additional materials. By designating the bridge traffic one way, the bridge can be striped for one 12 feet

¹³ Concept Study for SH-123 over the Caney River – Draft Report, ODOT, September 2012.

wide travel lane with 8 feet wide outside shoulder and 4 feet wide inside shoulder in order to provide a means to pass should a vehicle break down in the travel lane. This will require work to the approach roadway, such as restriping or other work to provide the appropriate width.

The flooring system across the bridge, including deck, stringers, floorbeams, and lateral bracing, should be replaced due to the poor condition of the stringers, floorbeams and bracing. These can be replaced with no adverse effect on the truss spans, as discussed in the discussion of Alternative 2(a).

The vertical clearance will need to be addressed, as described in Alternative 2(a), to provide the additional clearance. To accomplish this, the lower horizontal members, diagonals and verticals of the upper chord lateral bracing system require modification by moving the lower horizontal members up and installing new or modifying the existing diagonals and verticals. Diagonals and gusset plates within the portals will likely require replacement to accommodate the new angles at connections.

Other superstructure work to be performed includes replacement of the existing sidewalks and supports, replacement of some lower chord gusset plates, replacement of the truss bearings, upgrading the roadway barriers and existing pedestrian railings to meet current criteria, and cleaning and painting the entire structure. A discussion of issues related to these items is presented in Alternative 2(a). For estimating purposes, only a quarter of the lower chord gusset plates have been assumed to require replacement, since the lower chords of both truss span types have demand-capacity ratios well below 1.0.

The existing substructures do not appear to require significant work; however, holes for new adhesive or mechanical anchor bolts must be drilled as part of the bearing replacement. Jacking the trusses will be required to install the new bearings. This can be done either from locations on the piers or abutments, or using temporary supports braced to the existing piers. Analysis will be required to determine the suitability of either method, or if a different method will be required.

Following is a possible sequence to perform the work:

1. Close bridge and remove sidewalks and flooring system.
2. Make necessary modifications to trusses and gusset plates.
3. Jack trusses and install new bearings. Lower trusses back onto substructures when complete.
4. Install new flooring system and repair cantilevered sidewalks.
5. Clean and paint bridge.
6. Reopen bridge to traffic.

It is envisioned that work can be performed from the deck, and that a large crane will not be needed for work. For this reason, it is anticipated that protected species and their habitat will not be at risk.

The Project Initiation Report identified required permits for a new bridge from the following agencies: Federal Aviation Administration (FAA), US Army Corps of Engineers, and the Oklahoma Water Resources Board. The work detailed above does not require construction in the river, so it is anticipated that a permit may be required from the FAA only. However, the other agencies should be consulted once the overall project scope, that would include the described work to the existing bridge, is thoroughly defined.

The effect of these repairs on the overall bridge ratings is as follows, and is similar to the improvements noted in Alternative 2(a):

- Deck overall rating – deck will be all new, so overall rating will improve, from poor to good or very good condition.
- Superstructure overall rating – the lower chord, noted to be in serious condition, will have gusset plates replaced and repairs made, if needed, and stringers and floorbeams, components in poor condition, will be replaced. Overall rating should improve, from poor to fair or satisfactory condition.
- Substructure overall rating – spall and crack repairs will improve overall rating from poor condition to fair or satisfactory condition.

Note that the bridge is still considered fracture critical, even after all work is performed. The probable cost to complete the work as described above is approximately \$6.5 million. This cost does not include any work to the roadway approaches to the bridge or the cost of the new bridge half of the couplet, which was not part of this scope of work. A more detailed breakdown of costs and the results of the analyses performed are included in Appendix D. The cost for maintenance and inspection of the bridge over 20 years for this alternative is \$250,000 (in 2014 dollars).

The work described in this alternative is not anticipated to adversely affect the distinguishing characteristics of the truss spans.

Alternative 3(b) - Retain existing bridge in vehicular service as part of a one-way couplet, eliminating fracture critical designation

As with Alternative 2(b), in order to make the bridge non-fracture critical it is necessary to provide load path redundancy within each truss, which is an inherently non-redundant structure. The most reasonable option, in order to retain the truss lines in some fashion, is temporary removal of the truss spans and installation of a new three-span continuous multi-beam steel superstructure with a concrete deck, to which the existing trusses could be attached using diaphragms at the lower chord panel points. The cantilevered sidewalks would be retained on the final structure.

It is important that the truss continue to function as a truss, so the design would include the trusses generally supporting their own weight and that of the sidewalk. The new girders would

likely be deeper than the location of the bottom chord. Additionally, the intermediate piers would require changes, to install foundations between the end columns to support the new steel beams.

Crane access to remove the truss spans will require incursion into Johnstone Park and could require a trestle bent placed in the river or some temporary fill within the river for placement of the crane. A hydraulic investigation will be needed to evaluate the effect of placing fill in the waterway on channel flow and the possibility of upstream flooding.

It appears that the historic Bartlesville Water Company Dam under the bridge is far enough away from the existing piers to avoid an adverse effect to them; however, not enough details were available regarding the width of the structure underwater to confirm this to be the case. An underwater survey of the river in the vicinity of the bridge is needed to identify the width of the dam structure as it crosses the bridge and confirm the proximity of the dam from the bridge piers. Care will need to be taken during construction to ensure that adding new piles or drilled shaft foundation elements does not damage the adjacent dam due to vibrations caused by driving piles or by downdrag forces induced by drilled shaft installation.

Review of a cultural resources survey report for the proposed bridge replacement did not identify any significant historic resources that would be impacted; Johnstone Park is considered “not eligible” due to a lack of integrity caused by numerous changes within the park since its creation and the eligible Carr/Bartles’ Mill is well north of the bridge, where work would occur. Impact of work on endangered species is unknown; however, a biological assessment performed in 2012 noted that the bridge is within the historic range of the endangered American burying beetle and within probable migratory pathways for the endangered Interior Least Tern and Whooping Crane, the threatened Piping Plover and the candidate Neosho mucket. Suitable habitat for the beetle was found within the study area that extended from Hensley Blvd. at the south (the T intersection south of the bridge) to about 1,700 feet north of the bridge. No suitable habitat was observed for the other species during the study. Any incursion into the park for construction access will need to evaluate whether any protected species is present in that area. Care must be taken during construction to ensure that accommodations are made for any protected species found to be on the site including, if needed, scheduling the work to occur outside of normal migratory periods.

The Project Initiation Report identified required permits for a new bridge from the following agencies: Federal Aviation Administration, US Army Corps of Engineers, and the Oklahoma Water Resources Board. The work detailed above for this alternative is likely to require permits from the same identified agencies, since work will include construction in the river and use of cranes.

In order to evaluate this option, square foot costs for new bridges were used and additional costs included to account for truss attachment to the new beams, new top chord lateral bracing, new truss bearings, and cleaning and painting the trusses. Because this option is essentially creating a new bridge, supporting the existing truss structure, it is anticipated that the bridge will have a 75 year design life, similar to that of a new bridge. The probable cost to

complete the work as described above is approximately \$5.1 million. This cost does not include any work to the roadway approaches to the bridge or the cost of the new bridge half of the couplet, which was not part of this scope of work. A more detailed breakdown of costs and the results of the analyses performed are included in Appendix E. The cost for maintenance and inspection of the bridge over 20 years for this alternative is \$140,000 (in 2014 dollars).

There is a savings associated with no longer having the bridge classified as fracture critical. Fracture critical truss bridges require hands-on inspection of the floor beams, bottom chords, and diagonals. Accessing these members generally requires specialized equipment, such as high-reach bucket lifts or underbridge inspection vehicles. Alternatively, free climbing / rope access techniques can be used. Both of these options are costly, take more time and personnel than non-fracture critical bridges to inspect, and often require traffic control. The cost to perform inspections every other year on a non-fracture critical bridge at this location is estimated to save \$10,000 annually when compared to the effort need to inspect the existing bridge annually and with increasing frequency as it continues to deteriorate.

The work described in this alternative is not anticipated to adversely affect the distinguishing characteristics of the truss spans.

Alternative 3(c) – Retain the bridge in place, either as a non-functional “monument” or as a non-vehicular pedestrian or bicycle facility

Use of the bridge for a non-vehicle use, such as a dedicated bridge for pedestrians and bicyclists, was evaluated using the AASHTO pedestrian bridge guidance. The existing bridge was analyzed using a pedestrian load of 90 pounds per square foot.¹⁴ For the main truss span, the pedestrian loading causes higher loads than the design trucks and requires that the main truss be strengthened. The bridge in its current condition is adequate to support maintenance vehicles. Figure 13 shows the main truss members that require strengthening. For this use, the flooring system should also be replaced, including deck, stringers, floorbeams and lateral bracing. This will remove the members in the worst condition on the trusses, as well as allow for installation of a possible lighter weight deck. As discussed in the rehabilitation alternative, strengthening can be done without causing an adverse effect on the historic bridge. The cost for this work would be between the cost of making the bridge adequate for one-way traffic use and the rehabilitation alternative, so this has been dismissed as a reasonable solution.

¹⁴ LRFD Guide Specifications for the Design of Pedestrian Bridges, AASHTO, December 2009.

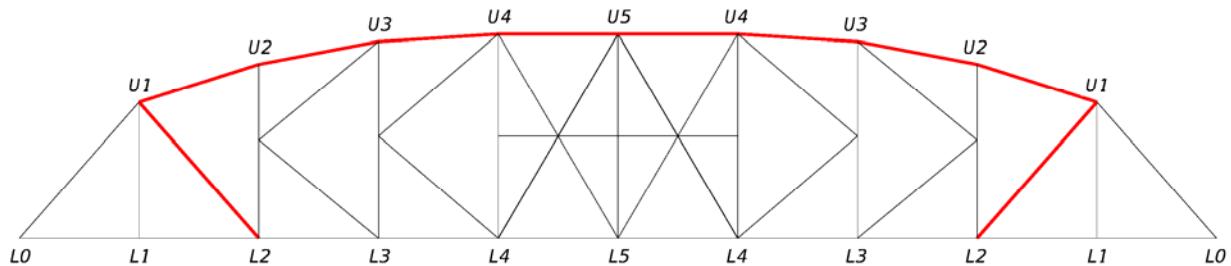


Figure 13 – Main Through Truss Span Members Overstressed Due to Pedestrian Loads

A more cost-effective solution that will not require strengthening of the trusses or replacement of the flooring system, yet provides access for pedestrians and bicyclists, is to delineate a narrower path by use of permanent railings down the center of the bridge. Analysis indicates that a pedestrian load of 80 pounds per square foot does not require strengthening of the bridge. This equates to an effective sidewalk width of 23 feet. If the existing 4 feet wide cantilevered sidewalks remain, the pathway between the trusses should be narrowed to 15 feet wide. In addition to the above work to make the bridge suitable for pedestrian use, the existing sidewalks require installation of railings that meet current design specifications, the sidewalks should be replaced due to the poor condition of the support stringers, and the bridge should be cleaned and painted. In order to provide a bridge without problems at the end of the project, it is recommended that the bridge be cleaned and painted after all deck work is done, to ensure that as much steel as possible is exposed and will have the noted pack rust and corrosion throughout the stringers and floorbeams at their top flanges cleaned properly prior to painting. Although not included in our cost proposal, common amenities added to structures converted to an adaptive use include refinishing or replacing the concrete deck, and installation of lighting. Transfer of the bridge to the City of Bartlesville or other public agency should be arranged prior to work, in order to ensure that the bridge continues to be cared for after the work is completed, since no bridge is maintenance free.

It is envisioned that work can be performed from the deck, and that a large crane will not be needed for work. For this reason, it is anticipated that protected species and their habitat will not be at risk.

The Project Initiation Report identified required permits for a new bridge from the following agencies: Federal Aviation Administration (FAA), US Army Corps of Engineers, and the Oklahoma Water Resources Board. The work detailed above does not require construction in the river, so it is anticipated that a permit may be required from the FAA only. However, the other agencies should be consulted once the overall project scope, that would include the described work to the existing bridge, is thoroughly defined.

The probable cost to complete the work as described above to convert the bridge to a pedestrian use is approximately \$2.6 million. This cost does not include any work to the

roadway approaches to the bridge, which was not part of this scope of work. A more detailed breakdown of costs and the results of the analyses performed are included in Appendix F. The cost for maintenance and inspection of the bridge over 20 years for this alternative is \$0 if left in place as a monument and \$100,000 if a pedestrian bridge (in 2014 dollars).

For use as a monument, steps need to be taken to prevent public access to the bridge. The cost to secure the bridge from the public using fencing and barricades or guardrail, and related activities, is considered to be very minor in nature and has not been prepared as part of this study. However, the bridge will continue to deteriorate and some maintenance will be required. If simple maintenance is not performed and access to do so is not provided, the structure will become a liability to the owner.

SUMMARY OF FINDINGS

Category	Avoidance Alternatives					
	#1: Do Nothing	#2: Rehabilitation of Existing Bridge		#3: Build on New Location		
		#2(a) Bridge Remains Fracture Critical	#2(b): Eliminate Fracture Critical Elements	#3(a): Bridge Remains Fracture Critical	#3(b): Eliminate Fracture Critical Elements	#3(c): Existing Bridge as Pedestrian Bridge/Monument
Maintenance	<ul style="list-style-type: none"> Increased inspection frequency Increased frequency of repairs to address section loss in steel, particularly stringers and floorbeams Increased frequency of maintenance, including spot painting, required 	<ul style="list-style-type: none"> Minimal maintenance required for first 20-25 years, after which spot painting will be required Structural repairs should not be required if regular program of cleaning the trusses and spot painting areas of corrosion is initiated 	<ul style="list-style-type: none"> Minimal maintenance required for first 20-25 years, after which spot painting required for the truss and the continuous steel beams Structural repairs should not be required if regular program of cleaning the trusses and spot painting areas of corrosion is initiated 	<ul style="list-style-type: none"> Minimal maintenance required for first 20-25 years, after which spot painting will be required Structural repairs should not be required if regular program of cleaning the trusses and spot painting areas of corrosion is initiated 	<ul style="list-style-type: none"> Minimal maintenance required for first 20-25 years, after which spot painting required for the truss and the continuous steel beams Structural repairs should not be required if regular program of cleaning the trusses and spot painting areas of corrosion is initiated 	<ul style="list-style-type: none"> Likely transfer from ODOT to local agency Increased inspection frequency Increased frequency of repairs to address section loss in steel, particularly stringers and floorbeams Increased frequency of maintenance
Geometric Adequacy	<ul style="list-style-type: none"> Roadway width remains substandard Vertical clearance on bridge remains substandard Sidewalks do not meet ADA requirements Remains Functionally Obsolete 	<ul style="list-style-type: none"> Provides 32 feet roadway width Provides 5 feet wide sidewalks to meet ADA requirements Provides required minimum vertical clearance No longer Functionally Obsolete 	<ul style="list-style-type: none"> Provides 32 feet roadway width Provides 5 feet wide sidewalks to meet ADA requirements Provides required minimum vertical clearance No longer Functionally Obsolete 	<ul style="list-style-type: none"> Provides 12 feet wide lane, 8 feet wide outside shoulder and 4 feet wide inside shoulder Provides 5 feet wide sidewalks to meet ADA requirements Provides required minimum vertical clearance No longer Functionally Obsolete 	<ul style="list-style-type: none"> Provides 12 feet wide lane, 8 feet wide outside shoulder and 4 feet wide inside shoulder Provides 5 feet wide sidewalks to meet ADA requirements Provides required minimum vertical clearance No longer Functionally Obsolete 	<ul style="list-style-type: none"> Retains 4 feet wide sidewalks outboard of truss lines Pedestrian use requires a 15 feet wide delineated path between truss lines to avoid truss strengthening – meets ADA requirements Pedestrian use requires new railings to meet current requirements for railing openings No longer Functionally Obsolete, as it is no longer open to vehicle traffic
Structural Adequacy	<ul style="list-style-type: none"> Bridge is not currently load posted, but lack of action will eventually cause posting and closure Remains Structurally Deficient 	<ul style="list-style-type: none"> No load posting Remains Fracture Critical No longer Structurally Deficient 	<ul style="list-style-type: none"> No load posting Fracture Critical Members eliminated No longer Structurally Deficient 	<ul style="list-style-type: none"> No load posting Remains Fracture Critical No longer Structurally Deficient 	<ul style="list-style-type: none"> No load posting Fracture Critical Members eliminated No longer Structurally Deficient 	<ul style="list-style-type: none"> No truss strengthening required Monument use requires fencing or other means to keep public off bridge, yet allow access for maintenance vehicles No longer considered Structurally Deficient, as it is no longer carrying vehicles
Environmental Impacts	<ul style="list-style-type: none"> No impacts identified 	<ul style="list-style-type: none"> Lead paint remediation likely Johnstone Park, while not eligible for the NRHP as a historic district, will be impacted by need for crane access to remove the existing truss and construct required rehabilitation Bartlesville Water Company Dam is eligible for NRHP as a contributing resource to the bridge. Based on the visible portion of dam, it appears that new foundations can be constructed without damaging the dam. Temporary access for construction equipment should not impact the dam. However, width of structure underwater is unknown and survey will be required to confirm this. 	<ul style="list-style-type: none"> Lead paint remediation likely Johnstone Park, while not eligible for the NRHP as a historic district, will be impacted by need for crane access to remove the existing truss and construct required rehabilitation Bartlesville Water Company Dam is eligible for NRHP as a contributing resource to the bridge. Based on the visible portion of dam, it appears that new foundations can be constructed without damaging the dam. Temporary access for construction equipment should not impact the dam. However, width of structure underwater is unknown and survey will be required to confirm this. 	<ul style="list-style-type: none"> Lead paint remediation likely Access for work from approach roadway and bridge deck possible 	<ul style="list-style-type: none"> Lead paint remediation likely Johnstone Park, while not eligible for the NRHP as a historic district, will be impacted by need for crane access to remove the existing truss and construct required rehabilitation Bartlesville Water Company Dam is eligible for NRHP as a contributing resource to the bridge. Based on the visible portion of dam, it appears that new foundations can be constructed without damaging the dam. Temporary access for construction equipment should not impact the dam. However, width of structure underwater is unknown and survey will be required to confirm this. 	<ul style="list-style-type: none"> Lead paint remediation likely

Category	Avoidance Alternatives					
	#1: Do Nothing	#2: Rehabilitation of Existing Bridge		#3: Build on New Location		
		#2(a) Bridge Remains Fracture Critical	#2(b): Eliminate Fracture Critical Elements	#3(a): Bridge Remains Fracture Critical	#3(b): Eliminate Fracture Critical Elements	#3(c): Existing Bridge as Pedestrian Bridge/Monument
Permits	• None required	• Federal Aviation Administration • US Army Corps of Engineers • Oklahoma Water Resources Board	• Federal Aviation Administration • US Army Corps of Engineers • Oklahoma Water Resources Board	• Federal Aviation Administration	• Federal Aviation Administration • US Army Corps of Engineers • Oklahoma Water Resources Board	• Federal Aviation Administration
Adverse Effects on Historic Bridge	• None	• None are expected – installing new foundations outboard of existing substructure, bolting additional steel to substandard members. Bridge retains appearance and function	• Effect determination will require consultation with SHPO – expected that work will not cause an adverse effect • New and existing clearly delineated	• None are expected – bridge retains appearance and function	• Effect determination will require consultation with SHPO – expected that work will not cause an adverse effect • New and existing clearly delineated	• None are expected – bridge retains appearance and function
Cost	\$ 0	\$ 7.7 million (bridge only, does not include work on approach roadways)	\$ 6.5 million (bridge only, does not include work on approach roadways) Savings of about \$10,000 annually by eliminating need for close up inspection of fracture critical elements	\$ 6.5 million (existing bridge only, does not include cost for new bridge or work on approach roadways)	\$ 5.1 million (existing bridge only, does not include cost for new bridge or work on approach roadways) Savings of about \$10,000 annually by eliminating need for close up inspection of fracture critical elements	\$ 2.6 million (pedestrian use – does not include work on approaches or cost for new bridge on a new alignment)
Estimated 20-year Maintenance and Inspection Cost (2014 dollars)	\$ 2 million	\$ 250,000	\$ 140,000	\$ 250,000	\$ 140,000	\$ 100,000

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Threatened, Endangered, and Candidate Species, Designated Critical Habitat, Bald Eagle, and Swallow Assessment, J/P Number 24348(10), ODOT, August 15, 2012. Prepared by: Enercon Services, Inc.

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APPENDIX A

Field Review Notes and Photographs



OKLAHOMA DEPARTMENT OF TRANSPORTATION

Bridge Division
200 N.E. 21st Street
Oklahoma City, OK 73105-3204
www.odot.org

April 10, 2015

To: Division VIII Division Engineer
From: Daniel Knickmeyer, PE
Re: Fracture Critical Bridge Inspection Report of SH123 over the Caney River
NBI 05521; Structure 7413 0165 X

On April 1, 2015 ODOT Bridge Division performed a fracture critical and routine bridge inspection of the subject bridge. The bridge is a three span structure with spans numbered from south to north and consisting of:

Span 1&3: 100' Pony Truss Span (STD E-100 (4&5))
Span 2: 210' High Truss Span (STD E-210 (4&5))

- The inspection team included Daniel Knickmeyer, PE and Wes Kellogg, PE.
 - The bridge is currently open to legal traffic with no restriction.

Year	58 Deck	59 Super	60 Sub	61 Channel	Sufficiency
Pervious (2013)	5 (Fair)	4 (Poor)	5 (Fair)	7 (Good)	33.6
Current (2015)	4 (Poor)	4 (Poor)	4 (Poor)	7 (Good)	29.9

In order of decreasing priority, the recommended action for this structure is as follows:

PX: Post 10 tons until gusset plate repairs can be made.

PX: Plate corrosion hole at span 1, east truss, L3 gusset plate.

PX: Repair cracked gusset plate at span3, west truss, L0 gusset.

PX: Close sidewalks to pedestrians due to condition of interior beams.

PX: Once repairs have been made a permanent posting may be warranted due to the overall condition of the structure.

FX: Monitor out of plane distortion of gusset plate due to pack rust.

FX: Monitor the 1" corrosion hole in L1U1 at span 1, east truss.

FX: Monitor corrosion holes in floor beams.

FX: Monitor corrosion to gusset repairs and corrosion holes.

FX: Monitor stiff leg repairs.

In addition to these recommendations it is recommended that this structure remain on a 24 month Routine/Fracture Critical inspection frequency and a 24 month Other/Special inspection frequency.

Sincerely,


Daniel Kniekemeyer, PE
DK/dk



cc: Steve Jacobi
Wes Kellogg
Ali Salami

Walt Peters
Matt Casillas
File

"The mission of the Oklahoma Department of Transportation is to provide a safe, economical, and effective transportation network for the people, commerce and communities of Oklahoma."



NBI Item 36 – Traffic Safety

Traffic Safety (6 Satisfactory Condition)

- No comments noted.

NBI Item 58 -Deck

Deck (4 Poor Condition)

- 2" concrete overlay.
- Moderate cracking and spalling in the overlay.
- Curbs have advance deterioration and are in effective in most areas.
- All joints are leaking.
- False work present at most joints.

NBI Item 59 - Superstructure

Fracture Critical Member Summary	
Floor Beams	4
Truss Lower Chord	3
Truss Web Members	4

Stringers (4 Poor Condition)

- Moderate section losses throughout
- Moderate pack rust to top flanges.
- Poor stringer cope radii.

[FCM] Floor Beams (4 Poor Condition)

- FX: Corrosion hole at span 1, floor beam 0, near stringer 6.
- FX: Corrosion hole at span 1, floor beam 2, near stringer 6.
- FX: Corrosion hole at span 2, floor beam 10, near stringer 1.
- Moderate section losses and pack rust to top flanges.
- Moderate section to bottom flanges at lower lateral connections.
- FX: All end floor beams have been stiff-legged.
- End floor beams at piers 1 and 2 have had angles welded to outer flanges due to section losses.

Floor Bracing System (4 Poor Condition)

- Moderate section losses to lower lateral bracing and gussets.
- Fracture lower lateral gusset plates.
- Fracture hanger rods throughout.

Truss Upper Chord (6 Satisfactory Condition)

- Isolated areas of surface rust.

[FCM] Truss Lower Chord (3 Serious Condition)

- PX: Span 1, east truss, L3 gusset plate has a 4"x6" corrosion hole.
- PX: Span3, west truss, L0 gusset plate is cracked approximately 8".
- Moderate section loss to lower cord at panel points.
- Significant pack rust and distortion at panel points.
- FX: Small corrosion hole at the top corners of both inner L0 gusset plate at span 1, pier 1.
- FX: Repaired L0 gusset plate cracks at span1, pier 1.
- FX: Out of plane distortion of gusset plate due to pack rust.



[FCM] Truss Web Members (4 Poor Condition)

- FX: 1" corrosion hole in L1U1 at span 1, east truss.
- Isolated areas of surface rust.

Truss End Posts (6 Satisfactory Condition)

- Isolated areas of surface rust.

Member Alignment (4 Poor Condition)

- FX: Out of plane distortion of gusset plate due to pack rust.

Paint/Coating System (3 Serious Condition)

- Paint system has failed.

Load Deflection (5 Fair Condition)

- FX: Stiff legs have been installed.

Pedestrian sidewalks (3 Serious Condition)

- PX: Sidewalks are recommended to be close to pedestrians.
- Serious deterioration and numerous corrosion holes to interior beam.
- Many locations the interior beams are not in contact with support due to pack rust.

NBI Item 60 - Substructure

Abutments (4 Poor Condition)

- Moderate cracking and spalling with exposed rebar at north abutment.
- Cracking and efflorescence at south abutment.

Piers (4 Poor Condition)

- Moderate spalls with exposed rebar at pier 2.
- Minor cracking and spalling throughout.

Bearings (4 Poor Condition)

- FX: Bearings have uplift and rotation due to excessive pack rust.
- Moderate section losses and pack to all bearings.

NBI Item 61 – Channel and Channel Protection

Channel Scour (7 Good Condition)

- No comments noted.

Embankment Erosion (7 Good Condition)

- No comments noted.

Debris (6 Satisfactory Condition)

- Debris is slightly restricting the channel.

Vegetation (7 Good Condition)

- No comments noted.

Approaches

Approach Roadway Condition (4 Poor Condition)

- Approach road is breaking up at both ends of the bridge.



Approach Roadway Settlement (4 Poor Condition)

- Approach road has settled increasing impact to the structure.

NBI Item 113 – Scour

Scour (8 Stable above Footing)

- No change in scour rating is recommended.

NBI 05521
Str. 7413 0165 X
Washington Co.
SH123 over Caney River
April 01, 2015



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Str. 7413 0165 X
Washington Co.
SH123 over Caney River
April 01, 2015



NBI 05521
Str. 7413 0165 X
Washington Co.
SH123 over Caney River
April 01, 2015

Span 1
LI UL
East

NBI 05521
Str. 7413 0165 X
Washington Co.
SH123 over Caney River
April 01, 2015

Span 1
FB2
ES

NBI 05521
Str. 7413 0165 X
Washington Co.
SH123 over Caney River
April 01, 2015



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Washington Co.
SH123 over Caney River
April 01, 2015



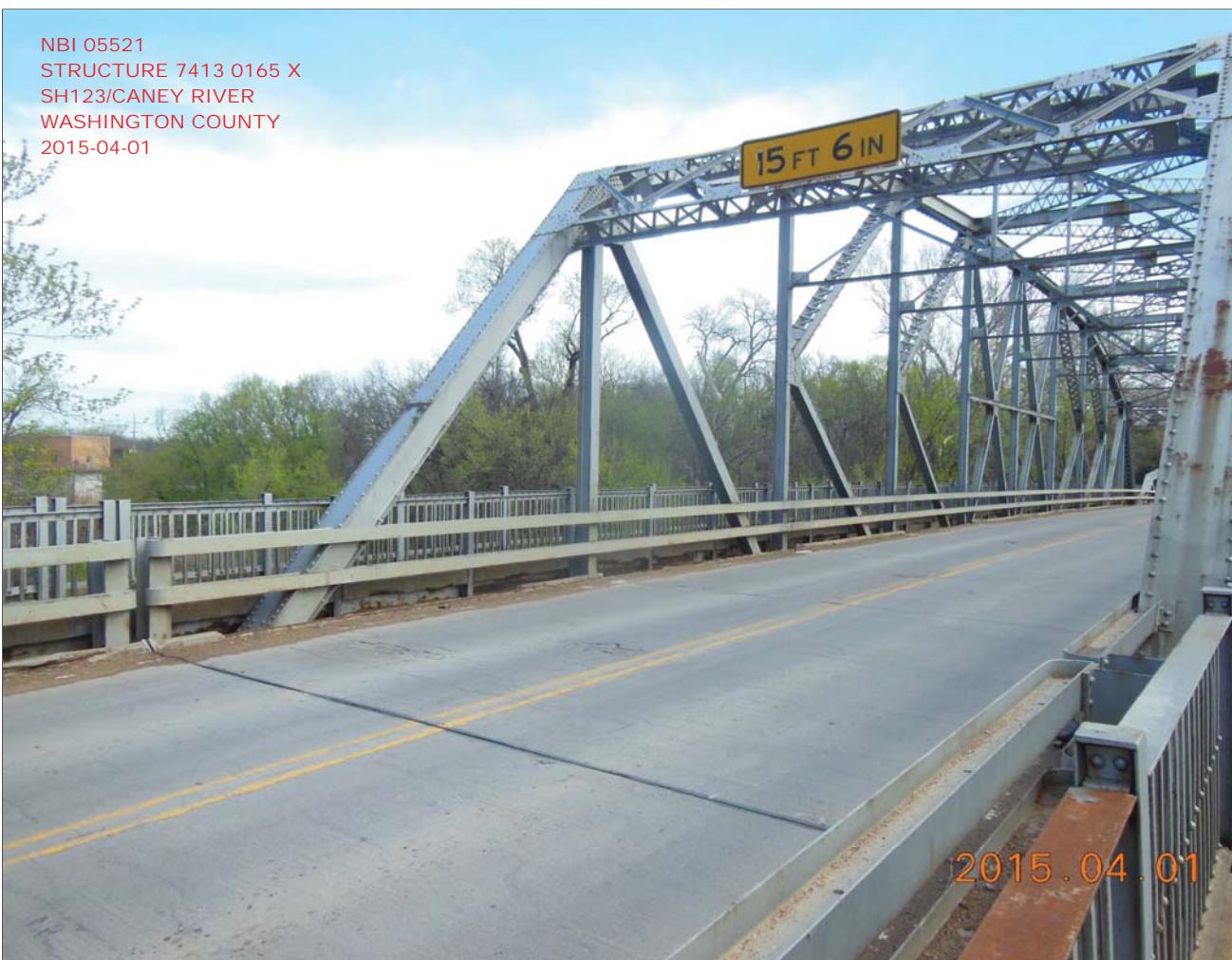
NBI 05521
Str. 7413 0165 X
Washington Co.
SH123 over Caney River
April 01, 2015



NBI 05521
STRUCTURE 7413 0165 X
SH123/CANEY RIVER
WASHINGTON COUNTY
2015-04-01

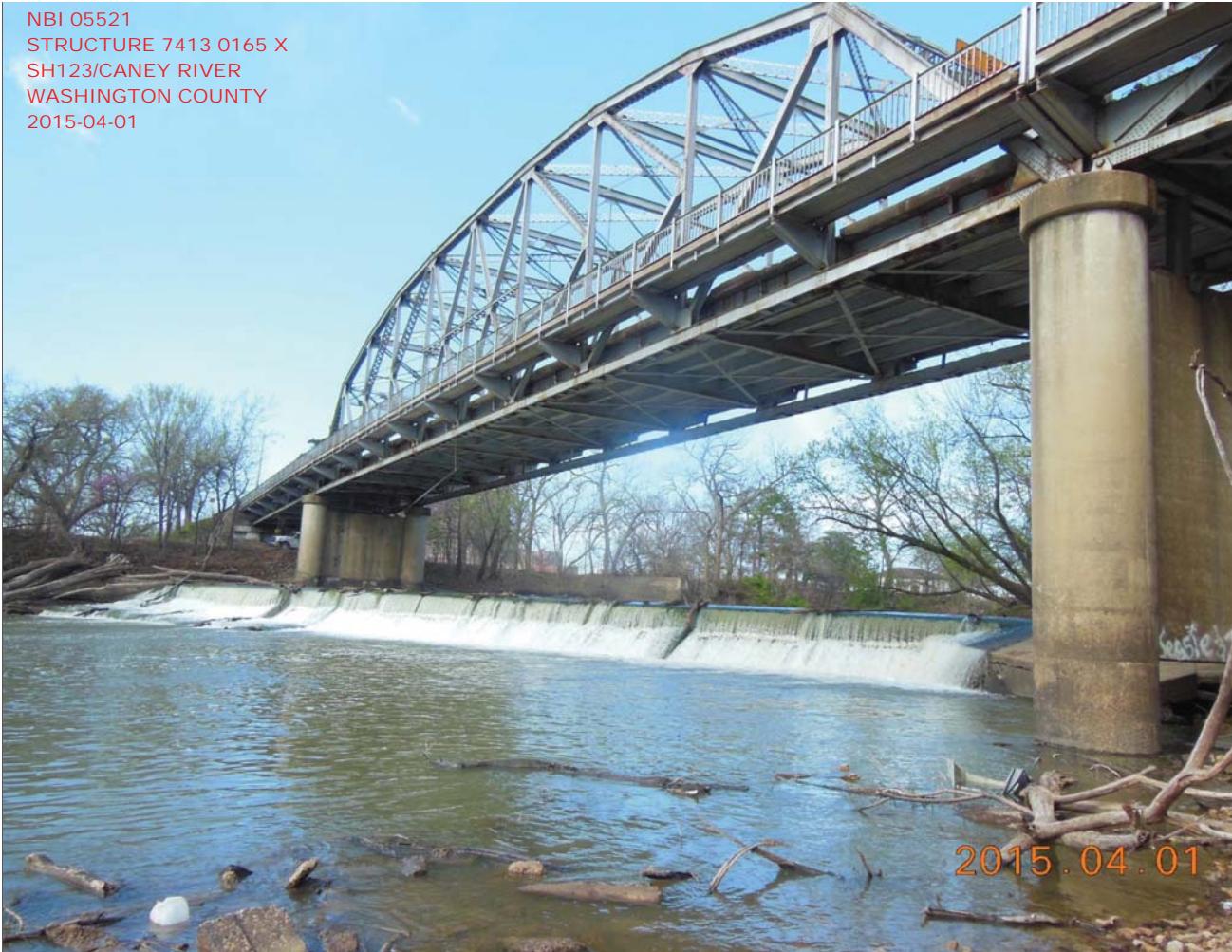


NBI 05521
STRUCTURE 7413 0165 X
SH123/CANEY RIVER
WASHINGTON COUNTY
2015-04-01

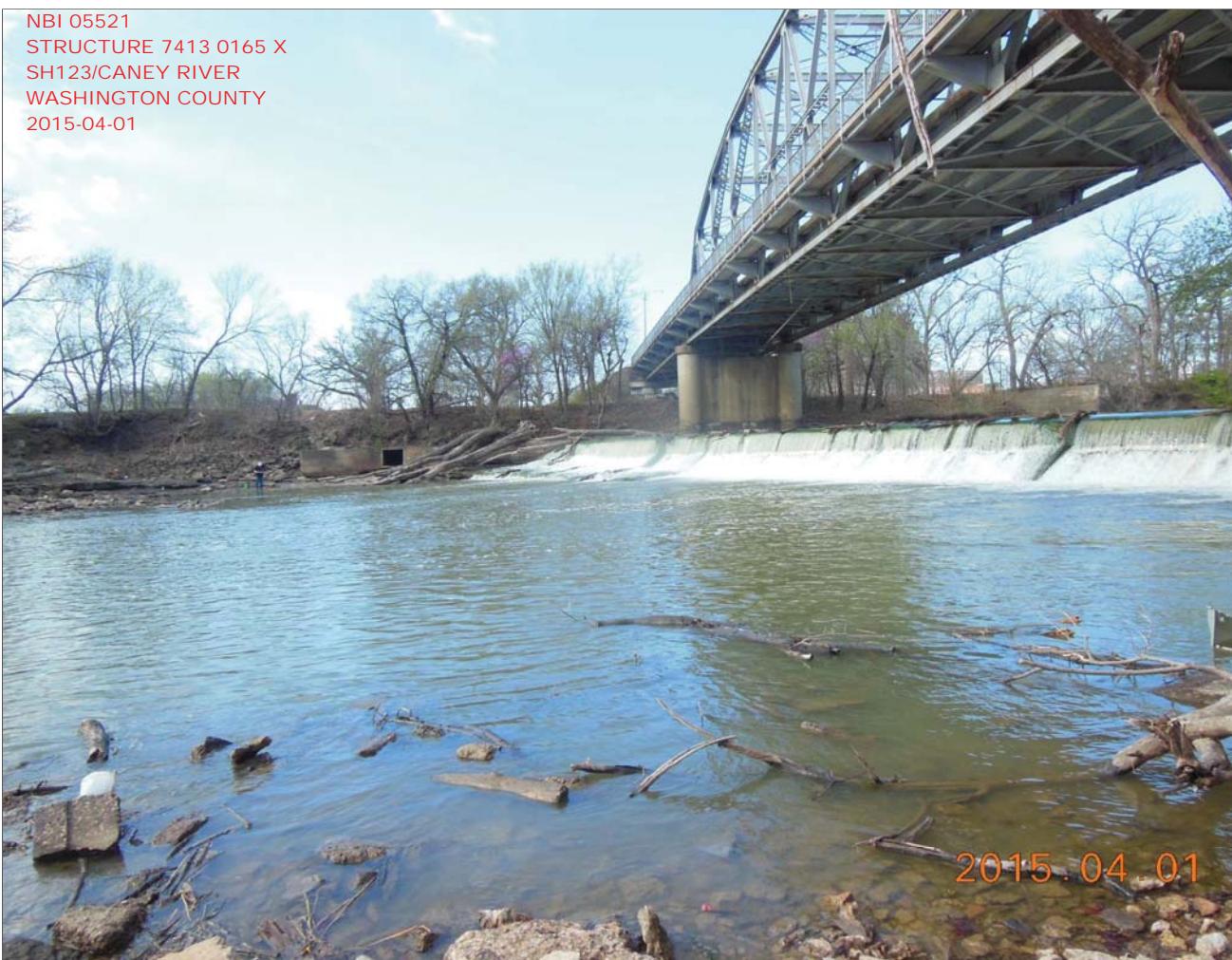




NBI 05521
STRUCTURE 7413 0165 X
SH123/CANEY RIVER
WASHINGTON COUNTY
2015-04-01



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2015-04-01



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SH123/CANEY RIVER
WASHINGTON COUNTY
2015-04-01



NBI 05521
STRUCTURE 7413 0165 X
SH123/CANEY RIVER
WASHINGTON COUNTY
2015-04-01

S3
FB1, SF
St 1

2015.04.01

2015.04.01

NBI 05521
STRUCTURE 7413 0165 X
SH123/CANEY RIVER
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2015-04-01



NBI 05521
STRUCTURE 7413 0165 X
SH123/CANEY RIVER
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NBI 05521
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SH123/CANEY RIVER
WASHINGTON COUNTY
2015-04-01



OKLAHOMA DEPARTMENT OF TRANSPORTATION -

Bridge Inspection Report

NBI No.: 05521

Structure No.: 7413 0165 X

Local ID:-1

Suff. Rating: 29.9

Health Index :

SD 64.6

IDENTIFICATION	
210' HI TRUSS & 2-100' PONY TRUSS SPANS (RIVITS) W/2'-4' SIDEWALKS	
1. State: Oklahoma	2. SHD District: Division 8
3. County Code: WASHINGTON	4. Place Code: BARTLESVILLE
Admin. Area: Unknown	
5. Inventory Route (Route On Structure): 1 - 3 - 1 - 00123 - 0	
6. Feature Intercepted: CANEY RIVER	
7. Facility Carried: S.H. 123	S.H. 123
9. Location: 1.85 mi.NE Osage C/L	11. Mile Post: 1.650 mi
13. LRS Inv. Route./ Subroute: -1	-1
16. Latitude: 36 45 12.64	17. Longitude: 095 58 19.31
98. Border Br. Code: Jnknown (P) %	99. Border Br. #: Unknown

STRUCTURE TYPE AND MATERIALS

43. Main Span Material and Design Type
Steel
44. Approach Span Material and Design Type
Steel
45. No. of Spans Main Unit: 1
46. No. of Approach Spans: 2
107. Deck Type: 1 Concrete-Cast-in-Place
108A. Wearing Surface: 1 Monolithic Concrete
108B. Membrane: 8 Unknown
108C. Deck Protection: 8 Unknown

AGE AND SERVICE

27. Year Built: 1937	106. Year Reconstructed: Unknown
28A. Lanes on: 2	28B. Lanes Under: 0
29. ADT: 4600	30. Year of ADT: 2013
42A. Type of Service on: 5 Highway-pedestrian	109. Truck ADT %: 5
42B. Type of Service under: 5 Waterway	

GEOMETRIC DATA

10. Inv. Rte. Min. Vert. Clr.: 15.7 ft
32. Approach Roadway Width (W/ Shoulders): 24.0 ft
Deck Area: 14,211. sq. ft
34. Skew: 0
47. Inv. Rte. Total Horiz. Clr.: 24.0 ft
48. Length Maximum Span: 210.0 ft
50A. Curb/Sdwlk Wdth L: 4.0 ft
51. Width Curb to Curb: 24.0 ft
53. Minimum Vertical Clearance Over Bridge: 15.6 ft
54A/54B. Min. Vert. Underclearance : N Feature not hwy or RR 0.0 ft
N/E
S/W
Meas. N1508 -1 -1 S1508 -1 -1
Post. DO NOT I
55A/55B. Minimum Lateral Undrclearance R: N Feature not hwy or RR 327.8 ft
56. Minimum Lateral Undrclearance L: 327.8 ft

200c. Temperature: 60

200d. Weather: PARTLY CLOUDY

201. Structural Steel ASTM Desig.: -1 -1

202. Waterproof Membrane : -1

Date Installed : 1/1/1901

203. Type Exp. Dev. : Sealed Expansion Joint

Pourable

204. Type of Handrail: Steel Post and Rail

205. Material and Quantity : 2650.0

208. Type of Abutment : Pedestal

Type of Foundation : Natural Foundation Matl.

209. Type of Pier / Found.: 2 Piers No

No Piling or Drilled Shaft

210. Foundation Elev. 6435.0 6355.0

-1.0

-1.0

211. Wear. Surf. Prot. System : None

Date Installed : 1/1/1901

213. Utilities Attached : -1

-1 -1 -1

214a. Posted Weight Limit:

b. Posted Speed Limit :

c. Narrow/One Lane Bridge sign :

d. Vertical Clearance Sign:

Advanced Warning Sign :

Min. Measured Clearance :

Max. Measured Clearance :

e. Navigation Lights :

Working/Not Working :

215. Overpass : B - State Highway

221. Substructure Cond. (U/W) : -

222. Fill over RCB:

223. Appr. Slab/Rdwy Cond.:

224. Critical Feature Type:

225. Paint Type :

Overcoat :

226. Date Painted:

227. Paint Coloring:

233. Deck Forming: Conventional Forming

236. Deck Cleaning : -1

238. School Bus Rte: Current Bus Route

240. Appr. Roadway Type: Asphalt/Bituminous

INSPECTION					
Type	Insp Req.	Insp Done	Freq:	Insp. Date:	Next Insp.:
NBI:		Y	24	4/1/2015	4/1/2017
FC Freq.:	Y	Y	24	4/1/2015	4/1/2017
UW Freq.:	N	N	NA	NA	NA
OS Freq.:	Y	N	24	4/5/2013	4/1/2016

CLASSIFICATION

12. Base Hwy Network : Not on Base Network	20. Toll Facility: 3 On free road
21. Custodian: 01 State Highway Agency	22. Owner: 01 State Highway Agency
26. Functional Class: 16 Urban Minor Arter	37. Historical Sig.: 4 Hist sign not determin
100. Defense Highway: 0 Not a STRAHNET h	101. Parallel Structure: No bridge exists
102. Dir. of Traffic: 2 2-way traffic	103. Temp. Structure: Not Applicable (P)
104. Highway System: 0 Not on NHS	105. Fed. Land Hwy 0 N/A (NBI)
110. National Truck Network: 0 Not part of na	112. NBIS Length: Long Enough

CONDITION

58. Deck: 4 Poor	59. Super.: 4 Poor	60. Sub.: 4 Poor
62. Culvert: N N/A (NBI)	61. Channel/Channel Protection: 7 Minor Damage	
Flowline Notes:		
11/2/2006 - heavy drift on spillway under the bridge * 5/01/2015 - Unable to measure due to swift water flow.		

LOAD RATING AND POSTING

31. Design Load: 2 M 13.5 (H 15)	41. Posting status: A Open, no restriction
63. Op. Rating Method: 1 LF Load Factor-Ton	Alt. Op. Rating Meth.: 1 LF Load Factor-To
64. Operating Rating (H / HS / 3-3):	23.0 36.0 61.2
66. Inventory Rating (H / HS / 3-3) :	13.6 21.3 33.9
65. Inv. Rating Method: 1 LF Load Factor-Ton	Alt. Inv. Rating Meth.: 1 LF Load Factor-To
70. Posting: 5 At/Above Legal Loads	Date Rated : 4/1/2014

PROPOSED IMPROVEMENTS

94. Bridge Cost: \$3,240,107	75. Type of Work: 31 Repl-Load Capacit
95. Roadway Cost: \$4,500,000	76. Lgth. of Improvement: 436.1 ft
96. Total Cost: \$8,178,226	114. Future ADT: 7360
97. Year of Cost Est.: 2009	115. Year of Future ADT: 2033

NAVIGATION DATA

38. Navigation Control: Permit Not Required
39. Vertical Clearance: 0.0 ft
111. Pier Protection: 1 Not Required

APPRAISAL

36A. Bridge Rail: 1 Meets Standards	36C. Approach Rail: 0 Substandard
36B. Transition: 0 Substandard	36D. Approach Rail Ends: 0 Substandard
67. Str. Evaluation: 4 Minimum Tolerable	68. Deck Geometry: 2 Intolerable - Replace
69. Underclearance, Vertical and Horizontal: N Not applicable (NBI)	
71. Waterway Adequacy: 5 Above Tolerable	
72. Approach Alignment: 8 Equal Desirable Crit	
113. Scour Critical: 7 Countermeasures	

243. Girder Spacing/Number :	-1.0 / -1
244. Span Lengths :	-1 -1 -1
	-1 -1 -1
245. Girder Depth :	-1.000
246. Type of Overlay :	6
246. Overlay Thickness :	2.0
246. Overlay Date :	12/31/1986
246. Overlay Depth Changed > 1" ?	_
247. Protective Systems :	1: _
2: _	3: _
4: _	5: _
248. No. of Field Splices w/ Corrosion :	1
249. Scour Crit. POA exists?:	No
250. Culvert Headwall Dist.:	-1.0
254. Thru Truss Type :	Ovh/Pony
256. Chan. Profile Up/Down Stream? :	_
257a. OkiePROS Auto. Truck Routing	Yes
258. Plans w/ found. are in file at ODOT	
259. Scour Eval. is in file at ODOT	
263. Interchange at Intersection	N
264. Interstate Milepoint	-1.00

OKLAHOMA DEPARTMENT OF TRANSPORTATION -

Bridge Inspection Report

Suff. Rating: 29.9

Health Index :

NBI No.: 05521

Structure No.: 7413 0165 X

Local ID:-1

SD

64.6

Inspection Date: 4/1/2015

Reported By: DKNICKMEYER

Invoice No.: -1

Inspected With: Wes Kellogg

Agency :

Daniel Knickmeyer

Digital signature of Daniel Knickmeyer
 DN: dc=local,dc=OK,dc=agency,ou=ABC,ou=00345,
 ou=Divisions,ou=DIV9,ou=Bridge,cn=Daniel
 Knickmeyer, email=DKnickmeyer@odot.org
 Date: 2015.04.10 10:33:25 -05'00'

Structure / Inspection Notes

Sidewalks are recommended to be close to pedestrians due to condition. Stiff legs at all end floors beams (third points).

OS is to focus on previous repairs and gusset plate condition.

Elm.	Env.	Description	Un.	Qty.	Qty.St. 1	% 1	Qty.St. 2	% 2	Qty.St. 3	% 3	Qty.St. 4	% 4	Qty.St. 5	% 5
12	4	Reinforced Concrete Deck	(SF)	10,032	0	0 %	10,032	100 %	0	0 %	0	0 %	0	0 %
113	4	Steel Stringer/Floorbeam	(LF)	1,079	0	0 %	971	90 %	108	10 %	0	0 %	0	0 %
120	4	Steel Truss (Pony)	(LF)	400	0	0 %	366	91 %	34	9 %	0	0 %	0	0 %
152	4	Steel Floor Beam	(LF)	574	2	0 %	464	81 %	108	19 %	0	0 %	0	0 %
162	4	Steel Gusset Plate	(EA)	92	0	0 %	89	97 %	3	3 %	0	0 %	0	0 %
205	4	Reinforced Conc Column or Pile Extension	(EA)	4	0	0 %	4	100 %	0	0 %	0	0 %	0	0 %
210	4	Reinforced Conc Pier Wall	(LF)	50	0	0 %	45	90 %	5	10 %	0	0 %	0	0 %
215	4	Reinforced Conc Abutment	(LF)	82	0	0 %	76	93 %	6	7 %	0	0 %	0	0 %
311	4	Moveable Bearing (roller, sliding, etc.)	(EA)	6	0	0 %	6	100 %	0	0 %	0	0 %	0	0 %
313	4	Fixed Bearing	(EA)	6	0	0 %	5	83 %	0	0 %	1	17 %	0	0 %
330	4	Metal Bridge Railing	(LF)	837	0	0 %	837	100 %	0	0 %	0	0 %	0	0 %
510	4	Wearing Surfaces	(SF)	10,032	0	0 %	9,029	90 %	1,003	10 %	0	0 %	0	0 %
515	4	Steel (Superstructure) Protective Coating	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
821	4	Steel Truss (Overhead)	(LF)	420	0	0 %	384	92 %	36	9 %	0	0 %	0	0 %
859	4	Soffit of Concrete Decks and Slabs	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
877	4	Steel Stringer End (5 Ft.)	(LF)	1,201	50	0 %	1,051	92 %	100	8 %	0	0 %	0	0 %
906	4	Sealed Expansion Joint (SEJ-3)	(LF)	49	0	0 %	0	0 %	0	0 %	49	100 %	0	0 %
909	4	Pourable Fixed Joint Seal	(LF)	427	0	0 %	0	0 %	0	0 %	427	100 %	0	0 %
957	4	Pack Rust	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
958	4	Concrete Cracking	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
963	4	Steel Section Loss	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
969	4	Out-Of-Plane Distortion/Loading	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %

Additional
Elements

Elem.	Element Notes (Include Size and Location of Deterioration)
12	FX:CRACKING,PATCHES & MINOR SPALLS.MORE THAN 10%.
113	Moderate section losses throughout. Moderate pack rust to top flanges.
120	Moderate section loss to lower cord at panel points. Significant pack rust and distortion at panel points.
152	Corrosion hole at span 1, floor beam 0, near stringer 6, span 1, floor beam 2, near stringer 6, and span 2, floor beam 10, near stringer 1. Moderate section losses and pack rust to top flanges. Moderate section to bottom flanges at lower lateral connections. All end floor beams have been stiff-legged. End floor beams at piers 1 and 2 have had angles welded to outer flanges due to section losses.
162	PX: Span 1, east truss, L3 gusset plate has a 4"x6" corrosion hole. PX: Span3, west truss, L0 gusset plate is cracked approximately 8". Small corrosion hole at the top corners of both inner L0 gusset plate at span 1, pier 1. Repaired L0 gusset plate cracks at span1, pier 1. Out of plane distortion of gusset plate due to pack rust.
205	FX: MINOR CRACKING/SPALLING WITH EXPOSED REBAR.
210	FX:MOD.SPALLS W/EXPOSED REBAR @ P.#2.
215	FX:MOD.CRACKING,SPALLS W/EXPOSED REBAR @ N.ABUT. CRACKING W/EFFORESSENCE AT ABUTMENT 1.
311	Bearings have uplift and rotation due to excessive pack rust. Moderate section losses and pack to all bearings.
313	Bearings have uplift and rotation due to excessive pack rust. Moderate section losses and pack to all bearings.
330	
510	FX: CRACKING, PATCHING & MINOR SPALLS.MORE THAN 10% OF CONCRETE OVERLAY.
515	PX: COATING HAS FAILED ON FLOOR SYSTEM. COATING IS CHALKING WITH ISOLATED LOCATIONS OF FAILURE ON TRUSSES.
821	
859	FX:CRACKS,SPALLS @ JOINTS W/FAKE WORK @ PIERS ARE SLIGHTLY OVER 10%.
877	Moderate section losses throughout. Moderate pack rust to top flanges. Poor stringer cope radii.
906	PX:JOINTS HAVE FAILED

OKLAHOMA DEPARTMENT OF TRANSPORTATION -

Bridge Inspection Report

Suff. Rating: 29.9

Health Index :

NBI No.: 05521

Structure No.: 7413 0165 X

Local ID:-1

SD

64.6

Elem.	Element Notes (Include Size and Location of Deterioration)
909	PX: JOINTS LEAK.
957	PX: MOD/SEV.PACK RUST THROUGHOUT. WORST AT BEARINGS AND LOWER CORD PANEL POINTS.
958	DECK HAS CRACKING THROUGHOUT.MID.SPAN ARE TRANSVERSE CRACKS.
963	MODERATE SECTION LOSS THROUGHOUT. WORST AT FLOOR BEAM AND STRINGER ENDS AND AT GUSSET PLATES.
969	Out of plane distortion of gusset plate due to pack rust.

Channel Profile																
Baseline	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
Distance	-1.0	200.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Profile	26.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	
Event	Flowline	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

General

On January 7-9, 2014, Infrastructure Engineers, Inc. performed an in-depth investigation at the bridge. The purpose of this investigation was to verify section properties and identify areas of deterioration that had advanced since the previous routine/fracture critical inspection. The superstructure of Spans 1, 2, and 3 were the focus of the investigation. The investigation was performed by a three person team consisting of an Oklahoma-registered professional engineer and two rope access trained engineers.

Findings Summary

The general condition of the structure is similar to the conditions reported in the attached Routine/Fracture Critical Inspection Report. There is pitting and laminar corrosion to most of the floor system in the areas directly below the curbs. The lower lateral bracing angles have failed at many locations due to areas of 100% section loss near the connections below the curbs. The portions of the superstructure above the roadway are typically in their as-built condition.

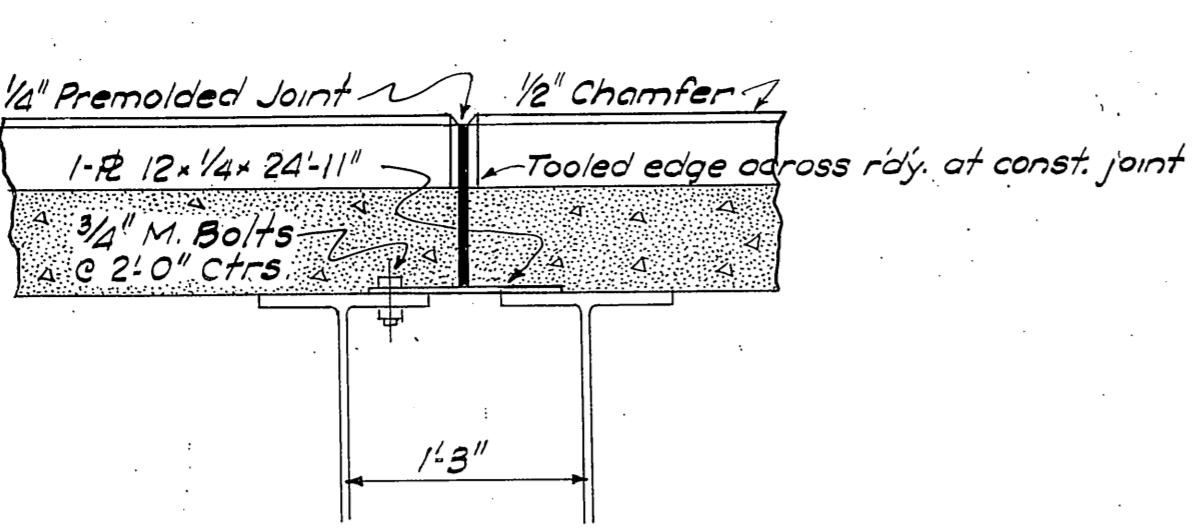
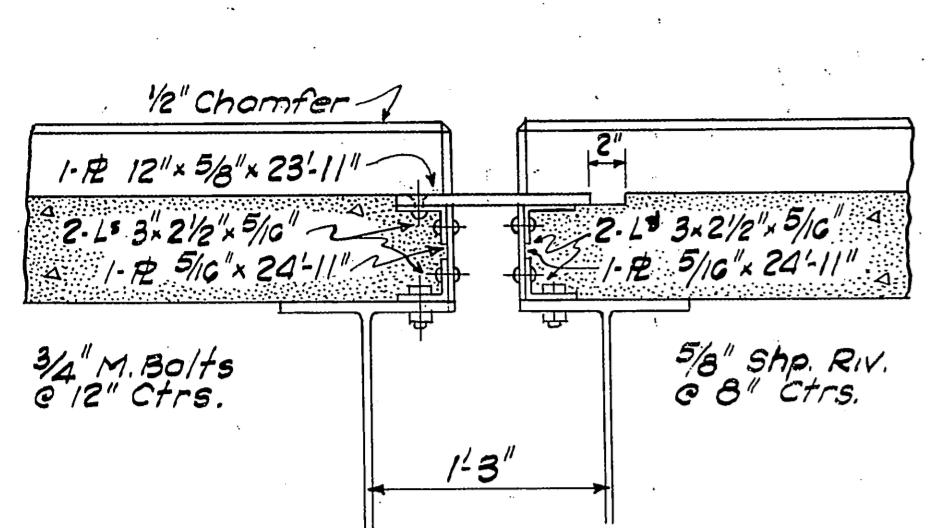
Advanced deterioration since the previous Routine/Fracture Critical Inspection has resulted in the following significant conditions:

- There are corrosion holes in the gusset plates at the following locations: Span 1, South Abutment, East Bearing, Inboard Gusset; Span 1, Pier 1, West Bearing, Inboard Gusset; Span 3, Pier 2, West Bearing, Inboard Gusset; Span 3, North Abutment, West Bearing, Inboard Gusset;
- Span 1, Floor Beam 0 has a 13" L x 2" H corrosion hole in the top of the web between Stringers 5 and 6.
- Span 1, Floor Beam 2 has a 1.5" L x 2" H corrosion hole in the bottom of the web at the east end.
- Span 1, Floor Beam 5: There is a previous repair that welded an angle to the lower portion of the floorbeam web; however, the base metal at the location of this repair is thin and most likely does not restore the original capacity of the floorbeam. The lower portion of the web has 100% section loss at the end 8-ft of each end of the floorbeam. There is 50% section loss to the top flanges for the end 4-ft at each end of the floorbeam. There is also a 2-in diameter corrosion hole in the top of the web at the east end of the floorbeam.

Refer to the attached inspection notes for complete documentation of the existing conditions at the structure.

FED. ROAD DIST. NO.	STATE OKLA.	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
G					

Revised 12-11-35
" 2-11-36
" 5-28-39
" 1-9-40
Revised 10-29-45



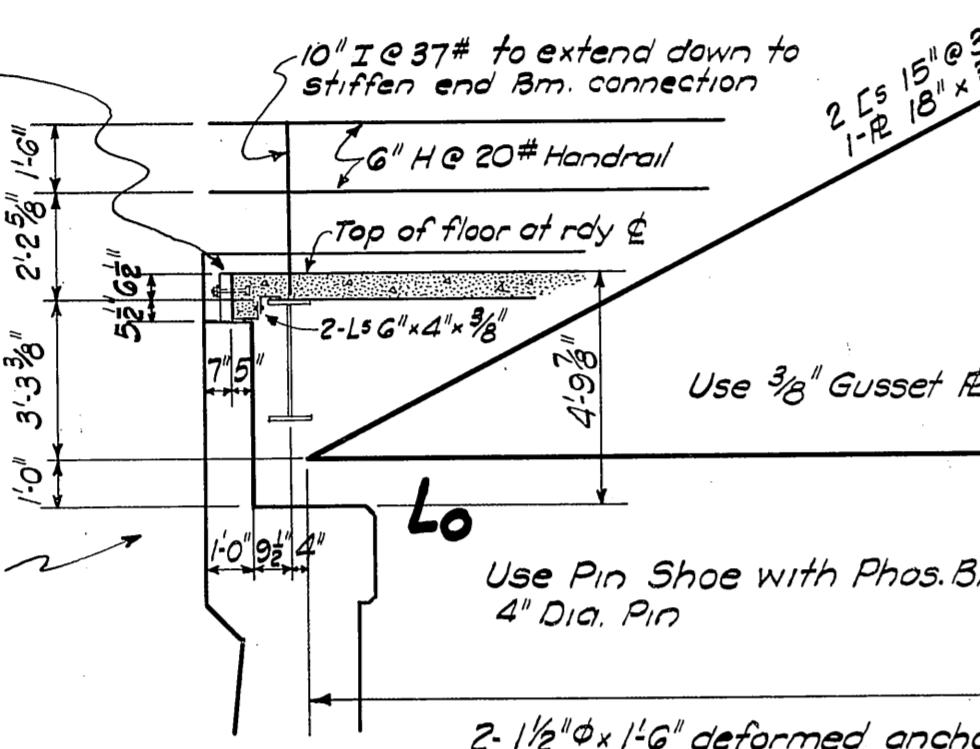
DETAIL OF EXPANSION JOINT
FOR A SERIES OF SPANS

DETAIL BETWEEN TRUSSES
AT FIXED JOINTS

Note:- Hand Rail to extend continuously over the three center panels and shall be riveted to the diagonals after the floor is poured. Sub-punch diagonal connections and ream in field.

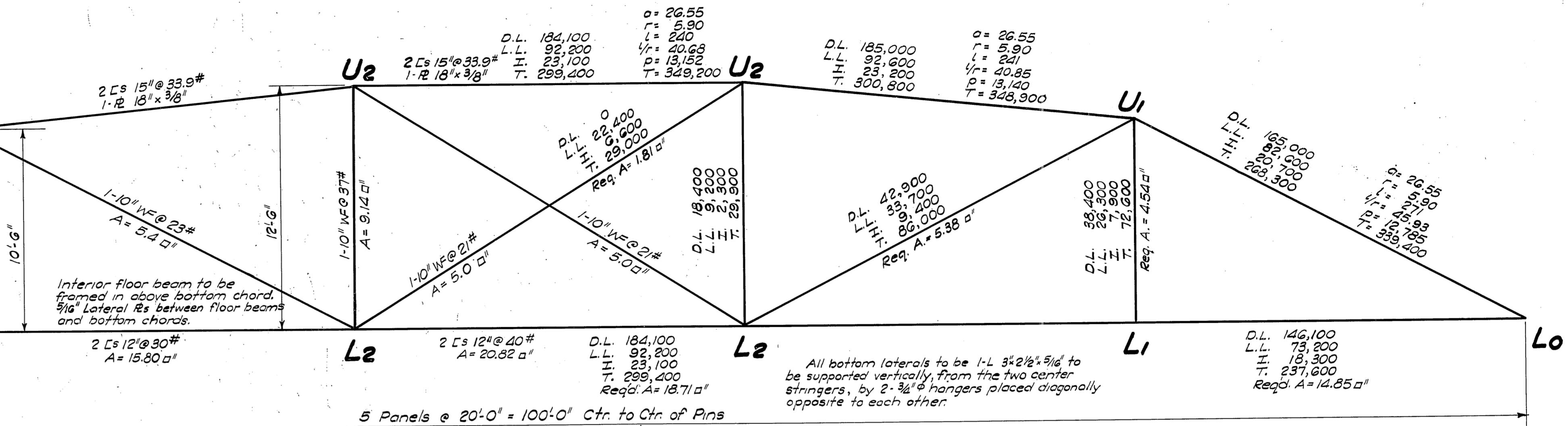
NOTE:- 3"x12" bumper added to crown of bridge floor and bolted to slab as shown, by 3/8x8" rivets, with washers, spaced at 2'0" centers. Cost of bumper to be included in price bid for floor concrete.

NOTE:- When I-Bm. Approach spans are framed into the end beam of the truss, place the end beam directly over the pin.



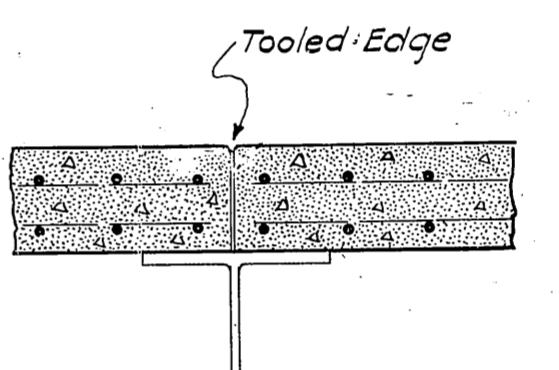
Use 3/8" Gusset Rs
Use Pin Shoe with Phos. Bronze sliding plates
4" Dia. Pin

2-1/2"φ x 1/8" deformed anchor bolts, with 1/8" plate washers, at each shoe.



5 Panels @ 20'0" = 100'0" Ctr. to Ctr. of Pins

GENERAL ELEVATION



LONGITUDINAL SECTION
DETAIL OF CONSTRUCTION JOINT

NOTE:- The contractor shall make a construction joint in the floor and curbs at each panel point by pouring the floor slab in alternate panels.

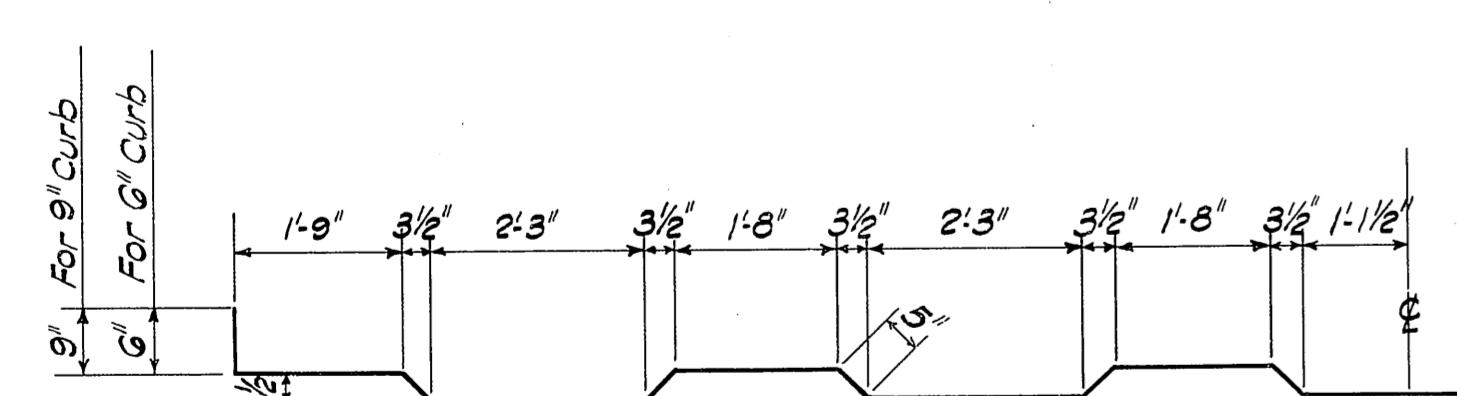
FLOOR
6 1/2" concrete, Class A-A; maximum aggregate 1/4"; Oklahoma Standard Specifications of 1937 for construction. Top of curbs to have a trowel finish, edges 1/2" chamfer, and sides corborundum block.

Surface of slab to have a crown of 1/8" on a parabola. The floor is figured for a 2" wearing surface of 22.5# per sq. ft.

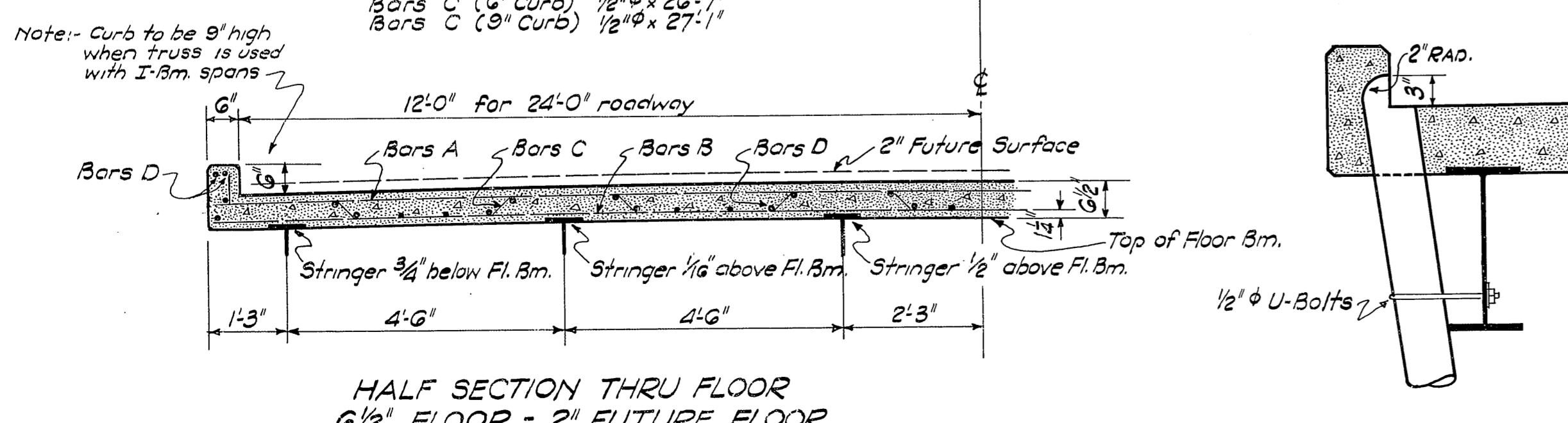
Reinforcing steel in floor slab shall be held in place with precast concrete blocks, spaced at 2'0" alternate centers under the top row of 6" bars.

Finish according to section 504.04, Okla. Std. Spec. of 1937.

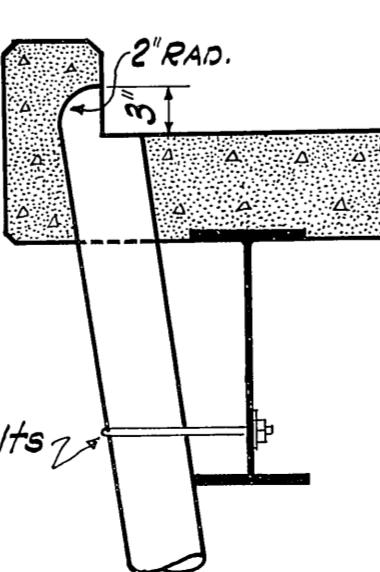
Bars A 1/2"φ x 10" Ctrs. across the roadway, 1 3/4" below top of slab
Bars B 1/2"φ x 10" Ctrs. " " " , 1/4" above bottom of slab
Bars C 1/2"φ x 10" Ctrs. " " " , top and bottom of slab
Bars D 1/2"φ longitudinal, 2 in each curb, 34 in roadway (19'0" long in int. panels)



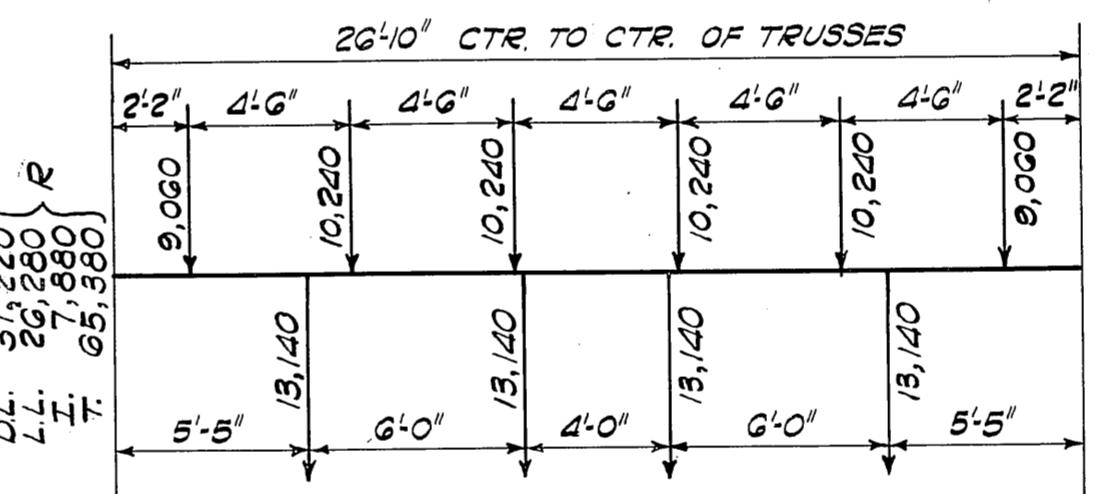
Designed By M.W. Herfey Checked By L.E. Acker Under Supervision of H.K. White & D.M. McCullough Drawn By L.E. Acker Checked By M.W. Herfey 8-25-34



DETAIL OF DRAINS
Cast iron drains, 4"φ x 4-5", 3/8" thickness, placed on both sides of the roadway at the center of each panel, except in panels adjacent to the abutments.



FLOOR BEAMS



D.L. 512x20 = 10,240 Lbs. Interior Stringer
453x20 = 9,060 Lbs. Outside Stringer
L.L. = 13,140 Lbs.

INTERIOR BEAMS
D.L.M. of beam 1/8x125x26.83² = 11,250 Ft. Lbs.
D.L.M. (29,520x11.17)-(9,9060)-(4.5x10240) = 202,240 " "
L.L.M. (26,280x11.42)-(13,140x6) = 221,190 " "
Impact 30% of L.L.M. = 66,360 " "
Total Moment = 501,040 " "
Req'd. S = 375.8 Use 33" WF @ 125# S = 385.1

END BEAMS
D.L.M. of beam 1/8x108x26.83² = 9,720 Ft. Lbs.
D.L.M. (24,760x11.42)-(12,383x6) = 102,810 " "
L.L.M. (24,760x11.42)-(12,383x6) = 208,250 " "
Impact 30% of L.L.M. = 62,530 " "
Total Moment = 383,510 " "
Req'd. S = 287.6 Use 30" WF @ 108# S = 299.2

General Notes
All steel is to be structural grade, except pins and rollers, which are to be cold rolled or forged. All reinforcement, deformed bars, cold bent. No welds permitted. Oklahoma Standard Specifications as approved by the Public Roads Administration.

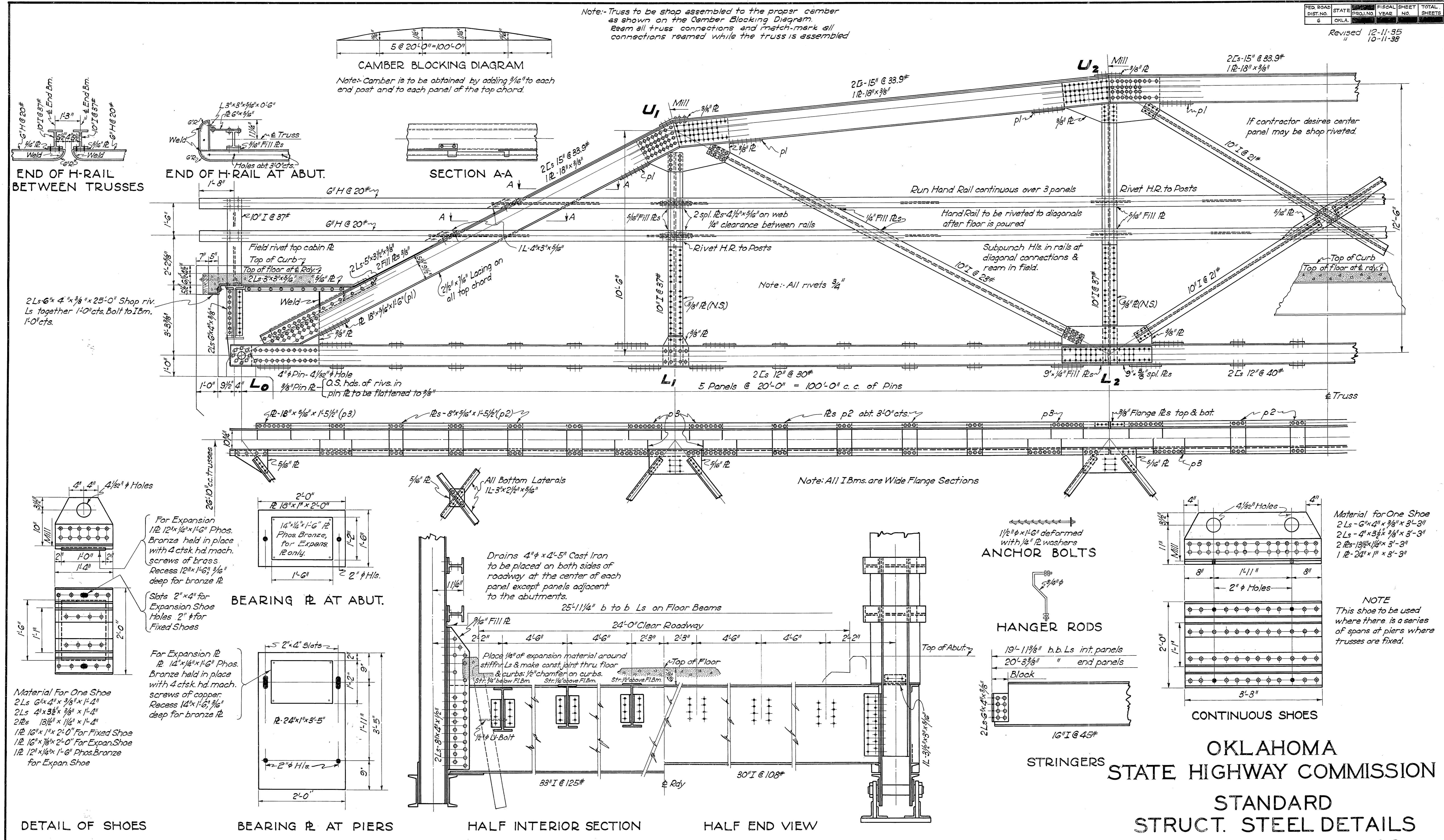
Rivets all 3/8", except those in 2 1/2" legs of angles which may be 5/8". All field rivets to be driven with a pneumatic hammer.

The basis for payment of structural steel will be the weight of the specified section. Sections of equivalent strength will be approved, if requested, but no allowance will be made for increased weight.

Paint: Paint application and materials shall comply with Oklahoma Standard Specifications of 1937, except that the use of approved mechanical equipment, with effective water trap device, will be allowed for all painting. No paint shall be applied when the temperature of the air is below 40° F. Second field coat shall be aluminum paint.

OKLAHOMA
STATE HIGHWAY COMMISSION
STANDARD
GENERAL DESIGN
100' RIVETED TRUSS SPAN
24' ROADWAY
E-1004

Revised 12-11-35
" 10-11-38



**OKLAHOMA
STATE HIGHWAY COMMISSION
STANDARD
STRUCT. STEEL DETAILS
100FT. RIVETED TRUSS
24'-0" ROADWAY**

Stringer Design

- 1005

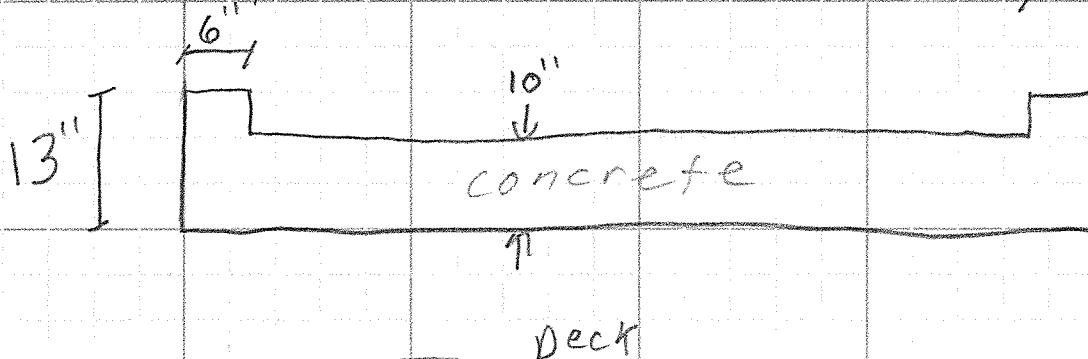
**INFRASTRUCTURE
ENGINEERS, INC.**

Made By:	MOO	Date:	1-8-14	Job No:	122040K
Chckd By:		Date:			
Bkched By:		Date:			Sheet No:

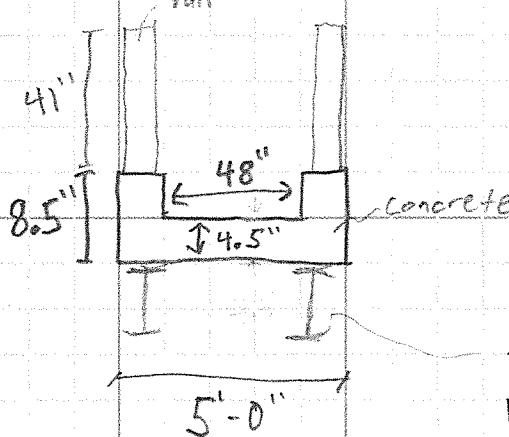
TYP. Deck cross section

Concrete Deck, NO Overlay

24' - 0" curb-to-curb



Steel rail

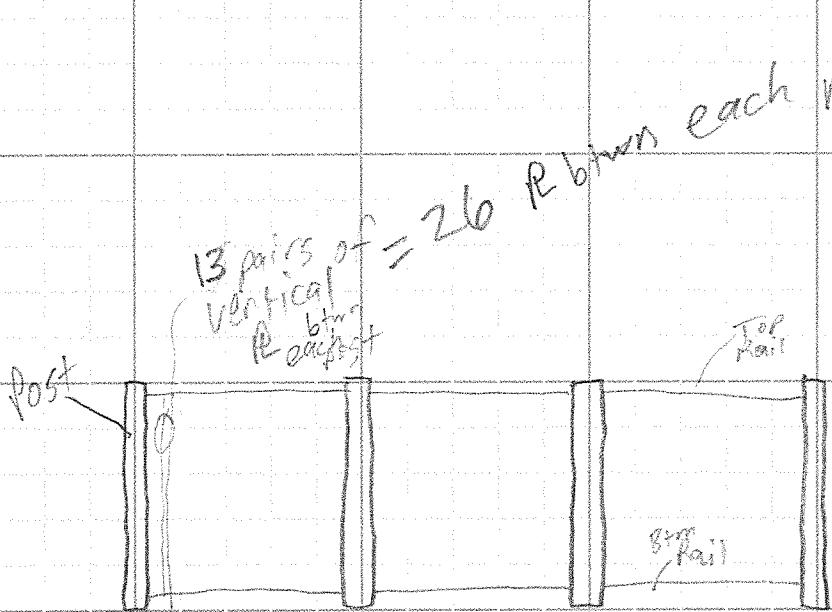


$$t_f = 0.322 \quad d_w = 0.25$$

$$W_f = 5.25 \quad d = 8\frac{1}{8}$$

For Cantilever FloorBeam extension section
that supports the sidewalks, See Defect Sheet
for Span 1, FB 0.

Sidewalk

INFRASTRUCTURE ENGINEERS, INC.			Made By: MDD	Date: 1-8-14	Job No:
			Chkd By:	Date:	122040k
Typ. Sidewalk Rail			Bkched By:	Date:	Sheet No:
Steel Sidewalk Rail					
3 pairs of vertical R per post					
					
Post	Rail	Vert. R			
$w_f = 4"$	$w_f = 4"$				
$d = 4"$	$d = 3"$				
$t_f = 0.275$	$t_f = 0.285$				
$t_w = 0.25$	$t_w = 0.25$				
		$34'$	$t = 0.25$		

**INFRASTRUCTURE
ENGINEERS, INC.**
Made By: *MJD*Date: *1-8-14*

Job No:

Chckd By:

Date:

12204dk

Bkched By:

Date:

Sheet No:

Truss Section Dimensions
Truss

$$In - In = 25' - 4"$$

$$E - E = 26' - 10"$$

$$Out - Out = 28' - 4"$$

$$\text{Center Rwy} - E \text{ Truss} = 160"$$

$$\text{Center Sidewalk} - E \text{ Truss} = 41"$$

SPAN 1 DEFECTS

~~DOE~~
U1-L1

Web of
3" DIA perforation in vertical (MDD 1112)
at top & connection angle to continuous
sidewall support beam.

Span 1

Bearing

Job No. 12204OK00.01

South Abutment – West Bearing

MDD Photos

1094-1095 - General Condition of Bearing, No measureable section loss

1118-1119 - The vertical member between Gusset Plates has a corrosion hole

12"H x 6"W. This plate is in line with FB0 and the Sidewalk Floorbeam Cantilever

Span 1

Bearing

Job No. 12204OK00.01

South Abutment – East Bearing

MDD Photos

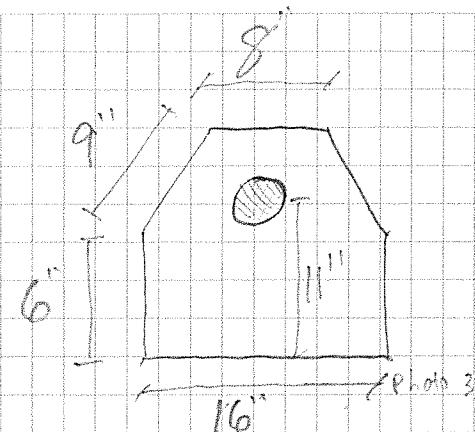
1097 - Overall photo of bearing

1115-1117 - Corrosion hole, 5" L x 3" H, on inboard Gusset Plate directly below the bottom flange of Floorbeam 0.

Pier 1 - West Bearing

TO Photos: 355-358

MDD Photos: 1131-35



Pin Diameter = 3-in

$P_t = 1.25$ -in original

outboard P_t has areas reduced to $t=1$ -in.
inboard P_t has areas reduced to $t=1$ -in.

- Inboard Gusset P_t area of 100% section loss

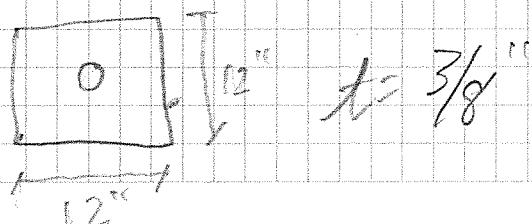
14" L x 1½" H directly above the inboard pin by plate.
(Photo 354, TO camera)

Photo 358 → this hole has been repaired by welding a P around the area; however, the welds on this repair have failed

(Photo 353 - Span 1), Pier 1, Overall of West Bearing
(Photo 356 - Span 2, " "

- Outboard Gusset P_t is in Good condition

- There is an additional stiffening plate around the pin on the interior face of the gusset plate

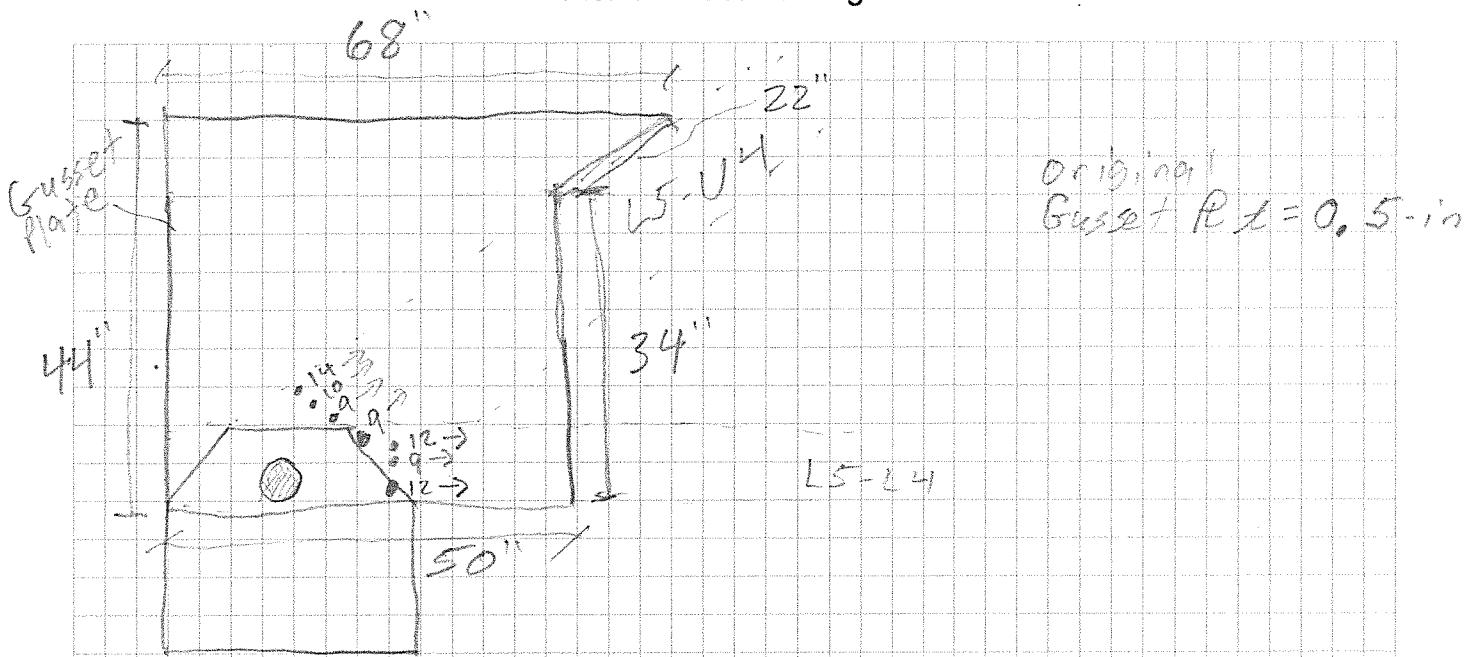


Span 1

Bearing

Job No. 12204OK00.01

Pier 1 – East Bearing



Bog PLATES in Good Cond. w/ no measurable
SECTION LOSS

-SEE J. Anderson Notes/Photos for Gusset
Plate SECTION LOSS notes

MDD Photos: 1121-26

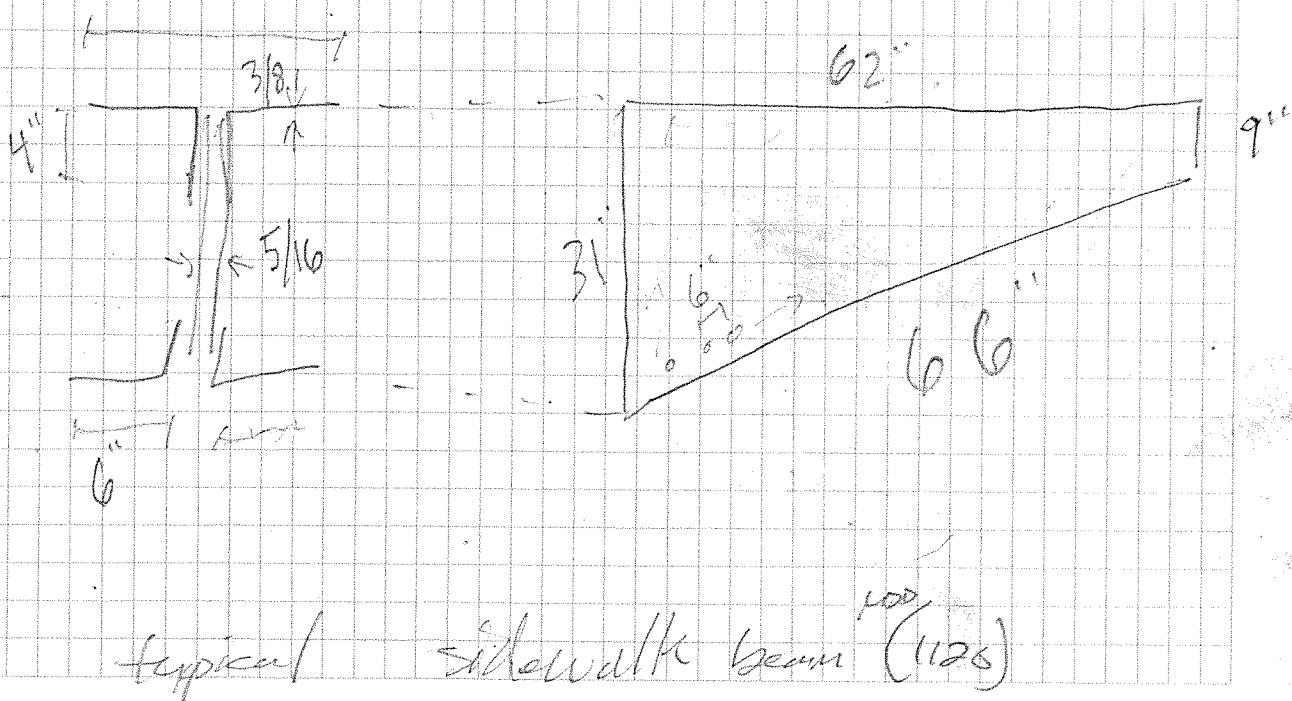
JA Photos: 40-43, 45

General Note: Floorbeams typically have laminar corrosion in the top and bottom flanges. There are areas in the top flanges with 1/2-in section remaining for the exterior 1-in of the flange.

East End, corrosion hole 1.3" L x up to 2" H in
to of web between Stingers 5 & 6. (MDD-1113-14)
Bottom flange laminar corrosion $\frac{1}{2}$ " top at end of fb.
up to $\frac{3}{8}$ " thick @ web end, with $\frac{3}{8}$ " flange thickness
remaining in end 3 ft.

- E truss, IB gusset plate, corrosion hole 5" L x up to 3" H, @ LO, in span 1, directly below FB 6, bottom edge of gusset plate (MDD 1115-17) - flange South
- W truss, Span 1, LO, corrosion hole in vertical member between gusset plates & directly adjacent to cantilever beam supporting sidewalk (MDD-1118-1119)

Cantilever Beam Dimensions
 sidewalk



West end, $\frac{1}{16}$ " D pitting in bottom 3" of web

East end, $\frac{1}{16}$ " D pitting

- East End @ L2, perforation in web,

2" H x 1½" W @ btm of web

MOD Olympus Photos 1108-10

North face

- West End, end 18" of web in lower 8" of webs has

3/8" D pitchng ← MOD (1111)

South face has pitchng upper 8" of web x 4" along
length 3 1/8" D.

East End

2 LF of up to $\frac{3}{16}$ " deep pitting, 4-in high in
the web, both sides

West End

Up to $\frac{1}{16}$ deep pitting in lower 3-in of web -
Web, 1 LF @ end

Gen - Top flanges + bottom flanges have minor
laminar corrosion throughout entire
Measuring section 1932.



West End:

Up to $\frac{1}{16}$ " deep pitting in lower 3-in of web, 1LF at end.

General Note: Top flanges and bottom flanges have minor laminar corrosion throughout
with no measureable section loss.

Span 1

FB 4

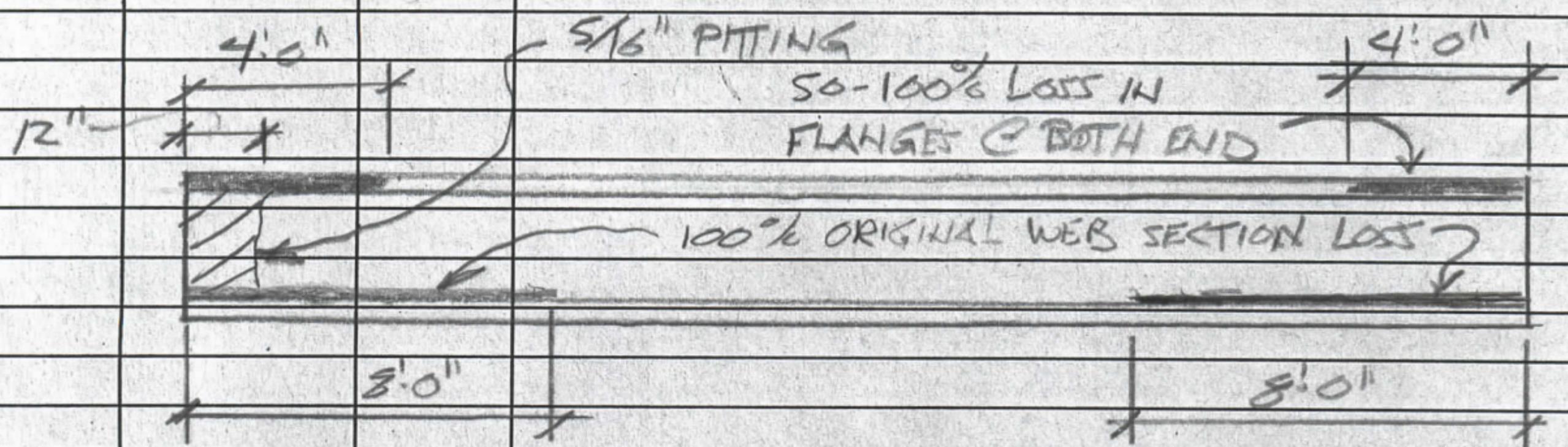
Job No. 12204OK00.01

No Significant defects

See sketch on next page.

There is a previous repair that welded an angle to the lower portion of the floorbeam web; however, the base metal at the location of this repair is thin and most likely does not restore near the original capacity of the floorbeam.

There is also a corrosion hole, 2-in diameter, in the top of the web at the east end of the floorbeam. Refer to MDD Photo 1127.

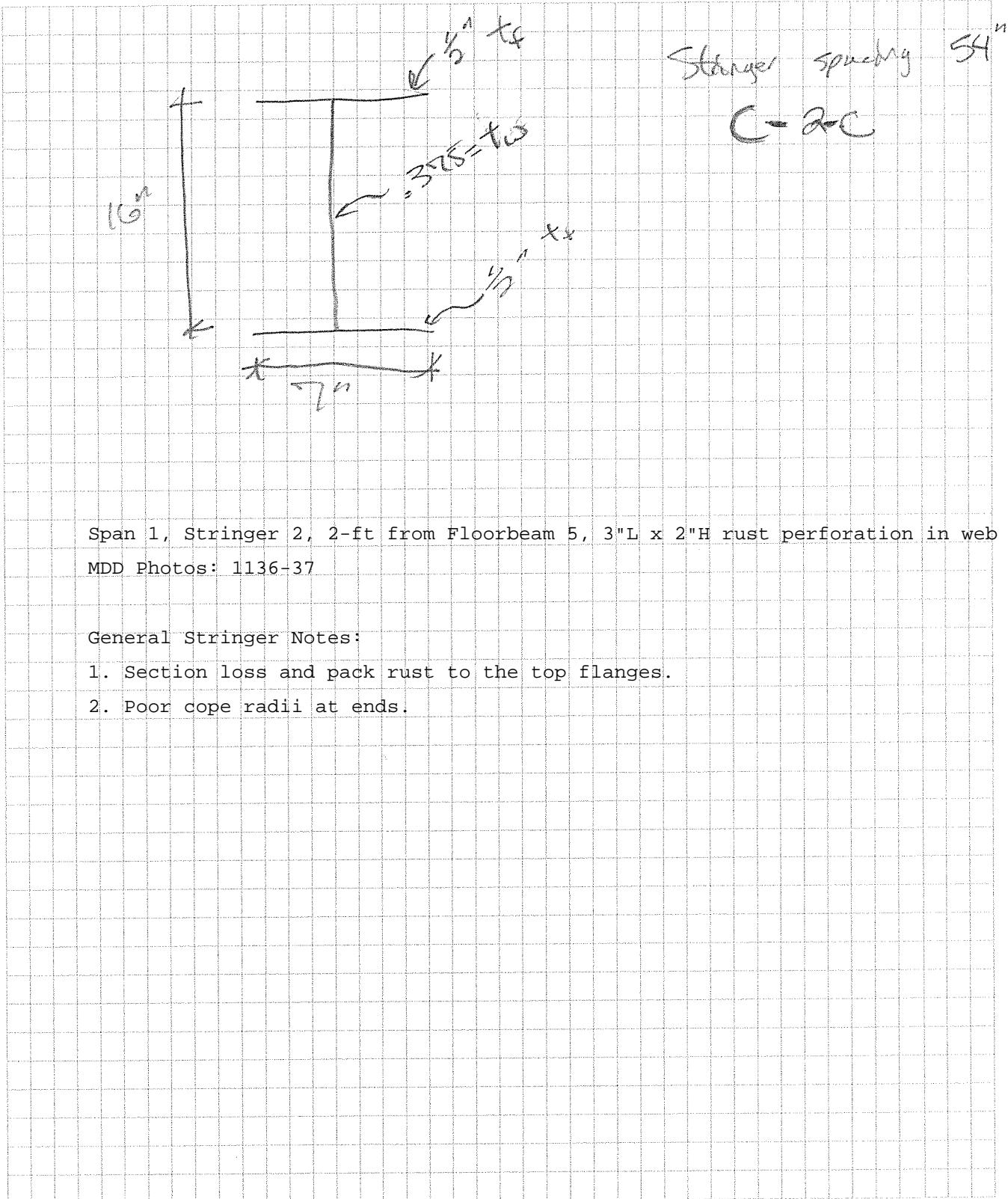


FB 5 ~ SPAN 1
LOOKING TOWARDS ABUTMENT 1

Span 1

Typical Stringer

Job No. 12204OK00.01



All Spans

~~Span 10~~

Typical Lower Lateral X-Bracing

Job No. 12204OK00.01

- ~~allied~~ Areas of 50% - 100% section loss near gusset connections.
- Span 1 & Span 2 lower Laterals all have 100% section loss near the connections to Pier 1.

SPAN 3 DEFECTS

Pier 2 – West Bearing

TO Photos: 394-95, 397-400, 407, 413, 414
401, 402-404

- Inboard Gusset R: west face, corrosion on hole 8" L x 2" H. directly above the pin plate, The gusset appears to be buckled (TO Photo 413-14)

Span 3

Bearing

Job No. 12204OK00.01

Pier 2 – East Bearing

JA Photos: 102 - 103

Brg Pl + Gusset Pl ~~lone~~, no significant
deficiencies recorded

Span 3

Bearing

Job No. 12204OK00.01

North Abutment – West Bearing

MOP Photos: 1140-42

~~No significant deficiencies recorded at this time~~
~~except gusset flange~~

- Inboard ~~end~~ Gusset flange, 2" L x 1" H corrosion hole directly below FB 5.

North Abutment – East Bearing

MDP Photo 1138

-No significant deficiencies recorded on
Gusset P or Bearing P

JA Photos 93-95, ~~K0000~~
109

- Previous Areas of 100% section loss in the web have a repair angle welded to the Floorbeam to restore lost section.

JA Photos 90-92

-Typ. FB. corrosion in flanges

JA Photos 81-89

-Typical Flange corrosion

SA Photos 75 - 81

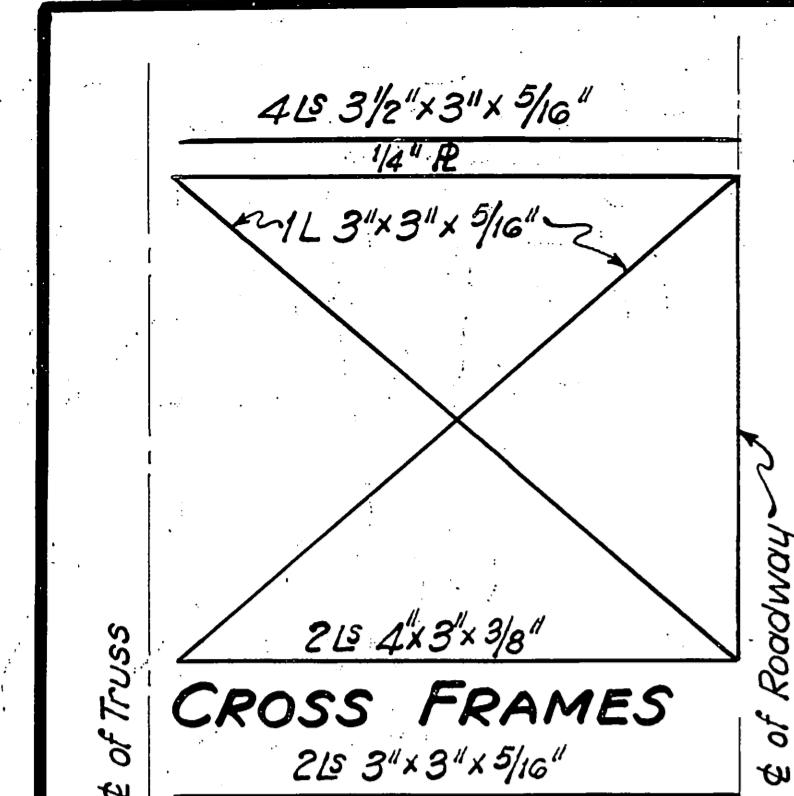
-East End, South Face, 4-ft of laminar
corrosion $\frac{1}{16}$ -in thick in btm 4-in of web

JA Photos 65 - ~~68~~ 73

- Surface corrosion w/ $\frac{1}{16}$ -in laminar corrosion on top & btm flanges.
- East end, top of web, $\frac{1}{8}$ -in deep pitting

JA PHOTOS: 60 - ~~12~~ 64

- East end 3 ft: btm flange of FB has section loss down to knife edging. (MM photo 1139)
- Remainder of FB has areas of surface corrosion w/o significant section loss



Note: 3" x 12" bumper adzed to camber of slab & bolted to slab as shown with washers & $\frac{3}{4}$ " ϕ x 8" bolts, spaced 2'-0" cts. Cost of bumper to be included in price bid for floor concrete.

Note: Handrail shall extend continuously over two panels, and shall be riveted to the diagonals after the floor is poured. Sub-punch diagonal connections and ream in the field.

CROSS FRAMES

2 LS 3 1/2 x 3 x 5/16"

2 LS 3 1/2 x 3 x 5/16 Laced

C26 3 1/2 x 3 x 5/16"

2 LS 3 1/2 x 3 x 5/16"

2" x 1/4" Lacing Bars 8" x 1/4" Batten Rs.

PORTAL

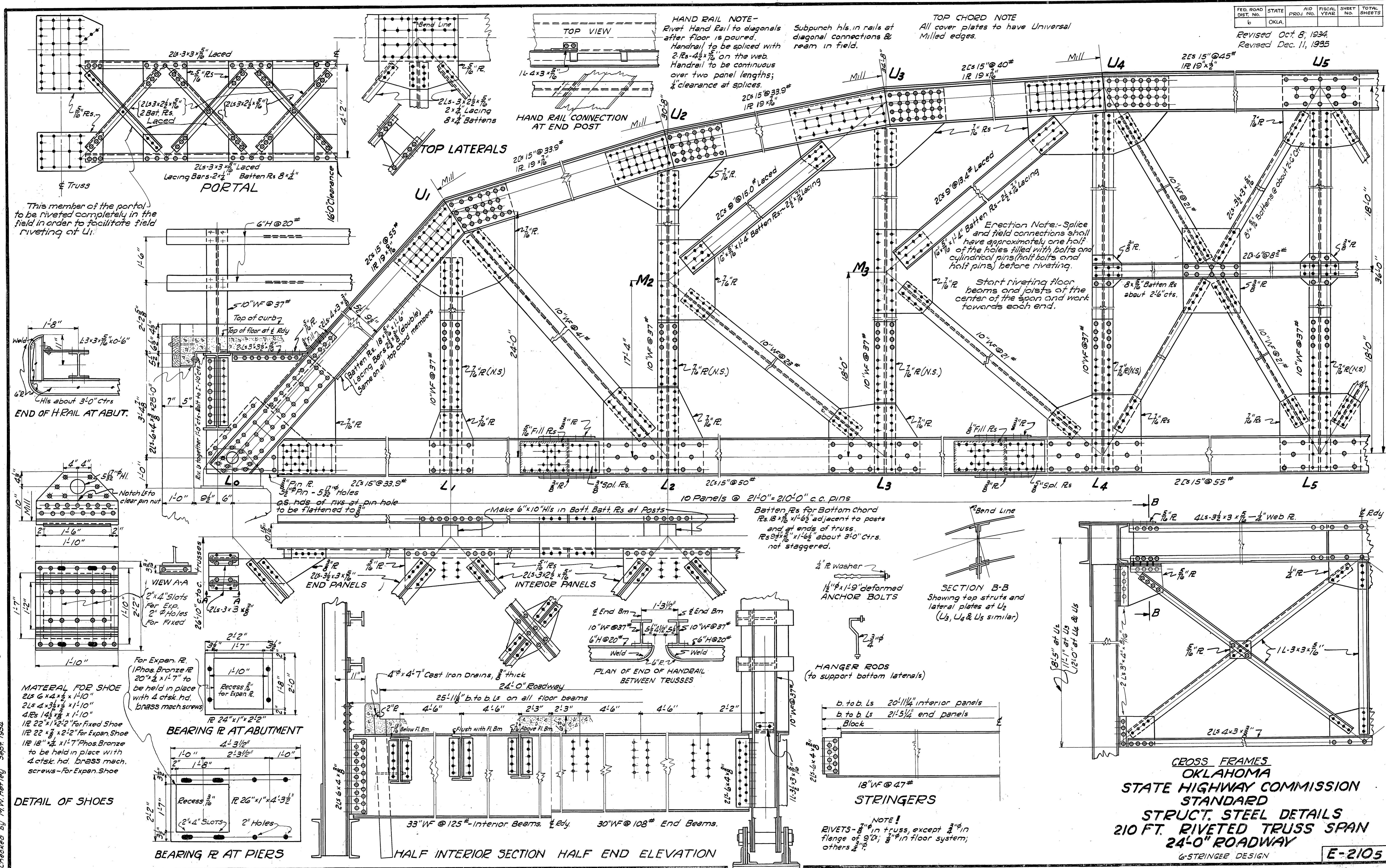
10" WF @ 37# to stiffen End Beam connection.

2 1/2" 15" @ 55# A=9.140"

1/2 19" x 7/16"

10" WF @ 37# A=9.140"

10" WF @ 3



SPAN 2

NOTE: Refer to Span 1 and 3 notes for typical deck and sidewalk cross sections.

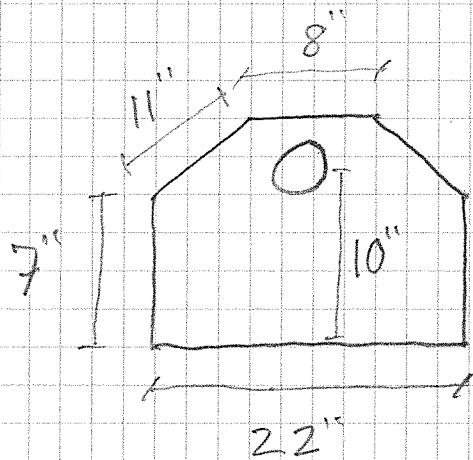
Same as U4 - M4, 5

2 4-ft from L5, area of $\frac{1}{16}$ -in section loss to
web, 6-in Ø areas

- also, @ inboard flange, 14" L x 6" W area of $\frac{1}{8}$ -in section
loss

X M4.5-L5 NOTE X

Pier 1 – West Bearing



4 Plates total, two @ each end of the pin

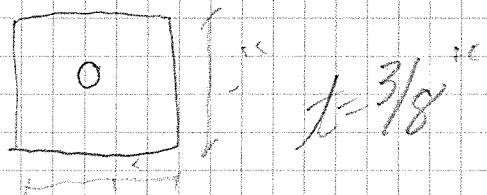
Each R t = 7/8-in

Pin $\phi = 4.5$ "

Gusset R, lifting up to 7/8-in deep @ location where gusset meets top flange of end post.

Gusset R t = 0.5-in

On the inside of the Gusset R, there is an additional stiffening R around the Pin,



Cannot access dimensions of R

Span 2

Bearing

Job No. 12204OK00.01

Pier 1 – East Bearing

SAME AS West bearing

Span 2

Bearing

Job No. 12204OK00.01

Pier 2 – West Bearing

SAME AS PIER 1 West bearing

Span 2

Bearing

Job No. 12204OK00.01

Pier 2 – East Bearing

SAME AS Pier 1 West bearing

Typ. Cond. $\frac{1}{16}$ " laminar corrosion in Flanges w/ up to $\frac{1}{16}$ " pittings in the web @ the FB ends primarily in the lower 6-in, isolated areas of the flange ends have $\frac{1}{8}$ -in laminar corrosion. Typ. section loss to the flanges is less than $\frac{1}{8}$ -in.

- Type Note FB
- Exterior Stringer on west side, $\frac{1}{16}$ " Corrosion w/ $\frac{1}{16}$ " d pitting on btm flg Full Length L2-L3,
- End 18" of webs have $\frac{1}{16}$ " d pitting full ht.

Webs no pitting

Flanges - typ. condition

- Btm Flange @ west end, isolated area of $\frac{1}{8}$ -in section loss @ lower lateral gusset interface
- Top Flange, S face has isolated areas of $\frac{1}{4}$ -in section loss due to pitting

FB in typical condition

- Top Flange of floor beam has 18-in section less directly above strainer top flanges
- to exterior 1-in of flange

Floor Beam top flange has $\frac{1}{8}$ " section
losses directly above stringer top flanges
to exterior 1-in. of flange

Good Condition

- General Note: Lower Chord/Lower Gussets.
1/8-in pack rust btwn ver/diagonals and
lower gussets is causing 1/8-in deep
pitting and up to 1/8-in distortion of
the lower gusset plates at panel points

Span 2

FB 8

Job No. 12204OK00.01

and FB 9

Typ. Condi

Span 2

FB 10

Job No. 12204OK00.01

-Previous repair is JA Photo 101

All Spans

~~Span 2~~

Typical Lower Lateral X-Bracing

Job No. 12204OK00.01

- ~~all spns~~ Areas of 50% - 100% section loss near gusset connections.
- Span 1 & Span 2 lower laterals all have 100% section loss near the connections to Pier 1.

SPAN ~~2~~ @ P2, JA Photo 98

L3e-L4on 100% section loss

INSPECTION PHOTOS (JA)

PHOTO LOG

 Roll Number: 1/7/14

 Camera: J. Anderson

 Lead Inspector: CH/MD

Additional Inspectors:

Job Number	Structure Number	Frame	Description of Photo	# in Report
502	SH 123 over CANE RIVER	497	Span 2, LO, East Brdg, Pier 1	
503		498	Span 2, LO gusset thickness	
504		499	Span 2, LO gusset, East Face, E Truss	
505		500	Span 2, LO, East Truss, Gusset PL sketch	
506		501	Span 2, LO-L1, sketch	
507		502	Span 2, LO, E truss, internal gusset	
508		503	" LO-U1 rivets @ LO, E truss	
509-510		504-05	" " LO-L1 "	
511		506	LO, Span 2, internal Gusset sketch, E truss	
512		507	" " internal Gusset, E truss	
513		508	ONU	
514		509	Stringer Sketch, Span 2, S 6	
515		510	SPAN 2, FBI sketch	
516		511	SPAN2 @ FBI, E truss, Can tilever sidewalk CMXN	
517		512	Span 2, E truss, L2 GUSSET diagram	
518		513	Span 2, E truss, E face, L2 Gusset R	
519		514	" " Btm portion	
520		515	Photo 512 Digg w/ thickness	
521		516	Span 2, FB 2, corrosion, N Face @ L2	
522		517	" "	
523		518	note, Heavy corr, sidewalk B, b/w L2-L3, W flange	
524		519	" "	
525		520	L3 Gusset, Span 2, E truss	
526		521	" "	
527		522	note, S face, E side, FB3, Span 2, typ. corr.	
528		523	" "	
529		524	CORRODED LATERAL BRACING, L3 EAST TO L4 WEST @ L3 EAST (100% SECTION LOSS)	
530		525	PHOTO " " " " "	
531		526	SKETCH OF L4 EAST, SPAN 2	
532		527	" " " " "	
533		528	PHOTO OF L4 EAST, SPAN 2 @ SOUTH SIDE	
534		529	" " " " " NORTH SIDE	
535		530	TYPICAL LATERAL BRACING BETWEEN LOWER CHORDS	
536		531	NOTE TO GO WITH PHOTO 529	
537		532	SKETCH OF L5 EAST SIDE, SPAN 2	
538		533	PHOTO OF " " " " "	
539		534	PHOTO OF " 536"	
540		535	" " " "	
541		536	100% SECTION LOSS IN Bottom FLANGE & WEB OF ROADSIDE SIDEWALK BEAM @ L5 SOUTH	

PHOTO LOG

 Roll Number: 1/8/14

 Camera: J. ANDERSON

 Lead Inspector: CH/MD

Additional Inspectors:

Job Number	Structure Number	Frame	Description of Photo	# in Report
002	SH 123	002	SKETCH OF SPAN 2 L1 GUSSET PLATE	
OVER		003	SPAN 2, L1 GUSSET PLATE	
CANEY RIVER		004	SPAN 2, L5 GUSSET PLATE	
		005	SPAN 2, L4 GUSSET PLATE	
		006	SPAN 2, L4 GUSSET PLATE	
		007	" " " "	
		008	NOTE CORRECTING PREVIOUS LOCATION	
		009	NOTE	
		010	CORRODED TOP FLANGE OF ROADSIDE SIDEWALK BEAM BETWEEN L4-L5 OF SPAN 2 EAST.	
		011	" " " "	
		012	SKETCH OF STRINGER SPACING FOR ALL SPANS	
		013	DON'T USE	
		014	SKETCH OF L6, SPAN 2 INSIDE GUSSET	
		015	PHOTO OF " " " "	
		016	NOTE FOR " " " " "	
		017	NOTE ~ SPAN 2 FLOOR SYSTEM.	
		018	SPAN 2 FLOOR SYSTEM.	
		019	SPAN 1 BEARING AT WEST SIDE AT L6	
		020	NOTE " " " "	
		021	SKETCH OF L6, SPAN 1 GUSSET	
		022	SOUTH END OF L2, SPAN 1 GUSSET (EAST SIDE)	
		023	SKETCH OF L2, SPAN 1 EAST SIDE GUSSET.	
		024	BOTTOM RIVET SPACING OF L2, SPAN 1 E. SIDE GUSSET.	
		025	BOTTOM RIVET SPACING OF L2, SPAN 1 E SIDE GUSSET CONTINUED	
		026	NOTE REFERRING PREVIOUS PHOTOS AS "L2"	
		027	SKETCH OF L1, SPAN 1. GUSSET	
		028	DON'T USE.	
		029	L1, SPAN 1 GUSSET	
		030	NOTE:	
		031	CORROSION HOLE IN L1, U, AT CANTILEVER FLOOR BEAM, EAST SIDE OF SPAN 1.	
		032	NOTE.	
		033	NORTH HALF OF L2, SPAN 1 @ EAST SIDE	
		034	" " " "	
		035	SKETCH OF " " " "	
		036	L3 SAME AS L2, L5 → L6, L4 → L1	
		037	SKETCH OF CANTILEVER FLOOR BEAM ~ SPAN 1	
		038	CANTILEVER FLOOR BEAM. @ SPAN 1	
		039	NOTE	
			TYPICAL CORROSION ON TOP OF CANTILEVER FLOOR BEAM.	

PHOTO LOG

Roll Number:

OKLAHOMA TRASS 1/9/14

 Camera: JEFF ANDERSON

Lead Inspector: CH/MD

Additional Inspectors:

MD/TD

Job Number	Structure Number	Frame	Description of Photo	# in Report
		40	LS, SPAN 1 EAST - INSIDE GUSSET PLATE w/ 100% LOSS OVER THE BEARING (OUTSIDE BRG IS O.K.)	
		41	" " " "	
		42	" " " "	
		43	INSIDE BRG OF SPAN 1 EAST @ LS	
		44	INSIDE BRG OF SPAN 2 EAST @ LS (OUTSIDE BRG IS SIMILAR)	
		45	OVERVIEW OF SPAN 1 EAST @ LS INSIDE BRG.	
		46	TYPICAL RIVET CONFIGURATION @ END SPAN BEARINGS	
		46 - 49	MOVIES THAT DONT SHOW ANYTHING	
		51 & 52	DON'T USE	
		53	BOTTOM FLANGE OF FB. 5 @ SPAN 1 EAST BRG. ORIGINAL WEB IS 100% GONE. OUTSIDE REPAIR PLATES CONNECTED TO CORRODED STEEL	
			<p>The diagram illustrates a bridge girder section. It shows a top flange with two vertical supports at 4'0" from the bottom. Between these supports, there is a horizontal line labeled "5/16" PITTING" with a note "50-100% LOSS IN FLANGES @ BOTH END". Below the top flange, a thick horizontal line represents the web, with a note "100% ORIGINAL WEB SECTION LOSS?". At the bottom, there are two vertical supports at 3'0" and 8'0". The text "FB 5 ~ SPAN 1" and "LOOKING TOWARDS ABUTMENT 1" is written below the diagram.</p>	
		54	FORWARD FACE OF FB 1 @ N. SIDE OF SPAN 2	
		55	" " " "	
		56	" " " "	
			MINOR PITTING IN TOP FLANGE w/ GENERAL CORROSION. LOSS IN LOWER LATERAL GUSSETS APPROXIMATELY 50%	
		57	TYPICAL TOP FLANGE CORROSION OF FB. 1 @ N. SIDE OF SPAN #2	
		58	NOTE OF 59	
		59	SPAN 3 @ LS EAST BRG.	
		60	CORROSION ON FB 5 @ SPAN 3 E. OVERHANG.	
		61	TYPICAL CORROSION ON TOP FLANGE OF FB 5 ~ SPAN 3	
		62	" " Bottom "	"

PHOTO LOG

 Roll Number: OKLAHOMA TRUSS 1/9/14

 Camera: JEFF ANDERSON

Lead Inspector: CH/MD

Additional Inspectors:

MD TO

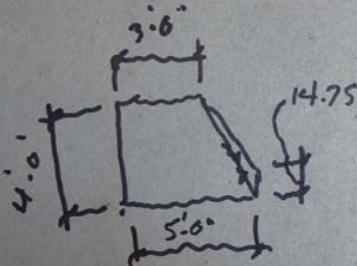
Job Number	Structure Number	Frame	Description of Photo	# in Report
		63	SAME AS 61	
		64	CORROSION NOTE FOR FB. 5 @ SPAN 3	
		65	MINOR CORROSION & DEBRIS ON EAST FACE OF FB 4 @ SPAN #3	
		66	PITTING IN TOP OF WEB OF FB 4, EAST SIDE, SPAN 3 @ EAST EXTERIOR STRINGER	
		67	TYP. LIGHT CORROSION, N FACE OF FB 4 OF SPAN 3	
		68	TYP. TOP FLANGE CORROSION, N FACE FB 4 OF SPAN	3
		69	NOTE FOR PHOTOS 70 THROUGH 74	
		70	FB 4, S. FACE @ EAST SIDE OF SPAN 3 - DEBRIS & CORROSION ON BOTTOM FLANGE.	
		71	" " "	
		72	SPAN, 3, FB 4 SOUTH FACE - BOTTOM FLANGE CORR.	
		73	" " " TOP "	
		74	DON'T USE	
		75	NOTE FOR PHOTOS 76 - 78	
		76	N. FACE OF FB 3, EAST SIDE OF SPAN 3, - BOTTOM FLANGE CORROSION	
		77	" " VIEW OF TOP & BOTTOM FLANGE	
		78	" " " TOP FLANGE CORROSION	
		79	NOTE FOR PHOTO 80	
		80	4' OF LAMINATING CORROSION ON S. FACE OF FB 3, EAST SIDE OF SPAN 3	
		81	TYP TOP FLANGE CORR ON FB 3 " " " "	
		82	NOTE FOR PHOTOS. 83 THROUGH 86	
		83	LAMINATING CORR ON N. FACE OF FB 2 @ EAST SIDE OF SPAN #3	
		84	DON'T USE	
		85	TOP FLANGE CORR @ N. FACE OF FB 2 @ SPAN 3	
		86	DEBRIS & CORROSION AT EAST SIDE OF FB 2 @ N. FACE OF SPAN 3.	
		87	LOCATION OF PHOTOS 88 & 89	
		88	S. FACE OF FB. 2, EAST SIDE OF SPAN 3 BOTTOM FLANGE CORROSION	
		89	" " " TOP FLANGE CORROSION	
		90	LOCATION OF PHOTOS 91 & 92	
		91	FB 1, EAST SIDE, N FACE, SPAN 1 - MINOR BOTTOM FLANGE CORROSION	
		92	" " TOP FLANGE CORROSION	

OKLAHOMA TRUSS
1/9/14

JEFF ANDERSON

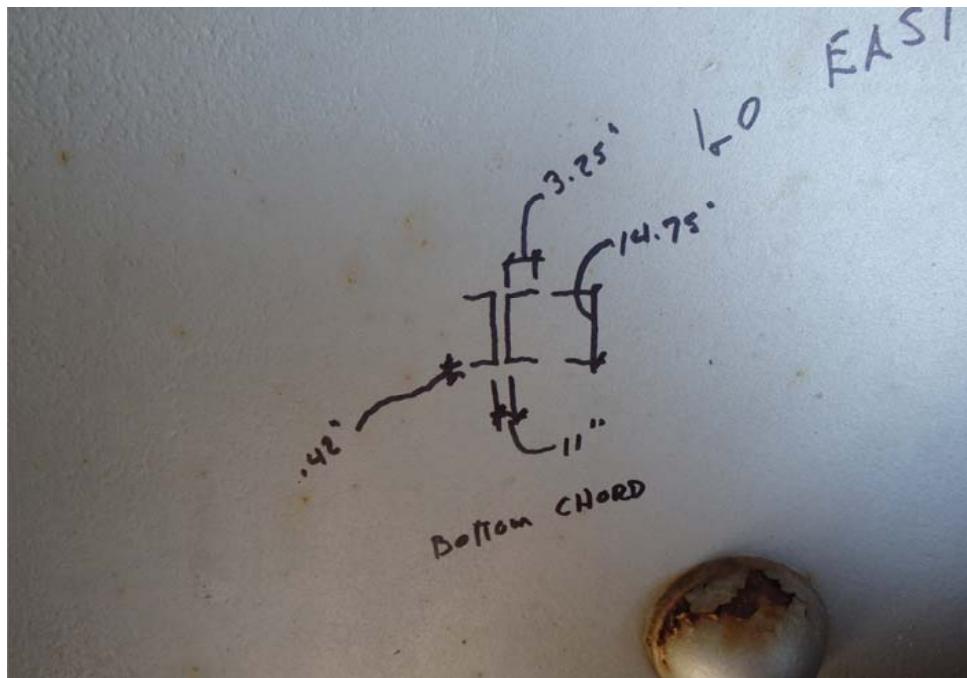
FRAME	PHOTO DESCRIPTION
93 - LOCATION OF PHOTO 94	
94 - S. FACE OF FB O EAST, SPAN 3. - HEAVY CORROSION ALONG BOTTOM FLANGE & WEB.	
95 - FB O BOTTOM FLANGE, N. FACE OF SPAN 3 - ADDED PLATE & L'S	
96 - DON'T USE	
97 - NOTE FOR PHOTO 98	
98 - SEVERED LOWER LATERAL BRG @ P2, SPAN 2, EAST SIDE.	
99 - DON'T USE	
100 - NOTE FOR 101	
101 - ANGLES ADDED TO BOTTOM FLANGE & WEB OF SPAN 2 FB AT PIER 2, SOUTH FACE.	
102 - LO EAST BRG OF SPAN 3	
103 - " " TOP OF BEARING	
104 - EAST SIDE BEARINGS @ PIER 2	
105 - DEBRIS AT INSIDE BEARING, NE CORNER OF SPAN 2.	
106 - LOCATION OF PHOTO 107	
107 - WEST SIDE OF LO @ SPAN 3. - 100% SECTION LOSS ALONG BOTTOM OF WEB, N. FACE.	
108 " " "	" "
109 PLATES & ANGLES ADDED ALONG BOTTOM OF FB O, N. FACE, SPAN 3.	

1,0
.462" GUSSET

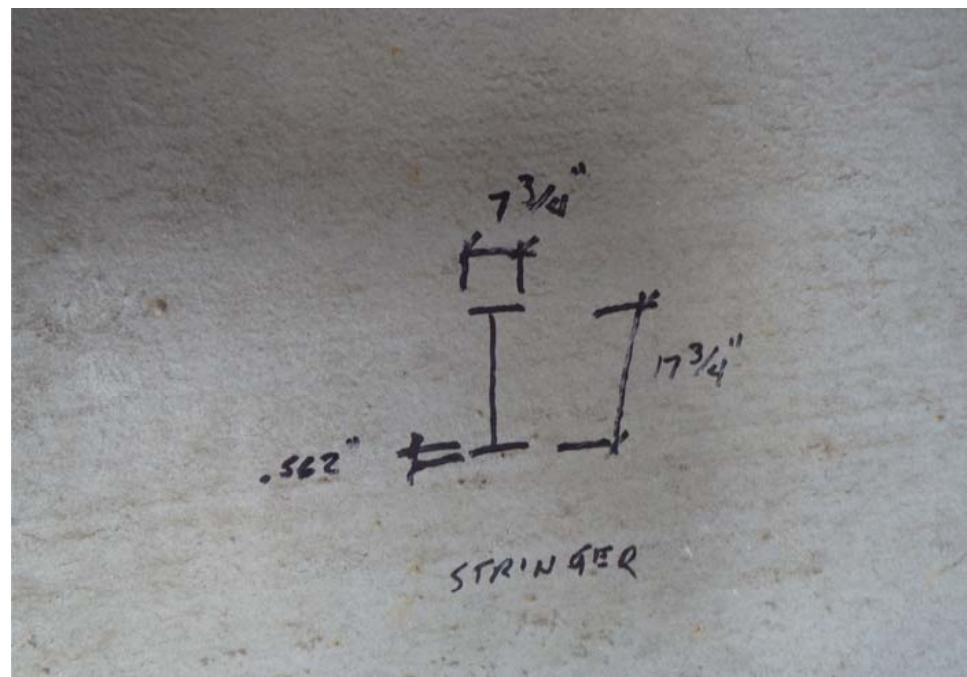
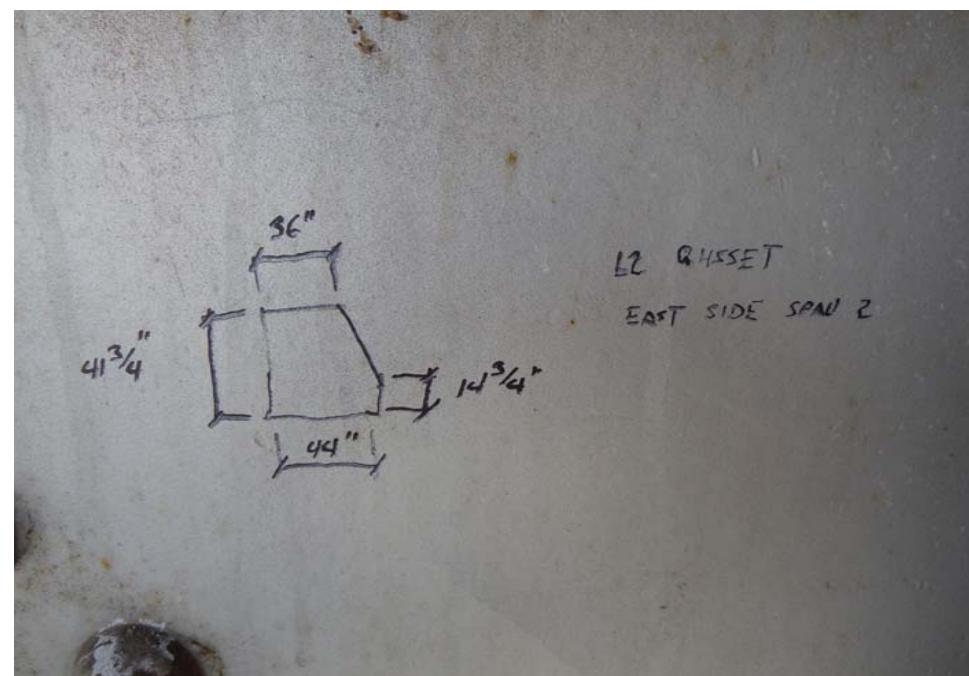
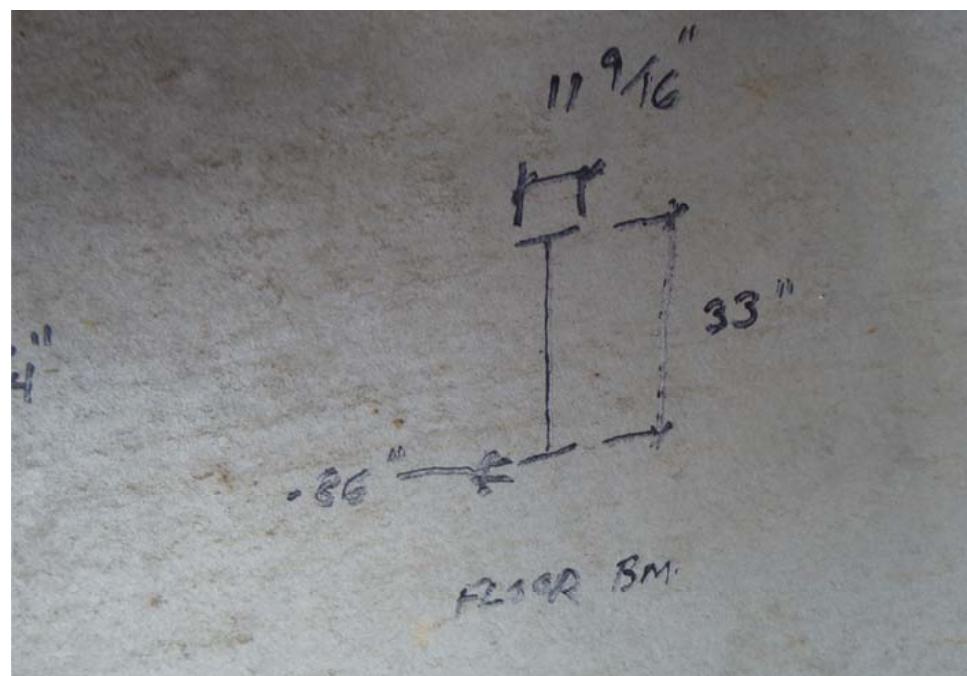


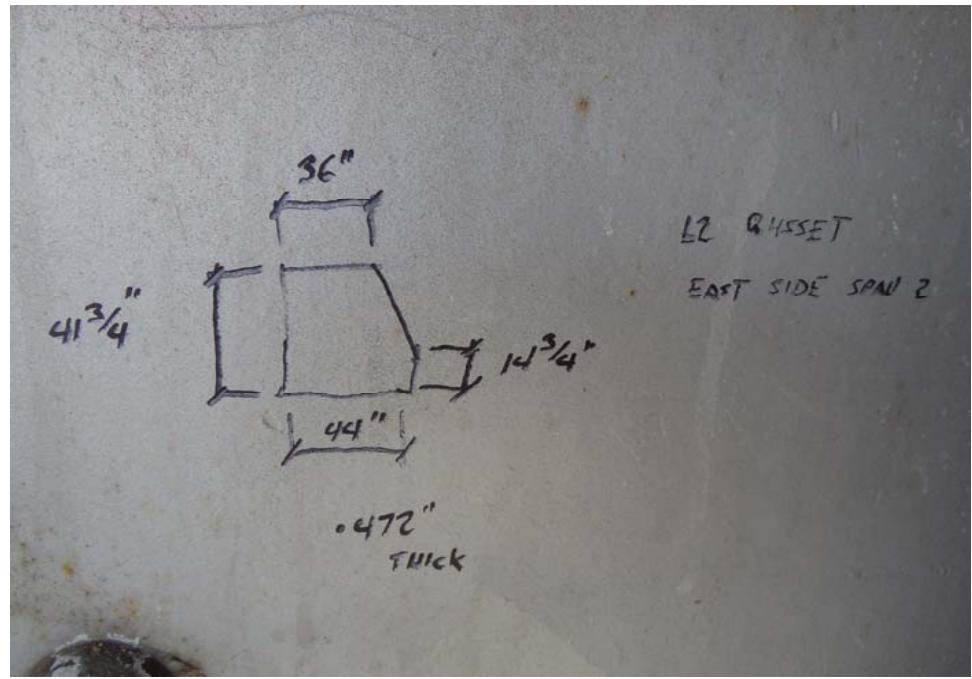
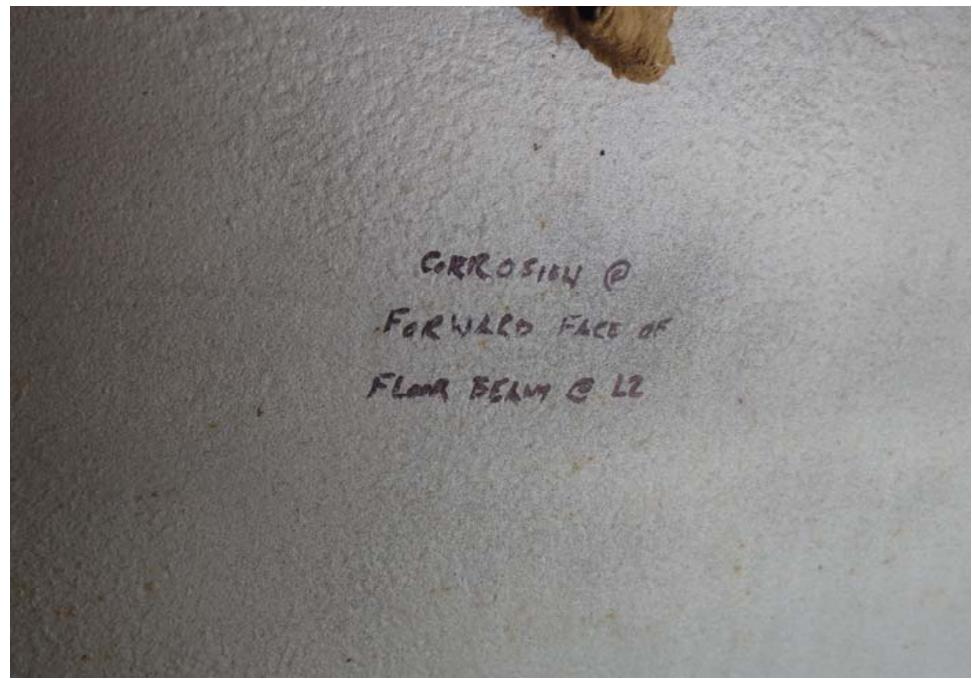
1,0
.462" GUSSET











HEAVY CORROSION
ON SIDEWALK BEAM
RIGHT SIDE SPAN 2
BETWEEN L2 & L3
(ROADWAY-SIDE FLANGE)

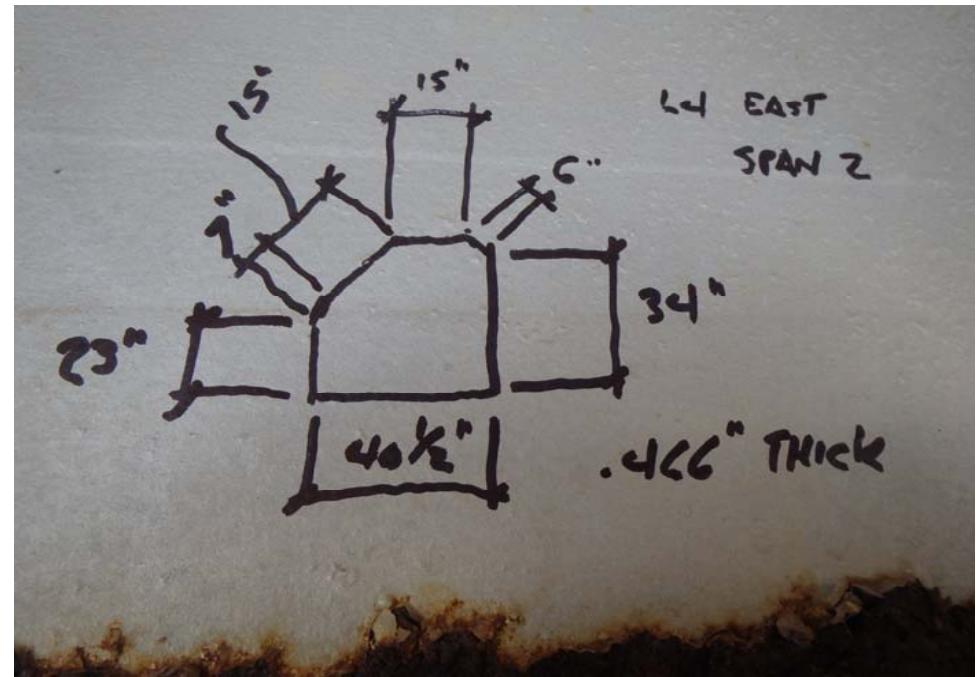
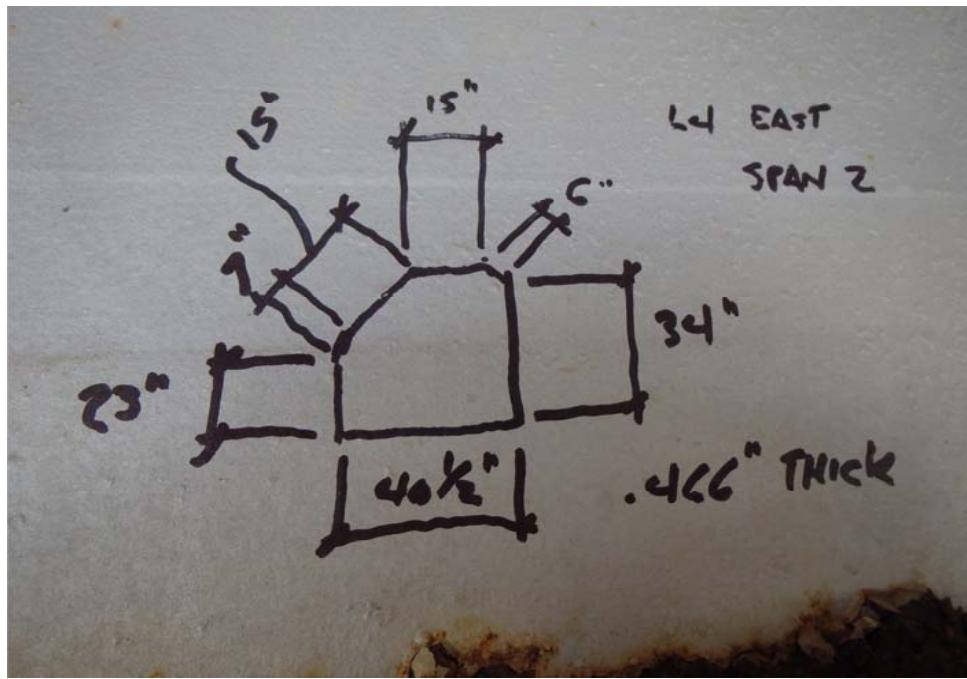
L3 GUSSET.
SAME AS L2

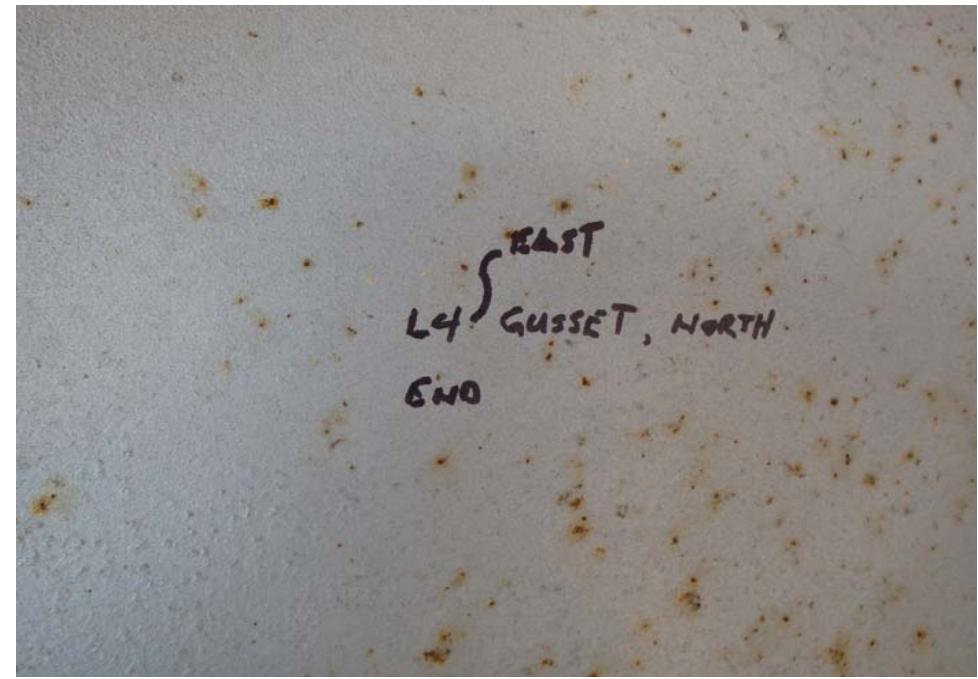
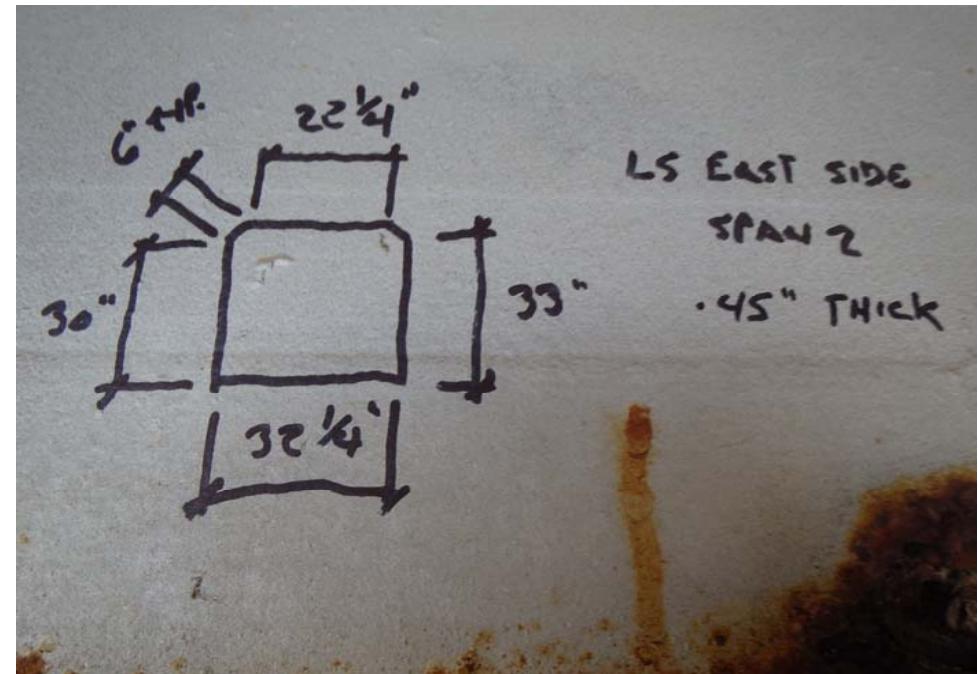


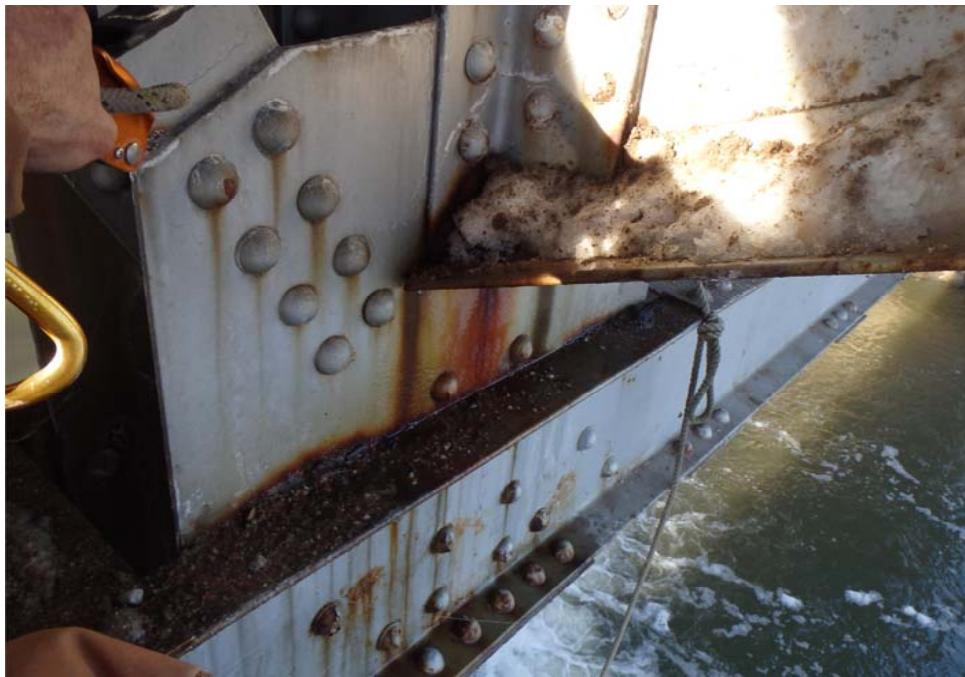
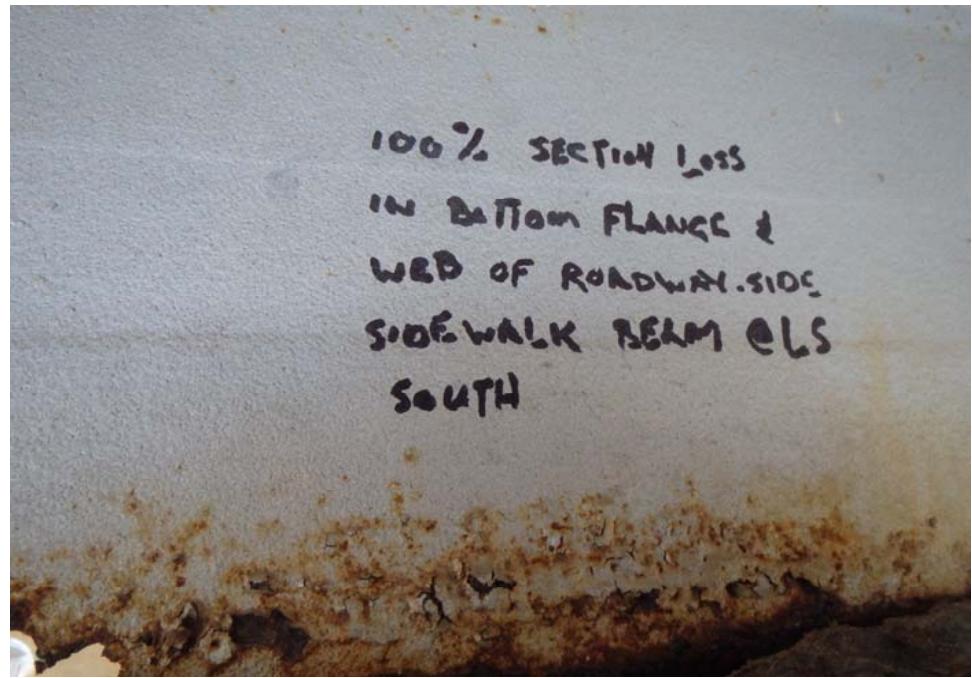
REAR FACE, RIGHT SIDE
OF L3 FLOOR BEAM - SPAN 2
- TYPICAL CORROSION

CORRODE LATERAL
BRACING - L3 EAST TO
L4 WEST & L3 EAST
(100% SECTION LOSS)

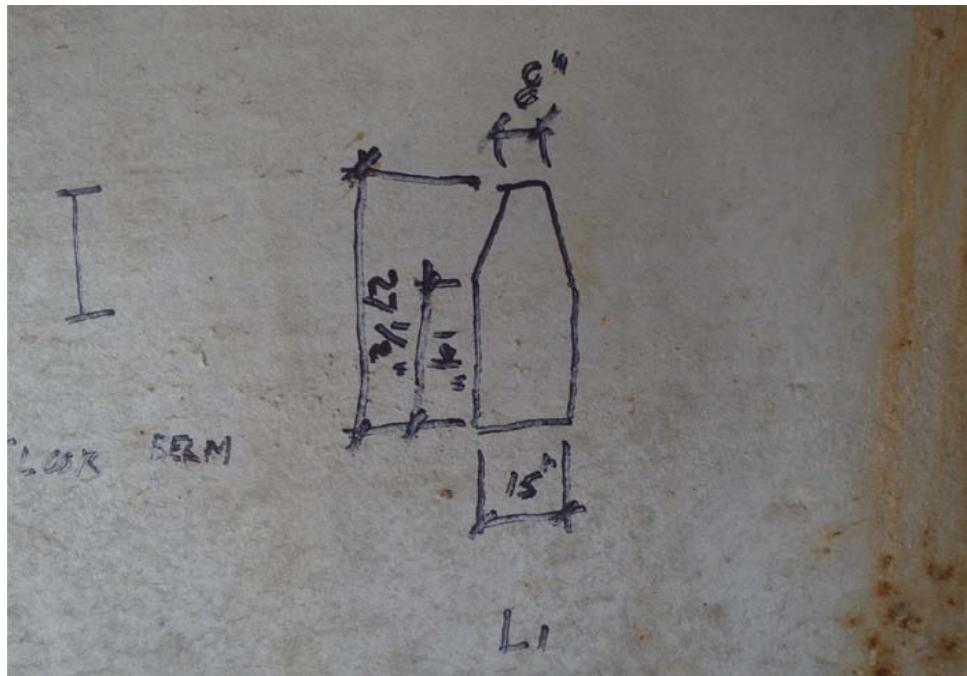


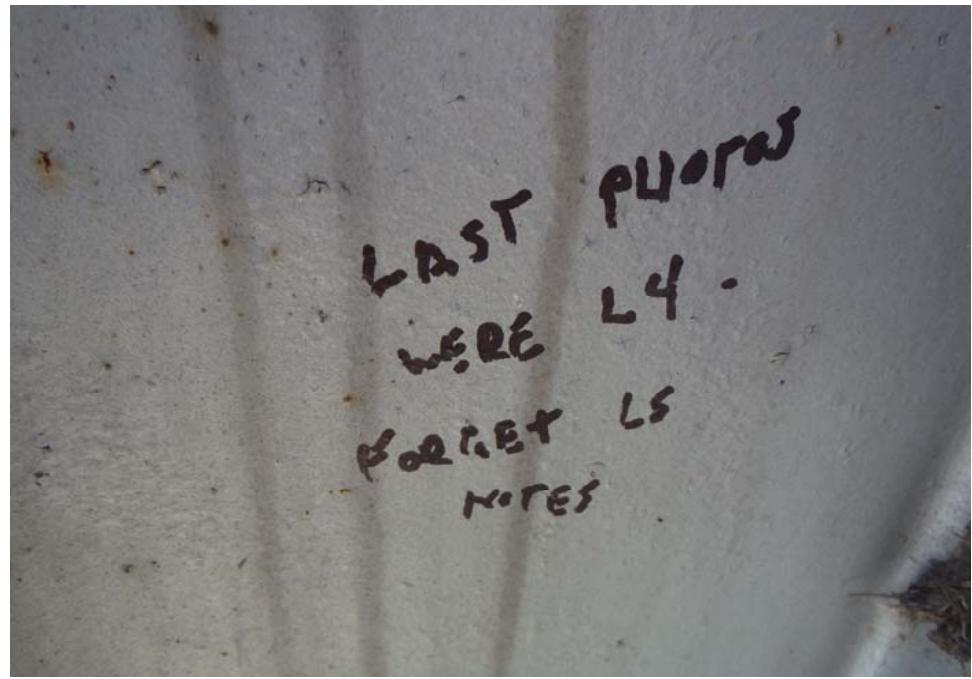
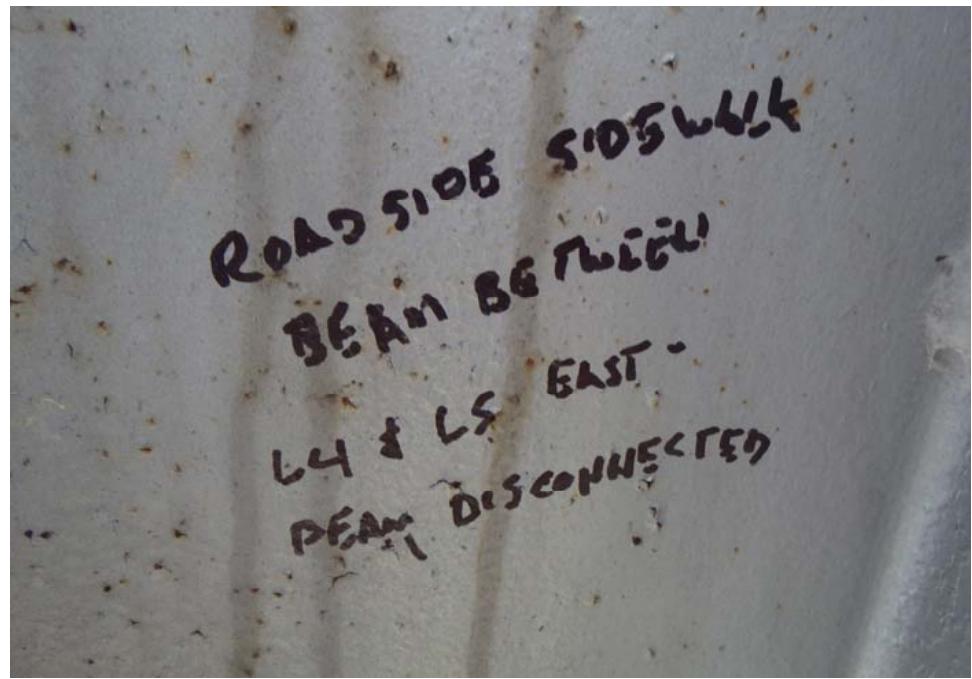


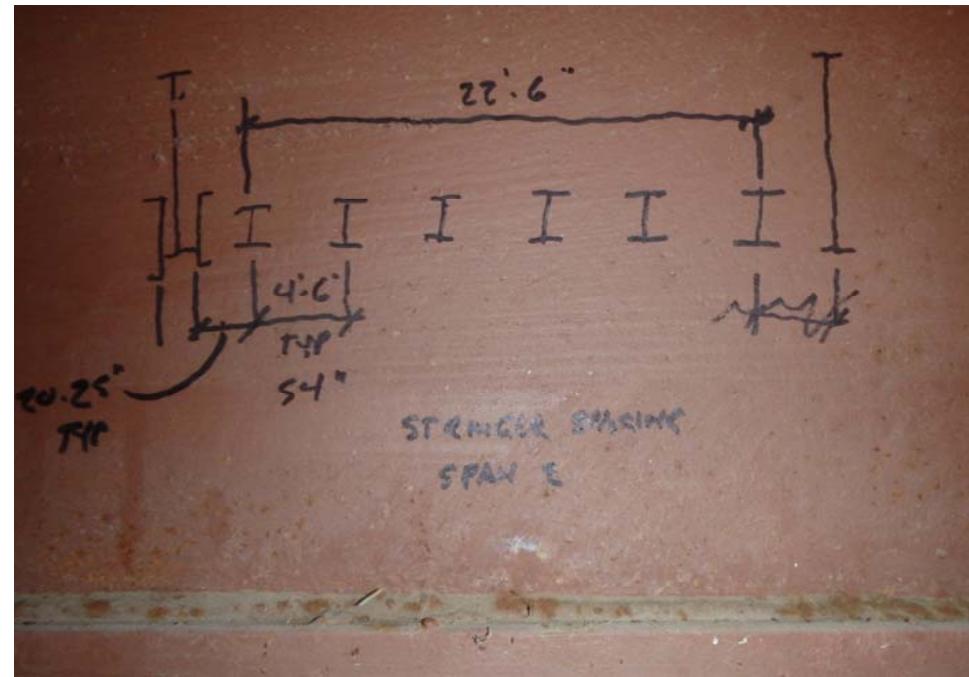
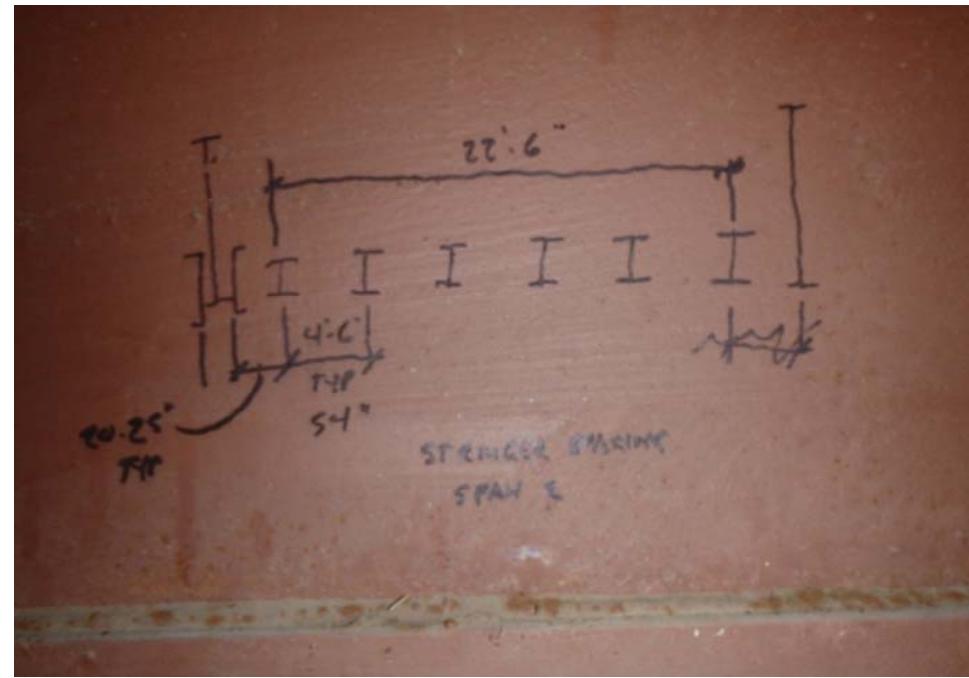


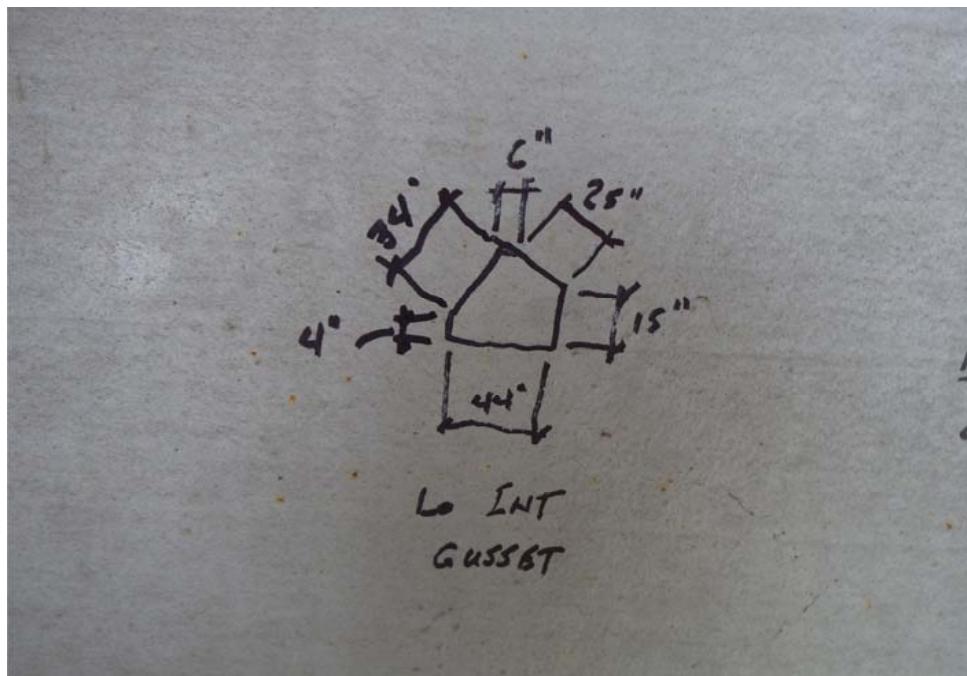
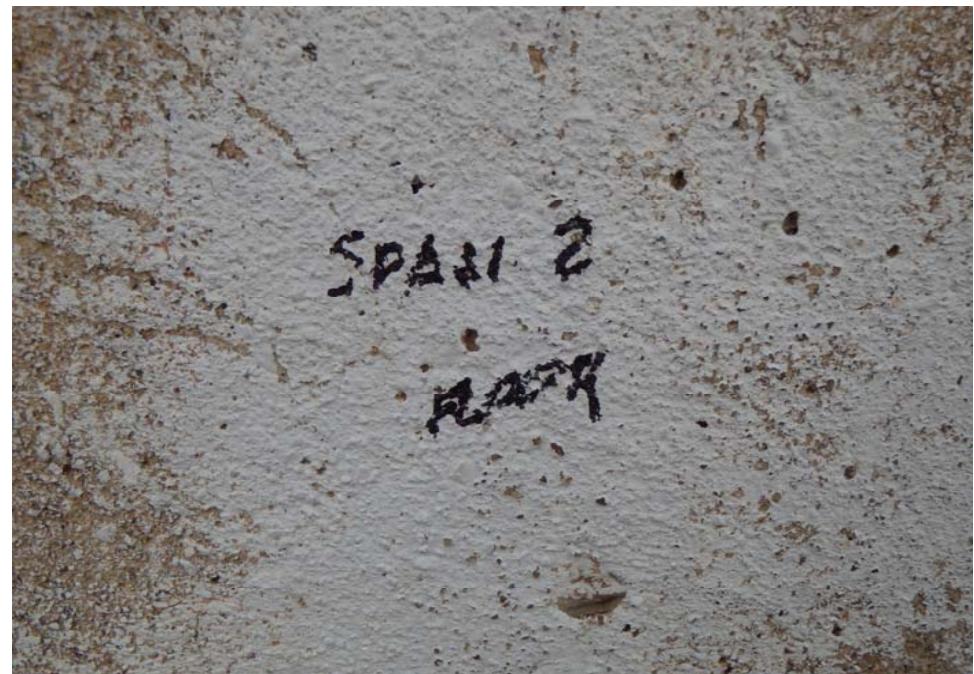


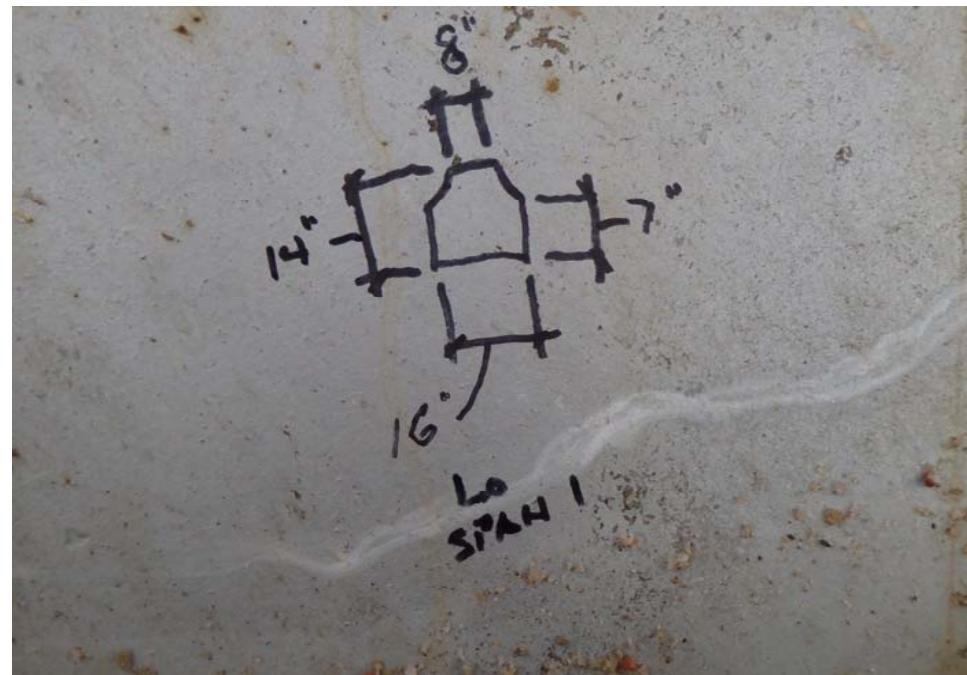


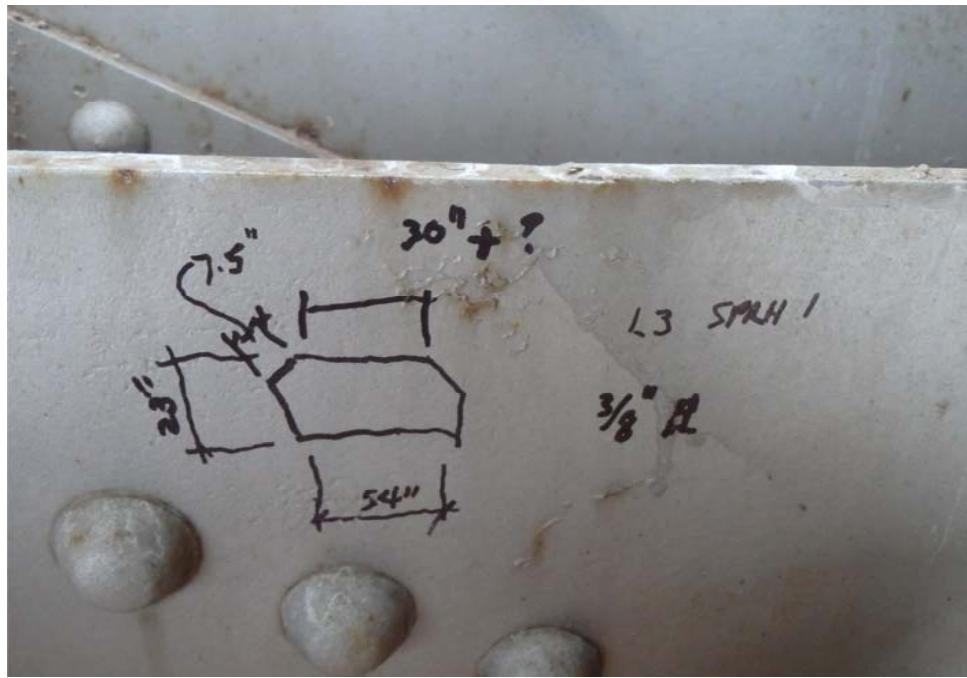


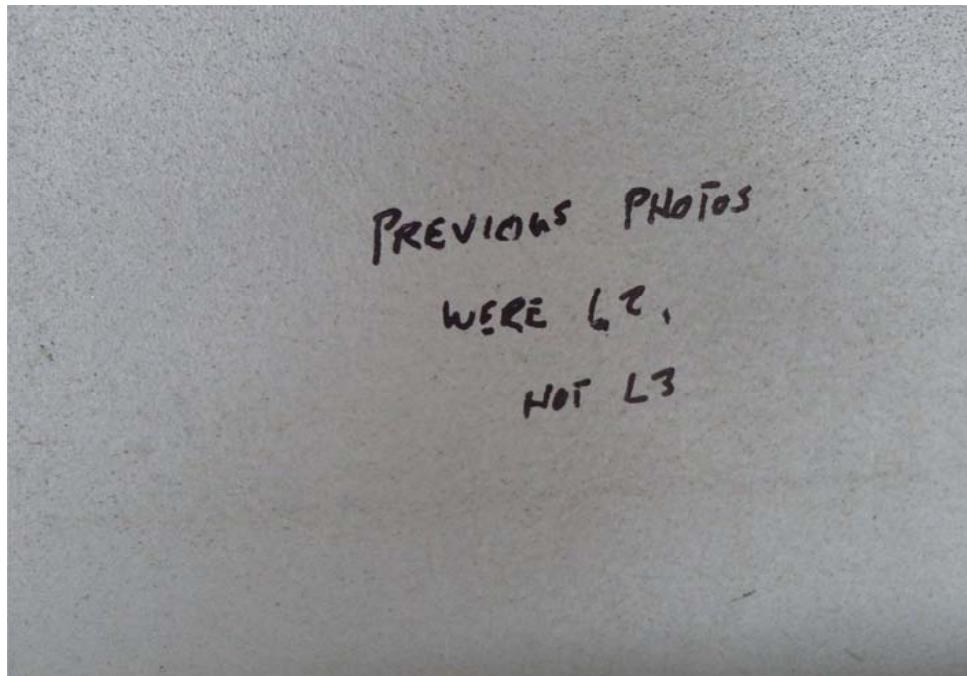


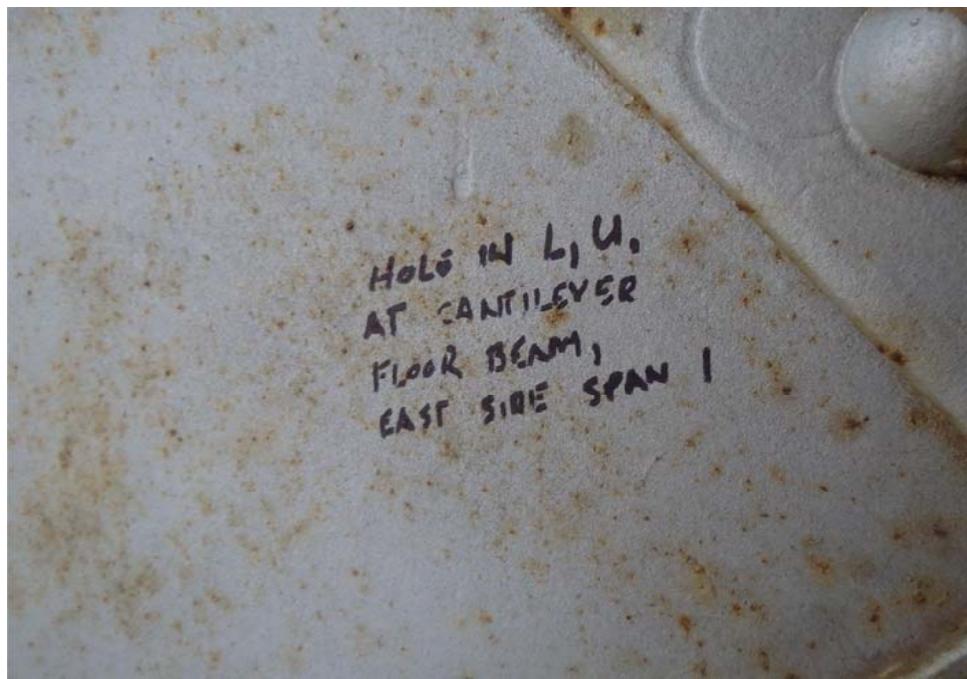


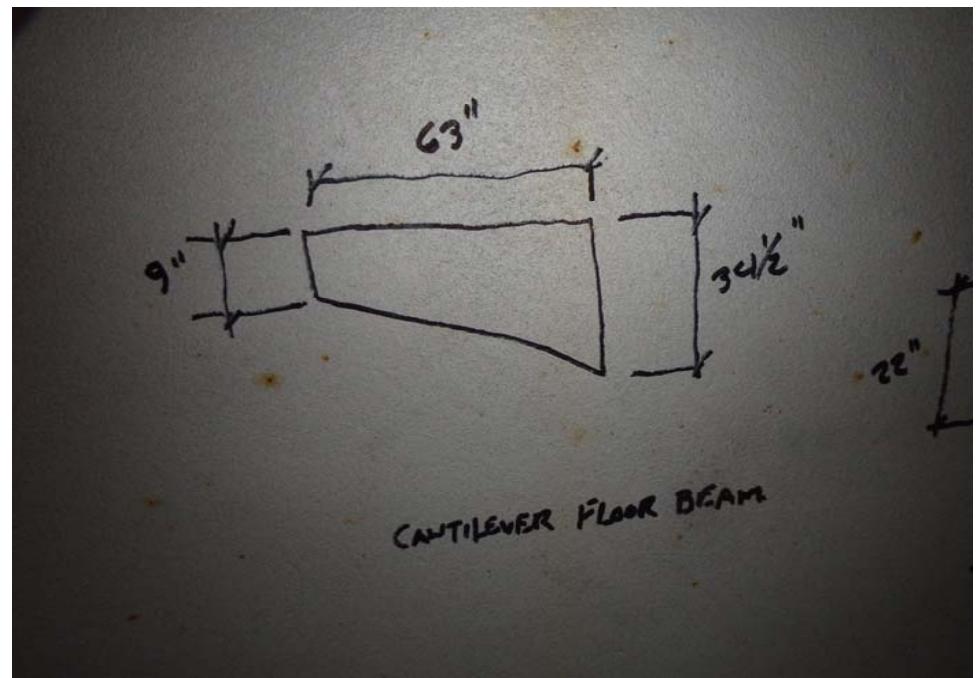
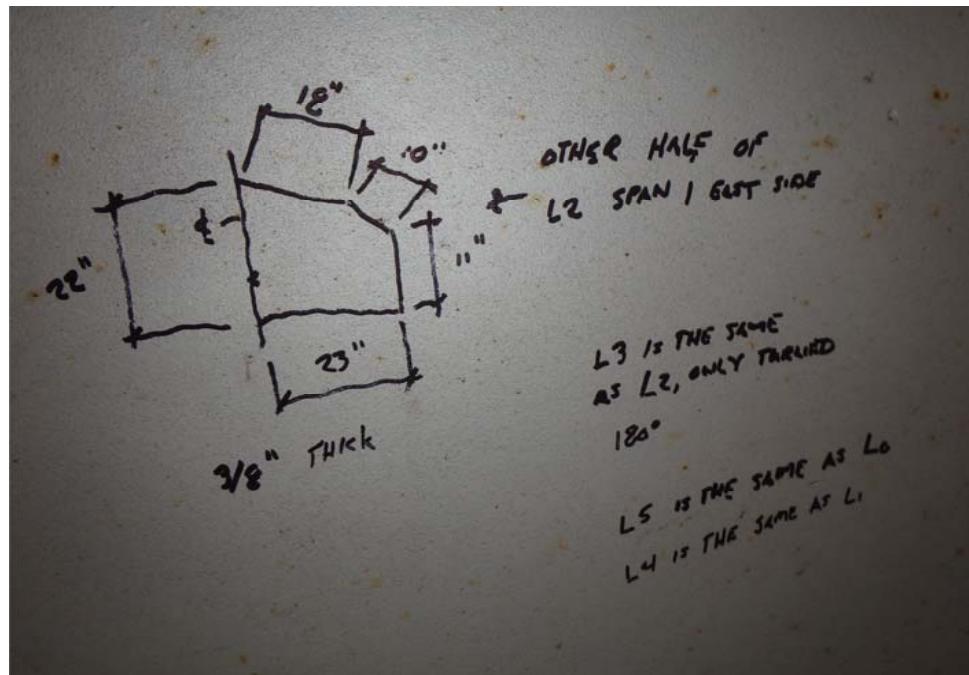
















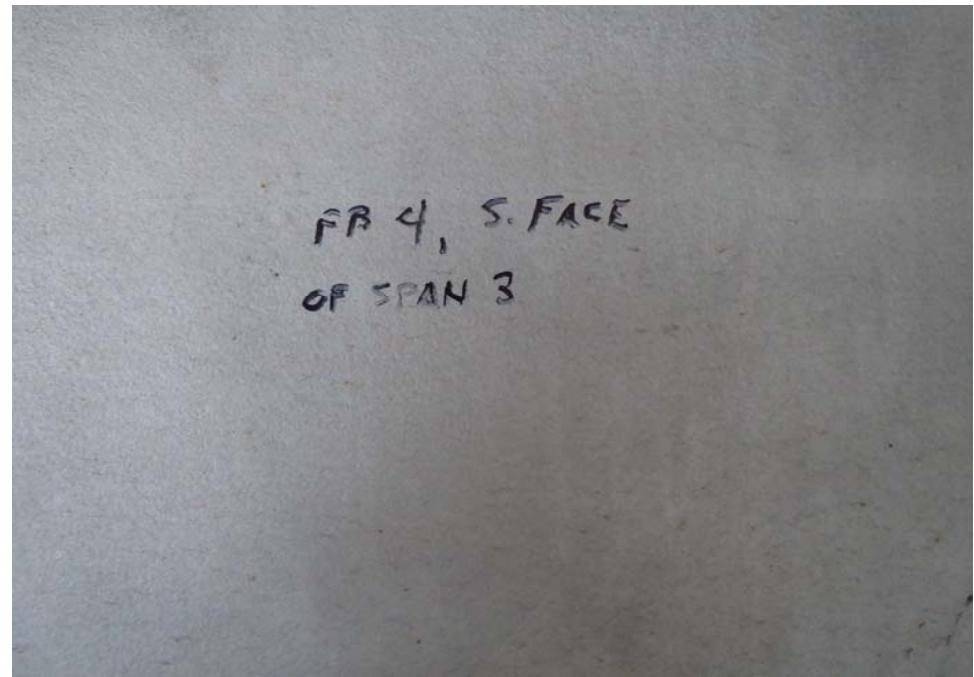




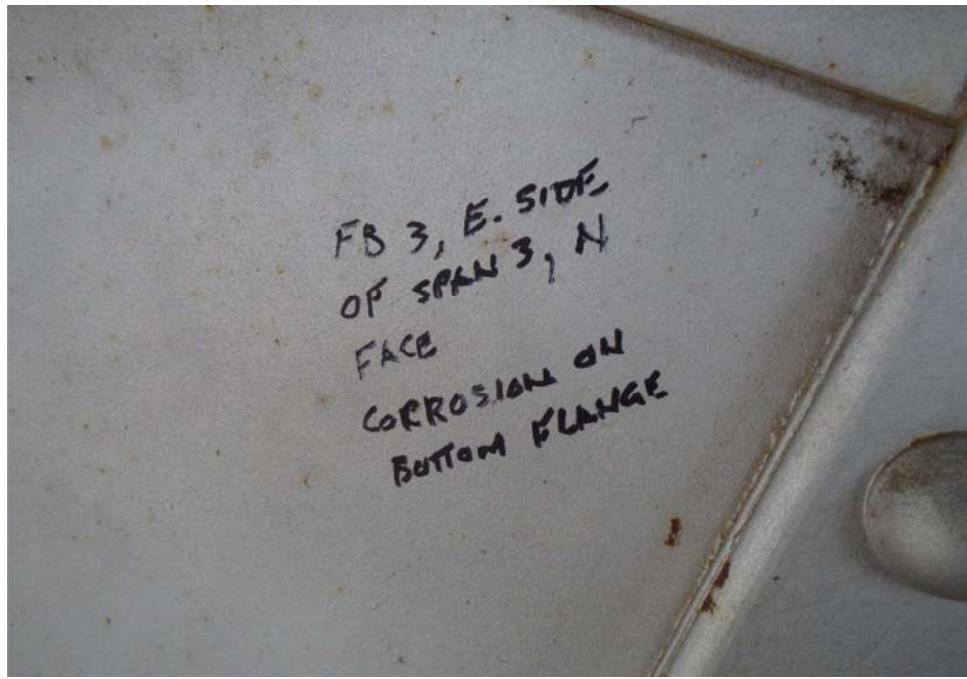


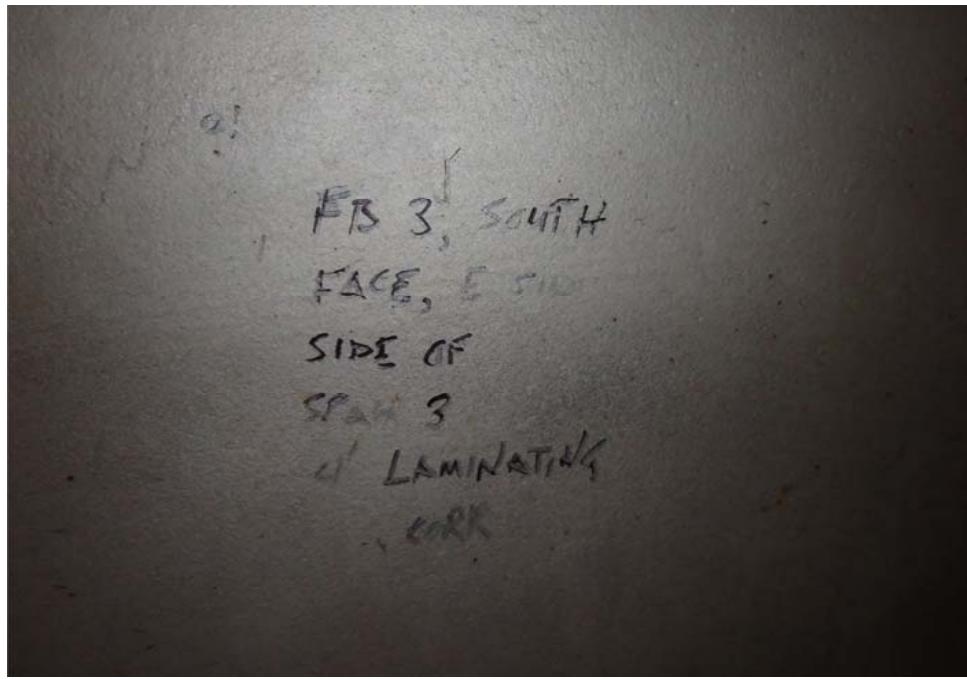
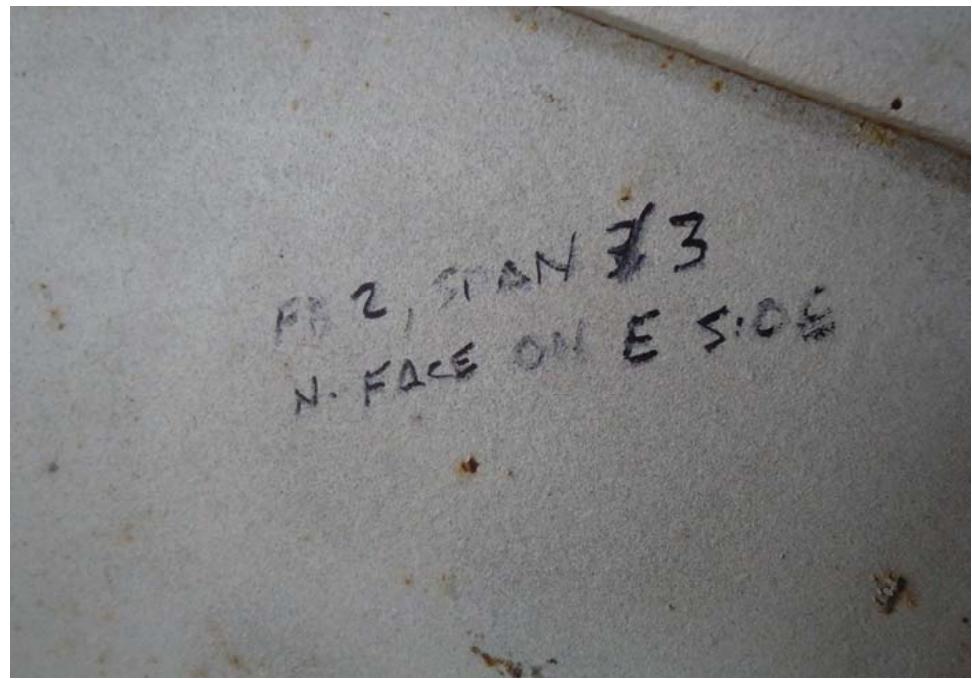




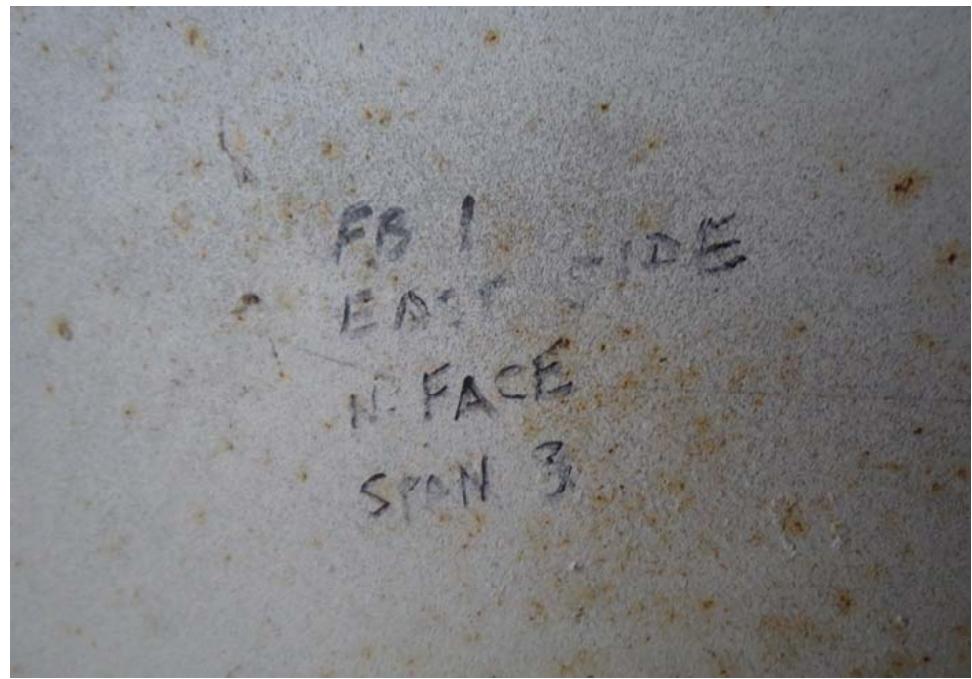






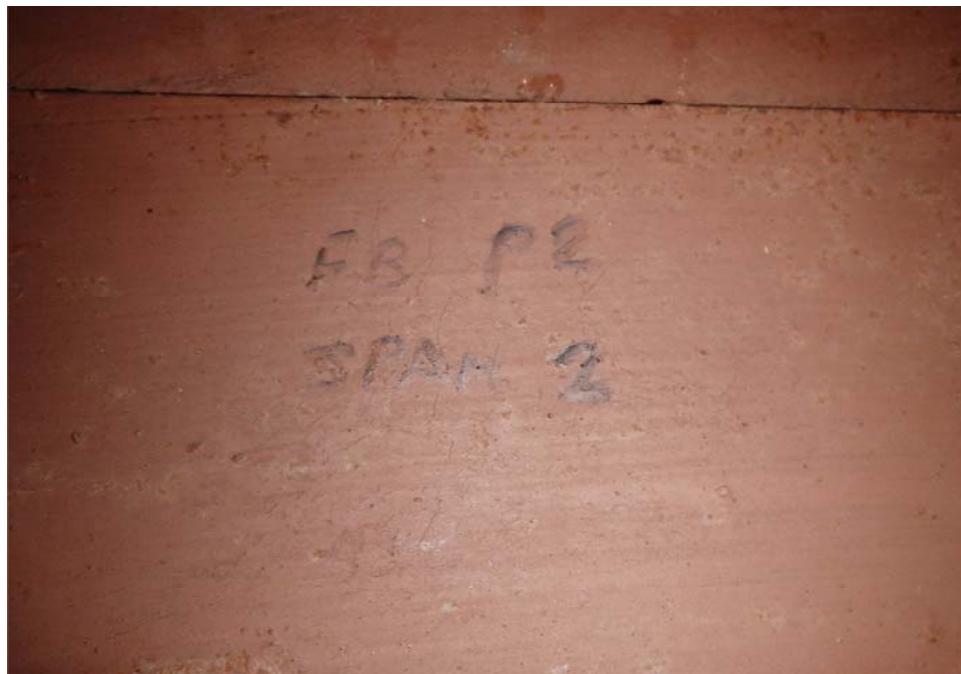


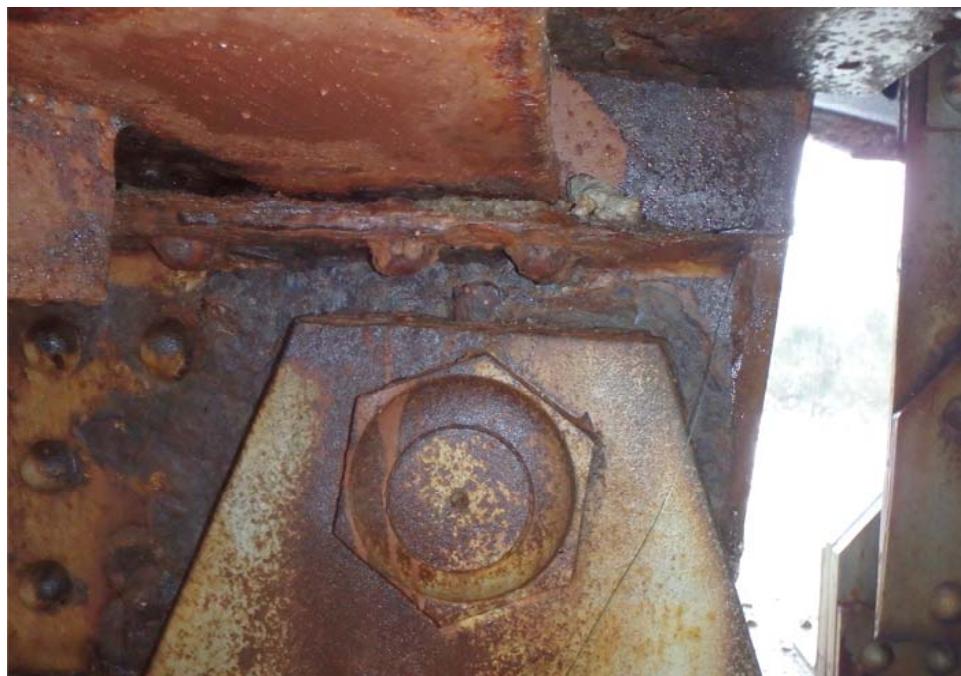
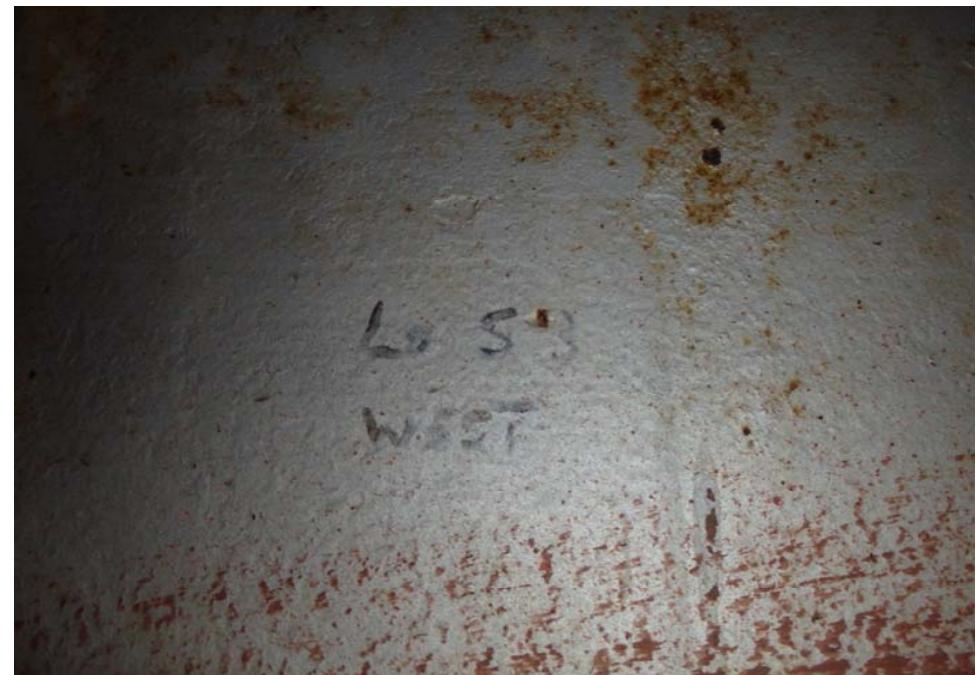














INSPECTION PHOTOS (MDD)

PHOTO LOG

 Roll Number: 1/7/14

 Camera: MOD OLYMPUS

Lead Inspector: CH/MD

Additional Inspectors:

Job Number	Structure Number	Frame	Description of Photo	# in Report
122040K	SIH 123 over CANAL AVEN	104642	SPAN 2, E truss, E face, Panel Pt. U1	
		1043	U1e - U1w port of bracing	
		1044-47	East Truss, Span 3, Hip Plate @ Panel Pt. U1	
		1048-50	East Truss, Span 2, Top RC @ Panel Pt. U2	
		1057	"	
		1058-60	E. Truss, Span 2, P.P. U2, South Face	
		1061	South Approach, Looking North	
		1062	Span 1 W. Truss, E. face	
		1063	Span 1, E. Truss, P.P. U1	
		1064-65	Span 1, E. Truss, P.P. U2	
		1066	" P.P. M2.S	
		1067	Span 1, E. Truss, looking S.(W.)	
		1068	Portal Bracing, SPAN 2, South End	
		1069	Sway Bracing U2 East truss to U2 West truss Span 2,	
		1070	SPAN 2, U1, East Truss	
		1071	" " West truss	
		1072	Span 2, U2, East truss, East face	
		1073	Span 2, U2, West truss, East face	
		1074	Span 2, M2, East truss, East face	
		1075	Span 2, M2, West truss, East face	
		1076-77	Span 2, U3, East truss "	
		1078	Span 2, U3, West truss, "	"
		1079	Span 2, M3, East truss, "	"
		1080	Span 2, M3, West truss, "	"
		1081	Span 2, M4, East truss, "	"
		1082	Span 2, M4, West truss, "	"
		1083	Span 2, U4, East truss, "	"
		1084	Span 2, U4, West truss, "	"
		1085	Span 2, M4.S, East truss, "	"
		1086	Span 2, M4.S, West truss, "	"
		1087	Span 2, M5, East truss, "	"
		1088	Span 2, M5, West truss, "	"
		1089	Span 2, U5, East truss, "	"
		1090	Span 2, U5, West truss, "	"
		1091	Span 2, West truss, P.P. " Q-3	
		1092	Span 2, West truss, P.P. " 3-7	
		1093	Span 2, Upper lateral Bracing typical	
		1094	Span 1, West truss, P.P. LQ, Gusset plate QP	
		1095	Span 1, West truss, P.P. LQ, bearing	
		1097	Span 1, East truss, P.P. LQ, bearing	

PHOTO LOG

Roll Number: _____

Camera: MPS

Lead Inspector: CH/MD

Additional Inspectors: T. D. DeZeeuw

PHOTO LOG

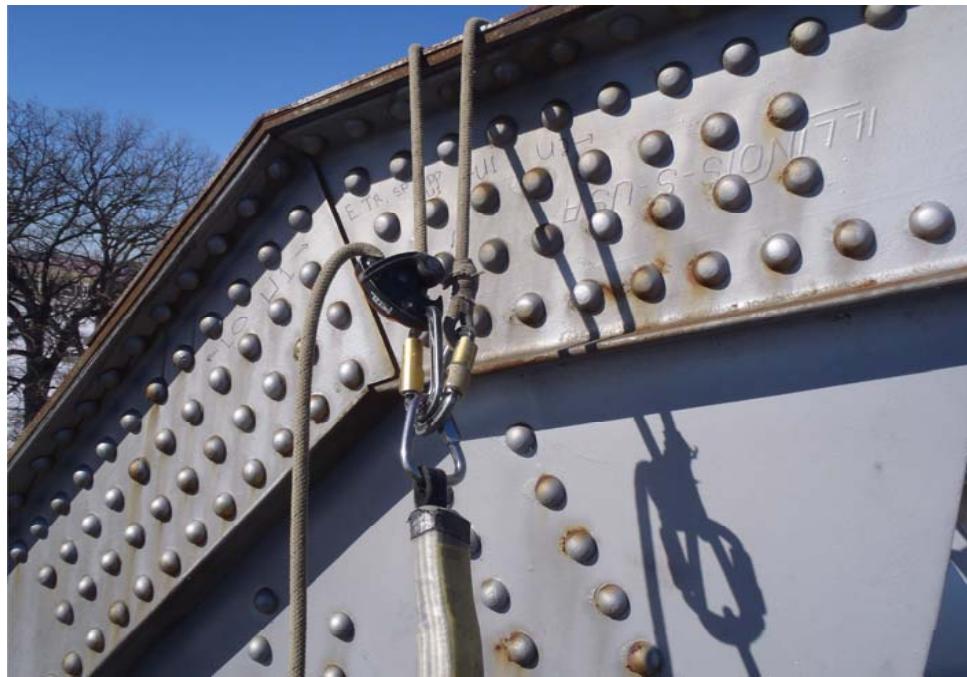
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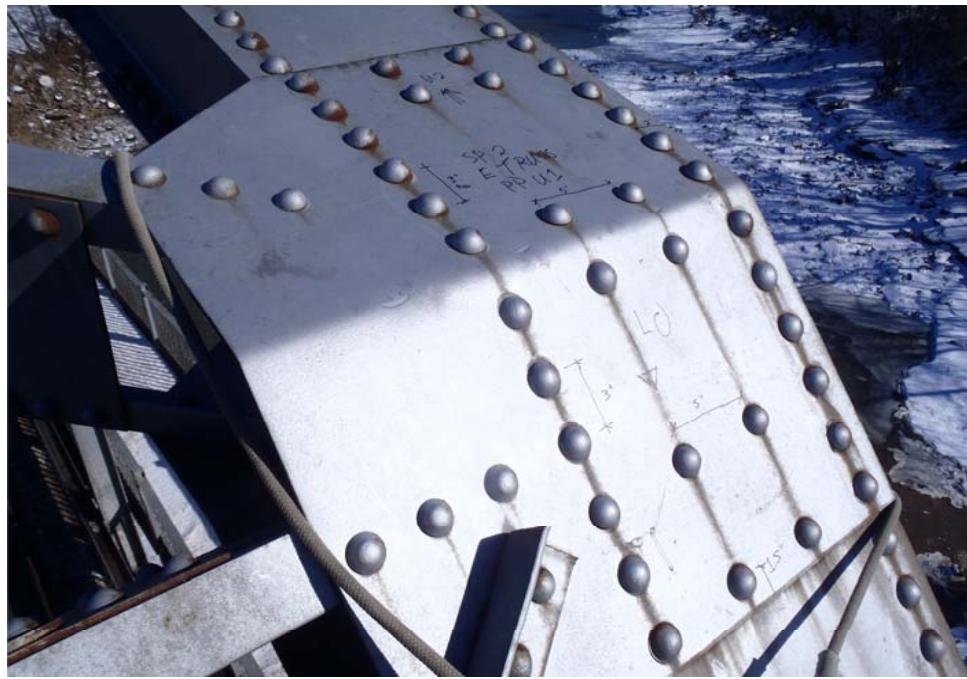
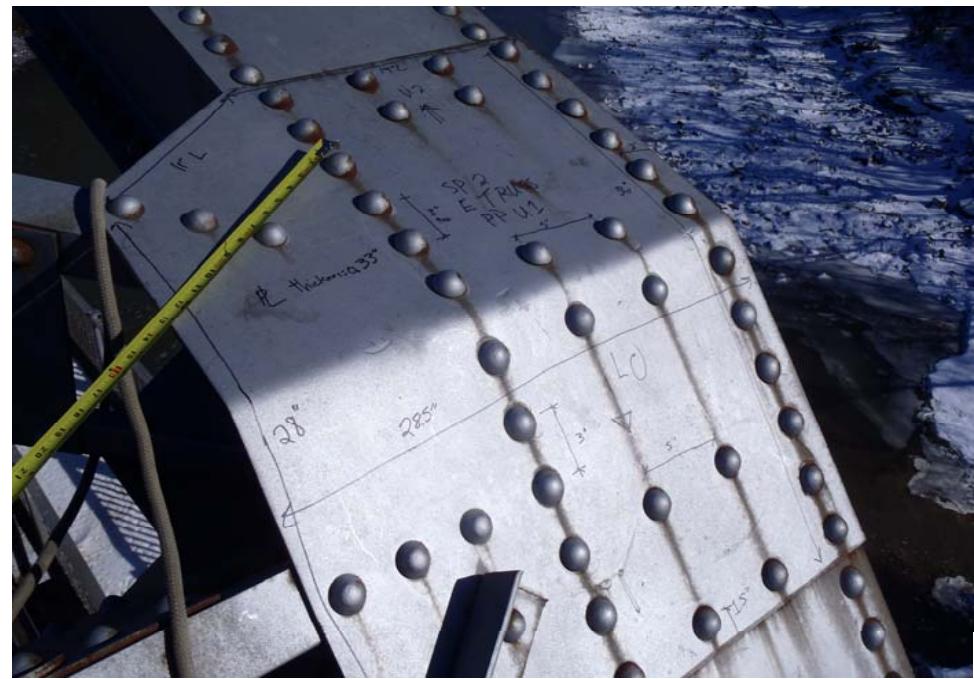
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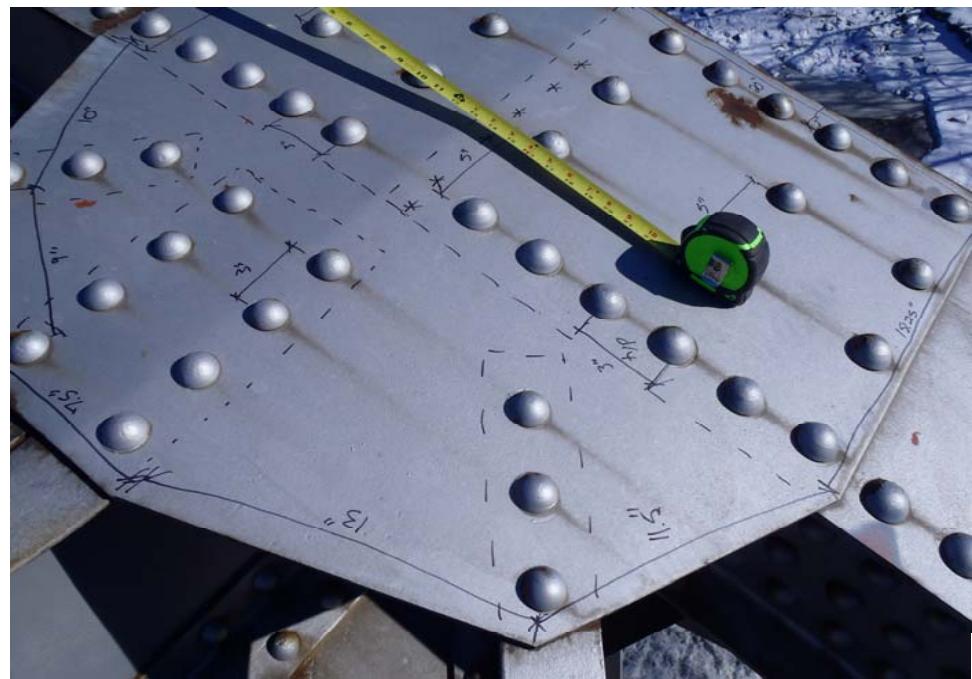
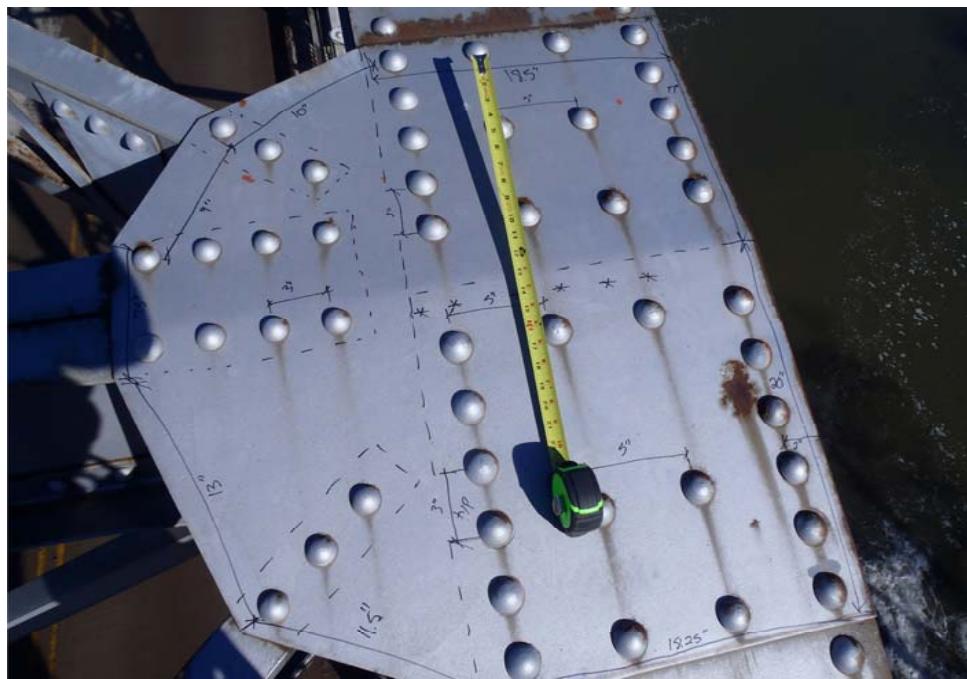
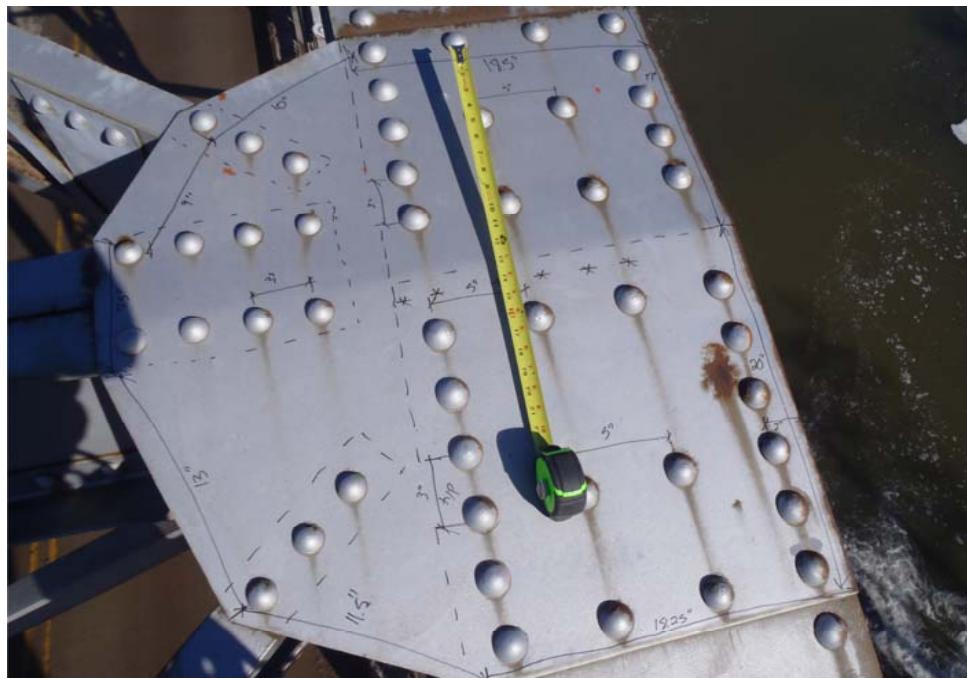
Lead Inspector: CH/MD

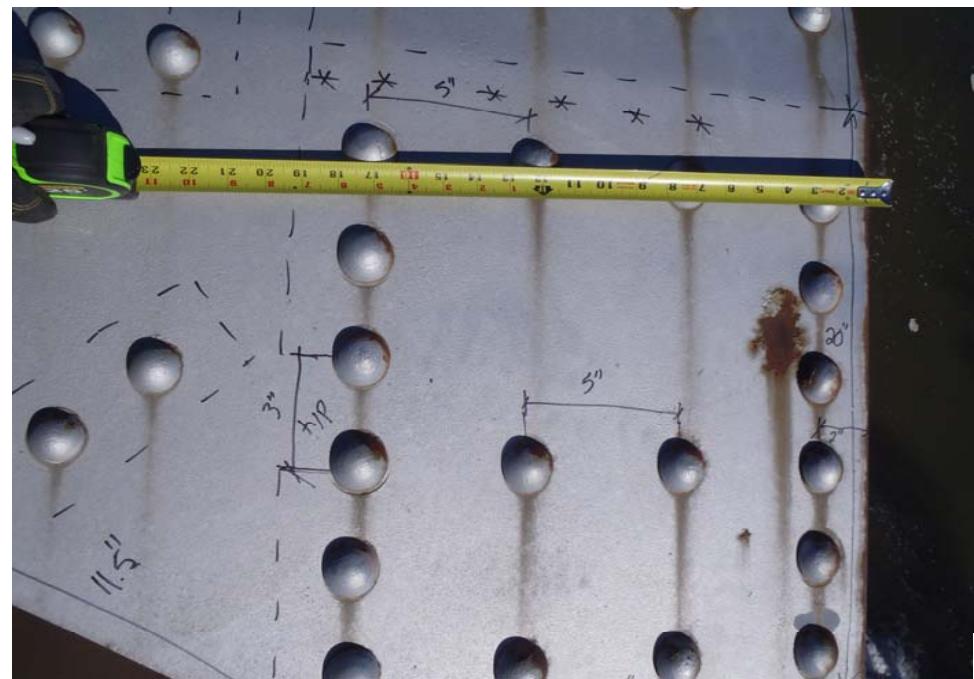
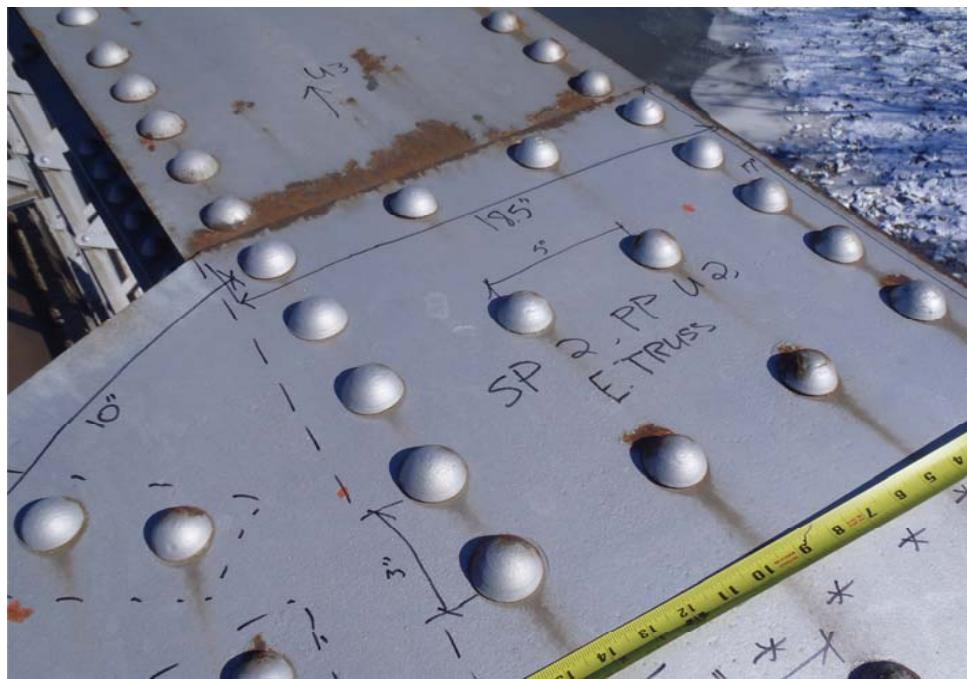
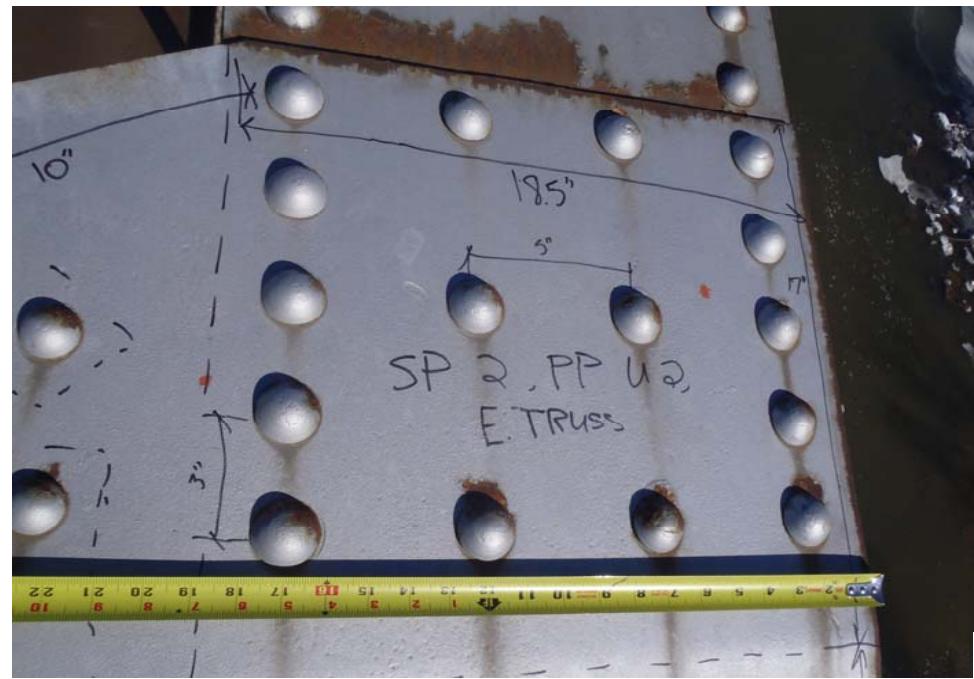
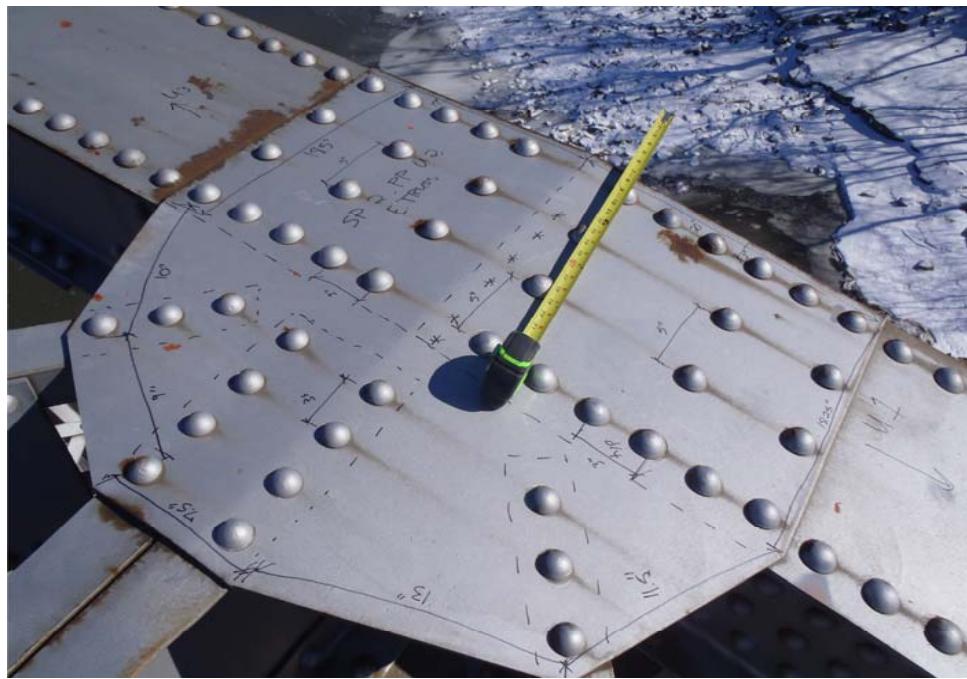
Additional Inspectors:

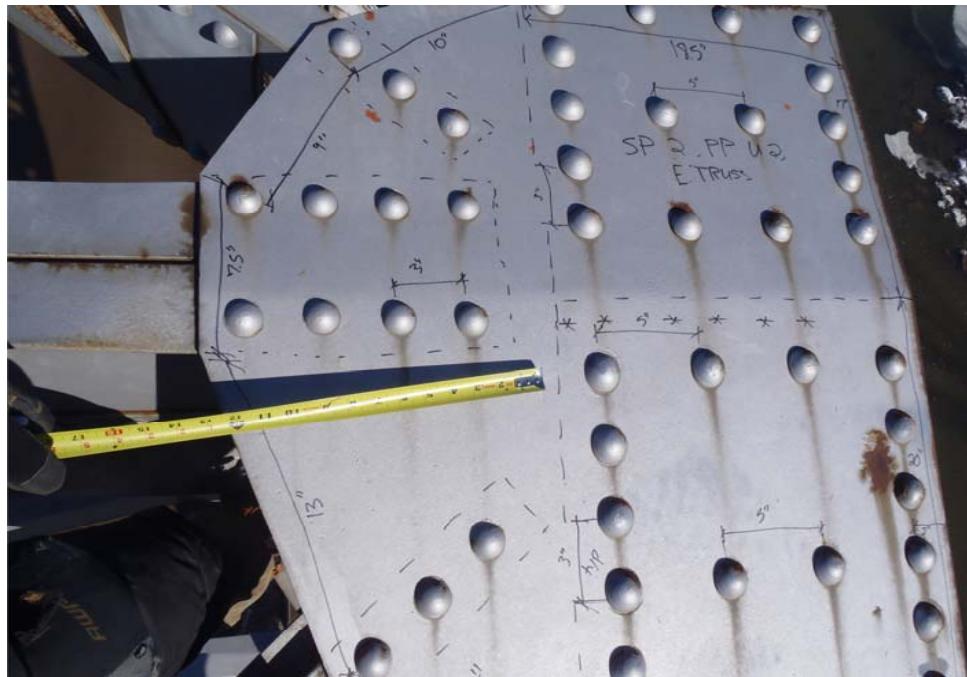
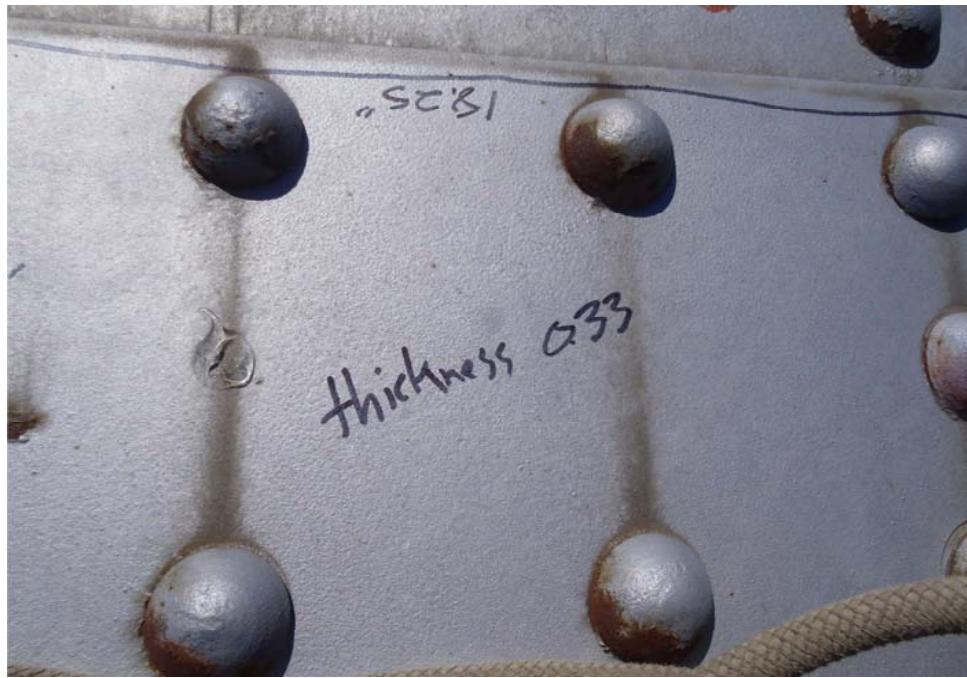
T. Coffer 2020













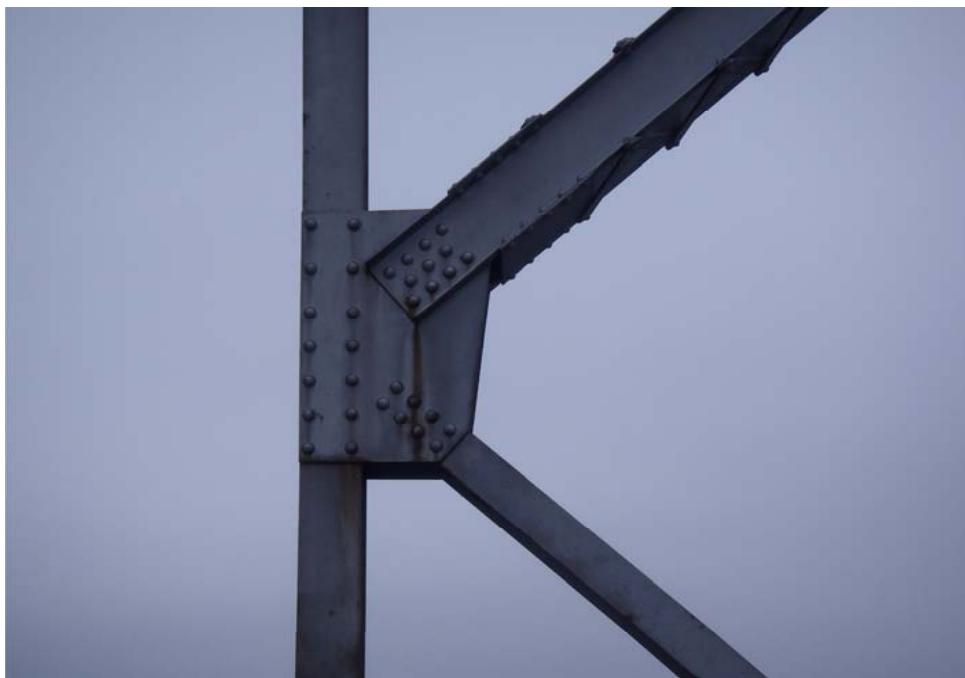












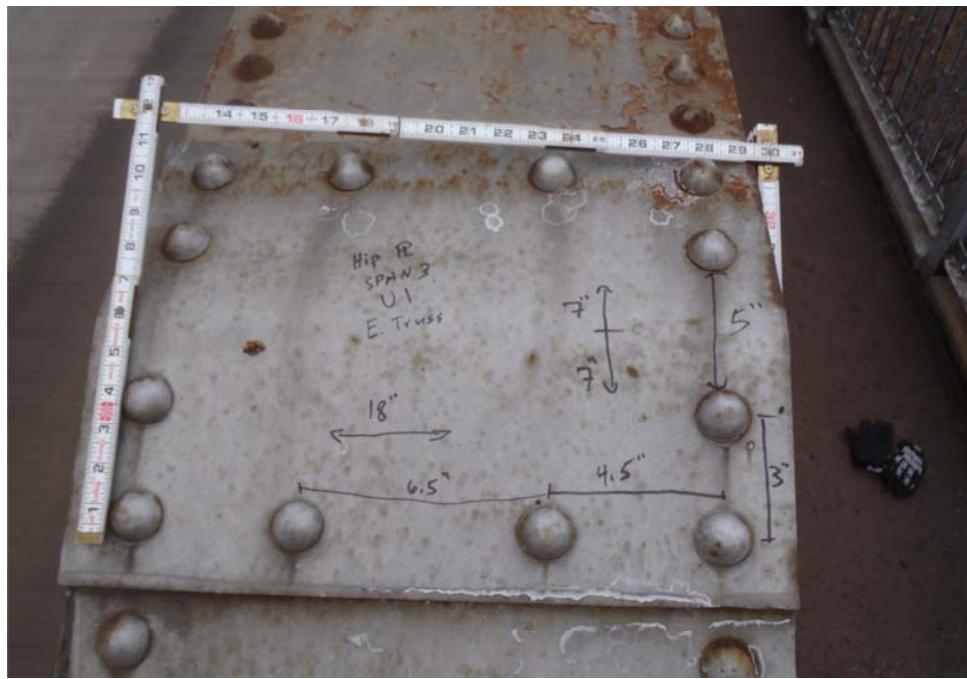




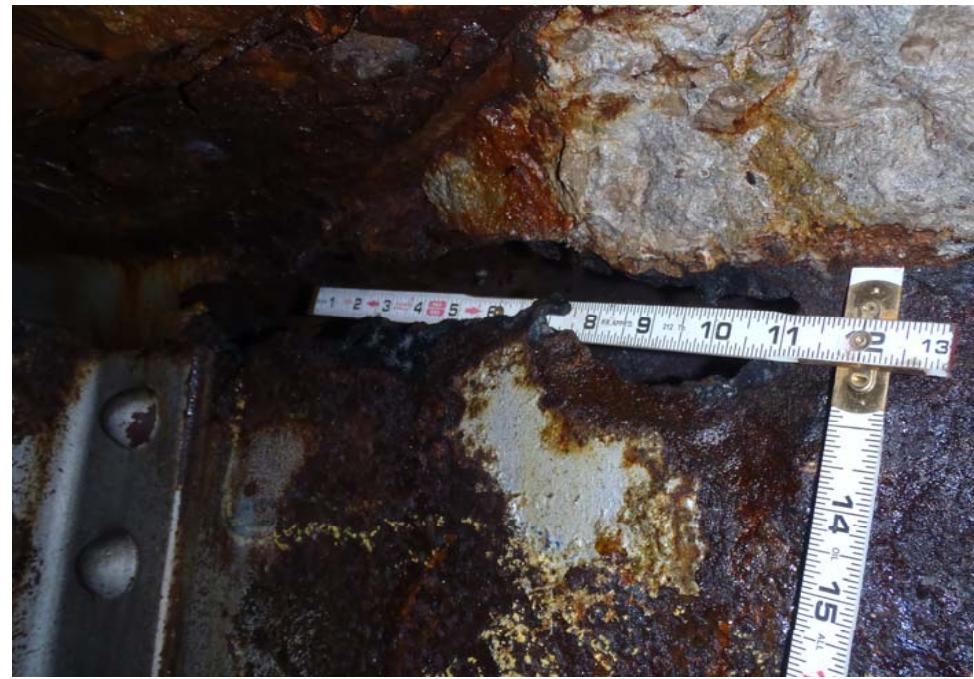














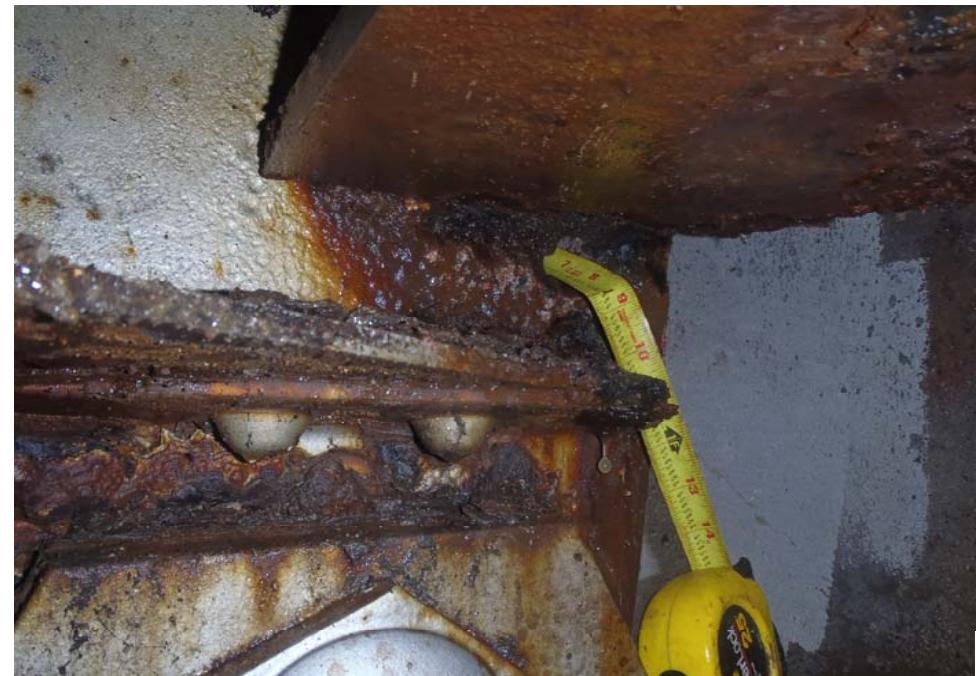












INSPECTION PHOTOS (TO)

PHOTO LOG

Roll Number: 1/7/14

Camera: T. Oppezzo

Lead Inspector: CH/MD

Additional Inspectors:

PHOTO LOG

Roll Number:

1-9-14

Camera:

TO

Lead Inspector: CH/MD

Additional Inspectors:

Job Number	Structure Number	Frame	Description of Photo	# in Report
12204	SH 123 over Caney River	351-52 Span 2, W. Truss, P.P. LO, 553		
		354	Span 1, W. Truss, L.S. I.B. Gusset plate, Inb face directly above pin plate, 14" L x 1-1/2" H corrosion hole	
		355	Span 1, W. truss, L.S. ext. face	
		356	Span 2, W. truss, LO, ext. face	
		357	Span 1, W. truss, L.S. I.B. bearing plate 1" section remaining	
		358	Span 1, W. truss, corrosion hole to edge of I.B. caused plate w/ partially debonded plate rebotting	
		359	Pier 1, W. truss, Spans 1+2 bearings Inb face	
		360-62	1/8" deep pitting in vertical leg of IB bearing connection angle at Span 1, LS	
		363	100% loss in LR gusset plate @ Pier 1 in Span 1, W. truss	
		365-G1	Seabird Loss w/ perforations in FB. S @ Pier 1 in SPAN 1, Perforations in bottom of web and top flange	
		368-72	W sidewalk, E beam, bturn L2 & L3, Span 2	
		373-74	Span 2, FB 4 @ W truss, isolated 1/8" loss to beam flange	
		375-76	Span 2, FB 5, Laminar corrosion bturn FB htm flg + LL gusset @ W truss.	
		377-83	SPAN 2, sidewalk cantilever @ FB 5, west side, 50% L.O.S., top flange + anchor bolts	
		384-85	SPAN 2, FB 6 top flange above stringer	
		386-91	SPAN 2 @ FB 6, N end of Gusset P, pack rust	
		396	392-93 SPAN 2 Brg, P2, W truss, W face	
		99-95	SPAN 3, Brg, P2, W truss, W face	
		393-900	SPAN 3, LO, W Brg, Inboard Gusset, W face, corrosion hole w/ scale in photo, directly above the pin plate, gusset P is buckling	
		407,413,		
		414		
		401	SPAN 3, P2 Brg, W truss, E face	
		402-04	SPAN 3, W truss, P2, Inboard lower chord top flange laminar corrosion.	
		405-06	DNV	
		408	SPAN 2, P2, Brg, W truss, E face	
		409-12	SPAN 3, FBO, perforations in btm 4-in web	

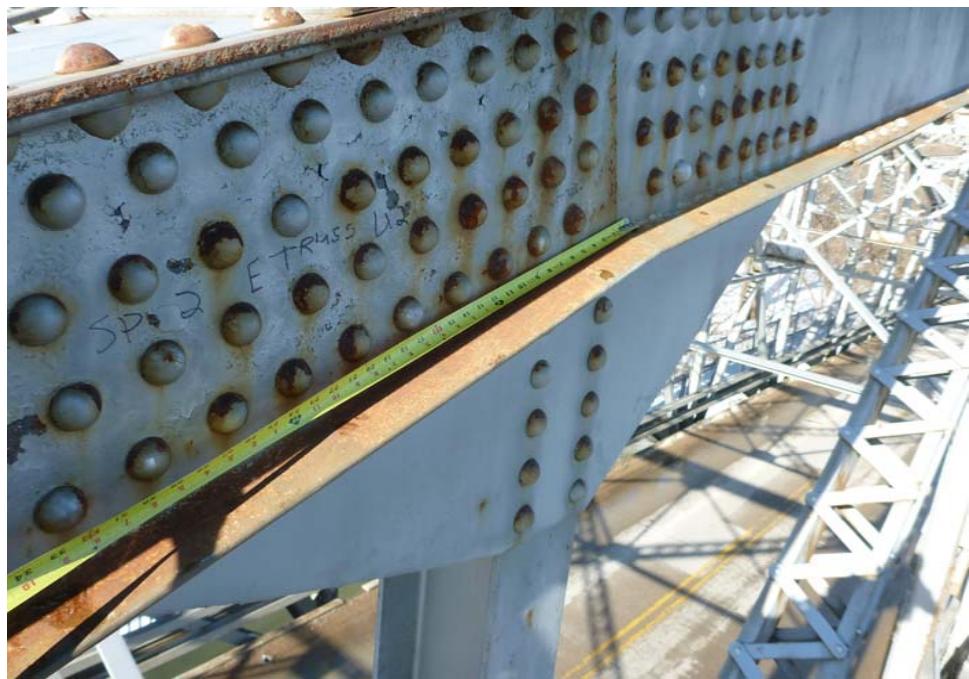
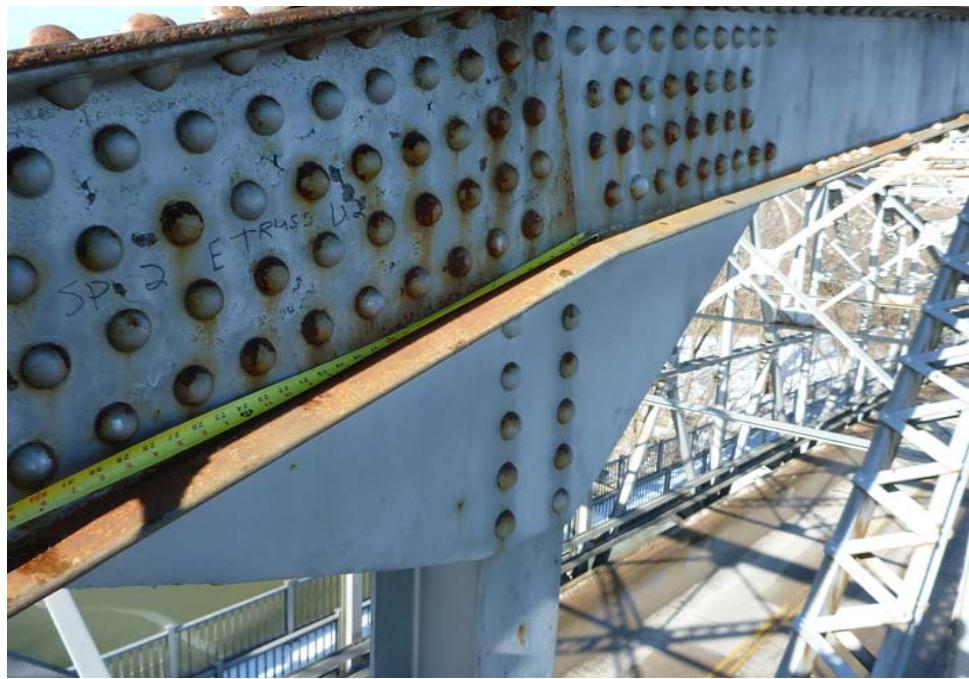
PHOTO LOG

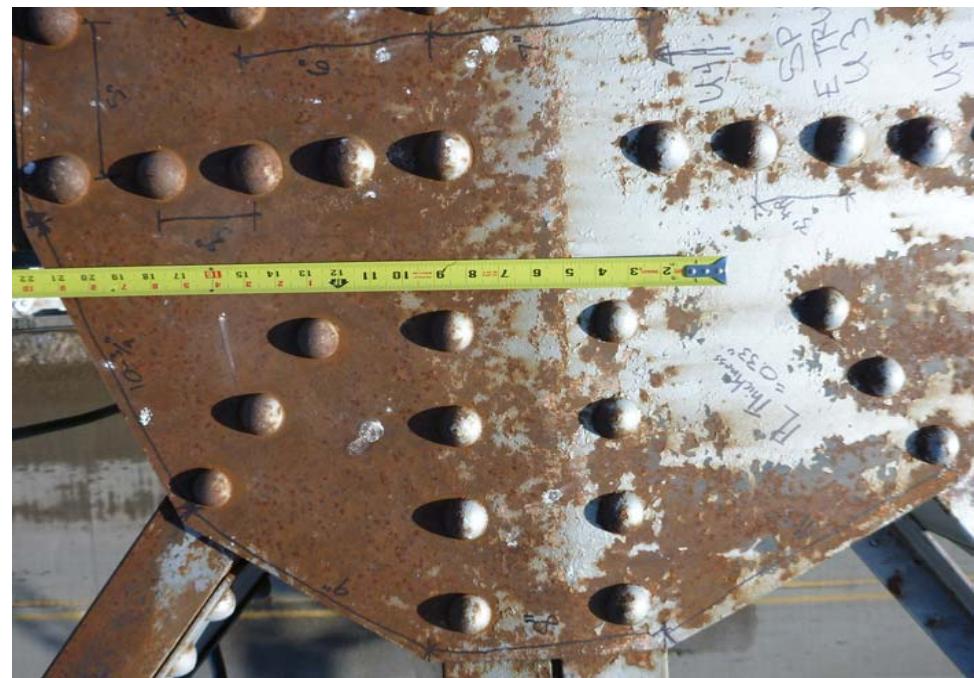
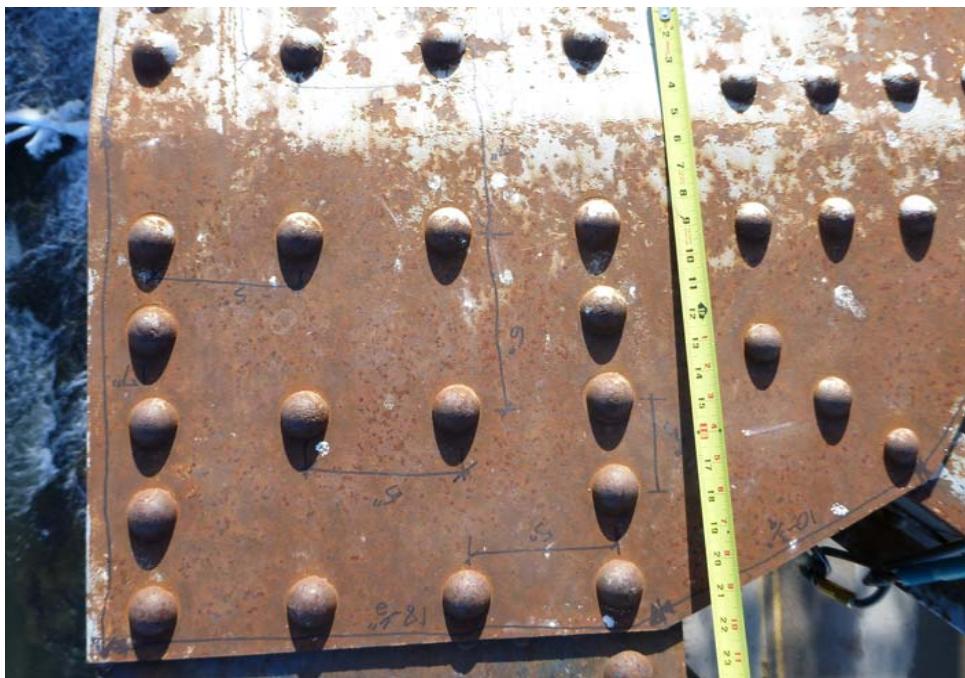
Roll Number: 1-9-17

Camera:

Lead Inspector: CH/MD

Additional Inspectors:













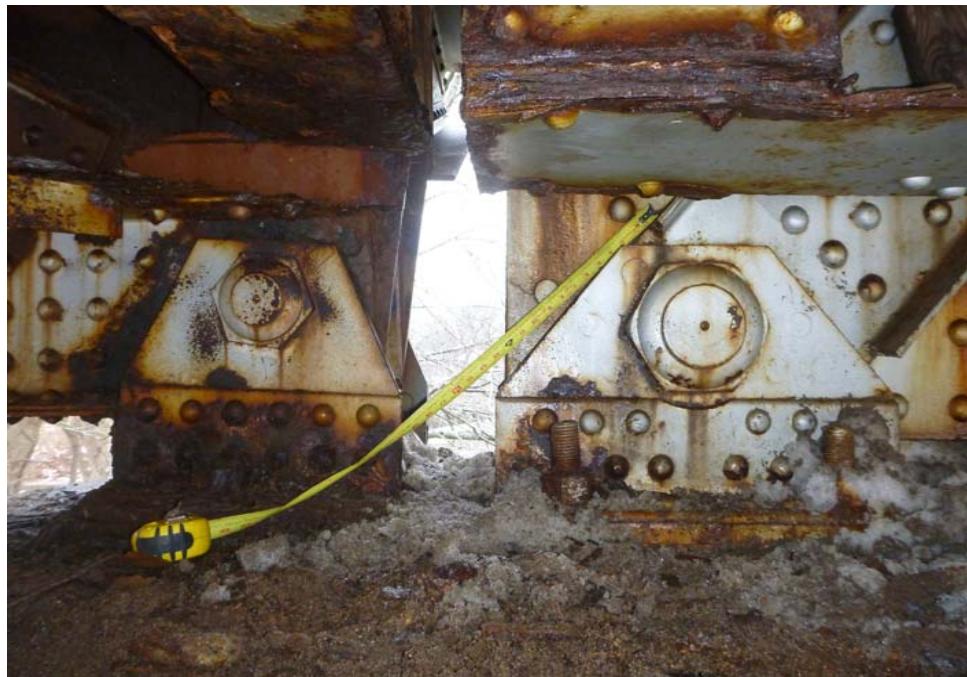


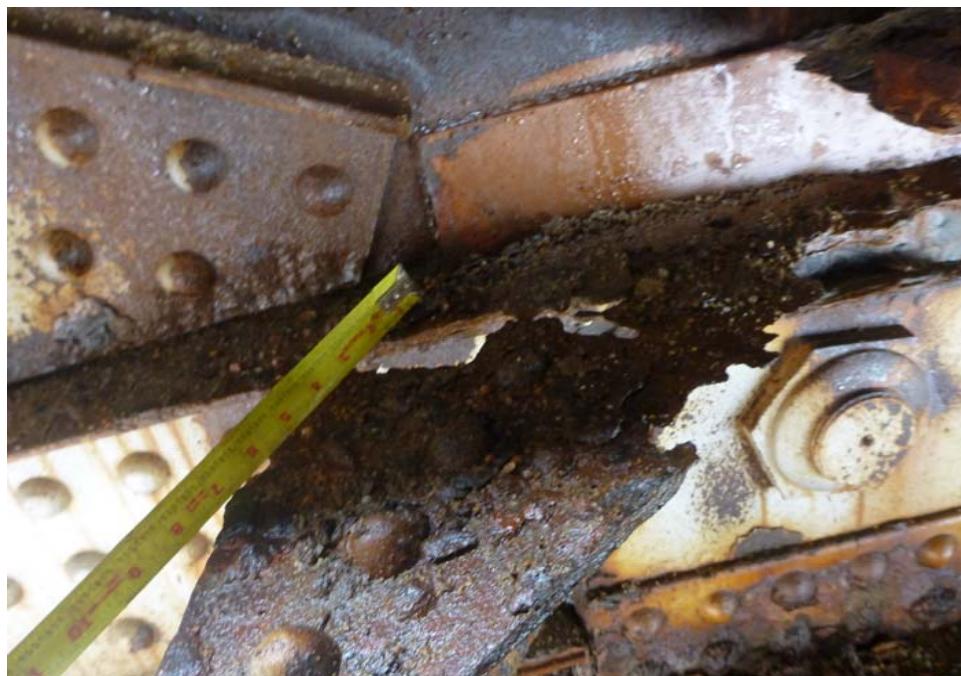














































OKLAHOMA DEPARTMENT OF TRANSPORTATION

To: Division VIII Division Engineer
From: Field Service Engineer
Date: 04/10/2013
Subject: Routine/Fracture Critical Bridge Inspection
NBI 05521, Structure 7413 0165 X, SH 123/Caney River

On 04/05/2013 an ODOT Bridge Division Rope Access Team inspected SH 123/Caney River as part of the routine/fracture critical bridge inspection program. The structure is a 3 span structure with the following configuration (South to North):

Span 1 – 100' Pony Truss Span (Standard E-100(4&5))
Span 2 – 210' High Truss Span (Standard E-210(4&5))
Span 3 – 100' Pony Truss Span (Standard E-100(4&5))

The inspection was performed by the following Bridge Division Personnel:

Wes Kellogg, PE – Team Leader
Daniel Knickmeyer, PE – Bridge Inspector

The bridge is currently open to legal traffic with no restriction.

The current NBI ratings for this structure versus the last inspection are as follows:

NBI Item	2011 Rating	2013 Rating
58 Deck	5 Fair	5 Fair
59 Super	5 Fair	4 Poor
60 Sub	6 Satisfactory	5 Fair
61 Channel	7 Minor Dam.	7 Minor Dam.
Sufficiency	44.2, FO	33.6 SD

In order of decreasing priority, the recommended action for this structure is as follows:

CX – There was no condition at the bridge site which warranted this level of follow-up.

PX – Stiff leg end floor beams at abutments 1 & 2 as well as piers 1 & 2.

PX – Weld a 4" x 4" x ½" angle to stringer end at span 1, floor beam 5, south face, stringer 2.

PX – Weld a 4" x 4" x ½" angle stiffener to web of floor beam 0, span 1, next to stringer 6.

PX – Close sidewalks to pedestrian traffic.

PX – Clean salt/sand/debris from bridge deck and lower chords.

PX – Clean and reseal all joints.

PX – Repair and level approach roadway pavement.

FX – Monitor cracking to sub-structure units.

FX – Monitor section losses to lower chords.

In addition to these recommendations it is recommended that this structure remain on a 24 month Routine/NBI/FC inspection frequency as well as a 24 month Other Special (OS) inspection. The OS inspection is to occur in the interim year between the Routine/NBI/FC inspections and is to focus on previous repairs and ongoing section losses.



Wesley Kellogg, PE
Field Service Engineer

WK/wk

CC: Bob Rusch
Walt Peters
Ali Salami
Daniel Knickmeyer
Jason Carter
Mark Peterman
Matt Casillas
File



NBI Item 36 – Traffic Safety (6, Satisfactory Condition) – The traffic safety features are in satisfactory condition with no noted impact damage and isolated areas of surface rust forming on steel surfaces.

NBI Item 58 – Deck (5, Fair Condition) FX – The deck is in fair condition with isolated moderate cracking and repaired spalls in the overlay. The curbs of the deck are failing or have failed throughout. All joints leak and are filled with debris.

NBI Item 59 - Superstructure

Fracture Critical Member Summary	
Floor Beams	4, Poor Condition
Truss Lower Chord	5, Fair Condition
Truss Web Members	5, Fair Condition

Stringers (4, Poor Condition) PX – Stringers are in poor condition due to widespread section losses and pack rust to the top flanges as well as a 2" x 4" corrosion hole in span 1, floor beam 5, south face, stringer 2. Section losses are also present at the stringer to floor beam connections. Poor cope radii are present at all stringer ends.

[FCM] Floor Beams (4, Poor Condition) PX – The floor beams are in poor condition due to section losses to the top flanges and pack rust between the deck and top flanges. Section losses to the bottom flange of the floor beams is present at the lower lateral bracing gusset plates as well as pack rust. Corrosion holes exist in span 1, floor beam 0, adjacent to stringer 6 as well as a 1.5" hole in floor beam 10, span 2, adjacent to stringer 1. End floor beams at piers 1 & 2 have had plates and angles added to the outboard flanges due to section losses.

Floor Bracing System (4, Poor Condition) PX – The floor bracing system is in poor condition due to section losses to lateral bracing members and gusset plates as well as fractured hanger rods throughout.

Truss Upper Chord (6, Satisfactory Condition) – The truss upper chord is in satisfactory condition with isolated areas of freckled surface rust forming. The upper chord gusset plates show no signs of distortion or distress. Fasteners were all present and functional.

[FCM] Truss Lower Chord (5, Fair Condition) FX – The truss lower chord is in fair condition with isolated minor section loss throughout. Repaired holes exist in the L0 gusset plate, span 1, pier 2, east truss. Unrepaired holes exist in the top plates above L0 in span 1, pier 2, west truss as well as span 3, abutment 2, west truss. All other gusset plates had minor section losses and pack rust at the gusset plate lower chord member interface. Fasteners were all present and functional.

[FCM] Truss Web Members (6, Satisfactory Condition) – The truss web members are in satisfactory condition with isolated areas of freckled surface rust forming.

Truss End Posts (6, Satisfactory Condition) – The truss end posts are in satisfactory condition with isolated areas of freckled surface rust forming.

Truss Bracing (7, Good Condition) – The truss bracing is in good condition with no signs of over height vehicle impact.

Member Alignment (7, Good Condition) – Member alignment is in good condition with no eccentricities noted.

Paint/Coating System (3, Serious Condition) PX – The paint system is in serious condition due to widespread failure on the floor system. The paint system on the lower chord has isolated locations of failure as well.

Load Deflection (4, Poor Condition) PX – The end truss floor beams exhibit roughly $\frac{1}{2}$ " of deflection under legal or above legal loads. All end truss floor beams at abutments 1 & 2 as well as piers 1 & 2 are recommended to have a stiff leg added to eliminate this deflection.

Sidewalks (3, Serious Condition) PX – The pedestrian sidewalks are in serious condition due to the deterioration of the inboard support beams. In many locations the inboard support beams are no longer in contact with the sidewalk due to pack rust. Also, the beams are deteriorated to the point that they provide little to no structural support. The sidewalks should be closed to pedestrian traffic.

NBI Item 60 - Substructure

Abutments (5, Fair Condition) FX – The abutments are in fair condition with cracking and efflorescence as well as spalling with no exposed rebar.

Piers (5, Fair Condition) FX – The piers are in fair condition with cracking and spalling with exposed rebar.

Bearings (4, Poor Condition) PX – The bearings are in poor condition due to section losses and pack rust. The truss fixed bearings have pack rust buildup between the bottom of the bearing device and bearing plate which has resulted in a rotation of the bearing.

NBI Item 61 – Channel and Channel Protection

Channel Scour (7, Good Condition) – The channel flowline is stable at this time. The channel flow was too swift to take an accurate flowline measurement. A broad crested weir is present to control any flowline degradation.

Embankment Erosion (7, Good Condition) – The channel is not meandering at this time. River control devices are in place to control the southward movement towards pier 1.

Debris (7, Good Condition) – Debris does not restrict the channel at this time.

Vegetation (7, Good Condition) – The channel banks are well vegetated at this time.

Approaches

Approach Roadway Condition (4, Poor Condition) PX – The asphalt approach roadway is beginning to breakup at either end of the bridge. The approach roadway should be repaired to reduce impact loading of the structure.

Approach Roadway Settlement (5, Poor Condition) PX – The asphalt approach roadway has begun to settle at either end of the bridge. The approach roadway should be leveled to reduce impact loading of the structure.

NBI Item 113 – Scour Rating (7, Countermeasures in Place) – No change in scour rating is recommended at this time.

NBI 05521
STRUCTURE 7413 0165 X
SH 123/CANEY RIVER
WASHINGTON COUNTY
2013-04-05



NBI 05521
Str. 7413 0165 X
Washington Co.
SH123 over Caney River
05 Apr 2013





MBI 05429
STRUCTURE 2413 0158 X
SH 123/CANEY RIVER
WASHINGTON COUNTY
2013-04-05

Port
Upper
Rack
Free

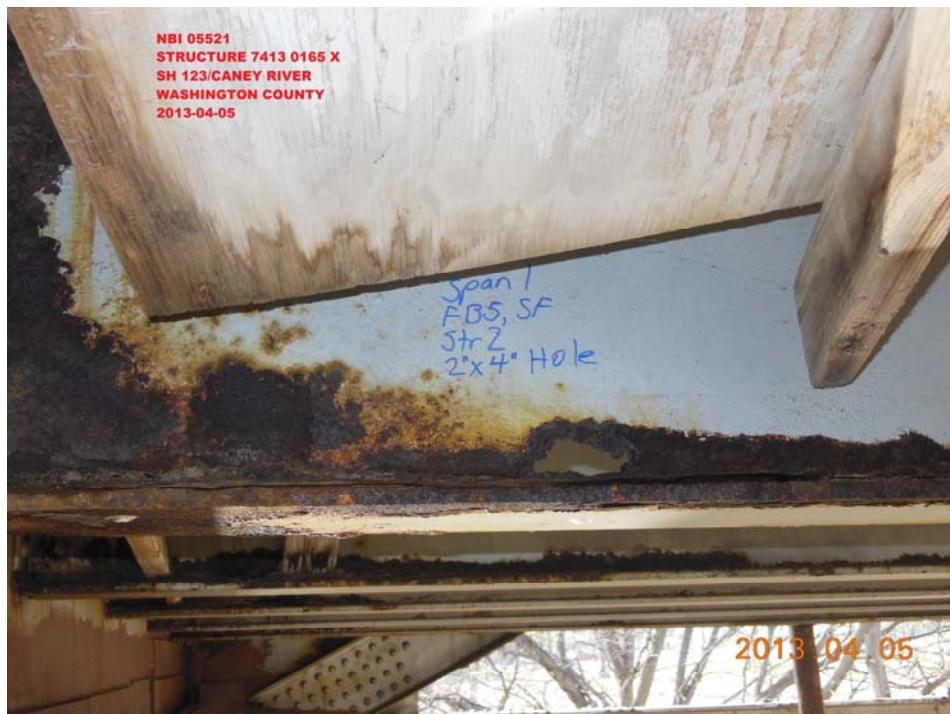
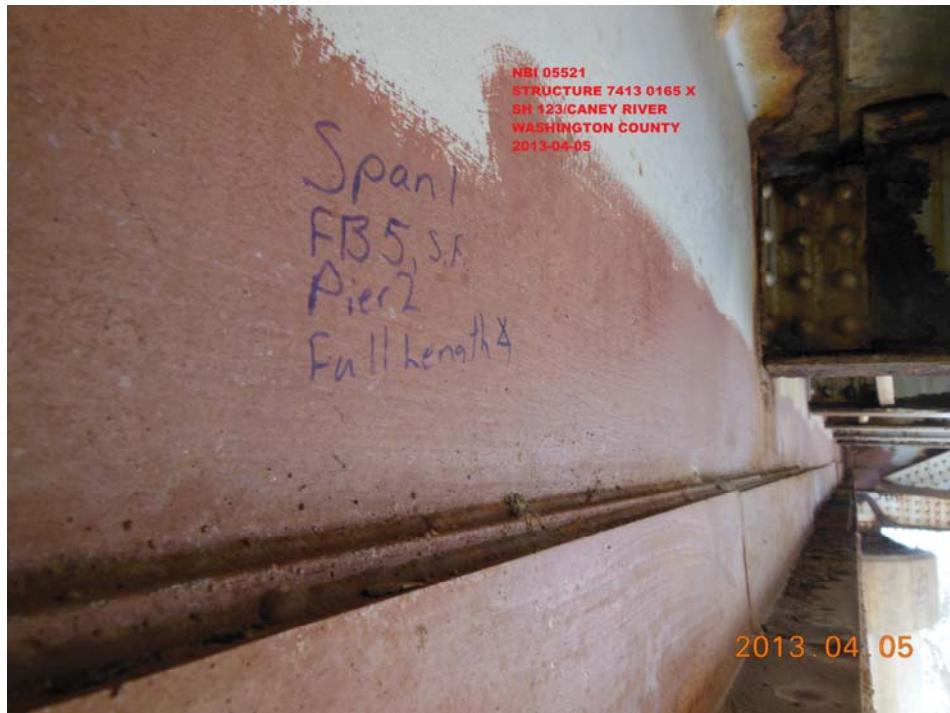
2013.04.05

MBI 05429
STRUCTURE 2413 0158 X
SH 123/CANEY RIVER
WASHINGTON COUNTY
2013-04-05

SO
FB
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2013.04.05



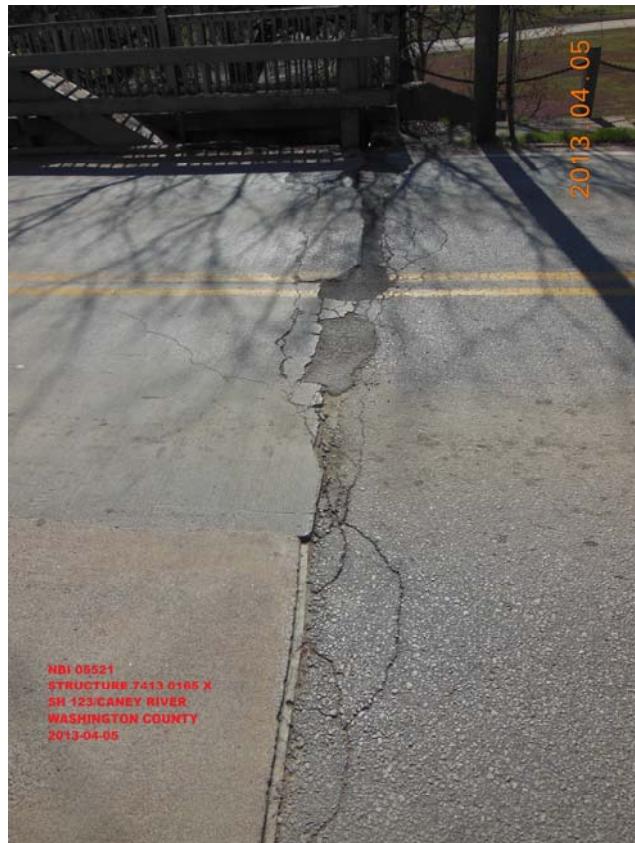














OKLAHOMA DEPARTMENT OF TRANSPORTATION -

Bridge Inspection Report

NBI No.: 05521

Structure No.: 7413 0165 X

Local ID:-1

Suff. Rating: 33.6
Structurally Deficient

Health Index :
67.0

IDENTIFICATION						INSPECTION						
210' HI TRUSS & 2-100' PONY TRUSS SPANS (RIVITS) W/2-4' SIDEWALKS						Type	Insp Req.	Insp Done	Freq:	Insp. Date:	Next Insp.:	
1. State: Oklahoma		2. SHD District: Division 8		NBI:		Y	24	4/5/2013	4/5/2015			
3. County Code: WASHINGTON		4. Place Code: BARTLESVILLE		FC Freq.:	Y	Y	24	4/5/2013	4/5/2015			
Admin. Area: Unknown						UW Freq.:	N	N	NA	NA	NA	
5. Inventory Route (Route On Structure): 1 - 3 - 1 - 00123 - 0						OS Freq.:	Y	N	24	1/1/1901	4/5/2014	
6. Feature Intersected: CANEY RIVER						CLASSIFICATION						
7. Facility Carried: S.H. 123 S.H. 123						12. Base Hwy Network: Not on Base Network 20. Toll Facility: 3 On free road						
9. Location: .2MI NJCT US 60 (CITY ST)		11. Mile Post: 1.650 mi		21. Custodian: 01State Highway Agency 22. Owner: 01 State Highway Agency								
13. LRS Inv. Route./ Subroute.: -1		-1		26. Functional Class: 16 Urban Minor Arter 37. Historical Sig.: 4 Hist sign not determin								
16. Latitude: 36 45 12.64		17. Longitude: 095 58 19.31		100. Defense Highway: 0 Not a STRAHNET h 101. Parallel Structure: No bridge exists								
98. Border Br. Code: Jnknown (P) % Resp. : 0		99. Border Br. #: Unknown		102. Dir. of Traffic: 2 2-way traffic 103. Temp. Structure: Not Applicable (P)								
104. Highway System: 0 Not on NHS 105. Fed. Land Hwy 0 N/A (NBI)						106. National Truck Network: 0 Not part of na 112. NBIS Length: Long Enough						
STRUCTURE TYPE AND MATERIALS						CONDITION						
43. Main Span Material and Design Type Steel Truss-Thru						58. Deck: 5 Fair 59. Super.: 4 Poor 60. Sub.: 5 Fair						
44. Approach Span Material and Design Type Steel Truss-Thru						62. Culvert: N/A (NBI) 61. Channel/Channel Protection: 7 Minor Damage						
45. No. of Spans Main Unit: 1		46. No. of Approach Spans: 2		Flowline Notes:								
107. Deck Type: 1 Concrete-Cast-in-Place						11/2/2006 - heavy drift on spillway under the bridge * 5/13/2009 - Unable to measure due to swift water flow.						
108A. Wearing Surface: 1 Monolithic Concrete												
108B. Membrane: 8 Unknown												
108C. Deck Protection: 8 Unknown												
AGE AND SERVICE						LOAD RATING AND POSTING						
27. Year Built: 1937 106. Year Reconstructed: Unknown						31. Design Load: 2 M 13.5 (H 15) 41. Posting status: A Open, no restriction						
28A. Lanes on: 2		28B. Lanes Under: 0		19. Detour Length: 3.1 mi		63. Op. Rating Method: 1 LF Load Factor-Ton Alt. Op. Rating Meth.: 1 LF Load Factor-To						
29. ADT: 4600		30. Year of ADT: 2011		109. Truck ADT %: 5		64. Operating Rating (H / HS / 3-3): 24.4 36.4 66.1						
42A. Type of Service on: 5 Highway-pedestrian						66. Inventory Rating (H / HS / 3-3) : 14.5 21.9 39.6						
42B. Type of Service under: 5 Waterway						65. Inv. Rating Method: 1 LF Load Factor-Ton Alt. Inv. Rating Meth.: 1 LF Load Factor-To						
						70. Posting: 5 At/Above Legal Loads Date Rated : 1/23/2004						
GEOMETRIC DATA						PROPOSED IMPROVEMENTS						
10. Inv. Rte. Min. Vert. Clr.: 15.7 ft						94. Bridge Cost: \$3,240,107 75. Type of Work: 31 Repl-Load Capacit						
32. Approach Roadway Width (W/ Shoulders): 24.0 ft						95. Roadway Cost: \$4,500,000 76. Lgth. of Improvment: 436.1 ft						
Deck Area: 14,211. sq. ft		33. Median: 0 No median		96. Total Cost: \$8,178,226 114. Future ADT: 7360								
34. Skew: 0		35. Structure Flared: 0 No flare		97. Year of Cost Est.: 2007 115. Year of Future ADT: 2031								
47. Inv. Rte. Total Horiz. Clr.: 24.0 ft												
48. Length Maximum Span: 210.0 ft 49. Structure Length: 418.0 ft						38. Navigation Control: Permit Not Required						
50A. Curb/Sdwlk Wdth L: 4.0 ft 50B. Curb/Sidewalk Width R: 4.0 ft						39. Vertical Clearance: 0.0 ft 40. Horizontal Clearance: 0.0 ft						
51. Width Curb to Curb: 24.0 ft 52. Width Out to Out: 34.0 ft						111. Pier Protection: 1 Not Required 116. Lift Bridge Vert. Clear.: 0.0 ft						
53. Minimum Vertical Clearance Over Bridge: 15.6 ft												
54A/54B. Min. Vert. Underclearance : N Feature not hwy or RR 0.0 ft												
<u>N/E</u> <u>S/W</u>												
<u>Meas.</u>	N1508	-1	-1	S1508	-1	-1						
<u>Post.</u>	DO NOT I	DO NOT I	DO NOT I	DO NOT I	DO NOT I	DO NOT I						
55A/55B. Minimum Lateral Undrclearance R: N Feature not hwy or RR 327.8 ft												
56. Minimum Lateral Undrclearance L: 327.8 ft												
						NAVIGATION DATA						
						38. Navigation Control: Permit Not Required						
						39. Vertical Clearance: 0.0 ft 40. Horizontal Clearance: 0.0 ft						
						111. Pier Protection: 1 Not Required 116. Lift Bridge Vert. Clear.: 0.0 ft						
						APPRAISAL						
						36A. Bridge Rail: 1 Meets Standards 36C. Approach Rail: 0 Substandard						
						36B. Transition: 0 Substandard 36D. Approach Rail Ends: 0 Substandard						
						67. Str. Evaluation: 4 Minimum Tolerable 68. Deck Geometry: 2 Intolerable - Replace						
						69. Underclearance, Vertical and Horizontal: N Not applicable (NBI)						
						71. Waterway Adequacy: 5 Above Tolerable						
						72. Approach Alignment: 8 Equal Desirable Crit						
						113. Scour Critical: 7 Countermeasures						
200c. Temperature: 65						243. Girder Spacing/Number : -1.0 / -1						
200d. Weather: CLEAR						244. Span Lengths :						
201. Structural Steel ASTM Desig.: -1 -1						-1 -1 -1						
202. Waterproof Membrane : -1						-1 -1 -1						
Date Installed : 1/1/1901						245. Girder Depth : -1.000						
203. Type Exp. Dev. : Sealed Expansion Joint						246. Type of Overlay : 6						
Pourable						246. Overlay Thickness : 2.0						
204. Type of Handrail: Steel Post and Rail						246. Overlay Date : 1/1/1901						
205. Material and Quantity : 2650.0						246. Overlay Depth Changed > 1" ? _						
208. Type of Abutment : Pedestal						247. Protective Systems : 1: _						
Type of Foundation : Natural Foundation Matl.						2: _ 3: _						
209. Type of Pier / Found.: 2 Piers No						4: _ 5: _						
No Piling or Drilled Shaft						248. No. of Field Splices w/ Corrosion : 1						
210. Foundation Elev. 6435.0 6355.0						249. Scour Crit. POA exists?: No						
-1.0 6436.0 -1.0						250. Culvert Headwall Dist.: -1.0						
211. Wear. Surf. Prot. System : None						254. Thru Truss Type : Ovh/Pony						
Date Installed : 1/1/1901						256. Chan. Profile Up/Down Stream?: _						
213. Utilities Attached : -1						257a. OkiePROS Auto. Truck Routing Yes						
-1 -1 -1						258. Plans w/ found. are in file at ODOT						
-1 -1 -1						259. Scour Eval. is in file at ODOT						
						263. Interchange at Intersection						
						264. Interstate Milepoint -1.000						

OKLAHOMA DEPARTMENT OF TRANSPORTATION -

Bridge Inspection Report

NBI No.: 05521

Structure No.: 7413 0165 X

Local ID:-1

Suff. Rating: 33.6

Health Index :

67.0

Inspection Date: 4/5/2013

Reported By: WKELLOGG

Invoice No.: -1

Inspected With: Dan Knickmeyer

Agency :

Wesley Kellogg, PE
WKELLOGG@ODOT.ORG

Structure / Inspection Notes

NOTE: REPAIRS WERE MADE TO FL.BMS.& GUSSET PLATES.BMS.5,STR.5,FL.BMS.5,FL.BRACING 5,TRUSS UPPER 6,TRUSS LOWER 5,TRUSS WEB MEM.6,TRUSS END POSTS 6,TRUSS BRACING 6,MEM.ALIGN.6,PAINT 4,LOAD DEFL.6,ABUTS.5,PIERS 6,BRNGS.6,CHANNEL SCOUR 7,EMBANK.ERO.7,DEBRIS 5,VEG.7,APPR.RDWY.CON.7,APPR.RDWY.SETT.7

OS is to focus on previous repairs.

Elem.	Env.	Description	Un.	Qty.	Qty.St. 1	% 1	Qty.St. 2	% 2	Qty.St. 3	% 3	Qty.St. 4	% 4	Qty.St. 5	% 5
12	4	Reinforced Concrete Deck	(SF)	10,032	0	0 %	10,032	100 %	0	0 %	0	0 %	0	0 %
113	4	Steel Stringer/Floorbeam	(LF)	1,079	0	0 %	971	90 %	108	10 %	0	0 %	0	0 %
120	4	Steel Truss (Pony)	(LF)	400	0	0 %	366	91 %	34	9 %	0	0 %	0	0 %
152	4	Steel Floor Beam	(LF)	574	2	0 %	464	81 %	108	19 %	0	0 %	0	0 %
162	4	Steel Gusset Plate	(EA)	92	0	0 %	89	97 %	3	3 %	0	0 %	0	0 %
205	4	Reinforced Conc Column or Pile Extension	(EA)	4	0	0 %	4	100 %	0	0 %	0	0 %	0	0 %
210	4	Reinforced Conc Pier Wall	(LF)	50	0	0 %	45	90 %	5	10 %	0	0 %	0	0 %
215	4	Reinforced Conc Abutment	(LF)	82	0	0 %	76	93 %	6	7 %	0	0 %	0	0 %
311	4	Moveable Bearing (roller, sliding, etc.)	(EA)	6	0	0 %	6	100 %	0	0 %	0	0 %	0	0 %
313	4	Fixed Bearing	(EA)	6	0	0 %	5	83 %	0	0 %	1	17 %	0	0 %
330	4	Metal Bridge Railing	(LF)	837	0	0 %	837	100 %	0	0 %	0	0 %	0	0 %
357	4	Pack Rust	(EA)	1	0	0 %	0	0 %	1	100 %	0	0 %	0	0 %
358	4	Concrete Cracking	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
363	4	Steel Section Loss	(EA)	1	0	0 %	1	100 %	0	0 %	0	0 %	0	0 %
510	4	Wearing Surfaces	(SF)	10,032	0	0 %	9,029	90 %	1,003	10 %	0	0 %	0	0 %
515	4	Steel (Superstructure) Protective Coating	(LF)	1,079	0	0 %	1,079	50 %	0	0 %	0	0 %	0	0 %
659	4	Soffit of Concrete Decks and Slabs	(SF)	10,032	0	0 %	10,032	100 %	0	0 %	0	0 %	0	0 %
721	4	Steel Truss (Overhead)	(LF)	420	0	0 %	384	92 %	36	9 %	0	0 %	0	0 %
777	4	Steel Stringer End (5 Ft.)	(LF)	1,201	50	0 %	1,051	92 %	100	8 %	0	0 %	0	0 %
906	4	Sealed Expansion Joint (SEJ-3)	(LF)	49	0	0 %	0	0 %	0	0 %	49	100 %	0	0 %
909	4	Pourable Fixed Joint Seal	(LF)	427	0	0 %	0	0 %	0	0 %	427	100 %	0	0 %
917	4	Steel (Bearing) Protective Coating	(EA)	12	0	0 %	0	0 %	0	0 %	12	100 %	0	0 %

Additional
Elements

Elem.	Element Notes (Include Size and Location of Deterioration)
12	FX:CRACKING,PATCHES & MINOR SPALLS.MORE THAN 10%.
113	FX:EX.BMS.ARE THE WORSE.SOME SURFACE CORR.HAS FORMED.
120	NOTE:FL.BMS. & GUSSET PLATES HAVE BEEN ARRESTED W/ANGLE & PLATE. CORROSION HOLES IN TOP PLATE OF L0 AT PIER 1, EAST TRUSS ABUTMENT 2, EAST TRUSS.
152	PX:1.5" CORROSION HOLE IN FB 10, SPAN 2, NEAR STRINGER 1. 4"X2" HOLE IN FB 0, SPAN 1, NEAR STRINGER 6.
162	NOTE:GUSSET PLATES WERE ARRESTED WITH PLATES. GUSSET PLATES HAVE MINOR SECTION LOSSES AT GUSSET PLATE/MEMBER INTERFACE
205	FX: MINOR CRACKING/SPALLING WITH EXPOSED REBAR.
210	FX:MOD.SPALLS W/EXPOSED REBAR @ P.#2.
215	FX:MOD.CRACKING,SPALLS W/EXPOSED REBAR @ N.ABUT. CRACKING W/EFFORESSENCE AT ABUTMENT 1.
311	PX:CLEAN,PAINT & REMOVE DEBRIS.
313	PX:CLEAN & PAINT & REMOVE DEBRIS.MOD.CORR. AT BOTH PIERS.
330	FX:SOME FRECKLE RUST THROUGHOUT.
357	FX:MOD/SEV.PACK RUST HAS FORMED @ LOWER LAT.BRACING GUSSET PLATES.MOD/SEV.DIST.(SEE PHOTOS)
358	FX:DECK HAS CRACKING THROUGHOUT.MID.SPAN ARE TRANSVERSE CRACKS.
363	NOTE:SECT/LOSS TO FL.BMS.& GUSSET PLATES HAS BEEN ARRESTED.
510	FX: CRACKING, PATCHING & MINOR SPALLS.MORE THAN 10% OF CONCRETE OVERLAY.
515	PX: COATING HAS FAILED ON FLOOR SYSTEM. COATING IS CHALKING WITH ISOLATED LOCATIONS OF FAILURE ON TRUSSES.
659	FX:CRACKS,SPALLS @ JOINTS W/FAKE WORK @ PIERS ARE SLIGHTLY OVER 10%.

OKLAHOMA DEPARTMENT OF TRANSPORTATION -**Bridge Inspection Report**NBI No.: **05521**

Structure No.: 7413 0165 X

Local ID:-1

Suff. Rating: 33.6

Health Index :

67.0

Structurally Deficient

Elem.	Element Notes (Include Size and Location of Deterioration)
721	
777	FX:EX.BMS.ARE THE WORST @ JOINTS.MAINLY JUST SURFACE CORR.
906	PX:JOINTS HAVE FAILED
909	PX: JOINTS LEAK.
917	PX: COATING HAS FAILED ON BEARINGS
	Channel Profile
	Baseline 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Distance	-1.0 200.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0
Profile	26.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0 -1.0
Event	Flowline - - - - - - - - - - - - - -

APPENDIX B

Alternative 2(a) – Opinion of Probable Costs, Quantity
Calculations and Analysis Results

ALTERNATIVE 2A

COSTS

ALTERNATIVE 2(a)				
Superstructure				
Item	Unit	Quantity	Unit Price	Total Dollars
Barriers	LF	820	\$250.00	\$205,000
Deck	CY	332	\$900.00	\$298,800
Deck Reinforcing Steel	LB	87,900	\$2.00	\$175,800
Deck Grooving	SY	490	\$5.00	\$2,450
Stringers	LB	129,150	\$3.00	\$387,450
Floorbeams				
End Floorbeams	LB	25,450	\$4.00	\$101,800
Interior Floorbeams	LB	137,400	\$4.00	\$549,600
Sidewalk Rehabilitation				
Stringers	LB	36,160	\$3.00	\$108,480
Pedestrian Railing	LF	820	\$400.00	\$328,000
Concrete	CY	57	\$900.00	\$51,300
Reinforcing Steel	LB	11,300	\$2.00	\$22,600
Truss Repairs				
Added Steel Sections	LB	19,680	\$10.00	\$196,800
Gusset Plates	EA	23	\$20,000.00	\$460,000
New Bracing	LB	36,160	\$8.00	\$289,280
Expansion Joints	LF	140	\$700.00	\$98,000
Approach Slabs	SY	156	\$200.00	\$31,200
Substructure				
Item	Unit	Quantity	Unit Price	Total Dollars
New Steel Bearings	EA	12	\$10,000.00	\$120,000
Pier Repairs				
End Bents (Concrete)	CY	22	\$900.00	\$19,800
End Bent Reinf. Steel	LB	4,400	\$2.00	\$8,800
Intermediate Pier (Conc.)	CY	67	\$900.00	\$60,300
Int. Pier Reinf. Steel	LB	13,200	\$2.00	\$26,400
Steel Piles	LF	600	\$90.00	\$54,000
General				
Item	Unit	Quantity	Unit Price	Total Dollars
Engineering Design	LS	1	\$500,000.00	\$500,000
Removal of Deck	LS	1	\$100,000.00	\$100,000
Removal/Reinstallation of Trusses	LS	1	\$500,000.00	\$500,000
Clean and Paint Steel	LS	1	\$1,010,000.00	\$1,010,000
Mobilization (15%)	LS	1	\$780,900.00	\$780,900
Maintenance of Traffic (3%)	LS	1	\$171,200.00	\$171,200
SUBTOTAL =				\$6,657,960
CONTINGENCY (15%) =				\$998,700
TOTAL =				\$7,656,660
USE				\$7,700,000
Note: Unit costs obtained from ODOT 2013/2015 bid history, Contractor bid tabulations for other TranSystems truss rehabilitation projects, and Engineering judgment.				

Install supplemental plates to top chord compression members							
Note: Quantities for (1) truss	Thickness		Width (15")	Length FT	Steel Qty.		LB
	IN, fraction	FT			CF	CF	
MAIN SPAN	U1 to U2	7 16	0.036	1.25	22	1.003	491
	U2 to U3	7 16	0.036	1.25	21.4	0.975	478
	U3 to U4	7 16	0.036	1.25	21.1	0.962	471
	U4 to U3	7 16	0.036	1.25	21.1	0.962	471
	U3 to U2	7 16	0.036	1.25	21.4	0.975	478
	U2 to U1	7 16	0.036	1.25	22	1.003	491
APPROACH SPANS		6 16	0.031	1.25	105.3	4.115	2,016

Subtotal, adding 5% for new connections and bolts = 14,517

Install supplemental sections to overstressed wide flange members					
Note: Quantities for (1) truss	No. C7x14.75	Length	Unit Weight	Steel Qty.	
	EA	FT	LB/FT	LB	
MAIN SPAN	L4 to U5	2	41.68	14.75	1,229
	U5 to L4	2	41.68	14.75	1,229

Subtotal, adding 5% for new connections and bolts = 5,164

Replacement of cross frames and bracing members					
	Area	Addt.	Length	Quantity	Steel Qty
	SI	%	FT	EA	LB
Cross Frames	11.47	0	34.8	7	9,508
	15.03	25	34.8	7	15,573
Lateral Bracing	6.93	10	34.8	7	6,319
Portal Bracing	7.12	80	34.8	2	3,035

Subtotal, adding 5% for new connections and bolts = 36,157

New flooring system					
	Quantity	Length	Unit Weight	Steel Qty	
	EA	FT	LB/FT	LB	
End Floorbeams	6	34.83	116	24,242	
Interior Floorbeams	17	34.83	221	130,856	
Stringers	6	410	50	123,000	

Subtotal, adding 5% for new connections and bolts = 292,003

Sidewalk Rehabilitation					
	Quantity	Length	Unit Weight	Steel Qty	
	EA	FT	LB/FT	LB	
Stringers	4	410	21	34,440	

Subtotal, adding 5% for new connections and bolts = 36,162

CONCRETE & REINF. STEEL QUANTITIES	Thickness (in)	Width (ft)	Length (ft)	Concrete (cy)	% Reinf. (assumed)	Reinforcing Steel (lb)
Deck Concrete	7.5	35	410	332	2	87,900
	Assumed 7.5" deck					
Sidewalk Concrete	4.5	10	410	57	1.5	11,300
	Assumed 4.5" deck, 5' sidewalk each side					
Pier Widening (dimensions assumed)	60	12	15	33.3		
	Quantity for 2 Piers:				67	1.5 13,200
End Bent Widening (dimensions assumed)	60	12	5	11.1		
	Quantity for 2 Abutments:				22.2	1.5 4,400
LINEAR MEASURE ITEMS						
Piles	Length (ft)	Quantity (ea)	Total (ft)			
Piles	75	8	600			
Expansion Joint	35	4	140			
AREA MEASURE ITEMS						
Replace Approach Slabs	Length (ft)	Width (ft)	Total (sf)			
Replace Approach Slabs	40	35	156			

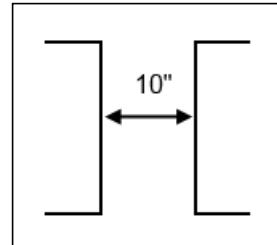
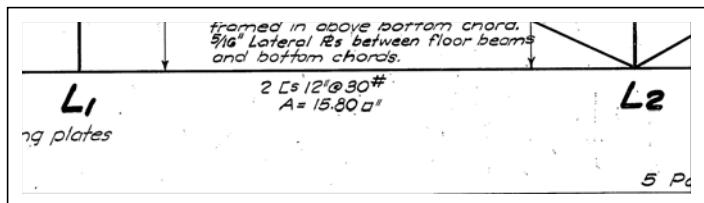
SQUARE FOOTAGE OF TRUSS MEMBERS (32' RDWY)			
Approach Spans (1/4)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	100.00	8.8	880
Top Chord	105.33	8.8	927
Verticals/Diagonals	140.34	3.5	491
Floor System			
Stringers	300.00	4.8	1,440
Floorbeams	104.50	9.9	1,035
Cantilevered Sidewalks			
Stringers	200.00	3.0	600
Brackets	36.00	5.0	180
Rails	100.00	6.8	683
SUBTOTAL =			6,236 SF
Factor for Lacing/Connections =			20%
TOTAL =			7,483 SF

Main Span (1/2)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	210.00	8.8	1,848
Top Chord	235.00	8.8	2,068
Verticals/Diagonals	631.60	3.5	2,211
Bracing			
Portal	34.83	8.8	307
Lateral	569.20	1.7	949
Cross	243.83	1.1	268
Floor System			
Stringers	630.00	4.8	3,024
Floorbeams	191.58	9.9	1,897
Cantilevered Sidewalks			
Stringers	420.00	3.0	1,260
Brackets	66.00	5.0	330
Rails	210.00	6.8	1,435
SUBTOTAL =			15,596 SF
Factor for Lacing/Connections =			20%
TOTAL =			18,715 SF

Total Cost to Clean and Paint Structure (32' RDWY)	
Cost Per Square Foot	\$15.00 /SF
Square Footage	
Approaches	29,933 SF
Main	37,430 SF
COST TO CLEAN AND PAINT = \$1,010,000	

ALTERNATIVE 2A

ANALYSIS

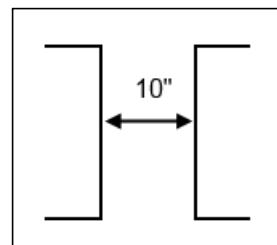
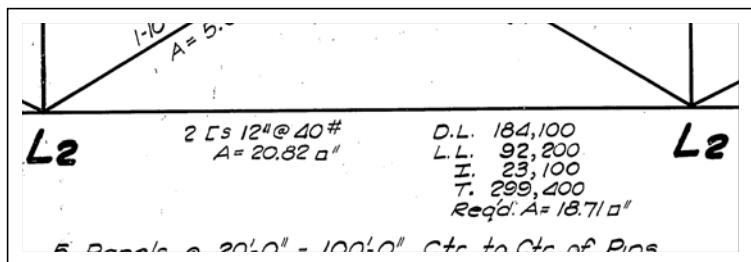
MEMBER SECTION PROPERTIESApproach Span (Organized by STAAD Prismatic General Reference Number)Section 1 - Bottom Chord, Outer Section

$$\text{Area}_1 := 2 \cdot 8.79 \text{ in}^2 = 17.58 \cdot \text{in}^2$$

$$I_{z1} := 2 \cdot 161.2 \text{ in}^4 = 322.4 \cdot \text{in}^4$$

$$I_{y1} := 2 \cdot \left[5.2 \text{ in}^4 + 8.79 \text{ in}^2 \cdot (5 \text{ in} + 0.68 \text{ in})^2 \right] = 577.573 \cdot \text{in}^4$$

$$I_{x1} := \frac{4 \cdot 3.17 \text{ in} \cdot (0.5 \text{ in})^3 + 2 \cdot 12 \text{ in} \cdot (0.51 \text{ in})^3}{3} = 1.59 \cdot \text{in}^4$$

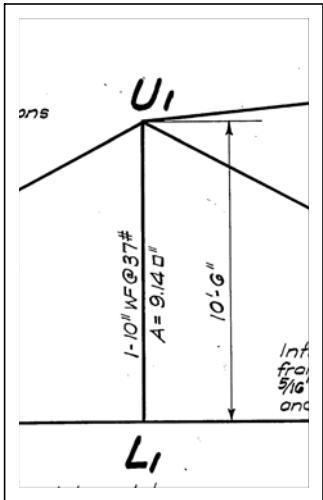
Section 2 - Bottom Chord, Inner Section

$$\text{Area}_2 := 2 \cdot 11.73 \text{ in}^2 = 23.46 \cdot \text{in}^2$$

$$I_{z2} := 2 \cdot 196.5 \text{ in}^4 = 393 \cdot \text{in}^4$$

$$I_{y2} := 2 \cdot \left[6.6 \text{ in}^4 + 11.73 \text{ in}^2 \cdot (5 \text{ in} + 0.72 \text{ in})^2 \right] = 780.774 \cdot \text{in}^4$$

$$I_{x2} := \frac{4 \cdot 3.415 \text{ in} \cdot (0.5 \text{ in})^3 + 2 \cdot 12 \text{ in} \cdot (0.755 \text{ in})^3}{3} = 4.012 \cdot \text{in}^4$$

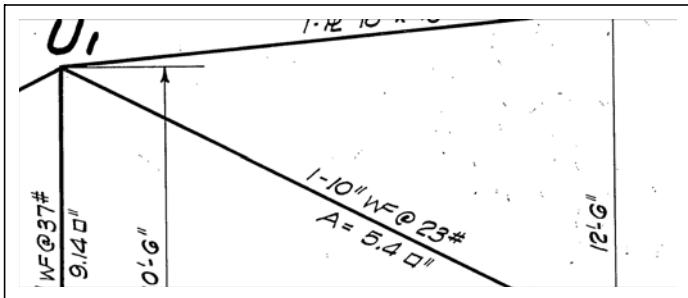
Section 3 - Verticals

$$\text{Area}_3 := 10.88 \text{ in}^2 = 10.88 \cdot \text{in}^2$$

$$I_{z3} := 196.9 \text{ in}^4 = 196.9 \cdot \text{in}^4$$

$$I_{y3} := 42.2 \text{ in}^4 = 42.2 \cdot \text{in}^4$$

$$I_{x3} := \frac{2 \cdot 7.978 \text{ in} \cdot (0.498 \text{ in})^3 + 9.88 \text{ in} \cdot (0.306 \text{ in})^3}{3} = 0.751 \cdot \text{in}^4$$

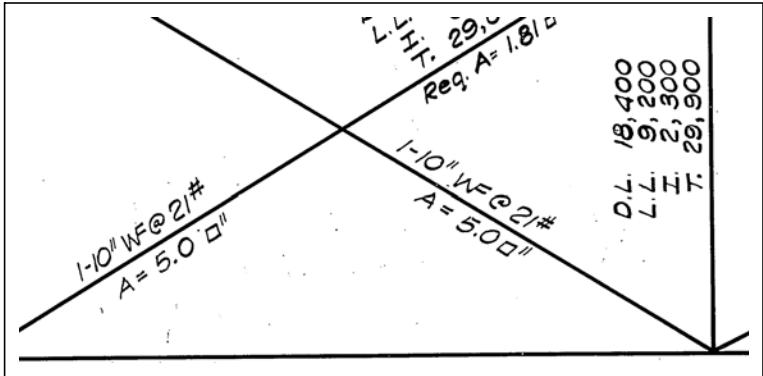
Section 4 - Diagonals, Outer

$$\text{Area}_4 := 6.77 \text{ in}^2 = 6.77 \cdot \text{in}^2$$

$$I_{z4} := 120.6 \text{ in}^4 = 120.6 \cdot \text{in}^4$$

$$I_{y4} := 11.3 \text{ in}^4 = 11.3 \cdot \text{in}^4$$

$$I_{x4} := \frac{2 \cdot 5.75 \text{ in} \cdot (0.39 \text{ in})^3 + 10 \text{ in} \cdot (0.24 \text{ in})^3}{3} = 0.273 \cdot \text{in}^4$$

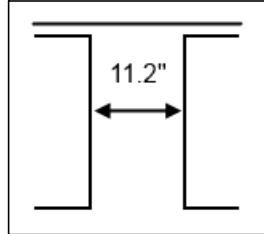
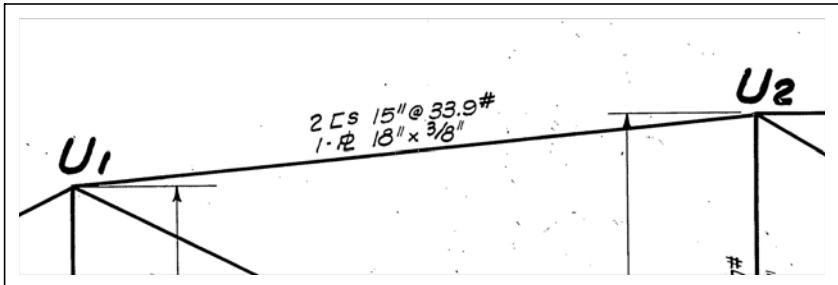
Section 5 - Diagonals, Inner

$$\text{Area}_5 := 6.19 \text{ in}^2 = 6.19 \cdot \text{in}^2$$

$$I_{z5} := 106.3 \text{ in}^4 = 106.3 \cdot \text{in}^4$$

$$I_{y5} := 9.7 \text{ in}^4 = 9.7 \cdot \text{in}^4$$

$$I_{x5} := \frac{2 \cdot 5.75 \text{ in} \cdot (0.34 \text{ in})^3 + 9.9 \text{ in} \cdot (0.24 \text{ in})^3}{3} = 0.196 \cdot \text{in}^4$$

Section 6 - Top Chord

$$\text{Area}_6 := 6.75 \text{ in}^2 + (2) \cdot 9.9 \text{ in}^2 = 1.2655 \text{ in}^2$$

$$y_6 := \frac{7.5 \text{ in} \cdot (2) \cdot 9.9 \text{ in}^2 + \left(15 \text{ in} + \frac{3 \text{ in}}{16}\right) \cdot 6.75 \text{ in}^2}{9.9 \text{ in}^2 + 9.9 \text{ in}^2 + 6.75 \text{ in}^2} = 9.454 \cdot \text{in}$$

$$I_{z6} := 2 \left[312.6 \text{ in}^4 + 9.9 \text{ in}^2 \cdot (y_6 - 7.5 \text{ in})^2 \right] + \left[0.1 \text{ in}^4 + 6.75 \text{ in}^2 \cdot (15.1875 \text{ in} - y_6)^2 \right] = 922.792 \cdot \text{in}^4$$

$$I_{y6} := 182.3 \text{ in}^4 + 2 \left[8.2 \text{ in}^4 + 9.9 \text{ in}^2 \cdot (5.6 \text{ in} + 0.79 \text{ in})^2 \right] = 1.007 \times 10^3 \cdot \text{in}^4$$

$$I_{x6} := \frac{4 \cdot 3.4 \text{ in} \cdot (0.625 \text{ in})^3 + 18 \text{ in} \cdot \left(\frac{3}{8} \text{ in}\right)^3 + 2 \cdot 15 \text{ in} \cdot (0.4 \text{ in})^3}{3} = 2.063 \cdot \text{in}^4$$

Section 7 - End Floorbeams - 30W10s

$$\text{Area}_7 := 31.77 \text{in}^2 = 31.77 \cdot \text{in}^2$$

$$I_{z7} := 4461 \text{in}^4 = 4.461 \times 10^3 \cdot \text{in}^4$$

$$I_{y7} := 135.1 \text{in}^4 = 135.1 \cdot \text{in}^4$$

$$I_{x7} := \frac{2 \cdot 10.484 \text{in} \cdot (0.76 \text{in})^3 + 29.82 \text{in} \cdot (0.548 \text{in})^3}{3} = 4.704 \cdot \text{in}^4$$

Section 8 - Interior Floorbeams - 33W12s

$$\text{Area}_8 := 36.78 \text{in}^2 = 36.78 \cdot \text{in}^2$$

$$I_{z8} := 6354.7 \text{in}^4 = 6.355 \times 10^3 \cdot \text{in}^4$$

$$I_{y8} := 188.2 \text{in}^4 = 188.2 \cdot \text{in}^4$$

$$I_{x8} := \frac{2 \cdot 11.5 \text{in} \cdot (0.805 \text{in})^3 + 33 \text{in} \cdot (0.57 \text{in})^3}{3} = 6.037 \cdot \text{in}^4$$

Section 9 - Stringers - 16W45

$$\text{Area}_9 := 13.24 \text{in}^2 = 13.24 \cdot \text{in}^2$$

$$I_{z9} := 583.3 \text{in}^4 = 583.3 \cdot \text{in}^4$$

$$I_{y9} := 30.5 \text{in}^4 = 30.5 \cdot \text{in}^4$$

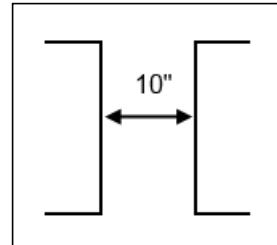
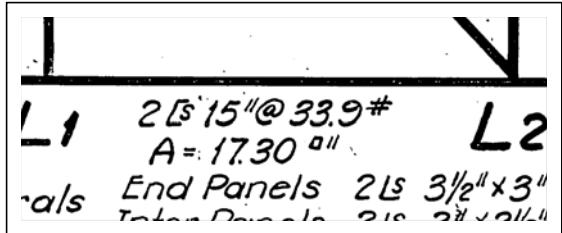
$$I_{x9} := \frac{2 \cdot 7.039 \text{in} \cdot (0.563 \text{in})^3 + 16.12 \text{in} \cdot (0.346 \text{in})^3}{3} = 1.06 \cdot \text{in}^4$$

Section Properties, Approach Span

Member	Section	A	I _z	I _y	I _x	Ref. Sect.
Lo to L1	(2) 12C30	17.58	322.4	577.6	1.059	1
Lo to U1	(2) 15C33.9, (1) PL 18 x 3/8	26.55	922.8	1007.2	2.063	6
L1 to U1	(1) 10W37	10.88	196.9	42.2	0.751	3
L1 to L2	(2) 12C30	17.58	322.4	577.6	1.059	1
U1 to U2	(2) 15C33.9, (1) PL 18 x 3/8	26.55	922.8	1007.2	2.063	6
U1 to L2	(1) 10W23	6.77	120.6	11.3	0.273	4
U2 to U2	(2) 15C33.9, (1) PL 18 x 3/8	26.55	922.8	1007.2	2.063	6
L2 to L2	(2) 12C40	23.46	393	780.8	4.012	2
Diagonal	(1) 10W21	6.19	106.3	9.7	0.196	5
U2 to L2	(1) 10W21	6.19	106.3	9.7	0.196	

MEMBER SECTION PROPERTIESMain Span

(Organized by STAAD Prismatic General Reference Number)

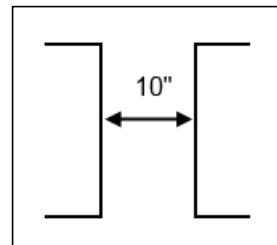
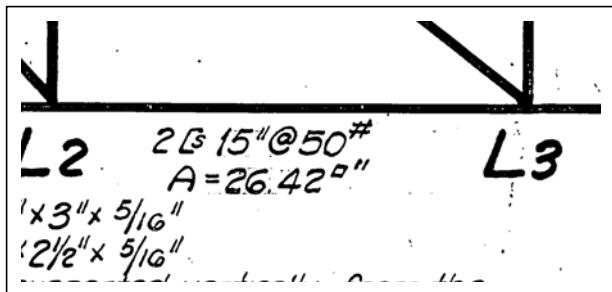
Section 1 - Bottom Chord, Outer Section

$$\text{Area}_1 := 2 \cdot 9.9 \text{ in}^2 = 19.8 \cdot \text{in}^2$$

$$I_{z1} := 2 \cdot 312.6 \text{ in}^4 = 625.2 \cdot \text{in}^4$$

$$I_{y1} := 2 \cdot [8.2 \text{ in}^4 + 9.9 \text{ in}^2 \cdot (5 \text{ in} + 0.79 \text{ in})^2] = 680.177 \cdot \text{in}^4$$

$$I_{x1} := \frac{4 \cdot 3.4 \text{ in} \cdot (0.625 \text{ in})^3 + 2 \cdot 15 \text{ in} \cdot (0.4 \text{ in})^3}{3} = 1.747 \cdot \text{in}^4$$

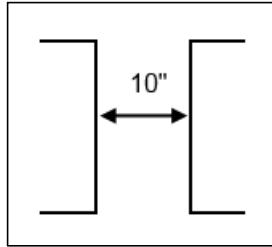
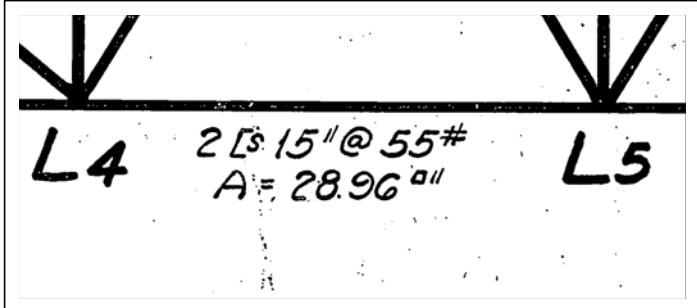
Section 2 - Bottom Chord, Inner Section

$$\text{Area}_2 := 2 \cdot 14.64 \text{ in}^2 = 29.28 \cdot \text{in}^2$$

$$I_{z2} := 2 \cdot 401.4 \text{ in}^4 = 802.8 \cdot \text{in}^4$$

$$I_{y2} := 2 \cdot [11.2 \text{ in}^4 + 14.64 \text{ in}^2 \cdot (5 \text{ in} + 0.8 \text{ in})^2] = 1.007 \times 10^3 \cdot \text{in}^4$$

$$I_{x2} := \frac{4 \cdot 3.716 \text{ in} \cdot (0.625 \text{ in})^3 + 2 \cdot 15 \text{ in} \cdot (0.716 \text{ in})^3}{3} = 4.88 \cdot \text{in}^4$$

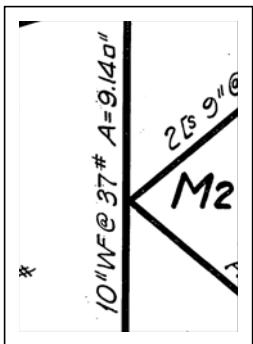
Section 3 - Bottom Chord, Middle Section

$$\text{Area}_3 := 2 \cdot 16.11 \text{ in}^2 = 32.22 \cdot \text{in}^2$$

$$I_{z3} := 2 \cdot 429 \text{ in}^4 = 858 \cdot \text{in}^4$$

$$I_{y3} := 2 \cdot \left[12.1 \text{ in}^4 + 16.11 \text{ in}^2 \cdot (5 \text{ in} + 0.82 \text{ in})^2 \right] = 1.116 \times 10^3 \cdot \text{in}^4$$

$$I_{x3} := \frac{4 \cdot 3.814 \text{ in} \cdot (0.625 \text{ in})^3 + 2 \cdot 15 \text{ in} \cdot (0.814 \text{ in})^3}{3} = 6.635 \cdot \text{in}^4$$

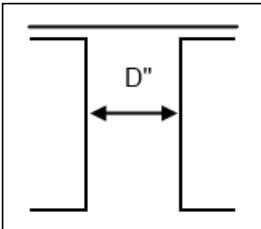
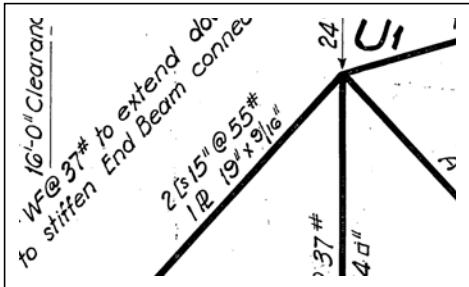
Section 4 - Verticals, 10W37

$$\text{Area}_4 := 10.88 \text{ in}^2 = 10.88 \cdot \text{in}^2$$

$$I_{z4} := 196.9 \text{ in}^4 = 196.9 \cdot \text{in}^4$$

$$I_{y4} := 42.2 \text{ in}^4 = 42.2 \cdot \text{in}^4$$

$$I_{x4} := \frac{2 \cdot 7.978 \text{ in} \cdot (0.498 \text{ in})^3 + 9.88 \text{ in} \cdot (0.306 \text{ in})^3}{3} = 0.751 \cdot \text{in}^4$$

Section 5 - Top Chord, Outer

$$D_5 := 19\text{in} - (2 \cdot 3.618\text{in}) = 11.764\text{-in}$$

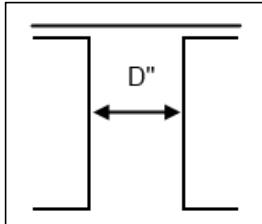
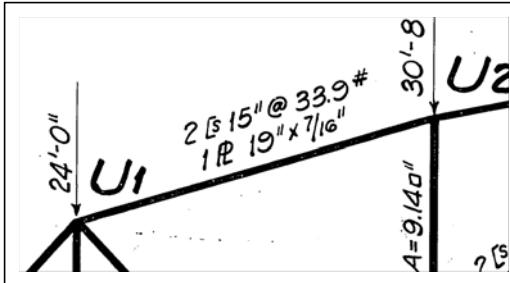
$$\text{Area}_5 := 10.6875\text{in}^2 + (2 \cdot 16.11\text{in}^2) = 42.907\cdot\text{in}^2$$

$$y_5 := \frac{7.5\text{in} \cdot (2) \cdot 16.11\text{in}^2 + \left(15\text{in} + \frac{9\text{in}}{32}\right) \cdot 10.6875\text{in}^2}{16.11\text{in}^2 + 16.11\text{in}^2 + 10.6875\text{in}^2} = 9.438\text{-in}$$

$$I_{z5} := 2 \cdot \left[429\text{in}^4 + 16.11\text{in}^2 \cdot (y_5 - 7.5\text{in})^2 \right] + \left[0.3\text{in}^4 + 10.6875\text{in}^2 \cdot (15.28125\text{in} - y_5)^2 \right] = 1.344 \times 10^3 \cdot \text{in}^4$$

$$I_{y5} := 321.5\text{in}^4 + 2 \cdot \left[12.1\text{in}^4 + 16.11\text{in}^2 \cdot \left(\frac{D_5}{2} + 0.82\text{in} \right)^2 \right] = 1.793 \times 10^3 \cdot \text{in}^4$$

$$I_{x5} := \frac{4 \cdot 3.814\text{in} \cdot (0.625\text{in})^3 + 19\text{in} \cdot \left(\frac{9}{16}\text{in} \right)^3 + 2 \cdot 15\text{in} \cdot (0.814\text{in})^3}{3} = 7.762 \cdot \text{in}^4$$

Section 6 - Top Chord, U1 through U3

$$D_6 := 19\text{in} - (2 \cdot 3.4\text{in}) = 12.2\text{-in}$$

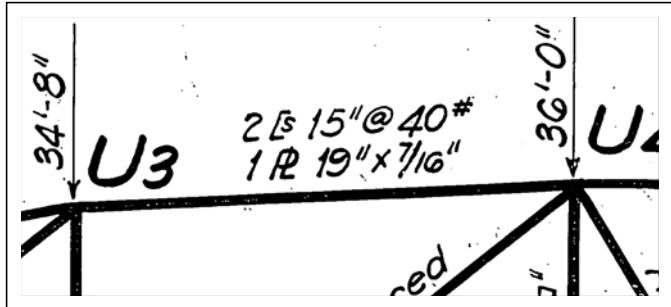
$$\text{Area}_6 := 8.3125\text{in}^2 + (2) \cdot 9.9\text{in}^2 = 28.113 \cdot \text{in}^2$$

$$y_6 := \frac{7.5\text{in} \cdot (2) \cdot 9.9\text{in}^2 + \left(15\text{in} + \frac{7\text{in}}{32}\right) \cdot 8.3125\text{in}^2}{9.9\text{in}^2 + 9.9\text{in}^2 + 8.3125\text{in}^2} = 9.782 \cdot \text{in}$$

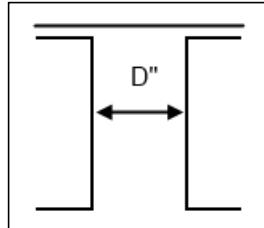
$$I_{z6} := 2 \cdot \left[312.6\text{in}^4 + 9.9\text{in}^2 \cdot (y_6 - 7.5\text{in})^2 \right] + \left[0.1\text{in}^4 + 8.3125\text{in}^2 \cdot \left[\left(15\text{in} + \frac{7\text{in}}{32} \right) - y_6 \right]^2 \right] = 974.112 \cdot \text{in}^4$$

$$I_{y6} := 250.1\text{in}^4 + 2 \cdot \left[8.2\text{in}^4 + 9.9\text{in}^2 \cdot \left(\frac{D_6}{2} + 0.79\text{in} \right)^2 \right] = 1.206 \times 10^3 \cdot \text{in}^4$$

$$I_{x6} := \frac{4 \cdot 3.4\text{in} \cdot (0.625\text{in})^3 + 19\text{in} \cdot \left(\frac{7}{16}\text{in} \right)^3 + 2 \cdot 15\text{in} \cdot (0.4\text{in})^3}{3} = 2.277 \cdot \text{in}^4$$

Section 7 - Top Chord, U3 to U4

$$\text{Area}_7 := 8.3125\text{in}^2 + (2) \cdot 11.7\text{in}^2 = 31.712 \cdot \text{in}^2$$

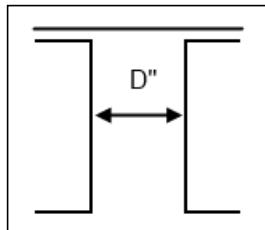
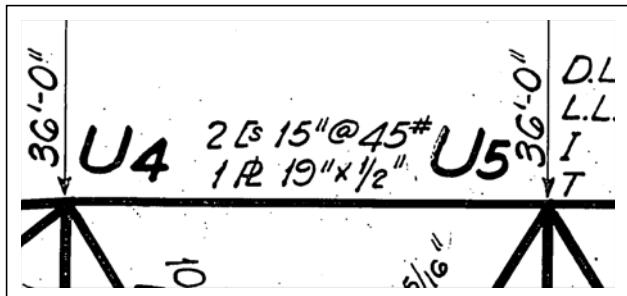


$$D_7 := 19\text{in} - (2 \cdot 3.52\text{in}) = 11.96 \cdot \text{in}$$

$$I_{z7} := 2 \cdot \left[346.3\text{in}^4 + 11.7\text{in}^2 \cdot (y_7 - 7.5\text{in})^2 \right] + \left[0.1\text{in}^4 + 8.3125\text{in}^2 \cdot \left(15 \frac{7}{32}\text{in} - y_7 \right)^2 \right] = 1.058 \times 10^3 \cdot \text{in}^4$$

$$I_{y7} := 250.1\text{in}^4 + 2 \cdot \left[9.3\text{in}^4 + 11.7\text{in}^2 \cdot \left(\frac{D_7}{2} + 0.78\text{in} \right)^2 \right] = 1.338 \times 10^3 \cdot \text{in}^4$$

$$I_{x7} := \frac{4 \cdot 3.52\text{in} \cdot (0.625\text{in})^3 + 19\text{in} \cdot \left(\frac{7}{16}\text{in} \right)^3 + 2 \cdot 15\text{in} \cdot (0.52\text{in})^3}{3} = 3.082 \cdot \text{in}^4$$

Section 8 - Top Chord, Center

$$D_8 := 19\text{in} - (2 \cdot 3.618\text{in}) = 11.764 \cdot \text{in}$$

$$\text{Area}_8 := 9.5\text{in}^2 + (2) \cdot 13.17\text{in}^2 = 35.84 \cdot \text{in}^2$$

$$y_8 := \frac{7.5\text{in} \cdot (2) \cdot 13.17\text{in}^2 + \left(15\text{in} + \frac{1\text{in}}{4} \right) \cdot 9.5\text{in}^2}{13.17\text{in}^2 + 13.17\text{in}^2 + 9.5\text{in}^2} = 9.554 \cdot \text{in}$$

$$I_{z8} := 2 \cdot \left[373.9\text{in}^4 + 13.17\text{in}^2 \cdot (y_8 - 7.5\text{in})^2 \right] + \left[0.2\text{in}^4 + 9.5\text{in}^2 \cdot \left[\left(15\text{in} + \frac{1\text{in}}{4} \right) - y_8 \right]^2 \right] = 1.167 \times 10^3 \cdot \text{in}^4$$

$$I_{y8} := 285.8\text{in}^4 + 2 \cdot \left[10.3\text{in}^4 + 13.17\text{in}^2 \cdot \left(\frac{D_8}{2} + 0.79\text{in} \right)^2 \right] = 1.479 \times 10^3 \cdot \text{in}^4$$

$$I_{x8} := \frac{4 \cdot 3.618\text{in} \cdot (0.625\text{in})^3 + 19\text{in} \cdot \left(\frac{1}{2}\text{in} \right)^3 + 2 \cdot 15\text{in} \cdot (0.618\text{in})^3}{3} = 4.33 \cdot \text{in}^4$$

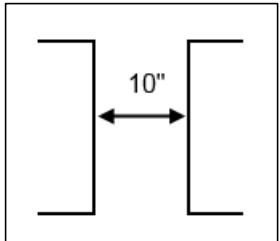
Section 9 - Diagonals - 10W41

$$\text{Area}_9 := 12.06 \text{in}^2 = 12.06 \cdot \text{in}^2$$

$$I_{z9} := 222.4 \text{in}^4 = 222.4 \cdot \text{in}^4$$

$$I_{y9} := 47.7 \text{in}^4 = 47.7 \cdot \text{in}^4$$

$$I_{x9} := \frac{2 \cdot 8 \text{in} \cdot (0.558 \text{in})^3 + 10 \text{in} \cdot (0.328 \text{in})^3}{3} = 1.044 \cdot \text{in}^4$$

Section 10 - Diagonals - (2)9C15

$$\text{Area}_{10} := 2 \cdot 4.39 \text{in}^2 = 8.78 \cdot \text{in}^2$$

$$I_{z10} := 2 \cdot 50.7 \text{in}^4 = 101.4 \cdot \text{in}^4$$

$$I_{y10} := 2 \cdot [1.9 \text{in}^4 + 4.39 \text{in}^2 \cdot (5 \text{in} + 0.59 \text{in})^2] = 278.158 \cdot \text{in}^4$$

$$I_{x10} := \frac{4 \cdot 2.485 \text{in} \cdot \left(\frac{7}{16} \text{in}\right)^3 + 2 \cdot 9 \text{in} \cdot (0.285 \text{in})^3}{3} = 0.416 \cdot \text{in}^4$$

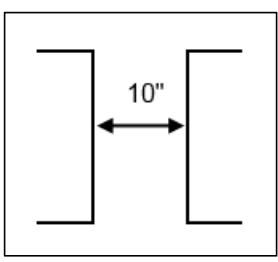
Section 11 - Diagonals - 10W23

$$\text{Area}_{11} := 6.77 \text{in}^2 = 6.77 \cdot \text{in}^2$$

$$I_{z11} := 120.6 \text{in}^4 = 120.6 \cdot \text{in}^4$$

$$I_{y11} := 11.3 \text{in}^4 = 11.3 \cdot \text{in}^4$$

$$I_{x11} := \frac{2 \cdot 5.75 \text{in} \cdot (0.39 \text{in})^3 + 10 \text{in} \cdot (0.24 \text{in})^3}{3} = 0.273 \cdot \text{in}^4$$

Section 12 - Diagonals - (2)9C13.4

$$\text{Area}_{12} := 2 \cdot 3.89 \text{in}^2 = 7.78 \cdot \text{in}^2$$

$$I_{z12} := 2 \cdot 47.3 \text{in}^4 = 94.6 \cdot \text{in}^4$$

$$I_{y12} := 2 \cdot [1.8 \text{in}^4 + 3.89 \text{in}^2 \cdot (5 \text{in} + 0.61 \text{in})^2] = 248.453 \cdot \text{in}^4$$

$$I_{x12} := \frac{4 \cdot 2.43 \text{in} \cdot \left(\frac{7}{16} \text{in}\right)^3 + 2 \cdot 9 \text{in} \cdot (0.23 \text{in})^3}{3} = 0.344 \cdot \text{in}^4$$

Section 13 - Diagonals - 10W21

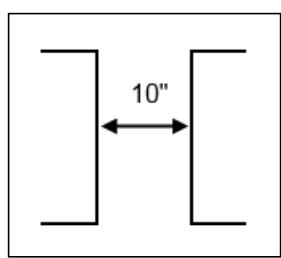
$$\text{Area}_{13} := 6.19 \text{in}^2 = 6.19 \cdot \text{in}^2$$

$$I_{z13} := 106.3 \text{in}^4 = 106.3 \cdot \text{in}^4$$

$$I_{y13} := 9.7 \text{in}^4 = 9.7 \cdot \text{in}^4$$

$$I_{x13} := \frac{2 \cdot 5.75 \text{in} \cdot (0.34 \text{in})^3 + 9.9 \text{in} \cdot (0.24 \text{in})^3}{3} = 0.196 \cdot \text{in}^4$$

Section 14 - Diagonals - Plans say 2L3x3.5x5/16 but inspection photos appear to show the same section as Section 13, 10W21

Section 15 - Diagonals - (2)6C8.2

$$\text{Area}_{15} := 2 \cdot 2.39 \text{in}^2 = 4.78 \cdot \text{in}^2$$

$$I_{z15} := 2 \cdot 13 \text{in}^4 = 26 \cdot \text{in}^4$$

$$I_{y15} := 2 \cdot \left[0.7 \text{in}^4 + 2.39 \text{in}^2 \cdot (5 \text{in} + 0.52 \text{in})^2 \right] = 147.049 \cdot \text{in}^4$$

$$I_{x15} := \frac{4 \cdot 1.92 \text{in} \cdot \left(\frac{3}{8} \text{in} \right)^3 + 2 \cdot 6 \text{in} \cdot (0.2 \text{in})^3}{3} = 0.167 \cdot \text{in}^4$$

Section 16 - End Floorbeams - 30W108

$$\text{Area}_{16} := 31.77 \text{in}^2 = 31.77 \cdot \text{in}^2$$

$$I_{z16} := 4461 \text{in}^4 = 4.461 \times 10^3 \cdot \text{in}^4$$

$$I_{y16} := 135.1 \text{in}^4 = 135.1 \cdot \text{in}^4$$

$$I_{x16} := \frac{2 \cdot 10.484 \text{in} \cdot (0.76 \text{in})^3 + 29.82 \text{in} \cdot (0.548 \text{in})^3}{3} = 4.704 \cdot \text{in}^4$$

Section 17 - Interior Floorbeams - 33W125

$$\text{Area}_{17} := 36.78 \text{in}^2 = 36.78 \cdot \text{in}^2$$

$$I_{z17} := 6354.7 \text{in}^4 = 6.355 \times 10^3 \cdot \text{in}^4$$

$$I_{y17} := 188.2 \text{in}^4 = 188.2 \cdot \text{in}^4$$

$$I_{x17} := \frac{2 \cdot 11.5 \text{in} \cdot (0.805 \text{in})^3 + 33 \text{in} \cdot (0.57 \text{in})^3}{3} = 6.037 \cdot \text{in}^4$$

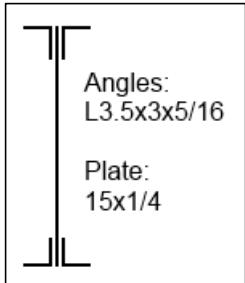
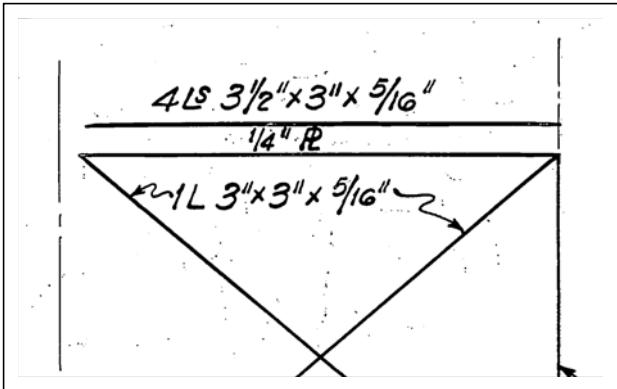
Section 18 - Stringers - 18W47

$$\text{Area}_{18} := 13.81 \text{in}^2 = 13.81 \cdot \text{in}^2$$

$$I_{z18} := 736.4 \text{in}^4 = 736.4 \cdot \text{in}^4$$

$$I_{y18} := 33.5 \text{in}^4 = 33.5 \cdot \text{in}^4$$

$$I_{x18} := \frac{2 \cdot 7.492 \text{in} \cdot (0.52 \text{in})^3 + 17.9 \text{in} \cdot (0.350 \text{in})^3}{3} = 0.958 \cdot \text{in}^4$$

Section 19 - Cross Bracing

$$I_{\text{plate}x} := \left(\frac{1}{12}\right)0.25\text{in} \cdot (15\text{in})^3 = 70.313 \cdot \text{in}^4$$

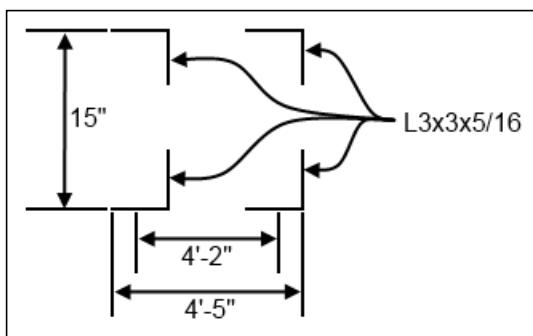
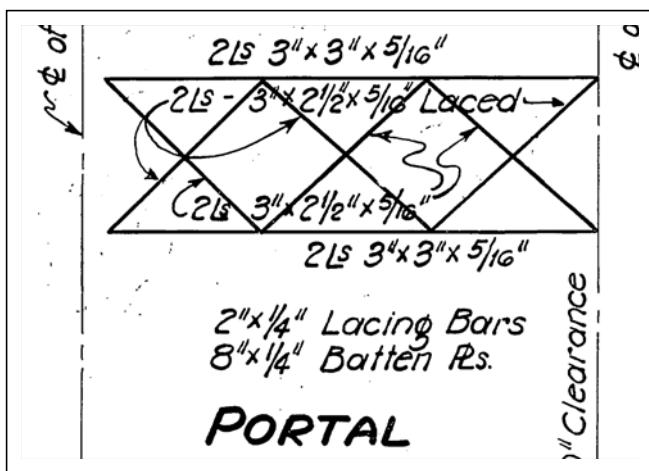
$$I_{\text{plate}y} := \left(\frac{1}{12}\right)15\text{in} \cdot (0.25\text{in})^3 = 0.02 \cdot \text{in}^4$$

$$\text{Area}_{19} := (15\text{in} \cdot 0.25\text{in}) + (4) \cdot 1.93\text{in}^2 = 11.47 \cdot \text{in}^2$$

$$I_{z19} := I_{\text{plate}x} + 4 \cdot \left[2.3\text{in}^4 + 1.93\text{in}^2 \cdot (6.44\text{in})^2 \right] = 399.689 \cdot \text{in}^4$$

$$I_{y19} := I_{\text{plate}y} + 4 \cdot \left[1.6\text{in}^4 + 1.93\text{in}^2 \cdot (0.935\text{in})^2 \right] = 13.169 \cdot \text{in}^4$$

$$I_{x19} := \frac{8 \cdot 3\text{in} \cdot \left(\frac{5}{16}\text{in}\right)^3 + 15\text{in} \cdot (0.25\text{in})^3}{3} = 0.322 \cdot \text{in}^4$$

Section 20 - Portal Bracing

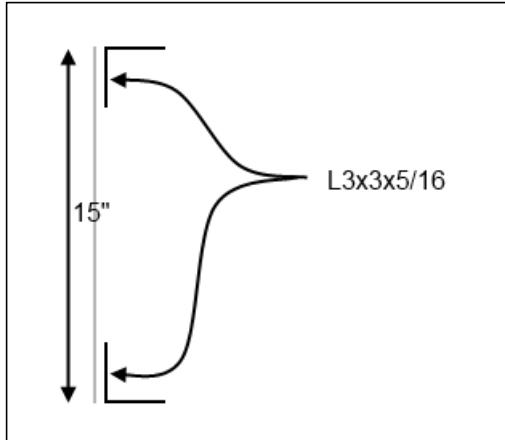
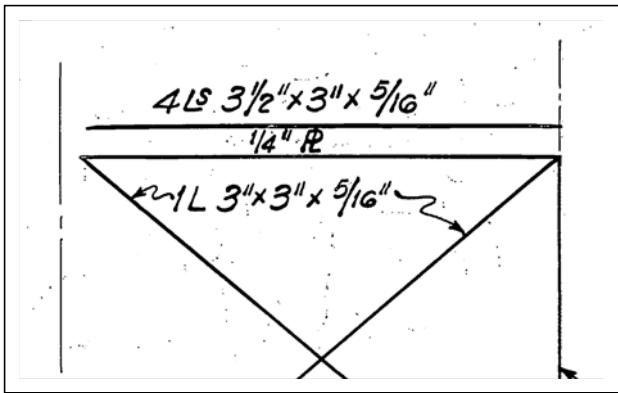
$$I_{z20} := 4 \cdot \left[1.5\text{in}^4 + 1.78\text{in}^2 \cdot (7.5\text{in} - 0.87\text{in})^2 \right] = 318.973 \cdot \text{in}^4$$

$$\text{Area}_{20} := 4 \cdot 1.78\text{in}^2 = 7.12 \cdot \text{in}^2$$

$$x_{20} := \frac{(3 - 0.87)\text{in} \cdot (2) \cdot 1.78\text{in}^2 + (53 - 0.87)\text{in} \cdot (2) \cdot 1.78\text{in}^2}{1.78\text{in}^2 \cdot 4} = 27.13 \cdot \text{in}$$

$$I_{y20} := 2 \cdot \left[1.5\text{in}^4 + 1.78\text{in}^2 \cdot (x_{20} - 2.13\text{in})^2 \right] + 2 \cdot \left[1.5\text{in}^4 + 1.78\text{in}^2 \cdot (x_{20} - 0.87\text{in})^2 \right] = 4.686 \times 10^3 \cdot \text{in}^4$$

$$I_{x20} := 4 \cdot \left[3\text{in} \cdot \left(\frac{5}{16}\text{in}\right)^3 \right] \div 3 = 0.122 \cdot \text{in}^4$$

Section 21 - Cross Bracing

$$I_{z21} := 2 \cdot \left[1.5\text{in}^4 + 1.78\text{in}^2 \cdot (7.5\text{in} - 0.59\text{in})^2 \right] = 172.983 \cdot \text{in}^4$$

$$I_{y21} := 2 \cdot 1.5\text{in}^4 = 3 \cdot \text{in}^4$$

$$\text{Area}_{21} := 2 \cdot 1.78\text{in}^2 = 3.56 \cdot \text{in}^2$$

$$I_{x21} := \frac{4 \cdot 3\text{in} \cdot \left(\frac{5}{16}\text{in} \right)^3}{3} = 0.122 \cdot \text{in}^4$$

Section Properties, Main Span

BOTTOM CHORD

Member	Section	A	I _z	I _y	I _x	Ref. Sect.
Lo to L1	(2) 15C33.9	19.80	625.2	680.2	1.7	1
L2 to L3	(2) 15C50	29.28	802.8	1007.4	4.9	2
L4 to L5	(2) 15C55	32.22	858.0	1115.6	6.6	3

VERTICALS

Member	Section	A	I _z	I _y	I _x	Ref. Sect.
(all)	(1) 10W37	10.88	196.9	42.2	0.8	4

TOP CHORD

Member	Section	A	I _z	I _y	I _x	Ref. Sect.
Lo to U1	(2) 15C55, (1) PL 19 x 9/16	42.91	1344.2	1792.9	7.8	5
U1 to U2	(2) 15C33.9, (1) PL 19 x 7/16	28.11	974.1	1206.4	2.3	6
U2 to U3	(2) 15C33.9, (1) PL 19 x 7/16	28.11	974.1	1206.4	2.3	6
U3 to U4	(2) 15C40, (1) PL 19 x 7/16	31.71	1058.1	1338.0	3.1	7
U4 to U5	(2) 15C45, (1) PL 19 x 1/2	35.84	1167.3	1478.9	4.3	8

DIAGONALS

Member	Section	A	I _z	I _y	I _x	Ref. Sect.
U1 to L2	(1) 10W41	12.06	222.4	47.7	1.0	9
M2 to U3	(2) 9C15	8.78	101.4	278.2	0.4	10
M2 to L3	(1) 10W23	6.77	120.6	11.3	0.3	11
M3 to U4	(2) 9C13.4	7.78	94.6	248.5	0.3	12
M3 to L4	(1) 10W21	6.19	106.3	9.7	0.2	13
U4 to L5	(1) 10W21	6.19	106.3	9.7	0.2	13
L4 to U5	(2) L3.5 x 3 x 5/16 **	6.19	106.3	9.7	0.2	14

HORIZONTALS (MID-SPAN)

Member	Section	A	I _z	I _y	I _x	Ref. Sect.
(all)	(2) 6C8.2	4.78	26.0	147.0	0.2	15

** Inspection photos show these members to be of the same 10W21 as Reference Section 13.

APPROACH SPAN TOP CHORD CAPACITY

$$F_y := 30\text{ksi}$$

$$F_u := 60\text{ksi}$$

$$E := 29000\text{ksi}$$

$$L_{byR} := 45.93$$

$$\text{Area} := 26.55\text{in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44 \quad 0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_e := \frac{\pi^2 \cdot E}{L_{byR}^2} \quad F_e = 135.677 \cdot \text{ksi}$$

$$F_{cr} := \left(0.658 \cdot \frac{F_y}{F_e} \right) \cdot F_y \quad F_{cr} = 27.348 \cdot \text{ksi}$$

$$F_a := 0.55 \cdot F_{cr} \quad F_a = 15.041 \cdot \text{ksi}$$

The allowable compressive load to the top chords of the pony truss is:

$$\text{Area} \cdot F_a = 399.352 \cdot \text{kip}$$

MAIN TRUSS CAPACITY CALCULATIONS

$$F_y := 30 \text{ ksi}$$

$$F_u := 60 \text{ ksi}$$

$$E := 29000 \text{ ksi}$$

Section 4

$$L_{byR4} := 18\text{ft} \div 1.97\text{in} = 109.645$$

$$Area_4 := 10.88\text{in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e4} := \frac{\pi^2 \cdot E}{(0.825 L_{byR4})^2}$$

$$F_{e4} = 28.858 \cdot \text{ksi}$$

$$F_{cr4} := \left(0.658 \frac{F_y}{F_{e4}} \right) \cdot F_y$$

$$F_{cr4} = 19.416 \cdot \text{ksi}$$

$$F_{a4} := \min(16 \cdot \text{ksi}, 0.55 \cdot F_{cr4})$$

$$F_{a4} = 10.679 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_4 \cdot F_{a4} = 116.184 \cdot \text{kip}$$

Section 5

$$L_{byR5} := 68.39$$

$$Area_5 := 42.91 \text{ in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e5} := \frac{\pi^2 \cdot E}{(0.825 L_{byR5})^2}$$

$$F_{e5} = 89.909 \cdot \text{ksi}$$

$$F_{cr5} := \left(\begin{array}{c} \frac{F_y}{F_{e5}} \\ 0.658 \end{array} \right) \cdot F_y$$

$$F_{cr5} = 26.09 \cdot \text{ksi}$$

$$F_{a5} := \min(16 \text{ ksi}, 0.55 \cdot F_{cr5})$$

$$F_{a5} = 14.349 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_5 \cdot F_{a5} = 615.73 \cdot \text{kip}$$

Section 6

$$L_{byR6} := 43.63$$

$$Area_6 := (28.11)in^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot ksi$$

$$F_{e6} := \frac{\pi^2 \cdot E}{(0.825 L_{byR6})^2}$$

$$F_{e6} = 220.912 \cdot ksi$$

$$F_{cr6} := \left(\frac{F_y}{0.658 F_{e6}} \right) \cdot F_y$$

$$F_{cr6} = 28.342 \cdot ksi$$

$$F_{a6} := \min(16ksi, 0.55 \cdot F_{cr6})$$

$$F_{a6} = 15.588 \cdot ksi$$

The allowable compressive load is:

$$Area_6 \cdot F_{a6} = 438.187 \cdot kip$$

Section 7

$$L_{byR7} := 43.85$$

$$Area_7 := 31.71 \text{ in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e7} := \frac{\pi^2 \cdot E}{(0.825 L_{byR7})^2}$$

$$F_{e7} = 218.701 \cdot \text{ksi}$$

$$F_{cr7} := \left(0.658 \frac{F_y}{F_{e7}} \right) \cdot F_y$$

$$F_{cr7} = 28.326 \cdot \text{ksi}$$

$$F_{a7} := \min(16 \text{ ksi}, 0.55 \cdot F_{cr7})$$

$$F_{a7} = 15.579 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_7 \cdot F_{a7} = 494.021 \cdot \text{kip}$$

Section 8

$$L_{byR8} := 44.13$$

$$Area_8 := 35.84 \text{ in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e8} := \frac{\pi^2 \cdot E}{(0.825 L_{byR8})^2}$$

$$F_{e8} = 215.934 \cdot \text{ksi}$$

$$F_{cr8} := \left(0.658 \frac{F_y}{F_{e8}} \right) \cdot F_y$$

$$F_{cr8} = 28.305 \cdot \text{ksi}$$

$$F_{a8} := \min(16 \cdot \text{ksi}, 0.55 \cdot F_{cr6})$$

$$F_{a8} = 15.588 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_8 \cdot F_{a8} = 558.685 \cdot \text{kip}$$

Section 9 (10W41)

$$L_{byR9} := 24\text{ft} \div 1.99\text{in} = 144.724$$

$$Area_9 := 12.06\text{in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e9} := \frac{\pi^2 \cdot E}{(0.825 L_{byR9})^2}$$

$$F_{e9} = 20.078 \cdot \text{ksi}$$

$$F_{cr9} := \left(\frac{F_y}{0.658 \cdot F_{e9}} \right) \cdot F_y$$

$$F_{cr9} = 16.051 \cdot \text{ksi}$$

$$F_{a9} := \min(16\text{ksi}, 0.55 \cdot F_{cr9})$$

$$F_{a9} = 8.828 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_9 \cdot F_{a9} = 106.469 \cdot \text{kip}$$

Section 10 (2*9C15)

$$L_{byR10} := 24\text{ft} \div 3.5\text{in} = 82.286$$

$$Area_{10} := 8.78\text{in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e10} := \frac{\pi^2 \cdot E}{(0.825 L_{byR10})^2}$$

$$F_{e10} = 62.107 \cdot \text{ksi}$$

$$F_{cr10} := \left(0.658 \frac{F_y}{F_{e10}} \right) \cdot F_y$$

$$F_{cr10} = 24.509 \cdot \text{ksi}$$

$$F_{a10} := \min(16\text{ksi}, 0.55 \cdot F_{cr10})$$

$$F_{a10} = 13.48 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_{10} \cdot F_{a10} = 118.352 \cdot \text{kip}$$

Section 12 (2*9C15)

$$L_{byR12} := 20\text{ft} \div 2.58\text{in} = 93.023$$

$$Area_{12} := 7.78\text{in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e12} := \frac{\pi^2 \cdot E}{(0.825 L_{byR12})^2}$$

$$F_{e12} = 48.597 \cdot \text{ksi}$$

$$F_{cr12} := \left(\frac{F_y}{0.658 \cdot F_{e12}} \right) \cdot F_y$$

$$F_{cr12} = 23.169 \cdot \text{ksi}$$

$$F_{a12} := \min(16\text{ksi}, 0.55 \cdot F_{cr12})$$

$$F_{a12} = 12.743 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_{12} \cdot F_{a12} = 99.14 \cdot \text{kip}$$

Section 14 (10W21)

$$L_{byR14} := 20\text{ft} \div 1.25\text{in} = 192$$

$$Area_{14} := 6.19\text{in}^2$$

$$4.71 \cdot \sqrt{\frac{E}{F_y}} = 146.44$$

$$0.44 \cdot F_y = 13.2 \cdot \text{ksi}$$

$$F_{e14} := \frac{\pi^2 \cdot E}{(0.825 L_{byR14})^2}$$

$$F_{e14} = 11.407 \cdot \text{ksi}$$

$$F_{cr14} := \left(0.658 \cdot \frac{F_y}{F_{e14}} \right) \cdot F_y$$

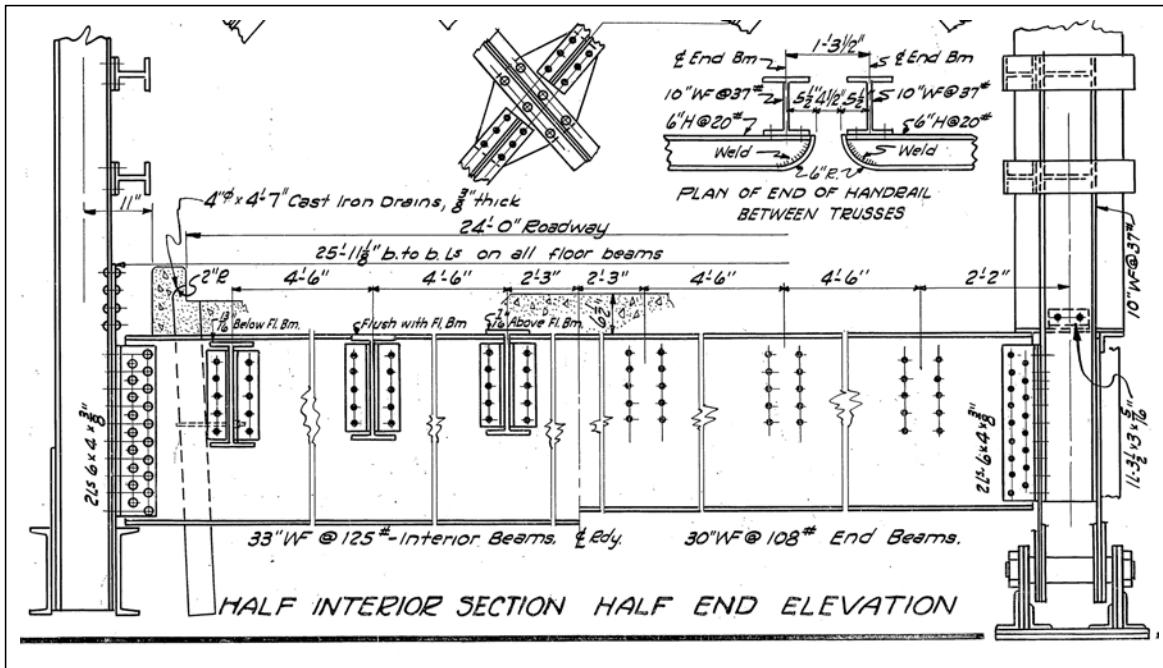
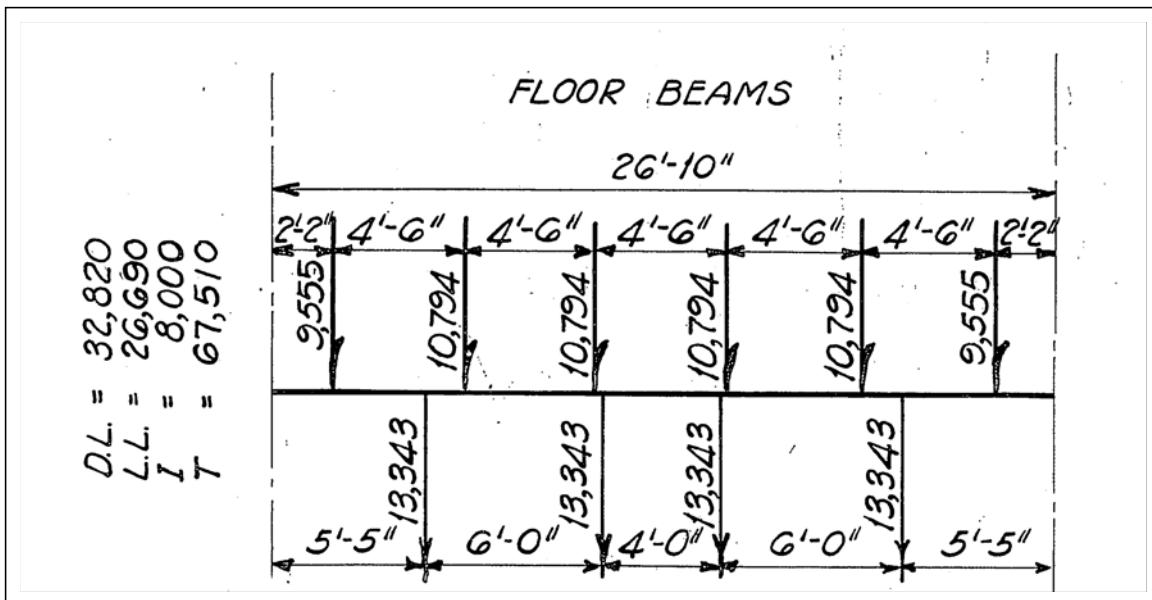
$$F_{cr14} = 9.979 \cdot \text{ksi}$$

$$F_{a14} := \min(16\text{ksi}, 0.55 \cdot F_{cr14})$$

$$F_{a14} = 5.488 \cdot \text{ksi}$$

The allowable compressive load is:

$$Area_{14} \cdot F_{a14} = 33.973 \cdot \text{kip}$$

LOADINGLive Load

The first wheel shall be applied at:

$$\frac{(26\text{ft} + 10\text{in}) - (24\text{ft})}{2} + (2\text{ft}) = 3.417\text{-ft}$$

For a 24' roadway, the number of lanes is:

$$\frac{24\text{ft}}{12\text{-ft}} = 2$$

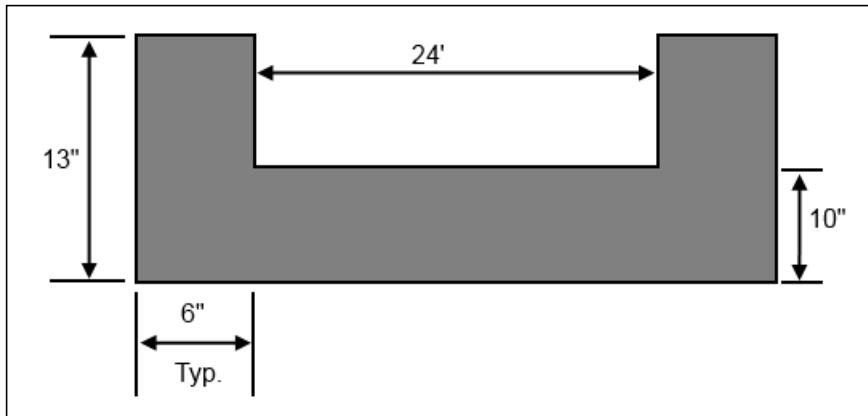
For a 32' roadway, the number of lanes is:

$$\frac{32\text{ft}}{12\text{-ft}} = 2.667$$

Dead Load

Dead load to Stringers from concrete deck:

From Infrastructure Engineering inspection notes (Roadway Deck):



$$\text{Area}_{\text{deck}} := 2 \cdot (6\text{in} \cdot 13\text{in}) + (24\text{ft} \cdot 10\text{in}) = 21.083 \cdot \text{ft}^2$$

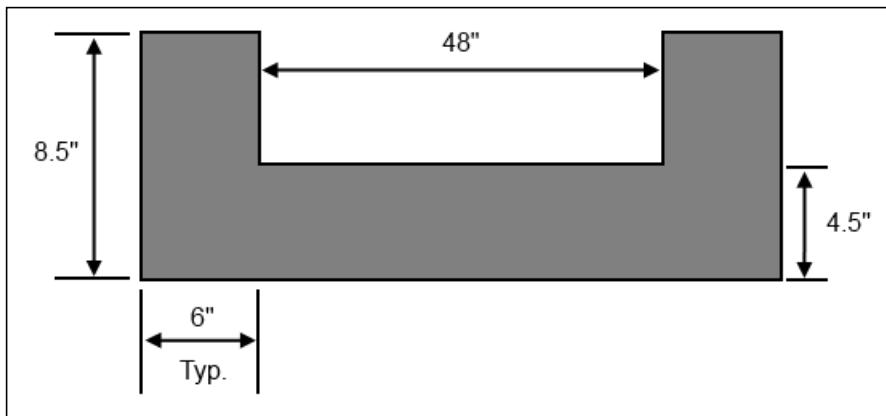
$$\text{Weight}_{\text{deck}} := \text{Area}_{\text{deck}} \cdot 0.15 \frac{\text{kip}}{\text{ft}^3} = 3.162 \cdot \frac{\text{kip}}{\text{ft}}$$

There are 6 stringers. The load to each is:

$$\frac{\text{Weight}_{\text{deck}}}{6} = 0.527 \cdot \frac{\text{kip}}{\text{ft}}$$

Dead load to floorbeams from sidewalk:

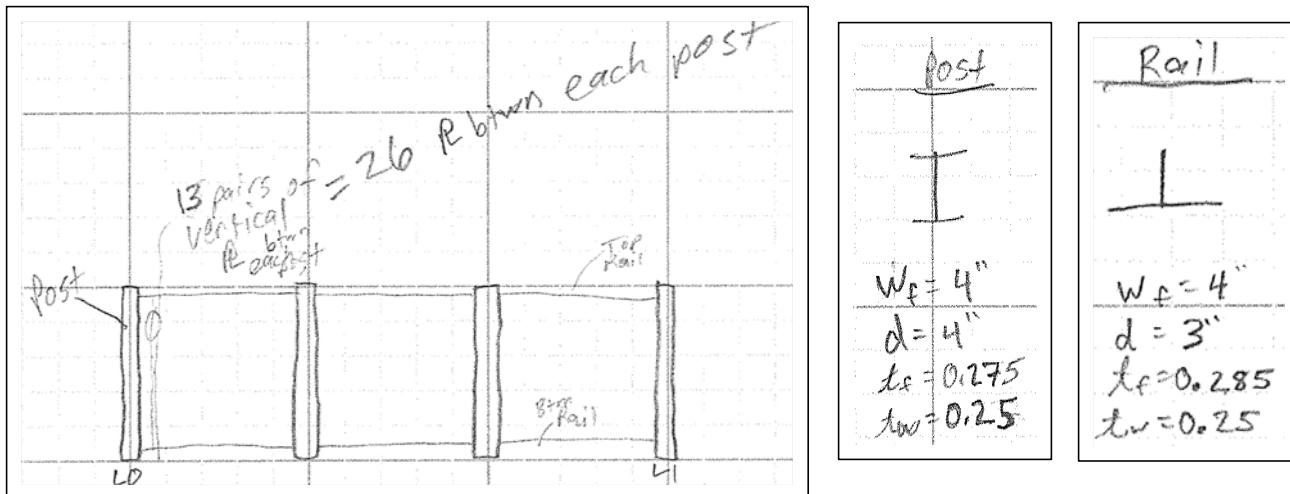
From Infrastructure Engineering inspection notes (Sidewalk Deck):

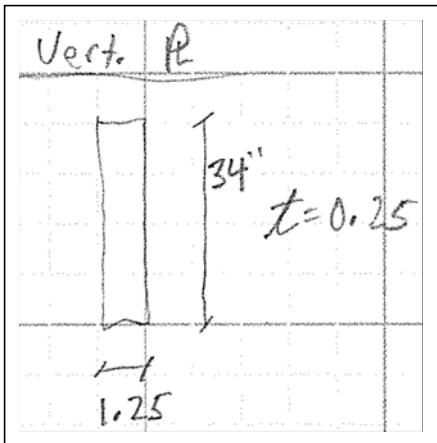


$$\text{Area}_{\text{sdwk}} := 2 \cdot (6\text{in} \cdot 8.5\text{in}) + (48\text{in} \cdot 4.5\text{in}) = 2.208 \cdot \text{ft}^2$$

$$\text{Weight}_{\text{sdwk}} := \text{Area}_{\text{sdwk}} \cdot 0.15 \frac{\text{kip}}{\text{ft}^3} = 0.331 \cdot \frac{\text{kip}}{\text{ft}}$$

From Infrastructure Engineering inspection notes, steel is configured as such:





Each "panel" has 4 posts: $4 \cdot 41\text{in} \cdot 10 \frac{\text{lb}}{\text{ft}} = 136.667 \cdot \text{lb}$

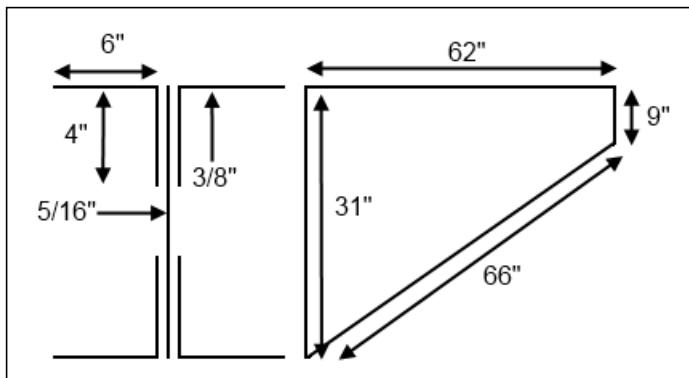
The vertical plates weigh: $(34\text{in} \cdot 1.25\text{in} \cdot 0.25\text{in}) \cdot 26 \cdot 4 \cdot \left(490 \cdot \frac{\text{lb}}{\text{ft}^3}\right) = 313.339 \cdot \text{lb}$

Top and Bottom Rails (ST3B): $2 \cdot 20\text{ft} \cdot 6 \frac{\text{lb}}{\text{ft}} = 240 \cdot \text{lb}$

Stringers are 8W19: $2 \cdot 19 \frac{\text{lb}}{\text{ft}} = 38 \frac{\text{lb}}{\text{ft}}$

$$0.038 \frac{\text{kip}}{\text{ft}} + 0.33125 \frac{\text{kip}}{\text{ft}} + \frac{0.137\text{kip} + 0.313\text{kip} + 0.24\text{kip}}{20\text{ft}} = 0.404 \frac{\text{kip}}{\text{ft}}$$

Load to each floorbeam: $20\text{-ft} \cdot 0.404 \cdot \frac{\text{kip}}{\text{ft}} = 8.08 \cdot \text{kip}$



Weight of plate for bracket:

$$\frac{5}{16} \text{in} \cdot 490 \cdot \frac{\text{lb}}{\text{ft}^3} \cdot \frac{(31\text{in} + 9\text{in})}{2} \cdot 62\text{in} = 109.881 \cdot \text{lb}$$

Angles are L6x4x3/8 (12#/'):

$$2 \cdot 12.3 \cdot \frac{\text{lb}}{\text{ft}} \cdot (62\text{in} + 31\text{in} + 66\text{in}) = 325.95 \cdot \text{lb}$$

Add 5% for connections: $1.05 \cdot (110\text{lb} + 326\text{lb}) = 457.8 \cdot \text{lb}$

$$8.08\text{kip} + 0.4578\text{kip} = 8.538\text{kip}$$

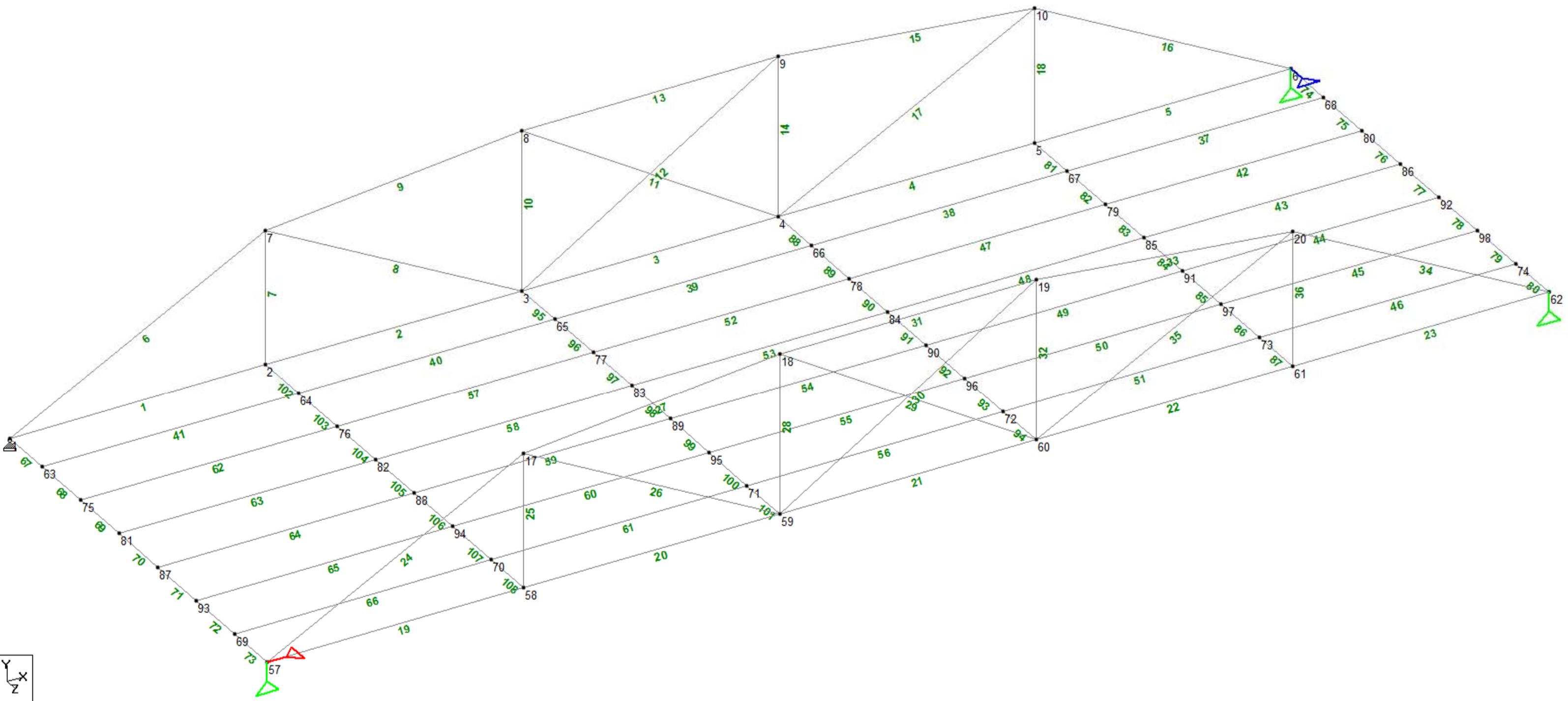
Dead load to floorbeams from traffic railing:

Two at 6W20 = 40lb/ft/rail = 0.8kips to each floorbeam panel point.

STAAD.Pro

Structural

Analysis



STAAD SPACE
 START JOB INFORMATION
 ENGINEER DATE 03-Feb-14
 JOB CLIENT Oklahoma DOT
 ENGINEER NAME JPD
 JOB NAME SH123
 JOB NO P310140022
 END JOB INFORMATION
 INPUT WIDTH 79
 UNIT FEET KIP
 JOINT COORDINATES
 1 0 0 0; 2 20 0 0; 3 40 0 0; 4 60 0 0; 5 80 0 0; 6 100 0 0; 7 20 10.5 0;
 8 40 12.5 0; 9 60 12.5 0; 10 80 10.5 0; 17 20 10.5 34.833; 18 40 12.5 34.833;
 19 60 12.5 34.833; 20 80 10.5 34.833; 57 0 0 34.833; 58 20 0 34.833;
 59 40 0 34.833; 60 60 0 34.833; 61 80 0 34.833; 62 100 0 34.833;
 63 0 0 4.41667; 64 20 0 4.41667; 65 40 0 4.41667; 66 60 0 4.41667;
 67 80 0 4.41667; 68 100 0 4.41667; 69 0 0 30.4163; 70 20 0 30.4163;
 71 40 0 30.4163; 72 60 0 30.4163; 73 80 0 30.4163; 74 100 0 30.4163;
 75 0 0 9.61667; 76 20 0 9.61667; 77 40 0 9.61667; 78 60 0 9.61667;
 79 80 0 9.61667; 80 100 0 9.61667; 81 0 0 14.8167; 82 20 0 14.8167;
 83 40 0 14.8167; 84 60 0 14.8167; 85 80 0 14.8167; 86 100 0 14.8167;
 87 0 0 20.0167; 88 20 0 20.0167; 89 40 0 20.0167; 90 60 0 20.0167;
 91 80 0 20.0167; 92 100 0 20.0167; 93 0 0 25.2167; 94 20 0 25.2167;
 95 40 0 25.2167; 96 60 0 25.2167; 97 80 0 25.2167; 98 100 0 25.2167;
 MEMBER INCIDENCES
 1 1 2; 2 2 3; 3 3 4; 4 4 5; 5 5 6; 6 1 7; 7 7 2; 8 7 3; 9 7 8; 10 8 3; 11 8 4;
 12 3 9; 13 8 9; 14 9 4; 15 9 10; 16 10 6; 17 4 10; 18 10 5; 19 57 58; 20 58 59;
 21 59 60; 22 60 61; 23 61 62; 24 57 17; 25 17 58; 26 17 59; 27 17 18; 28 18 59;
 29 18 60; 30 59 19; 31 18 19; 32 19 60; 33 19 20; 34 20 62; 35 60 20; 36 20 61;
 37 68 67; 38 67 66; 39 65 66; 40 65 64; 41 64 63; 42 80 79; 43 86 85; 44 92 91;
 45 98 97; 46 74 73; 47 79 78; 48 85 84; 49 91 90; 50 97 96; 51 73 72; 52 78 77;
 53 84 83; 54 90 89; 55 96 95; 56 72 71; 57 77 76; 58 83 82; 59 89 88; 60 95 94;
 61 71 70; 62 76 75; 63 82 81; 64 88 87; 65 94 93; 66 70 69; 67 1 63; 68 63 75;
 69 75 81; 70 81 87; 71 87 93; 72 93 69; 73 69 57; 74 6 68; 75 68 80; 76 80 86;
 77 86 92; 78 92 98; 79 98 74; 80 74 62; 81 5 67; 82 67 79; 83 79 85; 84 85 91;
 85 91 97; 86 97 73; 87 73 61; 88 4 66; 89 66 78; 90 84 78; 91 84 90; 92 90 96;
 93 96 72; 94 72 60; 95 3 65; 96 65 77; 97 77 83; 98 83 89; 99 89 95; 100 95 71;
 101 71 59; 102 2 64; 103 64 76; 104 76 82; 105 82 88; 106 88 94; 107 94 70;
 108 70 58;
 START GROUP DEFINITION
 MEMBER
 _SECTION1 1 2 4 5 19 20 22 23
 _SECTION2 3 21
 _SECTION3 7 10 14 18 25 28 32 36
 _SECTION4 8 17 26 35
 _SECTION5 11 12 29 30
 _SECTION6 6 9 13 15 16 24 27 31 33 34
 END GROUP DEFINITION
 DEFINE MATERIAL START
 ISOTROPIC STEEL
 E 4.176e+006
 POISSON 0.3
 DENSITY 0.489024
 ALPHA 6.5e-006
 DAMP 0.03
 TYPE STEEL
 STRENGTH FY 5184 FU 8352 RY 1.5 RT 1.2
 END DEFINE MATERIAL
 MEMBER PROPERTY AMERICAN
 1 2 4 5 19 20 22 23 PRIS AX 0.122083 IX 7.7e-005 IY 0.027855 IZ 0.015548
 3 21 PRIS AX 0.162917 IX 0.000193 IY 0.037654 IZ 0.018953
 7 10 14 18 25 28 32 36 PRIS AX 0.075556 IX 3.6e-005 IY 0.002035 IZ 0.009496
 8 17 26 35 PRIS AX 0.047014 IX 1.3e-005 IY 0.000545 IZ 0.005816
 11 12 29 30 PRIS AX 0.042986 IX 9e-006 IY 0.000468 IZ 0.005126
 6 9 13 15 16 24 27 31 33 -
 34 PRIS AX 0.184375 IX 9.9e-005 IY 0.048573 IZ 0.044502
 MEMBER PROPERTY AMERICAN
 37 TO 66 TABLE ST W18X50
 67 TO 80 TABLE ST W30X116
 81 TO 108 TABLE ST W33X221
 CONSTANTS
 MATERIAL STEEL ALL
 SUPPORTS
 1 PINNED
 57 FIXED BUT FZ MX MY MZ
 6 FIXED BUT FX MX MY MZ
 62 FIXED BUT FX FZ MX MY MZ
 DEFINE MOVING LOAD
 TYPE 1 LOAD 4 16 16
 DIST 14 14 WID 6
 TYPE 2 LOAD 16 16 4

```
DIST 14 14 WID 6
TYPE 3 LOAD 26
DIST 0
LOAD 1 LOADTYPE Dead TITLE DEAD LOADS
SELFWEIGHT Y -1.05
MEMBER LOAD
37 TO 66 UNI GY -0.528125
JOINT LOAD
2 TO 5 58 TO 61 FY -8.942
LOAD GENERATION 100
TYPE 1 -14 0 9.41667 XINC 1
LOAD GENERATION 100
TYPE 2 -14 0 21.4167 XINC 1
LOAD GENERATION 100
TYPE 3 0 0 6.41667 XINC 1
TYPE 3 0 0 18.4167 XINC 1
LOAD 402 LOADTYPE Live TITLE LANE
FLOOR LOAD
YRANGE 0 0 FLOAD -0.064 X RANGE 0 100 ZRANGE 3.4167 23.4167 GY
PERFORM ANALYSIS PRINT ALL
PRINT MEMBER FORCES LIST 1 TO 3 6 TO 13
PRINT MEMBER FORCES GLOBAL LIST 1 TO 3 6 TO 13
PERFORM ANALYSIS PRINT ALL
FINISH
```



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Job Title SH123	Job No P310140022	Sheet No 1	Rev
Part			
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Client Oklahoma DOT	File PONY_32ftRDWY_JH.std	Date/Time 29-Mar-2014 16:15	

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	4	1:DEAD LOAD	0.000	-161.656	0.254	2.021	-0.007	-194.906	-70.227
Min Fx	23	1:DEAD LOAD	0.000	-182.292	-0.013	-3.651	0.026	419.902	-105.956
Max Fy	19	1:DEAD LOAD	0.000	-182.287	1.267	3.650	-0.026	-456.213	47.598
Min Fy	5	1:DEAD LOAD	20.000	-182.285	-1.267	3.651	-0.026	456.294	47.597
Max Fz	5	1:DEAD LOAD	0.000	-182.285	-0.013	3.651	-0.026	-419.942	-105.955
Min Fz	23	1:DEAD LOAD	0.000	-182.292	-0.013	-3.651	0.026	419.902	-105.956
Max Mx	1	1:DEAD LOAD	0.000	-182.286	1.267	-3.650	0.026	456.242	47.597
Min Mx	19	1:DEAD LOAD	0.000	-182.287	1.267	3.650	-0.026	-456.213	47.598
Max My	5	1:DEAD LOAD	20.000	-182.285	-1.267	3.651	-0.026	456.294	47.597
Min My	23	1:DEAD LOAD	20.000	-182.292	-1.267	-3.651	0.026	-456.391	47.595
Max Mz	19	1:DEAD LOAD	0.000	-182.287	1.267	3.650	-0.026	-456.213	47.598
Min Mz	19	1:DEAD LOAD	20.000	-182.287	0.013	3.650	-0.026	419.868	-105.956



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Ref		
By JPD	Date 03-Feb-14	Chd

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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	3	1:DEAD LOAD	0.000	-203.010	0.837	-0.000	-0.000	44.937	-31.748
Min Fx	21	1:DEAD LOAD	0.000	-203.014	0.837	-0.000	-0.000	-44.853	-31.749
Max Fy	3	1:DEAD LOAD	0.000	-203.010	0.837	-0.000	-0.000	44.937	-31.748
Min Fy	21	1:DEAD LOAD	20.000	-203.014	-0.837	-0.000	-0.000	-44.955	-31.748
Max Fz	3	1:DEAD LOAD	0.000	-203.010	0.837	-0.000	-0.000	44.937	-31.748
Min Fz	21	1:DEAD LOAD	0.000	-203.014	0.837	-0.000	-0.000	-44.853	-31.749
Max Mx	3	1:DEAD LOAD	0.000	-203.010	0.837	-0.000	-0.000	44.937	-31.748
Min Mx	21	1:DEAD LOAD	0.000	-203.014	0.837	-0.000	-0.000	-44.853	-31.749
Max My	3	1:DEAD LOAD	0.000	-203.010	0.837	-0.000	-0.000	44.937	-31.748
Min My	21	1:DEAD LOAD	20.000	-203.014	-0.837	-0.000	-0.000	-44.955	-31.748
Max Mz	3	1:DEAD LOAD	0.000	-203.010	0.837	-0.000	-0.000	44.937	-31.748
Min Mz	21	1:DEAD LOAD	10.000	-203.014	-0.000	-0.000	-0.000	-44.904	-81.941



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	14	1:DEAD LOAD	12.500	-22.288	0.690	-0.136	-0.022	-16.270	-48.626
Min Fx	25	1:DEAD LOAD	0.000	-51.212	-2.029	0.315	-0.088	-3.985	-129.406
Max Fy	18	1:DEAD LOAD	0.000	-51.211	2.029	-0.316	-0.088	4.021	129.406
Min Fy	25	1:DEAD LOAD	0.000	-51.212	-2.029	0.315	-0.088	-3.985	-129.406
Max Fz	25	1:DEAD LOAD	0.000	-51.212	-2.029	0.315	-0.088	-3.985	-129.406
Min Fz	18	1:DEAD LOAD	0.000	-51.211	2.029	-0.316	-0.088	4.021	129.406
Max Mx	36	1:DEAD LOAD	0.000	-51.212	2.029	0.315	0.089	-3.887	129.407
Min Mx	25	1:DEAD LOAD	0.000	-51.212	-2.029	0.315	-0.088	-3.985	-129.406
Max My	36	1:DEAD LOAD	10.500	-50.804	2.029	0.315	0.089	35.811	-126.248
Min My	18	1:DEAD LOAD	10.500	-50.804	2.029	-0.316	-0.088	-35.809	-126.250
Max Mz	36	1:DEAD LOAD	0.000	-51.212	2.029	0.315	0.089	-3.887	129.407
Min Mz	25	1:DEAD LOAD	0.000	-51.212	-2.029	0.315	-0.088	-3.985	-129.406



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	8	1:DEAD LOAD	22.589	-55.173	-0.178	-0.003	-0.012	-1.975	-14.882
Min Fx	35	1:DEAD LOAD	22.589	-55.426	-0.305	-0.003	-0.012	1.173	2.318
Max Fy	26	1:DEAD LOAD	0.000	-55.426	0.305	0.003	0.012	1.159	2.318
Min Fy	17	1:DEAD LOAD	22.589	-55.426	-0.305	0.003	0.012	-1.155	2.318
Max Fz	17	1:DEAD LOAD	0.000	-55.173	0.178	0.003	0.012	-1.975	-14.882
Min Fz	8	1:DEAD LOAD	0.000	-55.426	0.305	-0.003	-0.012	-1.155	2.318
Max Mx	17	1:DEAD LOAD	0.000	-55.173	0.178	0.003	0.012	-1.975	-14.882
Min Mx	35	1:DEAD LOAD	0.000	-55.173	0.178	-0.003	-0.012	1.970	-14.881
Max My	26	1:DEAD LOAD	22.589	-55.173	-0.178	0.003	0.012	1.970	-14.882
Min My	17	1:DEAD LOAD	0.000	-55.173	0.178	0.003	0.012	-1.975	-14.882
Max Mz	17	1:DEAD LOAD	22.589	-55.426	-0.305	0.003	0.012	-1.155	2.318
Min Mz	26	1:DEAD LOAD	13.553	-55.274	0.015	0.003	0.012	1.646	-23.634



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	11	1:DEAD LOAD	23.585	-1.549	-0.222	0.002	-0.005	0.011	-5.283
Min Fx	29	1:DEAD LOAD	0.000	-1.825	0.220	-0.002	0.005	0.657	-5.600
Max Fy	30	1:DEAD LOAD	0.000	-1.549	0.222	0.002	-0.005	-0.015	-5.283
Min Fy	29	1:DEAD LOAD	23.585	-1.550	-0.222	-0.002	0.005	-0.016	-5.283
Max Fz	30	1:DEAD LOAD	0.000	-1.549	0.222	0.002	-0.005	-0.015	-5.283
Min Fz	29	1:DEAD LOAD	0.000	-1.825	0.220	-0.002	0.005	0.657	-5.600
Max Mx	12	1:DEAD LOAD	0.000	-1.549	0.222	-0.002	0.005	0.011	-5.283
Min Mx	11	1:DEAD LOAD	0.000	-1.825	0.220	0.002	-0.005	-0.657	-5.600
Max My	30	1:DEAD LOAD	23.585	-1.825	-0.220	0.002	-0.005	0.659	-5.600
Min My	12	1:DEAD LOAD	23.585	-1.825	-0.220	-0.002	0.005	-0.657	-5.600
Max Mz	12	1:DEAD LOAD	0.000	-1.549	0.222	-0.002	0.005	0.011	-5.283
Min Mz	30	1:DEAD LOAD	11.792	-1.687	0.001	0.002	-0.005	0.322	-21.059



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	31	1:DEAD LOAD	0.000	252.575	0.947	0.001	-0.000	37.549	-133.612
Min Fx	16	1:DEAD LOAD	0.000	224.981	0.630	0.452	-0.211	-8.210	-134.190
Max Fy	27	1:DEAD LOAD	0.000	251.875	1.722	0.134	0.077	5.992	-7.105
Min Fy	15	1:DEAD LOAD	20.100	251.874	-1.722	0.133	0.077	-6.088	-7.102
Max Fz	16	1:DEAD LOAD	0.000	224.981	0.630	0.452	-0.211	-8.210	-134.190
Min Fz	6	1:DEAD LOAD	0.000	225.975	1.263	-0.452	0.211	114.412	-48.373
Max Mx	34	1:DEAD LOAD	0.000	224.983	0.630	-0.450	0.212	7.827	-134.196
Min Mx	16	1:DEAD LOAD	0.000	224.981	0.630	0.452	-0.211	-8.210	-134.190
Max My	16	1:DEAD LOAD	22.589	225.975	-1.263	0.452	-0.211	114.417	-48.373
Min My	24	1:DEAD LOAD	0.000	225.977	1.263	0.452	-0.211	-114.501	-48.373
Max Mz	15	1:DEAD LOAD	20.100	251.874	-1.722	0.133	0.077	-6.088	-7.102
Min Mz	33	1:DEAD LOAD	2.010	251.705	-0.018	-0.136	-0.078	35.270	-195.706



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	20	101:LOAD GENI	0.000	-0.360	0.004	0.030	0.001	-3.541	0.335
Min Fx	5	69:LOAD GENI	0.000	-71.596	3.340	0.953	0.007	-98.319	-12.074
Max Fy	1	3:LOAD GENE	0.000	-32.925	4.463	-0.536	0.107	82.827	80.621
Min Fy	5	87:LOAD GENI	20.000	-41.828	-4.442	0.717	-0.104	105.322	78.320
Max Fz	5	61:LOAD GENI	0.000	-67.229	-0.023	0.975	0.001	-103.238	-7.163
Min Fz	1	32:LOAD GENI	0.000	-66.263	0.199	-0.768	0.002	109.117	9.671
Max Mx	1	102:LOAD GENI	0.000	-6.627	0.044	-0.375	0.145	58.008	1.784
Min Mx	19	102:LOAD GENI	0.000	-7.170	0.047	0.389	-0.151	-60.334	1.924
Max My	5	65:LOAD GENI	20.000	-70.310	-0.079	0.970	0.007	131.306	0.171
Min My	5	57:LOAD GENI	0.000	-63.121	-0.048	0.969	-0.007	-103.754	-9.682
Max Mz	1	7:LOAD GENE	0.000	-45.047	3.293	-0.579	0.063	88.178	109.056
Min Mz	5	78:LOAD GENI	10.000	-64.143	1.668	0.868	-0.024	18.118	-144.168



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	21	101:LOAD GENI	0.000	-0.835	-0.003	0.035	-0.001	-4.040	-0.078
Min Fx	3	47:LOAD GENI	0.000	-77.621	3.086	0.128	-0.008	10.133	73.078
Max Fy	3	43:LOAD GENI	0.000	-76.668	4.206	0.186	0.034	2.744	33.246
Min Fy	3	47:LOAD GENI	20.000	-77.621	-4.159	0.128	-0.008	40.811	27.877
Max Fz	3	21:LOAD GENI	0.000	-45.682	0.093	0.391	0.076	-34.444	13.707
Min Fz	21	131:LOAD GENI	0.000	-29.846	-0.079	-0.240	-0.121	22.520	-16.973
Max Mx	21	176:LOAD GENI	0.000	-37.494	0.122	0.192	0.180	-31.957	1.957
Min Mx	3	176:LOAD GENI	0.000	-33.174	0.105	-0.205	-0.177	31.743	1.219
Max My	3	26:LOAD GENI	20.000	-55.291	-0.008	0.377	0.100	61.340	-4.526
Min My	21	134:LOAD GENI	20.000	-33.337	-0.094	-0.236	-0.140	-35.673	1.666
Max Mz	3	55:LOAD GENI	20.000	-74.035	-2.557	0.006	-0.074	24.533	87.206
Min Mz	3	52:LOAD GENI	10.000	-76.183	1.783	0.052	-0.053	24.795	-149.078



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	14	24:LOAD GENI	0.000	3.550	0.479	0.043	-0.011	-1.153	38.616
Min Fx	18	77:LOAD GENI	0.000	-37.649	-0.118	-0.108	-0.015	1.450	-12.625
Max Fy	18	59:LOAD GENI	0.000	-15.339	1.441	-0.060	-0.028	-2.874	79.376
Min Fy	7	39:LOAD GENI	0.000	-9.095	-1.233	-0.010	0.020	-3.921	-75.721
Max Fz	25	132:LOAD GENI	0.000	-21.587	-0.160	0.296	-0.018	-8.659	-8.416
Min Fz	7	132:LOAD GENI	0.000	-18.946	-0.150	-0.306	0.018	9.484	-7.979
Max Mx	25	102:LOAD GENI	0.000	-5.450	0.080	-0.192	0.031	-2.586	5.626
Min Mx	7	102:LOAD GENI	0.000	-5.030	0.075	0.181	-0.030	2.658	5.236
Max My	25	133:LOAD GENI	10.500	-21.100	-0.191	0.295	-0.020	28.860	13.563
Min My	7	133:LOAD GENI	10.500	-18.536	-0.176	-0.305	0.020	-29.355	12.442
Max Mz	18	56:LOAD GENI	0.000	-10.445	1.407	-0.035	-0.027	-3.479	81.777
Min Mz	18	60:LOAD GENI	10.500	-17.063	1.429	-0.068	-0.028	-11.254	-102.583



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	8	9:LOAD GENE	0.000	19.164	-0.037	0.005	0.004	-0.126	-8.737
Min Fx	17	47:LOAD GENI	0.000	-39.586	-0.016	0.003	0.005	-0.868	-5.425
Max Fy	8	25:LOAD GENI	0.000	-4.062	0.080	0.003	-0.006	-0.659	0.749
Min Fy	17	64:LOAD GENI	0.000	-14.063	-0.080	-0.001	0.008	-0.425	-20.565
Max Fz	26	40:LOAD GENI	0.000	-6.047	0.011	0.009	0.009	-0.126	0.025
Min Fz	8	152:LOAD GEI	0.000	-18.957	0.033	-0.009	-0.012	0.116	0.858
Max Mx	8	116:LOAD GEN	0.000	7.914	-0.019	0.000	0.017	1.581	-4.527
Min Mx	26	116:LOAD GEN	0.000	9.001	-0.021	-0.001	-0.017	-1.628	-5.118
Max My	26	40:LOAD GENI	22.589	-6.047	0.011	0.009	0.009	2.198	-2.828
Min My	8	151:LOAD GEI	22.589	-18.342	0.032	-0.009	-0.012	-2.210	-8.102
Max Mz	8	2:LOAD GENE	22.589	14.087	-0.046	0.001	0.012	1.500	4.377
Min Mz	8	25:LOAD GENI	22.589	-4.062	0.080	0.003	-0.006	0.232	-21.005



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	11	27:LOAD GENI	0.000	15.755	-0.016	0.006	-0.000	-0.642	-6.537
Min Fx	12	28:LOAD GENI	0.000	-17.095	0.024	0.004	0.002	-0.813	-0.086
Max Fy	12	21:LOAD GENI	0.000	-15.117	0.061	0.003	0.001	-0.497	8.460
Min Fy	11	68:LOAD GENI	0.000	-15.858	-0.044	-0.003	-0.002	0.352	-8.314
Max Fz	29	172:LOAD GENI	0.000	-9.286	0.003	0.008	0.005	-0.604	-3.450
Min Fz	11	172:LOAD GENI	0.000	-8.068	0.002	-0.008	-0.005	0.581	-3.125
Max Mx	12	151:LOAD GENI	0.000	-4.297	-0.002	0.006	0.006	-1.488	-4.576
Min Mx	11	162:LOAD GENI	0.000	-3.520	0.000	-0.005	-0.006	0.082	-4.427
Max My	29	171:LOAD GENI	23.585	-8.958	0.003	0.008	0.006	1.726	-4.387
Min My	11	171:LOAD GENI	23.585	-7.776	0.002	-0.008	-0.006	-1.782	-3.823
Max Mz	12	20:LOAD GENI	0.000	-14.599	0.060	0.002	0.000	-0.438	8.508
Min Mz	11	44:LOAD GENI	23.585	2.421	0.052	0.002	-0.003	0.334	-18.072



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	15	54:LOAD GENI	0.000	96.951	-0.803	0.046	0.018	-1.299	-149.929
Min Fx	24	101:LOAD GENI	0.000	0.616	-0.000	-0.026	-0.008	1.645	-0.137
Max Fy	9	46:LOAD GENI	0.000	92.426	0.876	-0.040	-0.015	11.308	62.332
Min Fy	15	47:LOAD GENI	0.000	92.380	-0.948	0.041	0.016	0.876	-157.471
Max Fz	24	136:LOAD GENI	0.000	55.224	0.214	0.314	-0.031	-67.885	-10.519
Min Fz	6	136:LOAD GENI	0.000	48.964	0.188	-0.330	0.024	69.691	-9.355
Max Mx	9	116:LOAD GENI	0.000	16.438	-0.337	0.167	0.095	-23.357	-58.023
Min Mx	27	116:LOAD GENI	0.000	18.319	-0.382	-0.172	-0.099	22.516	-65.532
Max My	24	102:LOAD GENI	0.000	7.752	0.071	-0.319	-0.028	96.271	-1.207
Min My	6	102:LOAD GENI	0.000	7.117	0.065	0.304	0.027	-92.412	-1.098
Max Mz	15	44:LOAD GENI	20.100	88.130	-0.924	0.035	0.017	10.562	73.534
Min Mz	15	49:LOAD GENI	0.000	94.539	-0.929	0.044	0.016	0.099	-158.136



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	22	402:LANE	0.000	-21.194	-0.049	-0.285	-0.005	29.593	-12.868
Min Fx	5	402:LANE	0.000	-46.257	-0.193	0.855	-0.019	-94.096	-35.569
Max Fy	1	402:LANE	0.000	-45.884	0.192	-0.750	0.019	100.058	10.686
Min Fy	5	402:LANE	0.000	-46.257	-0.193	0.855	-0.019	-94.096	-35.569
Max Fz	5	402:LANE	0.000	-46.257	-0.193	0.855	-0.019	-94.096	-35.569
Min Fz	1	402:LANE	0.000	-45.884	0.192	-0.750	0.019	100.058	10.686
Max Mx	1	402:LANE	0.000	-45.884	0.192	-0.750	0.019	100.058	10.686
Min Mx	5	402:LANE	0.000	-46.257	-0.193	0.855	-0.019	-94.096	-35.569
Max My	5	402:LANE	20.000	-46.257	-0.193	0.855	-0.019	111.214	10.685
Min My	5	402:LANE	0.000	-46.257	-0.193	0.855	-0.019	-94.096	-35.569
Max Mz	1	402:LANE	0.000	-45.884	0.192	-0.750	0.019	100.058	10.686
Min Mz	5	402:LANE	0.000	-46.257	-0.193	0.855	-0.019	-94.096	-35.569



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	21	402:LANE	0.000	-26.704	0.000	0.062	0.000	-11.178	-8.448
Min Fx	3	402:LANE	0.000	-51.285	-0.000	0.062	0.000	5.979	-15.644
Max Fy	21	402:LANE	0.000	-26.704	0.000	0.062	0.000	-11.178	-8.448
Min Fy	3	402:LANE	0.000	-51.285	-0.000	0.062	0.000	5.979	-15.644
Max Fz	21	402:LANE	0.000	-26.704	0.000	0.062	0.000	-11.178	-8.448
Min Fz	3	402:LANE	0.000	-51.285	-0.000	0.062	0.000	5.979	-15.644
Max Mx	3	402:LANE	0.000	-51.285	-0.000	0.062	0.000	5.979	-15.644
Min Mx	21	402:LANE	0.000	-26.704	0.000	0.062	0.000	-11.178	-8.448
Max My	3	402:LANE	20.000	-51.285	-0.000	0.062	0.000	20.912	-15.626
Min My	21	402:LANE	0.000	-26.704	0.000	0.062	0.000	-11.178	-8.448
Max Mz	21	402:LANE	0.000	-26.704	0.000	0.062	0.000	-11.178	-8.448
Min Mz	3	402:LANE	0.000	-51.285	-0.000	0.062	0.000	5.979	-15.644



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	32	402:LANE	0.000	-3.362	0.086	0.047	0.004	-1.710	6.863
Min Fx	18	402:LANE	0.000	-13.816	0.518	-0.046	-0.019	-0.498	32.964
Max Fy	18	402:LANE	0.000	-13.816	0.518	-0.046	-0.019	-0.498	32.964
Min Fy	7	402:LANE	0.000	-13.815	-0.518	-0.038	0.015	-0.660	-32.931
Max Fz	25	402:LANE	0.000	-7.293	-0.287	0.091	-0.019	-2.438	-18.272
Min Fz	18	402:LANE	0.000	-13.816	0.518	-0.046	-0.019	-0.498	32.964
Max Mx	36	402:LANE	0.000	-7.293	0.287	0.084	0.016	-2.276	18.238
Min Mx	25	402:LANE	0.000	-7.293	-0.287	0.091	-0.019	-2.438	-18.272
Max My	25	402:LANE	10.500	-7.293	-0.287	0.091	-0.019	9.070	17.931
Min My	18	402:LANE	10.500	-13.816	0.518	-0.046	-0.019	-6.295	-32.310
Max Mz	18	402:LANE	0.000	-13.816	0.518	-0.046	-0.019	-0.498	32.964
Min Mz	7	402:LANE	0.000	-13.815	-0.518	-0.038	0.015	-0.660	-32.931



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	35	402:LANE	0.000	-7.399	-0.009	-0.001	-0.003	0.574	-3.572
Min Fx	17	402:LANE	0.000	-13.473	-0.015	-0.000	0.002	-0.140	-6.500
Max Fy	8	402:LANE	0.000	-13.468	0.015	0.001	-0.002	-0.299	-2.420
Min Fy	17	402:LANE	0.000	-13.473	-0.015	-0.000	0.002	-0.140	-6.500
Max Fz	26	402:LANE	0.000	-7.403	0.009	0.002	0.003	0.184	-1.183
Min Fz	35	402:LANE	0.000	-7.399	-0.009	-0.001	-0.003	0.574	-3.572
Max Mx	26	402:LANE	0.000	-7.403	0.009	0.002	0.003	0.184	-1.183
Min Mx	35	402:LANE	0.000	-7.399	-0.009	-0.001	-0.003	0.574	-3.572
Max My	26	402:LANE	22.589	-7.403	0.009	0.002	0.003	0.737	-3.559
Min My	8	402:LANE	0.000	-13.468	0.015	0.001	-0.002	-0.299	-2.420
Max Mz	35	402:LANE	22.589	-7.399	-0.009	-0.001	-0.003	0.214	-1.145
Min Mz	8	402:LANE	22.589	-13.468	0.015	0.001	-0.002	0.023	-6.513



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	29	402:LANE	0.000	-0.216	0.000	0.000	0.001	0.149	-2.054
Min Fx	11	402:LANE	0.000	-0.547	-0.000	0.001	-0.001	-0.102	-3.822
Max Fy	29	402:LANE	0.000	-0.216	0.000	0.000	0.001	0.149	-2.054
Min Fy	11	402:LANE	0.000	-0.547	-0.000	0.001	-0.001	-0.102	-3.822
Max Fz	11	402:LANE	0.000	-0.547	-0.000	0.001	-0.001	-0.102	-3.822
Min Fz	12	402:LANE	0.000	-0.543	0.000	-0.001	0.001	0.156	-3.808
Max Mx	29	402:LANE	0.000	-0.216	0.000	0.000	0.001	0.149	-2.054
Min Mx	30	402:LANE	0.000	-0.220	-0.000	0.000	-0.001	0.131	-2.071
Max My	11	402:LANE	23.585	-0.547	-0.000	0.001	-0.001	0.241	-3.803
Min My	11	402:LANE	0.000	-0.547	-0.000	0.001	-0.001	-0.102	-3.822
Max Mz	29	402:LANE	0.000	-0.216	0.000	0.000	0.001	0.149	-2.054
Min Mz	11	402:LANE	0.000	-0.547	-0.000	0.001	-0.001	-0.102	-3.822



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	13	402:LANE	0.000	63.269	-0.000	-0.001	0.001	2.315	-41.377
Min Fx	24	402:LANE	0.000	30.446	0.076	0.141	-0.024	-32.242	-5.771
Max Fy	9	402:LANE	0.000	62.986	0.175	-0.001	-0.014	2.426	-15.006
Min Fy	15	402:LANE	0.000	62.990	-0.173	0.000	0.016	1.914	-57.099
Max Fz	24	402:LANE	0.000	30.446	0.076	0.141	-0.024	-32.242	-5.771
Min Fz	34	402:LANE	0.000	30.447	-0.075	-0.133	0.020	5.632	-25.998
Max Mx	6	402:LANE	0.000	56.798	0.146	-0.038	0.058	12.651	-10.904
Min Mx	16	402:LANE	0.000	56.797	-0.147	0.046	-0.061	1.925	-50.733
Max My	27	402:LANE	20.100	33.938	0.101	0.048	0.017	16.814	-31.294
Min My	24	402:LANE	0.000	30.446	0.076	0.141	-0.024	-32.242	-5.771
Max Mz	24	402:LANE	0.000	30.446	0.076	0.141	-0.024	-32.242	-5.771
Min Mz	9	402:LANE	20.100	62.986	0.175	-0.001	-0.014	2.239	-57.191



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Part	Ref		
	By JPD	Date 03-Feb-14	Chd
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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	4	202:LOAD GEN	0.000	-0.016	-0.001	-0.001	0.000	0.037	-0.240
Min Fx	5	277:LOAD GEN	0.000	-43.997	-0.218	0.552	0.051	-60.622	-42.826
Max Fy	4	286:LOAD GEN	0.000	-34.486	0.341	0.147	-0.065	-4.744	28.889
Min Fy	2	218:LOAD GEN	0.000	-34.325	-0.341	-0.091	0.065	23.843	-52.912
Max Fz	5	264:LOAD GEN	0.000	-37.568	-0.125	0.575	0.013	-65.068	-21.867
Min Fz	1	241:LOAD GEN	0.000	-36.535	0.119	-0.507	-0.010	65.687	8.076
Max Mx	1	202:LOAD GEN	0.000	-3.971	0.030	-0.455	0.215	72.515	1.270
Min Mx	5	301:LOAD GEN	0.000	-6.322	-0.045	0.446	-0.193	-36.684	-9.051
Max My	5	266:LOAD GEN	20.000	-39.078	-0.139	0.575	0.021	73.060	8.404
Min My	5	261:LOAD GEN	0.000	-35.326	-0.109	0.574	0.003	-65.139	-18.241
Max Mz	2	249:LOAD GEN	0.000	-27.898	0.333	-0.303	-0.050	45.302	31.583
Min Mz	4	284:LOAD GEN	20.000	-36.847	0.338	0.165	-0.063	33.705	-53.783



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Job Title SH123	Job No P310140022	Sheet No 1	Rev
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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	3	202:LOAD GEN	0.000	0.073	0.016	-0.000	-0.014	-0.173	2.907	
Min Fx	3	252:LOAD GEN	0.000	-46.387	-0.000	0.040	0.000	9.494	-22.949	
Max Fy	3	264:LOAD GEN	0.000	-41.558	0.192	-0.080	-0.154	21.707	5.997	
Min Fy	3	240:LOAD GEN	0.000	-41.526	-0.192	0.160	0.154	-7.047	-40.009	
Max Fz	3	225:LOAD GEN	0.000	-25.087	-0.049	0.263	0.063	-26.120	-9.709	
Min Fz	3	281:LOAD GEN	0.000	-22.734	0.027	-0.191	-0.046	27.651	0.776	
Max Mx	3	239:LOAD GEN	0.000	-40.691	-0.191	0.170	0.156	-8.636	-39.025	
Min Mx	3	265:LOAD GEN	0.000	-40.727	0.191	-0.090	-0.155	22.555	6.825	
Max My	3	228:LOAD GEN	20.000	-28.754	-0.087	0.256	0.092	37.590	4.414	
Min My	21	277:LOAD GEN	0.000	-14.829	0.047	0.211	0.087	-26.823	2.048	
Max Mz	3	236:LOAD GEN	20.000	-37.866	-0.177	0.200	0.151	34.507	7.958	
Min Mz	3	243:LOAD GEN	0.000	-43.650	-0.178	0.129	0.136	-2.443	-40.933	



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Job Title SH123	Job No P310140022	Sheet No 1	Rev
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	Ref		
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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	10	271:LOAD GEN	0.000	2.701	-0.380	0.033	0.007	-0.390	-29.500
Min Fx	7	221:LOAD GEN	0.000	-27.416	0.172	-0.232	0.011	6.528	13.705
Max Fy	18	257:LOAD GEN	0.000	-0.341	0.762	0.024	-0.019	-3.353	50.231
Min Fy	7	247:LOAD GEN	0.000	-0.341	-0.762	0.029	0.017	-3.454	-50.209
Max Fz	7	202:LOAD GEN	0.000	-3.317	0.077	0.322	-0.044	1.468	5.113
Min Fz	25	202:LOAD GEN	0.000	-3.179	0.072	-0.271	0.038	-1.452	4.840
Max Mx	18	301:LOAD GEN	0.000	-5.096	-0.097	0.273	0.040	1.880	-6.568
Min Mx	7	202:LOAD GEN	0.000	-3.317	0.077	0.322	-0.044	1.468	5.113
Max My	7	202:LOAD GEN	10.500	-3.317	0.077	0.322	-0.044	42.016	-4.544
Min My	25	202:LOAD GEN	10.500	-3.179	0.072	-0.271	0.038	-35.604	-4.256
Max Mz	18	257:LOAD GEN	0.000	-0.341	0.762	0.024	-0.019	-3.353	50.231
Min Mz	7	247:LOAD GEN	0.000	-0.341	-0.762	0.029	0.017	-3.454	-50.209



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Client Oklahoma DOT		

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	8	217:LOAD GEN	0.000	15.003	-0.037	0.006	0.003	-0.437		-8.051
Min Fx	17	255:LOAD GEN	0.000	-25.527	-0.044	0.006	0.007	-1.441		-9.350
Max Fy	8	244:LOAD GEN	0.000	-23.781	0.048	-0.006	-0.009	0.210		2.275
Min Fy	17	260:LOAD GEN	0.000	-23.784	-0.048	0.007	0.009	-1.654		-10.700
Max Fz	26	244:LOAD GEN	0.000	-11.304	0.022	0.009	0.010	-0.322		0.759
Min Fz	35	260:LOAD GEN	0.000	-11.301	-0.022	-0.008	-0.010	1.961		-5.310
Max Mx	8	202:LOAD GEN	0.000	3.328	-0.009	-0.004	0.021	2.688		-1.367
Min Mx	17	301:LOAD GEN	0.000	4.393	0.011	0.003	-0.019	1.502		1.166
Max My	8	202:LOAD GEN	0.000	3.328	-0.009	-0.004	0.021	2.688		-1.367
Min My	26	202:LOAD GEN	0.000	3.157	-0.008	0.003	-0.018	-2.273		-1.294
Max Mz	8	248:LOAD GEN	0.000	-25.460	0.045	-0.006	-0.008	0.206		2.498
Min Mz	8	241:LOAD GEN	22.589	-20.720	0.046	-0.006	-0.009	-1.496		-10.875



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	11	235:LOAD GEN	0.000	10.770	-0.011	0.007	-0.001	-0.917	-4.645
Min Fx	11	268:LOAD GEN	0.000	-11.636	0.007	-0.007	-0.004	0.654	-2.382
Max Fy	11	217:LOAD GEN	0.000	5.345	0.018	0.001	0.002	0.289	2.564
Min Fy	12	287:LOAD GEN	0.000	5.341	-0.018	-0.001	-0.002	0.504	-2.391
Max Fz	29	265:LOAD GEN	0.000	-5.241	0.004	0.008	0.005	-0.590	-1.637
Min Fz	30	239:LOAD GEN	0.000	-5.247	-0.004	-0.008	-0.005	1.586	-2.714
Max Mx	29	259:LOAD GEN	0.000	-3.543	0.003	0.006	0.005	-0.363	-2.148
Min Mx	30	245:LOAD GEN	0.000	-3.547	-0.003	-0.006	-0.005	1.420	-3.048
Max My	29	262:LOAD GEN	23.585	-4.530	0.004	0.008	0.005	1.654	-2.958
Min My	12	242:LOAD GEN	0.000	-9.949	-0.013	0.007	0.005	-1.439	-6.375
Max Mz	12	289:LOAD GEN	23.585	4.612	-0.017	-0.000	-0.002	0.433	2.639
Min Mz	11	244:LOAD GEN	0.000	7.489	-0.015	0.005	-0.002	-0.855	-6.918



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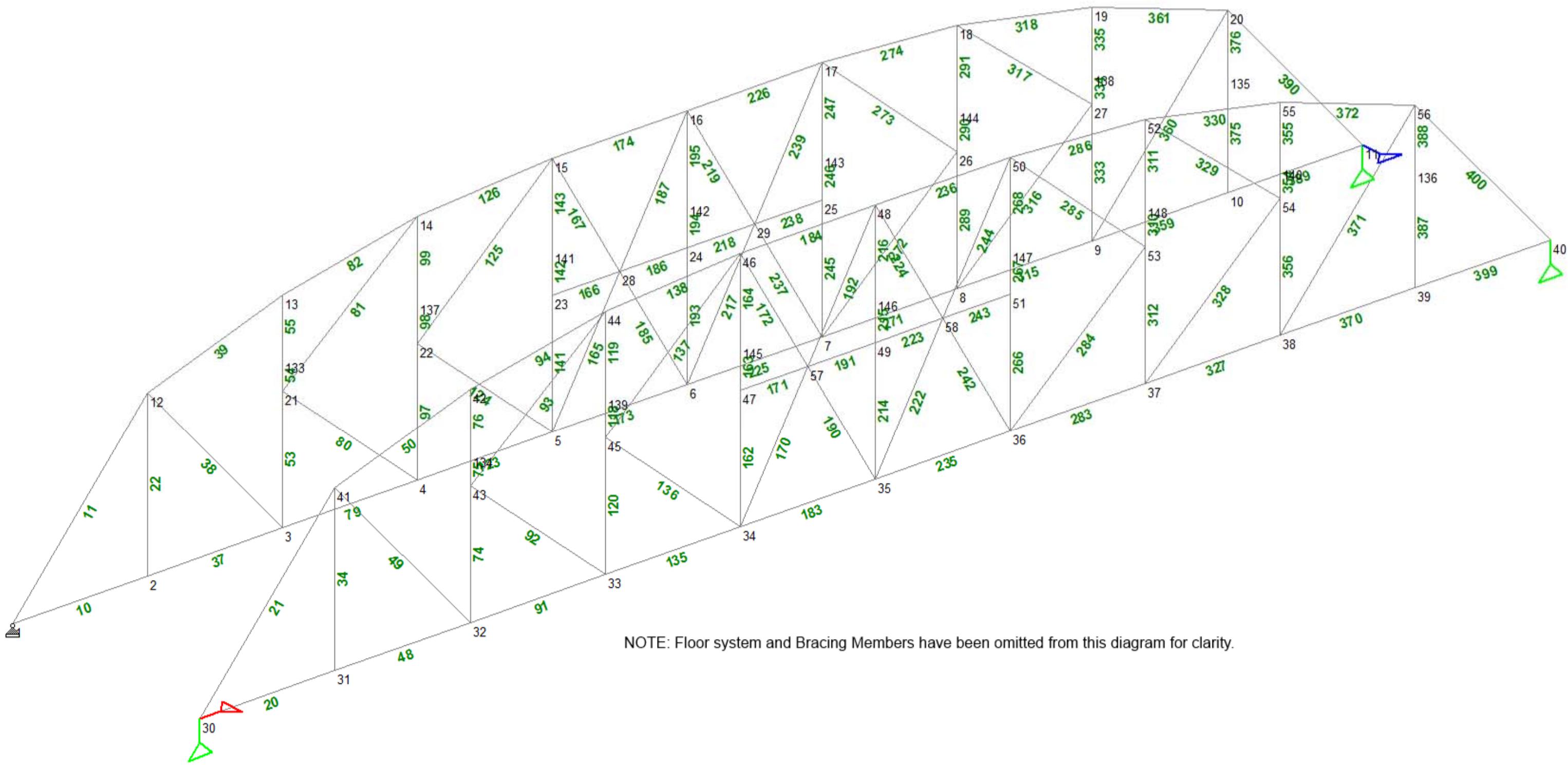
Client Oklahoma DOT

File PONY_32ftRDWY_JH.std Date/Time 29-Mar-2014 17:13

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	15	261:LOAD GEN	0.000	59.927	-0.581	0.088	0.001	-15.798	-105.430
Min Fx	15	202:LOAD GEN	0.000	-0.094	-0.005	-0.057	0.041	26.248	-1.224
Max Fy	9	247:LOAD GEN	0.000	58.990	0.635	-0.090	-0.000	7.800	45.847
Min Fy	15	257:LOAD GEN	0.000	58.992	-0.634	0.090	0.001	-14.154	-107.171
Max Fz	6	202:LOAD GEN	0.000	3.436	0.047	0.477	0.033	-137.438	-0.199
Min Fz	16	301:LOAD GEN	0.000	6.427	-0.065	-0.419	-0.033	-8.770	-19.059
Max Mx	9	202:LOAD GEN	0.000	-0.011	-0.123	0.159	0.136	-9.714	-16.746
Min Mx	15	301:LOAD GEN	0.000	1.670	0.166	-0.149	-0.122	26.114	16.336
Max My	24	202:LOAD GEN	0.000	3.345	0.045	-0.409	-0.029	118.258	-0.260
Min My	6	202:LOAD GEN	0.000	3.436	0.047	0.477	0.033	-137.438	-0.199
Max Mz	9	250:LOAD GEN	0.000	57.001	0.620	-0.086	-0.003	8.661	48.275
Min Mz	9	245:LOAD GEN	20.100	59.734	0.620	-0.091	0.001	-14.932	-107.967



NOTE: Floor system and Bracing Members have been omitted from this diagram for clarity.

STAAD SPACE
START JOB INFORMATION
ENGINEER DATE 03-Feb-14
END JOB INFORMATION
INPUT WIDTH 79
UNIT INCHES KIP
JOINT COORDINATES
1 0 0 0; 2 252 0 0; 3 504 0 0; 4 756 0 0; 5 1008 0 0; 6 1260 0 0; 7 1512 0 0;
8 1764 0 0; 9 2016 0 0; 10 2268 0 0; 11 2520 0 0; 12 252 288 0; 13 504 368 0;
14 756 416 0; 15 1008 432 0; 16 1260 432 0; 17 1512 432 0; 18 1764 416 0;
19 2016 368 0; 20 2268 288 0; 21 504 216 0; 22 756 216 0; 23 1008 216 0;
24 1260 216 0; 25 1512 216 0; 26 1764 216 0; 27 2016 216 0; 28 1134 216 0;
29 1386 216 0; 30 0 0 418; 31 252 0 418; 32 504 0 418; 33 756 0 418;
34 1008 0 418; 35 1260 0 418; 36 1512 0 418; 37 1764 0 418; 38 2016 0 418;
39 2268 0 418; 40 2520 0 418; 41 252 288 418; 42 504 368 418; 43 504 216 418;
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48 1260 432 418; 49 1260 216 418; 50 1512 432 418; 51 1512 216 418;
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56 2268 288 418; 57 1134 216 418; 58 1386 216 418; 125 378 328 209;
126 630 392 209; 127 882 424 209; 128 1134 432 209; 129 1386 432 209;
130 1638 424 209; 131 1890 392 209; 132 2142 328 209; 133 504 267 0;
134 504 267 418; 135 2268 187 0; 136 2268 187 418; 137 756 283 0;
138 2016 267 0; 139 756 283 417.996; 140 2016 267 417.996; 141 1008 288 0;
142 1260 288 0; 143 1512 288 0; 144 1764 283 0; 145 1008 288 418;
146 1260 288 418; 147 1512 288 418; 148 1764 283 417.996; 149 504 267 209;
150 756 283 208.998; 151 1008 288 209; 152 1260 288 209; 153 1512 288 209;
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158 1008 432 209; 159 1260 432 209; 160 1512 432 209; 161 1764 416 209;
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195 2520 0 174.5; 196 0 0 243.5; 197 252 0 243.5; 198 504 0 243.5;
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203 1764 0 243.5; 204 2016 0 243.5; 205 2268 0 243.5; 206 2520 0 243.5;
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 UNIT FEET KIP
 DEFINE MATERIAL START
 ISOTROPIC STEEL
 E 4.176e+006
 POISSON 0.3
 DENSITY 0.489024
 ALPHA 6.5e-006
 DAMP 0.03
 TYPE STEEL
 STRENGTH FY 5184 FU 8352 RY 1.5 RT 1.2
 END DEFINE MATERIAL
 UNIT INCHES KIP
 MEMBER PROPERTY AMERICAN
 10 20 37 48 359 370 389 399 PRIS AX 19.8 IX 1.7 IY 680.2 IZ 625.2
 79 91 123 135 271 283 315 327 PRIS AX 29.28 IX 4.9 IY 1007.4 IZ 802.8
 173 183 225 235 PRIS AX 32.2 IX 6.6 IY 1115.6 IZ 858
 22 34 53 TO 55 74 TO 76 97 TO 99 118 TO 120 141 TO 143 162 TO 164 193 TO 195 -
 214 TO 216 245 TO 247 266 TO 268 289 TO 291 310 TO 312 333 TO 335 -
 354 TO 356 375 376 387 388 PRIS AX 10.88 IX 0.8 IY 42.2 IZ 196.9
 11 21 390 400 PRIS AX 42.91 IX 7.8 IY 1792.9 IZ 1344.2
 39 50 82 94 318 330 361 372 PRIS AX 28.11 IX 2.3 IY 1206.4 IZ 974.1
 126 138 274 286 PRIS AX 31.71 IX 3.1 IY 1338 IZ 1058.1
 174 184 226 236 PRIS AX 35.84 IX 4.3 IY 1478.9 IZ 1167.3
 38 49 360 371 PRIS AX 12.06 IX 1 IY 47.7 IZ 222.4
 81 93 317 329 PRIS AX 8.78 IX 0.4 IY 278.2 IZ 101.4
 80 92 316 328 PRIS AX 6.77 IX 0.3 IY 11.3 IZ 120.6
 125 137 273 285 PRIS AX 7.78 IX 0.3 IY 248.5 IZ 94.6
 124 136 167 172 185 190 217 222 239 244 272 -
 284 PRIS AX 6.19 IX 0.2 IY 9.7 IZ 106.3
 165 170 187 192 219 224 237 242 PRIS AX 6.19 IX 0.2 IY 9.7 IZ 106.3
 166 171 186 191 218 223 238 243 PRIS AX 4.78 IX 26 IY 147.049 IZ 0.2
 61 70 105 114 149 158 201 210 253 262 297 306 341 -
 350 PRIS AX 11.47 IX 0.3 IY 13.2 IZ 399.7
 27 381 PRIS AX 7.12 IX 0.1 IY 4685.9 IZ 319
 35 36 51 52 77 78 95 96 121 122 139 140 168 169 188 189 220 221 240 241 269 -
 270 287 288 313 314 331 332 357 358 373 -
 374 PRIS AX 3.56 IX 0.122 IY 3 IZ 173
 58 67 102 111 146 155 198 207 250 259 294 303 338 347 TABLE LD L40306 SP 0.3125
 59 60 64 68 69 103 104 108 112 113 147 148 152 156 157 199 200 204 208 209 -
 251 252 256 260 261 295 296 300 304 305 339 340 344 348 -
 349 TABLE ST L30305
 401 402 412 422 423 433 434 444 445 455 456 466 467 477 TABLE ST W30X116
 478 TO 537 TABLE ST W18X50
 403 TO 411 413 TO 421 424 TO 432 435 TO 443 446 TO 454 457 TO 465 468 TO 475 -
 476 TABLE ST W33X221
 CONSTANTS
 BETA 311.186 MEMB 27
 BETA 48.8141 MEMB 381
 MATERIAL STEEL ALL
 SUPPORTS
 1 PINNED
 30 FIXED BUT FZ MX MY MZ
 11 FIXED BUT FX MX MY MZ
 40 FIXED BUT FX FZ MX MY MZ
 DEFINE MOVING LOAD
 TYPE 1 LOAD 4 16 16
 DIST 168 168 WID 72
 TYPE 2 LOAD 16 16 4
 DIST 168 168 WID 72

```
TYPE 3 LOAD 18
DIST 0 WID 0
TYPE 4 LOAD 26
DIST 0 WID 0
LOAD 1 LOADTYPE Dead TITLE DEAD LOADS
SELFWEIGHT Y -1.05
JOINT LOAD
2 TO 10 31 TO 39 FY -8.942
MEMBER LOAD
478 TO 537 UNI GY -0.0434896
LOAD GENERATION 200
TYPE 1 0 0 113 XINC 11
TYPE 1 0 0 257 XINC 11
LOAD GENERATION 200
TYPE 2 0 0 113 XINC 11
TYPE 2 0 0 257 XINC 11
LOAD GENERATION 100
TYPE 3 0 0 101 XINC 25.2
LOAD GENERATION 100
TYPE 4 0 0 221 XINC 25.2
LOAD 602 LOADTYPE Live TITLE LANE
FLOOR LOAD
XRANGE 0 0 FLOAD -0.000444444 X RANGE 0 2520 Z RANGE 41 281 GY
PERFORM ANALYSIS PRINT ALL
DEFINE ENVELOPE
502 TO 602 ENVELOPE 2
402 TO 501 602 ENVELOPE 1
END DEFINE ENVELOPE
FINISH
```



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	370	1:DEAD LOAD	0.000	-157.238	0.839	-4.330	0.005	496.036	6.141
Min Fx	20	1:DEAD LOAD	0.000	-197.743	1.399	6.584	-0.009	-875.921	81.056
Max Fy	20	1:DEAD LOAD	0.000	-197.743	1.399	6.584	-0.009	-875.921	81.056
Min Fy	399	1:DEAD LOAD	21.000	-197.743	-1.399	-6.584	0.009	-875.930	81.056
Max Fz	20	1:DEAD LOAD	0.000	-197.743	1.399	6.584	-0.009	-875.921	81.056
Min Fz	399	1:DEAD LOAD	0.000	-197.743	0.084	-6.584	0.009	783.240	-84.590
Max Mx	10	1:DEAD LOAD	0.000	-197.743	1.399	-6.584	0.009	875.878	81.056
Min Mx	389	1:DEAD LOAD	0.000	-197.743	0.084	6.584	-0.009	-783.198	-84.590
Max My	10	1:DEAD LOAD	0.000	-197.743	1.399	-6.584	0.009	875.878	81.056
Min My	399	1:DEAD LOAD	21.000	-197.743	-1.399	-6.584	0.009	-875.930	81.056
Max Mz	20	1:DEAD LOAD	0.000	-197.743	1.399	6.584	-0.009	-875.921	81.056
Min Mz	20	1:DEAD LOAD	18.900	-197.743	0.064	6.584	-0.009	617.318	-84.631



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	327	1:DEAD LOAD	0.000	-221.726	0.377	-3.835	0.014	448.692	-79.472
Min Fx	271	1:DEAD LOAD	0.000	-254.383	1.069	2.219	0.011	-246.210	-18.647
Max Fy	79	1:DEAD LOAD	0.000	-221.729	1.815	-3.835	0.014	517.780	101.708
Min Fy	315	1:DEAD LOAD	21.000	-221.730	-1.815	3.835	-0.014	517.790	101.708
Max Fz	91	1:DEAD LOAD	0.000	-221.727	1.815	3.835	-0.014	-517.831	101.708
Min Fz	327	1:DEAD LOAD	0.000	-221.726	0.377	-3.835	0.014	448.692	-79.472
Max Mx	79	1:DEAD LOAD	0.000	-221.729	1.815	-3.835	0.014	517.780	101.708
Min Mx	315	1:DEAD LOAD	0.000	-221.730	0.377	3.835	-0.014	-448.639	-79.473
Max My	315	1:DEAD LOAD	21.000	-221.730	-1.815	3.835	-0.014	517.790	101.708
Min My	91	1:DEAD LOAD	0.000	-221.727	1.815	3.835	-0.014	-517.831	101.708
Max Mz	327	1:DEAD LOAD	21.000	-221.726	-1.815	-3.835	0.014	-517.821	101.709
Min Mz	315	1:DEAD LOAD	4.200	-221.730	-0.061	3.835	-0.014	-255.353	-86.978



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	235	1:DEAD LOAD	0.000	-288.128	0.946	-0.788	0.011	66.131	-45.794
Min Fx	225	1:DEAD LOAD	0.000	-288.130	0.946	0.788	-0.011	-66.146	-45.794
Max Fy	173	1:DEAD LOAD	0.000	-288.130	1.465	-0.788	0.011	132.327	19.681
Min Fy	225	1:DEAD LOAD	21.000	-288.130	-1.465	0.788	-0.011	132.334	19.682
Max Fz	225	1:DEAD LOAD	0.000	-288.130	0.946	0.788	-0.011	-66.146	-45.794
Min Fz	173	1:DEAD LOAD	0.000	-288.130	1.465	-0.788	0.011	132.327	19.681
Max Mx	235	1:DEAD LOAD	0.000	-288.128	0.946	-0.788	0.011	66.131	-45.794
Min Mx	183	1:DEAD LOAD	0.000	-288.128	1.465	0.788	-0.011	-132.326	19.681
Max My	225	1:DEAD LOAD	21.000	-288.130	-1.465	0.788	-0.011	132.334	19.682
Min My	183	1:DEAD LOAD	0.000	-288.128	1.465	0.788	-0.011	-132.326	19.681
Max Mz	225	1:DEAD LOAD	21.000	-288.130	-1.465	0.788	-0.011	132.334	19.682
Min Mz	235	1:DEAD LOAD	8.400	-288.128	-0.019	-0.788	0.011	-13.249	-92.181



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	333	1:DEAD LOAD	18.000	48.549	0.397	-0.144	-0.042	-27.642	-57.613
Min Fx	311	1:DEAD LOAD	0.000	-72.648	0.119	0.059	-0.002	-8.131	21.463
Max Fy	375	1:DEAD LOAD	0.000	-52.827	0.412	-0.156	-0.045	-0.346	12.170
Min Fy	34	1:DEAD LOAD	0.000	-53.153	-0.412	0.156	-0.045	-15.436	-53.825
Max Fz	387	1:DEAD LOAD	0.000	-52.827	0.412	0.156	0.045	0.344	12.170
Min Fz	22	1:DEAD LOAD	0.000	-53.153	-0.412	-0.156	0.045	15.429	-53.824
Max Mx	22	1:DEAD LOAD	0.000	-53.153	-0.412	-0.156	0.045	15.429	-53.824
Min Mx	375	1:DEAD LOAD	0.000	-52.827	0.412	-0.156	-0.045	-0.346	12.170
Max My	387	1:DEAD LOAD	15.583	-52.222	0.412	0.156	0.045	29.563	-64.952
Min My	22	1:DEAD LOAD	24.000	-52.222	-0.412	-0.156	0.045	-29.553	64.953
Max Mz	34	1:DEAD LOAD	24.000	-52.222	-0.412	0.156	-0.045	29.561	64.953
Min Mz	375	1:DEAD LOAD	15.583	-52.222	0.412	-0.156	-0.045	-29.551	-64.953



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	390	1:DEAD LOAD	31.890	352.047	-1.031	-0.120	-0.619	-20.501	-82.898
Min Fx	400	1:DEAD LOAD	0.000	348.374	2.183	0.120	0.619	-25.319	137.496
Max Fy	400	1:DEAD LOAD	0.000	348.374	2.183	0.120	0.619	-25.319	137.496
Min Fy	21	1:DEAD LOAD	31.890	348.375	-2.183	-0.120	-0.619	-25.305	137.497
Max Fz	400	1:DEAD LOAD	0.000	348.374	2.183	0.120	0.619	-25.319	137.496
Min Fz	21	1:DEAD LOAD	0.000	352.047	1.031	-0.120	-0.619	20.606	-82.898
Max Mx	11	1:DEAD LOAD	0.000	352.047	1.031	0.120	0.619	-20.520	-82.898
Min Mx	390	1:DEAD LOAD	0.000	348.375	2.183	-0.120	-0.619	25.239	137.496
Max My	11	1:DEAD LOAD	31.890	348.375	-2.183	0.120	0.619	25.252	137.496
Min My	400	1:DEAD LOAD	0.000	348.374	2.183	0.120	0.619	-25.319	137.496
Max Mz	21	1:DEAD LOAD	31.890	348.375	-2.183	-0.120	-0.619	-25.305	137.497
Min Mz	11	1:DEAD LOAD	9.567	350.946	0.067	0.120	0.619	-6.788	-144.867



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	361	1:DEAD LOAD	22.033	332.373	-2.114	-0.035	0.013	-3.227	164.166
Min Fx	330	1:DEAD LOAD	0.000	322.365	1.421	-0.026	-0.007	0.819	23.403
Max Fy	39	1:DEAD LOAD	0.000	332.373	2.114	0.035	-0.013	-3.217	164.166
Min Fy	361	1:DEAD LOAD	22.033	332.373	-2.114	-0.035	0.013	-3.227	164.166
Max Fz	39	1:DEAD LOAD	0.000	332.373	2.114	0.035	-0.013	-3.217	164.166
Min Fz	361	1:DEAD LOAD	0.000	331.705	-0.009	-0.035	0.013	6.035	-116.601
Max Mx	50	1:DEAD LOAD	0.000	332.372	2.114	-0.035	0.013	3.176	164.164
Min Mx	372	1:DEAD LOAD	0.000	331.703	-0.009	0.035	-0.013	-6.025	-116.597
Max My	361	1:DEAD LOAD	0.000	331.705	-0.009	-0.035	0.013	6.035	-116.601
Min My	372	1:DEAD LOAD	0.000	331.703	-0.009	0.035	-0.013	-6.025	-116.597
Max Mz	361	1:DEAD LOAD	22.033	332.373	-2.114	-0.035	0.013	-3.227	164.166
Min Mz	361	1:DEAD LOAD	0.000	331.705	-0.009	-0.035	0.013	6.035	-116.601



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	274	1:DEAD LOAD	21.042	369.304	-1.549	0.061	-0.007	11.311	58.983
Min Fx	286	1:DEAD LOAD	0.000	369.151	0.826	-0.062	0.007	4.230	-32.348
Max Fy	138	1:DEAD LOAD	0.000	369.302	1.549	0.062	-0.007	-11.333	58.989
Min Fy	286	1:DEAD LOAD	21.042	369.301	-1.549	-0.062	0.007	-11.339	58.988
Max Fz	138	1:DEAD LOAD	0.000	369.302	1.549	0.062	-0.007	-11.333	58.989
Min Fz	286	1:DEAD LOAD	0.000	369.151	0.826	-0.062	0.007	4.230	-32.348
Max Mx	286	1:DEAD LOAD	0.000	369.151	0.826	-0.062	0.007	4.230	-32.348
Min Mx	138	1:DEAD LOAD	0.000	369.302	1.549	0.062	-0.007	-11.333	58.989
Max My	126	1:DEAD LOAD	0.000	369.304	1.549	-0.061	0.007	11.311	58.983
Min My	286	1:DEAD LOAD	21.042	369.301	-1.549	-0.062	0.007	-11.339	58.988
Max Mz	138	1:DEAD LOAD	0.000	369.302	1.549	0.062	-0.007	-11.333	58.989
Min Mz	286	1:DEAD LOAD	8.417	369.211	-0.124	-0.062	0.007	-1.998	-67.430



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	226	1:DEAD LOAD	0.000	419.023	0.878	0.035	-0.002	-2.751	-107.512	
Min Fx	236	1:DEAD LOAD	0.000	419.021	0.878	-0.035	0.002	2.757	-107.510	
Max Fy	174	1:DEAD LOAD	0.000	419.023	1.805	-0.035	0.002	6.153	9.312	
Min Fy	226	1:DEAD LOAD	21.000	419.023	-1.805	0.035	-0.002	6.153	9.311	
Max Fz	184	1:DEAD LOAD	0.000	419.021	1.805	0.035	-0.002	-6.166	9.309	
Min Fz	236	1:DEAD LOAD	0.000	419.021	0.878	-0.035	0.002	2.757	-107.510	
Max Mx	174	1:DEAD LOAD	0.000	419.023	1.805	-0.035	0.002	6.153	9.312	
Min Mx	226	1:DEAD LOAD	0.000	419.023	0.878	0.035	-0.002	-2.751	-107.512	
Max My	174	1:DEAD LOAD	0.000	419.023	1.805	-0.035	0.002	6.153	9.312	
Min My	184	1:DEAD LOAD	0.000	419.021	1.805	0.035	-0.002	-6.166	9.309	
Max Mz	174	1:DEAD LOAD	0.000	419.023	1.805	-0.035	0.002	6.153	9.312	
Min Mz	174	1:DEAD LOAD	14.700	419.023	-0.073	-0.035	0.002	-0.080	-142.914	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	371	1:DEAD LOAD	31.890	-135.167	-0.526	-0.104	-0.012	-26.317	39.022	
Min Fx	360	1:DEAD LOAD	0.000	-136.200	0.377	0.104	0.012	-13.646	10.590	
Max Fy	360	1:DEAD LOAD	0.000	-136.200	0.377	0.104	0.012	-13.646	10.590	
Min Fy	49	1:DEAD LOAD	31.890	-135.167	-0.526	0.104	0.012	26.315	39.022	
Max Fz	49	1:DEAD LOAD	0.000	-136.199	0.377	0.104	0.012	-13.655	10.590	
Min Fz	371	1:DEAD LOAD	0.000	-136.199	0.377	-0.104	-0.012	13.657	10.590	
Max Mx	49	1:DEAD LOAD	0.000	-136.199	0.377	0.104	0.012	-13.655	10.590	
Min Mx	371	1:DEAD LOAD	0.000	-136.199	0.377	-0.104	-0.012	13.657	10.590	
Max My	49	1:DEAD LOAD	31.890	-135.167	-0.526	0.104	0.012	26.315	39.022	
Min My	371	1:DEAD LOAD	31.890	-135.167	-0.526	-0.104	-0.012	-26.317	39.022	
Max Mz	49	1:DEAD LOAD	31.890	-135.167	-0.526	0.104	0.012	26.315	39.022	
Min Mz	49	1:DEAD LOAD	12.756	-135.786	0.016	0.104	0.012	2.333	-19.317	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	81	1:DEAD LOAD	26.810	65.865	-0.335	0.050	-0.010	0.478	18.267
Min Fx	93	1:DEAD LOAD	0.000	65.342	0.322	-0.050	0.010	15.516	16.229
Max Fy	329	1:DEAD LOAD	0.000	65.342	0.322	0.050	-0.010	-15.533	16.229
Min Fy	81	1:DEAD LOAD	26.810	65.865	-0.335	0.050	-0.010	0.478	18.267
Max Fz	329	1:DEAD LOAD	0.000	65.342	0.322	0.050	-0.010	-15.533	16.229
Min Fz	93	1:DEAD LOAD	0.000	65.342	0.322	-0.050	0.010	15.516	16.229
Max Mx	93	1:DEAD LOAD	0.000	65.342	0.322	-0.050	0.010	15.516	16.229
Min Mx	329	1:DEAD LOAD	0.000	65.342	0.322	0.050	-0.010	-15.533	16.229
Max My	93	1:DEAD LOAD	0.000	65.342	0.322	-0.050	0.010	15.516	16.229
Min My	329	1:DEAD LOAD	0.000	65.342	0.322	0.050	-0.010	-15.533	16.229
Max Mz	81	1:DEAD LOAD	26.810	65.865	-0.335	0.050	-0.010	0.478	18.267
Min Mz	317	1:DEAD LOAD	13.405	65.604	-0.006	-0.050	0.010	7.512	-9.192



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	92	1:DEAD LOAD	27.659	-67.444	-0.247	0.015	0.011	4.341	14.893	
Min Fx	80	1:DEAD LOAD	0.000	-67.879	0.260	-0.015	-0.011	0.589	16.951	
Max Fy	92	1:DEAD LOAD	0.000	-67.879	0.260	0.015	0.011	-0.589	16.951	
Min Fy	328	1:DEAD LOAD	27.659	-67.444	-0.247	-0.015	-0.011	-4.337	14.893	
Max Fz	92	1:DEAD LOAD	0.000	-67.879	0.260	0.015	0.011	-0.589	16.951	
Min Fz	80	1:DEAD LOAD	0.000	-67.879	0.260	-0.015	-0.011	0.589	16.951	
Max Mx	92	1:DEAD LOAD	0.000	-67.879	0.260	0.015	0.011	-0.589	16.951	
Min Mx	328	1:DEAD LOAD	0.000	-67.879	0.260	-0.015	-0.011	0.582	16.951	
Max My	92	1:DEAD LOAD	27.659	-67.444	-0.247	0.015	0.011	4.341	14.893	
Min My	80	1:DEAD LOAD	27.659	-67.445	-0.247	-0.015	-0.011	-4.339	14.893	
Max Mz	92	1:DEAD LOAD	0.000	-67.879	0.260	0.015	0.011	-0.589	16.951	
Min Mz	316	1:DEAD LOAD	13.829	-67.662	0.006	0.015	0.011	1.875	-5.111	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	285	1:DEAD LOAD	27.659	50.359	-0.256	0.043	-0.006	0.114	10.598	
Min Fx	273	1:DEAD LOAD	0.000	49.859	0.326	-0.043	0.006	14.199	22.187	
Max Fy	273	1:DEAD LOAD	0.000	49.859	0.326	-0.043	0.006	14.199	22.187	
Min Fy	285	1:DEAD LOAD	27.659	50.359	-0.256	0.043	-0.006	0.114	10.598	
Max Fz	285	1:DEAD LOAD	0.000	49.859	0.326	0.043	-0.006	-14.247	22.188	
Min Fz	137	1:DEAD LOAD	0.000	49.859	0.326	-0.043	0.006	14.247	22.188	
Max Mx	137	1:DEAD LOAD	0.000	49.859	0.326	-0.043	0.006	14.247	22.188	
Min Mx	285	1:DEAD LOAD	0.000	49.859	0.326	0.043	-0.006	-14.247	22.188	
Max My	137	1:DEAD LOAD	0.000	49.859	0.326	-0.043	0.006	14.247	22.188	
Min My	285	1:DEAD LOAD	0.000	49.859	0.326	0.043	-0.006	-14.247	22.188	
Max Mz	137	1:DEAD LOAD	0.000	49.859	0.326	-0.043	0.006	14.247	22.188	
Min Mz	273	1:DEAD LOAD	16.595	50.158	-0.023	-0.043	0.006	5.604	-7.862	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	217	1:DEAD LOAD	0.000	-22.234	0.140	0.018	0.009	-4.286	5.182
Min Fx	284	1:DEAD LOAD	0.000	-50.044	0.253	-0.010	-0.009	0.176	15.394
Max Fy	284	1:DEAD LOAD	0.000	-50.044	0.253	-0.010	-0.009	0.176	15.394
Min Fy	272	1:DEAD LOAD	27.659	-49.646	-0.210	0.010	0.009	3.043	8.273
Max Fz	190	1:DEAD LOAD	0.000	-22.632	0.092	0.018	0.009	-0.306	-0.816
Min Fz	222	1:DEAD LOAD	0.000	-22.234	0.140	-0.018	-0.009	4.289	5.181
Max Mx	190	1:DEAD LOAD	0.000	-22.632	0.092	0.018	0.009	-0.306	-0.816
Min Mx	222	1:DEAD LOAD	0.000	-22.234	0.140	-0.018	-0.009	4.289	5.181
Max My	222	1:DEAD LOAD	0.000	-22.234	0.140	-0.018	-0.009	4.289	5.181
Min My	185	1:DEAD LOAD	20.839	-22.234	-0.140	-0.018	-0.009	-4.286	5.182
Max Mz	284	1:DEAD LOAD	0.000	-50.044	0.253	-0.010	-0.009	0.176	15.394
Min Mz	172	1:DEAD LOAD	12.503	-24.559	0.010	0.002	-0.003	-0.590	-9.960



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	224	1:DEAD LOAD	20.839	10.561	-0.076	0.002	-0.003	-0.400		-2.815
Min Fx	237	1:DEAD LOAD	0.000	9.228	0.143	-0.016	-0.011	0.088		2.879
Max Fy	219	1:DEAD LOAD	0.000	10.163	0.156	-0.002	0.003	0.851		7.181
Min Fy	187	1:DEAD LOAD	20.839	10.163	-0.156	0.002	-0.003	0.851		7.181
Max Fz	242	1:DEAD LOAD	0.000	9.228	0.143	0.016	0.011	-0.090		2.879
Min Fz	170	1:DEAD LOAD	0.000	9.625	0.089	-0.016	-0.011	3.851		-3.830
Max Mx	242	1:DEAD LOAD	0.000	9.228	0.143	0.016	0.011	-0.090		2.879
Min Mx	170	1:DEAD LOAD	0.000	9.625	0.089	-0.016	-0.011	3.851		-3.830
Max My	242	1:DEAD LOAD	20.839	9.625	-0.089	0.016	0.011	3.851		-3.830
Min My	165	1:DEAD LOAD	0.000	9.625	0.089	0.016	0.011	-3.847		-3.830
Max Mz	187	1:DEAD LOAD	20.839	10.163	-0.156	0.002	-0.003	0.851		7.181
Min Mz	242	1:DEAD LOAD	12.503	9.466	0.004	0.016	0.011	2.274		-8.069



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	166	1:DEAD LOAD	0.000	0.076	0.091	-0.010	-0.162	0.015	1.983
Min Fx	186	1:DEAD LOAD	0.000	-1.448	0.090	0.021	0.177	-1.316	1.898
Max Fy	171	1:DEAD LOAD	0.000	0.076	0.091	0.010	0.162	-0.015	1.983
Min Fy	243	1:DEAD LOAD	10.500	0.076	-0.091	-0.010	-0.162	-0.015	1.983
Max Fz	223	1:DEAD LOAD	0.000	-1.448	0.090	0.021	0.177	-1.318	1.898
Min Fz	191	1:DEAD LOAD	0.000	-1.448	0.090	-0.021	-0.177	1.318	1.898
Max Mx	223	1:DEAD LOAD	0.000	-1.448	0.090	0.021	0.177	-1.318	1.898
Min Mx	191	1:DEAD LOAD	0.000	-1.448	0.090	-0.021	-0.177	1.318	1.898
Max My	191	1:DEAD LOAD	0.000	-1.448	0.090	-0.021	-0.177	1.318	1.898
Min My	223	1:DEAD LOAD	0.000	-1.448	0.090	0.021	0.177	-1.318	1.898
Max Mz	243	1:DEAD LOAD	10.500	0.076	-0.091	-0.010	-0.162	-0.015	1.983
Min Mz	186	1:DEAD LOAD	5.250	-1.448	0.000	0.021	0.177	-0.023	-0.949



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	48	200:LOAD GEN	0.000	-1.504	0.002	0.065	0.001	-8.630	0.301	
Min Fx	389	176:LOAD GEN	0.000	-59.472	-0.514	1.211	0.110	-139.984	-78.774	
Max Fy	10	214:LOAD GEN	0.000	-52.015	0.710	-1.534	-0.059	241.236	63.717	
Min Fy	389	189:LOAD GEN	0.000	-53.213	-0.709	1.618	0.051	-161.303	-115.649	
Max Fz	389	200:LOAD GEN	0.000	-37.398	-0.529	2.440	-0.167	-215.177	-88.066	
Min Fz	10	202:LOAD GEN	0.000	-35.185	0.512	-2.481	0.184	412.078	44.138	
Max Mx	10	202:LOAD GEN	0.000	-35.185	0.512	-2.481	0.184	412.078	44.138	
Min Mx	389	200:LOAD GEN	0.000	-37.398	-0.529	2.440	-0.167	-215.177	-88.066	
Max My	10	202:LOAD GEN	0.000	-35.185	0.512	-2.481	0.184	412.078	44.138	
Min My	20	202:LOAD GEN	0.000	-24.002	0.276	2.294	-0.143	-366.656	23.978	
Max Mz	10	215:LOAD GEN	0.000	-52.907	0.708	-1.481	-0.070	231.539	63.913	
Min Mz	389	190:LOAD GEN	0.000	-52.177	-0.707	1.675	0.038	-164.812	-115.681	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	91	201:LOAD GEN	0.000	-2.233	0.009	0.085	0.002	-10.969	1.291
Min Fx	271	136:LOAD GEN	0.000	-79.526	0.449	0.346	-0.181	-25.449	5.813
Max Fy	271	359:LOAD GEN	0.000	-74.731	0.681	0.165	-0.349	-3.966	55.222
Min Fy	123	44:LOAD GEN	0.000	-73.999	-0.677	-0.104	0.347	30.223	-116.999
Max Fz	315	315:LOAD GEN	0.000	-45.099	-0.156	1.032	-0.016	-123.854	-11.824
Min Fz	79	87:LOAD GEN	0.000	-44.316	0.163	-0.944	0.014	126.153	28.694
Max Mx	79	19:LOAD GEN	0.000	-58.503	-0.406	-0.200	0.366	38.809	-72.846
Min Mx	315	383:LOAD GEN	0.000	-60.551	0.411	0.278	-0.366	-21.668	28.828
Max My	315	319:LOAD GEN	21.000	-46.877	-0.165	1.030	0.008	136.444	29.308
Min My	315	311:LOAD GEN	0.000	-43.359	-0.157	1.030	-0.032	-124.026	-12.999
Max Mz	271	363:LOAD GEN	0.000	-71.185	0.638	0.110	-0.342	1.655	59.082
Min Mz	271	355:LOAD GEN	21.000	-77.246	0.647	0.221	-0.317	45.519	-120.527



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	183	201:LOAD GEN	0.000	-4.055	0.008	0.075	0.003	-9.894	0.411
Min Fx	225	315:LOAD GEN	0.000	-83.647	-0.155	0.240	0.154	-14.988	-71.337
Max Fy	173	314:LOAD GEN	0.000	-78.655	0.438	-0.343	-0.476	57.022	23.392
Min Fy	225	89:LOAD GEN	0.000	-79.028	-0.437	0.407	0.475	-37.569	-87.680
Max Fz	225	266:LOAD GEN	0.000	-52.012	-0.060	0.544	-0.019	-62.872	-12.316
Min Fz	173	348:LOAD GEN	0.000	-51.152	0.042	-0.481	0.040	66.340	1.137
Max Mx	173	65:LOAD GEN	0.000	-72.918	-0.377	0.131	0.487	-5.560	-71.443
Min Mx	225	337:LOAD GEN	0.000	-73.698	0.383	-0.058	-0.486	18.270	23.111
Max My	225	273:LOAD GEN	21.000	-57.743	-0.057	0.539	0.031	74.920	3.484
Min My	225	51:LOAD GEN	0.000	-48.141	-0.058	0.541	-0.045	-63.306	-12.405
Max Mz	173	318:LOAD GEN	0.000	-76.012	0.401	-0.374	-0.454	60.074	26.806
Min Mz	173	310:LOAD GEN	21.000	-80.774	0.412	-0.307	-0.443	-24.060	-91.211



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	53	278:LOAD GEN	0.000	34.509	-0.156	0.029	0.013	-2.550	-6.299	
Min Fx	22	215:LOAD GEN	0.000	-61.415	0.003	-0.177	0.006	15.414	3.340	
Max Fy	334	134:LOAD GEN	0.000	-10.894	0.321	0.023	-0.012	-4.498	4.273	
Min Fy	54	269:LOAD GEN	0.000	-10.961	-0.323	-0.009	-0.005	-0.605	-4.583	
Max Fz	215	307:LOAD GEN	0.000	-9.249	-0.000	0.297	0.002	-24.223	0.010	
Min Fz	355	162:LOAD GEN	0.000	-6.885	-0.039	-0.245	-0.006	7.478	-3.635	
Max Mx	118	263:LOAD GEN	0.000	-14.030	0.007	0.190	0.069	-17.351	0.053	
Min Mx	354	161:LOAD GEN	0.000	-6.976	-0.030	0.215	-0.080	-18.844	0.456	
Max My	312	141:LOAD GEN	18.000	-20.887	-0.010	0.238	0.027	43.039	0.058	
Min My	22	217:LOAD GEN	24.000	-60.829	-0.008	-0.180	0.008	-35.894	4.223	
Max Mz	335	133:LOAD GEN	0.000	-10.642	0.320	-0.065	-0.002	2.190	36.763	
Min Mz	55	270:LOAD GEN	0.000	-10.734	-0.322	-0.016	0.004	0.819	-37.263	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	11	228:LOAD GEN	0.000	106.305	-0.065	0.027	0.146	32.645	-48.256	
Min Fx	21	201:LOAD GEN	0.000	2.786	-0.002	0.082	0.002	-18.305	-0.509	
Max Fy	390	132:LOAD GEN	0.000	79.392	0.089	0.254	-0.106	-25.165	17.699	
Min Fy	11	271:LOAD GEN	0.000	81.424	-0.101	0.298	0.142	-35.056	-17.421	
Max Fz	11	202:LOAD GEN	0.000	50.265	-0.060	3.111	0.850	-954.397	-46.041	
Min Fz	390	200:LOAD GEN	0.000	51.854	0.059	-2.804	-0.806	197.660	-25.159	
Max Mx	11	202:LOAD GEN	0.000	50.265	-0.060	3.111	0.850	-954.397	-46.041	
Min Mx	390	200:LOAD GEN	0.000	51.854	0.059	-2.804	-0.806	197.660	-25.159	
Max My	21	202:LOAD GEN	0.000	27.024	-0.024	-2.634	-0.681	822.675	-23.555	
Min My	11	202:LOAD GEN	0.000	50.265	-0.060	3.111	0.850	-954.397	-46.041	
Max Mz	11	268:LOAD GEN	31.890	83.025	-0.101	0.292	0.144	78.403	21.348	
Min Mz	11	214:LOAD GEN	0.000	90.394	-0.086	1.017	0.379	-288.715	-67.358	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	39	248:LOAD GEN	0.000	99.802	0.443	-0.219	0.010	42.216	35.323
Min Fx	50	201:LOAD GEN	0.000	3.051	0.011	-0.048	-0.000	9.976	1.731
Max Fy	39	252:LOAD GEN	0.000	99.000	0.455	-0.236	0.011	45.708	42.461
Min Fy	361	150:LOAD GEN	0.000	97.274	-0.456	-0.097	-0.021	0.808	-77.312
Max Fz	361	200:LOAD GEN	0.000	24.711	0.218	0.871	0.029	-48.338	14.273
Min Fz	39	202:LOAD GEN	0.000	23.887	-0.214	-1.013	-0.033	211.999	-42.017
Max Mx	361	200:LOAD GEN	0.000	24.711	0.218	0.871	0.029	-48.338	14.273
Min Mx	39	202:LOAD GEN	0.000	23.887	-0.214	-1.013	-0.033	211.999	-42.017
Max My	39	202:LOAD GEN	0.000	23.887	-0.214	-1.013	-0.033	211.999	-42.017
Min My	372	200:LOAD GEN	22.033	14.084	0.129	-0.885	-0.029	-187.193	-25.947
Max Mz	361	137:LOAD GEN	22.033	89.469	-0.398	-0.088	-0.021	-22.847	51.600
Min Mz	82	26:LOAD GEN	0.000	90.315	-0.389	0.040	-0.002	-12.707	-87.026



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	126	267:LOAD GEN	0.000	108.810	-0.160	-0.011	0.003	-2.095	-54.437	
Min Fx	138	201:LOAD GEN	0.000	4.077	0.008	-0.001	0.001	0.098	0.971	
Max Fy	126	294:LOAD GEN	0.000	92.350	0.382	0.001	0.018	-2.341	27.980	
Min Fy	274	108:LOAD GEN	0.000	91.516	-0.377	-0.027	-0.018	-0.397	-67.243	
Max Fz	138	202:LOAD GEN	0.000	9.637	-0.011	0.057	-0.001	-11.839	-0.461	
Min Fz	286	200:LOAD GEN	0.000	10.284	0.010	-0.061	0.001	2.884	2.305	
Max Mx	126	306:LOAD GEN	0.000	83.038	0.301	0.002	0.019	-2.048	30.758	
Min Mx	274	97:LOAD GEN	0.000	82.987	-0.301	-0.028	-0.019	0.122	-45.595	
Max My	126	202:LOAD GEN	0.000	17.121	-0.025	-0.059	-0.002	11.281	-1.758	
Min My	286	200:LOAD GEN	21.042	10.284	0.010	-0.061	0.001	-12.537	-0.202	
Max Mz	126	301:LOAD GEN	0.000	86.824	0.348	0.002	0.019	-2.194	31.831	
Min Mz	126	290:LOAD GEN	21.042	95.669	0.362	-0.000	0.017	-2.457	-70.640	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	174	296:LOAD GEN	0.000	120.860	0.065	0.016	0.011	-7.111	-50.449	
Min Fx	184	201:LOAD GEN	0.000	5.897	0.011	0.001	0.002	-0.653	0.377	
Max Fy	174	316:LOAD GEN	0.000	110.252	0.409	0.015	0.020	-6.927	9.679	
Min Fy	226	87:LOAD GEN	0.000	110.464	-0.408	-0.012	-0.020	-3.163	-93.742	
Max Fz	184	273:LOAD GEN	0.000	59.951	-0.085	0.030	-0.007	-9.668	-28.584	
Min Fz	236	130:LOAD GEN	0.000	59.847	0.083	-0.026	0.007	-2.208	-7.231	
Max Mx	184	319:LOAD GEN	0.000	61.198	0.200	0.016	0.023	-7.156	3.418	
Min Mx	236	83:LOAD GEN	0.000	61.099	-0.200	-0.012	-0.023	-3.124	-46.721	
Max My	236	200:LOAD GEN	21.000	7.918	-0.005	0.011	0.001	1.832	0.271	
Min My	184	281:LOAD GEN	0.000	64.558	-0.084	0.029	-0.004	-9.906	-35.720	
Max Mz	226	77:LOAD GEN	21.000	100.478	-0.345	-0.010	-0.020	-5.549	15.320	
Min Mz	174	311:LOAD GEN	21.000	114.433	0.381	0.016	0.019	-3.082	-96.583	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	360	195:LOAD GEN	0.000	16.924	0.070	-0.010	0.013	2.937	8.506
Min Fx	38	254:LOAD GEN	0.000	-52.891	-0.051	-0.062	-0.019	7.813	-9.713
Max Fy	360	393:LOAD GEN	0.000	2.435	0.097	0.032	0.020	-2.755	11.442
Min Fy	38	269:LOAD GEN	0.000	-47.395	-0.085	-0.019	0.002	2.730	-14.162
Max Fz	49	239:LOAD GEN	0.000	-20.244	0.019	0.089	0.033	-11.732	1.206
Min Fz	371	163:LOAD GEN	0.000	-21.543	0.016	-0.103	-0.037	14.230	0.682
Max Mx	49	26:LOAD GEN	0.000	-18.083	0.025	0.089	0.033	-11.721	2.008
Min Mx	371	376:LOAD GEN	0.000	-19.374	0.022	-0.103	-0.037	14.172	1.502
Max My	49	239:LOAD GEN	31.890	-20.244	0.019	0.089	0.033	22.229	-6.195
Min My	371	163:LOAD GEN	31.890	-21.543	0.016	-0.103	-0.037	-25.205	-5.506
Max Mz	38	269:LOAD GEN	31.890	-47.395	-0.085	-0.019	0.002	-4.596	18.433
Min Mz	360	392:LOAD GEN	31.890	0.265	0.097	0.036	0.021	10.468	-25.687



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	81	277:LOAD GEN	0.000	34.530	-0.032	-0.012	0.002	4.767	-3.657
Min Fx	317	387:LOAD GEN	0.000	-21.772	0.041	0.004	0.002	0.892	2.576
Max Fy	317	390:LOAD GEN	0.000	-21.204	0.042	0.004	0.001	0.534	2.873
Min Fy	81	271:LOAD GEN	0.000	33.281	-0.035	-0.009	0.001	4.243	-4.797
Max Fz	329	136:LOAD GEN	0.000	15.919	-0.017	0.040	-0.009	-10.910	-2.690
Min Fz	93	266:LOAD GEN	0.000	15.042	-0.016	-0.038	0.006	9.965	-2.681
Max Mx	93	243:LOAD GEN	0.000	-3.841	0.007	-0.023	0.011	8.507	-0.806
Min Mx	329	159:LOAD GEN	0.000	-2.903	0.006	0.026	-0.015	-9.518	-0.899
Max My	93	260:LOAD GEN	0.000	11.039	-0.012	-0.036	0.008	10.112	-2.620
Min My	329	142:LOAD GEN	0.000	12.025	-0.013	0.039	-0.011	-11.077	-2.659
Max Mz	81	277:LOAD GEN	26.810	34.530	-0.032	-0.012	0.002	0.988	6.680
Min Mz	317	388:LOAD GEN	26.810	-21.675	0.041	0.004	0.002	2.016	-10.600



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	316	387:LOAD GEN	0.000	22.616	-0.016	-0.012	0.001	2.137	-7.546
Min Fx	80	277:LOAD GEN	0.000	-35.778	0.022	-0.011	-0.007	1.031	7.433
Max Fy	80	46:LOAD GEN	0.000	-18.098	0.067	-0.012	-0.014	0.454	10.109
Min Fy	316	397:LOAD GEN	0.000	18.225	-0.025	-0.007	-0.001	1.141	-7.824
Max Fz	92	267:LOAD GEN	0.000	-16.196	0.029	0.023	0.016	-2.301	5.555
Min Fz	328	135:LOAD GEN	0.000	-17.073	0.028	-0.022	-0.016	1.991	5.658
Max Mx	92	48:LOAD GEN	0.000	-10.565	0.033	0.020	0.017	-1.638	5.156
Min Mx	328	355:LOAD GEN	0.000	-10.782	0.034	-0.020	-0.018	1.271	5.230
Max My	92	265:LOAD GEN	27.659	-15.059	0.031	0.023	0.017	5.308	-4.597
Min My	328	138:LOAD GEN	27.659	-15.368	0.031	-0.022	-0.017	-5.523	-4.651
Max Mz	80	264:LOAD GEN	0.000	-28.467	0.063	-0.016	-0.013	1.132	11.296
Min Mz	316	362:LOAD GEN	27.659	-7.977	0.063	0.007	0.013	2.481	-13.093



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	125	299:LOAD GEN	0.000	34.759	-0.018	-0.017	0.004	6.812	-0.899	
Min Fx	273	366:LOAD GEN	0.000	-22.389	0.038	0.005	-0.001	-0.043	3.368	
Max Fy	273	371:LOAD GEN	0.000	-21.559	0.040	0.005	-0.002	-0.715	3.625	
Min Fy	125	295:LOAD GEN	0.000	34.268	-0.018	-0.015	0.004	6.322	-1.339	
Max Fz	285	116:LOAD GEN	0.000	14.996	-0.008	0.042	-0.009	-12.799	-0.834	
Min Fz	137	286:LOAD GEN	0.000	14.082	-0.007	-0.039	0.008	11.636	-0.811	
Max Mx	137	265:LOAD GEN	0.000	-3.489	0.009	-0.028	0.012	10.749	0.382	
Min Mx	285	138:LOAD GEN	0.000	-3.283	0.009	0.030	-0.013	-11.855	0.401	
Max My	137	278:LOAD GEN	0.000	7.989	-0.002	-0.037	0.010	11.981	-0.603	
Min My	285	124:LOAD GEN	0.000	9.038	-0.003	0.040	-0.011	-13.188	-0.653	
Max Mz	125	301:LOAD GEN	27.659	34.594	-0.017	-0.018	0.004	1.076	5.035	
Min Mz	273	370:LOAD GEN	27.659	-21.844	0.040	0.005	-0.002	1.162	-9.530	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	272	366:LOAD GEN	0.000	22.361	-0.018	-0.010	0.000	1.543	-7.057
Min Fx	124	298:LOAD GEN	0.000	-34.716	0.036	-0.011	-0.005	1.248	8.560
Max Fy	124	281:LOAD GEN	0.000	-20.635	0.065	-0.010	-0.009	0.673	10.220
Min Fy	239	351:LOAD GEN	0.000	15.540	-0.050	0.005	0.001	-1.070	-4.370
Max Fz	190	310:LOAD GEN	0.000	-13.297	0.013	0.043	0.012	-2.621	1.482
Min Fz	222	92:LOAD GENI	0.000	-13.890	-0.012	-0.043	-0.012	8.215	-1.413
Max Mx	190	92:LOAD GENI	0.000	-10.173	0.020	0.041	0.013	-2.282	1.638
Min Mx	222	310:LOAD GEN	0.000	-10.880	-0.019	-0.041	-0.013	8.017	-3.209
Max My	222	94:LOAD GENI	0.000	-13.225	-0.014	-0.043	-0.012	8.242	-1.958
Min My	284	114:LOAD GEN	27.659	-16.138	0.031	-0.018	-0.012	-4.691	-4.687
Max Mz	124	287:LOAD GEN	0.000	-28.632	0.062	-0.013	-0.009	1.232	10.917
Min Mz	124	64:LOAD GENI	27.659	-10.952	0.061	-0.006	-0.009	-2.070	-12.083



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	187	329:LOAD GEN	0.000	22.971	-0.040	0.004	0.001	-1.088	-3.063	
Min Fx	237	340:LOAD GEN	0.000	-24.395	0.008	-0.015	-0.005	0.450	2.682	
Max Fy	237	107:LOAD GEN	0.000	-3.707	0.076	-0.004	-0.007	-0.818	5.928	
Min Fy	165	296:LOAD GEN	0.000	-2.540	-0.077	0.005	0.007	-1.920	-13.297	
Max Fz	242	333:LOAD GEN	0.000	-10.715	0.021	0.043	0.012	-2.584	2.492	
Min Fz	170	69:LOAD GEN	0.000	-11.354	-0.019	-0.041	-0.012	7.933	-2.308	
Max Mx	242	115:LOAD GEN	0.000	-7.065	0.032	0.040	0.013	-2.232	3.006	
Min Mx	170	288:LOAD GEN	0.000	-7.228	-0.032	-0.039	-0.012	7.642	-5.001	
Max My	242	332:LOAD GEN	20.839	-10.303	0.023	0.043	0.012	8.169	-3.047	
Min My	165	69:LOAD GEN	0.000	-21.611	-0.039	0.019	0.007	-4.118	-4.800	
Max Mz	237	360:LOAD GEN	20.839	-16.259	-0.055	0.006	0.002	0.870	10.649	
Min Mz	165	299:LOAD GEN	0.000	2.321	-0.075	-0.000	0.007	-1.018	-13.515	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	218	95:LOAD GENI	0.000	3.083	0.001	0.028	-0.393	3.181	0.050
Min Fx	218	340:LOAD GENI	0.000	-2.583	-0.001	0.003	0.609	-1.756	-0.087
Max Fy	166	320:LOAD GENI	0.000	-0.042	0.002	-0.005	0.478	0.033	0.119
Min Fy	238	82:LOAD GENI	0.000	-0.044	-0.002	0.002	-0.562	-0.263	-0.108
Max Fz	223	116:LOAD GENI	0.000	-0.383	-0.000	0.048	0.070	-2.561	-0.025
Min Fz	191	287:LOAD GENI	0.000	-0.342	-0.000	-0.047	-0.157	2.554	-0.026
Max Mx	223	89:LOAD GENI	0.000	1.167	0.001	0.036	1.062	-4.175	0.038
Min Mx	191	314:LOAD GENI	0.000	1.139	0.001	-0.036	-1.133	4.038	0.037
Max My	218	95:LOAD GENI	10.500	3.083	0.001	0.028	-0.393	6.671	-0.056
Min My	186	308:LOAD GENI	10.500	3.083	0.001	-0.027	0.331	-6.669	-0.060
Max Mz	166	320:LOAD GENI	0.000	-0.042	0.002	-0.005	0.478	0.033	0.119
Min Mz	166	321:LOAD GENI	10.500	-0.046	0.002	-0.003	0.464	-0.328	-0.110



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	370	602:LANE	0.000	-17.917	0.027	-0.466	-0.001	53.310	-1.297
Min Fx	389	602:LANE	0.000	-30.711	-0.158	1.078	-0.002	-125.567	-22.466
Max Fy	10	602:LANE	0.000	-30.009	0.160	-1.032	0.001	147.177	17.880
Min Fy	389	602:LANE	0.000	-30.711	-0.158	1.078	-0.002	-125.567	-22.466
Max Fz	389	602:LANE	0.000	-30.711	-0.158	1.078	-0.002	-125.567	-22.466
Min Fz	10	602:LANE	0.000	-30.009	0.160	-1.032	0.001	147.177	17.880
Max Mx	20	602:LANE	0.000	-23.508	0.113	0.895	0.006	-115.790	12.260
Min Mx	399	602:LANE	0.000	-22.803	-0.115	-0.850	-0.008	97.379	-16.178
Max My	10	602:LANE	0.000	-30.009	0.160	-1.032	0.001	147.177	17.880
Min My	389	602:LANE	0.000	-30.711	-0.158	1.078	-0.002	-125.567	-22.466
Max Mz	10	602:LANE	0.000	-30.009	0.160	-1.032	0.001	147.177	17.880
Min Mz	389	602:LANE	0.000	-30.711	-0.158	1.078	-0.002	-125.567	-22.466



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	327	602:LANE	0.000	-25.130	-0.073	-0.421	-0.007	49.295	-12.795
Min Fx	271	602:LANE	0.000	-38.791	0.008	0.352	-0.003	-38.993	-8.675
Max Fy	79	602:LANE	0.000	-33.531	0.102	-0.551	0.011	75.225	7.825
Min Fy	315	602:LANE	0.000	-33.994	-0.099	0.592	-0.010	-69.181	-17.526
Max Fz	315	602:LANE	0.000	-33.994	-0.099	0.592	-0.010	-69.181	-17.526
Min Fz	79	602:LANE	0.000	-33.531	0.102	-0.551	0.011	75.225	7.825
Max Mx	79	602:LANE	0.000	-33.531	0.102	-0.551	0.011	75.225	7.825
Min Mx	315	602:LANE	0.000	-33.994	-0.099	0.592	-0.010	-69.181	-17.526
Max My	315	602:LANE	21.000	-33.994	-0.099	0.592	-0.010	80.002	7.386
Min My	315	602:LANE	0.000	-33.994	-0.099	0.592	-0.010	-69.181	-17.526
Max Mz	79	602:LANE	0.000	-33.531	0.102	-0.551	0.011	75.225	7.825
Min Mz	79	602:LANE	21.000	-33.531	0.102	-0.551	0.011	-63.510	-17.789



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	235	602:LANE	0.000	-32.458	-0.028	-0.072	-0.001	5.457	-10.606
Min Fx	225	602:LANE	0.000	-43.566	-0.038	0.134	-0.004	-11.823	-14.320
Max Fy	173	602:LANE	0.000	-43.499	0.039	-0.102	0.004	18.054	-4.658
Min Fy	225	602:LANE	0.000	-43.566	-0.038	0.134	-0.004	-11.823	-14.320
Max Fz	225	602:LANE	0.000	-43.566	-0.038	0.134	-0.004	-11.823	-14.320
Min Fz	173	602:LANE	0.000	-43.499	0.039	-0.102	0.004	18.054	-4.658
Max Mx	173	602:LANE	0.000	-43.499	0.039	-0.102	0.004	18.054	-4.658
Min Mx	225	602:LANE	0.000	-43.566	-0.038	0.134	-0.004	-11.823	-14.320
Max My	225	602:LANE	21.000	-43.566	-0.038	0.134	-0.004	22.015	-4.698
Min My	183	602:LANE	0.000	-32.524	0.028	0.104	0.001	-16.543	-3.529
Max Mz	235	602:LANE	21.000	-32.458	-0.028	-0.072	-0.001	-12.565	-3.489
Min Mz	173	602:LANE	21.000	-43.499	0.039	-0.102	0.004	-7.654	-14.457



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	53	602:LANE	0.000	6.440	-0.047	-0.033	0.009	0.452	-2.511	
Min Fx	98	602:LANE	0.000	-11.942	-0.008	-0.018	0.001	0.169	-1.715	
Max Fy	375	602:LANE	0.000	-9.430	0.068	-0.029	-0.007	-0.781	2.061	
Min Fy	22	602:LANE	0.000	-9.442	-0.071	-0.047	0.006	4.324	-9.396	
Max Fz	215	602:LANE	0.000	-1.787	0.000	0.085	0.001	-6.852	0.029	
Min Fz	355	602:LANE	0.000	-4.674	0.029	-0.063	-0.001	1.788	4.945	
Max Mx	118	602:LANE	0.000	-8.485	-0.006	0.040	0.017	-4.130	-1.170	
Min Mx	310	602:LANE	0.000	-8.657	0.007	0.048	-0.020	-5.169	1.251	
Max My	266	602:LANE	18.000	-3.696	0.016	0.057	0.002	10.697	-2.916	
Min My	22	602:LANE	24.000	-9.442	-0.071	-0.047	0.006	-9.077	11.047	
Max Mz	22	602:LANE	24.000	-9.442	-0.071	-0.047	0.006	-9.077	11.047	
Min Mz	375	602:LANE	15.583	-9.430	0.068	-0.029	-0.007	-6.210	-10.700	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	11	602:LANE	0.000	55.047	-0.055	0.364	0.157	-89.915	-18.004
Min Fx	21	602:LANE	0.000	38.568	-0.033	0.081	-0.081	-0.700	-12.372
Max Fy	390	602:LANE	0.000	53.913	0.049	-0.088	-0.138	-2.698	1.390
Min Fy	11	602:LANE	0.000	55.047	-0.055	0.364	0.157	-89.915	-18.004
Max Fz	11	602:LANE	0.000	55.047	-0.055	0.364	0.157	-89.915	-18.004
Min Fz	390	602:LANE	0.000	53.913	0.049	-0.088	-0.138	-2.698	1.390
Max Mx	11	602:LANE	0.000	55.047	-0.055	0.364	0.157	-89.915	-18.004
Min Mx	390	602:LANE	0.000	53.913	0.049	-0.088	-0.138	-2.698	1.390
Max My	400	602:LANE	31.890	39.702	0.038	0.195	0.099	52.712	-12.853
Min My	11	602:LANE	0.000	55.047	-0.055	0.364	0.157	-89.915	-18.004
Max Mz	11	602:LANE	31.890	55.047	-0.055	0.364	0.157	49.536	3.094
Min Mz	11	602:LANE	0.000	55.047	-0.055	0.364	0.157	-89.915	-18.004



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	39	602:LANE	0.000	51.777	0.138	-0.192	-0.000	39.143	13.194
Min Fx	94	602:LANE	0.000	35.913	-0.046	0.029	0.004	-6.506	-13.187
Max Fy	39	602:LANE	0.000	51.777	0.138	-0.192	-0.000	39.143	13.194
Min Fy	361	602:LANE	0.000	50.959	-0.140	0.009	-0.005	-1.980	-23.534
Max Fz	82	602:LANE	0.000	49.944	-0.058	0.048	0.002	-11.093	-17.318
Min Fz	39	602:LANE	0.000	51.777	0.138	-0.192	-0.000	39.143	13.194
Max Mx	94	602:LANE	0.000	35.913	-0.046	0.029	0.004	-6.506	-13.187
Min Mx	372	602:LANE	0.000	37.401	-0.097	-0.084	-0.008	2.796	-16.592
Max My	39	602:LANE	0.000	51.777	0.138	-0.192	-0.000	39.143	13.194
Min My	372	602:LANE	22.033	37.401	-0.097	-0.084	-0.008	-19.540	9.181
Max Mz	361	602:LANE	22.033	50.959	-0.140	0.009	-0.005	0.488	13.385
Min Mz	361	602:LANE	0.000	50.959	-0.140	0.009	-0.005	-1.980	-23.534



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	126	602:LANE	0.000	56.802	0.048	-0.010	0.004	0.713	0.309
Min Fx	138	602:LANE	0.000	41.128	0.031	0.008	0.003	-2.090	-0.324
Max Fy	126	602:LANE	0.000	56.802	0.048	-0.010	0.004	0.713	0.309
Min Fy	274	602:LANE	0.000	56.616	-0.046	-0.002	-0.004	-1.019	-11.487
Max Fz	138	602:LANE	0.000	41.128	0.031	0.008	0.003	-2.090	-0.324
Min Fz	286	602:LANE	0.000	41.313	-0.033	-0.021	-0.002	0.765	-8.405
Max Mx	126	602:LANE	0.000	56.802	0.048	-0.010	0.004	0.713	0.309
Min Mx	274	602:LANE	0.000	56.616	-0.046	-0.002	-0.004	-1.019	-11.487
Max My	286	602:LANE	0.000	41.313	-0.033	-0.021	-0.002	0.765	-8.405
Min My	286	602:LANE	21.042	41.313	-0.033	-0.021	-0.002	-4.412	-0.028
Max Mz	126	602:LANE	0.000	56.802	0.048	-0.010	0.004	0.713	0.309
Min Mz	126	602:LANE	21.042	56.802	0.048	-0.010	0.004	-1.813	-11.785



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	174	602:LANE	0.000	64.293	0.072	0.005	0.004	-2.466	-7.033
Min Fx	184	602:LANE	0.000	46.755	0.050	0.008	0.003	-3.074	-5.401
Max Fy	174	602:LANE	0.000	64.293	0.072	0.005	0.004	-2.466	-7.033
Min Fy	226	602:LANE	0.000	64.198	-0.071	-0.003	-0.004	-1.250	-24.918
Max Fz	184	602:LANE	0.000	46.755	0.050	0.008	0.003	-3.074	-5.401
Min Fz	236	602:LANE	0.000	46.850	-0.051	-0.007	-0.003	-1.014	-18.250
Max Mx	174	602:LANE	0.000	64.293	0.072	0.005	0.004	-2.466	-7.033
Min Mx	226	602:LANE	0.000	64.198	-0.071	-0.003	-0.004	-1.250	-24.918
Max My	184	602:LANE	21.000	46.755	0.050	0.008	0.003	-0.973	-18.102
Min My	184	602:LANE	0.000	46.755	0.050	0.008	0.003	-3.074	-5.401
Max Mz	184	602:LANE	0.000	46.755	0.050	0.008	0.003	-3.074	-5.401
Min Mz	174	602:LANE	21.000	64.293	0.072	0.005	0.004	-1.209	-25.066



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	49	602:LANE	0.000	-14.841	-0.009	0.019	0.006	-2.261	-2.274
Min Fx	38	602:LANE	0.000	-20.943	-0.013	-0.024	-0.007	3.029	-3.306
Max Fy	49	602:LANE	0.000	-14.841	-0.009	0.019	0.006	-2.261	-2.274
Min Fy	38	602:LANE	0.000	-20.943	-0.013	-0.024	-0.007	3.029	-3.306
Max Fz	49	602:LANE	0.000	-14.841	-0.009	0.019	0.006	-2.261	-2.274
Min Fz	371	602:LANE	0.000	-15.300	-0.010	-0.027	-0.008	3.701	-2.492
Max Mx	49	602:LANE	0.000	-14.841	-0.009	0.019	0.006	-2.261	-2.274
Min Mx	371	602:LANE	0.000	-15.300	-0.010	-0.027	-0.008	3.701	-2.492
Max My	49	602:LANE	31.890	-14.841	-0.009	0.019	0.006	4.982	1.089
Min My	371	602:LANE	31.890	-15.300	-0.010	-0.027	-0.008	-6.706	1.287
Max Mz	38	602:LANE	31.890	-20.943	-0.013	-0.024	-0.007	-6.115	1.684
Min Mz	38	602:LANE	0.000	-20.943	-0.013	-0.024	-0.007	3.029	-3.306



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	81	602:LANE	0.000	10.033	-0.002	-0.002	-0.001	0.417	-0.264	
Min Fx	93	602:LANE	0.000	7.023	-0.001	-0.012	0.003	3.640	-0.172	
Max Fy	93	602:LANE	0.000	7.023	-0.001	-0.012	0.003	3.640	-0.172	
Min Fy	81	602:LANE	0.000	10.033	-0.002	-0.002	-0.001	0.417	-0.264	
Max Fz	329	602:LANE	0.000	7.316	-0.002	0.013	-0.005	-4.107	-0.182	
Min Fz	93	602:LANE	0.000	7.023	-0.001	-0.012	0.003	3.640	-0.172	
Max Mx	93	602:LANE	0.000	7.023	-0.001	-0.012	0.003	3.640	-0.172	
Min Mx	329	602:LANE	0.000	7.316	-0.002	0.013	-0.005	-4.107	-0.182	
Max My	93	602:LANE	0.000	7.023	-0.001	-0.012	0.003	3.640	-0.172	
Min My	329	602:LANE	0.000	7.316	-0.002	0.013	-0.005	-4.107	-0.182	
Max Mz	81	602:LANE	26.810	10.033	-0.002	-0.002	-0.001	-0.223	0.440	
Min Mz	81	602:LANE	0.000	10.033	-0.002	-0.002	-0.001	0.417	-0.264	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	92	602:LANE	0.000	-7.241	0.003	0.004	0.004	-0.189	0.736
Min Fx	80	602:LANE	0.000	-10.338	0.004	-0.001	-0.003	-0.207	1.107
Max Fy	80	602:LANE	0.000	-10.338	0.004	-0.001	-0.003	-0.207	1.107
Min Fy	92	602:LANE	0.000	-7.241	0.003	0.004	0.004	-0.189	0.736
Max Fz	92	602:LANE	0.000	-7.241	0.003	0.004	0.004	-0.189	0.736
Min Fz	328	602:LANE	0.000	-7.542	0.003	-0.004	-0.004	0.021	0.797
Max Mx	92	602:LANE	0.000	-7.241	0.003	0.004	0.004	-0.189	0.736
Min Mx	328	602:LANE	0.000	-7.542	0.003	-0.004	-0.004	0.021	0.797
Max My	92	602:LANE	27.659	-7.241	0.003	0.004	0.004	1.098	-0.132
Min My	328	602:LANE	27.659	-7.542	0.003	-0.004	-0.004	-1.203	-0.098
Max Mz	80	602:LANE	0.000	-10.338	0.004	-0.001	-0.003	-0.207	1.107
Min Mz	316	602:LANE	27.659	-10.037	0.004	0.002	0.002	0.587	-0.190



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	125	602:LANE	0.000	7.663	0.004	-0.003	0.000	0.772	0.773
Min Fx	137	602:LANE	0.000	5.361	0.003	-0.012	0.003	3.989	0.578
Max Fy	273	602:LANE	0.000	7.383	0.004	0.004	-0.001	-1.347	0.784
Min Fy	285	602:LANE	0.000	5.641	0.003	0.013	-0.004	-4.564	0.567
Max Fz	285	602:LANE	0.000	5.641	0.003	0.013	-0.004	-4.564	0.567
Min Fz	137	602:LANE	0.000	5.361	0.003	-0.012	0.003	3.989	0.578
Max Mx	137	602:LANE	0.000	5.361	0.003	-0.012	0.003	3.989	0.578
Min Mx	285	602:LANE	0.000	5.641	0.003	0.013	-0.004	-4.564	0.567
Max My	137	602:LANE	0.000	5.361	0.003	-0.012	0.003	3.989	0.578
Min My	285	602:LANE	0.000	5.641	0.003	0.013	-0.004	-4.564	0.567
Max Mz	273	602:LANE	0.000	7.383	0.004	0.004	-0.001	-1.347	0.784
Min Mz	273	602:LANE	27.659	7.383	0.004	0.004	-0.001	-0.006	-0.479



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	190	602:LANE	0.000	-2.546	-0.002	0.010	0.003	-0.496	-0.615
Min Fx	124	602:LANE	0.000	-7.626	0.007	-0.001	-0.002	-0.128	1.115
Max Fy	124	602:LANE	0.000	-7.626	0.007	-0.001	-0.002	-0.128	1.115
Min Fy	239	602:LANE	0.000	-3.799	-0.006	0.002	0.000	-0.318	-1.797
Max Fz	190	602:LANE	0.000	-2.546	-0.002	0.010	0.003	-0.496	-0.615
Min Fz	222	602:LANE	0.000	-2.748	0.003	-0.009	-0.003	1.904	0.044
Max Mx	190	602:LANE	0.000	-2.546	-0.002	0.010	0.003	-0.496	-0.615
Min Mx	222	602:LANE	0.000	-2.748	0.003	-0.009	-0.003	1.904	0.044
Max My	222	602:LANE	0.000	-2.748	0.003	-0.009	-0.003	1.904	0.044
Min My	284	602:LANE	27.659	-5.615	0.005	-0.002	-0.003	-0.939	-0.797
Max Mz	124	602:LANE	0.000	-7.626	0.007	-0.001	-0.002	-0.128	1.115
Min Mz	239	602:LANE	0.000	-3.799	-0.006	0.002	0.000	-0.318	-1.797



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	187	602:LANE	0.000	1.462	-0.007	0.001	0.000	-0.258	-1.211	
Min Fx	170	602:LANE	0.000	0.692	-0.003	-0.008	-0.003	1.757	-0.927	
Max Fy	219	602:LANE	0.000	1.253	0.006	-0.001	-0.001	0.043	0.376	
Min Fy	187	602:LANE	0.000	1.462	-0.007	0.001	0.000	-0.258	-1.211	
Max Fz	242	602:LANE	0.000	0.900	0.003	0.009	0.004	-0.456	-0.189	
Min Fz	170	602:LANE	0.000	0.692	-0.003	-0.008	-0.003	1.757	-0.927	
Max Mx	242	602:LANE	0.000	0.900	0.003	0.009	0.004	-0.456	-0.189	
Min Mx	170	602:LANE	0.000	0.692	-0.003	-0.008	-0.003	1.757	-0.927	
Max My	242	602:LANE	20.839	0.900	0.003	0.009	0.004	1.852	-1.008	
Min My	224	602:LANE	20.839	1.111	0.005	-0.002	-0.002	-0.627	-0.880	
Max Mz	187	602:LANE	20.839	1.462	-0.007	0.001	0.000	0.031	0.434	
Min Mz	165	602:LANE	0.000	1.197	-0.005	0.001	0.002	-0.365	-1.400	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	166	602:LANE	0.000	0.012	0.000	-0.001	-0.036	0.002	0.016
Min Fx	218	602:LANE	0.000	-0.245	0.000	0.003	0.013	0.027	0.002
Max Fy	166	602:LANE	0.000	0.012	0.000	-0.001	-0.036	0.002	0.016
Min Fy	238	602:LANE	0.000	0.012	-0.000	0.000	-0.008	0.001	-0.016
Max Fz	223	602:LANE	0.000	-0.198	0.000	0.016	0.165	-0.876	0.002
Min Fz	191	602:LANE	0.000	-0.198	0.000	-0.016	-0.199	0.840	0.002
Max Mx	223	602:LANE	0.000	-0.198	0.000	0.016	0.165	-0.876	0.002
Min Mx	191	602:LANE	0.000	-0.198	0.000	-0.016	-0.199	0.840	0.002
Max My	223	602:LANE	10.500	-0.198	0.000	0.016	0.165	1.195	-0.005
Min My	191	602:LANE	10.500	-0.198	0.000	-0.016	-0.199	-1.195	-0.004
Max Mz	166	602:LANE	0.000	0.012	0.000	-0.001	-0.036	0.002	0.016
Min Mz	166	602:LANE	10.500	0.012	0.000	-0.001	-0.036	-0.081	-0.017



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	389	402:LOAD GEN	0.000	0.162	0.000	-0.004	-0.000	-0.313	0.067
Min Fx	389	489:LOAD GEN	0.000	-9.311	-0.110	0.153	0.022	-17.418	-17.466
Max Fy	10	411:LOAD GEN	0.000	-8.178	0.140	-0.175	-0.017	28.574	12.341
Min Fy	389	493:LOAD GEN	0.000	-8.555	-0.139	0.189	0.016	-18.969	-22.898
Max Fz	20	502:LOAD GEN	0.000	-3.652	0.027	0.812	-0.107	-137.441	2.211
Min Fz	10	502:LOAD GEN	0.000	-3.666	0.026	-0.795	0.102	134.072	2.158
Max Mx	10	502:LOAD GEN	0.000	-3.666	0.026	-0.795	0.102	134.072	2.158
Min Mx	20	502:LOAD GEN	0.000	-3.652	0.027	0.812	-0.107	-137.441	2.211
Max My	10	502:LOAD GEN	0.000	-3.666	0.026	-0.795	0.102	134.072	2.158
Min My	20	502:LOAD GEN	0.000	-3.652	0.027	0.812	-0.107	-137.441	2.211
Max Mz	10	411:LOAD GEN	0.000	-8.178	0.140	-0.175	-0.017	28.574	12.341
Min Mz	359	493:LOAD GEN	21.000	-7.401	0.136	0.063	-0.026	11.161	-22.969



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	271	402:LOAD GEN	0.000	0.146	0.000	-0.008	0.000	0.820	0.034
Min Fx	271	471:LOAD GEN	0.000	-12.349	0.139	0.047	-0.057	-2.756	9.363
Max Fy	271	473:LOAD GEN	0.000	-12.112	0.156	0.038	-0.068	-1.635	13.116
Min Fy	123	431:LOAD GEN	0.000	-11.877	-0.155	-0.022	0.068	5.991	-26.165
Max Fz	91	547:LOAD GEN	0.000	-6.913	0.016	0.153	-0.007	-20.272	3.967
Min Fz	327	557:LOAD GEN	0.000	-6.951	-0.016	-0.156	0.007	18.728	-0.003
Max Mx	327	584:LOAD GEN	0.000	-9.982	0.082	-0.044	0.121	3.556	5.657
Min Mx	91	520:LOAD GEN	0.000	-9.927	-0.082	0.041	-0.121	-7.207	-15.094
Max My	315	456:LOAD GEN	21.000	-6.593	-0.010	0.152	-0.012	20.014	3.049
Min My	327	559:LOAD GEN	21.000	-7.250	-0.017	-0.156	0.000	-20.664	4.297
Max Mz	271	474:LOAD GEN	0.000	-11.859	0.153	0.033	-0.068	-1.123	13.627
Min Mz	271	472:LOAD GEN	21.000	-12.276	0.152	0.043	-0.066	8.560	-26.544



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	225	402:LOAD GEN	0.000	0.160	0.000	-0.010	0.000	1.130	0.039
Min Fx	235	555:LOAD GEN	0.000	-12.885	-0.040	-0.039	-0.075	2.569	-13.424
Max Fy	173	453:LOAD GEN	0.000	-12.221	0.108	-0.039	-0.092	7.377	6.974
Min Fy	225	451:LOAD GEN	0.000	-12.251	-0.108	0.055	0.093	-4.547	-20.297
Max Fz	183	570:LOAD GEN	0.000	-7.780	0.007	0.082	-0.010	-11.127	0.307
Min Fz	235	534:LOAD GEN	0.000	-7.772	-0.007	-0.084	0.010	9.750	-1.533
Max Mx	235	564:LOAD GEN	0.000	-11.605	0.081	0.009	0.162	-2.891	5.027
Min Mx	183	540:LOAD GEN	0.000	-11.594	-0.081	-0.012	-0.162	-0.263	-15.287
Max My	225	437:LOAD GEN	21.000	-8.196	0.008	0.080	-0.011	11.071	-0.818
Min My	235	536:LOAD GEN	21.000	-8.325	-0.002	-0.084	0.010	-11.471	0.115
Max Mz	225	464:LOAD GEN	0.000	-11.274	0.101	0.002	-0.094	1.703	7.705
Min Mz	173	452:LOAD GEN	21.000	-12.375	0.104	-0.036	-0.089	-2.069	-20.590



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	53	437:LOAD GEN	0.000	5.742	-0.025	0.008	0.002	-0.602	-0.824	
Min Fx	22	412:LOAD GEN	0.000	-11.902	0.005	-0.032	0.001	2.878	1.257	
Max Fy	334	471:LOAD GEN	0.000	-1.641	0.062	0.007	-0.004	-1.260	0.345	
Min Fy	54	434:LOAD GEN	0.000	-1.630	-0.062	0.001	0.000	-0.436	-0.478	
Max Fz	74	522:LOAD GEN	0.000	-5.745	0.007	0.059	-0.004	-1.811	0.405	
Min Fz	333	582:LOAD GEN	0.000	-4.977	-0.006	-0.060	-0.004	2.010	-0.374	
Max Mx	334	582:LOAD GEN	0.000	-1.731	-0.023	-0.055	0.015	3.926	0.058	
Min Mx	310	472:LOAD GEN	0.000	-1.263	-0.002	0.036	-0.015	-3.641	0.002	
Max My	34	512:LOAD GEN	24.000	-10.962	0.003	0.056	-0.001	10.969	-0.004	
Min My	333	582:LOAD GEN	18.000	-4.977	-0.006	-0.060	-0.004	-10.933	0.989	
Max Mz	335	470:LOAD GEN	0.000	-1.580	0.062	-0.018	-0.001	0.571	6.673	
Min Mz	55	434:LOAD GEN	0.000	-1.610	-0.062	-0.007	0.001	0.254	-6.782	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	11	416:LOAD GEN	0.000	16.688	-0.012	0.012	0.022	5.752	-9.327
Min Fx	390	402:LOAD GEN	0.000	-0.155	-0.000	0.028	0.002	-5.258	-0.079
Max Fy	390	470:LOAD GEN	0.000	12.034	0.014	0.037	-0.019	-4.074	2.774
Min Fy	11	434:LOAD GEN	0.000	12.541	-0.017	0.086	0.027	-13.705	-2.966
Max Fz	11	502:LOAD GEN	0.000	0.988	-0.002	1.208	0.294	-370.730	-1.677
Min Fz	21	502:LOAD GEN	0.000	1.032	-0.002	-1.239	-0.307	382.808	-1.702
Max Mx	11	502:LOAD GEN	0.000	0.988	-0.002	1.208	0.294	-370.730	-1.677
Min Mx	21	502:LOAD GEN	0.000	1.032	-0.002	-1.239	-0.307	382.808	-1.702
Max My	21	502:LOAD GEN	0.000	1.032	-0.002	-1.239	-0.307	382.808	-1.702
Min My	11	502:LOAD GEN	0.000	0.988	-0.002	1.208	0.294	-370.730	-1.677
Max Mz	11	433:LOAD GEN	31.890	12.718	-0.017	0.085	0.027	19.013	3.583
Min Mz	11	411:LOAD GEN	0.000	14.726	-0.015	0.109	0.046	-27.195	-12.614



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	39	424:LOAD GEN	0.000	15.488	0.073	-0.057	0.002	10.985	4.525
Min Fx	39	502:LOAD GEN	0.000	-0.150	-0.026	-0.390	-0.012	82.044	-4.100
Max Fy	318	483:LOAD GEN	0.000	14.023	0.087	0.004	0.001	-1.159	5.345
Min Fy	82	421:LOAD GEN	0.000	14.152	-0.087	0.012	-0.001	-3.440	-16.923
Max Fz	50	502:LOAD GEN	0.000	-0.137	-0.026	0.388	0.012	-81.447	-4.064
Min Fz	39	502:LOAD GEN	0.000	-0.150	-0.026	-0.390	-0.012	82.044	-4.100
Max Mx	50	502:LOAD GEN	0.000	-0.137	-0.026	0.388	0.012	-81.447	-4.064
Min Mx	39	502:LOAD GEN	0.000	-0.150	-0.026	-0.390	-0.012	82.044	-4.100
Max My	39	502:LOAD GEN	0.000	-0.150	-0.026	-0.390	-0.012	82.044	-4.100
Min My	50	502:LOAD GEN	0.000	-0.137	-0.026	0.388	0.012	-81.447	-4.064
Max Mz	361	471:LOAD GEN	22.033	13.266	-0.061	-0.012	-0.005	-3.622	8.206
Min Mz	82	422:LOAD GEN	0.000	14.494	-0.085	0.013	-0.001	-3.596	-17.130



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	138	534:LOAD GEN	0.000	16.731	-0.040	0.004	-0.001	-0.252	-10.613	
Min Fx	274	402:LOAD GEN	0.000	-0.068	0.000	-0.001	0.000	0.097	0.058	
Max Fy	126	444:LOAD GEN	0.000	14.184	0.075	0.000	0.004	-0.574	5.198	
Min Fy	274	460:LOAD GEN	0.000	14.096	-0.073	-0.006	-0.004	-0.096	-13.480	
Max Fz	138	502:LOAD GEN	0.000	-0.029	-0.001	0.024	0.000	-4.790	-0.230	
Min Fz	126	502:LOAD GEN	0.000	-0.004	-0.001	-0.024	0.000	4.882	-0.241	
Max Mx	126	449:LOAD GEN	0.000	12.859	0.056	0.001	0.004	-0.493	5.444	
Min Mx	274	455:LOAD GEN	0.000	12.770	-0.054	-0.006	-0.004	0.029	-8.459	
Max My	126	502:LOAD GEN	0.000	-0.004	-0.001	-0.024	0.000	4.882	-0.241	
Min My	138	502:LOAD GEN	0.000	-0.029	-0.001	0.024	0.000	-4.790	-0.230	
Max Mz	126	447:LOAD GEN	0.000	13.367	0.067	0.001	0.004	-0.527	5.897	
Min Mz	126	443:LOAD GEN	21.042	14.476	0.072	0.000	0.004	-0.510	-13.777	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	184	547:LOAD GEN	0.000	18.446	0.008	0.000	-0.001	0.074	-8.361
Min Fx	226	402:LOAD GEN	0.000	-0.076	0.000	-0.001	-0.000	0.173	0.053
Max Fy	174	454:LOAD GEN	0.000	17.028	0.080	0.004	0.005	-1.662	2.495
Min Fy	226	450:LOAD GEN	0.000	16.983	-0.079	-0.003	-0.005	-0.742	-17.476
Max Fz	184	439:LOAD GEN	0.000	5.508	-0.010	0.006	-0.002	-2.062	-3.212
Min Fz	184	502:LOAD GEN	0.000	-0.008	0.000	-0.006	-0.000	1.159	0.013
Max Mx	184	456:LOAD GEN	0.000	5.548	0.018	0.004	0.006	-1.649	0.040
Min Mx	236	448:LOAD GEN	0.000	5.593	-0.018	-0.003	-0.006	-0.751	-4.447
Max My	184	502:LOAD GEN	0.000	-0.008	0.000	-0.006	-0.000	1.159	0.013
Min My	184	442:LOAD GEN	0.000	5.824	-0.008	0.006	-0.001	-2.117	-3.609
Max Mz	226	447:LOAD GEN	21.000	15.994	-0.070	-0.003	-0.005	-1.378	3.279
Min Mz	174	453:LOAD GEN	21.000	17.308	0.078	0.004	0.005	-0.726	-17.889



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	360	494:LOAD GEN	0.000	4.344	0.014	-0.004	0.000	0.784	1.750	
Min Fx	38	426:LOAD GEN	0.000	-8.564	-0.003	-0.012	-0.004	1.451	-0.809	
Max Fy	360	489:LOAD GEN	0.000	1.064	0.017	0.003	0.002	-0.109	2.030	
Min Fy	38	434:LOAD GEN	0.000	-7.084	-0.016	-0.002	0.001	0.278	-2.501	
Max Fz	49	522:LOAD GEN	0.000	-6.459	0.007	0.027	0.011	-3.455	0.583	
Min Fz	371	582:LOAD GEN	0.000	-6.431	0.007	-0.027	-0.011	3.365	0.594	
Max Mx	49	522:LOAD GEN	0.000	-6.459	0.007	0.027	0.011	-3.455	0.583	
Min Mx	371	582:LOAD GEN	0.000	-6.431	0.007	-0.027	-0.011	3.365	0.594	
Max My	49	522:LOAD GEN	31.890	-6.459	0.007	0.027	0.011	6.979	-2.255	
Min My	371	582:LOAD GEN	31.890	-6.431	0.007	-0.027	-0.011	-6.871	-2.266	
Max Mz	38	434:LOAD GEN	31.890	-7.084	-0.016	-0.002	0.001	-0.422	3.470	
Min Mz	360	489:LOAD GEN	31.890	1.064	0.017	0.003	0.002	1.013	-4.398	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	81	436:LOAD GEN	0.000	5.622	-0.006	-0.004	0.001	1.325	-0.868
Min Fx	317	485:LOAD GEN	0.000	-4.119	0.007	0.001	0.000	0.032	0.419
Max Fy	317	487:LOAD GEN	0.000	-3.917	0.007	0.001	-0.000	-0.022	0.513
Min Fy	81	434:LOAD GEN	0.000	5.354	-0.006	-0.003	0.001	1.241	-1.019
Max Fz	329	470:LOAD GEN	0.000	1.471	-0.002	0.008	-0.002	-2.236	-0.262
Min Fz	93	434:LOAD GEN	0.000	1.340	-0.002	-0.007	0.001	2.016	-0.258
Max Mx	317	582:LOAD GEN	0.000	-2.500	0.004	-0.002	0.003	1.388	0.051
Min Mx	81	522:LOAD GEN	0.000	-2.518	0.004	0.002	-0.003	-1.356	0.051
Max My	93	433:LOAD GEN	0.000	1.225	-0.001	-0.007	0.001	2.018	-0.264
Min My	329	471:LOAD GEN	0.000	1.355	-0.002	0.008	-0.002	-2.238	-0.268
Max Mz	81	436:LOAD GEN	26.810	5.622	-0.006	-0.004	0.001	0.195	1.138
Min Mz	317	486:LOAD GEN	26.810	-4.067	0.007	0.001	-0.000	0.367	-1.831



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	316	485:LOAD GEN	0.000	4.284	-0.002	-0.003	-0.000	0.416	-1.289	
Min Fx	80	436:LOAD GEN	0.000	-5.844	0.008	-0.002	-0.001	0.201	1.841	
Max Fy	80	431:LOAD GEN	0.000	-4.138	0.014	-0.002	-0.002	0.163	2.283	
Min Fy	316	490:LOAD GEN	0.000	3.203	-0.005	-0.001	-0.000	0.164	-1.397	
Max Fz	316	571:LOAD GEN	0.000	-4.142	0.010	0.006	0.005	-0.597	1.801	
Min Fz	80	533:LOAD GEN	0.000	-4.120	0.010	-0.006	-0.004	0.609	1.796	
Max Mx	316	572:LOAD GEN	0.000	-3.702	0.011	0.006	0.005	-0.563	1.775	
Min Mx	80	532:LOAD GEN	0.000	-3.680	0.011	-0.006	-0.005	0.575	1.770	
Max My	316	572:LOAD GEN	27.659	-3.702	0.011	0.006	0.005	1.488	-1.754	
Min My	80	532:LOAD GEN	27.659	-3.680	0.011	-0.006	-0.005	-1.480	-1.756	
Max Mz	80	432:LOAD GEN	0.000	-4.775	0.014	-0.003	-0.002	0.213	2.366	
Min Mz	316	474:LOAD GEN	27.659	-3.226	0.014	0.002	0.002	0.515	-2.519	



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Job Title	Part	Job No	Sheet No	Rev
			1	
	Ref			
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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	125	446:LOAD GEN	0.000	5.706	-0.003	-0.004	0.001	1.736	-0.296
Min Fx	273	476:LOAD GEN	0.000	-3.992	0.006	0.002	-0.001	-0.262	0.519
Max Fy	273	479:LOAD GEN	0.000	-3.594	0.007	0.002	-0.001	-0.439	0.605
Min Fy	125	445:LOAD GEN	0.000	5.652	-0.003	-0.004	0.001	1.686	-0.350
Max Fz	285	461:LOAD GEN	0.000	1.442	-0.001	0.009	-0.002	-2.639	-0.091
Min Fz	137	443:LOAD GEN	0.000	1.311	-0.001	-0.008	0.001	2.367	-0.086
Max Mx	273	572:LOAD GEN	0.000	-2.231	0.003	-0.003	0.002	1.755	0.209
Min Mx	285	471:LOAD GEN	0.000	-0.437	0.001	0.005	-0.002	-2.006	0.039
Max My	137	442:LOAD GEN	0.000	1.178	-0.001	-0.008	0.001	2.371	-0.086
Min My	285	462:LOAD GEN	0.000	1.308	-0.001	0.008	-0.002	-2.643	-0.091
Max Mz	125	447:LOAD GEN	27.659	5.672	-0.003	-0.005	0.001	0.212	0.830
Min Mz	273	479:LOAD GEN	27.659	-3.594	0.007	0.002	-0.001	0.119	-1.555



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	272	476:LOAD GEN	0.000	3.990	-0.002	-0.002	-0.000	0.271	-1.098	
Min Fx	124	446:LOAD GEN	0.000	-5.709	0.008	-0.002	-0.001	0.238	1.741	
Max Fy	124	441:LOAD GEN	0.000	-4.202	0.013	-0.002	-0.001	0.208	2.085	
Min Fy	217	455:LOAD GEN	0.000	-3.048	-0.009	0.001	0.001	-0.317	-1.569	
Max Fz	217	552:LOAD GEN	0.000	-3.652	-0.006	0.010	0.003	-1.957	-0.814	
Min Fz	185	552:LOAD GEN	0.000	-3.637	0.006	-0.010	-0.003	0.509	0.575	
Max Mx	272	562:LOAD GEN	0.000	-3.768	0.010	0.005	0.003	-0.464	1.670	
Min Mx	124	542:LOAD GEN	0.000	-3.747	0.010	-0.005	-0.003	0.474	1.664	
Max My	190	552:LOAD GEN	20.839	-4.195	0.006	0.009	0.003	1.847	-0.945	
Min My	217	552:LOAD GEN	0.000	-3.652	-0.006	0.010	0.003	-1.957	-0.814	
Max Mz	124	442:LOAD GEN	0.000	-4.783	0.013	-0.002	-0.001	0.252	2.146	
Min Mz	124	440:LOAD GEN	27.659	-3.480	0.013	-0.002	-0.001	-0.432	-2.268	



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Job Title	Part	Job No	Sheet No	Rev
			1	
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Client	File	MAIN_32ftRDWY.std	Date/Time	25-Mar-2014 13:42

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	165	456:LOAD GEN	0.000	3.846	-0.004	-0.004	-0.000	0.681	-1.269	
Min Fx	237	465:LOAD GEN	0.000	-4.392	0.005	-0.002	-0.001	0.025	0.760	
Max Fy	237	458:LOAD GEN	0.000	-1.452	0.014	-0.000	-0.001	-0.166	1.186	
Min Fy	165	446:LOAD GEN	0.000	-1.353	-0.014	0.000	0.001	-0.238	-2.279	
Max Fz	165	542:LOAD GEN	0.000	-2.979	-0.008	0.010	0.003	-1.972	-1.194	
Min Fz	237	562:LOAD GEN	0.000	-2.963	0.008	-0.010	-0.003	0.538	0.921	
Max Mx	165	542:LOAD GEN	0.000	-2.979	-0.008	0.010	0.003	-1.972	-1.194	
Min Mx	237	562:LOAD GEN	0.000	-2.963	0.008	-0.010	-0.003	0.538	0.921	
Max My	170	542:LOAD GEN	0.000	-3.431	-0.010	-0.009	-0.003	1.886	-1.388	
Min My	237	562:LOAD GEN	20.839	-2.963	0.008	-0.010	-0.003	-1.979	-1.200	
Max Mz	237	474:LOAD GEN	20.839	-2.381	-0.011	0.002	0.001	0.378	2.078	
Min Mz	165	447:LOAD GEN	0.000	-0.544	-0.014	-0.000	0.001	-0.093	-2.310	



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Job Title	Part	Job No	Sheet No	Rev
			1	
	Ref			
	By	Date 03-Feb-14	Chd	

Client File MAIN_32ftRDWY.std Date/Time 25-Mar-2014 13:42

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	186	452:LOAD GEN	0.000	0.887	0.000	-0.008	0.046	-0.659	0.010
Min Fx	218	464:LOAD GEN	0.000	-0.602	-0.000	0.002	0.132	-0.435	-0.014
Max Fy	166	456:LOAD GEN	0.000	-0.007	0.000	-0.002	0.094	0.007	0.020
Min Fy	238	448:LOAD GEN	0.000	-0.007	-0.000	0.001	-0.115	-0.146	-0.017
Max Fz	223	460:LOAD GEN	0.000	-0.026	-0.000	0.009	0.026	-0.438	-0.002
Min Fz	191	444:LOAD GEN	0.000	-0.027	-0.000	-0.009	-0.042	0.420	-0.002
Max Mx	238	563:LOAD GEN	0.000	0.019	0.000	0.002	0.256	-0.291	0.006
Min Mx	166	541:LOAD GEN	0.000	0.019	-0.000	-0.002	-0.253	-0.006	-0.007
Max My	218	452:LOAD GEN	10.500	0.887	0.000	0.009	-0.062	1.724	-0.010
Min My	186	452:LOAD GEN	10.500	0.887	0.000	-0.008	0.046	-1.724	-0.011
Max Mz	166	456:LOAD GEN	0.000	-0.007	0.000	-0.002	0.094	0.007	0.020
Min Mz	166	456:LOAD GEN	10.500	-0.007	0.000	-0.002	0.094	-0.185	-0.018

APPROACH TRUSS: 32'-0" CURB-TO-CURB WIDTH, 30ksi STEEL

$$\text{Impact Factor } \frac{50}{L+125} = 0.222$$

Section	CAPACITY						DEMAND						DEMAND/CAPACITY	
	A (gross)	A (net)	Ref. Sect.	Yielding (kip)	Fracture (kip)	Buckling (kip)	DL Effects (Tension, kip)	LL Effects (Tension, w/o impact, kip)	DL Effects (Compression, kip)	LL Effects (Compression, w/o impact, kip)	Combined Tension, w/ impact (kip)	Combined Compression, w/ impact (kip)	Demand / Capacity Ratio (Tension)	Demand / Capacity Ratio (Compression)
(2) 12C30	17.58	15.8	1	316.44	474		182.292	71.596			269.798		0.853	
(2) 12C40	23.46	20.82	2	422.28	624.6		203.014	77.621			297.884		0.705	
(1) 10W37	10.88	9.14	3	195.84	274.2		51.212	37.649			97.227		0.496	
(1) 10W23	6.77	5.4	4	121.86	162	108.32	55.426	39.586		19.164	103.809	23.423	0.852	0.216
(1) 10W21	6.19	5	5	111.42	150	33.973	1.825	17.095		15.755	22.719	19.256	0.204	0.567
(2) 15C33.9, (1) PL 18 x 3/8	26.55	26.55	6	477.9		399.352			252.575	96.951	0.000	371.071	0.000	0.929

APPROACH TRUSS: 32'-0" CURB-TO-CURB WIDTH, 30ksi STEEL

$$\text{Impact Factor } \frac{50}{L+125} = 0.222$$

Section	CAPACITY						DEMAND (LANE LOADING)						DEMAND/CAPACITY	
	A (gross)	A (net)	Ref. Sect.	Yielding (kip)	Fracture (kip)	Buckling (kip)	DL Effects (Tension, kip)	LL Effects (Tension, w/o impact, kip)	DL Effects (Compression, kip)	LL Effects (Compression, w/o impact, kip)	Combined Tension, w/ impact (kip)	Combined Compression, w/ impact (kip)	Demand / Capacity Ratio (Tension)	Demand / Capacity Ratio (Compression)
(2) 12C30	17.58	15.8	1	316.44	474		182.292	90.254		0.000	292.602		0.925	
(2) 12C40	23.46	20.82	2	422.28	624.6		203.014	97.672		0.073	322.391		0.763	
(1) 10W37	10.88	9.14	3	195.84	274.2		51.212	41.232		2.701	101.607		0.519	
(1) 10W23	6.77	5.4	4	121.86	162	108.32	55.426	39.000		15.003	103.093	18.337	0.846	0.169
(1) 10W21	6.19	5	5	111.42	150	33.973	1.825	12.183		10.770	16.715	13.163	0.150	0.387
(2) 15C33.9, (1) PL 18 x 3/8	26.55	26.55	6	477.9		399.352		0.094	252.575	123.196	0.115	403.148	0.000	1.010

MAIN TRUSS: 32'-0" CURB-TO-CURB WIDTH, 30ksi STEEL, TRUCK LOADING

$$\text{Impact Factor } \frac{50}{L+125} = 0.149$$

Section					CAPACITY			DEMAND					DEMAND/CAPACITY		
	A (gross)	A (net)	Ref. Sect.		Yielding (kip)	Fracture (kip)	Buckling (kip)	DL Effects (Tension, kip)	LL Effects (Tension, w/o impact, kip)	DL Effects (Compression, kip)	LL Effects (Compression, w/o impact, kip)	Combined Tension, w/ impact (kip)	Combined Compression, w/ impact (kip)	Demand / Capacity Ratio (Tension)	Demand / Capacity Ratio (Compression)
(2) 15C33.9	19.8	17.3	1		356.4	519		197.743	59.472			266.091		0.747	
(2) 15C50	29.28	26.42	2		527.04	792.6		254.383	79.526			345.779		0.656	
(2) 15C55	32.22	28.96	3		579.96	868.8		288.130	83.647			384.262		0.663	
(1) 10W37	10.88	9.14	4		195.84	274.2	116.184	72.648	61.415	48.549	34.509	143.229	88.209	0.731	0.759
(2) 15C55, (1) PL 19 x 9/16	42.91		5		772.38		615.73			352.047	106.305		474.218	0.000	0.770
(2) 15C33.9, (1) PL 19 x 7/16	28.11		6		505.98		438.187			332.373	99.802		447.071	0.000	1.020
(2) 15C40, (1) PL 19 x 7/16	31.71		7		570.78		494.021			369.304	108.810		494.354	0.000	1.001
(2) 15C45, (1) PL 19 x 1/2	35.84		8		645.12		558.685			419.023	120.860		557.922	0.000	0.999
(1) 10W41	12.06	9.83	9		217.08	294.9	106.469	136.200	52.891		16.924	196.985	19.450	0.907	0.183
(2) 9C15	8.78		10		158.04		118.352		21.772	65.865	34.530	25.022	105.549	0.158	0.892
(1) 10W23	6.77	5.21	11		121.86	156.3		67.444	35.000		22.616	107.668	25.992	0.884	
(2) 9C13.4	7.78		12		140.04		99.14		22.389	50.359	34.759	25.731	90.306	0.184	0.911
(1) 10W21	6.19	4.83	13		111.42	144.9		50.044	34.716		22.361	89.941	25.698	0.807	
(1) 10W21	6.19	4.83	14		111.42	144.9	33.973		24.395	10.561	22.971	28.036	36.961	0.252	1.088
(2) 6C8.2	4.78	3.24	15		86.04	97.2	23.9	1.448	2.583	0.076	3.083	4.417	3.619	0.051	0.151

MAIN TRUSS: 32'-0" CURB-TO-CURB WIDTH, 30ksi STEEL, LANE LOADING

$$\text{Impact Factor } \frac{50}{L+125} = 0.149$$

Section	CAPACITY						DEMAND (LANE LOADING)						DEMAND/CAPACITY	
	A (gross)	A (net)	Ref. Sect.	Yielding (kip)	Fracture (kip)	Buckling (kip)	DL Effects (Tension, kip)	LL Effects (Tension, w/o impact, kip)	DL Effects (Compression, kip)	LL Effects (Compression, w/o impact, kip)	Combined Tension, w/ impact (kip)	Combined Compression, w/ impact (kip)	Demand / Capacity Ratio (Tension)	Demand / Capacity Ratio (Compression)
(2) 15C33.9	19.8	17.3	1	356.4	519		197.743	55.561		0.235	261.597		0.734	
(2) 15C50	29.28	26.42	2	527.04	792.6		254.383	71.788		0.182	336.886		0.639	
(2) 15C55	32.22	28.96	3	579.96	868.8		288.130	77.330		0.163	377.002		0.650	
(1) 10W37	10.88	9.14	4	195.84	274.2	116.184	72.648	43.610	48.549	21.711	122.767	73.500	0.627	0.633
(2) 15C55, (1) PL 19 x 9/16	42.91		5	772.38		615.73		0.233	352.047	99.480		466.375	0.000	0.757
(2) 15C33.9, (1) PL 19 x 7/16	28.11		6	505.98		438.187		0.253	332.373	93.024		439.281	0.000	1.002
(2) 15C40, (1) PL 19 x 7/16	31.71		7	570.78		494.021		0.103	369.304	101.465		485.913	0.000	0.984
(2) 15C45, (1) PL 19 x 1/2	35.84		8	645.12		558.685		0.114	419.023	113.011		548.901	0.000	0.982
(1) 10W41	12.06	9.83	9	217.08	294.9	106.469	136.200	43.731		11.522	186.458	13.242	0.859	0.124
(2) 9C15	8.78		10	158.04		118.352		20.981	65.865	14.959	24.112	83.057	0.153	0.702
(1) 10W23	6.77	5.21	11	121.86	156.3		67.444	25.893		11.373	97.202	13.070	0.798	
(2) 9C13.4	7.78		12	140.04		99.14		10.604	50.359	22.854	12.187	76.624	0.087	0.773
(1) 10W21	6.19	4.83	13	111.42	144.9		50.044	22.828		10.587	76.279	12.167	0.685	
(1) 10W21	6.19	4.83	14	111.42	144.9	33.973		11.675	10.561	11.688	13.418	23.993	0.120	0.706
(2) 6C8.2	4.78	3.24	15	86.04	97.2	23.9	1.448	1.849	0.076	2.357	3.573	2.785	0.042	0.117

APPENDIX C

Alternative 2(b) – Opinion of Probable Costs
and Quantity Calculations

ALTERNATIVE 2B

COSTS

ALTERNATIVE 2(b)				
Superstructure				
Item	Unit	Quantity	Unit Price	Total Dollars
Barriers	LF		\$250.00	\$0
Deck	CY		\$900.00	\$0
Deck Reinforcing Steel	LB		\$2.00	\$0
Deck Grooving	SY		\$5.00	\$0
Stringers	LB		\$3.00	\$0
Floorbeams				
End Floorbeams	LB		\$4.00	\$0
Interior Floorbeams	LB		\$4.00	\$0
Sidewalk Rehabilitation				
Stringers	LB	36,160	\$3.00	\$108,480
Pedestrian Railing	LF	820	\$400.00	\$328,000
Concrete	CY	57	\$900.00	\$51,300
Reinforcing Steel	LB	11,300	\$2.00	\$22,600
Truss Repairs				
Added Steel Sections	LB		\$10.00	\$0
Gusset Plates	EA		\$20,000.00	\$0
New Bracing	LB	36,160	\$5.00	\$180,800
Expansion Joints	LF		\$700.00	\$0
Approach Slabs	SY	156	\$200.00	\$31,200
Substructure				
Item	Unit	Quantity	Unit Price	Total Dollars
New Steel Bearings	EA	12	\$10,000.00	\$120,000
Pier Repairs (quantities for repairs only)				
End Bents (Concrete)	CY	2	\$900.00	\$1,800
End Bent Reinf. Steel	LB	500	\$2.00	\$1,000
Intermediate Pier (Conc.)	CY	6	\$900.00	\$5,400
Int. Pier Reinf. Steel	LB	500	\$2.00	\$1,000
Steel Piles	LF		\$90.00	\$0
General				
Item	Unit	Quantity	Unit Price	Total Dollars
Engineering Design	LS	1	\$500,000.00	\$500,000
Removal of Deck	LS	1	\$100,000.00	\$100,000
Removal/Reinstallation of Trusses	LS	1	\$500,000.00	\$500,000
Clean and Paint Steel	LS	1	\$655,000.00	\$655,000
Mobilization (15%)	LS	1	\$316,000.00	\$316,000
Maintenance of Traffic (3%)	LS	1	\$78,200.00	\$78,200
SUBTOTAL =				\$3,000,780
CONTINGENCY (20%) =				\$600,200
TRUSS REHABILITATION TOTAL =				\$3,600,980
NEW STRINGER BRIDGE TOTAL =				\$2,870,000
TOTAL =				\$6,470,980
USE				\$6,500,000
Note: Unit costs obtained from ODOT 2013/2015 bid history, Contractor bid tabulations for other TranSystems truss rehabilitation projects, and Engineering judgment.				

SQUARE FOOTAGE OF TRUSS MEMBERS (32' RDWY)			
Approach Spans (1/4)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	100.00	8.8	880
Top Chord	105.33	8.8	927
Verticals/Diagonals	140.34	3.5	491
Floor System			
Stringers		4.8	0
Floorbeams		9.9	0
Cantilevered Sidewalks			
Stringers	200.00	3.0	600
Brackets	36.00	5.0	180
Rails	100.00	6.8	683
SUBTOTAL =			3,761 SF
Factor for Lacing/Connections =			20%
TOTAL =			4,514 SF

Main Span (1/2)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	210.00	8.8	1,848
Top Chord	235.00	8.8	2,068
Verticals/Diagonals	631.60	3.5	2,211
Bracing			
Portal	34.83	8.8	307
Lateral	569.20	1.7	949
Cross	243.83	1.1	268
Floor System			
Stringers		4.8	0
Floorbeams		9.9	0
Cantilevered Sidewalks			
Stringers	420.00	3.0	1,260
Brackets	66.00	5.0	330
Rails	210.00	6.8	1,435
SUBTOTAL =			10,675 SF
Factor for Lacing/Connections =			20%
TOTAL =			12,810 SF

Total Cost to Clean and Paint Structure (32' RDWY)	
Cost Per Square Foot	\$15.00 /SF
Square Footage	
Approaches	18,055 SF
Main	25,620 SF
COST TO CLEAN AND PAINT =	\$655,000

New Bridge Construction Cost							
24'-0" ROADWAY				32'-0" ROADWAY			
	Distance	Length	Area		Distance	Length	Area
	FT	FT	SF		FT	FT	SF
Curb-to-Curb	24			Curb-to-Curb	32		
Barrier	3			Barrier	3		
Sidewalk	0			Sidewalk	0		
Out-to-Out	27	410	11,070	Out-to-Out	35	410	14,350
Total Square Footage (SF)			11,070	Total Square Footage (SF)			14,350
\$/SF (Low Estimate)			\$135	\$/SF (Low Estimate)			\$135
New Bridge Cost (Low)		\$1,494,450		New Bridge Cost (Low)		\$1,937,250	
\$/SF (High Estimate)			\$200	\$/SF (High Estimate)			\$200
New Bridge Cost (High)		\$2,214,000		New Bridge Cost (High)		\$2,870,000	

APPENDIX D

Alternative 3(a) – Opinion of Probable Costs
and Quantity Calculations

ALTERNATIVE 3A

COSTS

ALTERNATIVE 3(a)				
Superstructure				
Item	Unit	Quantity	Unit Price	Total Dollars
Barriers	LF	820	\$250.00	\$205,000
Deck	CY	240	\$900.00	\$216,000
Deck Reinforcing Steel	LB	63,500	\$2.00	\$127,000
Deck Grooving	SY	490	\$5.00	\$2,450
Stringers	LB	129,150	\$5.00	\$645,750
Floorbeams				
End Floorbeams	LB	19,610	\$6.00	\$117,660
Interior Floorbeams	LB	105,840	\$6.00	\$635,040
Sidewalk Rehabilitation				
Stringers	LB	36,160	\$5.00	\$180,800
Pedestrian Railing	LF	820	\$400.00	\$328,000
Concrete	CY	57	\$900.00	\$51,300
Reinforcing Steel	LB	11,300	\$2.00	\$22,600
Truss Repairs				
Added Steel Sections	LB		\$10.00	\$0
Gusset Plates	EA	12	\$25,000.00	\$300,000
New Bracing	LB	22,760	\$5.00	\$113,800
Expansion Joints	LF	140	\$700.00	\$98,000
Approach Slabs	SY	156	\$200.00	\$31,200
Substructure				
Item	Unit	Quantity	Unit Price	Total Dollars
New Steel Bearings	EA	12	\$10,000.00	\$120,000
Pier Repairs (quantities for repairs only)				
End Bents (Concrete)	CY	2	\$900.00	\$1,800
End Bent Reinf. Steel	LB	500	\$2.00	\$1,000
Intermediate Pier (Conc.)	CY	6	\$900.00	\$5,400
Int. Pier Reinf. Steel	LB	500	\$2.00	\$1,000
Steel Piles	LF		\$90.00	\$0
General				
Item	Unit	Quantity	Unit Price	Total Dollars
Engineering Design	LS	1	\$400,000.00	\$400,000
Removal of Deck	LS	1	\$100,000.00	\$100,000
Clean and Paint Steel	LS	1	\$967,000.00	\$967,000
Mobilization (15%)	LS	1	\$640,600.00	\$640,600
Maintenance of Traffic (3%)	LS	1	\$140,100.00	\$140,100
			SUBTOTAL =	\$5,451,500
			CONTINGENCY (20%) =	\$1,090,300
			TOTAL =	\$6,541,800
			USE	\$6,500,000
Note: Unit costs obtained from ODOT 2013/2015 bid history, Contractor bid tabulations for other TranSystems truss rehabilitation projects, and Engineering judgment.				

Replacement of portal bracing members					
	Area	Addt.	Length	Quantity	Steel Qty
	SI	%	FT	EA	LB
Cross Frames	11.47	0	26.83	7	7,330
	15.03	25	26.83	7	12,007
Lateral Bracing	6.93	10	26.83	0	0
Portal Bracing	7.12	80	26.83	2	2,340

Subtotal, adding 5% for new connections and bolts = 22,761

New flooring system				
	Quantity	Length	Unit Weight	Steel Qty
	EA	FT	LB/FT	LB
End Floorbeams	6	26.83	116	18,674
Interior Floorbeams	17	26.83	221	100,800
Stringers	6	410	50	123,000

Subtotal, adding 5% for new connections and bolts = 254,598

Sidewalk Rehabilitation				
	Quantity	Length	Unit Weight	Steel Qty
	EA	FT	LB/FT	LB
Stringers	4	410	21	34,440

Subtotal, adding 5% for new connections and bolts = 36,162

CONCRETE & REINF. STEEL QUANTITIES	Thickness (in)	Width (ft)	Length (ft)	Concrete (cf)	% Reinf. (assumed)	Reinforcing Steel (lb)
Deck Concrete	7.5	25	410	240	2	63,500
	Assumed 7.5" deck					
Sidewalk Concrete	4.5	10	410	57	1.5	11,300
	Assumed 4.5" deck, 5' sidewalk each side					

LINEAR MEASURE ITEMS	Length (ft)	Quantity (ea)	Total (ft)
Expansion Joint	35	4	140

AREA MEASURE ITEMS	Length (ft)	Width (ft)	Total (sy)
Replace Approach Slabs	40	35	156

SQUARE FOOTAGE OF TRUSS MEMBERS (24' RDWY)			
Approach Spans (1/4)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	100.00	8.8	880
Top Chord	105.33	8.8	927
Verticals/Diagonals	140.34	3.5	491
Floor System			
Stringers	300.00	4.8	1,440
Floorbeams	80.50	9.9	797
Cantilevered Sidewalks			
Stringers	200.00	3.0	600
Brackets	36.00	5.0	180
Rails	100.00	6.8	683
SUBTOTAL =			5,998 SF
Factor for Lacing/Connections =			20%
TOTAL =			7,198 SF

Main Span (1/2)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	210.00	8.8	1,848
Top Chord	235.00	8.8	2,068
Verticals/Diagonals	631.60	3.5	2,211
Bracing			
Portal	26.83	8.8	236
Lateral	460.40	1.7	767
Cross	201.83	1.1	222
Floor System			
Stringers	630.00	4.8	3,024
Floorbeams	147.58	9.9	1,461
Cantilevered Sidewalks			
Stringers	420.00	3.0	1,260
Brackets	66.00	5.0	330
Rails	210.00	6.8	1,435
SUBTOTAL =			14,862 SF
Factor for Lacing/Connections =			20%
TOTAL =			17,835 SF

Total Cost to Clean and Paint Structure (24' RDWY)	
Cost Per Square Foot	\$15.00 /SF
Square Footage	
Approaches	28,792 SF
Main	35,669 SF
COST TO CLEAN AND PAINT =	\$967,000

APPENDIX E

Alternative 3(b) – Opinion of Probable Costs
and Quantity Calculations

ALTERNATIVE 3B

COSTS

ALTERNATIVE 3(b)				
Superstructure				
Item	Unit	Quantity	Unit Price	Total Dollars
Barriers	LF		\$250.00	\$0
Deck	CY		\$900.00	\$0
Deck Reinforcing Steel	LB		\$2.00	\$0
Deck Grooving	SY		\$5.00	\$0
Stringers	LB		\$5.00	\$0
Floorbeams				
End Floorbeams	LB		\$6.00	\$0
Interior Floorbeams	LB		\$6.00	\$0
Sidewalk Rehabilitation				
Stringers	LB	36,160	\$5.00	\$180,800
Pedestrian Railing	LF	820	\$400.00	\$328,000
Concrete	CY	57	\$900.00	\$51,300
Reinforcing Steel	LB	11,300	\$2.00	\$22,600
Truss Repairs				
Added Steel Sections	LB		\$10.00	\$0
Gusset Plates	EA		\$25,000.00	\$0
New Bracing	LB	36,160	\$5.00	\$180,800
Expansion Joints	LF		\$700.00	\$0
Approach Slabs	SY		\$200.00	\$0
Substructure				
Item	Unit	Quantity	Unit Price	Total Dollars
New Steel Bearings	EA	12	\$10,000.00	\$120,000
Pier Repairs (quantities for repairs only)				
End Bents (Concrete)	CY	2	\$900.00	\$1,800
End Bent Reinf. Steel	LB	500	\$2.00	\$1,000
Intermediate Pier (Conc.)	CY	6	\$900.00	\$5,400
Int. Pier Reinf. Steel	LB	500	\$2.00	\$1,000
Steel Piles	LF		\$90.00	\$0
General				
Item	Unit	Quantity	Unit Price	Total Dollars
Engineering Design	LS	1	\$500,000.00	\$500,000
Removal of Deck	LS	1	\$100,000.00	\$100,000
Clean and Paint Steel	LS	1	\$644,000.00	\$644,000
Mobilization (15%)	LS	1	\$245,500.00	\$245,500
Maintenance of Traffic (3%)	LS	1	\$64,100.00	\$64,100
SUBTOTAL =				\$2,446,300
CONTINGENCY (20%) =				\$489,300
TRUSS REHABILITATION TOTAL =				\$2,935,600
NEW STRINGER BRIDGE TOTAL =				\$2,214,000
TOTAL =				\$5,149,600
USE				\$5,100,000
Note: Unit costs obtained from ODOT 2013/2015 bid history, Contractor bid tabulations for other TranSystems truss rehabilitation projects, and Engineering judgment.				

SQUARE FOOTAGE OF TRUSS MEMBERS (24' RDWY)			
Approach Spans (1/4)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	100.00	8.8	880
Top Chord	105.33	8.8	927
Verticals/Diagonals	140.34	3.5	491
Floor System			
Stringers		4.8	0
Floorbeams		9.9	0
Cantilevered Sidewalks			
Stringers	200.00	3.0	600
Brackets	36.00	5.0	180
Rails	100.00	6.8	683
SUBTOTAL =			3,761 SF
Factor for Lacing/Connections =			20%
TOTAL =			4,514 SF

Main Span (1/2)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	210.00	8.8	1,848
Top Chord	235.00	8.8	2,068
Verticals/Diagonals	631.60	3.5	2,211
Bracing			
Portal	26.83	8.8	236
Lateral	460.40	1.7	767
Cross	201.83	1.1	222
Floor System			
Stringers		4.8	0.00
Floorbeams		9.9	0.00
Cantilevered Sidewalks			
Stringers	420.00	3.0	1,260
Brackets	66.00	5.0	330
Rails	210.00	6.8	1,435
SUBTOTAL =			10,377 SF
Factor for Lacing/Connections =			20%
TOTAL =			12,453 SF

Total Cost to Clean and Paint Structure (24' RDWY)	
Cost Per Square Foot	\$15.00 /SF
Square Footage	
Approaches	18,055 SF
Main	24,905 SF
COST TO CLEAN AND PAINT =	\$644,000

New Bridge Construction Cost							
24'-0" ROADWAY				32'-0" ROADWAY			
	Distance	Length	Area		Distance	Length	Area
	FT	FT	SF		FT	FT	SF
Curb-to-Curb	24			Curb-to-Curb	32		
Barrier	3			Barrier	3		
Sidewalk	0			Sidewalk	0		
Out-to-Out	27	410	11,070	Out-to-Out	35	410	14,350
Total Square Footage (SF)			11,070	Total Square Footage (SF)			14,350
\$/SF (Low Estimate)			\$135	\$/SF (Low Estimate)			\$135
New Bridge Cost (Low)		\$1,494,450		New Bridge Cost (Low)		\$1,937,250	
\$/SF (High Estimate)			\$200	\$/SF (High Estimate)			\$200
New Bridge Cost (High)		\$2,214,000		New Bridge Cost (High)		\$2,870,000	

APPENDIX F

Alternative 3(c) – Opinion of Probable Costs, Quantity
Calculations and Analysis Results

ALTERNATIVE 3C

COSTS

ALTERNATIVE 3(c)				
Superstructure				
Item	Unit	Quantity	Unit Price	Total Dollars
Handrail	LF	820	\$150.00	\$123,000
Deck	CY		\$900.00	\$0
Deck Reinforcing Steel	LB		\$2.00	\$0
Deck Grooving	SY		\$5.00	\$0
Stringers	LB		\$5.00	\$0
Floorbeams				
End Floorbeams	LB		\$6.00	\$0
Interior Floorbeams	LB		\$6.00	\$0
Sidewalk Rehabilitation				
Stringers	LB	36,160	\$5.00	\$180,800
Pedestrian Railing	LF	820	\$400.00	\$328,000
Concrete	CY	57	\$900.00	\$51,300
Reinforcing Steel	LB	11,300	\$2.00	\$22,600
Truss Repairs				
Added Steel Sections	LB		\$10.00	\$0
Gusset Plates	EA		\$25,000.00	\$0
New Bracing	LB		\$5.00	\$0
Expansion Joints	LF		\$700.00	\$0
Approach Slabs	SY		\$200.00	\$0
Substructure				
Item	Unit	Quantity	Unit Price	Total Dollars
New Steel Bearings	EA		\$10,000.00	\$0
Pier Repairs				
End Bents (Concrete)	CY		\$900.00	\$0
End Bent Reinf. Steel	LB		\$2.00	\$0
Intermediate Pier (Conc.)	CY		\$900.00	\$0
Int. Pier Reinf. Steel	LB		\$2.00	\$0
Steel Piles	LF		\$90.00	\$0
General				
Item	Unit	Quantity	Unit Price	Total Dollars
Engineering Design	LS	1	\$200,000.00	\$200,000
Removal of Deck	LS		\$100,000.00	\$0
Clean and Paint Steel	LS	1	\$967,000.00	\$967,000
Mobilization (15%)	LS	1	\$250,900.00	\$250,900
Maintenance of Traffic (3%)	LS	1	\$56,200.00	\$56,200
SUBTOTAL =				\$2,179,800
CONTINGENCY (20%) =				\$436,000
TOTAL =				\$2,615,800
USE				\$2,600,000
Note: Unit costs obtained from ODOT 2013/2015 bid history, Contractor bid tabulations for other TranSystems truss rehabilitation projects, and Engineering judgment.				

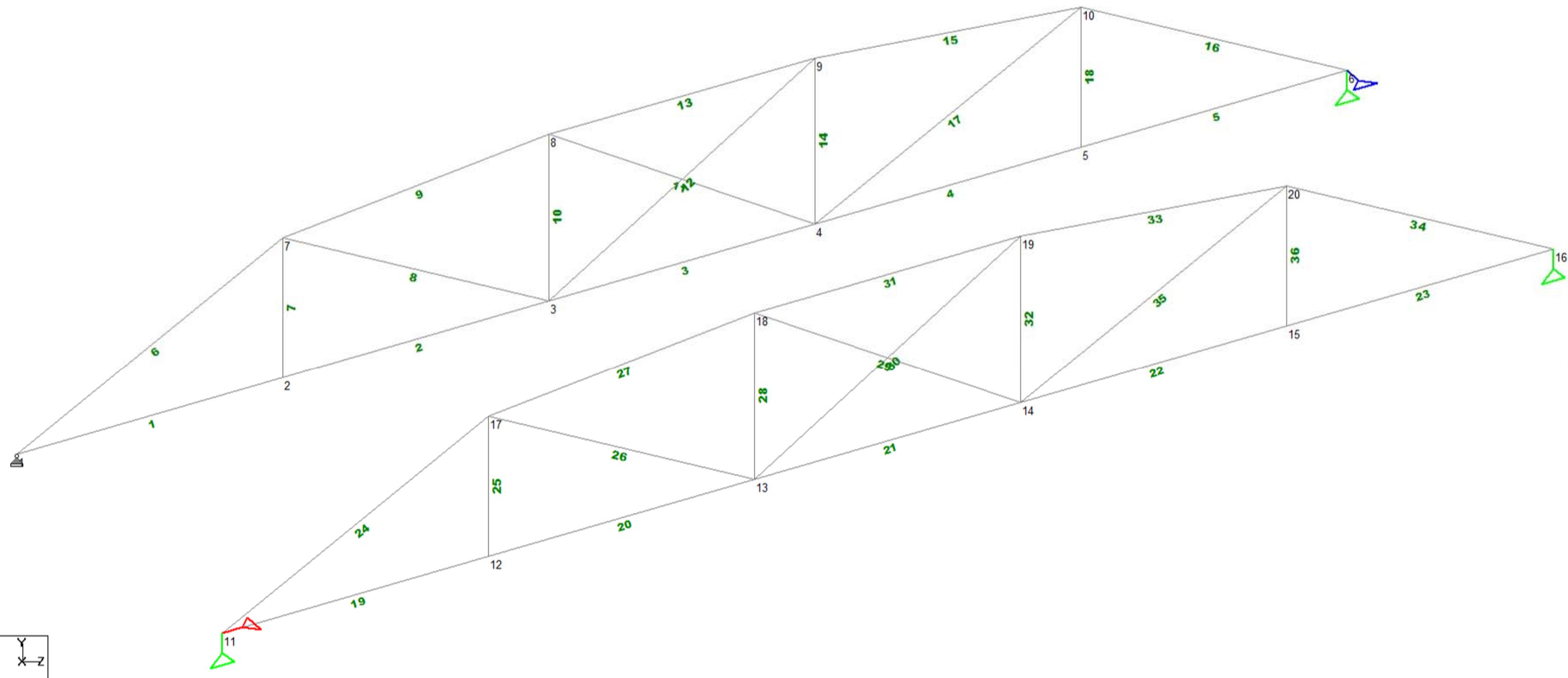
SQUARE FOOTAGE OF TRUSS MEMBERS (24' RDWY)			
Approach Spans (1/4)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	100.00	8.8	880
Top Chord	105.33	8.8	927
Verticals/Diagonals	140.34	3.5	491
Floor System			
Stringers	300.00	4.8	1,440
Floorbeams	80.50	9.9	797
Cantilevered Sidewalks			
Stringers	200.00	3.0	600
Brackets	36.00	5.0	180
Rails	100.00	6.8	683
SUBTOTAL =			5,998 SF
Factor for Lacing/Connections =			20%
TOTAL =			7,198 SF

Main Span (1/2)	length (ft)	perimeter (ft)	area (sf)
Bottom Chord	210.00	8.8	1,848
Top Chord	235.00	8.8	2,068
Verticals/Diagonals	631.60	3.5	2,211
Bracing			
Portal	26.83	8.8	236
Lateral	460.40	1.7	767
Cross	201.83	1.1	222
Floor System			
Stringers	630.00	4.8	3,024
Floorbeams	147.58	9.9	1,461
Cantilevered Sidewalks			
Stringers	420.00	3.0	1,260
Brackets	66.00	5.0	330
Rails	210.00	6.8	1,435
SUBTOTAL =			14,862 SF
Factor for Lacing/Connections =			20%
TOTAL =			17,835 SF

Total Cost to Clean and Paint Structure (24' RDWY)	
Cost Per Square Foot	\$15.00 /SF
Square Footage	
Approaches	28,792 SF
Main	35,669 SF
COST TO CLEAN AND PAINT =	\$967,000

ALTERNATIVE 3C

ANALYSIS

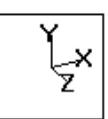
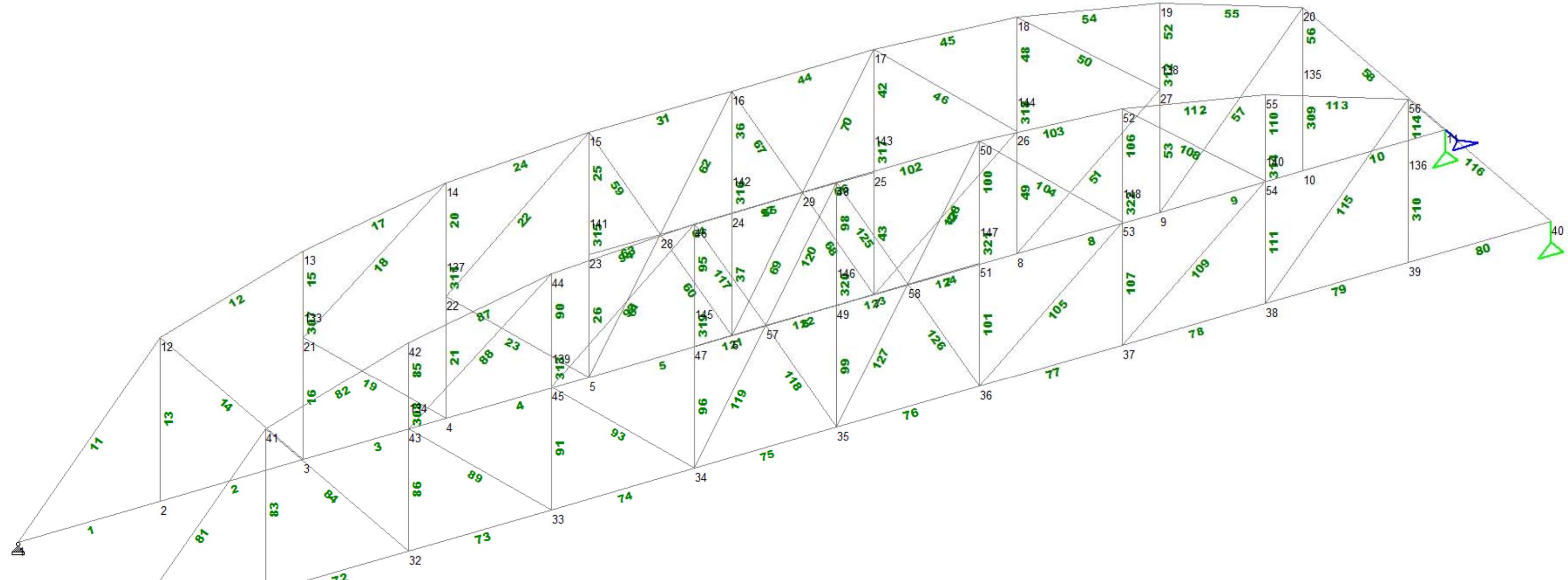


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JOB CLIENT Oklahoma DOT
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ALPHA 6.5e-006
DAMP 0.03
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STRENGTH FY 5184 FU 8352 RY 1.5 RT 1.2
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PERFORM ANALYSIS PRINT ALL
FINISH
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APPROACH TRUSS: Pedestrian Loads (80psf)

Section	A (gross)	A (net)	Ref. Sect.	CAPACITY				DEMAND/CAPACITY		
				Yielding (kip)	Fracture (kip)	Buckling (kip)	DL + 80psf (tension, kip)	DL + 80psf (comp., kip)	Demand / Capacity Ratio (Tension)	Demand / Capacity Ratio (Compression)
(2) 12C30	17.58	15.8	1	316.44	474		212.174		0.671	#DIV/0!
(2) 12C40	23.46	20.82	2	422.28	624.6		237.669		0.563	#DIV/0!
(1) 10W37	10.88	9.14	3	195.84	274.2		67.212		0.343	#DIV/0!
(1) 10W23	6.77	5.4	4	121.86	162	108.32	70.179		0.576	0.000
(1) 10W21	6.19	5	5	111.42	150	33.973	0.003	0.273	0.000	0.008
(2) 15C33.9, (1) PL 18 x 3/8	26.55	26.55	6	477.9		399.352		333.996	0.000	0.836



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ENGINEER DATE 03-Feb-14
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JOINT COORDINATES

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UNIT FEET KIP
DEFINE MATERIAL START
ISOTROPIC STEEL
E 4.176e+006
POISSON 0.3
DENSITY 0.489024
ALPHA 6.5e-006
DAMP 0.03
TYPE STEEL
STRENGTH FY 5184 FU 8352 RY 1.5 RT 1.2
END DEFINE MATERIAL
UNIT INCHES KIP

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MEMBER PROPERTY AMERICAN
1 2 9 10 71 72 79 80 PRIS AX 19.8 IX 1.7 IY 680.2 IZ 625.2
3 4 7 8 73 74 77 78 PRIS AX 29.28 IX 4.9 IY 1007.4 IZ 802.8
5 6 75 76 PRIS AX 32.2 IX 6.6 IY 1115.6 IZ 858
13 15 16 20 21 25 26 36 37 42 43 48 49 52 53 56 83 85 86 90 91 95 96 -
98 TO 101 106 107 110 111 114 307 TO 321 -
322 PRIS AX 10.88 IX 0.8 IY 42.2 IZ 196.9
11 58 81 116 PRIS AX 42.91 IX 7.8 IY 1792.9 IZ 1344.2
12 17 54 55 82 87 112 113 PRIS AX 28.11 IX 2.3 IY 1206.4 IZ 974.1
24 45 94 103 PRIS AX 31.71 IX 3.1 IY 1338 IZ 1058.1
31 44 97 102 PRIS AX 35.84 IX 4.3 IY 1478.9 IZ 1167.3
14 57 84 115 PRIS AX 12.06 IX 1 IY 47.7 IZ 222.4
18 50 88 108 PRIS AX 8.78 IX 0.4 IY 278.2 IZ 101.4
19 51 89 109 PRIS AX 6.77 IX 0.3 IY 11.3 IZ 120.6
22 46 92 104 PRIS AX 7.78 IX 0.3 IY 248.5 IZ 94.6
23 47 59 60 69 70 93 105 117 118 127 128 PRIS AX 6.19 IX 0.2 IY 9.7 IZ 106.3
61 62 67 68 119 120 125 126 PRIS AX 6.19 IX 0.2 IY 9.7 IZ 106.3
63 TO 66 121 TO 124 PRIS AX 4.78 IX 26 IY 147.049 IZ 0.2
129 TO 142 PRIS AX 31.77 IX 4.7 IY 135.1 IZ 4461
143 TO 205 PRIS AX 36.78 IX 6 IY 188.2 IZ 6354.7
206 TO 265 PRIS AX 13.81 IX 1 IY 33.5 IZ 736.4
266 TO 272 337 TO 343 PRIS AX 11.47 IX 0.3 IY 13.2 IZ 399.7
273 274 PRIS AX 7.12 IX 0.1 IY 4685.9 IZ 319
275 TO 306 PRIS AX 3.56 IX 0.122 IY 3 IZ 173
323 TO 336 TABLE LD L40306 SP 0.3125
344 TO 378 TABLE ST L30305

CONSTANTS
BETA 311.186 MEMB 273
BETA 48.8141 MEMB 274
MATERIAL STEEL ALL
SUPPORTS
1 PINNED
30 FIXED BUT FZ MX MY MZ
11 FIXED BUT FX MX MY MZ
40 FIXED BUT FX FZ MX MY MZ
LOAD 1 LOADTYPE Dead TITLE DEAD LOADS
SELFWEIGHT Y -1.05
MEMBER LOAD
206 TO 265 UNI GY -0.0439167
JOINT LOAD
2 TO 10 31 TO 39 FY -8.942
FLOOR LOAD
YRANGE 0 0 FLOAD -0.000555556 X RANGE 0 2520 Z RANGE 17 305 GY
PERFORM ANALYSIS PRINT ALL
FINISH

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MAIN TRUSS: 90psf PEDESTRIAN LOADING

Section	A (gross)	A (net)	Ref. Sect.	CAPACITY			DEMAND		DEMAND/CAPACITY	
				Yielding (kip)	Fracture (kip)	Buckling (kip)	DL + 90psf (tension, kip)	DL + 90psf (comp., kip)	Demand / Capcity Ratio (Tension)	Demand / Capcity Ratio (Compression)
(2) 15C33.9	19.8	17.3	1	356.4	519		315.725		0.886	#DIV/0!
(2) 15C50	29.28	26.42	2	527.04	792.6		434.019		0.824	#DIV/0!
(2) 15C55	32.22	28.96	3	579.96	868.8		492.524		0.849	#DIV/0!
(1) 10W37	10.88	9.14	4	195.84	274.2	116.184	127.779	77.176	0.652	0.664
(2) 15C55, (1) PL 19 x 9/16	42.91		5	772.38		615.73		603.967	0.000	0.981
(2) 15C33.9, (1) PL 19 x 7/16	28.11		6	505.98		438.187		563.484	0.000	1.286
(2) 15C40, (1) PL 19 x 7/16	31.71		7	570.78		494.021		626.536	0.000	1.268
(2) 15C45, (1) PL 19 x 1/2	35.84		8	645.12		558.685		711.508	0.000	1.274
(1) 10W41	12.06	9.83	9	217.08	294.9	106.469	231.977		1.069	0.000
(2) 9C15	8.78		10	158.04		118.352		111.567	0.000	0.943
(1) 10W23	6.77	5.21	11	121.86	156.3		115.005		0.944	#DIV/0!
(2) 9C13.4	7.78		12	140.04		99.14		85.261	0.000	0.860
(1) 10W21	6.19	4.83	13	111.42	144.9		84.801		0.761	#DIV/0!
(1) 10W21	6.19	4.83	14	111.42	144.9	33.973		16.808	0.000	0.495
(2) 6C8.2	4.78	3.24	15	86.04	97.2	23.9	2.780	0.122	0.032	0.005

MAIN TRUSS: 80psf PEDESTRIAN LOADING

Section	A (gross)	A (net)	Ref. Sect.	CAPACITY			DEMAND		DEMAND/CAPACITY	
				Yielding (kip)	Fracture (kip)	Buckling (kip)	DL + 90psf (tension, kip)	DL + 90psf (comp., kip)	Demand / Capcity Ratio (Tension)	Demand / Capcity Ratio (Compression)
(2) 15C33.9	19.8	17.3	1	356.4	519		235.910		0.662	#DIV/0!
(2) 15C50	29.28	26.42	2	527.04	792.6		325.021		0.617	#DIV/0!
(2) 15C55	32.22	28.96	3	579.96	868.8		369.239		0.637	#DIV/0!
(1) 10W37	10.88	9.14	4	195.84	274.2	116.184	94.659	59.565	0.483	0.513
(2) 15C55, (1) PL 19 x 9/16	42.91		5	772.38		615.73		451.824	0.000	0.734
(2) 15C33.9, (1) PL 19 x 7/16	28.11		6	505.98		438.187		421.812	0.000	0.963
(2) 15C40, (1) PL 19 x 7/16	31.71		7	570.78		494.021		469.226	0.000	0.950
(2) 15C45, (1) PL 19 x 1/2	35.84		8	645.12		558.685		532.937	0.000	0.954
(1) 10W41	12.06	9.83	9	217.08	294.9	106.469	174.097		0.802	0.000
(2) 9C15	8.78		10	158.04		118.352			0.000	0.000
(1) 10W23	6.77	5.21	11	121.86	156.3				0.000	#DIV/0!
(2) 9C13.4	7.78		12	140.04		99.14			0.000	0.000
(1) 10W21	6.19	4.83	13	111.42	144.9				0.000	#DIV/0!
(1) 10W21	6.19	4.83	14	111.42	144.9	33.973			0.000	0.000
(2) 6C8.2	4.78	3.24	15	86.04	97.2	23.9			0.000	0.000



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Client Oklahoma DOT

File PONY_pedestrian.std Date/Time 02-Apr-2014 12:23

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	20	1:DEAD LOAD	0.000	-182.043	1.336	1.448	0.181	-204.785	58.776
Min Fx	23	1:DEAD LOAD	0.000	-212.174	1.588	-4.916	-0.086	480.963	-13.751
Max Fy	5	1:DEAD LOAD	0.000	-212.173	1.588	4.916	0.086	-481.033	-13.747
Min Fy	19	1:DEAD LOAD	20.000	-212.170	-1.588	4.915	0.085	480.951	-13.750
Max Fz	5	1:DEAD LOAD	0.000	-212.173	1.588	4.916	0.086	-481.033	-13.747
Min Fz	23	1:DEAD LOAD	0.000	-212.174	1.588	-4.916	-0.086	480.963	-13.751
Max Mx	4	1:DEAD LOAD	0.000	-182.045	-0.082	1.448	0.181	-142.685	-111.475
Min Mx	22	1:DEAD LOAD	0.000	-182.046	-0.083	-1.448	-0.182	142.616	-111.483
Max My	5	1:DEAD LOAD	20.000	-212.173	0.335	4.916	0.086	698.760	-244.480
Min My	23	1:DEAD LOAD	20.000	-212.174	0.335	-4.916	-0.086	-698.782	-244.481
Max Mz	20	1:DEAD LOAD	0.000	-182.043	1.336	1.448	0.181	-204.785	58.776
Min Mz	23	1:DEAD LOAD	20.000	-212.174	0.335	-4.916	-0.086	-698.782	-244.481



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	3	1:DEAD LOAD	0.000	-237.668	0.837	-0.000	0.000	36.059	-54.798
Min Fx	21	1:DEAD LOAD	0.000	-237.669	0.837	-0.000	-0.001	-36.022	-54.796
Max Fy	21	1:DEAD LOAD	0.000	-237.669	0.837	-0.000	-0.001	-36.022	-54.796
Min Fy	3	1:DEAD LOAD	20.000	-237.668	-0.837	-0.000	0.000	36.002	-54.796
Max Fz	3	1:DEAD LOAD	0.000	-237.668	0.837	-0.000	0.000	36.059	-54.798
Min Fz	21	1:DEAD LOAD	0.000	-237.669	0.837	-0.000	-0.001	-36.022	-54.796
Max Mx	3	1:DEAD LOAD	0.000	-237.668	0.837	-0.000	0.000	36.059	-54.798
Min Mx	21	1:DEAD LOAD	0.000	-237.669	0.837	-0.000	-0.001	-36.022	-54.796
Max My	3	1:DEAD LOAD	0.000	-237.668	0.837	-0.000	0.000	36.059	-54.798
Min My	21	1:DEAD LOAD	20.000	-237.669	-0.837	-0.000	-0.001	-36.082	-54.800
Max Mz	21	1:DEAD LOAD	0.000	-237.669	0.837	-0.000	-0.001	-36.022	-54.796
Min Mz	21	1:DEAD LOAD	10.000	-237.669	0.000	-0.000	-0.001	-36.052	-104.990



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	14	1:DEAD LOAD	12.500	-32.547	1.159	-0.718	-0.047	-91.097	-81.061
Min Fx	36	1:DEAD LOAD	0.000	-67.212	1.371	0.604	0.139	2.888	81.487
Max Fy	36	1:DEAD LOAD	0.000	-67.212	1.371	0.604	0.139	2.888	81.487
Min Fy	25	1:DEAD LOAD	0.000	-67.212	-1.371	0.606	-0.138	2.587	-81.481
Max Fz	32	1:DEAD LOAD	0.000	-33.033	1.159	0.718	0.047	-16.585	92.758
Min Fz	10	1:DEAD LOAD	0.000	-33.032	-1.159	-0.718	0.047	16.536	-92.754
Max Mx	36	1:DEAD LOAD	0.000	-67.212	1.371	0.604	0.139	2.888	81.487
Min Mx	18	1:DEAD LOAD	0.000	-67.211	1.371	-0.606	-0.139	-2.630	81.480
Max My	32	1:DEAD LOAD	12.500	-32.548	1.159	0.718	0.047	91.102	-81.064
Min My	10	1:DEAD LOAD	12.500	-32.547	-1.159	-0.718	0.047	-91.098	81.061
Max Mz	32	1:DEAD LOAD	0.000	-33.033	1.159	0.718	0.047	-16.585	92.758
Min Mz	28	1:DEAD LOAD	0.000	-33.033	-1.159	0.718	-0.047	-16.557	-92.757



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	8	1:DEAD LOAD	22.589	-69.925	-0.046	-0.017	-0.057	-7.764	-31.218
Min Fx	26	1:DEAD LOAD	0.000	-70.179	0.437	0.017	0.057	3.232	21.735
Max Fy	26	1:DEAD LOAD	0.000	-70.179	0.437	0.017	0.057	3.232	21.735
Min Fy	17	1:DEAD LOAD	22.589	-70.178	-0.437	0.017	0.057	-3.239	21.734
Max Fz	17	1:DEAD LOAD	0.000	-69.925	0.046	0.017	0.057	-7.765	-31.219
Min Fz	8	1:DEAD LOAD	0.000	-70.178	0.437	-0.017	-0.057	-3.238	21.734
Max Mx	17	1:DEAD LOAD	0.000	-69.925	0.046	0.017	0.057	-7.765	-31.219
Min Mx	35	1:DEAD LOAD	0.000	-69.926	0.046	-0.017	-0.057	7.763	-31.217
Max My	35	1:DEAD LOAD	0.000	-69.926	0.046	-0.017	-0.057	7.763	-31.217
Min My	17	1:DEAD LOAD	0.000	-69.925	0.046	0.017	0.057	-7.765	-31.219
Max Mz	26	1:DEAD LOAD	0.000	-70.179	0.437	0.017	0.057	3.232	21.735
Min Mz	26	1:DEAD LOAD	20.330	-69.951	0.002	0.017	0.057	7.306	-31.741



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	30	1:DEAD LOAD	0.000	0.273	0.226	-0.010	-0.027	4.147	-10.760
Min Fx	12	1:DEAD LOAD	23.585	-0.003	-0.215	0.010	0.027	-1.447	-12.246
Max Fy	30	1:DEAD LOAD	0.000	0.273	0.226	-0.010	-0.027	4.147	-10.760
Min Fy	29	1:DEAD LOAD	23.585	0.273	-0.226	0.010	0.027	4.135	-10.761
Max Fz	12	1:DEAD LOAD	0.000	0.273	0.226	0.010	0.027	-4.145	-10.760
Min Fz	11	1:DEAD LOAD	0.000	-0.003	0.215	-0.010	-0.027	-1.446	-12.246
Max Mx	12	1:DEAD LOAD	0.000	0.273	0.226	0.010	0.027	-4.145	-10.760
Min Mx	11	1:DEAD LOAD	0.000	-0.003	0.215	-0.010	-0.027	-1.446	-12.246
Max My	30	1:DEAD LOAD	0.000	0.273	0.226	-0.010	-0.027	4.147	-10.760
Min My	12	1:DEAD LOAD	0.000	0.273	0.226	0.010	0.027	-4.145	-10.760
Max Mz	30	1:DEAD LOAD	0.000	0.273	0.226	-0.010	-0.027	4.147	-10.760
Min Mz	29	1:DEAD LOAD	11.792	0.135	-0.005	0.010	0.027	2.788	-27.121



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	33	1:DEAD LOAD	20.100	333.996	-2.847	-0.732	-0.206	-15.809	149.700	
Min Fx	16	1:DEAD LOAD	0.000	301.296	4.256	1.349	-0.371	13.380	89.942	
Max Fy	34	1:DEAD LOAD	0.000	301.302	4.256	-1.346	0.372	-14.141	89.948	
Min Fy	24	1:DEAD LOAD	22.589	301.302	-4.256	1.350	-0.371	-13.252	89.948	
Max Fz	24	1:DEAD LOAD	0.000	302.296	-2.363	1.350	-0.371	-379.174	-807.093	
Min Fz	6	1:DEAD LOAD	0.000	302.290	-2.363	-1.349	0.371	379.133	-807.081	
Max Mx	34	1:DEAD LOAD	0.000	301.302	4.256	-1.346	0.372	-14.141	89.948	
Min Mx	16	1:DEAD LOAD	0.000	301.296	4.256	1.349	-0.371	13.380	89.942	
Max My	16	1:DEAD LOAD	22.589	302.290	2.363	1.349	-0.371	379.145	-807.085	
Min My	24	1:DEAD LOAD	0.000	302.296	-2.363	1.350	-0.371	-379.174	-807.093	
Max Mz	33	1:DEAD LOAD	20.100	333.996	-2.847	-0.732	-0.206	-15.809	149.700	
Min Mz	24	1:DEAD LOAD	0.000	302.296	-2.363	1.350	-0.371	-379.174	-807.093	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	79	1:DEAD LOAD	0.000	-178.802	0.875	-2.883	0.007	336.902	3.934	
Min Fx	71	1:DEAD LOAD	0.000	-220.833	1.586	7.023	0.063	-1.03E+3	103.738	
Max Fy	71	1:DEAD LOAD	0.000	-220.833	1.586	7.023	0.063	-1.03E+3	103.738	
Min Fy	80	1:DEAD LOAD	21.000	-220.833	-1.586	-7.023	-0.063	-1.03E+3	103.738	
Max Fz	71	1:DEAD LOAD	0.000	-220.833	1.586	7.023	0.063	-1.03E+3	103.738	
Min Fz	80	1:DEAD LOAD	0.000	-220.833	-0.103	-7.023	-0.063	735.643	-109.021	
Max Mx	71	1:DEAD LOAD	0.000	-220.833	1.586	7.023	0.063	-1.03E+3	103.738	
Min Mx	80	1:DEAD LOAD	0.000	-220.833	-0.103	-7.023	-0.063	735.643	-109.021	
Max My	1	1:DEAD LOAD	0.000	-220.832	1.586	-7.023	-0.063	1.03E+3	103.738	
Min My	80	1:DEAD LOAD	21.000	-220.833	-1.586	-7.023	-0.063	-1.03E+3	103.738	
Max Mz	71	1:DEAD LOAD	0.000	-220.833	1.586	7.023	0.063	-1.03E+3	103.738	
Min Mz	71	1:DEAD LOAD	21.000	-220.833	0.103	7.023	0.063	735.637	-109.021	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	78	1:DEAD LOAD	0.000	-262.224	0.248	-2.763	0.022	324.625	-101.942
Min Fx	7	1:DEAD LOAD	0.000	-304.455	1.077	1.615	0.017	-178.613	-30.038
Max Fy	3	1:DEAD LOAD	0.000	-262.228	1.945	-2.763	0.022	371.656	111.824
Min Fy	8	1:DEAD LOAD	21.000	-262.229	-1.945	2.763	-0.022	371.669	111.824
Max Fz	73	1:DEAD LOAD	0.000	-262.225	1.945	2.763	-0.022	-371.698	111.824
Min Fz	78	1:DEAD LOAD	0.000	-262.224	0.248	-2.763	0.022	324.625	-101.942
Max Mx	3	1:DEAD LOAD	0.000	-262.228	1.945	-2.763	0.022	371.656	111.824
Min Mx	8	1:DEAD LOAD	0.000	-262.229	0.248	2.763	-0.022	-324.559	-101.943
Max My	8	1:DEAD LOAD	21.000	-262.229	-1.945	2.763	-0.022	371.669	111.824
Min My	73	1:DEAD LOAD	0.000	-262.225	1.945	2.763	-0.022	-371.698	111.824
Max Mz	78	1:DEAD LOAD	21.000	-262.224	-1.945	-2.763	0.022	-371.685	111.825
Min Mz	3	1:DEAD LOAD	18.900	-262.228	-0.029	-2.763	0.022	-254.934	-105.123



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	76	1:DEAD LOAD	0.000	-345.975	0.897	-0.566	0.017	47.543	-64.324
Min Fx	6	1:DEAD LOAD	0.000	-345.977	0.897	0.566	-0.017	-47.560	-64.324
Max Fy	5	1:DEAD LOAD	0.000	-345.977	1.514	-0.566	0.017	95.146	13.499
Min Fy	6	1:DEAD LOAD	21.000	-345.977	-1.514	0.566	-0.017	95.151	13.499
Max Fz	6	1:DEAD LOAD	0.000	-345.977	0.897	0.566	-0.017	-47.560	-64.324
Min Fz	5	1:DEAD LOAD	0.000	-345.977	1.514	-0.566	0.017	95.146	13.499
Max Mx	76	1:DEAD LOAD	0.000	-345.975	0.897	-0.566	0.017	47.543	-64.324
Min Mx	75	1:DEAD LOAD	0.000	-345.975	1.514	0.566	-0.017	-95.142	13.498
Max My	6	1:DEAD LOAD	21.000	-345.977	-1.514	0.566	-0.017	95.151	13.499
Min My	75	1:DEAD LOAD	0.000	-345.975	1.514	0.566	-0.017	-95.142	13.498
Max Mz	6	1:DEAD LOAD	21.000	-345.977	-1.514	0.566	-0.017	95.151	13.499
Min Mz	76	1:DEAD LOAD	8.400	-345.975	-0.068	-0.566	0.017	-9.529	-105.772



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	53	1:DEAD LOAD	18.000	56.245	0.456	-0.225	-0.038	-43.334	-67.455
Min Fx	322	1:DEAD LOAD	0.000	-88.411	0.136	0.162	-0.040	-12.522	7.750
Max Fy	56	1:DEAD LOAD	0.000	-65.709	0.500	-0.249	-0.032	25.082	65.270
Min Fy	83	1:DEAD LOAD	0.000	-65.709	-0.500	0.250	-0.032	-25.093	-65.271
Max Fz	114	1:DEAD LOAD	0.000	-65.709	0.500	0.250	0.032	-25.095	65.270
Min Fz	13	1:DEAD LOAD	0.000	-65.709	-0.500	-0.249	0.032	25.085	-65.270
Max Mx	308	1:DEAD LOAD	0.000	-46.781	-0.443	0.187	0.056	-14.812	-15.996
Min Mx	314	1:DEAD LOAD	0.000	-46.781	0.443	0.190	-0.056	-14.902	15.997
Max My	310	1:DEAD LOAD	15.583	-64.778	0.500	0.250	0.032	46.782	-78.729
Min My	13	1:DEAD LOAD	24.000	-64.777	-0.500	-0.249	0.032	-46.771	78.729
Max Mz	83	1:DEAD LOAD	24.000	-64.778	-0.500	0.250	-0.032	46.780	78.729
Min Mz	309	1:DEAD LOAD	15.583	-64.778	0.500	-0.249	-0.032	-46.768	-78.729



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	58	1:DEAD LOAD	31.890	423.200	-0.945	0.688	-0.757	218.383	-106.547
Min Fx	116	1:DEAD LOAD	0.000	419.527	2.268	-0.687	0.757	44.631	146.695
Max Fy	58	1:DEAD LOAD	0.000	419.528	2.268	0.688	-0.757	-44.715	146.696
Min Fy	81	1:DEAD LOAD	31.890	419.527	-2.268	0.687	-0.757	44.650	146.697
Max Fz	58	1:DEAD LOAD	0.000	419.528	2.268	0.688	-0.757	-44.715	146.696
Min Fz	11	1:DEAD LOAD	0.000	423.200	0.945	-0.687	0.757	218.355	-106.547
Max Mx	11	1:DEAD LOAD	0.000	423.200	0.945	-0.687	0.757	218.355	-106.547
Min Mx	58	1:DEAD LOAD	0.000	419.528	2.268	0.688	-0.757	-44.715	146.696
Max My	58	1:DEAD LOAD	31.890	423.200	-0.945	0.688	-0.757	218.383	-106.547
Min My	81	1:DEAD LOAD	0.000	423.199	0.945	0.687	-0.757	-218.270	-106.547
Max Mz	81	1:DEAD LOAD	31.890	419.527	-2.268	0.687	-0.757	44.650	146.697
Min Mz	116	1:DEAD LOAD	22.323	422.098	0.019	-0.687	0.757	-139.380	-158.661



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	55	1:DEAD LOAD	22.033	395.087	-2.320	-0.258	0.000	-51.074	187.874
Min Fx	112	1:DEAD LOAD	0.000	383.486	1.503	-0.085	-0.012	5.323	21.338
Max Fy	12	1:DEAD LOAD	0.000	395.086	2.320	0.258	-0.000	-51.060	187.873
Min Fy	55	1:DEAD LOAD	22.033	395.087	-2.320	-0.258	0.000	-51.074	187.874
Max Fz	12	1:DEAD LOAD	0.000	395.086	2.320	0.258	-0.000	-51.060	187.873
Min Fz	55	1:DEAD LOAD	0.000	394.418	-0.215	-0.258	0.000	17.051	-147.150
Max Mx	87	1:DEAD LOAD	0.000	383.887	0.602	0.085	0.012	-16.413	-94.305
Min Mx	112	1:DEAD LOAD	0.000	383.486	1.503	-0.085	-0.012	5.323	21.338
Max My	82	1:DEAD LOAD	0.000	395.085	2.320	-0.257	0.000	51.027	187.871
Min My	55	1:DEAD LOAD	22.033	395.087	-2.320	-0.258	0.000	-51.074	187.874
Max Mz	55	1:DEAD LOAD	22.033	395.087	-2.320	-0.258	0.000	-51.074	187.874
Min Mz	55	1:DEAD LOAD	0.000	394.418	-0.215	-0.258	0.000	17.051	-147.150



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	45	1:DEAD LOAD	21.042	439.550	-1.608	0.053	-0.012	8.508	58.978
Min Fx	103	1:DEAD LOAD	0.000	439.396	0.766	-0.054	0.012	4.986	-47.338
Max Fy	94	1:DEAD LOAD	0.000	439.547	1.608	0.054	-0.012	-8.534	58.987
Min Fy	103	1:DEAD LOAD	21.042	439.547	-1.608	-0.054	0.012	-8.542	58.985
Max Fz	94	1:DEAD LOAD	0.000	439.547	1.608	0.054	-0.012	-8.534	58.987
Min Fz	103	1:DEAD LOAD	0.000	439.396	0.766	-0.054	0.012	4.986	-47.338
Max Mx	103	1:DEAD LOAD	0.000	439.396	0.766	-0.054	0.012	4.986	-47.338
Min Mx	94	1:DEAD LOAD	0.000	439.547	1.608	0.054	-0.012	-8.534	58.987
Max My	24	1:DEAD LOAD	0.000	439.550	1.608	-0.053	0.012	8.509	58.977
Min My	103	1:DEAD LOAD	21.042	439.547	-1.608	-0.054	0.012	-8.542	58.985
Max Mz	94	1:DEAD LOAD	0.000	439.547	1.608	0.054	-0.012	-8.534	58.987
Min Mz	103	1:DEAD LOAD	6.313	439.441	0.054	-0.054	0.012	0.927	-77.897



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	44	1:DEAD LOAD	0.000	499.249	0.787	0.035	-0.007	-2.665	-139.758	
Min Fx	102	1:DEAD LOAD	0.000	499.246	0.787	-0.035	0.007	2.672	-139.756	
Max Fy	31	1:DEAD LOAD	0.000	499.249	1.897	-0.035	0.007	6.119	0.129	
Min Fy	44	1:DEAD LOAD	21.000	499.249	-1.897	0.035	-0.007	6.119	0.129	
Max Fz	97	1:DEAD LOAD	0.000	499.246	1.897	0.035	-0.007	-6.136	0.124	
Min Fz	102	1:DEAD LOAD	0.000	499.246	0.787	-0.035	0.007	2.672	-139.756	
Max Mx	31	1:DEAD LOAD	0.000	499.249	1.897	-0.035	0.007	6.119	0.129	
Min Mx	44	1:DEAD LOAD	0.000	499.249	0.787	0.035	-0.007	-2.665	-139.758	
Max My	31	1:DEAD LOAD	0.000	499.249	1.897	-0.035	0.007	6.119	0.129	
Min My	97	1:DEAD LOAD	0.000	499.246	1.897	0.035	-0.007	-6.136	0.124	
Max Mz	31	1:DEAD LOAD	0.000	499.249	1.897	-0.035	0.007	6.119	0.129	
Min Mz	31	1:DEAD LOAD	14.700	499.249	0.018	-0.035	0.007	-0.029	-168.241	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial		Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)	
Max Fx	115	1:DEAD LOAD	31.890	-162.128	-0.538	-0.136	-0.032	-34.267	40.834	
Min Fx	57	1:DEAD LOAD	0.000	-163.162	0.365	0.136	0.032	-17.666	7.559	
Max Fy	57	1:DEAD LOAD	0.000	-163.162	0.365	0.136	0.032	-17.666	7.559	
Min Fy	84	1:DEAD LOAD	31.890	-162.129	-0.538	0.136	0.032	34.264	40.834	
Max Fz	84	1:DEAD LOAD	0.000	-163.161	0.365	0.136	0.032	-17.678	7.558	
Min Fz	115	1:DEAD LOAD	0.000	-163.160	0.365	-0.136	-0.032	17.680	7.559	
Max Mx	84	1:DEAD LOAD	0.000	-163.161	0.365	0.136	0.032	-17.678	7.558	
Min Mx	115	1:DEAD LOAD	0.000	-163.160	0.365	-0.136	-0.032	17.680	7.559	
Max My	84	1:DEAD LOAD	31.890	-162.129	-0.538	0.136	0.032	34.264	40.834	
Min My	115	1:DEAD LOAD	31.890	-162.128	-0.538	-0.136	-0.032	-34.267	40.834	
Max Mz	84	1:DEAD LOAD	31.890	-162.129	-0.538	0.136	0.032	34.264	40.834	
Min Mz	84	1:DEAD LOAD	12.756	-162.748	0.003	0.136	0.032	3.099	-20.411	



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	79	1:DEAD LOAD	0.000	-190.978	0.895	-3.076	0.008	359.465	3.071
Min Fx	71	1:DEAD LOAD	0.000	-235.910	1.667	7.516	0.071	-1.11E+3	112.900
Max Fy	71	1:DEAD LOAD	0.000	-235.910	1.667	7.516	0.071	-1.11E+3	112.900
Min Fy	80	1:DEAD LOAD	21.000	-235.910	-1.667	-7.516	-0.071	-1.11E+3	112.900
Max Fz	71	1:DEAD LOAD	0.000	-235.910	1.667	7.516	0.071	-1.11E+3	112.900
Min Fz	80	1:DEAD LOAD	0.000	-235.910	-0.185	-7.516	-0.071	786.830	-120.487
Max Mx	71	1:DEAD LOAD	0.000	-235.910	1.667	7.516	0.071	-1.11E+3	112.900
Min Mx	80	1:DEAD LOAD	0.000	-235.910	-0.185	-7.516	-0.071	786.830	-120.487
Max My	1	1:DEAD LOAD	0.000	-235.909	1.667	-7.516	-0.071	1.11E+3	112.900
Min My	80	1:DEAD LOAD	21.000	-235.910	-1.667	-7.516	-0.071	-1.11E+3	112.900
Max Mz	71	1:DEAD LOAD	0.000	-235.910	1.667	7.516	0.071	-1.11E+3	112.900
Min Mz	71	1:DEAD LOAD	21.000	-235.910	0.185	7.516	0.071	786.822	-120.487



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	78	1:DEAD LOAD	0.000	-279.994	0.196	-2.948	0.023	346.370	-111.202
Min Fx	7	1:DEAD LOAD	0.000	-325.021	1.081	1.723	0.018	-190.525	-34.684
Max Fy	3	1:DEAD LOAD	0.000	-279.998	1.997	-2.948	0.023	396.540	115.779
Min Fy	8	1:DEAD LOAD	21.000	-279.999	-1.997	2.948	-0.023	396.554	115.778
Max Fz	73	1:DEAD LOAD	0.000	-279.995	1.997	2.948	-0.023	-396.585	115.778
Min Fz	78	1:DEAD LOAD	0.000	-279.994	0.196	-2.948	0.023	346.370	-111.202
Max Mx	3	1:DEAD LOAD	0.000	-279.998	1.997	-2.948	0.023	396.540	115.779
Min Mx	8	1:DEAD LOAD	0.000	-279.999	0.196	2.948	-0.023	-346.298	-111.204
Max My	8	1:DEAD LOAD	21.000	-279.999	-1.997	2.948	-0.023	396.554	115.778
Min My	73	1:DEAD LOAD	0.000	-279.995	1.997	2.948	-0.023	-396.585	115.778
Max Mz	78	1:DEAD LOAD	21.000	-279.994	-1.997	-2.948	0.023	-396.572	115.779
Min Mz	3	1:DEAD LOAD	18.900	-279.998	0.024	-2.948	0.023	-272.012	-113.062



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	76	1:DEAD LOAD	0.000	-369.236	0.877	-0.604	0.018	50.697	-71.930
Min Fx	6	1:DEAD LOAD	0.000	-369.239	0.877	0.604	-0.018	-50.716	-71.930
Max Fy	5	1:DEAD LOAD	0.000	-369.239	1.535	-0.604	0.018	101.459	11.000
Min Fy	6	1:DEAD LOAD	21.000	-369.239	-1.535	0.604	-0.018	101.465	11.000
Max Fz	6	1:DEAD LOAD	0.000	-369.239	0.877	0.604	-0.018	-50.716	-71.930
Min Fz	5	1:DEAD LOAD	0.000	-369.239	1.535	-0.604	0.018	101.459	11.000
Max Mx	76	1:DEAD LOAD	0.000	-369.236	0.877	-0.604	0.018	50.697	-71.930
Min Mx	75	1:DEAD LOAD	0.000	-369.236	1.535	0.604	-0.018	-101.455	10.999
Max My	6	1:DEAD LOAD	21.000	-369.239	-1.535	0.604	-0.018	101.465	11.000
Min My	75	1:DEAD LOAD	0.000	-369.236	1.535	0.604	-0.018	-101.455	10.999
Max Mz	6	1:DEAD LOAD	21.000	-369.239	-1.535	0.604	-0.018	101.465	11.000
Min Mz	76	1:DEAD LOAD	8.400	-369.236	-0.088	-0.604	0.018	-10.162	-111.335



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	53	1:DEAD LOAD	18.000	59.565	0.480	-0.247	-0.041	-47.535	-71.449
Min Fx	322	1:DEAD LOAD	0.000	-94.659	0.141	0.179	-0.045	-13.768	8.629
Max Fy	56	1:DEAD LOAD	0.000	-70.633	0.536	-0.273	-0.034	27.340	70.058
Min Fy	83	1:DEAD LOAD	0.000	-70.633	-0.536	0.273	-0.034	-27.351	-70.058
Max Fz	114	1:DEAD LOAD	0.000	-70.633	0.536	0.273	0.034	-27.353	70.058
Min Fz	13	1:DEAD LOAD	0.000	-70.633	-0.536	-0.273	0.034	27.342	-70.058
Max Mx	308	1:DEAD LOAD	0.000	-50.208	-0.463	0.207	0.062	-16.277	-17.463
Min Mx	314	1:DEAD LOAD	0.000	-50.208	0.463	0.210	-0.062	-16.374	17.464
Max My	310	1:DEAD LOAD	15.583	-69.702	0.536	0.273	0.034	51.272	-84.414
Min My	13	1:DEAD LOAD	24.000	-69.702	-0.536	-0.273	0.034	-51.260	84.414
Max Mz	83	1:DEAD LOAD	24.000	-69.702	-0.536	0.273	-0.034	51.269	84.414
Min Mz	309	1:DEAD LOAD	15.583	-69.702	0.536	-0.273	-0.034	-51.257	-84.414



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	58	1:DEAD LOAD	31.890	451.824	-0.916	0.710	-0.815	224.854	-115.933
Min Fx	116	1:DEAD LOAD	0.000	448.150	2.297	-0.709	0.815	46.751	148.211
Max Fy	58	1:DEAD LOAD	0.000	448.151	2.297	0.710	-0.815	-46.842	148.211
Min Fy	81	1:DEAD LOAD	31.890	448.151	-2.297	0.709	-0.815	46.772	148.212
Max Fz	58	1:DEAD LOAD	0.000	448.151	2.297	0.710	-0.815	-46.842	148.211
Min Fz	11	1:DEAD LOAD	0.000	451.823	0.916	-0.710	0.815	224.824	-115.933
Max Mx	11	1:DEAD LOAD	0.000	451.823	0.916	-0.710	0.815	224.824	-115.933
Min Mx	58	1:DEAD LOAD	0.000	448.151	2.297	0.710	-0.815	-46.842	148.211
Max My	58	1:DEAD LOAD	31.890	451.824	-0.916	0.710	-0.815	224.854	-115.933
Min My	81	1:DEAD LOAD	0.000	451.823	0.916	0.709	-0.815	-224.732	-115.933
Max Mz	81	1:DEAD LOAD	31.890	448.151	-2.297	0.709	-0.815	46.772	148.212
Min Mz	116	1:DEAD LOAD	22.323	450.721	0.048	-0.709	0.815	-143.267	-164.777



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	55	1:DEAD LOAD	22.033	421.812	-2.394	-0.263	0.000	-52.175	195.310
Min Fx	112	1:DEAD LOAD	0.000	409.461	1.535	-0.088	-0.013	5.652	20.197
Max Fy	12	1:DEAD LOAD	0.000	421.812	2.394	0.263	-0.000	-52.160	195.309
Min Fy	55	1:DEAD LOAD	22.033	421.812	-2.394	-0.263	0.000	-52.175	195.310
Max Fz	12	1:DEAD LOAD	0.000	421.812	2.394	0.263	-0.000	-52.160	195.309
Min Fz	55	1:DEAD LOAD	0.000	421.144	-0.289	-0.263	0.000	17.452	-159.467
Max Mx	87	1:DEAD LOAD	0.000	409.862	0.570	0.087	0.013	-16.803	-103.628
Min Mx	112	1:DEAD LOAD	0.000	409.461	1.535	-0.088	-0.013	5.652	20.197
Max My	82	1:DEAD LOAD	0.000	421.810	2.394	-0.263	0.000	52.124	195.307
Min My	55	1:DEAD LOAD	22.033	421.812	-2.394	-0.263	0.000	-52.175	195.310
Max Mz	55	1:DEAD LOAD	22.033	421.812	-2.394	-0.263	0.000	-52.175	195.310
Min Mz	82	1:DEAD LOAD	22.033	421.142	0.289	-0.263	0.000	-17.441	-159.467



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	45	1:DEAD LOAD	21.042	469.226	-1.632	0.057	-0.012	9.060	58.965
Min Fx	103	1:DEAD LOAD	0.000	469.071	0.742	-0.058	0.012	5.438	-53.420
Max Fy	94	1:DEAD LOAD	0.000	469.222	1.632	0.058	-0.012	-9.087	58.975
Min Fy	103	1:DEAD LOAD	21.042	469.222	-1.632	-0.058	0.012	-9.095	58.973
Max Fz	94	1:DEAD LOAD	0.000	469.222	1.632	0.058	-0.012	-9.087	58.975
Min Fz	103	1:DEAD LOAD	0.000	469.071	0.742	-0.058	0.012	5.438	-53.420
Max Mx	103	1:DEAD LOAD	0.000	469.071	0.742	-0.058	0.012	5.438	-53.420
Min Mx	94	1:DEAD LOAD	0.000	469.222	1.632	0.058	-0.012	-9.087	58.975
Max My	24	1:DEAD LOAD	0.000	469.225	1.632	-0.057	0.012	9.060	58.965
Min My	103	1:DEAD LOAD	21.042	469.222	-1.632	-0.058	0.012	-9.095	58.973
Max Mz	94	1:DEAD LOAD	0.000	469.222	1.632	0.058	-0.012	-9.087	58.975
Min Mz	103	1:DEAD LOAD	6.313	469.117	0.030	-0.058	0.012	1.078	-82.158



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Beam Force Detail Summary

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	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	44	1:DEAD LOAD	0.000	532.937	0.750	0.037	-0.007	-2.788	-152.925
Min Fx	102	1:DEAD LOAD	0.000	532.934	0.750	-0.037	0.007	2.796	-152.923
Max Fy	31	1:DEAD LOAD	0.000	532.937	1.934	-0.037	0.007	6.416	-3.656
Min Fy	44	1:DEAD LOAD	21.000	532.937	-1.934	0.037	-0.007	6.416	-3.656
Max Fz	97	1:DEAD LOAD	0.000	532.934	1.934	0.037	-0.007	-6.435	-3.661
Min Fz	102	1:DEAD LOAD	0.000	532.934	0.750	-0.037	0.007	2.796	-152.923
Max Mx	31	1:DEAD LOAD	0.000	532.937	1.934	-0.037	0.007	6.416	-3.656
Min Mx	44	1:DEAD LOAD	0.000	532.937	0.750	0.037	-0.007	-2.788	-152.925
Max My	31	1:DEAD LOAD	0.000	532.937	1.934	-0.037	0.007	6.416	-3.656
Min My	97	1:DEAD LOAD	0.000	532.934	1.934	0.037	-0.007	-6.435	-3.661
Max Mz	31	1:DEAD LOAD	0.000	532.937	1.934	-0.037	0.007	6.416	-3.656
Min Mz	31	1:DEAD LOAD	14.700	532.937	0.056	-0.037	0.007	-0.026	-178.593



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Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

	Beam	L/C	d (ft)	Axial	Shear		Torsion	Bending	
				Fx (kip)	Fy (kip)	Fz (kip)	Mx (kip·in)	My (kip·in)	Mz (kip·in)
Max Fx	115	1:DEAD LOAD	31.890	-173.064	-0.545	-0.148	-0.036	-37.372	41.679
Min Fx	57	1:DEAD LOAD	0.000	-174.097	0.358	0.148	0.036	-19.210	5.928
Max Fy	57	1:DEAD LOAD	0.000	-174.097	0.358	0.148	0.036	-19.210	5.928
Min Fy	84	1:DEAD LOAD	31.890	-173.064	-0.545	0.148	0.036	37.369	41.679
Max Fz	84	1:DEAD LOAD	0.000	-174.096	0.358	0.148	0.036	-19.223	5.928
Min Fz	115	1:DEAD LOAD	0.000	-174.096	0.358	-0.148	-0.036	19.226	5.928
Max Mx	84	1:DEAD LOAD	0.000	-174.096	0.358	0.148	0.036	-19.223	5.928
Min Mx	115	1:DEAD LOAD	0.000	-174.096	0.358	-0.148	-0.036	19.226	5.928
Max My	84	1:DEAD LOAD	31.890	-173.064	-0.545	0.148	0.036	37.369	41.679
Min My	115	1:DEAD LOAD	31.890	-173.064	-0.545	-0.148	-0.036	-37.372	41.679
Max Mz	84	1:DEAD LOAD	31.890	-173.064	-0.545	0.148	0.036	37.369	41.679
Min Mz	84	1:DEAD LOAD	12.756	-173.683	-0.003	0.148	0.036	3.414	-21.051