

**Request for Statement of Interest (SOI)**  
**Rural Street over Indian Creek**  
**Sec 15-01127-01-BR**

The Aurora Township Road District is in need of professional services from a qualified engineering firm to provide engineering services as detailed in the attached preliminary scope of work. The Kane County Division of Transportation is assisting the Road District with the consultant selection process. Ultimately, the project will be administered by the Road District.

A Statement of Interest shall be submitted **VIA KDOTQBS** no later than **4:00 P.M.** on **January 30th, 2015**, and should be addressed to **Michael Zakosek, P.E., Chief of Design**. The SOI shall be submitted in a PDF format viewable with the latest version of Adobe Reader.

Statements of Interest received will be used by the Township to determine a preferred consultant for the work.

For more information regarding the SOI, such as content and format of these items, please reference the QBS document found at <http://www.co.kane.il.us/dot/consultant/selectionProcess.pdf>. Also, the SOI shall be submitted in PDF format viewable with the latest version of Adobe reader.

The preferred consultant will be contacted by the Township.

If the respondent plans to utilize a sub-consultant for any portion of this work please note this on the submitted Statement of Interest.

Any questions on the project may be emailed to the Chief of Design.

**A Statement of Interest (SOI) received after the above noted deadline will not be considered.**

Michael Zakosek, P.E.  
Chief of Design  
Kane County Division of Transportation  
41W011 Burlington Road  
St. Charles, Illinois 60175  
zakosekmike@co.kane.il.us

# **Rural Street over Indian Creek**

## **Scope of Work**

### Project Description/Preliminary Scope of Services

This project consists of phase I (and at the discretion of the township, phase II) design services to rehabilitate or replace the Rural Street over Indian Creek bridge (045-3127). The work will include complete rehabilitation or replacement of the structure and needed roadway approach reconstruction or reprofiling.

The work includes all design, permitting, plat and plan preparation activities necessary to construct the project.

This project will be funded through the STP-Bridge Program.

# Routine NBIS Bridge Inspection Report



## STRUCTURE NO. 045-3127

Rural Street / TR 189  
over  
Indian Creek

March 20, 2014

Prepared For

**Kane County Division of Transportation**

**Aurora Township**

Prepared By

**COLLINS**  
**ENGINEERS** INC

123 N. Wacker Drive, Suite 900  
Chicago, IL 60606  
(312) 704-9300

**STRUCTURE INVENTORY DATA****INSPECTION INFORMATION**

Date: March 20, 2014  
 Weather: 30° F, Cloudy

**STRUCTURE INFORMATION**

Structure Number: 045-3127  
 District: 1  
 County: Kane  
 Township: Aurora  
 Feature Carried: Rural Street / TR 189  
 Feature Crossed: Indian Creek  
 Type: Precast concrete channel beams  
 Span Arrangement: Three simple spans (21'-7 3/8", 28'-0", 21'-7 3/8")  
 Length: 73'-9 1/4" back-to-back of abutments  
 Width: 37'-6" out-to-out of deck  
 37'-6" face-to-face of rails  
 Skew: 10° right forward  
 Abutments: Concrete stub abutments on steel H piles  
 Piers: Concrete pile bent piers on concrete encased steel H piles  
 Year Constructed: 1985  
 Year/s Reconstructed: NA

**ROADWAY INFORMATION**

ADT (2010): 1200 – IDOT Master Structure Report  
 ADTT (2010): 5% – IDOT Master Structure Report  
 Inventory Rating RF: 0.777 – Collins Engineers, Inc.  
 0.890 – IDOT Master Structure Report  
 Operating Rating RF: 1.298 – Collins Engineers, Inc.  
 1.485 – IDOT Master Structure Report  
 Existing Clear Width: 37'-6"  
 Width to Remain in Place: 22'-0"  
 Clear Roadway Bridge Width: 28'-0"

**INSPECTION HISTORY (NBIS RATINGS)**

<u>Year</u>	<u>Deck:</u>	<u>Super:</u>	<u>Sub:</u>
2008	5	4	7
2010	5	4	7
2012	5	3	7
2014	3	3	7

## **STRUCTURE CONDITION FINDINGS**

### **APPROACH ROADWAY**

The bituminous approach roadway is in **good** condition (see *Photo No. 4 – 5*).

- Several transverse cracks, typically 1/4 in. wide and up to 1 in. wide, are located along the roadway.
- Transverse cracks up to 1/2 in. wide are located at the abutments.
- The west approach roadway has transverse cracks up to 1/2 in. wide approximately 8 ft. behind the abutments (see *Photo No. 5*).
- Minor longitudinal cracking up to 1/8 in. wide is located on the approach roadways.

### **BRIDGE PARAPET / RAIL**

The bridge rails are in **good** condition and are Type S1 Steel sections (see *Photo No. 6*).

- There is minor scraping along the rails.
- The bridge rail is not crash tested and therefore does not meet current IDOT design guidelines for this structure.

### **SUPERSTRUCTURE**

#### **Top of Deck** (see *Photo No. 7*)

The 3.5 in. HMA wearing surface is in **good** condition.

- Transverse cracks up to 1/4 in. are present over pier joints.
- The wearing surface has minor debris accumulation along its edges.

#### **Beams** (see *Photo No. 8 – 10*)

The channel beams are in **serious** condition.

- Significant water leakage is present between channel beam joints throughout all spans.
- The beams in the east span are in satisfactory condition with water leakage between beams and several minor areas of rust staining (see *Photo No. 11*).
- Several areas of longitudinal cracking up to 1/2 in. wide are present in the center span along the bottom legs of the beams, most significantly at the joint between beams 5 and 6. These beams also have spalls with exposed corroded reinforcement on the channel legs (see *Photo No. 12*).
- Longitudinal cracking up to 1/8 in. wide and delaminated areas are present along the outside channel legs of both fascia beams in the center span.
- Several areas with longitudinal cracks up to 1/8 in. wide and impending spalls are present along the legs on the channel beams in the west span, most notably on beams 3, 4 and 5 from the north side of the structure (see *Photo No. 13*).
- Several areas of rust staining are present, particularly along the cracked flanges of the beams in the center and west spans.

### **SUBSTRUCTURE**

The substructure is in **good** condition.

#### **Abutments/Wingwalls** (see *Photo No. 14 – 15*)

- Water leakage from the transverse joint in the wearing surface is present on the abutments.

- No notable defects are present on the wingwalls.

**Piers** (see *Photo No. 16 – 17*)

- Water leakage from the above joint is present on the pier caps.
- Several spalls with exposed corroded reinforcement are present on the east and west pier pile encasements (see *Photo No. 18*).

**SLOPE / CHANNEL**

**Slope/Channel Protection**

Fabric formed revetment mat is in place on both abutment slopes and is in **good** condition (see *Photo No. 19*).

- The fabric formed revetment mat has no notable defects.

**Channel Adequacy**

The channel is in **good** condition (see *Photo No. 20 – 21*).

- The channel bottom is silty with some rocky areas.
- Channel banks are well vegetated but steep.
- Minor bank erosion is present downstream from the structure.

**TRAFFIC SAFETY**

Pavement lane markings are not present at this structure.

**Guardrail**

- No approach guardrails are present at this structure.
- Curved guardrail ends are present at the end of the bridge rails at all corners. The end sections are not crash tested and therefore do not meet current IDOT policy guidelines for this structure.

**Signage**

- Hazard clearance markers are present at all four corners of the structure.

**GEOMETRY / UTILITIES**

**Geometry**

- The structure is in a tangent horizontal alignment with a 1.36% vertical grade decrease from west to east.

**Utilities**

- Pole mounted utility lines are located in the north and south ROW and crossing over the structure at the east abutment.

**STRUCTURE RATING / POSTING**

- The structure was load rated based on the original design plans and field inspection data. The results are as follows:
  - Inventory Rating = RF 0.777 (HS 15.5)
  - Operating Rating = RF 1.298 (HS 25.9)
- This structure has an Operating Rating of less than 1.0 for Kane County Special Permit Vehicles, and weight restrictions for permit vehicles should be implemented. Refer to Structure Rating calculations (Appendix F) for recommended permit vehicle weight restrictions.

Posting not required.

## **CONCLUSIONS AND RECOMMENDATIONS**

### **CONCLUSIONS**

- The superstructure is in serious condition with numerous areas of cracking and spalling along the beam flanges. The longitudinal cracks extend almost to the end blocks of the beams, which indicates that the main reinforcement is nearing the point where it will not have sufficient development length to contribute to the capacity. Based on guidance from IDOT, the current condition would not warrant capacity reductions in the load rating at this time, however the capacity of the beams will be substantially reduced when the cracks continue to develop and extend into the end blocks. This would require the structure to be posted to restrict live loads.
- The substructure is in good condition with several minor spalls on the pier pile encasements.
- The bridge rail does not meet current IDOT crash tested requirements. Additionally there are no approach guardrails at this structure and the end sections at the ends of the bridge rails are not crash tested in accordance with current IDOT policy guidelines for this structure.
- Posting is not required to restrict the weight of legal vehicles; however weight restrictions should be implemented for Kane County permit vehicles. Refer to Structure Rating calculations (Appendix F) for recommended permit vehicle weight restrictions.
- This structure is scheduled for replacement.

### **RECOMMENDATIONS**

This structure is programmed for replacement. Based on the condition of the structure, only minimal repairs and maintenance are recommended until the structure is replaced.

#### **Short Term (1 – 3 Years)**

- Monitor the cracking and deterioration in the west and center span beam legs. If the cracking propagates into the beam end blocks load restrictions may be required.
- Consideration should be given to installing approach guardrails, guardrail end sections, and bridge rails that are crash tested in accordance with current IDOT policy guidelines.

#### **Long Term (3 – 8 Years)**

- None at this time – structure scheduled for replacement.

## **APPENDICES**

Appendix A	Bridge Inspection Report
Appendix B	IDOT Master Structure Report
Appendix C	Structure Sketches
Appendix D	Structure Photos
Appendix E	Cost Estimates
Appendix F	Structure Rating

# **APPENDIX A**

## **BRIDGE INSPECTION REPORT**





<b>SN:</b> 045-3127	<b>District:</b> 1	<b>Spans:</b> 3	<b>Appr. Spans:</b> 0	<b>Skew:</b> 10°	<b>ADT:</b> 1200	<b>Truck Pct:</b> 5
<b>ADT Un:</b>	<b>Maint. Co:</b> Kane	<b>Twsp:</b> Aurora			<b>Status:</b> Open - No Restrictions	
<b>Facility Carried:</b> Rural Street				<b>Feature Crossed:</b> Indian Creek		
<b>Location:</b> 0.1 mi. W of Farnsworth Ave.		<b>Municipality:</b>	<b>Team/Sub Section:</b>		<b>Insp/Rte:</b>	
<b>Bridge Name:</b> Rural			<b>Material &amp; Type:</b> A/29			
<b>Insp. Intervals Routine</b> 24		<b>Fracture Critical:</b> 0	<b>Underwater:</b> 0	<b>Special:</b> 0	<b>Element Level:</b>	
<b>90- Inspection Date:</b>	3/20/2014	<b>90C - Temp. (°F):</b>	30	<b>90B1- In Depth:</b>	<input type="checkbox"/>	
<b>Is Delinquent:</b>	<input type="checkbox"/>	<b>Reason:</b>				
<b>90A - Agency Program Manager:</b> James Hamelka			<b>90A3- Consultant Program Manager:</b>			
<b>90A1- Team Leader:</b> Michael Haas		<b>90A2- Inspector:</b> Carolyn Kois				
<b>90B- Inspection Remarks:</b>						

**Previous Inspections**  
 2012 - Heavy cracking, delams, and some spalling of beams at fascias and CL of structure in West and Center spans. Cracking and delams are within 4' of the ends of the beams. East span has no deterioration.

**Resources**

<b>Time to Inspect (H:M):</b>	1:15	2:30	<b>Traffic Control:</b>	N	N	<b>Boat:</b>	N	N	<b>Waders:</b>	N	Y	<b>Snooper:</b>	N	N
<b>Ladder:</b>	N	N	<b>Manlift:</b>	N	N	<b>Bucket Truck:</b>	N	N	<b>Other:</b>					

**Inspector's Appraisals**

	Prev	New	Comments
58 - Deck Condition:	5	3	Transverse cracks at abutments and piers up to 1/2" wide.
59 - Superstructure Cond:	3	3	Significant water leakage at keyway joints. Several areas of longitudinal cracks and delamination or spalls on beam flanges.
60 - Substructure Cond:	7	7	Several areas of spalls with exposed rebar on pier columns and caps.
62 - Culvert Condition:	N	N	
61 - Channel Condition:	6	7	Minor bank erosion downstream from structure.
71 - Waterway Adequacy:	8	8	
72 - Approach Rdwy Align:	8	8	
111 - Pier Navig Protection:	N	N	

**90B - Inspection Remarks**

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## **APPENDIX B**

### **IDOT MASTER STRUCTURE REPORT**

**Illinois Department of Transportation  
Structures Information Management System  
Structure Summary Report**

Date: 03/26/2014

Page: 1

Structure Number: 045-3127

District: 1

**Inventory Data**

<b>Facility Carried:</b> RURAL STREET	<b>Bridge Name:</b> RURAL	<b>Sufficiency Rating:</b> 52.7	<b>Structure Length:</b> 72.0
<b>Feature Crossed:</b> INDIAN CREEK	<b>Location:</b> 0.1 MI W FARNSWORTH	<b>HBP Eligible:</b> Yes	<b>AASHTO Bridge Length:</b> 68.9
<b>Bridge Remarks:</b>		<b>Replaced By:</b> -	<b>Length of Long Span:</b> 28.0
<b>Bridge Status:</b> 1 OPEN - NO RESTRICT	<b>Status Date:</b> 04/1988	<b>Replaces:</b> -	<b>Bridge Roadway Width:</b> 37.5
<b>Status Remarks:</b>		<b>Last Update Date:</b> 07/05/2012	<b>Appr Roadway Width:</b> 28.0
<b>Maint County:</b> 045 KANE	<b>Maint Township:</b> 01 AURORA	<b>Parallel Structure:</b> None	<b>Deck Width:</b> 37.5
<b>Maint Responsibility:</b> 09 TOWNSHIP OR ROAD DISTRICT		<b>Multi-Level Structure Nbr:</b>	<b>Sidewalk Width Right:</b> 0.0
<b>Service On/Under:</b> 1 HIGHWAY	5 / WATERWAY	<b>Skew Direction:</b> R	<b>Sidewalk Width Left:</b> 0.0
<b>Reporting Agency:</b> 3 COUNTY		<b>Skew Angle:</b> 10 D 0 M 0 S	<b>Navigation Control:</b> 0 No
<b>Main Span Matl/Type:</b> A PRECAST CONCRETE/NOT PRESTRESS / 29 CHANNEL BEAM		<b>Structure Flared:</b> No	<b>Navigation Horiz Clear:</b> 0
<b>Nbr Of Main Spans:</b> 3	<b>Nbr Of Approach Spans:</b> 0	<b>Historical Significance:</b> No	<b>Navigation Vert Clear:</b> 0
<b>***Approaches***</b>		<b>Border Bridge State:</b>	<b>Culvert Fill Depth:</b> 0.0
<b>Near #1 Matl/Type:</b> /		<b>Bdr State SN:</b>	<b>Number Culvert Cells:</b> 0
<b>Near #2 Matl/Type:</b> /		<b>Bdr State % Responsibility:</b> 0	<b>Culvert Opening Area:</b> 0.0
<b>Far #1 Matl/Type:</b> /		<b>Structural Steel Wt:</b> 0	<b>Culvert Cell Height:</b> 0.00
<b>Far #2 Matl/Type:</b> /		<b>Substructure Material:</b>	<b>Culvert Cell Width:</b> 0.00
<b>Median Width/Type:</b> 0 Ft. / 0 None		<b>Rated By:</b> 2 IDOT	<b>Rate Method:</b> 1 LOAD FACTOR
<b>Guardrail Type L/R:</b> 0None / 0 None		<b>Inventory Rating:</b> 0.890(32)	<b>Load Rating Date:</b> 10/31/2012
<b>Toll Facility Indicator:</b> 0 No Toll		<b>Operating Rating:</b> 1.485(53)	<b>Railroad Crossing Info</b>
<b>Latitude:</b> 41 D 46 M 11.82 S	<b>Longitude:</b> 88 D 17 M 0.22 S	<b>Design Load:</b> 02 HS20	<b>Crossing 1 Nbr:</b>
<b>Deck Structure Type:</b> D PCAST REIN CN DK BM	<b>Deck Structure Thickness:</b> 5 SD: Y FO: Y		<b>Crossing 1 Nbr:</b>
<b>Sidewalks Under Structure:</b> 0 None			<b>RR Lateral Underclear:</b> 0.0
			<b>RR Vertical Underclear:</b> 0 Ft 0 In

**Key Route On Data**

<b>Key Route Nbr:</b> TOWNSHIP OR ROAD DISTRICT 0189	<b>Station:</b> 0.1000
<b>Appurtenances:</b> Main Route 00000	<b>Segment:</b>
<b>Inventory County:</b> 045 KANE	<b>Linked:</b> Y
<b>Township/Road Dist:</b> 01 AURORA	<b>Natl. Hwy System:</b> Not on NHS
<b>Municipality:</b> 0000	<b>Inventory Direction:</b>
<b>Urban Area:</b> 1051 1051	<b>Curr AADT Yr/Count:</b> 2010 / 1200
<b>Functional Class:</b> 7 LOCAL	<b>Est Truck Percentage:</b> 5
<b>** CLEARANCES **</b> South/East North/West	<b>Number Of Lanes:</b> 2
<b>Max Rdwy Width:</b> 37.5	<b>One Or Two Way:</b> 2 Two-Way
<b>Horizontal:</b> 37.5 0.0	<b>Bypass Length:</b> 1
	<b>Future AADT Yr/Cnt:</b> 2032 / 1531
	<b>Designated Truck Rte:</b> NONE
<b>Lateral:</b>	<b>Special Systems:</b> No

**Key Route Under Data**

<b>Station:</b>
<b>Segment:</b>
<b>Linked:</b>
<b>Natl. Hwy System:</b>
<b>Inventory Direction:</b>
<b>Curr AADT Yr/Count:</b> /
<b>Est Truck Percentage:</b>
<b>Number Of Lanes:</b>
<b>One Or Two Way:</b>
<b>Bypass Length:</b>
<b>Future AADT Yr/Cnt:</b> /
<b>Designated Truck Rte:</b>
<b>Special Systems:</b>

**\*\*\* Marked Route On Data \*\*\***

Designation	Kind	Number
Route #1: 1 Mainline	4 FAS, CH, or TR's Unmarked	
Route #2: 1 Mainline		
Route #3: 1 Mainline		

**\*\*\* Marked Route Under Data \*\*\***

Designation	Kind	Number
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**Illinois Department of Transportation  
Structures Information Management System  
Structure Summary Report**

Date: 03/26/2014

Page: 2

Structure Number: 045-3127

District: 1

**Data Related to Inspection Information**

\*\*\* Inspection Intervals \*\*\*

\*\*\* Maximum Allowable Posting Limits \*\*\*

Bridge Posting Level:

Routine NBIS:	24 MOS	Underwater:	0 MOS	One Truck At A Time:	0	Combination Type 3S-1:	Tons	5	No Posting Required
		Special:	N	Single Unit Vehicles:	Tons	Combination Type 3S-2:	Tons		

**Inspection/Appraisal Information**

\*\* Actual Posted Limits \*\*

Inspection Date:	03/06/2012	Inspection Temperature:	35Deg. F						
Deck:	5	FAIR CONDITION - MINOR SECTION LOSS, CRACKS				Single Unit Vehicles:	Tons		
Superstructure:	3	SERIOUS CONDITION - SIGNIFICANT SECTION LOSS				Combination Type 3S-1:	Tons		
Substructure:	7	GOOD CONDITION - SOME MINOR PROBLEMS				Combination Type 3S-2:	Tons		
Culvert:	N	NOT APPLICABLE				One Truck At A Time:	0		
Channel and Protection:	6	SATISFACTORY CONDITION - MINOR DETERIORATION		Deck Wearing Surf:	G	BITUMINOUS OVERLAY		Last Paint Type:	
Structural Evaluation:	3	INTOLERABLE - HIGH PRIORITY FOR CORRECTION		Deck Membrane:	A	WATERPROOF MEM SYST			
Deck Geometry:	6	EQUAL TO PRESENT MINIMUM CRITERIA		Deck Protection:	J	NONE			
Underclearance-Vert/Lat.:	N	NOT APPLICABLE		Total Deck Thick:	24.5				
Waterway Adequacy:	8	EQUAL TO PRESENT DESIRABLE CRITERIA		Last Paint Date:					
Approach Roadway Align:	8	EQUAL TO PRESENT DESIRABLE CRITERIA							
Bridge Railing Appraisal:	3	Meets Standards							
Approach Guardrail:	111	Does Not Exist	Does Not Exist	Does Not Exist					
Pier Navig Protection:	N	N/A							

**Underwater Inspection/Appraisal Information**

Inspection Date:		Inspection Category:	
Temperature:		Inspection Method:	
		Appraisal Rating:	

**Scour Critical Information**

**Miscellaneous**

Rating:	8	CALCULATED SCOUR ABOVE FOOTING	Evaluation Method:	B	Rational Analysis		
Analysis Date:	09/29/1996					Microfilm Data Recorded:	No

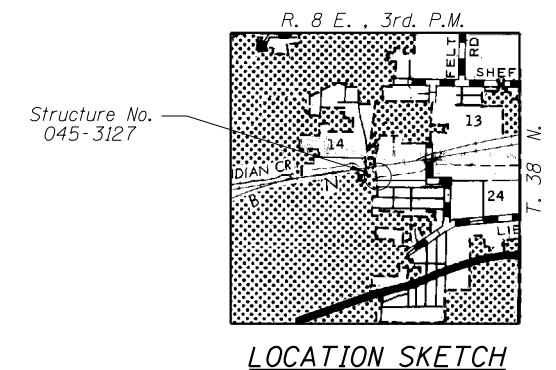
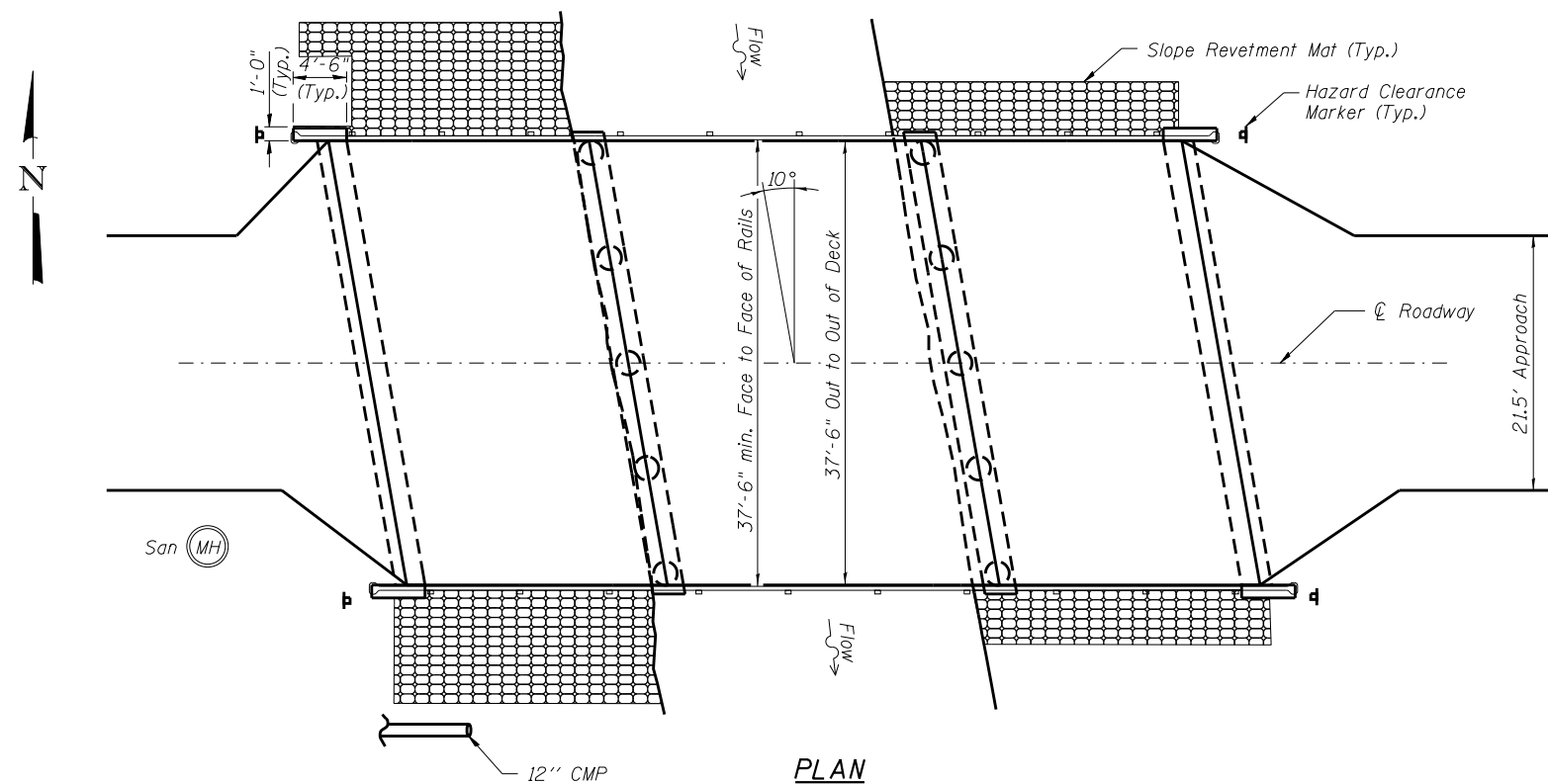
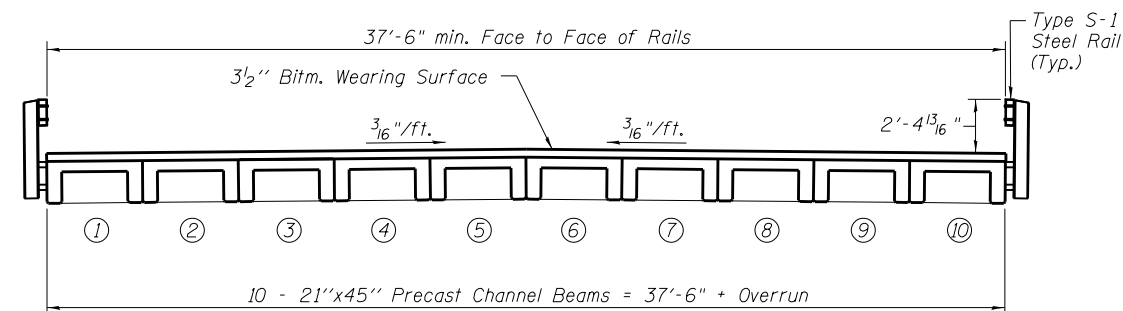
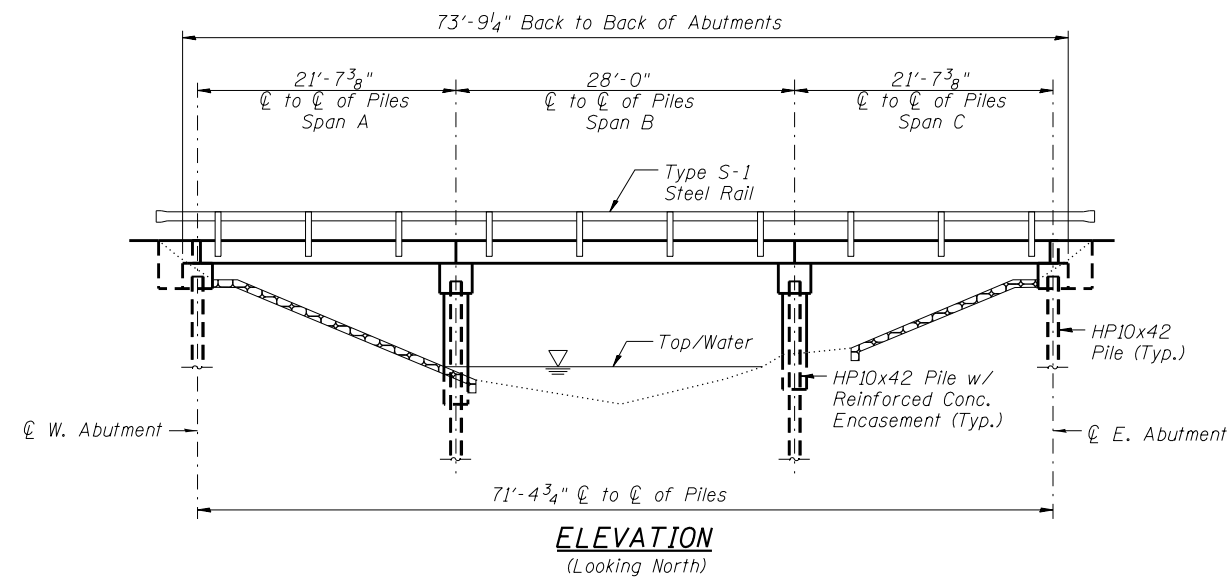
**Construction Information**

**Waterway Information**

Year:	1985	Original	Reconstructed	Flood Design Frequency:	YRS	Drainage Area:	Acre
Route:		Sta: 10+10	Sta:	Flood Design Q (CFS):		Flood Base Q (CFS):	
Section Nbr:	84-01127-00-BR			Flood Design Nat H W E:		Flood Base Nat H W E:	
Contract Nbr:				Flood Des Open Prop:	SF		
Fed Aid Pr#:	00000000000000						
Built By:	9	TOWNSHIP OR ROAD DISTRICT					

## **APPENDIX C**

### **STRUCTURE SKETCHES**



**LEGEND**

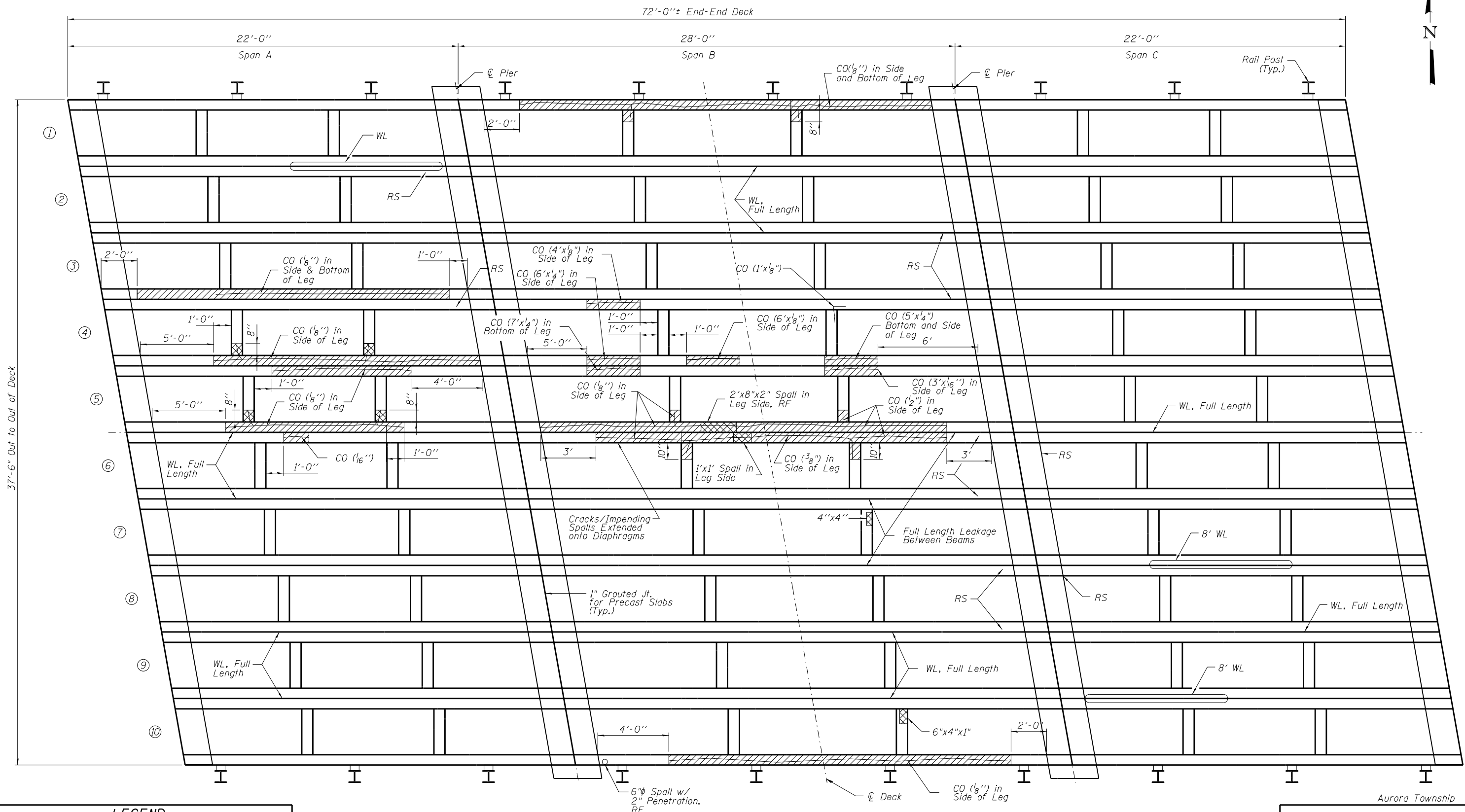
CO = Crack - Open	SS = Shear Stirrup
CC = Crack - Closed	EF = Efflorescence
DL = Delamination	WL = Water Leakage
LE = Leaching	
PD = Plugged Drain Hole	Delamination
PS = Prestressed Strand	Spalls
RF = Reinforcement	Honeycomb
RP = Repair	Crack
RS = Rust Staining	
SP = Spall	

Aurora Township

**KANE COUNTY DIVISION OF TRANSPORTATION**

RURAL STREET OVER  
INDIAN CREEK  
KANE COUNTY  
STRUCTURE NUMBER: 045-3127  
**GENERAL PLAN AND ELEVATION**

DRAWN BY: PRH	<b>COLLINS ENGINEERS</b> <small>125 North Wacker Drive Chicago, IL 60606 (312) 704-9380 www.collinseng.com ILLINOIS PROFESSIONAL DESIGN FIRM LICENSE NO. 184-00093</small>	DATE: MARCH 20, 2014
CHECKED BY: MAH	PROJECT NO. 8319	SHEET 1 OF 5



**LEGEND**

CO = Crack - Open	SS = Shear Stirrup
CC = Crack - Closed	EF = Efflorescence
DL = Delamination	WL = Water Leakage
LE = Leaching	
PD = Plugged Drain Hole	Delamination
PS = Prestressed Strand	Spalls
RF = Reinforcement	Honeycomb
RP = Repair	Crack
RS = Rust Staining	
SP = Spall	

**UNDERSIDE OF DECK PLAN**

Aurora Township

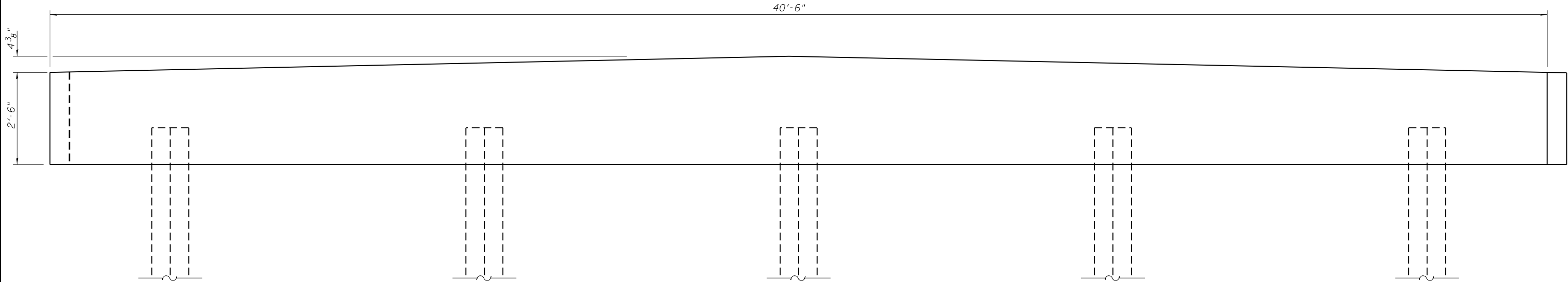
**KANE COUNTY DIVISION OF TRANSPORTATION**

RURAL STREET OVER  
INDIAN CREEK  
KANE COUNTY  
STRUCTURE NUMBER: 045-3127

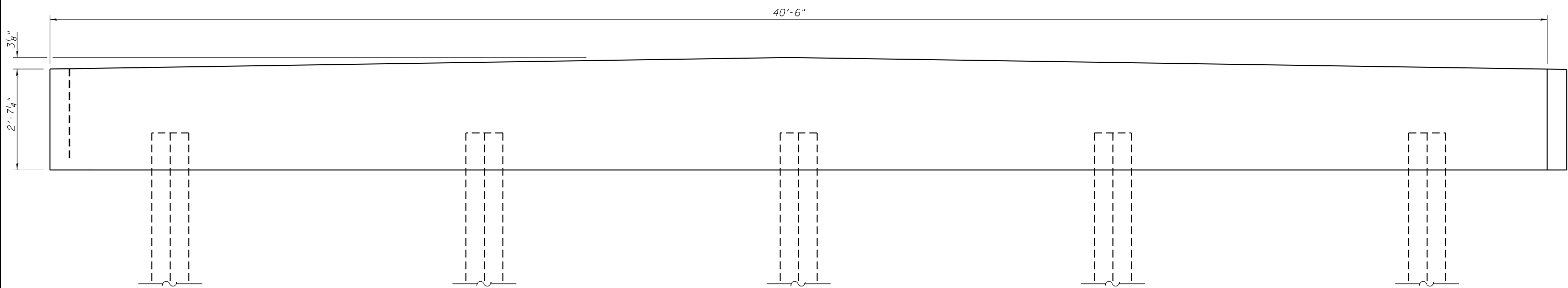
**UNDERSIDE OF DECK**

DRAWN BY: PRH		DATE: MARCH 20, 2014
CHECKED BY: MAH	133 North Wacker Drive Chicago, IL 60606 (312) 704-9300 www.collinseng.com	SHEET 2 OF 5
PROJECT NO. 8319	ILLINOIS PROFESSIONAL DESIGN FIRM LICENSE NO. 184-080993	









WEST ABUTMENT ELEVATION



EAST ABUTMENT ELEVATION

**LEGEND**

CO = Crack - Open	SS = Shear Stirrup
CC = Crack - Closed	EF = Efflorescence
DL = Delamination	WL = Water Leakage
LE = Leaching	
PD = Plugged Drain Hole	 Delamination
PS = Prestressed Strand	 Spalls
RF = Reinforcement	 Honeycomb
RP = Repair	 Crack
RS = Rust Staining	
SP = Spall	

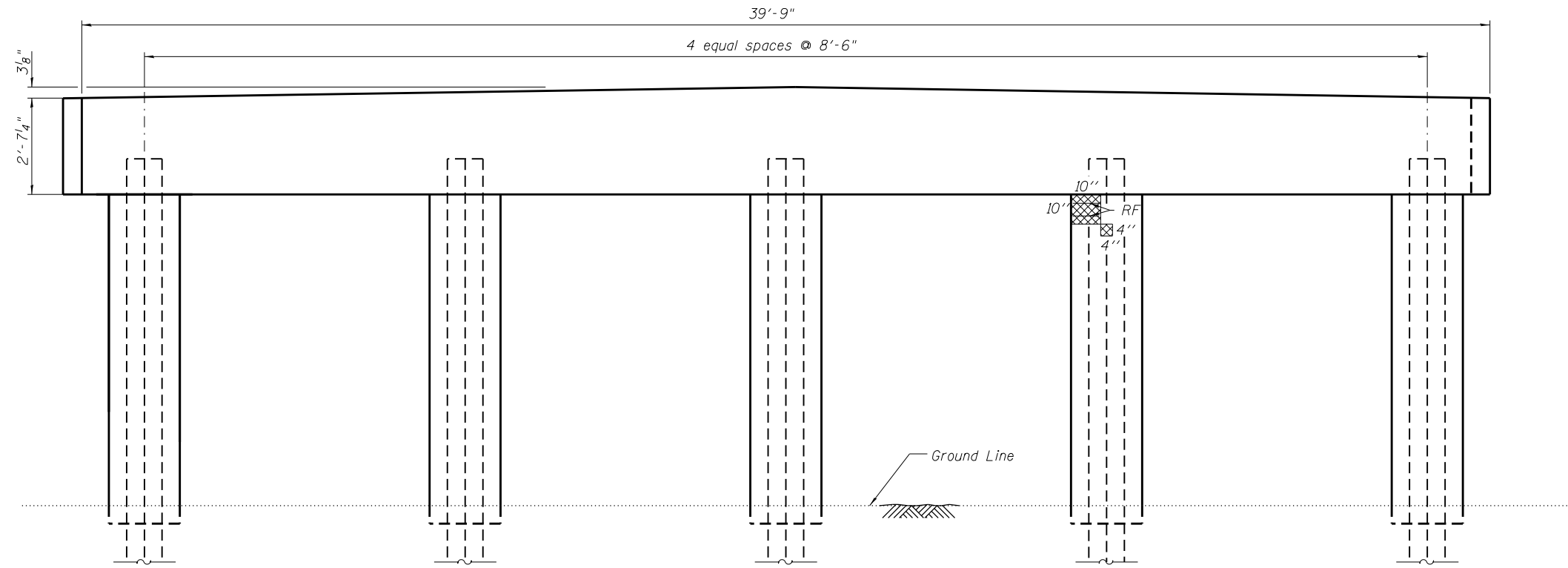
Aurora Township

**KANE COUNTY DIVISION OF TRANSPORTATION**

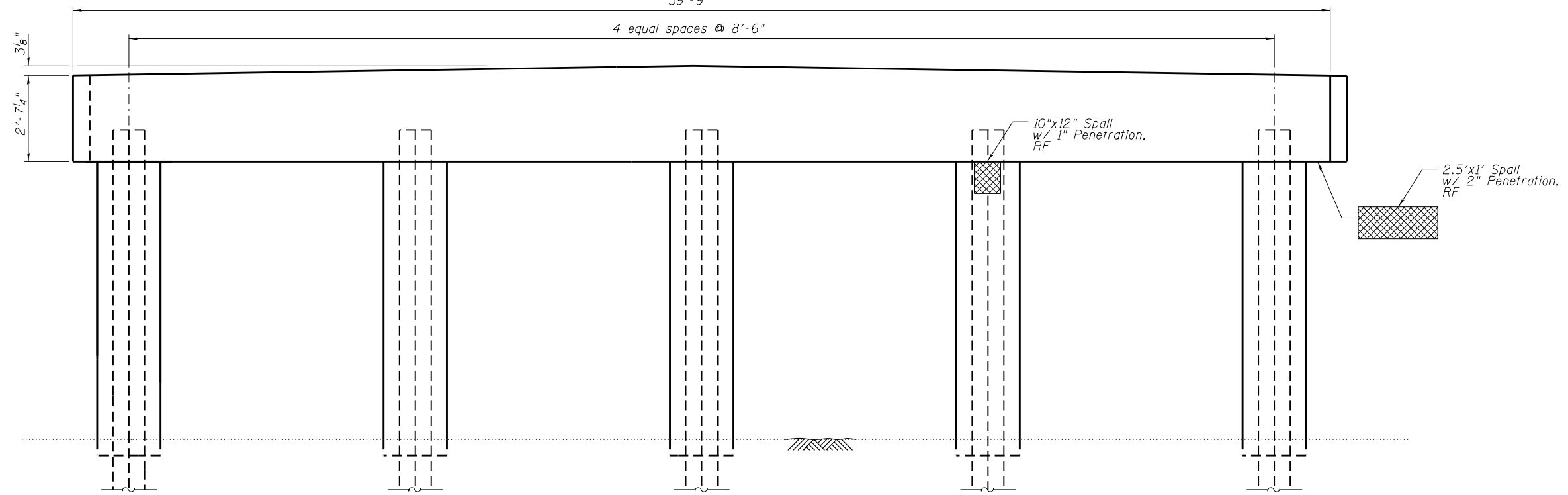
RURAL STREET OVER  
INDIAN CREEK  
KANE COUNTY  
STRUCTURE NUMBER: 045-3127

**WEST AND EAST ABUTMENT**

DRAWN BY: PRH		DATE: MARCH 20, 2014
CHECKED BY: MAH		SHEET 3 OF 5
PROJECT NO. 8319	<small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinseng.com ILLINOIS PROFESSIONAL DESIGNER LICENSE NO. 184-08093</small>	







**PIER ELEVATION**  
(West Side)  
39'-9"



**PIER ELEVATION**  
(East Side)  
39'-9"

**LEGEND**

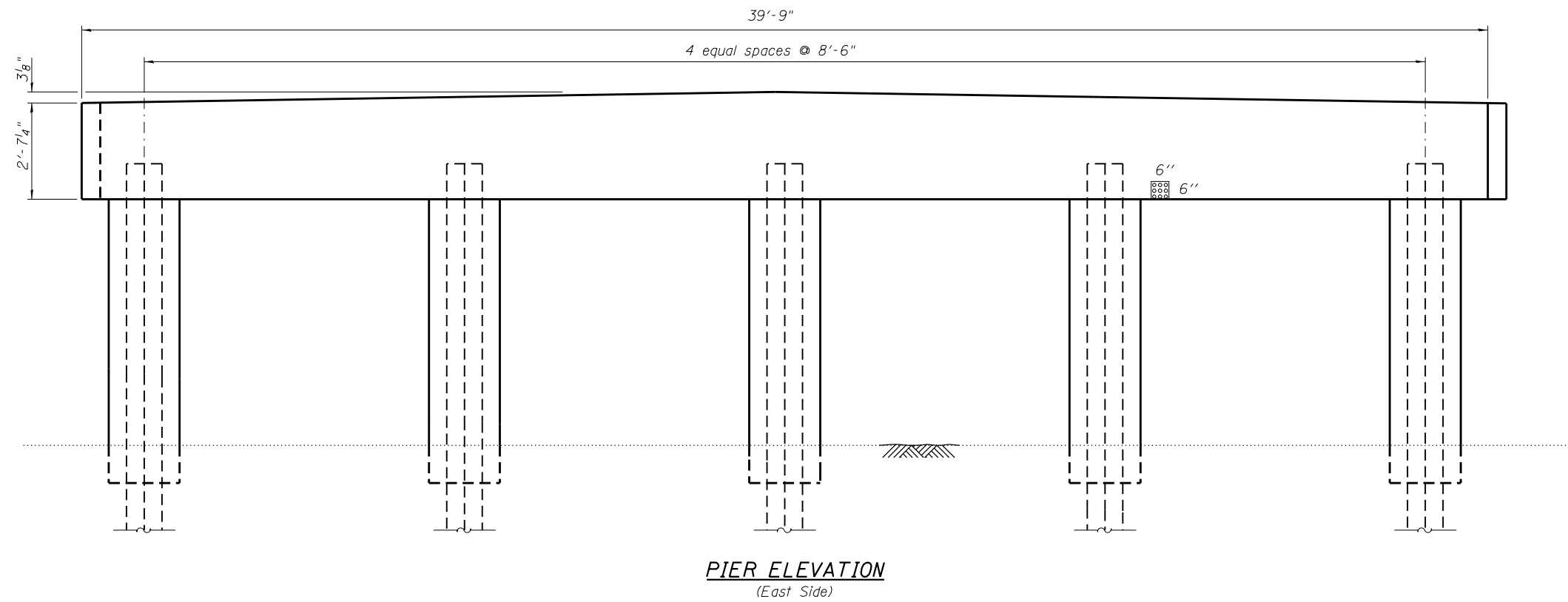
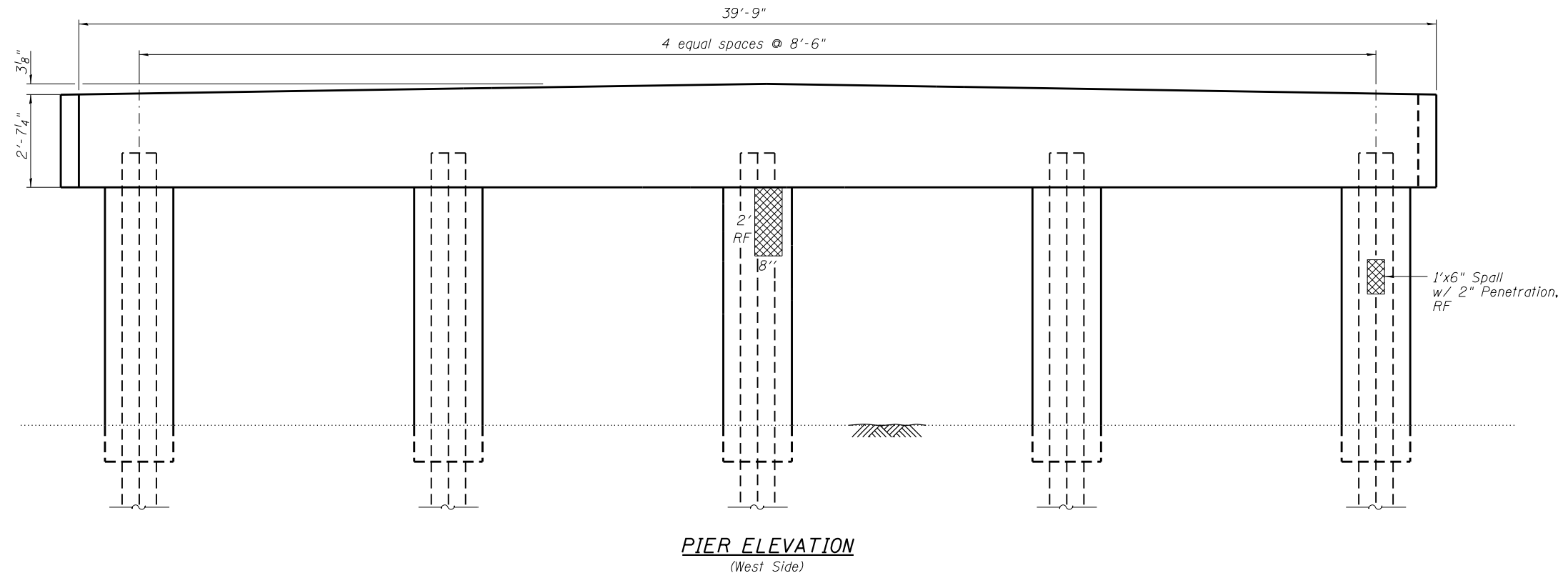
- |                         |  |
|-------------------------|--|
| CO = Crack - Open       | SS = Shear Stirrup   |
| CC = Crack - Closed     | EF = Efflorescence   |
| DL = Delamination       | WL = Water Leakage   |
| LE = Leaching           |  |
| PD = Plugged Drain Hole |  Delamination |
| PS = Prestressed Strand |  Spalls       |
| RF = Reinforcement      |  Honeycomb    |
| RP = Repair             |  Crack        |
| RS = Rust Staining      |  |
| SP = Spall              |  |

Aurora Township

**KANE COUNTY DIVISION OF TRANSPORTATION**

RURAL STREET OVER  
INDIAN CREEK  
KANE COUNTY  
STRUCTURE NUMBER: 045-3127  
**WEST PIER**

DRAWN BY: PRH		DATE:
CHECKED BY: MAH		MARCH 20, 2014
PROJECT NO. 8319		SHEET 4 OF 5



**LEGEND**

CO = Crack - Open	SS = Shear Stirrup
CC = Crack - Closed	EF = Efflorescence
DL = Delamination	WL = Water Leakage
LE = Leaching	
PD = Plugged Drain Hole	Delamination
PS = Prestressed Strand	Spalls
RF = Reinforcement	Honeycomb
RP = Repair	Crack
RS = Rust Staining	
SP = Spall	

Aurora Township

**KANE COUNTY DIVISION OF TRANSPORTATION**

RURAL STREET OVER  
INDIAN CREEK  
KANE COUNTY  
STRUCTURE NUMBER: 045-3127  
**EAST PIER**

DRAWN BY: PRH	<b>COLLINS ENGINEERS</b> <small>133 North Wacker Drive Chicago, IL 60606 (312) 704-9300 www.collinseng.com</small>	DATE: MARCH 20, 2014
CHECKED BY: MAH	ILLINOIS PROFESSIONAL DESIGN FIRM LICENSE NO. 184-08093	SHEET 5 OF 5

## **APPENDIX D**

### **STRUCTURE PHOTOS**



Photo No. 1  
South Elevation of Structure, looking North



Photo No. 2  
North Elevation of Structure, looking South



Photo No. 3  
Approach Roadway and Structure, looking West



Photo No. 4  
East Approach Roadway, looking South



Photo No. 5  
West Approach Roadway, looking Southwest



Photo No. 6  
Typical Bridge Rail Elevation (South side shown), looking Southeast



Photo No. 7  
Typical Deck Condition, looking West



Photo No. 8  
Underside of East Span, looking Southeast





Photo No. 9  
Underside of Center Span, looking Northwest



Photo No. 10  
Underside of West Span, looking Southwest



Photo No. 11  
Typical Condition of Channel Beams in East Span, looking East



Photo No. 12  
Joint Between Beams 5 and 6 in Center Span, looking Southeast



Photo No. 13

Typical Longitudinal Crack (Beam 5 in West Span Shown), looking Southwest



Photo No. 14

West Abutment Elevation, looking Northwest



Photo No. 15  
East Abutment Elevation, looking Southeast



Photo No. 16  
West Pier, looking Northwest



Photo No. 17  
East Pier, looking Southwest



Photo No. 18  
Typical Spall on Pier Pile Encasement (East Pier Middle Column Shown), looking East



Photo No. 19

Typical Revetment Mat Slope Protection (East Side Shown), looking South



Photo No. 20

Downstream from Bridge Deck, looking South



Photo No. 21  
Upstream from Bridge Deck, looking North

# **APPENDIX E**

## **COST ESTIMATES**



**Cost Estimate**

**Short Term Recommended Repairs**

<u>Item</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Price</u>	<u>Total</u>
Bridge Rail Replacement	Ft.	143	\$175	\$25,025
Steel Plate Beam Guardrail	Ft.	640	\$30	\$19,200
Guardrail Transition Sections	Each	4	\$3,000	\$12,000
Guardrail End Sections	Each	4	\$2,500	\$10,000
Traffic Control and Protection	L Sum	1	\$1,800	\$1,800
Subtotal				<u>\$66,225</u>
10% Contingency				\$6,623
10% Mobilization				\$6,623
The total cost of the short term recommended repairs				<u>\$79,470</u>

## **APPENDIX F**

### **STRUCTURE RATING**

**Structure Rating Summary**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

**Simple Span Precast Concrete Channel Beam Rating**

**LFR METHOD**

	RF	HS	Gross Weight (Tons)
HS-20 Inventory	0.777	15.5	27.9
HS-20 Operating	1.298	25.9	46.7

**Illinois Posting Vehicle (Operating Level)**

	RF	Gross Weight (Tons)
Single Unit	1.780	38.4
3 or 4 axles	1.738	50.8
5 or more axles	1.368	55.7

**Kane County Special Permit Vehicle (Operating Level)**

	RF	Gross Weight (Kips)
KC-1	0.915	155.5
KC-2	0.918	151.4
KC-3	0.949	132.8
KC-4	1.151	132.3

**AASHTO Notional Truck (Operating Level)**

	RF	Gross Weight (Tons)
AASHTO Notional	1.364	54.5

**Required Postings / Permitting Limitations**

	Gross Vehicle Weight
Single Unit	--
3 or 4 axles	--
5 or more axles	--

Bridge posting not required.

**Recommended Kane County Special Permit Vehicle Limitations**

	Gross Vehicle Weight
KC-1	155.5 Kips
KC-2	151.4 Kips
KC-3	132.8 Kips
KC-4	115 Kips

Weight restrictions should be implemented for special permit vehicles. Gross Vehicle Weight indicated is the maximum recommended weight for that vehicle type.

Current IDOT S-107 Bridge Posting Level:  
Recommended Bridge Posting Level:

5 No Posting Required  
No change recommended

**Structure Rating Calculations**  
**Center Span**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

**Simple Span Precast Concrete Channel Beam Rating**  
**LFR METHOD**

Bridge:

Span Length	27.24	Ft
WS Thickness	3.50	In
F'c	4.50	ksi
Fy	40.00	ksi
Ec	3,824	ksi
Es	29,000	ksi
n	8	
Rail / Parapet	0.050	k/Ft
S (Beam spacing)	3.75	ft
Number of beams	10.00	

Slab Properties:

Beam depth (incl deck)	1.75	ft
Beam depth (incl deck)	21.00	in
Slab Depth	5.00	in
Width of beam web (aver	16	in
Beam Area with t/flange	480.9	in <sup>2</sup>
Beam Weight	0.501	k/Ft
Moment of Inertia, I	19,122	in <sup>4</sup>
Section Modulus, S	1481	in <sup>3</sup>
% Reinf Area Reduction	0.00	%

Reinforcement:

# of Bars per beam	Bar Size	At	Area
		In	In <sup>2</sup>
4.00	11	3.125	6.25
2.00	11	6.125	3.12
0.00	0	0.000	0.00
		0.00	0.00
	C.G.	4.13	in
		As =	9.37 in <sup>2</sup>

Dead Load: uniform

Beam with t/flange	0.501	k/Ft
Slab	0.000	k/Ft
Wearing Surface	0.164	k/Ft
Rail / Parapet	0.010	k/Ft
Other - haunches	0.00	k/Ft
<b>Total uniform</b>	<b>0.675</b>	<b>k/Ft</b>
Diaphragm @ 10' from brg	0.383	k

2 total

Moment Loads: @ midspan

D = Dead Load	66.43	k-Ft / beam
Live Load HS20	240.60	k-Ft (truck or lane)
L = LL+Imp distrib	117.69	k-Ft / beam

Shear Loads: @ section 1

D = Dead Load	8.63	k / beam
Live Load HS20	43.53	k (truck or lane)
L = Live Load	28.29	k / beam

Factors:

Impact	0.300	
D (Moment) **	0.753	wheel per beam
D (Moment)	0.376	axle per beam
D (Shear)	1.000	wheel per beam
D (Shear)	0.500	axle per beam
d	16.875	in

\*\* see further pages for calculations of distribution factor

Moment Capacity: AASHTO 8.16.3

b1	82	in
b2	45	in
b3	76	in
b eff	45	in
As	9.37	in <sup>2</sup>
a	2.18	in
a < Slab Depth?	YES	
C = φ Mn	443.7	k-Ft (8-16)
β1	0.825	8.16.2.7
ρ	0.0123	As/bd
ρ b	0.0540	(8-18)
.75 ρ b	0.0405	OK

Shear Capacity: AASHTO 8.16.6

	sect. 1	sect. 2
Location	1.41	1 ft from brg
d	16.875	16.875
No. of stirrup legs	4.00	4.00
Bar Size	3.00	3.00
Spacing, s	9.00	3.00 in
Av	0.44	0.44 in <sup>2</sup>
Vs	33.12	99.36 k
Vs Limit	407.52	407.52 k
Vs Used	33.12	99.36 k
Vc	36.22	36.22 k
C = φ Vn	58.94	115.25 k

Final Capacities:

φ Mn	443.7	k-Ft
% Cap. Reduction	0.00	%
C = φ Mn	443.7	k-Ft

STAAD results	MOMENT	shear
HS20 OR LANE =	240.6	see below

Shear Loads: @ section 2

D = Dead Load	8.90	k / beam
Live Load HS20	44.55	k (truck or lane)
L = Live Load	28.96	k / beam

Live Load Moment for HS-20 taken from AASHTO Appendix A

Live Load Shear for HS-20 taken from STAAD at critical section

Live Load Shear and Moment for all other vehicles taken from STAAD analysis

**Structure Rating Calculations**

**Center Span**

**Simple Span Reinforced Concrete Slab Rating**

Rating Factor

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

	C	D	L	RF	HS	Gross Tons
M Inventory	443.71	66.43	117.69	1.399	27.98	50.37
M Operating	443.71	66.43	117.69	2.336	46.71	84.08
V(sec.1) Inventory	58.94	8.63	28.29	0.777	15.55	27.99
V(sec.1) Operating	58.94	8.63	28.29	1.298	25.95	46.72
V(sec.2) Inventory	115.25	8.90	28.96	1.650	33.00	59.40
V(sec.2) Operating	115.25	8.90	28.96	2.754	55.08	99.15

Rating Factor:

	RF	HS
Inventory	0.777	15.5
Operating	1.298	25.9

< 1

If Inventory RF is below 1.00 then the Legal Load Rating should be performed

Illinois Posting Vehicles:

**Single Unit**

\*Type 2 - 15.75 Tons

	C	D	L	RF	Tons
M Inventory	443.71	66.43	66.57	2.474	38.96
M Operating	443.71	66.43	66.57	4.129	65.03
V(sec.1) Inventory	58.94	8.63	15.03	1.464	23.05
V(sec.1) Operating	58.94	8.63	15.03	2.443	38.48
V(sec.2) Inventory	115.25	8.90	15.35	3.112	49.01
V(sec.2) Operating	115.25	8.90	15.35	5.194	81.80

STAAD RESULTS

MOMENT (k-ft)

136.1

SHEAR (k)

@ sect1 23.1

@ sect2 23.6

\*Type 3 - 22 Tons

	C	D	L	RF	Tons
M Inventory	443.71	66.43	95.94	1.716	37.76
M Operating	443.71	66.43	95.94	2.865	63.03
V(sec.1) Inventory	58.94	8.63	20.63	1.066	23.46
V(sec.1) Operating	58.94	8.63	20.63	1.780	39.15
V(sec.2) Inventory	115.25	8.90	21.09	2.266	49.85
V(sec.2) Operating	115.25	8.90	21.09	3.782	83.21

MOMENT (k-ft)

196.14

SHEAR (k)

@ sect1 31.7

@ sect2 32.4

**Semi-Trailers**

\*Type 3-S1 - 29.25 Tons

	C	D	L	RF	Tons
M Inventory	443.71	66.43	98.45	1.673	48.93
M Operating	443.71	66.43	98.45	2.792	81.67
V(sec.1) Inventory	58.94	8.63	21.12	1.041	30.45
V(sec.1) Operating	58.94	8.63	21.12	1.738	50.84
V(sec.2) Inventory	115.25	8.90	21.64	2.207	64.57
V(sec.2) Operating	115.25	8.90	21.64	3.685	107.78

MOMENT (k-ft)

201.26

SHEAR (k)

@ sect1 32.5

@ sect2 33.3

\*Type 3-S2 - 40.75 Tons

	C	D	L	RF	Tons
M Inventory	443.71	66.43	111.47	1.477	60.20
M Operating	443.71	66.43	111.47	2.466	100.49
V(sec.1) Inventory	58.94	8.63	26.83	0.820	33.41
V(sec.1) Operating	58.94	8.63	26.83	1.368	55.76
V(sec.2) Inventory	115.25	8.90	27.66	1.727	70.38
V(sec.2) Operating	115.25	8.90	27.66	2.883	117.47

MOMENT (k-ft)

227.88

SHEAR (k)

@ sect1 41.3

@ sect2 42.6

\*Type 3-S2 - 40 Tons

	C	D	L	RF	Tons
M Inventory	443.71	66.43	104.27	1.579	63.17
M Operating	443.71	66.43	104.27	2.636	105.45
V(sec.1) Inventory	58.94	8.63	22.13	0.994	39.75
V(sec.1) Operating	58.94	8.63	22.13	1.659	66.36
V(sec.2) Inventory	115.25	8.90	22.61	2.113	84.53
V(sec.2) Operating	115.25	8.90	22.61	3.527	141.10

MOMENT (k-ft)

213.17

SHEAR (k)

@ sect1 34.0

@ sect2 34.8

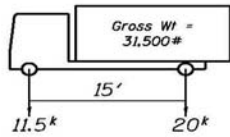
Postings: (Operating Level)	RF	OPERATING	Tons
<b>Single Unit</b>	Type 2	2.443	38.48
	Type 3	1.780	39.15
<b>Semi-Trailers</b>	Type 3-S1	1.738	50.84
	Type 3-S2	1.368	55.76
	Type 3-S2	1.659	66.36

Recommended Posting	
Single Unit	--
3 or 4 axles	--
5 or more axles	--

\*\* Structures less than a rating of 3 Tons should be closed to traffic.  
Operating = Absolute maximum permissible load level

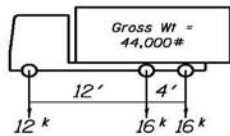
**Structure Rating Calculations**  
**Center Span**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014



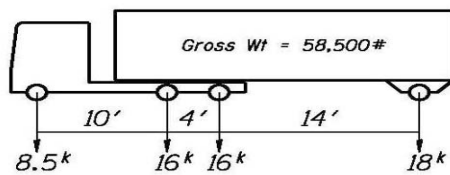
**Single Unit**  
Type 2

**Empty Weight**      **GVW**  
4 Tons      15.75 Tons



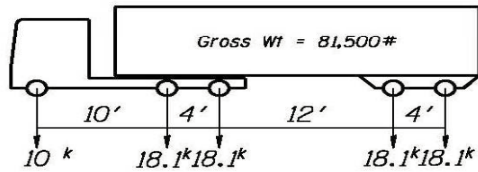
Type 3

8 Tons      22 Tons



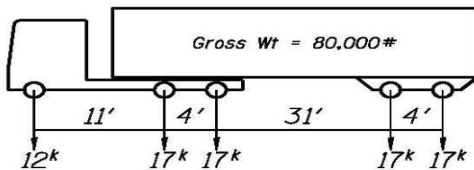
**3 or 4 axles**

Type 3-S1      12 Tons      29.75 Tons



**5 or more axles**

Type 3-S2      13 Tons      40.75 Tons



**5 or more axles**

Type 3-S2      13 Tons      40 Tons

**Structure Rating Calculations**  
**Center Span**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

*Kane County Special Permit Vehicles*

Type KC 1 - 170,000 lb	C	D	L	RF	Kips
M Inventory	443.71	66.43	200.18	0.823	139.85
M Operating	443.71	66.43	200.18	1.373	233.43
V(sec.1) Inventory	58.94	8.63	40.12	0.548	93.19
V(sec.1) Operating	58.94	8.63	40.12	0.915	155.56
V(sec.2) Inventory	115.25	8.90	41.06	1.164	197.83
V(sec.2) Operating	115.25	8.90	41.06	1.942	330.22

MOMENT (k-ft)  
**409.25**  
SHEAR (k)  
@ sect1 **61.7**  
@ sect2 **63.2**

Type KC 2 - 165,000 lb	C	D	L	RF	Kips
M Inventory	443.71	66.43	200.55	0.821	135.48
M Operating	443.71	66.43	200.55	1.371	226.15
V(sec.1) Inventory	58.94	8.63	39.99	0.550	90.74
V(sec.1) Operating	58.94	8.63	39.99	0.918	151.47
V(sec.2) Inventory	115.25	8.90	40.93	1.167	192.62
V(sec.2) Operating	115.25	8.90	40.93	1.949	321.53

MOMENT (k-ft)  
**410**  
SHEAR (k)  
@ sect1 **61.5**  
@ sect2 **63.0**

Type KC 3 - 140,000 lb	C	D	L	RF	Kips
M Inventory	443.71	66.43	200.49	0.821	114.99
M Operating	443.71	66.43	200.49	1.371	191.95
V(sec.1) Inventory	58.94	8.63	38.69	0.569	79.60
V(sec.1) Operating	58.94	8.63	38.69	0.949	132.86
V(sec.2) Inventory	115.25	8.90	39.46	1.211	169.49
V(sec.2) Operating	115.25	8.90	39.46	2.021	282.92

MOMENT (k-ft)  
**409.87**  
SHEAR (k)  
@ sect1 **59.5**  
@ sect2 **60.7**

Type KC 4 - 115,000 lb	C	D	L	RF	Kips
M Inventory	443.71	66.43	151.27	1.089	125.19
M Operating	443.71	66.43	151.27	1.817	208.97
V(sec.1) Inventory	58.94	8.63	31.90	0.690	79.29
V(sec.1) Operating	58.94	8.63	31.90	1.151	132.36
V(sec.2) Inventory	115.25	8.90	32.57	1.467	168.68
V(sec.2) Operating	115.25	8.90	32.57	2.448	281.57

MOMENT (k-ft)  
**309.25**  
SHEAR (k)  
@ sect1 **49.1**  
@ sect2 **50.1**

Type AASHTO Notional Truck- 80K	C	D	L	RF	Tons
M Inventory	443.71	66.43	143.74	1.146	45.83
M Operating	443.71	66.43	143.74	1.912	76.49
V(sec.1) Inventory	58.94	8.63	26.93	0.817	32.67
V(sec.1) Operating	58.94	8.63	26.93	1.364	54.54
V(sec.2) Inventory	115.25	8.90	27.58	1.732	69.29
V(sec.2) Operating	115.25	8.90	27.58	2.892	115.66

MOMENT (k-ft)  
**293.86**  
SHEAR (k)  
@ sect1 **41.4**  
@ sect2 **42.4**

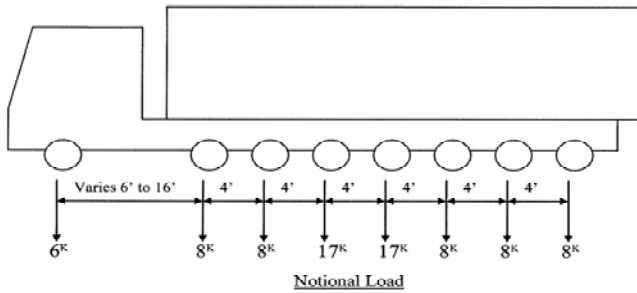
**Permit Vehicles**

	RF	Gross	
	OPERATING	Weight	
Type KC 1 - 170,000 lb	<b>0.915</b>	<b>155.6</b>	Kips
Type KC 2 - 165,000 lb	<b>0.918</b>	<b>151.5</b>	Kips
Type KC 3 - 140,000 lb	<b>0.949</b>	<b>132.9</b>	Kips
Type KC 4 - 115,000 lb	<b>1.151</b>	<b>132.4</b>	Kips
Type AASHTO Notional Truck- 80K	<b>1.364</b>	<b>54.5</b>	Tons

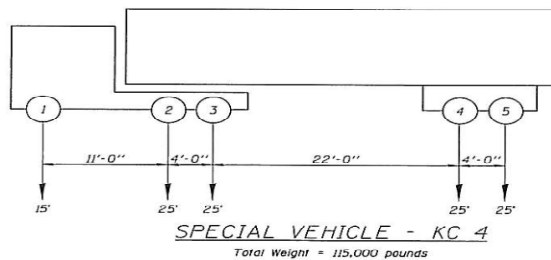
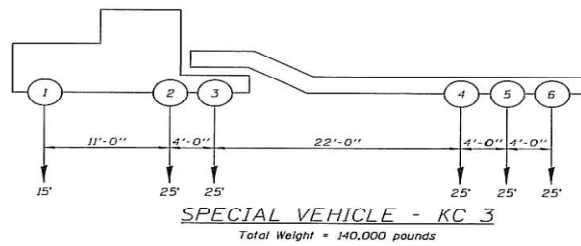
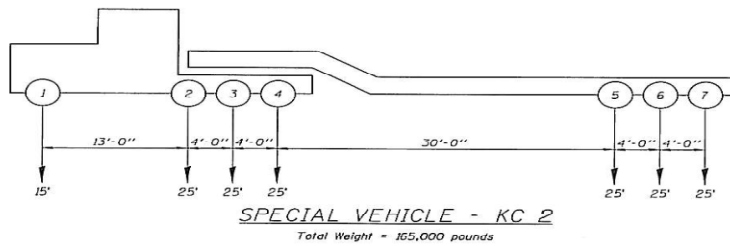
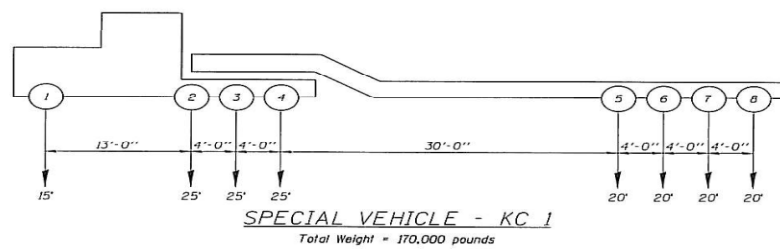
Gross Weight indicates the maximum permissible weight for each permit vehicle.

**Structure Rating Calculations**  
**Center Span**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014



**SPECIAL PERMIT VEHICLES**



**Codes Used:**

- 1: Standard Specifications for Highway Bridges, 17th Ed. - AASHTO
- 2: Manual for Condition Evaluation of Bridges, 2nd Ed. - AASHTO
- 3: Structural Services Manual, Section 4, Feb. 2013 - IDOT



**Structure Rating Calculations**  
**End Spans**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

**Simple Span Precast Concrete Channel Beam Rating**  
**LFR METHOD**

Bridge:

Span Length	21.24	Ft
WS Thickness	3.50	In
F'c	4.50	ksi
Fy	40.00	ksi
Ec	3,824	ksi
Es	29,000	ksi
n	8	
Rail / Parapet	0.050	k/Ft
S (Beam spacing)	3.75	ft
Number of beams	10.00	

Slab Properties:

Beam depth (incl deck)	1.75	ft
Beam depth (incl deck)	21.00	in
Slab Depth	5.00	in
Width of beam web (aver	16	in
Beam Area with t/flange	480.9	in <sup>2</sup>
Beam Weight	0.501	k/Ft
Moment of Inertia, I	19,122	in <sup>4</sup>
Section Modulus, S	1481	in <sup>3</sup>
% Reinf Area Reduction	0.00	%

Reinforcement:

# of Bars per beam	Bar Size	At	Area
		In	In <sup>2</sup>
4.00	10	3.125	5.07
0.00	0	0.000	0.00
0.00	0	0.000	0.00
		0.00	0.00
	C.G.	3.13	in
		As =	5.07 in <sup>2</sup>

Dead Load: uniform

Beam with t/flange	0.501	k/Ft
Slab	0.000	k/Ft
Wearing Surface	0.164	k/Ft
Rail / Parapet	0.010	k/Ft
Other - haunches	0.00	k/Ft
<b>Total uniform</b>	<b>0.675</b>	<b>k/Ft</b>
Diaphragm @ 10' from brg	0.383	k

2 total

Moment Loads: @ midspan

D = Dead Load	41.89	k-Ft /beam
Live Load HS20	169.92	k-Ft (truck or lane)
L = LL+Imp distrib	83.12	k-Ft /beam

Shear Loads: @ section 1

D = Dead Load	6.55	k / beam
Live Load HS20	38.43	k (truck or lane)
L = Live Load	24.98	k / beam

Factors:

Impact	0.300	
D (Moment) **	0.753	wheel per beam
D (Moment)	0.376	axle per beam
D (Shear)	1.000	wheel per beam
D (Shear)	0.500	axle per beam
d	17.875	in

\*\* see further pages for calculations of distribution factor

Moment Capacity: AASHTO 8.16.3

b1	64	in
b2	45	in
b3	76	in
b eff	45	in
As	5.07	in <sup>2</sup>
a	1.18	in
a < Slab Depth?	YES	
C = φ Mn	262.8	k-Ft (8-16)
β1	0.825	8.16.2.7
ρ	0.0063	As/bd
ρ b	0.0540	(8-18)
.75 ρ b	0.0405	OK

Shear Capacity: AASHTO 8.16.6

	sect. 1	sect. 2	sect. 3
Location	1.49	1	2
d	17.875	17.875	17.875
No. of stirrup legs	4.00	4.00	4.00
Bar Size	3.00	3.00	3.00
Spacing, s	8.00	4.00	12.00
Av	0.44	0.44	0.44
Vs	39.47	78.94	26.31
Vs Limit	431.67	431.67	431.67
Vs Used	39.47	78.94	26.31
Vc	38.37	38.37	38.37
C = φ Vn	66.16	99.71	54.98

Final Capacities:

φ Mn	262.8	k-Ft
% Cap. Reduction	0.00	%
C = φ Mn	262.8	k-Ft

STAAD results	MOMENT	shear
HS20 OR LANE =	169.9	see below

Shear Loads: @ section 2

D = Dead Load	6.20	k / beam
Live Load HS20	36.97	k (truck or lane)
L = Live Load	24.03	k / beam

Live Load Moment for HS-20 taken from AASHTO Appendix A

Live Load Shear for HS-20 taken from STAAD at critical section

Live Load Shear and Moment for all other vehicles taken from STAAD analysis

**Structure Rating Calculations**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

**End Spans**

**Simple Span Reinforced Concrete Slab Rating**

Rating Factor

	C	D	L	RF	HS	Gross Tons
M Inventory	262.76	41.89	83.12	1.155	23.10	41.58
M Operating	262.76	41.89	83.12	1.928	38.56	69.40
V(sec.1) Inventory	66.16	6.55	24.98	1.064	21.27	38.29
V(sec.1) Operating	66.16	6.55	24.98	1.775	35.51	63.91
V(sec.2) Inventory	54.98	6.20	24.03	0.900	17.99	32.39
V(sec.2) Operating	54.98	6.20	24.03	1.502	30.04	54.07

Rating Factor:

	RF	HS
Inventory	0.900	21.2
Operating	1.502	35.5

< 1

If Inventory RF is below 1.00 then the Legal Load Rating should be performed

Illinois Posting Vehicles:

**Single Unit**

\*Type 2 - 15.75 Tons

	C	D	L	RF	Tons
M Inventory	262.76	41.89	51.41	1.867	29.41
M Operating	262.76	41.89	51.41	3.117	49.09
V(sec.1) Inventory	66.16	6.55	13.76	1.931	30.41
V(sec.1) Operating	66.16	6.55	13.76	3.223	50.76
V(sec.2) Inventory	54.98	6.20	13.29	1.627	25.62
V(sec.2) Operating	54.98	6.20	13.29	2.715	42.76

STAAD RESULTS

MOMENT (k-ft)

105.1

SHEAR (k)

@ sect1 21.2

@ sect2 20.5

\*Type 3 - 22 Tons

	C	D	L	RF	Tons
M Inventory	262.76	41.89	68.04	1.411	31.04
M Operating	262.76	41.89	68.04	2.355	51.81
V(sec.1) Inventory	66.16	6.55	18.77	1.416	31.15
V(sec.1) Operating	66.16	6.55	18.77	2.363	51.99
V(sec.2) Inventory	54.98	6.20	18.11	1.194	26.26
V(sec.2) Operating	54.98	6.20	18.11	1.993	43.84

MOMENT (k-ft)

139.09

SHEAR (k)

@ sect1 28.9

@ sect2 27.9

**Semi-Trailers**

\*Type 3-S1 - 29.25 Tons

	C	D	L	RF	Tons
M Inventory	262.76	41.89	68.34	1.405	41.09
M Operating	262.76	41.89	68.34	2.345	68.58
V(sec.1) Inventory	66.16	6.55	19.00	1.398	40.89
V(sec.1) Operating	66.16	6.55	19.00	2.334	68.26
V(sec.2) Inventory	54.98	6.20	18.48	1.170	34.23
V(sec.2) Operating	54.98	6.20	18.48	1.953	57.13

MOMENT (k-ft)

139.71

SHEAR (k)

@ sect1 29.2

@ sect2 28.4

\*Type 3-S2 - 40.75 Tons

	C	D	L	RF	Tons
M Inventory	262.76	41.89	77.49	1.239	50.48
M Operating	262.76	41.89	77.49	2.068	84.26
V(sec.1) Inventory	66.16	6.55	22.06	1.205	49.09
V(sec.1) Operating	66.16	6.55	22.06	2.011	81.94
V(sec.2) Inventory	54.98	6.20	21.11	1.024	41.74
V(sec.2) Operating	54.98	6.20	21.11	1.710	69.67

MOMENT (k-ft)

158.42

SHEAR (k)

@ sect1 33.9

@ sect2 32.5

\*Type 3-S2 - 40 Tons

	C	D	L	RF	Tons
M Inventory	262.76	41.89	72.45	1.325	53.00
M Operating	262.76	41.89	72.45	2.212	88.46
V(sec.1) Inventory	66.16	6.55	20.19	1.316	52.65
V(sec.1) Operating	66.16	6.55	20.19	2.197	87.89
V(sec.2) Inventory	54.98	6.20	19.59	1.104	44.16
V(sec.2) Operating	54.98	6.20	19.59	1.843	73.71

MOMENT (k-ft)

148.12

SHEAR (k)

@ sect1 31.1

@ sect2 30.1

Postings: (Operating Level)	RF OPERATING	Tons
<b>Single Unit</b>		
Type 2	2.715	42.76
Type 3	1.993	43.84
<b>Semi-Trailers</b>		
Type 3-S1	1.953	57.13
Type 3-S2	1.710	69.67
Type 3-S2	1.843	73.71

Recommended Posting

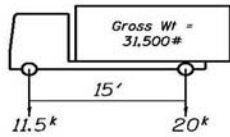
Single Unit	--
3 or 4 axles	--
5 or more axles	--

\*\* Structures less than a rating of 3 Tons should be closed to traffic.

Operating = Absolute maximum permissible load level

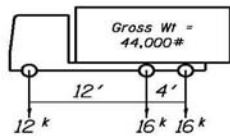
**Structure Rating Calculations**  
**End Spans**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014



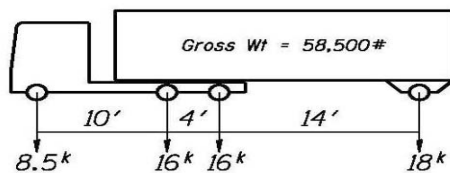
**Single Unit**  
Type 2

**Empty Weight**      **GVW**  
4 Tons      15.75 Tons



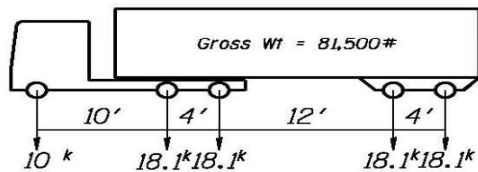
Type 3

8 Tons      22 Tons



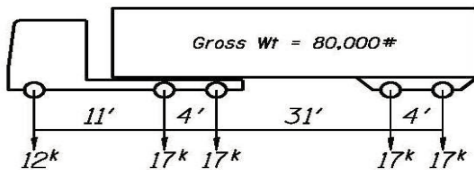
**3 or 4 axles**

Type 3-S1      12 Tons      29.75 Tons



**5 or more axles**

Type 3-S2      13 Tons      40.75 Tons



**5 or more axles**

Type 3-S2      13 Tons      40 Tons

**Structure Rating Calculations**  
**End Spans**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014

Kane County Special Permit Vehicles

Type KC 1 - 170,000 lb	C	D	L	RF	Kips
M Inventory	262.76	41.89	145.46	0.660	112.18
M Operating	262.76	41.89	145.46	1.102	187.26
V(sec.1) Inventory	66.16	6.55	36.31	0.732	124.39
V(sec.1) Operating	66.16	6.55	36.31	1.221	207.63
V(sec.2) Inventory	54.98	6.20	35.18	0.615	104.50
V(sec.2) Operating	54.98	6.20	35.18	1.026	174.43

MOMENT (k-ft)	<b>297.38</b>
SHEAR (k)	
@ sect1	<b>55.9</b>
@ sect2	<b>54.1</b>

Type KC 2 - 165,000 lb	C	D	L	RF	Kips
M Inventory	262.76	41.89	145.15	0.661	109.12
M Operating	262.76	41.89	145.15	1.104	182.14
V(sec.1) Inventory	66.16	6.55	36.18	0.734	121.17
V(sec.1) Operating	66.16	6.55	36.18	1.226	202.26
V(sec.2) Inventory	54.98	6.20	35.06	0.617	101.77
V(sec.2) Operating	54.98	6.20	35.06	1.030	169.88

MOMENT (k-ft)	<b>296.75</b>
SHEAR (k)	
@ sect1	<b>55.7</b>
@ sect2	<b>53.9</b>

Type KC 3 - 140,000 lb	C	D	L	RF	Kips
M Inventory	262.76	41.89	145.15	0.661	92.58
M Operating	262.76	41.89	145.15	1.104	154.54
V(sec.1) Inventory	66.16	6.55	36.16	0.735	102.87
V(sec.1) Operating	66.16	6.55	36.16	1.226	171.71
V(sec.2) Inventory	54.98	6.20	35.05	0.617	86.37
V(sec.2) Operating	54.98	6.20	35.05	1.030	144.18

MOMENT (k-ft)	<b>296.75</b>
SHEAR (k)	
@ sect1	<b>55.6</b>
@ sect2	<b>53.9</b>

Type KC 4 - 115,000 lb	C	D	L	RF	Kips
M Inventory	262.76	41.89	106.54	0.901	103.62
M Operating	262.76	41.89	106.54	1.504	172.96
V(sec.1) Inventory	66.16	6.55	29.32	0.906	104.21
V(sec.1) Operating	66.16	6.55	29.32	1.513	173.94
V(sec.2) Inventory	54.98	6.20	28.48	0.759	87.32
V(sec.2) Operating	54.98	6.20	28.48	1.267	145.75

MOMENT (k-ft)	<b>217.8</b>
SHEAR (k)	
@ sect1	<b>45.1</b>
@ sect2	<b>43.8</b>

Type AASHTO Notional Truck- 80K	C	D	L	RF	Tons
M Inventory	262.76	41.89	94.88	1.012	40.47
M Operating	262.76	41.89	94.88	1.689	67.55
V(sec.1) Inventory	66.16	6.55	24.49	1.085	43.40
V(sec.1) Operating	66.16	6.55	24.49	1.811	72.44
V(sec.2) Inventory	54.98	6.20	23.70	0.912	36.49
V(sec.2) Operating	54.98	6.20	23.70	1.523	60.91

MOMENT (k-ft)	<b>193.98</b>
SHEAR (k)	
@ sect1	<b>37.7</b>
@ sect2	<b>36.5</b>

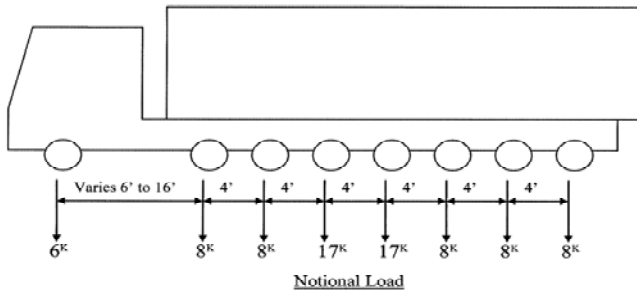
**Permit Vehicles**

	RF	Gross	
	OPERATING	Weight	
Type KC 1 - 170,000 lb	<b>1.026</b>	<b>187.3</b>	Kips
Type KC 2 - 165,000 lb	<b>1.030</b>	<b>182.1</b>	Kips
Type KC 3 - 140,000 lb	<b>1.030</b>	<b>154.5</b>	Kips
Type KC 4 - 115,000 lb	<b>1.267</b>	<b>173.0</b>	Kips
Type AASHTO Notional Truck- 80K	<b>1.523</b>	<b>67.5</b>	Tons

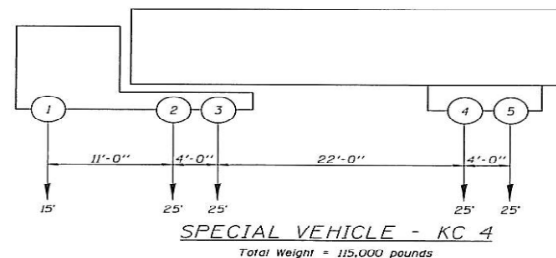
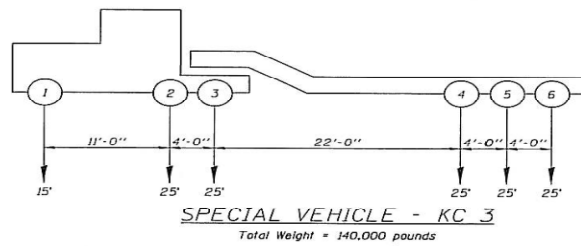
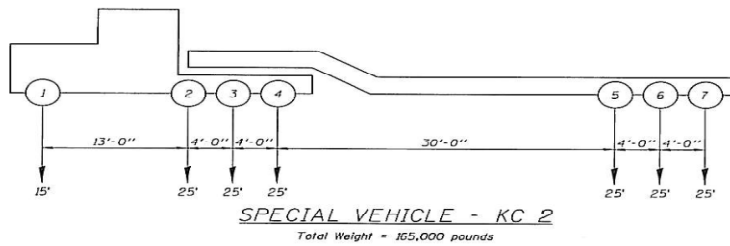
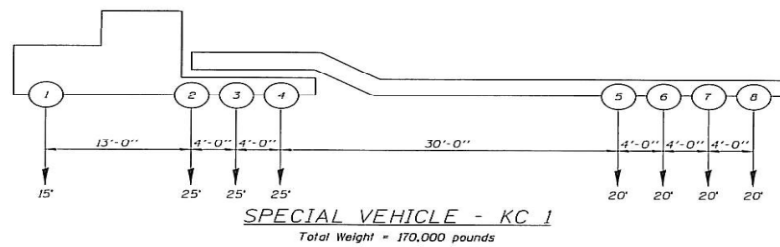
Gross Weight indicates the maximum permissible weight for each permit vehicle.

**Structure Rating Calculations**  
**End Spans**

Load Rating Performed	DMM	4/16/2014
Load Rating Checked	CEK	9/25/2014



*SPECIAL PERMIT VEHICLES*



**Codes Used:**

- 1: Standard Specifications for Highway Bridges, 17th Ed. - AASHTO
- 2: Manual for Condition Evaluation of Bridges, 2nd Ed. - AASHTO
- 3: Structural Services Manual, Section 4, Feb. 2013 - IDOT

**Structure Rating Calculations**

Load Rating Performed	DMM	4/15/2014
Load Rating Checked	CEK	9/25/2014

**Simple Span Precast Concrete Channel Beam Rating**  
**LFM METHOD**

*Moment Distribution of wheel loads AASHTO 3.23.4*

DF = S / D fraction of a WHEEL load DF = 0.753

S = 3.75 ft width of precast member

D = (5.75 - 0.5 NL) + 0.7 NL (1-0.2C)<sup>2</sup> =

NL = 3 or 1 number of traffic lanes

C = K (W / L) for W/L < 1 or C = K for W/L >= 1

W = 37.5 or 12.5 ft overall width of bridge

L = 21.24 ft span length

K = { (1+μ) I/J }<sup>1/2</sup> = 2.046

if sqrt(I/J) > 5.0 or skew > 45 deg - more precise method should be used

I = 19,121.9 in<sup>4</sup> moment of inertia

sqrt(I/J) = 1.867 < 5.0

J = 5483.4 in<sup>4</sup> Saint-Venant torsion constant

μ = 0.2 AASHTO 8.7.3

J = Σ { (1/3) b t<sup>3</sup> (1 - 0.630 t/b) } = 5483.4 in<sup>4</sup>

the flanges and stems are considered as separate rectangular componets whose values are summed together

b (in)	t (in)	t <sup>3</sup>	t/b	(1/3) b t <sup>3</sup> (1 - 0.630 t/b)	
16.0	8	512.0	0.50	1869.8	
16.0	8	512.0	0.50	1869.8	b- the length of each component
45.0	5.00	125.0	0.11	1743.8	t- the thickness of each component
				Sum =	5483.4

	thickness/ web height (in)	width / web thick. (in)	Area, A (sq in)	Centroid, d (inches) bottom of girder	A x d	Io (inches <sup>4</sup> )	y (in)	A x y <sup>2</sup>	I total (inches <sup>4</sup> )
Top flange	5.000	45.0	225.00	18.496	4161.6	468.75	5.587	7022.4	7491.12
Web	16.0	16.00	255.94	7.998	2047.0	5457.24	-4.911	6173.6	11630.79
Bottom flange	0.000	0.0	0.00	0.000	0.0	0.00	0.000	0.0	0.00
<b>TOTAL</b>	<b>21.00</b>		<b>480.94</b>	<b>12.909</b>	<b>6208.6</b>	<b>5926.0</b>		<b>13195.9</b>	<b>19,121.9</b>

y bot gdr (inches)	y top gdr (inches)	S bot gdr (inches <sup>3</sup> )	S top gdr (inches <sup>3</sup> )
12.91	8.087	1,481.2	2,364.6