Public Works Department Bridge Asset Inventory Procedure Revised February 2018



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# **BRIDGE ASSET INVENTORY PROCEDURE**

#### OVERVIEW

Bridge structures are a significant and increasingly important element of Overland Park's transportation infrastructure. New structures built and bridges annexed into the City need to be added to the City's inventory. Existing structures require inspection and maintenance. The upkeep of the data in the City's inventory requires coordination with Kansas Department of Transportation (KDOT), Public Works Maintenance, Public Works Engineering, Planning's Engineering Services, and the City's licensed engineer in charge of the bridge inventory and inspection program (hereinafter the Bridge Manager).

The procedures outlined in this document follow federal guidelines and state law. If at any time there appears to be a conflict between this document and state/federal law, the current law shall prevail.

#### **GENERAL DEFINITIONS**

*BRIDGE* as defined by the NBIS is "a structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous *opening*."

Multiple pipes, as well as single or multiple box culverts may be considered a bridge. These structures are considered a bridge if the contiguous length (as measured along the center of the roadway), is greater than 20 feet. The clear distance between openings of multiple pipes must be less than 1/2 the diameter of the smallest adjacent pipe to be considered contiguous.

*LUCITY* is the database program used to manage the official bridge files including plans, load ratings, inventory, inspections, repairs and maintenance.

KDOT BUREAU OF LOCAL PROJECTS – LOCAL BRIDGE INSPECTION MANUAL contains guidelines and requirements for local bridge inspections.

NATIONAL BRIDGE INSPECTION STANDARDS (NBIS) published in the <u>Code of Federal Regulations</u> (23 CFR 650.3) are the federal regulations establishing requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a State bridge inventory. The NBIS applies to all structures defined as bridges located on or over all public roads.

NATIONAL BRIDGE INVENTORY (NBI) is the aggregation of structure inventory and appraisal data collected to fulfill the requirements of the NBIS.

*PUBLIC ROADS* are defined in the CFR, Title 23 Highways Part 650 Subpart C-National Bridge Inspection Standards (NBIS) as any road under the jurisdiction of and maintained by a public authority and open to public travel.

*KDOT BLP BRIDGE INSPECTION WEB PORTAL* is the program used to submit the NBIS inspection information to KDOT.

RECORDING AND CODING GUIDE FOR THE STRUCTURE INVENTORY AND APPRAISAL OF THE NATION'S BRIDGES provides guidance for evaluating and coding specific bridge data.

STRUCTURE INVENTORY AND APPRAISAL SHEET (SI&A) is the graphic representation of the data recorded and stored for each NBI record in accordance with the "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges".

## **NEW INVENTORY/BRIDGE REPAIR PROJECTS**

PRIOR TO PLAN APPROVAL

The Project Manager, Plan Reviewer, or City's Bridge consultant shall obtain and review the Hydraulic Assessment Checklist (Attachment A) prior to final construction approval on any new bridge project or bridge rehabilitation project that affects the waterway opening at the bridge.

A licensed professional engineer in the State of Kansas must seal the Hydraulic Assessment Checklist document and the supporting calculations. The scour analysis shall be performed in accordance with the current KDOT procedures. This checklist is located in the KDOT Bridge Design Manual as well as on KDOT's website (www.ksdot.org).

The City's Bridge Manager will coordinate with KDOT to assign an Overland Park bridge id number for new, replacement, and annexed bridges. Once assigned, the bridge number will be reserved within Lucity as well as KDOT's bridge database. The bridge id numbers are three digits long and appear at the end of the fifteen digit KDOT structure number.

The project manager or plan reviewer should provide the following information when requesting a bridge id number from the Bridge Manager:

- Latitude and longitude expressed in degrees, minutes, seconds.
- Feature carried (typically the roadway).
- Location description, expressed in feet, from the nearest roadway intersection.
- Feature intersected (typically the named tributary or creek).
- Bridge type.

The files and data associated with replaced bridges will be retired once the new bridge inventory inspection is complete and uploaded to Lucity and KDOT's database. Additionally, the Lucity inventory record of a retired bridge should be updated to show an "Inactive" status and a note regarding the replacement bridge number and year of replacement should be added to the comment tab.

Annexed bridges must maintain their existing KDOT structure number. The new Overland Park bridge id will use the last three digits of the existing structure number. If it conflicts with an existing OP bridge id number the Bridge Manager will assign a different id number. Plans, load ratings, inspections, SI&A sheet, repair and maintenance records from the previous owner of newly annexed bridges will be added to the Overland Park database. Bridges added to the inventory by annexation may need to be inspected in order to align their inspection cycle with the City's remaining bridge inventory.

As part of the construction project and/or annexation process, a plaque shall be installed designating the Overland Park structure number. The plaque shall be constructed in accordance with KDOT standard specifications. For box culverts meeting the definition of a bridge, the plaque shall be placed in the North West inside barrel corner. Bridges shall have the plaque placed on the inside face of the approach bridge barrier rail for southbound traffic on north/south bridges and on the inside face of the approach bridge barrier rail for westbound traffic on east/west bridges. For bridges carrying traffic in one direction only, the plaque shall be placed on the inside face of the approach bridge barrier rail as shown. Annexed bridges may already have a plaque with a local id number. If the existing local id number does not correspond to the assigned Overland Park bridge id number the plaque should be replaced.



#### COMPLETION OF CONSTRUCTION

The Project Manager/Plan Reviewer shall obtain the information listed below from the Engineer upon completion of the bridge construction. This information shall be submitted to the City's Bridge Manager to upload into Lucity and for submittal to KDOT.

• As-Built plans in Adobe pdf format. Plans need to include enough detail for future load rating of the structure, including design standards and loading used, material strengths, member sizes, and reinforcing steel details. Shop drawings will be required for precast

RCB's, Arches or other members where enough detail is not included in the design plans for rating.

• An initial inventory inspection in accordance with the latest version of KDOT's Bureau of Local Projects Bridge Inspection Manual using the bridge inventory inspection form, Attachment B. This inspection shall be performed and signed by a KDOT prequalified bridge inspection team leader.

• Structure inventory and appraisal information as required by FHWA and KDOT, by completion of the SI&A sheet, Attachment C.

• KDOT Load Rating Summary Sheet, Attachment D and supporting load rating information. To be compatible with the KDOT Bureau of Local Projects and NBI requirements, AASHTOWare Bridge Rating (BrR) software shall be utilized for performing load ratings, unless otherwise approved by the City's Bridge Manager. Ratings shall be performed in accordance with procedures outlined in this document. The supporting load rating calculations must be provided in written form and sealed by a licensed professional engineer in the State of Kansas. Computer data files and output files must be provided in digital format.

• Digital photos of the upstream and downstream elevations of the structure and the channel, both roadway approaches and the superstructure elements from the underside of the bridge, defects, all attached utilities, and any unique features.

• Item 113 Justification Form, Attachment E shall be completed in accordance with the latest version of KDOT's Bureau of Local Projects Bridge Inspection Manual. Scour vulnerability shall be evaluated for all bridges over a waterway.

The inventory inspection and related information shall be provided to the City's Bridge Manager within 90 calendar days of acceptance of the bridge or opening to the traveling public. The City's Bridge Manager or Bridge Consultant will review the information and submit to KDOT within 90 days of the inspection.

The above information also is required for bridge structures that are modified or repaired. Maintenance types of repairs that do not affect the load carrying capacity or the NBIS coding criteria do not require re-inspection or a revised submittal of information to KDOT.

## LOAD POSTING OF BRIDGES

## LOAD RATING

Load rating of the City's bridges shall be performed as described in the current version of the AASHTO "Manual for Bridge Evaluation" (MBE) using the Load Factor Rating (LFR) method if

they were designed using Load Factor Design (LFD) or Allowable Stress Design (ASD). If they were designed using Load and Resistance Factor Design (LRFD) then both LRFR and LFR shall be required. All load rating shall be done in accordance with the Kansas Department of Transportation's Bureau of Local Projects LPA Manual.

As-built construction plans and consideration for the extent of deterioration of the structure should be considered when determining its capacity.

For Load Factor Rating method, a comparison of the live load capacity of a member to the applied rating truck load will yield a rating for both the Inventory and Operating levels, defined as follows:

Operating Rating: The absolute maximum permissible load level to which the structure may be subjected. Allowing unlimited numbers of vehicles to use the bridge at Operating level may shorten the life of the bridge.

For Load and Resistance Rating method, a comparison of the live load capacity of a member to the applied rating truck load will yield a rating for the Operating level (as described above) and the Inventory level will be obtained by dividing the Operating level rating with the appropriate factor based on average daily truck traffic that the bridge experiences.

The City's bridges will be rated using KDOT load rating/posting trucks as shown in Attachment F, except for the permit vehicles. Load rating shall also be provided for the Special Haul Vehicles (SU4, SU5, SU6 and SU7, Attachment G) described in the MBE, and the Emergency Vehicle loads (EV2 and EV3, Attachment G) as prescribed by the FAST Act (Section 1410 of the FAST Act amended 23 U.S.C.127) although these trucks will not be used for load posting. Calculations will be performed to establish Inventory and Operating Ratings for each of these load rating trucks and will be compiled on the Load Rating Summary Sheet (Attachment D). This form shall be signed and sealed by a licensed professional engineer in the State of Kansas.

## LOAD POSTING

A bridge that cannot carry a minimum live load of 3 tons must be closed to traffic. Bridges with an operating rating less than the maximum legal load must be posted.

The City of Overland Park posts load limits for bridges (as defined by NBIS) as shown in TABLE I. Current city truck routes can be found in Municipal Code Title 12.12.

The Public Works Department may vary from this practice on a case by case basis due to unique situations or circumstance. These special cases may include special truck configurations,

*Inventory Rating:* The load level that can safely utilize an existing structure for an indefinite period of time.

limited access requirements, traffic volume and speeds, the likelihood of overweight vehicles and the enforceability of a weight posting.

					Posting Policy	
Rating Condition					Truck Pouto	Non-Truck
					TTUCK NOULE	Route
Inventory Rating	<	Operating Rating	<	3 TONS	Bridge Closed	Bridge Closed
Posting Truck Weight *	<	Inventory Rating	<	Operating Rating	No Posting Required	No Posting Required
Inventory Rating	<	Posting Truck Weight	<	Operating Rating	Average of IR and OR **	No Posting Required
Inventory Rating	<	Operating Rating	<	Posting Truck Weight	Inventory Rating	Average of IR and OR

\* The posting weight of the trucks is shown in Attachment F.

\*\* If average exceeds posting truck weight, no posting required.

If analysis indicates that load posting is for bridges that were designed using LRFR, at the discretion of the City's Bridge Manager the LFR load rating may also be considered in determining actual posting levels.

There will be instances where plans are not available and a concrete bridge cannot be rated using calculations. According to AASHTO, "a concrete bridge need not be posted for restricted loading when it has been carrying normal traffic for an appreciable length of time and shows no distress. The general rule may apply to bridges for which details of the reinforcement are not known."

It shall be the established policy of the City of Overland Park that in concrete bridges where the details of reinforcing are not known, posting shall be at the level as recommended by the City's Bridge Manager. In general, if the bridge is not currently posted, has been carrying normal traffic for an appreciable length of time and shows no signs of distress, the bridge need not be posted for load restrictions. If the bridge is currently posted, the posting need not change unless distress or deterioration becomes evident that warrants reduced load capacity.

## SIGNING

The weight limit sign adopted for use by the City, in accordance with the FHWA "Manual on Uniform Control Devices" (MUTCD), is the three-vehicle gross weight sign, R12-5. The R12-5 goes into detail by defining total weight of the vehicle for three basic truck configurations. There is a simpler one-vehicle sign, R 12-1, which may be used in special circumstances.

These signs are not intended for trucks utilizing the maximum axle weights established by the State of Kansas. They are based on the truck loading configurations of the KDOT Load Rating/Posting Truck (Attachment F).

When using the R 12-5 sign, the weights to be shown shall be determined as follows:



Where posting is proposed for a bridge where proper load rating calculation cannot be performed because the details of the reinforcement are not known, the City has the option of using the single-vehicle gross weight sign (R12-1).

## INSPECTION

In general, bridges (as defined by the NBIS) in the City of Overland Park shall be inspected on a 24 month cycle. In addition, the driving surfaces, barriers and sidewalks of those bridges owned by KDOT with a deck maintained by the City of Overland Park shall be inspected on a 24 month cycle to ensure needed repairs are reported to the proper authority. KDOT will supply, on request, the latest inspection records and SI&A sheets for these bridges to the City. The City's Bridge Manager will be responsible for requesting this information to coordinate maintenance activities.

Bridges in the City of Overland Park with the following conditions shall be inspected on a 12 month cycle:

- 1. Problem Structure (cribbed, shored, etc.)
- 2. NBI Item #58, #59, #60, #61, or #62 are coded as ≤ 3
- 3. Bridge with a posted load limit of <10 tons, and an ADT of > 400
- 4. Bridge with a posted load limit  $\leq$  5 tons, and an ADT of  $\leq$  400
- 5. All Structurally Deficient bridges with a Sufficiency Rating less than 30
- 6. Those requiring Critical Feature inspections (Pin and Hanger, Underwater, and Fracture Critical).
- 7. Those requiring element level data collection (bridges located on the NHS).

KDOT performs inspections for bridges meeting condition 6 and 7 above. The City participates in the cost for KDOT's inspection based on City-State agreement No 100-17.

Smaller box culverts (less than 20 ft. long) are inspected by the Maintenance Division of the City's Public Works Department.

The required bridge inspections shall be completed by Bridge Inspection Team Leaders on the prequalified inspector's list maintained by KDOT. The City requires a PE to perform all bridge inspections. Inspections shall be performed in accordance with the KDOT-BLP Bridge Inspection Manual. After each field inspection, a SI&A sheet shall be updated with the results of the inspection. The Bridge Manager or Bridge Consultant ensures all the bridge inspection data is updated in Lucity and KDOT's Bridge Inspection Web Portal. Recommended bridge maintenance activities are provided and used to prioritize maintenance tasks over the following two years.

## FILES

Each bridge under authority of the City of Overland Park has a record within the Lucity database. There are four sets of bridge types:

1)	Bridges owned and maintained by OP	XXX
2)	Bridges owned by KDOT, deck maintained by OP	8XXX
3)	Pedestrian bridges owned and maintained	9XXX
	by OP Public Works	

4) Pedestrian bridges owned and maintained 7XXX by OP Parks

The following information should be attached to each bridge within Lucity, if available:

- Bridge Inspection Form and Photos
- SI&A sheet
- Plan Drawings
- Load Rating Calculations
- Hydraulic Assessment Checklist

- Repairs/Maintenance Items
- Scour Vulnerability Report

In addition to the Lucity database, digital files for the Bridge Inspection Form, Photos, SI&A, and Scour are stored in K:\Operations\Bridge\Bridge Inspection and are sorted by the year of inspection. The electronic copies of the bridge plans and hydraulic assessments are stored in K:\Operations\Bridge\Bridge Plans. The electronic copies of the load ratings are stored in K:\Operations\Bridge\Bridge Load Ratings.

The data on the SI&A sheets are brought into Lucity through Access and SQL commands and make up the body of the main bridge file.

#### INDEX OF ATTACHMENTS

- Attachment A Hydraulic Assessment Checklist
- Attachment B Bridge Inventory Inspection Form
- Attachment C Structure Inventory & Appraisal (SI&A) Sheet
- Attachment D KDOT Load Rating Summary Sheet
- Attachment E Scour Vernability, Item 113 Justification Form
- Attachment F KDOT Load Rating/Posting Trucks
- Attachment G Special Haul Vehicles and Emergency Vehicles

# Attachment A HYDRAULIC ASSESSMENT CHECKLIST FOR DRAINAGE DESIGN

## **1. SITE DESCRIPTION**

Completed By			Bridge ID
Designer Name			Date
Con and Information			
			Highway
Project No.			Project Type
Stream Name		2.2.2	Dist/Area
Location			
Legal Description: Section	Township (S)	Range	Setting
Traffic: Design Year	Design AADT	%Trucks	Design DHV
2. DRAINAGE STRUCTURE DA	TA		
Existing Structure			
Length (EWS)	Deck Width (ft)	Milepost	Serial No.
Structure Type			
Spans/Units		29.1 1 1 s	
Abutment #1		LOB Piers	
Abutment #2		MC Piers	
		ROB Piers	
Proposed Structure			
Length (EWS)	Deck Width (ft)	Milepost	Serial No.
Structure Type			
Spans/Units			
Special Environmental Desig	gn/Detail (Culverts)	_	
Abutment #1		LOB Piers	
Abutment #2		MC Piers	
		ROB Piers	
Existing Structure History			
Bridge Damage from Previo	us Floods		Year Built
Road Overtopping Damage			
Historic High Water Date(s)			
Historic High Water Notes			
HHW Measurement Locatio	'n		
Drift History	· · · · · · · · · · · · · · · · · · ·	-	
Considerations for New Structure			
Inadequate Roadway		Route Re	location
Inadequate Load Capacity		Structura	I Deterioration
Inadequate HW Clearance		Г	
Inadequate Waterway		Other	
		_	

## HYDRAULIC ASSESSMENT CHECKLIST FOR DRAINAGE DESIGN

#### 3. BASIN HYDROLOGY

#### **Basin Characteristics**

			Controlled Draina	ge Area (mi <sup>2</sup> )
			 Noncontributing	Drainage Area (mi <sup>2</sup> )
Land Use:	% Pasture	% Urban	Impervious Area	mi <sup>2</sup> )
Land Obc.	% Cultivated	- % Besidential	- Area with Storm S	Sewer (mi <sup>2</sup> )
	% Timber	% Other	- High Permeability	(Area
			_ Low Runoff Area	
Organized	Watershed Name			
Main Channel Infor	mation			
Main Cha	nnel Slope (ft/mi)		(Taken from 10% t	o 85% of main channel length)
Channel S	ilope @ Bridge (ft/mi)		 (Approx. 2 bridge	engths US to 6 bridge lengths DS)
	Vertically Unstable		- Countermeasu	res Proposed
	-Degradation/+Aggr. (ft	)	- Degradation/-	+Aggr. Years
	Laterally Unstable		Stream Planform	
Ordinary	High Water: Elevation		Distance from	Bridge (US/DS)
Channel (	Change Proposed*		Existing Channel S	ilope (ft/mi)
Change in	Length* (ft)		Proposed Channe	l Slope (ft/mi)
			*Measured from be	ginning to end of proposed channel change
Control Affecting W	ater Surface Elevation	ydrologic controls (dams,	levees, bridges, rock outci	oppings, etc.)
Describe t	spe and location of any n		ierees, shaBes, rock suter	
Describe t Upstream	Control(s)			
Describe t Upstream Downstre	Control(s)			
Describe t Upstream Downstre Additiona	am Control(s)			
Describe t Upstream Downstre Additiona Watershed Develop	am Control(s) am Control(s) I Notes			
Describe t Upstream Downstre Additiona <b>Watershed Develop</b> Upstream	am Control(s) am Control(s) I Notes ment		Developm	ent Potential
Describe t Upstream Downstre Additiona <b>Watershed Develop</b> Upstream Build	i Control(s) am Control(s) I Notes ment ding #1: Type		Developm	ent Potential
Describe t Upstream Downstre Additiona <b>Watershed Develop</b> Upstream Build	am Control(s) am Control(s) l Notes ment Development ding #1: Type 1 <sup>st</sup> Floor Elev		Developm Buildir	ent Potential ng #2: Type 1 <sup>st</sup> Floor Elev
Describe t Upstream Downstre Additiona <b>Watershed Develop</b> Upstream Building L	am Control(s) am Control(s) I Notes Development ding #1: Type 1 <sup>st</sup> Floor Elev ocation(s)		Developm Buildir	ent Potential g #2: Type 1 <sup>st</sup> Floor Elev
Describe t Upstream Downstre Additiona <b>Watershed Develop</b> Upstream Building L	am Control(s) am Control(s) l Notes Development ding #1: Type 1 <sup>st</sup> Floor Elev ocation(s)		Developm Buildir	ent Potential ng #2: Type 1 <sup>st</sup> Floor Elev.
Describe t Upstream Downstre Additiona Watershed Develop Upstream Build Building L Discharges Method o	ocation(s) am Control(s) l Notes ding #1: Type 1 <sup>st</sup> Floor Elev ocation(s)	od Flows	Developm Buildir	ent Potential ng #2: Type 1 <sup>st</sup> Floor Elev
Describe t Upstream Downstre Additiona Watershed Develop Upstream Building L Discharges Method o	am Control(s) am Control(s) l Notes ding #1: Type 1 <sup>st</sup> Floor Elev ocation(s) gq (cfs)	od Flows	Developm Buildir Q <sub>10</sub> (cfs)	ent Potential ng #2: Type 1 <sup>st</sup> Floor Elev. Q25 (cfs)
Describe t Upstream Downstre Additiona Watershed Develop Upstream Building L Discharges Method o	i Control(s) am Control(s) I Notes Development 1 <sup>st</sup> Floor Elev ocation(s) f Hydrologic Analysis, Flo Q <sub>2</sub> (cfs) Q <sub>5</sub> (cfs)	od Flows	Q <sub>10</sub> (cfs)	ent Potential ng #2: Type 1 <sup>st</sup> Floor Elev Q <sub>25</sub> (cfs)

#### HYDRAULIC ASSESSMENT CHECKLIST FOR DRAINAGE DESIGN

4. BRIDGE HYDRAULICS				
Design Information			Des	ign Discharge, Q <sub>des</sub> (cfs)
			Des	ign Frequency (yrs)
Method of Hydraulic Analysi	s			
Allowable High Water for De	sign			Elevation
AHW Description/Location				
Waterway Opening Data		Existing	Proposed	
Top of Opening	(TO) Elevation			
Headroom: TO	Elev SB Elevation			
Proposed Subst	ructure Skew Angle			
	Exis	ting Propos	ed Proposed-	Existing
Total Waterway Opening (ft	<sup>2</sup> )		0.0	ft <sup>2</sup>
Design Waterway Opening (	ft <sup>2</sup> )		0.0	ft <sup>2</sup>
Average Velocity at Q <sub>2</sub> (fps)			0.0	fps
Average Velocity at Q <sub>des</sub> (fp	s)		0.0	fps
Average Velocity at $Q_{100}$ (fr	os)		0.0	fps
Clearance to Ton of Opening				
Existin	ng: WSE Cleara	ance Proposed	l: WSE Clearan	ce
@ Q <sub>des</sub>	0.00	ft	0.00	ft.
@ Q <sub>100</sub>	0.00	ft	0.00	ft.
@ Historic HW	0.00	ft.		
FEMA				
FEMA Zone		FEMA	Panel No. & Date	
Floodway Width (ft.)	1			
Backwater	Unobstructed	Existing	Proposed	Change in
	Water Surface	Backwater	Backwater	Backwater
	Elevation	Elevation	Elevation	Elevation
Q <sub>2</sub>				<u>0.00</u> ft.
Q <sub>5</sub>		· · · · · · · · · · · · · · · · · · ·		<u>0.00</u> ft.
Q <sub>10</sub>				<u>0.00</u> ft.
Q <sub>25</sub>				<u>0.00</u> ft.
Q <sub>50</sub>				<u>0.00</u> ft.
Q <sub>100</sub>				<u>0.00</u> ft.
Q <sub>des</sub>				<u>0.00</u> ft.
Overtopping		Existing		Proposed
<b>Overtopping Project Station</b>		×		
Discharge (cfs) and Frequence	cy (yrs)			
Overtopping (OT) Elevation			_	

#### HYDRAULIC ASSESSMENT CHECKLIST FOR DRAINAGE DESIGN

#### 5. SCOUR ANALYSIS

Streambe	ed Evaluation					
	Evidence of Degradation	Exposed	l Utility Line	Exposed Falsework	Exposed	Bridge Footing
		Headcut	t Present	Bank Erosion	Other (Sp	ecify in Scour Notes)
	Streambed Material					
		LOB D <sub>50</sub> (mr	n)	MC D <sub>50</sub> (mm)	 ROB D <sub>50</sub> (mm)	
						18
Bridge Sc	our	F	or culvert structur	es, scour analysis is not re	quired	<u></u>
	Method of Scour Analysis					
	Evidence of Scour (Existing)			94.K		
	Scour Discharge, Qscour				Q <sub>500</sub> (Use 1.7* Q <sub>100</sub>	)
Contracti	on Scour		(Left OB)	(Main Channel)	(Right OB)	
	Approach Section Discharge	(cfs)				
	Bridge Section Discharge (cf	- s)				
	Contraction Scour Equation					
	Estimated Contraction S	- Scour (ft)				
Pier Scou	r		o	o	o	
	Stream/Pier Angle of Attack	, @ Qscour -				
	Pier Webwall Proposed			3- <u></u> -		
	Approach Flow Depth, $y_1$ (It	-) 			-	
	Ectimated Local Diar Sec	v <sub>1</sub> (ips) _				
		- (U)				
Abutmen	t Scour					
	Setback from Main Channel	(ft)				
	Angle of Attack @ Qscour	-				
	Estimated Local Abutme	ent Scour (ft) _				
Predicted	d Streambed Degradation (ft)	-			For A	Aggradation, use 0.0
Total Sco	ur Summary		n Ann ann an An			
			Estimated Sco	our Foundation		
	Elevation @ Left Abut	ment			*FOR ALI	PIERS: Use overall
	Elevation @ Left Over	bank Pier(s)*			deepe	st pier scour and
	Elevation @ Main Cha	nnel Pier(s)*			elevat	ion unless
	Elevation @ Right Ove	rbank Pier(s)*	1 		justific	cation is provided
	Elevation @ Right Abu	itment				
	Scour Elevation = St	reambed Eleva	ation - (Contraction	n Scour + Local Scour + Lor	ng-Term Degradation)	
	Scour Countermeasures: Pro	oposed		Fristi	ng	
					·	

#### 6. ADDITIONAL SITE INFORMATION

#### **General Information**

Drift Accumulation Considered in Hydr Bridge is Stable for Scour	aulic Model	Drift Accum	nulation Considered in Scour Analysis
Special Design for Environmental Requ	uirements		
erences and Special Reports Available			
erences and Special Reports Available Field Check Report			
erences and Special Reports Available Field Check Report Hydraulic/Scour Report		Describe	
erences and Special Reports Available Field Check Report Hydraulic/Scour Report USGS, USACE, NRCS (SCS), FEN	MA, or other report	Describe Document(s)	

NOTE: Send all information in this section related to the hydraulic analysis of the site to the Bridge Section project leader at the KDOT State Bridge Office with the Hydraulic Assessment Checklist. Also, send a copy to <u>#BridgeHydraulics@ksdot.org.</u> Reference the Bridge ID with all information. Submit documents in electronic format when possible.

#### **Additional Project Notes**



#### Additional Hydraulic/Scour Notes

#### **Definitions and Additional Notes**

\* All units and elevations are U.S. Customary unless otherwise indicated (feet, pounds, seconds)

\* For more information, see "KDOT Design Manual, Volume III - Bridge Section" and "KDOT Design Manual Volume I (Part C) - Road Section, Elements of Drainage & Culvert Design"

BW = Backwater. This is typically taken one bridge length upstream of bridge. Use proposed bridge length for location. WSE = Water Surface Elevation. For waterway and clearance values, this is taken under the upstream bridge face. TO = Top of Opening. OT = Overtopping. HW = High Water (typically an elevation). OHW = Ordinary High Water LOB = Left Overbank, MC = Main Channel, ROB = Right Overbank. Taken looking in the downstream direction US = Upstream of Bridge. DS = Downstream of Bridge. EWS = End of Wearing Surface of Bridge fps = feet per second. cfs = cubic feet per second. mm = millimeter (For D50 diameter). USACE = U.S. Army Corps of Engineers, NRCS = Natural Resources Conservation Service, USGS = U.S. Geological Survey

# Attachment B INVENTORY INSPECTION REPORT

County Number (3)	Structure No. (8)
Route Number (5D)	State Ref. Pt.
City Bridge No.	Year Built (27)
Latitude (16)	
Longitude (17)	
Location Description (9)	
Feature Crossed (6A)	
Feature Carried (7)	
Contractor	
Type of Work	
Project Number	
Notice of Acceptance Date	
Pictures (New Structures)	
Approach View	
Elevation View	····
Channel Profile	
Defects	
All Attached Utilities	
Unique Features	
Pictures (Widened or Repaired Structures)	
View of Improvement	
Revised Channel Profile	
Defects	
New or Revised Attached Utilities	
Unique Features	
Inspected By	
Inspected On Month	DayYear

DEC	ĸ

DECK CONDITION (58) [ ]	
Bridge Roadway Width, Curb to Curb (51)	FT
Deck Width, Out to Out (52)	FT
Approach Roadway Width (32)	FT Route Horizontal Clearance (47)FT
Structure Flared (35) Yes N	o
Number of Lanes On (28A)	Number of Turning/Transition Lanes On
Min Vertical Clearance (Over Route) (10)	FT
Min Vertical Clearance (Over Bridge) (53)	FT
Deck Type (107)	
Wearing Surface Type (108A)	ThicknessIN
Type of Membrane (108B)	
Deck Protection (108C)	
Railing Type	
Expansion Joint Type	
Manufacturer's Name	
Deck Drainage Type	
Left Curb or Sidewalk Width (50A)	FT
Right Curb or Sidewalk Width (50B)	FT
Bridge Median (33) None O	pen Closed
Туре	WidthFT
Light on Bridge	o
Vertical Clearance (Over) FT	IN

# **SUPERSTRUCTURE**

SUPERSTRUCTURE RATING (59	)[]	
Unit#	Туре	Spans
Structure Length (EWS to EWS	along centerline roadway) (49	)FT
Maximum Span Length (48)	FT	Number of Spans (45)
Main Span Design Type (43B)		
Main Span Material Type (43A)	l	
Number of Approach Spans (46	5)	
Approach Span Design Type (44	4B)	
Approach Span Material Type (	(44A)	
Skew (34) Degree	ees Left	Right Curvature
Widening Type		
Number of Girders	a	
Paint System		
Bearing Type		
Attachments		
	<u>SUBSTRUC</u>	TURE
SUBSTRUCTURE CONDITION (6	0) [ ]	
Abutment Type		. <i>0.001</i>
Abutment Footing Type		
Pier Type		
Pier Footing Type		
Paint System		а 
Berm Protection		
Wet Condition Assessment ("W	/et" applies only if water is in c	contact with any substructure element.)
Not Wet	t. <b>Two</b>	Feet To Four Feet Wet (*).
Less Tha	in Two Feet (*). 🛛 🗌 Gre	ater Than Four Feet (*).
	* - Wet (Photo Required).	

# **CULVERT**

CULVERT RATING (62) [ ]	<u></u>		20 - 145 - 12 - 12 - 12
Unit#Type		Spans	
Unit# Type		Spans	
Structure Length (Face of Support to Fac	e of Support along	centerline roadway) (49)	FT
Maximum Span Length (48)	FT	Number of Spans (45)	
Main Span Design Type (43B)			
Main Span Material Type (43A)			
Skew (34) Degrees	Left	Right	
Widening Type	14 		
Bridge Roadway Width, Curb to Curb (51	L)	FT	
Deck Width, Out to Out (52)	FT		
Approach Roadway Width (32)	FT	Route Horizontal Clearance (47)	FT
Structure Flared (35) Yes	No		
Number of Lanes On (28A)		Number of Turning/Transition La	anes On
Min Vertical Clearance (Over Route) (10)	)	FT	
Min Vertical Clearance (Over Bridge) (53	)	FT	
Depth of FillFT	*-If top slab is a	t grade then items 107 and 108 ne	ed to be coded.
Deck Type (107)*			
Wearing Surface Type (108A)*		8	ThicknessIN
Type of Membrane (108B)*			
Deck Protection (108C)*			
Deck Drainage Type			
Railing Type			
Left Curb or Sidewalk Width (50A)		FT	
Right Curb or Sidewalk Width (50B)		FT	
Bridge Median (33) None	Open	Closed	
Туре		Width	FT
Vertical Clearance (Over)	FT	IN	
Wing Treatment Upstream	Flared	Straight	
Wing Treatment Downstream	Flared	Straight	
Attachments			

# **CHANNEL**

CHANNEL RATING (61) [ ]					
Channel Protection					
APPRAISAL RA	TINGS				
APPROACH ROADWAY ALIGNMENT RATING (72) [ ]					
Approach Roadway Width (32)FT	Relief Slots				
Traffic Safety Features [] [] [] []					
Guardfence Lengths (ft.)					
Apr. Lt Apr. Rt Exit Lt	Exit Rt				
Guardfence End Treatment					
Signing					
Apr. Lt Apr. Rt Exit Lt	Exit Rt				
Comments					
	IFORMATION				
Number of Lanes Under (28B)					
Min Vertical Underclearance (Under Bridge) (54B)	г				
Min Lateral Underclearance RT (Under Bridge) (55)F	T a				
Min Lateral Underclearance LT (Under Bridge) (56)F	T .				
Guardfence Lengths Under (ft.)					
LT LT. Ctr RT	RT. Ctr				
WATERWAY ADEQUACY RATING (71) [ ]					

Available from KART (https://kart.ksdot.org/)

# Structure Inventory & Appraisal (English)

# Attachment C

		Suruc	sture	invento	ry œ	Apprais	ai (English)		
(8) STRUCTURE NO	42195046285018	2 (1) S	TATE	Kansas		(4) CITY	<b>Overland Park</b>	(3) COU	NTY Johnson
L PA Bridge ID	18	2 IPA	Bridge N	lame Mo	onitor S	Souare Brido	e	(5A) ROUTE ON/UN	DER Route On Structure
			Bridge N						
	IDENTIFICATION							GEOMETRIC DATA	
(5B) ROUTE TYPE				City Stre	et	(112) NBIS BI	RIDGE DEFINITION		Long Enough
(5C) SERVICE TYPE				Mainlin	e	(49) STRUCT	URE LENGTH		91.5 FT
(5D) ROUTE NUMBER 00000	(5E)	SUFFIX		N/A (NB	il)	(48) MAXIMU	IM SPAN LENGTH		89.0 FT
(6A) FEATURE INTERSECTED			INDIAN	CK TRIB NO	1	(32) ROUTE	WIDTH		44.3 FT
(9) LOCATION			0.2 MI E (	OF NALL AVI	Ξ.	(51) BRIDGE	ROADWAY WIDTH	, CURB TO CURB	45.0 FT
(16) LATITUDE			3	8 ° 56 ' 31.60		(52) DECK W	IDTH OUT TO OUT		62.8 FT
(17) LONGITUDE			9	4 ° 38 ' 43.30		(50A) LEFT C	URB OR SIDEWAL	K WIDTH	5.9 FT
(2) HIGHWAY AGENCY DISTRICT			Distri	ict 01 - Topek	a	(50B) RIGHT	CURB OR SIDEWA	LK WIDTH	8.2 FT
(98A) BORDER BRIDGE STATE			Not	Applicable (F	2)	(34) SKEW			0.0 °
(98B) BORDER BRIDGE RESPONSIB	LITY				, ,	(47) ROUTE	HORIZONTAL CLEA	RANCE	44.3 FT
(99) BORDER BRIDGE STRUCTURE	NO.				/0	(10) MIN VER	T CLEARANCE OV		99.99 FT
(7) (ROUTE NAME) FACILITY CARRIE	-D			103RD S	Ŧ	(53) MIN VER	T CLEARANCE OV		99 99 FT
				100110 0		(33) MEDIAN	CI OLLAIVAROL OV	ENDINDGE	No Median
FUNC	TIONAL DESCRIPT	ION				(35) STRUCT			No flare
(26) FUNCTIONAL CLASSIFICATION		A THE CHOICE A LONG	Urban	n Minor Arteri	al	(54A) MIN VE	RT UNDERCLEAR	ANCE REF	Feature not hwy or RR
(104) NHS DESIGNATION				Not on NH	S	(54B) MIN VE	RT UNDERCLEAR	ANCE	0.00 FT
(100) STRAHNET DESIGNATION			Not a ST	TRAHNET hw	Ŋ	(55A) MIN LA	TERAL UNDERCLE	AR REF RT	Feature not hwy or RR
(110) NATIONAL TRUCK NET			Not par	rt of natl netw	0	(55B) MIN LA	TERAL UNDERCLE	ARRT	0.0 FT
(12) BASE HIGHWAY NET			Not on	Base Netwo	ĸ	(56) MIN LAT	ERAL UNDERCLEA	RANCE LEFT	0.0 FT
(13A) LRS INVENTORY ROUTE	02850 (13B)	LRS SUBRT	E #	C	0	• •			
(11) LRS MILE POINT				0.000 N	/1		S	TRUCTURE AND MATER	RIALS
(105) FEDERAL LANDS HIGHWAY				N/A (NB	1)	(45) NUMBER	R OF MAIN SPANS		1
(20) TOLL				Toll Fre	e	(43B) MAIN S	PAN DESIGN TYPE		Stringer/Girder
(21) MAINTAINENANCE RESPONSIBI	LITY	Ci	ity/Municip	pal Hwy Agen	IC	(43A) MAIN S	PAN MATERIAL TY	'PE	Prestressed Concrete
(22) OWNER		Ci	ity/Municip	pal Hwy Agen	IC	KDOT	MAIN SPAN MATER	RIAL TYPE:	5-02: PBMS
(37) HISTORICAL SIGNIFICANCE			Not elig	gible for NRH	Р				Prestr. Conc. Beam, Simple
(101) PARALLEL STRUCTURE			No	bridge exist	s	(107) DECK 1	TYPE		Concrete-Cast-in-Place
(103) TEMPORARY STRUCTURE				Not Applicabl	e	(108A) DECK	SURFACE		Epoxy Overlay
						(108B) MEMB	BRANE		None
	AGE AND SERVICE					(108C) DECK	PROTECTION		Epoxy Coated Reinforci
(29) AVERAGE DAILY TRAFFIC				10,90	0	(46) NUMBER	R OF APPROACH SI	PANS	0
(109) AVERAGE DAILY TRUCK TRAF	FIC			4 9	%	(44B) APPRO	ACH SPAN DESIG	N TYPE	Other (NBI)
				201	3	(44A) APPRO	ACH SPAN MATER		Other
				201	6	KDOT	APPROACH SPAN	MATERIAL TYPE:	0 - 00 UNK
(106) YEAR REHABILITATED								Ur	iknown Type 0 / Material 00 Unknown
(102) ONE WAY OR TWO WAY TRAFF	-IC		High	2-way traffi	ic n			CONDITION	
(42R) SERVICE UNDER THE BRIDGE			Tigit	Waterwa	N N	(58) DECK CO		CONDITION	
(28A) LANES ON BOUTE				Traterina	4	(59) SUPERS	TRUCTURE COND		8
(28B) LANES UNDER ROUTE					0	(60) SUBSTR	UCTURE CONDITION	N	8
(19) BYPASS DETOUR LENGTH				1.000 N	AI	(62) CULVER	T CONDITION		N
						(61) STREAM	STABILITY / CHAN	INFI	7
	LOAD RATING					(0.) 0			
(66) INVENTORY LOAD RATING			41	ton, HS 22.0	0			APPRAISAL	
(64) MAXIMUM LOAD RATING			69	ton, HS 37.0	0	DEFICIENCY	STATUS		Not Deficient
(31) DESIGN LOAD				HL 9	3	(72) BRIDGE	ROUTE ALIGNMEN	IT	8
(65) INVENTORY LOAD RATING MET	HOD		L	F Load Facto	or	(71) WATERV	WAY ADEQUACY		8
(63) OPERATING (MAX) LOAD RATIN	G METHOD		L	F Load Facto	or	(113) SCOUR	VULNERABILITY		8
(70) POSTING REQUIREMENTS			At/Abov	/e Legal Load	s	(67) STRUCT	URAL EVALUATION	N	8
(41) POSTING STATUS			Open	n, no restrictio	n	(68) DECK W	IDTH APPRAISAL		2
						(69) HORIZ. L	JNDERCLEARANCE	E APPRAISAL	N
	SCHEDULE					SUFFICIENC	Y RATING		79.90
(90) ROUTINEINSPECTION DATE				07/26/201	7	(36A) BRIDGI	E RAILS		1
(91) ROUTINE INSPECTION FREQUE	NCY			24 M	0	(36B) RAIL TR	RANSITIONS		1
(92) CRITICAL FEATURE INSPECTIO	N:		(9	3) INSP DAT	E	(36C) APPRC	ACH GUARDRAILS	3	N
A) FRACTURE CRITICAL	N	MO	A)			(36D) APPRC	DACH GUARDRAIL	ENDS	N
B) UNDERWATER INSP	N	MO	B)						
C) SPECIAL INSP	N	MO	C)			(00) 1141 (004		NAVIGATION DATA	
BDOD	OSED INDROVENE	NTS				(30) NAVIGA		EADANCE	NA-no waterway
(75A) TYPE OF WORK	SOLD IMPROVEME		Not	Applicable (F	2)				F1 ET
(75B) WORK BY			Not	Applicable (F	2)	(111) SURST	RUCTURE NAV PR	OTECTION	FI
(76) IMPROVEMENT LENGTH			1101	- 4Procedic (F	ŕ	(116) MIN NA	V VERT CI FAR VE		ET
(94) BRIDGE COST				F					E)
(95) ROADWAY COST									
(96) TOTAL COST									
(97) COST ESTIMATE YEAR									
(114) FUTURE ADT				13.00	0				
(115) FUTURE ADT YEAR				203	7				

Bridge Load Rating Summary Sheet for Local Bridges Rating ansas 411 NBI Bridge # : Inspection Key : ADT : County: LPA Bridge ID : ADTT : Owner: Year Built : **Route Carried :** Year Reconst. : f'c: ksi Design Load : f<sub>y</sub>: ksi NBI Item 43 Structure Type Rating Information Provided : Field Measurements Testing Plans No Information Exists **Load Rating Manuals: General Load Rating Information: Condition Ratings:** Overburden Type : Deck: LFR/ASR Version : 17th Ed., 2002 Int. Overburden (in.) : Superstructure: **LRFR Version**: LRFD, 7th Ed, 2014. Overlay Type : Substructure: MBE Version : 2nd Ed., 2016 Int. Overlay (in.) : Culvert: Culvert Fill Height (ft.) : Channel: Method Used: LFR or ASR LRFR **Load Rating Evaluation Summary :** LFR A1 : 1.3 (Areas investigated in load rating) +M Girder/Beam 🔽 Int 🗂 Ext 2.17 A2 INV : 1.3 A2 OP :  $\mathsf{RF}_{\mathsf{OP}}$ Tonsop -M Girder/Beam T Int T Ext Tons RFINV Truck Tons HL-93 -----M Slab F +M Slab -----..... HS20-44 36 Culvert Walls Shear at/near Supports **T3** 25 Truss Members T3S2 36 **Floor Beams** T3-3 40 Г Stringers SU4 27 **Pins** SU5 ☐ Hangers 31 SU6 34.75 Fatigue Prone Details SU7 38.75 Deck Overhang NRL 40 Deck between Girders 28.75 EV2 Substructure (NBI Item 60 < 4)</p> EV3 43 Operating Ratings Only. This serves as the maximum posting load for the LPA. (Only necessary to fill out if Posting is REQUIRED) Single Posting (R12-1, MUTCD) Standard Posting (R12-5, MUTCD) Maximum (Operating) Truck Truck Truck Truck **Rating:** Load: tons Load: Load: Load: tons tons tons NBI Item 70 (Relationship of Operating Rating to Maximum Legal Load) : Equal to or above legal loads Additional Comments (include any section loss, assumptions, hand calc. references, etc.) **Controlling Structural Element for Design** Truck (HS20-44) AASHTOWare BrR Version 6.8.2 model was used to generate this load rating. The model is available from KDOT BLP for Printed Name (P.E.): download and modification for future load ratings. A new, sealed Load Rating Summary Sheet will be required with any new load rating or if the BrR model is modified. License #: P.E. Licensed in Kansas Seal & Date

Desi

Rating

**AASHTO Load** 

The Rating(s) for this structure is (are) based on a theoretical analysis of the structural elements involved, and on a limited amount of information Company : H.W. Lochner concerning their condition. The calculated values are the maximum posting limits. The LPA shall not post the structure at a load exceeding thes Analyst : values. The LPA may decide to post the structure at lower load limits. Revised 2017-10-12 Statewide Program KLBRP 106 C-4505-17 Analysis Date :

# Attachment D



# Load Rating Summary Sheet for Local Bridges



NBI Bridge # : LPA Bridge ID : Route Carried : \_\_\_ County: \_\_\_\_\_ \_\_\_ Owner: \_\_\_\_\_

# **Maximum Legal Posting Limits**

# NO POSTING REQUIRED

# Attachment E

# Item 113 Justification Form | Bridge Owner

# **Structure Information**

NBI Structure Number		Owner	
County Structure Name		Year Constructed	
POA Required?		Feature Intersected	
Date Delivered		Facility Carried	
		Location	
Critical Inspection Finding?	YES/NO	L	
Date Delivered			

# **Summary of Scour Analysis**

Current Item 61 Rating	
Current Item 62 Rating	_
Extensive Scour Observed	YES/NO
Comments:	
	Current Item 61 Rating Current Item 62 Rating Extensive Scour Observed Comments:

# **HEC-18 Scour Analysis Results**

HEC-18 Date Completed	HEC-18 Summary:
HEC-18 Recommended Item 113	

# 15.13 Posting/Signing Example





# Attachment G

# Special Haul Vehicles and Emergency Vehicles



Bridge Posting Loads for Single-Unit SHVs that meet Formula B

The Federal Highway Administration (FHWA) has determined that, for the purpose of load rating, two emergency vehicle configurations produce load effects in typical bridges that envelop the effects resulting from the family of typical emergency vehicles that is covered by the FAST Act:

Type EV2 - for single rear axle emergency vehicles

Front Single Axle: 24,000 pounds Rear Single Axle: 33,500 pounds Wheelbase: 15 ft.

Type EV3 - for tandem rear axle emergency vehicles

Front Single Axle: 24,000 pounds Rear Tandem Axle: 62,000 pounds (two 31,000 pound axles spaced at 4 ft.) Wheelbase: 17 ft. (distance from front axle to the centerline of rear tandem axle)