Public Works Department

Spokane County, Washington

Date: February 25, 2020

To: Board of County Commissioners

From: Chad Coles, PE
County Engineer

Subject: **2019 ANNUAL BRIDGE REPORT**

The bridges of the County Road System have been inspected in accordance with the County Road Administration Board guidelines and herewith I submit a report of the findings of the inspection. These findings will be taken into consideration in the preparation of the proposed 2021 Annual and 2021-2026 Six Year Construction Programs.

The report also comments on some of the major bridge accomplishments during the past year and describes some of the bridge projects contemplated this year.

I would be glad to meet with the Board to discuss and answer questions about the report, if the Board desires.

ANNUAL BRIDGE REPORT

February 2020

The following report is submitted in accordance with W.A.C. 136-20-060, and is the findings of the annual inspection of the bridge inventory. Included is a brief explanation of bridge inventory and inspection, State and County funding, a review of the current bridge conditions and a summary of bridge design and construction work during the past year.

Definitions:

Bridge – structure having a centerline length greater than 20 feet.

Functionally Obsolete (FO) – designation when the deck geometry, load carrying capacity (comparison of the original design load to the current State legal load), clearance or approach roadway alignment no longer meet the usual criteria for the system of which it is an integral part. In general, FO means that the bridge was built to standards that are not used today.

Short Span Bridge – structure having a centerline length less than or equal to 20 feet and meets the short span bridge criteria in the WSBIM.

Structurally Deficient (SD) – designation if significant load carrying elements are found to be in poor condition due to deterioration and/or damage, or the adequacy of the waterway opening provided by the bridge is determined to be extremely insufficient to the point of causing overtopping with intolerable traffic interruptions.

Sufficiency Rating (SR) – provides a method of evaluating highway bridge data by calculating four separate factors to obtain a numeric value which is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent an entirely sufficient bridge and zero percent would represent an entirely insufficient or deficient bridge. The formula considers the structural adequacy, functional obsolescence, level of service and essentiality for public use.

WSBIM – Washington State Bridge Inspection Manual.

BRIDGE INVENTORY

Spokane County currently has 173 bridges in its bridge inspection inventory, 18 of which are owned by the Railroad and 7 of which are owned by small cities.

Of the 148 county owned bridges, 107 are bridges and 41 are short span bridges. A breakdown by main span material as well as weight restrictions and calculated deficiencies can be found in Tables 1 and 2 below, respectively.

Table 1: Main span material breakdown for both County owned bridges and short span bridges.

Main Span Material	107 Bridges	41 Short Span Bridges
Concrete/Concrete Continuous	30	8
Prestressed and/or Post Tensioned Concrete/Concrete Continuous	64	7
Steel	9	3
Timber	4	23

Table 2: Posted and calculated designations for both County owned bridges and short span bridges.

Classification	107 Bridges	41 Short Span Bridges
Posted for Weight	11	5
Structurally Deficient (SD)	7	0
Functionally Obsolete (FO)	10	0

A complete list of posted bridges can be found in in Appendix B.

The replacement value of all county owned structures is estimated to be $313 million dollars.

BRIDGE INSPECTION

The County follows the National Bridge Inspection Standards (NBIS) in its program as required by the Federal Highway Administration (FHWA) in accordance with the Code of Federal Regulations part 650. The inspection requirements of this standard are met by performing inspections in two categories: Routine Inspections and Special Inspections. Routine Inspections must be done at least once every two years and Special Inspections are performed at different intervals as required by the condition of the bridge. Special Inspections often require specialized equipment and training to perform. There are currently 8 bridges and 8 short span bridges that require inspections every 12 months or less due to some structure components needing more frequent inspections.

Routine Inspections and some aspects of Special Inspections are accomplished by Bridge Department staff. To perform Special Inspections, the County utilizes the services of a local company, Commercial Grading, to provide the specialized equipment and operators

required to accomplish these inspections. In addition, the WSDOT Bridge Preservation Dive Team performs Underwater Inspections.

For the towns of Spangle, Fairfield, and Rockford, the Bridge Department staff performs routine inspections and other work, such as load rating and scour evaluation. A complete inventory of structures that Spokane County inspects can be found in Appendix A.

ROUTINE INSPECTIONS: 62 bridges, 26 short span bridges, and 2 interim inspections (which look at a specific element of a bridge rather than every piece of a bridge) were conducted in 2019. All deficiencies found from the inspections have been noted and scheduled for routine maintenance either with the Spokane County Bridge Maintenance Crew or put on the list for future Small Works Roster projects.

SPECIAL INSPECTIONS: Three inspections fall under this category:

Fracture Critical Inspection (FC): Spokane County has no FC bridges.

Underwater Inspections: The WSDOT dive team completed the short span and routine inspections on Coulee Hite Road Bridge No. 0512 and Sunset Highway Bridge No. 0514, respectively, due to the uncharacteristically high water under the bridges.

Under Bridge Inspection Truck (UBIT): These inspections require the use of a truck that can access the soffits of high span bridges which cannot be inspected from the ground. In 2019, three County bridges received UBIT inspections. These included: Cheney Spokane Road Bridge No. 2404, Bigelow Gulch Road Bridge No. 4604, and Nine Mile/Charles Road Bridge No. 2602.

Other noteworthy elements of the NBIS which are integral to the bridge program are:

LOAD RATING: All bridges on the inventory have been rated to determine the percentage of legal loads which they can safely carry. This is an ongoing effort and the files are maintained as the condition of the inventory changes. This work is shared between Bridge Department staff and a consultant.

In 2014, FHWA mandated that all bridge load ratings be updated to address a new class of trucks. A two-tier timetable was established and the Bridge Department is currently working to ensure compliance with the load rating schedule.

SCOUR EVALUATIONS: All bridges over water must be evaluated for the stability of their foundations due to the erosion of the stream bed which supports them. For bridges that have foundations classified as scour critical or unknown, a Scour Plan of Action has been prepared which includes monitoring during high flows and is updated as needed.

FUNDING

The Federal Government provides the main source of funds for bridge rehabilitation and replacement projects which are constructed under contract. Under the MAP-21 structure, bridges located on the National Highway System are eligible for funding under the National Highway Performance Program (NHPP) while bridges not located on the NHS have a separate set-aside in the Surface Transportation Program (STP). In Washington, the MAP-21 Steering Committee created a set-aside for the local bridge program. Agencies with eligible bridges can then apply for these funds through a process which awards funds to those bridges with the greatest need. In general, eligibility is established based on four criteria with the sufficiency rating being the primary factor. The sufficiency rating (SR) is a number on a scale of 0 to 100, with 100 being a new bridge, that captures all the factors which reflect the condition of a bridge. The other three criteria are structural deficiency (SD), functional obsolescence (FO), and scour condition.

Figure 1, below, shows a snapshot of the sufficiency rating for the 148 Spokane County owned bridges in 2019. A complete list of the SD, FO, and weight restricted bridges can be found in Appendix B.

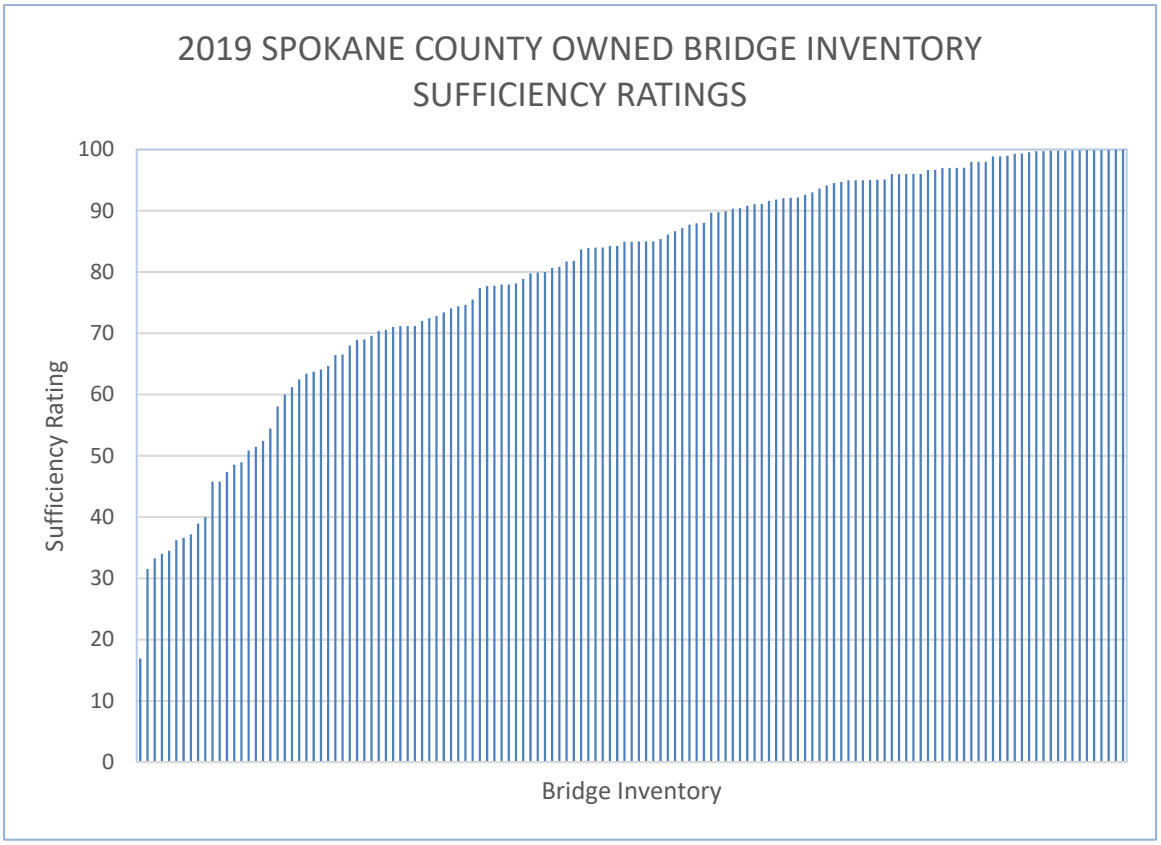

Figure 1: Sufficiency ratings for the 148 Spokane County owned bridges.

In most years, Federal funding is provided at an 80% level with the County Road Fund providing a 20% match. However, on occasion, State funding such as those available through the Rural Arterial Program (RAP) have been utilized as matching funds.

The County Road Fund provides money for replacing short span bridges (less than 20 feet in length) that are not eligible to receive funding through the State, as well as yearly routine maintenance of bridges.

In 2019, the local bridge program awarded approximately $81.1 million in funds to be distributed to local agencies throughout the State in the upcoming years. The next call for projects is anticipated in early 2021.

RECENTLY FUNDED PROJECTS

In December 2019, the County was successful in obtaining $4,109,512 in Federal grants for the following three bridge projects: Little Spokane Drive over Little Spokane River Bridge #3704 replacement, Sunset Highway over North Fork of Deep Creek Bridge #0514 removal, and Waikiki Road over Little Spokane River Bridge #2606 deck repair. The preliminary engineering scheduled to begin in 2020 for Little Spokane Drive and Waikiki Road and 2021 for Sunset Highway.

The following are photos of two structures that demonstrate bridges with a high funding priority because of deficiencies and are both weight restricted. Both bridges were awarded funds in 2019 for either replacements or deck repairs.

Structural Deficient
Sufficiency Rating: 16.91 SD
Little Spokane Drive Bridge No. 3704 over Little Spokane River

Structural Deficient
Sufficiency Rating 36.60 SD
Waikiki Road Bridge No. 2606 over Little Spokane River

ACTIVE PROJECTS

Table 3 below provides the status of the active projects in 2019. Additional details about each project can be found on the following pages.

Table 3: Status of active projects in 2019.

PROJECT	ESTIMATED TOTAL COST	PLANNED CONSTRUCTION DATE	FUNDING
Projects Constructed in 2019			
Bigelow Gulch/Forker Intersection CRP 2989A	$1,653,895*	Construct in 2018/2019	STP RAP
Elk-Chattaroy Road Bridge No. 4901 CRP 3237	$580,900	Construct in 2019	Federal County
Projects in Design			
Frideger Road Bridge No. 4902 CRP 3239	$1,300,500	Construct in 2021	Federal County
Blanchard Creek Road Culvert Replacement CRP 3229	$574,500	Construct in 2020	Federal County
Pine Bluff Road Bridge No. 2609 CRP 3230	$568,100	Construct in 2020	Federal County
Deer Park Milan Road Bridge No. 3915 CRP 3241	$1,325,200	Construct in 2023 or 2024	County
Idaho Road Bridge No. 6206 CRP 3254	$350,000	Construct in 2020	County
Wallis Road Bridge No. 5712	$250,000	Construct in 2020 or 2021	County
Antler Road Bridge No. 4814	$250,000	Construct in 2020 or 2021	County

*****Only includes estimated construction cost for bridge.

COMPLETED BRIDGE PROJECTS

During 2019, two bridge projects were completed. The following are a few details about the projects.

Elk-Chattaroy Road Bridge No. 4901 over Little Spokane River, CRP 3237 was a bridge deck rehabilitation project. It is located approximately three miles east of Highway 2 in north Spokane County. The three-span bridge is 77 feet long and comprised of two piers with cantilevered slabs beyond the piers. The deck was rehabilitated and new bridge approaches with structural earth walls was constructed to better protect the approach fills.

Bigelow Gulch Road Bridge No. 4604 over Forker Road, CRP 2989A is part of the Bigelow/Forker Intersection Project. This is a new bridge provides a grade separation of

Bigelow Gulch and Forker Roads. The structure is a single span, prestressed concrete girder bridge with a cast-in-place deck, supported on stub abutment walls. Each abutment is supported by permanent geo-synthetic retaining walls with cast-in-place fascia panels. The bridge opened to traffic in September 2018 with Forker Road traffic under the bridge open in November 2018. Work on the structure was completed in 2019.

BRIDGE DESIGN

County Bridges are designed using in the latest edition of the AASHTO LRFD Bridge Design Specification in concert with the WSDOT Bridge Design Manual. Following is a short description of the bridges which are currently under design.

Frideger Road Bridge No. 4902 over Little Spokane River, CRP 3239 is a bridge replacement project. It is located approximately 0.07 miles east of Elk-Camden Road in north Spokane County. The existing single span, conventionally reinforced concrete structure is scour critical and weight restricted for all seven legal trucks. The replacement structure will be a single span, prestressed concrete girder bridge with a concrete cast-in-place deck and include a roadway realignment. The topographic survey was completed in 2018 with design work scheduled for 2019/2020 and construction in 2021.

Blanchard Creek Road Culvert Replacement over Blanchard Creek Overflow, CRP 3229 is a culvert replacement project. It is located approximately 9.5 miles east of Elk-Chattaroy Road on Blanchard Creek Road, 50 feet south of Blanchard Road. The four existing culverts, 2-36" and 2-30" are deteriorating and not adequately conveying the flows. The replacement structure is a precast concrete three-sided bottomless culvert, with a 12-foot wide opening and approximately 34 feet wide. The profile of Blanchard Creek Road will be revised to allow the installation of the structure and maximize the freeboard. Construction will occur in 2020.

Pine Bluff Road Bridge No. 2609 over Coulee Creek, CRP 3230 is a bridge scour repair project. It is located approximately 0.2 miles north of Seven Mile Road in northwest Spokane County. The bridge is a three span, prestressed concrete bridge. High spring flows from 2017 have caused significant stability concerns to the foundations of the two interior piers. Repairs include anchoring a cast-in-place concrete to the bedrock and using soil anchors with reinforced shotcrete on the slopes with riprap at the toe of the slopes in front of each interior pier. Construction is slated for 2020.

Deer Park Milan Road Bridge No. 3915 over Bear Creek, CRP 3241 is a bridge replacement project. It is located approximately 4 miles east of Deer Park. The existing single span cast-in-place concrete bridge was built in 1921 and widened to the north in 1973. It is scour critical and deteriorating. The replacement structure is still being evaluated and will be built on the existing alignment. The topographic survey was completed in 2018 with design work scheduled for 2022 and construction in 2023 or 2024.

BRIDGE MAINTENANCE

Routine maintenance includes work on the inventory of timber bridges, by rebuilding deteriorated superstructures, updating bridge rail systems, repairing damaged guardrail and scour repair. There is also an extensive inventory of concrete bridges which receive maintenance work such as; repairing and washing decks, cleaning and replacing expansion joints and bridge rail repairs. The bulk of this work is accomplished by the Bridge Maintenance Crew who also handle emergency repairs and monitoring of the inventory during high water events.

MAJOR BRIDGE MAINTENANCE

No major bridge maintenance work was completed in 2019, but preliminary engineering and survey was started for the following three bridge replacement projects that will use County funds and the Bridge Maintenance and District Crews to perform the work.

Idaho Road Bridge No. 6206 over South Fork Rock Creek is a bridge replacement project. The existing weight restricted timber bridge is deteriorating with rot and section loss in the timber beams, deck planks and piles. The existing structure and center timber pile bent will be removed and a new steel piles will be driven in line with the existing abutment piles, a new timber pile cap and superstructure will be placed. Construction will occur in 2020.

Wallis Road Bridge No. 5712 over South Fork Deadman Creek is a bridge replacement project. The existing weight restricted timber bridge is deteriorating with rot and section loss in the timber beams, deck planks and piles. The existing structure will be removed and a new steel bridge supported on a structural earth wall foundation will be constructed. Preliminary engineering and survey work started in 2019 with potential construction completion in 2020.

Antler Road Bridge No. 4814 over Deer Creek is a bridge replacement project. The existing weight restricted timber bridge is deteriorating with rot and section loss in the timber beams and piles. The existing structure will be removed and a new steel bridge supported on a structural earth wall foundation will be constructed. Preliminary engineering and survey work started in 2019 with potential construction completion in 2020.

MOVING FORWARD

Of the 27 County owned timber bridges, 23 are founded on timber pile. Most of these timber bridges were built in the 1950's and 1960's and have an average age of 52 years old. The typical expected service life of a timber bridge is 50 years, indicating that the County's timber bridge inventory is at or beyond its expected service life. Currently, 26

percent of the timber bridges supported by timber piling are considered poor condition as the timber substructure and/or piles are wearing out and beginning to fail. With more expected to be added to this list, funding options and replacement structures will be reviewed.

APPENDIX A
INVENTORY OF STRUCTURES

Spokane County

Bridge Description	Total Number of Bridges	Bridges with weight restrictions	Closed bridges	Bridges with height restrictions
Railroad Under Crossings (Primary Safety Inspections)	17	0	0	13
Railroad Over Crossings	7	2	1	0
River, Stream, Drainage Crossings, Trails, and Roadways	142	14	1	0
Totals:	166	16	2	13

SMALL CITY BRIDGES INSPECTED BY SPOKANE COUNTY

City of Fairfield

Bridge Description	Total Number of Bridges	Bridges with weight restrictions	Bridges with height restrictions
River, Stream and Drainage Crossings	2	0	0
Totals:	2	0	0

City of Rockford

Bridge Description	Total Number of Bridges	Bridges with weight restrictions	Bridges with height restrictions
River, Stream and Drainage Crossings	1	0	0
Totals:	1	0	0

City of Spangle

Bridge Description	Total Number of Bridges	Bridges with weight restrictions	Bridges with height restrictions
River, Stream and Drainage Crossings	4	0	0
Totals:	4	0	0

APPENDIX B
2019 BRIDGE REPORT FIGURES AND TABLES

Bridges Categorized as Structurally Deficient in 2019 (7)

Bridge #	Bridge Name	Sufficiency Rating	Posting Status	Year Built	Length (ft)	Traffic Volume (ADT)
SPOK-3704	L SPO DR OVER L SPO RIV	16.91	Posted	1951	90	1136
SPOK-4902	FRIDEGER ROAD	33.27	Posted	1957	30	289
SPOK-0514	SUNSET HWY OV N FK DP CR	33.99	Posted	1910	27	8
SPOK-3112	OLD STATE ROUTE 195	36.20	Posted	1929	195	438
SPOK-2606	WAIKIKI RD OV LITTLE SPOKANE RIVER	36.60	Open	1961	168	2944
SPOK-6206	IDAHO RD OV SF ROCK CRK	38.94	Posted	1959	42	37
SPOK-2404	CHENEY-SPO OVER UP&BN RR	51.47	Posted	1949	547	3301

Bridges Categorized as Functionally Obsolete in 2019 (10)

Bridge #	Bridge Name	Sufficiency Rating	Posting Status	Year Built	Length (ft)	Traffic Volume (ADT)
SPOK-3715	GREENLEAF DRIVE	31.51	Open	1990	126	1592
SPOK-3703	COLBERT RD OV LITTLE SPOKANE RIVER	37.18	Posted	1953	90	2167
SPOK-2608	SEVEN MILE RD OV DEEP CREEK	52.43	Open	1958	170	2996
SPOK-3308	VALLEY CHAPEL ROAD	63.70	Open	1923	38	401
SPOK-4204	KEEVEY ROAD	64.65	Open	1976	96	19
SPOK-4403	DUNN ROAD	77.70	Closed	1963	42	1
SPOK-3701	LITTLE SPOKANE DR OV LITTLE SPOKANE RIVER	79.91	Open	1961	97	2260
SPOK-2604	RUTTER PKWY OV LITTLE SPOKANE RIVER	81.70	Open	1960	157	2317
SPOK-4212	HAYS ROAD	92.99	Open	1960	81	16
SPOK-3313	ELDER RD OV CALIFORNIA CREEK	94.93	Open	1984	73	62

APPENDIX B

2019 BRIDGE REPORT FIGURES AND TABLES

Bridges with Weight Restrictions in 2019 (16)

Bridge #	Bridge Name	Sufficiency Rating	Posting Status	Year Built	Length (ft)	Traffic Volume (ADT)
SPOK-3704	L SPO DR OVER L SPO RIV	16.91	Posted	1951	90	1136
SPOK-4902	FRIDEGER ROAD	33.27	Posted	1957	30	289
SPOK-0514	SUNSET HWY OV N FK DP CR	33.99	Posted	1910	27	8
SPOK-4814	ANTLER RD OV DEER CREEK	34.48	Posted	1955	18	13
SPOK-3112	OLD STATE ROUTE 195	36.20	Posted	1929	195	438
SPOK-3703	COLBERT RD OV LITTLE SPOKANE RIVER	37.18	Posted	1953	90	2167
SPOK-6206	IDAHO RD OV SF ROCK CRK	38.94	Posted	1959	42	37
SPOK-2401	MARSHALL RD OV MARSHALL CREEK	39.96	Posted	1960	20	44
SPOK-3801	CHATTAROY RD OV LITTLE SPOKANE RIVER	45.78	Posted	1953	45	1387
SPOK-5712	WALLIS RD OV SOUTH FORK DEADMAN CK	45.79	Posted	1948	15	30
SPOK-3902	DEER PARK MILAN ROAD	47.37	Posted	1954	42	1562
SPOK-2203	WELLS RD OVER SANDERS CR	48.53	Posted	1953	30	282
SPOK-2404	CHENEY-SPO OVER UP&BN RR	51.47	Posted	1949	547	3301
SPOK-3705	SHADY SLOPE RD OV LITTLE DEEP CRK	54.43	Posted	1955	20	1641
SPOK-3620	JAY AVE OVER DRAINAGE	66.54	Posted	1963	27	156
SPOK-1102	BADGER LK OVERFLOW BR	77.39	Posted	1952	21	141

APPENDIX B
2019 BRIDGE REPORT FIGURES AND TABLES

County Owned Short Span Bridges (41)

Bridge #	Bridge Name	Sufficiency Rating	Posting Status	Year Built	Length (ft)	Traffic Volume (ADT)
SPOK-4814	ANTLER RD OV DEER CREEK	34.48	Posted	1955	18	13
SPOK-2401	MARSHALL RD OV MARSHALL CREEK	39.96	Posted	1960	20	44
SPOK-5712	WALLIS RD OV SOUTH FORK DEADMAN CK	45.79	Posted	1948	15	30
SPOK-3710	SHADY SLOPE RD OV PEONE CREEK	50.87	Open	1964	21	1641
SPOK-3705	SHADY SLOPE RD OV LITTLE DEEP CRK	54.43	Posted	1955	20	1641
SPOK-3619	HOLLAND AV OVER DRAINAGE	59.97	Open	1974	13	970
SPOK-2101	CHENEY-PLAZA OVER BONNIE CK	62.45	Open	1921	12	234
SPOK-2818	DAHL RD OV SPRING CREEK	64.07	Open	1916	16	516
SPOK-4909	MILAN-ELK OVER DRY CR.	66.46	Open	1968	17	1239
SPOK-4404	CONNOR RD OV CALIFORNIA CRK	68.00	Open	1953	21	12
SPOK-3201	KEEVY RD OVER SPANGLE C	68.94	Open	1951	23	56
SPOK-2909	BRIDGES RD OV DRAGOON CRK	68.99	Open	1972	18	35
SPOK-2813	DAHL RD OV DRAGOON CREEK	69.58	Open	1916	16	516
SPOK-2911	SPRING CREEK RD OV SPRING CREEK	70.36	Open	1964	21	349
SPOK-5305	OLD ELDER RD OV MICA CREEK	71.18	Open	1921	21	29
SPOK-4408	MADISON OVER CALIFORNIA	72.47	Open	1952	20	767
SPOK-4410	BELMONT RD OV CALIFORNIA CRK	73.41	Open	1965	19	879
SPOK-1102	BADGER LK OVERFLOW BR	77.39	Posted	1952	21	141
SPOK-3204	WHITTIER OV BR N PINE CR	77.95	Open	1954	16	88
SPOK-0515	STROUP RD OV W BR DP CR	79.99	Open	1967	21	29
SPOK-3706	SHADY SLOPE OV PEONE CRK OVERFLOW	80.85	Open	1964	21	1421
SPOK-3915	DEER PK-MILAN OVER BEAR	83.93	Open	1921	13	3108
SPOK-3709	WOOLARD RD OV LITTLE DEEP CREEK	84.23	Open	1958	22	371
SPOK-3202	SPANGLE-WAVERLY OV SPANGL	84.24	Open	1917	20	848
SPOK-3203	CEDAR RD OVER CREEK	84.96	Open	1967	12	65

Bridge #	Bridge Name	Sufficiency Rating	Posting Status	Year Built	Length (ft)	Traffic Volume (ADT)
SPOK-0512	COULEE HITE RD. OV DP CR	84.99	Open	1952	21	25
SPOK-5107	KNIGHT ROAD BRIDGE	85.00	Open	1962	16	36
SPOK-3102	BABB ROAD BRIDGE	86.08	Open	1952	20	84
SPOK-3621	IVANHOE RD OVER DRAINAGE	89.68	Open	1957	21	173
SPOK-3622	BARNES RD OVER DRAINAGE	89.75	Open	1957	21	270
SPOK-0524	STROUP RD OVER BR DEEP C	90.32	Open	1950	20	49
SPOK-4202	RATTLERS RUN ROAD	94.10	Open	1964	21	14
SPOK-6201	IDAHO RD OVER ROSE CREEK	94.99	Open	1900	18	9
SPOK-4215	CAHILL OVER DRAINAGE	95.98	Open	1955	18	34
SPOK-4801	BRUCE RD OV DEER CREEK	95.98	Open	1950	19	27
SPOK-0508	COULEE HITE RD OV DP CRK	95.99	Open	1962	22	33
SPOK-5701	MUZZY ROAD BRIDGE	96.65	Open	1951	21	308
SPOK-0406	THORPE ROAD OVER DEEP CR	96.97	Open	1962	19	69
SPOK-3108	GRIFFITH RD ARCH PIPE	97.00	Open	1994	18	17
SPOK-1201	MULLINIX RD ARCH PIPE	98.86	Open	1994	17	269
SPOK-3104	DIXON ROAD ARCH PIPE	100.00	Open	1992	17	18