



# Small Structure Inventory Data Review and Editing Guidance



Published by the  
South Dakota  
Department of Transportation  
April 2022

## Disclaimer

The contents of this report, funded in part through grant(s) from the Federal Highway Administration, reflect the views of the authors who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the South Dakota Department of Transportation, the State Transportation Commission, or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

The South Dakota Department of Transportation provides services without regard to race, color, gender, religion, national origin, age, or disability, according to the provisions contained in SDCL 20-13, Title VI of the Civil Rights Act of 1964, the Rehabilitation Act of 1973, as amended, the Americans With Disabilities Act of 1990 and Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 1994. Any person who has questions concerning this policy or who believes he or she has been discriminated against should contact the Department's Civil Rights Office at 605.773.3540.

## Contacts

David Huft (author of this document)	(605) 773-3358 <a href="mailto:dave.huft@state.sd.us">dave.huft@state.sd.us</a>
SD County Highway Superintendents Association	(605) 224-4554 <a href="https://sdcountycommissioners.org">https://sdcountycommissioners.org</a>
SD Association of Towns and Townships	(605) 353-1439 <a href="http://sdtownships.com">http://sdtownships.com</a>
SD Association of County Commissioners	(605) 224-4554 <a href="https://sdcountycommissioners.org">https://sdcountycommissioners.org</a>
SD Local Transportation Assistance Program	(800) 422-0129 <a href="mailto:sdltap@sdstate.edu">sdltap@sdstate.edu</a>
SD Department of Transportation Geographic Information Systems Coordinator	(605) 773-3278 <a href="mailto:kimberly.zerr@state.sd.us">kimberly.zerr@state.sd.us</a> <a href="https://dot.sd.gov/transportation/highways/planning/gis">https://dot.sd.gov/transportation/highways/planning/gis</a>
SD Department of Transportation Local Government Assistance Program	(605) 773-2995

# Contents

Disclaimer .....	ii
Contacts.....	ii
Contents .....	iii
1 Document Purpose.....	1
2 Editing Process.....	1
2.1 Editing Small Structure Data Using the ESRI Collector or Field Maps App.....	1
2.2 Searching the ESRI Collector or Field Maps App Structures by Small Structure Number .....	2
2.3 Editing Small Structure Data Submitted by Spreadsheet.....	3
3 Culvert Data Checks.....	4
3.1 Road System .....	5
3.2 Maintenance Level .....	5
3.3 Culvert Groups.....	6
3.4 Outlet Area .....	7
3.5 RAIF Eligibility .....	8
3.6 Missing Culvert Inventory Data .....	8
3.7 Skew Angle .....	9
3.8 Load Limits.....	9
4 Small Bridge Data Checks .....	10
4.1 Road System .....	10
4.2 Maintenance Level .....	11
4.3 NBIS Bridge Length .....	11
4.4 RAIF Eligibility .....	11
4.5 Missing Small Bridge Inventory Data.....	12
4.6 Skew Angle .....	12
4.7 Load Limits.....	12

# 1 Document Purpose

This document is being provided to each County Highway Department in South Dakota to:

- help them review and edit data they have already submitted to the Small Structure Inventory
- provide feedback to avoid problems in future data submissions

Along with this document, each County Highway Department that has already submitted data is receiving an Excel spreadsheet named **CountyName\_Small\_Structures\_04-20-2022**. The spreadsheet:

- lists culvert data (in the **Culverts** tab) that was submitted by April 8, 2022
- lists small bridge data (in the **Small\_Bridges** tab) that was submitted by April 8, 2022
- identifies **Actions Required** to correct potential gaps and errors in the reported data

Each county should review and edit its data before May 31, 2022. Data reported by May 31 will be used to determine the distribution of the FY2023 Rural Access Infrastructure Funding in July 2022. Because \$11.333 million will be distributed in proportion to the number of small structures (culverts and small bridges) inventoried in each county, a complete and accurate inventory is critically important.

# 2 Editing Process

Reviewing and editing your Small Structure Inventory data is necessary because:

- the mobile app and spreadsheet tools used to collect the inventory have limited ability to check the data as it is being entered; some checks are only possible after the data has been submitted
- individuals who performed the inventory sometimes interpreted inventory instructions differently
- some of the reported data exhibits errors or missing items

## 2.1 Editing Small Structure Data Using the ESRI Collector or Field Maps App

If your agency used the Small Structure Inventory mobile app to collect inventory data, your data was immediately loaded into a statewide geographic database. To edit the data, you must again use the mobile app.

- Open the Small Structure Inventory Collection Map in ArcGIS Collector or Field Maps.
- Locate the structure on the map and tap on it to open the attributes (Figure 1).
- Tap on the pencil at the bottom of the attribute box to begin editing.
- Edit appropriate field data and photos.

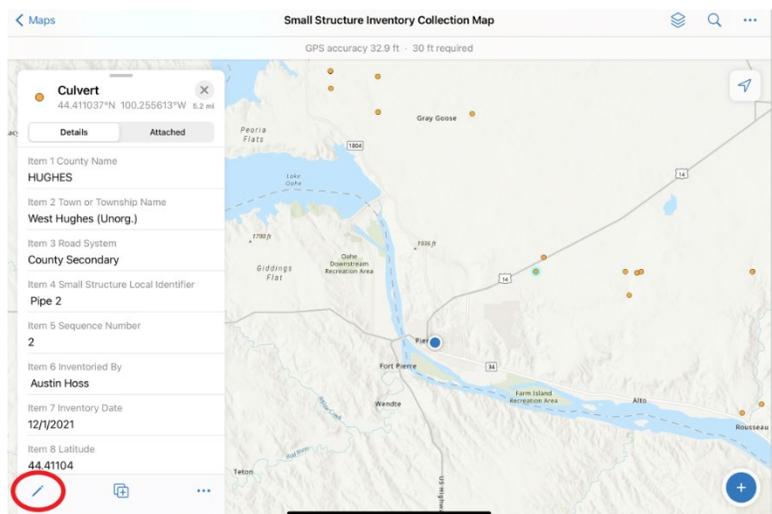


Figure 1: Small Structure Inventory mobile app map

- Tap **Update Point** to save your edits, then Submit (Figure 2).

Edits will be immediately stored in the statewide geographic database.

Do not use the Excel spreadsheet to edit your county's data. Although changes can be made to the spreadsheet, they will not be transferred to the statewide geographic database.

Contact Kimberly Zerr at 605.773.3402 or [Kimberly.zerr@state.sd.us](mailto:Kimberly.zerr@state.sd.us) for assistance if needed.

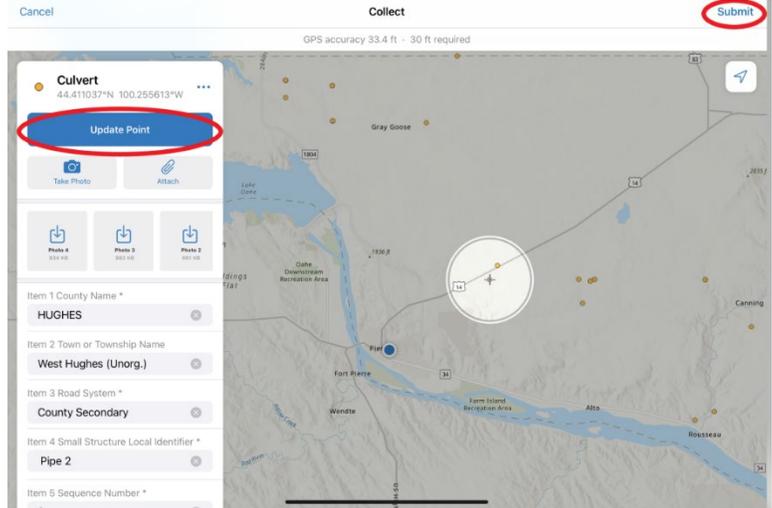


Figure 2: Saving edited data with the mobile app

## 2.2 Searching the ESRI Collector or Field Maps App Structures by Small Structure Number

With the ESRI Collector or Field Maps mobile apps, it is also possible to use the search bar to find a structure.

- In the upper right-hand corner of the screen, tap the magnifying glass icon to open the search bar (Figure 3).

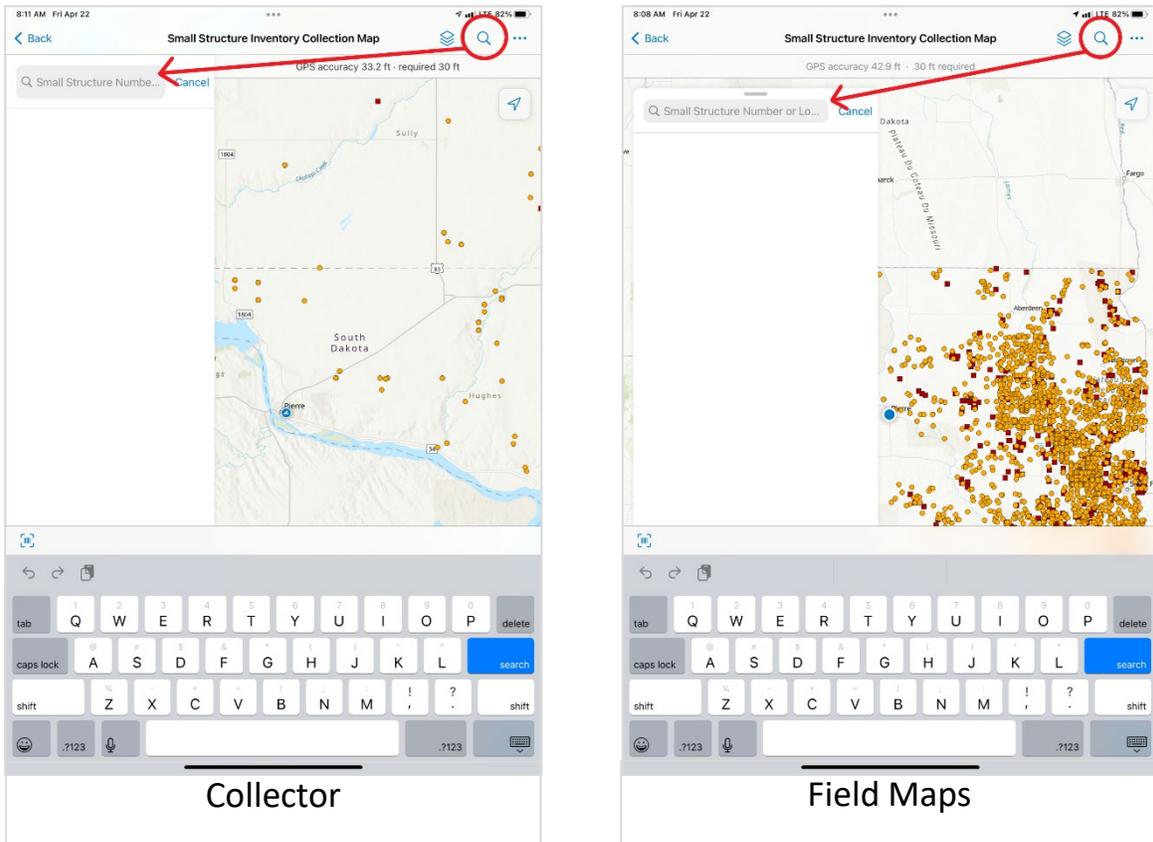


Figure 3: Small Structure Inventory Mobile App Screens

- Type in the Small Structure Number and tap **Search** on the keyboard. **Remember to include the hyphens when searching.** You can also search by partial structure number. This will pull up a list of all matching structures (Figure 4).

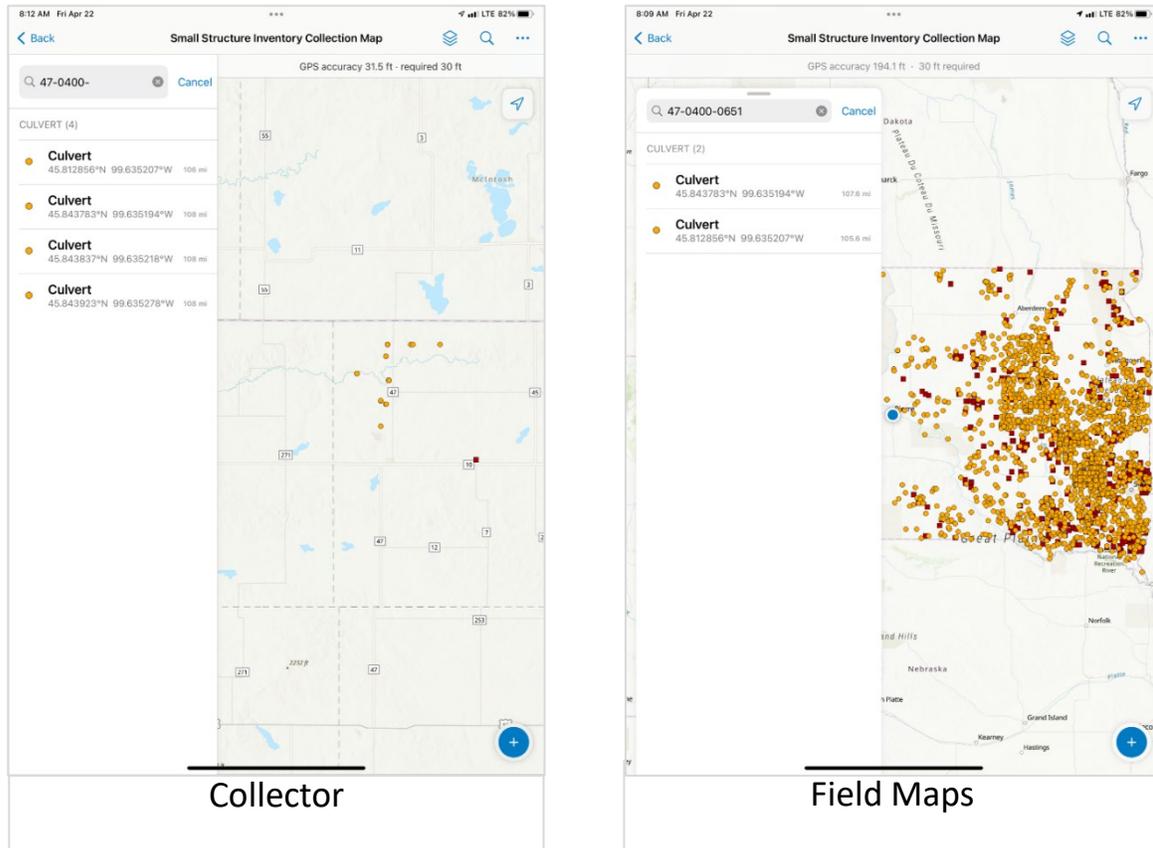


Figure 4: List of structures to select for editing

- Tap on the desired structure to select it and open its details. From here, you can tap the edit icon to change the structure’s information.

### 2.3 Editing Small Structure Data Submitted by Spreadsheet

If your agency submitted inventory data using the Small Structure Inventory Spreadsheet tool, the data is still in the process of being added to the statewide geographic database. To edit the data, you must again use the Small Structure Inventory Spreadsheet tool and resubmit the updated data to SDDOT.

- Reopen the most current copy of your county spreadsheet. It should display a list of all the structures inventoried so far. (Figure 5). If data for a specific structure happens to display when you first open the spreadsheet, select **Save Changes** to close that structure and get to the list. **Open** the structure to begin editing.

South Dakota Small Structure Inventory			
<i>Structures appear in the order they were entered.</i>			
Small Structure Local Identifier	Sequence Number		
S Nellie Trailer 1	1	<a href="#">Open</a>	<a href="#">Delete</a>
S Nellie Trailer 2	1	<a href="#">Open</a>	<a href="#">Delete</a>
S Split Tree	1	<a href="#">Open</a>	<a href="#">Delete</a>
S Split Tree	2	<a href="#">Open</a>	<a href="#">Delete</a>
S Split Tree	3	<a href="#">Open</a>	<a href="#">Delete</a>
S Split Tree	4	<a href="#">Open</a>	<a href="#">Delete</a>

Figure 5: Small Structure Inventory Spreadsheet structure list

- Enter or edit data as needed to report missing data and make corrections (Figure 6).
- Be sure to Save Changes.

After changes are made, resubmit your spreadsheet to SDDOT. Contact Dave Huft at 605.773.3358 or [dave.huft@state.sd.us](mailto:dave.huft@state.sd.us) for resubmission instructions or technical assistance.

Figure 6: Small Structure Inventory data entry screen

### 3 Culvert Data Checks

The Culverts tab of the Small Structure Spreadsheet consists of two main areas:

- Columns Y – CG list all of the culvert-related items reported in the Small Structure Inventory. Each row represents one culvert reported in the Small Structure Inventory. Cells that possibly need attention are highlighted by cell color.

OBJECT ID	Item 1 County Name	Item 2 Town or Township Name	Item 3 Road System	Item 4 Small Structure Local Identifier	Item 5 Sequence Number	Item 6 Inventoried By	Item 7 Inventory Date	Item 8 Latitude	Item 9 Longitude	Item 10 Small Structure Number	Item 11 Road Name	Item 12 Road Maintenance Level	Item 13 Road Surface	Item 14 Number Served
259379	DEWEY	North Dewey (Unorg.)	County Secondary	tributary	1	Robert Williams	12/28/2021	44.9936494	-101.2734658	21-1112-3312	166th street	Full Maintenance	Asphalt Mat	More than 1 farm, home, or r
259382	DEWEY	North Dewey (Unorg.)	County Secondary	tributary	2	Robert Williams	12/28/2021	44.9936496	-101.2734737	21-1112-3313	166th street	Full Maintenance	Asphalt Mat	More than 1 farm, home, or r
260180	DEWEY	North Dewey (Unorg.)	County Secondary	tributary	1	Robert Williams	12/30/2021	45.2755245	-100.9006489	21-2893-1365	county 7	Full Maintenance	Gravel	More than 1 farm, home, or r
260181	DEWEY	North Dewey (Unorg.)	County Secondary	tributary	1	Robert Williams	12/30/2021	45.4727329	-101.2685288	21-1127-0002	133rd street	Minimum Maintenance	Gravel	More than 1 farm, home, or r
260184	DEWEY	North Dewey (Unorg.)	County Secondary	tributary	1	Robert Williams	12/30/2021	45.4727373	-101.2707346	21-1087-0002	133rd street	Minimum Maintenance	Gravel	More than 1 farm, home, or r
260182	DEWEY	North Dewey (Unorg.)	County Secondary	large flat land	1	Robert Williams	12/30/2021	45.2686838	-100.8725106	21-3056-1404	county 7	Full Maintenance	Gravel	More than 1 farm, home, or r
260183	DEWEY	North Dewey (Unorg.)	County Secondary	large flat land	1	Robert Williams	12/30/2021	45.2701966	-100.8787971	21-3026-1402	county 7	Full Maintenance	Gravel	More than 1 farm, home, or r
259580	DEWEY	South Dewey (Unorg.)	County Secondary	large area flow	2	Robert Williams	12/29/2021	45.3147532	-100.6030443	21-4363-1094	Lance Way Point road	Minimum Maintenance	Gravel	More than 1 farm, home, or r
259581	DEWEY	South Dewey (Unorg.)	County Secondary	large area flow	1	Robert Williams	12/29/2021	45.3270393	-100.6131786	21-4313-1009	Lance Way Point road	Minimum Maintenance	Gravel	More than 1 farm, home, or r
259583	DEWEY	South Dewey (Unorg.)	County Secondary	large area flow	1	Robert Williams	12/29/2021	45.3147442	-100.6030382	21-4363-1095	Lance Way Point road	Minimum Maintenance	Gravel	More than 1 farm, home, or r
259584	DEWEY	South Dewey (Unorg.)	County Secondary	large area flow	1	Robert Williams	12/29/2021	45.3246345	-100.6130523	21-4314-1025	Lance Way Point road	Minimum Maintenance	Gravel	More than 1 farm, home, or r

Figure 7: Columns Y - CG contain all of the culvert data reported in the Small Structure Inventory (partial image)

- Columns A – X perform checks on items reported in the Small Structure Inventory. These columns are calculated by formulas and must not be changed manually.

Reported System	Township	Secondary	County	Eligible System	Highway Maintenance Level	Seq #	Sequence Number	Nearest Culvert N & W (row)	Distance to Nearest Culvert N & W (ft)	Nearest Culvert N & W w/in 120' (row)	Nearest Culvert S & E Small Structure Number	Distance to Nearest Culvert S & E (ft)	Nearest Culvert S & E w/in 120' (row)	Link Index	Possible Grouping with Small Structure Number	Possible Grouping with Small Structure Number	Estimated Culvert Outlet Area ft <sup>2</sup>	Culvert Group Estimated Outlet Area ft <sup>2</sup>	Culvert RAIF Eligible	Culvert Group RAIF Eligible	Potential Small Structure	
County Secondary				Yes	Full	1	8	21-3056-1404	144225.1	0	0	1000000.0	0	3	3	21-1112-3312	14	14	No	No		
County Secondary				Yes	Full	2	8	21-3056-1404	144230.0	0	0	1000000.0	0	0	0	UNKNOWN	14	14	No	No		
County Secondary				Yes	Full	1	12	21-4363-1095	79062.0	0	9	21-3026-1402	7260.5	0	5	5	21-2893-1365	16	16	Yes	Yes	Yes
County Secondary				Yes	Minimum	1	7	21-1087-0002	2099.1	0	11	21-4313-1009	176075.4	0	6	6	21-1127-0002	25	25	No	No	
County Secondary				Yes	Minimum	1	0		1000000.0	0	6	21-1127-0002	2099.1	0	7	7	21-1087-0002	25	25	No	No	
County Secondary				Yes	Full	1	9	21-3026-1402	1618.0	0	4	21-1112-3313	144230.5	0	8	8	21-3056-1404	75	75	Yes	Yes	Yes
County Secondary				Yes	Full	1	5	21-2893-1365	7280.5	0	8	21-3056-1404	1618.0	0	9	9	21-3026-1402	60	60	Yes	Yes	Yes
County Secondary				Yes	Minimum	2	13	21-4314-1025	4425.3	0	12	21-4363-1095	3.6	12	12	21-4363-1095	14	14	No	No		
County Secondary				Yes	Minimum	1	6	21-1127-0002	176075.4	0	13	21-4314-1025	877.9	0	11	11	21-4313-1009	24	24	No	No	
County Secondary				Yes	Minimum	1	10	21-4363-1094	3.6	10	5	21-2893-1365	79062.4	0	12	12	21-4363-1095	14	14	No	No	
County Secondary				Yes	Minimum	1	11	21-4313-1009	877.9	0	10	21-4363-1094	4425.3	0	13	13	21-4314-1025	38	38	No	No	
Estimated # of Eligible Structures																			3			

Figure 8: Columns A - X are calculated from data reported in the Small Structure Inventory

### 3.1 Road System

Column A **Reported System** reflects the Road System (*Item 3, Column AB*) reported in the Small Structure Inventory.

Columns B – D **Structure Maps to Other System** indicate whether the culvert maps to a Road System other than reported in the inventory, based on the reported Latitude (*Item 8, Column AG*) and Longitude (*Item 9, Column AH*) and SDDOT’s local road inventory. For example, in Figure 9, Rows 4 – 7 were reported on the County Secondary system, but mapping places them on the County Primary system.

Column E **Eligible System** indicates whether the Road System is eligible for RAIF funding. Township and County Secondary roads are eligible and are listed as Yes. Roads on the County Primary system are not eligible and are listed as No and shaded pink. Structures that map to a different system (such as Rows 4 – 7), or structures that have no reported Road System, are listed as UNKNOWN, pending verification of the correct Road System.

**Action Required:**

- Verify that Road System is reported for every structure.
- Determine the correct Road System for any structure that maps to a system different from the Reported System.
- If you determine the Road System was incorrectly reported to the Small Structures Inventory, correct the entry.
- If you believe the Road System is correctly reported and SDDOT’s local road inventory may be wrong, please contact Greg Pollreizs at 605.773.6645 or [greg.pollreizs@state.sd.us](mailto:greg.pollreizs@state.sd.us) to resolve the question.

	A	B	C	D	E
1		Structure Maps to Other System			
2	Reported System	Township	Secondary	County	Eligible System
3	County				No
4	County Secondary			County	UNKNOWN
5	County Secondary			County	UNKNOWN
6	County Secondary			County	UNKNOWN
7	County Secondary			County	UNKNOWN
8	County				No
9	County				No
10	County				No
11	County				No
12	County				No
13	County				No
14	County				No
15	County				No
16	County				No
17	Township				Yes
18	Township				Yes
19	Township				Yes
20	County				No
21	County				No
22	County				No
23	County				No
24	County				No

Figure 9: Columns A - E check for possible misidentification of Road System

### 3.2 Maintenance Level

Column F **Highway Maintenance Level** reflects the Road Maintenance Level (*Item 12, Column AK*) reported in the Small Structure Inventory. Only structures on Full Maintenance roads, such as those in Rows 3 – 16 in Figure 10, are eligible for RAIF funding. Structures on No Maintenance or Minimum Maintenance roads, such as Rows 17 – 18, are not eligible and are shaded pink.

**Action Required:**

- Verify that the reported Highway Maintenance Level is correct. Edit the item in the Small Structure Inventory if necessary.

	F
1	
2	Highway Maintenance Level
3	Full
4	Full
5	Full
6	Full
7	Full
8	Full
9	Full
10	Full
11	Full
12	Full
13	Full
14	Full
15	Full
16	Full
17	Minimum
18	Minimum

Figure 10: Column F indicates Maintenance Level eligibility for RAIF

### 3.3 Culvert Groups

Columns G – S deal with groups of culverts.

Grouping is important because the provisions of SDCL § 31-41 allow the opening size requirement to be met by either:

- a single culvert with an opening of at least 16 square feet
- a group of culverts serving the same drainage with a combined opening of at least 16 square feet

Culvert Grouping													
Seq #	Sequence Number Culvert Grouping Error Message	Nearest Culvert N & W (row)	Nearest Culvert N & W Small Structure Number	Distance to Nearest Culvert N & W (ft)	Nearest N & W Culvert w/in 120' (row)	Nearest Culvert S & E (row)	Nearest Culvert S & E Small Structure Number	Distance to Nearest Culvert S & E (ft)	Nearest S & E Culvert w/in 120' (row)	Link Index	Possible Grouping with Small Structure (row)	Possible Grouping with Small Structure Number	
3	1	30	05-0972-1453	37977.1	0	29	05-1287-1703	21164.0	0	3	3	05-1675-1606	
4	1	19	05-2471-1855	5274.0	0	8	05-2572-1868	10595.3	0	4	4	05-2371-1858	
5	1	7	05-2572-1884	981.3	0	9	05-2600-1902	1782.4	0	5	5	05-2566-1901	
6	2	No nearby culvert	10	05-2600-1904	1893.5	0	12	05-1588-1905	51548.1	0	0	0	UNKNOWN
7	1		8	05-2572-1868	821.5	0	5	05-2566-1901	981.3	0	7	7	05-2572-1884
8	1		4	05-2371-1858	10595.3	0	7	05-2572-1884	821.5	0	8	8	05-2572-1868
9	1		5	05-2566-1901	1782.4	0	11	05-2600-1903	16.9	11	9	9	05-2600-1902
10	2	Do not group if >16 sqft	11	05-2600-1903	12.1	11	11	05-2600-1903	12.1	11	11	11	05-2600-1903
11	3	Do not group if >16 sqft	10	05-2600-1904	12.1	10	10	05-2600-1904	12.1	10	10	11	05-2600-1903
12	1		6	05-2564-1903	51548.1	0	21	05-2299-1905	37533.6	0	12	12	05-1888-1905
13	1		21	05-2299-1905	33785.7	0	40	05-0949-1971	37635.9	0	13	13	05-1659-1905
14	1		37	05-1134-2003	51615.3	0	36	05-1115-2082	52638.6	0	14	14	05-2111-2020
15	1		29	05-1287-1703	47430.0	0	17	05-2184-1705	19.3	17	15	15	05-2185-1705
16	2	Do not group if >16 sqft	17	05-2184-1705	30.4	17	28	05-0870-1747	69462.9	0	17	17	05-2184-1705
17	3	Do not group if >16 sqft	15	05-2185-1705	19.3	15	16	05-2185-1706	30.4	16	16	17	05-2184-1705
18	1		28	05-0870-1747	84516.6	0	23	05-2170-1778	15881.7	0	18	18	05-2471-1771
19	1		22	05-2170-1779	16374.9	0	4	05-2371-1858	5274.0	0	19	19	05-2471-1855
20	1		40	05-0949-1971	81324.7	0	53	05-0579-2001	100889.5	0	20	20	05-2489-1978
21	1		12	05-1588-1905	37533.6	0	13	05-1659-1905	33785.7	0	21	21	05-2299-1905

Figure 11: Columns G - S, used to identify groups of culverts

Column G **Seq #** reflects the reported Sequence Number (*Item 5, Column*

*AD*). A Sequence Number greater than 1 means that the structure is grouped with one or more other culverts to achieve the 16 square foot opening requirement. Because the data reported to the Small Structure Inventory does not identify the other culverts, this area of the spreadsheet attempts to find nearby culverts (within 120 feet, based on reported Latitude and Longitude) that could be grouped together.<sup>1</sup>

Column H lists one of three messages that may apply to the entry:

- If the Sequence Number is greater than 1, meaning the culvert is grouped with another, but no nearby culvert exists, the message **No nearby culvert** displays. This message most frequently indicates that the Sequence Number was reported incorrectly. Another less likely explanation is that its “partner” culvert was not reported.
- If the Sequence Number is greater than 1, meaning the culvert is grouped with another, but the culvert exceeds the 16 square foot opening requirement by itself, the message **Do not group if >16 sqft** appears.
- If the distance from the culvert to the nearest structure is less than 3 feet, the message **Too close to neighbor** appears. This message may indicate that the same culvert was reported more than once, or it may simply reflect error inherent in measuring Latitude and Longitude and not require correction.

Columns I – L list:

- the Row Number of the nearest structure northwest of a diagonal line running southwest to northeast through the culvert
- the Small Structure Number of the nearest North & West structure
- the Distance (in feet) from the culvert to the nearest North & West structure
- the Row Number of the nearest North & West structure, if it is within 120 feet of the culvert

<sup>1</sup> The spreadsheet’s grouping method is quite reliable, but not perfect. Certain errors, such as not numbering one of the culverts with Sequence Number 1, can make grouping difficult. Work is ongoing to improve the method.

Columns M – P likewise list:

- the Row Number of the nearest structure southeast of a diagonal line running southwest to northeast through the culvert
- the Small Structure Number of the nearest South & East structure
- the Distance (in feet) from the culvert to the nearest South & East structure
- the Row Number of the nearest South & East structure, if it is within 120 feet of the culvert

Columns Q – S try to identify culverts that could be grouped together.

- Columns Q and R are row pointers used to identify possible group partners.
- Column S lists the Small Structure Number of another structure with **Seq #** equal to 1 that the culvert in this row could be grouped with. In Figure 11 for example, the two culverts in Rows 10 – 11 could be grouped together if necessary to meet the culvert opening requirement. If the Seq # of the culvert is greater than 1 (indicating that it belongs to a group of culverts) but no nearby culvert exits, Column S shows **UNKNOWN**, as shown in Row 6 of Figure 11.

**Action Required:**

- The most common error related to grouping involves misreporting the Sequence Number (*Item 5, Column AD*).
  - If a culvert is not located near any other culverts, it must be assigned a Sequence Number of 1.
  - If a culvert is large enough to meet the 16 square foot opening requirement for RAIF, it is better to assign a Sequence Number of 1, to avoid grouping it with other culvert(s).
  - If culverts serving the same drainage need to be grouped to collectively meet the 16 square foot opening requirement for RAIF, assign Sequence Numbers in order from one end of the group to the other (direction does not matter).

**3.4 Outlet Area**

Columns T – X estimate the outlet area of the culvert or group of culverts, which affects the culvert’s eligibility for RAIF funding.

- Column T estimates the outlet area, to the nearest square foot, of the culvert in this row, based upon the culvert’s Shape (*Item 23, Column AV*), Span (*Item 24, Column AW*), Rise (*Item 25, Column AX*), and Number of Cells (*Item 20, Column AS*). If the area is less than 16 square feet, the value is highlighted in pink, as shown in Figure 12.
- If the culvert is grouped with culvert(s) in other row(s), Column U estimates the total outlet area of the group of culverts. In Figure 12, the culverts in rows 10 and 12 are a group, as indicated by the same Small Structure Numbers listed in Column S. Each culvert has an opening of 14 square feet (less than the 16 square foot requirement), but together they have a combined opening of 28 square feet, making them eligible for RAIF. If the opening area of the group is less than 16 square feet, the value is highlighted in pink.

	S	T	U	V	W	X
1		Outlet Area		Eligible		
	Possible Grouping with Small Structure Number	Estimated Culvert Outlet Area ft <sup>2</sup>	Culvert Group Estimated Outlet Area ft <sup>2</sup>	Culvert RAIF Eligible	Culvert Group RAIF Eligible	Potential Small Structure
2						
3	21-1112-3312	14	14	No	No	
4	UNKNOWN	14		No		
5	21-2893-1365	16	16	Yes	Yes	Yes
6	21-1127-0002	25	25	No	No	
7	21-1087-0002	25	25	No	No	
8	21-3056-1404	75	75	Yes	Yes	Yes
9	21-3026-1402	60	60	Yes	Yes	Yes
10	21-4363-1095	14		No		
11	21-4313-1009	24	24	No	No	
12	21-4363-1095	14	28	No	No	
13	21-4314-1025	38	38	No	No	
14		Estimated # of Eligible Structures				3

Figure 12: Columns T - X estimate outlet area and indicate RAIF eligibility

### 3.5 RAIF Eligibility

- Column V indicates whether the culvert in this row is eligible for RAIF funding, in consideration of the requirements set in SDCL § 31-41:
  - the reported Road System (*Item 3, Column AB*)
  - the reported Road Maintenance Level (*Item 12, Column AK*)
  - the Estimated Culvert Outlet Area (Column T).
- Column W indicates whether the group of culverts is eligible for RAIF funding, in consideration of the requirements set in SDCL § 31-41:
  - the reported Road System (*Item 3, Column AB*)
  - the reported Road Maintenance Level (*Item 12, Column AK*)
  - the Culvert Group Estimated Outlet Area (Column U).
- Column X indicates whether the culvert or culvert group appears to be a small structure eligible for RAIF funding. This assessment is based on currently reported information and can change if the information in the Small Structure Inventory is updated.

The total number of eligible small structures, based on data currently reported in the Small Structure Inventory, is shown at the bottom of column X.

#### **Action Required:**

- Verify that the Estimated Culvert Outlet Area (Column T) is reasonable. The calculation will be accurate if the Shape (*Item 23, Column AV*), Span (*Item 24, Column AW*), Rise (*Item 25, Column AX*), and Number of Cells (*Item 20, Column AS*) were reported correctly.
- If the culvert Shape (*Item 23, Column AV*) was reported as “Other” the Outlet Area is estimated as if “Pipe Arch” were reported. If another shape—such as circular, elliptical, or rectangular—is more appropriate, edit the Shape accordingly.
- Verify that the Culvert Group Estimated Outlet Area is correct. A very common error is to report culverts individually but then list the total number of barrels in the Number of Cells (*Item 20, Column AS*) for every culvert. For example, listing two culverts in individual rows and recording the Number of Cells as 2 for each row causes the estimate to be twice as large as it should be. [This can affect RAIF eligibility.](#)
- If the eligibility of the culvert or culvert group is unexpected, check that data for the Road System (*Item 3, Column AB*), Road Maintenance Level (*Item 12, Column AK*), and culvert shape and dimensions were reported correctly. Edit any incorrectly reported entries.

### 3.6 Missing Culvert Inventory Data

Most of Columns Y – CG, which contain the culvert data reported to the Small Structure Inventory, are set to flag missing entries by shading the cells **orange** as indicated in Row 6 of Figure 12.

Some items, like Small Structure Local Identifier (*Item 4, Column AC*) or Inventoried By (*Item 6, Column AE*) are mainly informational. Although not essential to establish funding eligibility or develop future small structure improvement plans, the information can be useful to local road managers and officials. Reporting the missing information is encouraged when possible.

Other items, especially those relating to culvert location, jurisdiction, type, dimensions, and condition are essential to establishing funding eligibility and developing future structure improvement plans. Failure to

accurately report the information will hinder planning and analysis later. Any item that affects the culvert’s eligibility for RAIF funding is especially important.

A few counties chose to report all of their culverts in the Small Structure Inventory—including those on the County Primary system—but to skip entering condition information for those ineligible for RAIF funding. This is acceptable, with the caveat that the missing information will simply be unavailable for analysis.

**Action Required:**

- Review Columns Y – CG for missing data values. Strive to report all items related to culvert jurisdiction, location, type, dimensions, and condition for all structures potentially eligible for RAIF funding.

**3.7 Skew Angle**

A few agencies appear to have reported Skew Angle (*Item 28, Column BA*) incorrectly, as shown by values shaded in red in Figure 14. As shown in Figure 13, Skew Angle is to be measured between the culvert alignment and a line running perpendicular to the direction of the road. The Skew Angle of a culvert lying at right angles to the roadway is 0°. The Skew Angle of the culverts in Figure 13 is approximately 18°. A culvert with a Skew Angle of 89° would run nearly parallel to the roadway—which never happens.

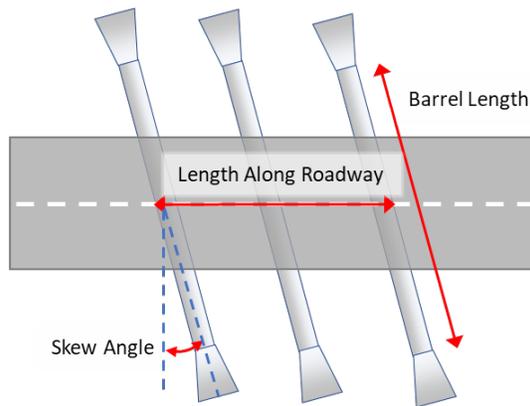


Figure 13: Skew Angle definition

	AY	AZ	BA	BB
1	Data: (Rows 3 to the end contain data reported to the Small Structure Inventory as of April 2022)			
	Item 26 Barrel Length (in feet)	Item 27 Length Along Roadway (in feet)	Item 28 Skew Angle	Item 29 Cover Height (in feet)
2				
3	60	4	89	2
4	45	15	65	2
5	45	15	65	2
6	45	15	65	2
7	36	15	89	2
8	40	15	89	2
9	36	15	89	2
10	40	15	89	2
11	36	15	89	2
12	40	15	89	2
13	90	4	89	5
14	90	6	80	5
15	90	6	89	5
16	72	20	89	2
17	70	5	60	2
18	72	20	60	2
19	72	20	89	2
20	65	20	89	2

Figure 14: Improperly reported Skew Angle

To flag possibly incorrectly reported values, cells in Column BA highlight values greater than 45° yellow and values greater than 60° red.

**Action Required:**

- Verify that the values reported for Skew Angle (*Item 28, Column BA*) are correct. If the Skew Angle was originally measured incorrectly—between the culvert and the road centerline—as appears to be the case in Figure 14, the correct value can be calculated by subtracting the incorrect value from 90°. The 89° values in Figure 14 would then be changed to 1° (or 0°), and the 60° values to 30°.

**3.8 Load Limits**

Columns BZ – CC list information reported regarding Load Posting for the culvert. Two types of errors are highlighted in yellow.

- Column BZ of Row 3 in Figure 15 indicates the culvert is posted for load, but no weight limit(s) are reported in Columns CA – CC. If the culvert is posted, a weight limit is needed in at least one of the Columns CA – CC.

	BZ	CA	CB	CC	CD
1	Small Structure Inventory Data: (Rows 3 to the end contain data reported to the Small Structure Inventory as of April 2022)				
	Item 68 Traffic Status	Item 69 Axle Weight Load Posting (tons)	Item 70 Load Posting for Single Unit Vehicles (tons)	Item 71 Load Posting for Combination Vehicles (tons)	Item 72 Load Rating Evaluation Recommended
2					
3	Posted for load				Load rating evaluation not recommended
4	Posted for load	2			Load rating evaluation not recommended
5	Posted for load			40	Load rating evaluation not recommended
6	Open without load restrictions				
7	Open without load restrictions				
8	Open without load restrictions				Load rating evaluation not recommended
9	Open without load restrictions				Load rating evaluation not recommended

Figure 15: Culvert load posting data discrepancies

- Column CA of Row 4 indicates a 2-ton axle weight limit. Although possible, this value is quite unlikely. Any value less than 5 tons in Columns CA – CC highlights **yellow**.

A few agencies made a third error, which was to list the spring load restriction in effect on the road instead of the Load Posting specific to the culvert. Only Load Postings specific to the culvert should be reported here.

Incidentally, Rows 6 and 7 in Figure 15 highlight missing data for Load Rating Evaluation Recommended (*Item 72, Column CD*).

**Action Required:**

- Verify that culverts posted for load restrictions are identified properly.
- Verify that the load restrictions apply to the culvert, not the roadway in general.
- If a culvert is “Posted for load”, ensure that proper values are reported for Axle Weight Load Posting (*Item 69, Column CA*), Load Posting for Single Unit Vehicles (*Item 70, Column CB*), and Load Posting for Combination Vehicles (*Item 71, Column CC*).

## 4 Small Bridge Data Checks

The Small\_Bridges tab of the Small Structure Spreadsheet consists of two main areas (Figure 16).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1		Structure Maps to Other System						Eligible	Small Structure Inventory Data: (Rows 3 to the end contain data reported to the Small Structure Inventory as of April 8, 2022, sorted in order of Small Structure Number)							
2	Reported System	Township	Secondary	County	Eligible System	Reported Maintenance Level	NBIS Bridge Length (ft)	Bridge RAIF Eligible	OBJECT ID	Item 1 County Name	Item 2 Town or Township Name	Item 3 Road System	Item 4 Small Structure Local Identifier	Item 6 Inventoried By	Item 7 Inventory Date	Itc La
3	County Secondary	Township			UNKNOWN	Full	5	No	38719	MCPHERSON	Odessa Township	County Secondary	47-1400-1125	Michael and Dean	12/14/2021	45.7
4	County Secondary				Yes	Full	15	Yes	11752	MCPHERSON	Willow Township	County Secondary	47-4778-1613	Michael and Dean	10/14/2021	45.7

Figure 16: Small\_Bridges tab (partial image)

- Columns I – AW list all of the bridge-related items reported in the Small Structure Inventory. Each row represents one small bridge reported in the Small Structure Inventory. Cells that possibly need attention are highlighted by cell color.
- Columns A – H perform checks on items reported in the Small Structure Inventory. These columns are calculated by formulas and must not be changed manually.

### 4.1 Road System

Column A **Reported System** reflects the Road System (*Item 3, Column L*) reported in the Small Structure Inventory (Figure 17).

Columns B – D check the whether the Road System (*Item 3, Column L*) whether the small bridge maps to a Road System other than reported in the inventory, based on the reported Latitude (*Item 8, Column P*) and Longitude (*Item 9, Column Q* and SDDOT’s local road inventory). The process is similar to that described for culverts in Section 3.1.

	A	B	C	D	E	F	G	H
1		Structure Maps to Other System						Eligible
2	Reported System	Township	Secondary	County	Eligible System	Reported Maintenance Level	NBIS Bridge Length (ft)	Bridge RAIF Eligible
3	County Secondary	Township			UNKNOWN	Minimum	5	No
4	County Secondary				Yes	Full	15	Yes
5	Estimated # of Eligible Structures							1

Figure 17: Columns A - H of Small\_Bridges tab

Column E **Eligible System** indicates whether the Road System is eligible for RAIF funding. Township and County Secondary roads are eligible and are listed as Yes. Roads on the County Primary system are not eligible and are

listed as No and shaded pink. Structures that map to a different system (such as Rows 4 – 7), or structures that have no reported Road System, are listed as UNKNOWN, pending verification of the correct Road System.

**Action Required:**

- Verify that Road System is reported for every structure.
- Determine the correct Road System for any structure that maps to a system different from the Reported System.
- If you determine the Road System was incorrectly reported to the Small Structures Inventory, correct the entry.
- If you believe the Road System is correctly reported and SDDOT’s local road inventory may be wrong, please contact Greg Pollreisz at 605.773.6645 or [greg.pollreisz@state.sd.us](mailto:greg.pollreisz@state.sd.us) to resolve the question.

#### 4.2 Maintenance Level

Column F **Highway Maintenance Level** reflects the Road Maintenance Level (*Item 12, Column T*) reported in the Small Structure Inventory. Only structures on Full Maintenance roads, such as that in Rows 4 in Figure 17, are eligible for RAIF funding. Structures on No Maintenance or Minimum Maintenance roads, such as Rows 3, are not eligible and are shaded pink.

**Action Required:**

- Verify that the reported Highway Maintenance Level is correct. Edit the item in the Small Structure Inventory if necessary.

#### 4.3 NBIS Bridge Length

Column G **NBIS Bridge Length** reflects the data reported for NBIS Length (*Item 53, Column AA*). Structures with NBIS Length > 20 ft are not eligible for RAIF funding and are shaded pink.

**Action Required:**

- Verify that the reported NBIS Length (*Item 53, Column AA*) is correct. Edit the item in the Small Structure Inventory if necessary.

#### 4.4 RAIF Eligibility

Column H **Bridge RAIF Eligible** is Yes if:

- the structure lies on the Township or County Secondary system, and
- is on a Full Maintenance road, and
- is not more than 20 feet long

This assessment is based on currently reported information and can change if the information in the Small Structure Inventory is updated.

The total number of eligible small bridges, based on data currently reported in the Small Structure Inventory, is shown at the bottom of column H.

**Action Required:**

- Verify that the data reported for Road System, Highway Maintenance Level, and NBIS Bridge Length is correct. Edit entries in the Small Structure Inventory if necessary.

#### 4.5 Missing Small Bridge Inventory Data

Missing data for small bridges is flagged in the same manner as missing data for culverts (Section 3.6).

##### Action Required:

- Review Columns I – AW for missing data values. Strive to report all items related to small bridge jurisdiction, location, type, dimensions, and condition for all structures eligible for RAIF funding.

#### 4.6 Skew Angle

A few agencies appear to have reported Skew Angle (Item 58, Column AF) incorrectly, as shown by values shaded in red in Figure 19. As shown in Figure 18, Skew Angle is to be measured between the bridge end and a line running perpendicular to the direction of the road. The Skew Angle of an unskewed bridge is 0°. The Skew Angle of the bridge in Figure 18 is approximately 10°. A bridge with a Skew Angle of 89° never happens.

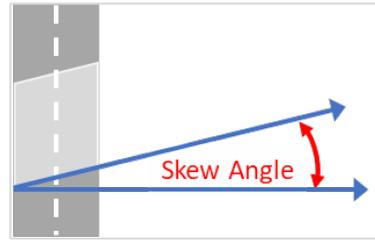


Figure 18: Small Bridge Skew Angle Definition

	AE	AF	AG
1	contain data reported to the Small Struc		
	Item 57 Roadway Width (in feet)	Item 58 Skew Angle	Item 59 Deck Condition
2	25	89	Good
4	18	89	Good

Figure 19: Improperly reported Skew Angle

To flag possibly incorrectly reported values, cells in Column AF highlight values greater than 45° yellow and values greater than 60° red.

#### 4.7 Load Limits

Columns AP-AS list information reported regarding Load Posting for the bridge. Two types of errors are highlighted in yellow.

- Column AP of Row 3 in Figure 20 indicates the bridge is posted for load, but no weight limit(s) are reported in Columns AQ-AS. If the bridge is posted, a weight limit is needed in at least one of the Columns AQ-AS.
- Column AR of Row 4 indicates a 4-ton axle weight limit. Although possible, this value is unlikely. Any value less than 5 tons in Columns AQ - AS highlights yellow.

	AP	AQ	AR	AS
1	Small Structure Inventory Data: (Rows 3 to the end contain			
	Item 68 Traffic Status	Item 69 Axle Weight Load Posting	Item 70 Load Posting for Single Unit Vehicles	Item 71 Load Posting for Combination Vehicles
3	Posted for Load			
4	Posted for Load		4	

Figure 20: Small Bridge load posting data discrepancies

A few agencies made a third error, which was to list the spring load restriction in effect on the road instead of the Load Posting specific to the bridge. Only Load Postings specific to the bridge should be reported here.

##### Action Required:

- Verify that bridges posted for load restrictions are identified properly.
- Verify that the load restrictions apply to the bridge, not the roadway in general.
- If a bridge is “Posted for load”, ensure that proper values are reported for Axle Weight Load Posting (Item 69, Column AQ), Load Posting for Single Unit Vehicles (Item 70, Column AR), and Load Posting for Combination Vehicles (Item 71, Column AS).