



Le Sueur County, MN

Tuesday, October 23, 2018

Board Meeting

Item 7

9:30 a.m. Darrell Pettis, County Administrator

RE: Le Sueur-Rice Joint Ditch 63

RE: HR Item

RE: Miscellaneous

Staff Contact:

MEMORANDUM

DATE: July 26th, 2018
TO: Darrell Pettis
FROM: Chuck Brandel
SUBJECT: SP 4010-10, TH99, County Ditch Culvert Work

Darrell,

ISG has looked at the elevations and drainage capacities that the Minnesota Department of Transportation (MnDOT) is proposing for the two culvert crossings on Township Highway 99 (TH99). The first crossing is located on Le Sueur County Ditch No. 40 (CD 40) and the second is located on Le Sueur County Ditch No. 63 (CD 63).

Existing Conditions

The capacity of agricultural culvert crossings is expressed as a drainage coefficient in inches per day (in/day), and is defined as the depth of water over the entire area of the upstream watershed that a culvert crossing can drain in a 24-hour period. The NRCS recommends a drainage coefficient of 1.00 in/day for open ditch culvert crossings. The existing culverts on CD 40 and CD 63 currently exceed this parameter as shown in Table 1 below.

Table 1: Existing Culvert Crossing Drainage Capacities

Crossing #	Location	Existing Type	Existing Material	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
CD 40	TH 99	ROUND CULVERT	CMP	84	1.28%	3116	2.88
CD 63	TH 99	ROUND CULVERT	RCP	48	0.73%	1276	2.30

Crossing #1 (CD 40) has a current drainage coefficient of 2.88 in/day which is based on a slope of 1.28%. While the drainage coefficient is adequate the culvert is in poor condition, see Figure 1 below. The existing pipe has invert elevations of 1036.06 and 1035.20 Mean Sea Level (MSL) resulting in a 1.26% grade. The original profiles from the construction of the ditch in 1914 show a 0.02% grade. Utilizing survey information of the culverts taken by ISG upstream and downstream of the TH 99 crossing, and comparing these to original profiles, it has been determined that the CD 40 culvert was originally at an elevation of approximately 1038.95 MSL upstream and 1038.935 MSL downstream. Based on the roadway construction that will occur removing and replacing this culvert should be completed.



Figure 1: Upstream of CD 40 Culvert (Left) & Downstream of CD 40 Culvert (Right)

Crossing #2 (CD 63) has two 48" RCP culverts, one main culvert and one overflow culvert. The drainage coefficient for the main culvert is 1.70 in/day. The main culvert is in poor condition, see Figure 2 below. The current elevations of the existing main culvert are 1058.79 and 1058.21 MSL resulting in a 0.73% grade. The overflow culvert is set approximately 4 ft higher at a 0.18% grade with elevations of 1063.00 and 1062.04 MSL. The overflow culvert is in fair condition, but overgrown with vegetation, as can be seen in Figure 3. The original profiles show the culvert elevation to be approximately 1058.16 MSL downstream and 1058.24 MSL upstream with a slope of 0.10%.



Figure 2: Upstream of CD 63 Culvert (Left) & Downstream of CD 63 Culvert (Right)



Figure 3: Upstream of CD 63 Overflow Culvert (Left) & Downstream of CD 63 Overflow Culvert (Right)

On request of a downstream landowner, Mr. Jim Fisher, two culverts downstream of CD 63 located in Section 36 of Montgomery Township were observed. The landowner has stated that his land has experienced flooding has overtopped his driveway several times in the last 10 years, therefore the culverts were checked for sufficient capacity and existing conditions. Table 2 shows the existing culvert capacities. Figure 4 shows the ditch condition just upstream, and just downstream of the driveway crossing.

Table 2: Downstream Culverts on CD 63

Crossing Type	Location	Existing Type	Existing Material	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
Driveway	Section 36	ROUND CULVERT	CMP	60	0.46%	2000	1.10
Road	141st Ave	ROUND CULVERT	CMP	72	1.30%	2073	2.89



Figure 4: Upstream of Driveway Crossing (Left) & Downstream of Driveway Crossing (Right)

Proposed Conditions

MnDOT is proposing to replace and upsize both of the culverts located on TH 99 along CD 40 and CD 63. The proposed culvert capacities are well over the NRCS recommended drainage coefficient for open ditch crossings, as shown in Table 3 below.

Table 3: MnDOT Proposed Culvert Crossing and Legal Grade Drainage Capacities

Crossing #	Location	Proposed Type	Proposed Material	Proposed Size (in)	Legal Grade (%)	Proposed Slope (%)	Drainage Area (Acres)	Legal Drainage Coefficient (in/day)	Proposed Drainage Coefficient (in/day)
CD 40	TH 99	ROUND CULVERT	RCP	90	0.02%	1.01%	3116	0.83	5.91
CD 63	TH 99	ROUND CULVERT	RCP	60	0.10%	0.96%	1276	1.54	4.77

Crossing #1 (CD 40) is to be upsized to prevent the 50 year storm event from overtopping the road. Crossing #1 is proposed to be set at an inlet invert elevation of 1035.92 MSL and an outlet invert elevation of 1034.83 MSL resulting in a slope of 1.01%. This is similar to the existing 1.26% slope of the 84" culvert in place. The elevations of the proposed pipe are set slightly lower than existing elevations at about .15-feet and .4-feet. The original plans for this crossing showed a legal ditch grade set about 3-feet higher than the proposed and existing elevations of the culvert. The original crossing was set at about 1038.9 MSL with a slope of 0.02%.

Crossing #2 (CD 63) will be upsized to reduce the number of pipes that need to be maintained. In the 45% plans submitted by MnDOT the profile view for crossing #2 shows a 48" pipe as the proposed, but this will be a 60" pipe as reported in the excel review documents sent to ISG and will need to be updated in more complete plans. Crossing #2 (CD 63) is proposed to be set at an inlet invert elevation of 1059.0 MSL and an outlet invert of 1057.86 MSL resulting in a slope of 0.96%. This is slightly higher than the existing 0.73% grade, and much higher than the original plans grade of 0.10%. However, the elevation is set nearly at original elevation of the originally constructed open ditch.

ISG proposes 3 options for the culvert crossing Jim Fishers driveway to address the flooding caused by rain events. These options are shown below in Table 4. Option 1 is to replace the existing 60" CMP with a 60" RCP to increase the capacity to be closer to the capacity of the upstream CD 63 TH 99 culvert and the downstream 141st Ave culvert. Option 2 is to replace the existing 60" CMP with a 72" CMP. Option 3 is to match the proposed CD 63 Th 99 crossing to the existing capacity of the driveway crossing. This would reduce the occurrence of flooding on Jim Fishers land due to a lower drainage capacity.

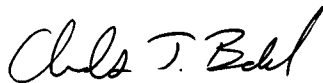
Option	Crossing	Proposed Type	Proposed Material	Proposed Size (in)	Proposed Slope (%)	Drainage Area (Acres)	Proposed Drainage Coefficient (in/day)
1	Driveway	ROUND CULVERT	RCP	60	0.46%	2000	2.11
2	Driveway	ROUND CULVERT	CMP	72	0.46%	2000	1.78
3	TH 99	ROUND CULVERT	RCP	60	0.05%	1276	1.09

Recommendation

ISG has reviewed MnDOT's plans for each of the culvert crossing under TH 99. MnDOT is proposing to replace two culvert crossings on County Ditch No. 40 as well as County Ditch No. 63. Both of the proposed culvert crossings have sufficient capacity. ISG recommends that the culvert crossing on County Ditch No. 40 have an upstream elevation of 1035.92 MSL and downstream elevation of 1034.83 MSL, resulting in MnDOT's proposed elevation and slope of 1.01%. This will allow the CD 40 culvert to increase capacity without drastically changing the elevation of the existing culvert, but it should be noted that the CD 40 culvert is well below legal grade elevation and set at a higher slope.

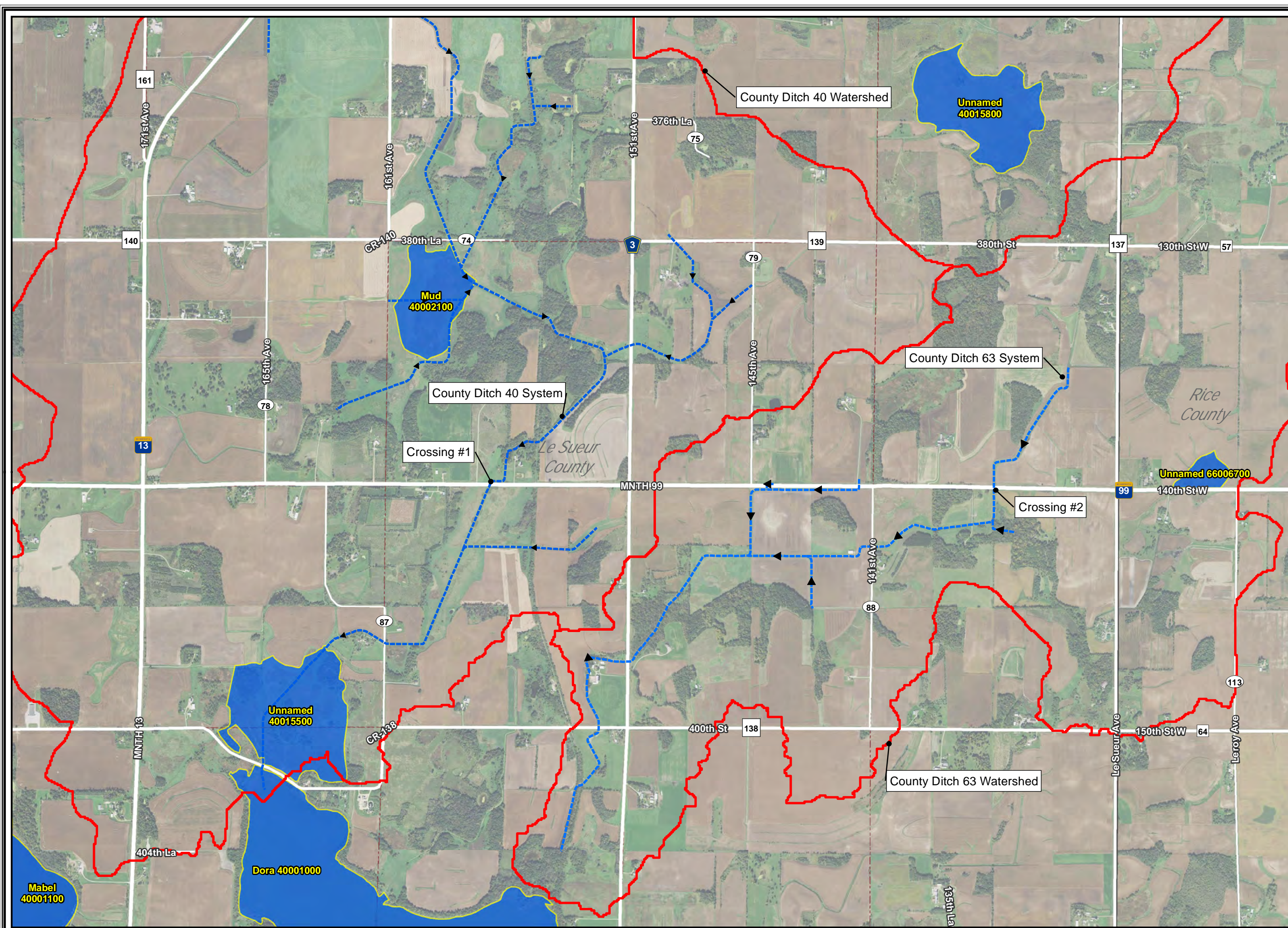
Based on the elevations of the CD 63 TH 99 crossing and the crossing at 141st Ave, the crossing on Jim Fishers land is at the correct slope, with sufficient drainage capacity at 1.10in/day. However due to the TH 99 culvert capacity being larger at 2.88in/day, Mr. Fisher contends that his land floods and his crossing has less capacity than the TH 99 crossing upstream and the crossing at 141st Avenue downstream. The TH 99 culvert shall be placed at a slope of 0.05% with a 60" culvert or the culvert on Mr. Fisher's land should be replaced with the project. The current proposed capacity of 4.77in/day will increase the potential of flooding downstream. ISG recommends that the culvert crossing on County Ditch No. 63 have an upstream elevation of 1057.52 MSL and downstream elevation of 1057.47 MSL at 0.05%. This will set the CD 63 culvert inlet at legal grade elevation while maintaining the proposed capacity of the crossing.

Sincerely,



Charles J. Brandel, PE


Vice President



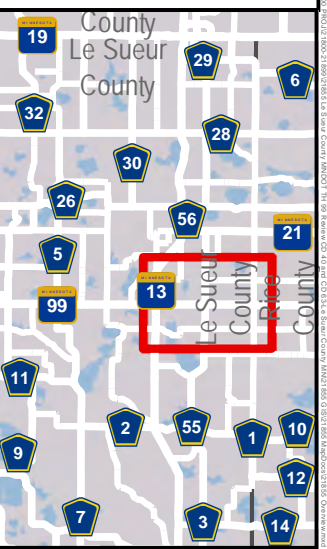
**TH 99
Culvert
Crossings
CD 40 and CD 63**
Le Sueur County,
Minnesota
Thursday, July 12, 2018

- Legend**
- CD 63
 - CD 40
 - CD 63 Watershed
 - CD 40 Watershed

PN: 16-21855
Source:
Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Le Sueur County, 12/16/2016)
Parcels (Le Sueur County, 12/16/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 450 900 1,800
Feet
1 inch = 1,901 feet





TH 99
Crossing #1
CD 40
Le Sueur County,
Minnesota
Thursday, July 12, 2018

Legend

- CD 63
- CD 40
- Parcels

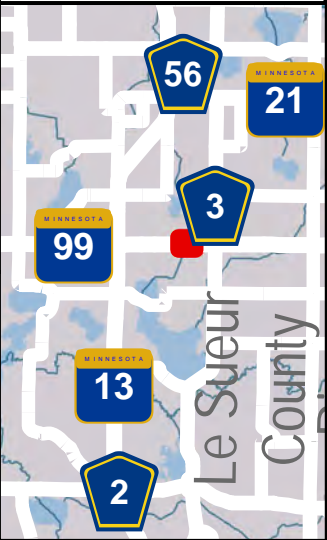
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Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 25 50 100 Feet
1 inch = 125 feet





TH 99
Crossing #2
CD 63
Le Sueur County,
Minnesota
Thursday, July 26, 2018

Legend

- CD 63
- CD 40
- Parcels

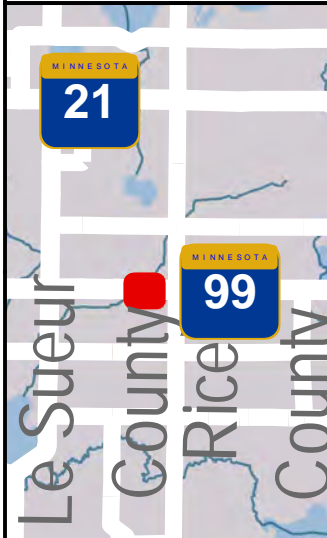
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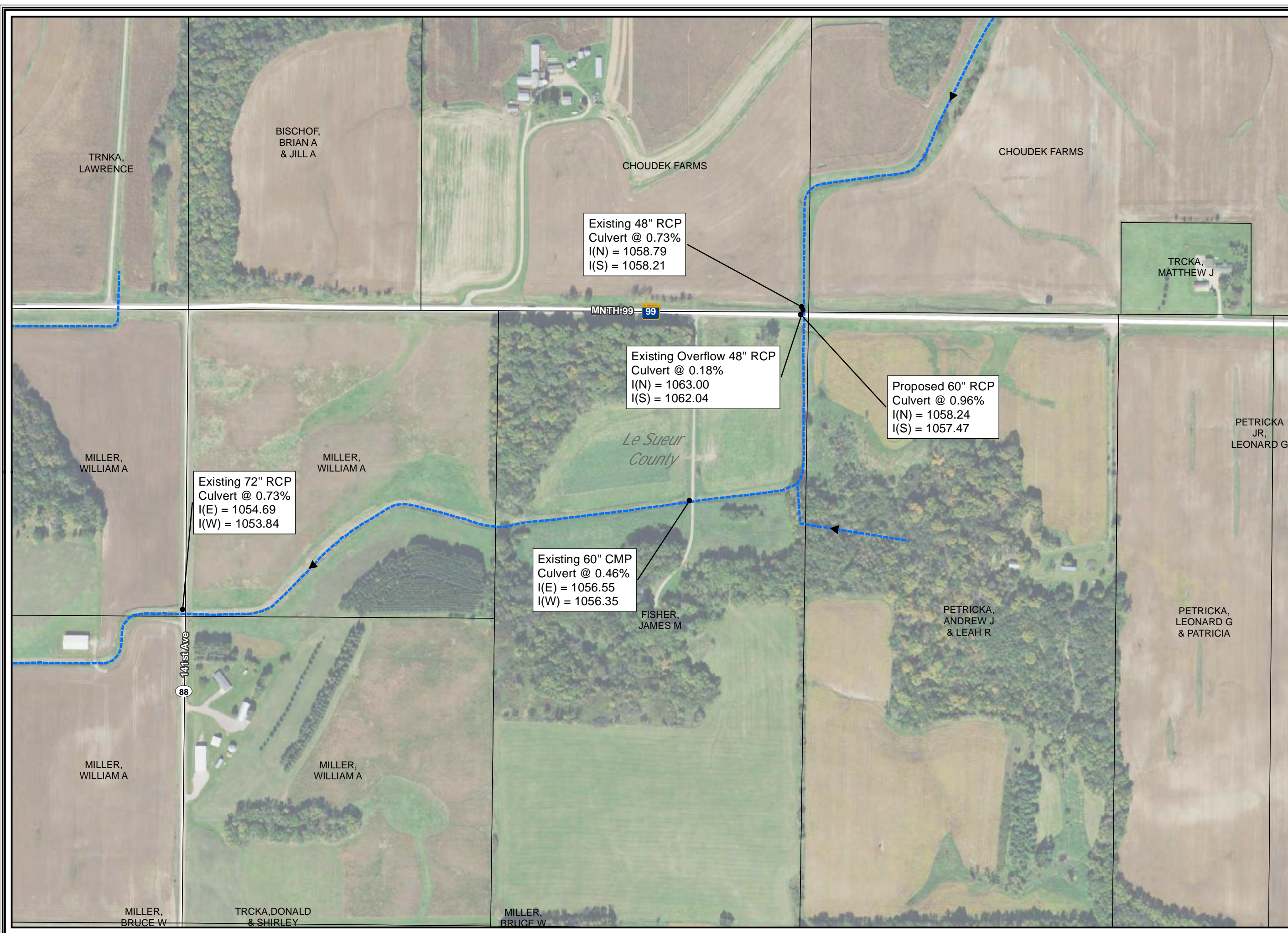
Source:

Orthophotograph (MnGeo WMS, 2015)
Tile/Ditch (Le Sueur County, 12/16/2016)
Parcels (Le Sueur County, 12/16/2016)
Lakes (MN DNR, July, 2008)
Major Stream (MN DNR, July 2008)
Counties (MN DNR, July 2013)
PLSS (MnGeo/USGS)



0 25 50 100 Feet
1 inch = 125 feet



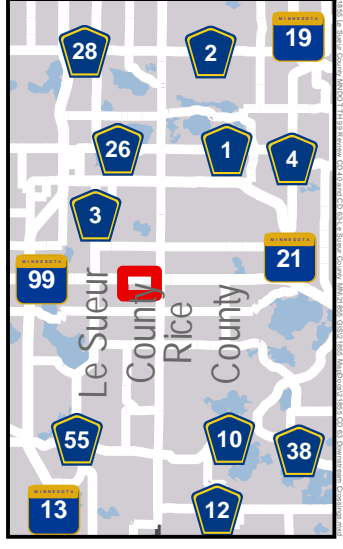


**Driveway Crossing
CD 63**
Le Sueur County,
Minnesota
Thursday, July 26, 2018

Legend
 CD 63
 Parcels

PN: 16-21855
 Source:
 Orthophotograph (MnGeo WMS, 2015)
 Tile/Ditch (Le Sueur County, 12/16/2016)
 Parcels (Le Sueur County, 12/16/2016)
 Lakes (MN DNR, July, 2008)
 Major Stream (MN DNR, July 2008)
 Counties (MN DNR, July 2013)
 PLSS (MnGeo/USGS)

0 87.5 175 350 Feet
 1 inch = 374 feet





Human Resources

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Telephone: 507-357-8517 • Fax: 507-357-8607
Cindy Westerhouse – Human Resources Director

HUMAN RESOURCES AGENDA ITEMS October 23, 2018

Recommendation to hire a part time Correctional Officer/Dispatcher in the Sheriff's Office as a Grade 6, Step 4 at \$20.35 per hour.

Equal Opportunity Employer