DATE: April 27, 2023

TO: Faribault County Drainage Authority

FROM: Mark Origer, PE - ISG

SUBJECT: Faribault 64 Private Driveway Bridge Replacement Hydraulic Analysis

---

PROJECT SUMMARY

ISG has completed a hydraulic analysis of the existing private bridge along the main open ditch of Faribault County Ditch No. 64 (CD 64). The scope included an examination of the existing bridge crossing, as well as recommendations for replacing the crossing. Maps of the watershed, an existing open ditch, and field crossing are shown on the attached exhibits and is referenced herein. The crossing is located in the NE ¼ of the NW ¼ of Section 12 of Seely Township in Faribault County and provides access to a residence and approximately 144 acres that would otherwise be landlocked. The watercourse at the crossing is Faribault County Judicial Ditch No. 64 Mainline and flows East to West through Keister and Seely Townships and eventually outlets into the Faribault CD 72 Open Ditch. The existing structure is a steel span bridge with a paved surface over a wooden deck that is nearing the end of its lifespan. Hydraulic analyses were performed for the existing structure as well as for the proposed options to compare peak flood elevations as well as velocities. Three replacement options were created and include a 10' by 12' reinforced concrete box culvert, a new timber bridge, and a 144-inch corrugated metal culvert. Additionally, the cost to permanently remove the crossing and realign the access driveway was tabulated for review.

EXISTING CONDITIONS

The field crossing/private driveway site information and dimensions were obtained by survey performed by ISG. The existing crossing is a steel span bridge with a paved surface over a timber decking, steel flared guard rails, and concrete flared wing walls on the up and downstream sides of the bridge. The bridge has a deck elevation ranging from 1166.42 to 1167.31 (NAVD 88), a deck width of 16-feet, and a span of 50-feet that provides access to parcels and a residency otherwise landlocked. The existing open ditch at the location of the crossing is approximately 19-feet deep with a legal ditch grade elevation of 1149.77. The current bridge is showing signs of disrepair and nearing the end of its lifespan based on similar bridges of this design. Figures 1 through 5 below show the current conditions of the span bridge.

Figure 1. Private Driveway Crossing as Viewed in the Upstream Direction

Figure 2. Private Driveway Crossing as Viewed in the Downstream Direction

Figure 3. Bridge Supports and Timber Wing/Retaining Wall


Figure 4. Timber Bridge Supports and Cross Members


Figure 5. Concrete Base-Flow Grade Control Structure


Figure 6. Steel Span Beams and Timber Decking, Gaps and Voids in Decking

Figure 7. Paved Decking Beginning to Crack and Separate

Figure 8. Gaps and Voids Arising on Driving Surface

HYDRAULIC MODEL

A hydraulic model was created utilizing HEC-RAS software to analyze the current capacity of the existing and proposed field crossing. This was an expansion of the model created for the upstream private field crossing, 550th Avenue floodplain culvert sizing, and design of the recently constructed two-stage channel.

The watershed contributing to this culvert crossing was delineated using USGS StreamStats and Faribault County Drainage Watersheds and is approximately 2,618 acres. Peak flow rates were generated using StreamStats as a reference and were verified based on past modeling experience in this area and a runoff to rainfall ratio utilized in similar modeling calibrations, flows were also updated based upon monitoring from the DNR. The model utilized the 2, 5, 10, 25, 50, 100, and 500-year rainfall frequencies for the existing and proposed culverts as shown below in Table 1.

TABLE 1. PEAK FLOWRATES AT CROSSING

Storm Frequency	Flow (cfs)
2-Year	80
5-Year	180
10-Year	360
25-Year	440
50-Year	520
100-Year	700
500-Year	1110

Bridge specifications used in the hydraulic analysis were obtained from topographic survey. The top of bridge has an elevation of 1167.0 (NAVD 88) with a deck thickness of approximately 2-feet. The width of the bridge structure is 16-feet with a length of 50-feet. An additional grade control structure exists below the bridge which consists of a concrete slab buried into the bed of the channel with a 24" orifice through the structure allowing baseflow passage downstream.

Table 2 below summarizes the drainage coefficient (as inches of water drained per day) of the field crossing immediately upstream at 550th Avenue, which consists of a large primary arch culvert and a secondary floodplain culvert, as well as the existing bridge. Table 3 summarizes the proposed conditions for all three options.

TABLE 2. EXISTING CROSSING DRAINAGE COEFFICIENTS

Ditch Description	Station	Roadway	Existing Type	Existing Material	Existing Size (in)	Existing Slope (%)	Drainage Area (Acres)	Existing Drainage Coefficient (in/day)
Bridge	8+00	Driveway	BRIDGE	Grass	-	0.32%	2618	17.27
Culvert	35+50	550th Ave	ARCH CULVERT	CMP	79" x 117"	0.31%	2002	3.43
Floodplain Culvert	35+50	550th Ave	ARCH CULVERT	CMP	39" x 55"	0.34%	2002	*0.45*

TABLE 3. PROPOSED CROSSING DRAINAGE COEFFICIENTS

Option	Station	Roadway	Proposed Type	Proposed Material	Proposed Size (in)	Proposed Width (ft)	Proposed Height (ft)	Proposed Slope (%)	Drainage Area (Acres)	Proposed Drainage Coefficient (in/day)
Bridge Replacement	8+00	Driveway	BRIDGE	Grass	-	-	-	0.32%	2618	17.27
Corrugated Metal Culvert	8+00	Driveway	ROUND CULVERT	CMP	144	-	-	0.32%	2618	9.01
Reinforced Concrete Box Culvert	8+00	Driveway	BOX CULVERT	RCP	-	10	12	0.32%	2618	16.40

The relatively steep nature of the open ditch yields large flowrates and subsequently large drainage coefficients as detailed in the previous tables. The Bridge Replacement Option would yield the same drainage coefficient as the existing condition, where the CMP and RCP Options would yield smaller drainage coefficients, being 9.01 and 16.40, respectively. Culvert sizing was iterative and for each option sought to have water surface profiles on the recently constructed proposed two-stage benches between the 2 and 5-year events. The other constraint was to keep the private drive from overtopping during the 500-year event. All 3 options achieve this, however the hydraulics vary in each option. The culvert replacement options display significantly lower velocities than the bridge replacement option as well as the existing during low flow events due to the increase in cross-sectional area near the base of the channel, but increased velocities during larger, more infrequent events, where the bridge offers significantly higher cross-sectional area. Tables 4 and 5 below depict the velocities as well as the headwater elevations, respectively, for both the existing conditions and proposed options directly upstream of the crossing. Additionally, water surface profiles comparing all proposed options to the current conditions are included in the attachments. These show the entire profile of the ditch at this location instead of comparing just one point upstream of the crossing.

TABLE 4. HEADWATER VELOCITIES

Option	Velocity (ft/s)											
	2-Year Event			5-Year Event			10-Year Event			25-Year Event		
	Existing	Proposed	% Change	Existing	Proposed	% Change	Existing	Proposed	% Change	Existing	Proposed	% Change
Bridge Replacement	6.7	6.7	0%	6.16	6.16	0%	6.72	6.72	0%	6.88	6.88	0%
Corrugated Metal Culvert		3.2	52%		4.38	29%		5.82	13%		6.29	9%
RC Box Culvert		3.01	55%		4.49	27%		6.33	6%		6.92	1%
Option	50-Year Event			100-Year Event			500-Year Event					
	Existing	Proposed	% Change	Existing	Proposed	% Change	Existing	Proposed	% Change			
Bridge Replacement	7.05	7.05	0%	7.43	7.43	0%	8.26	8.26	0%			
Corrugated Metal Culvert		6.64	6%		8.13	9%		8.85	7%			
RC Box Culvert		7.39	5%		9.31	25%		9.05	10%			

A general reduction in velocity would be seen at the upstream end of the proposed culvert replacements for the more common storm events, with slight increases during larger, more infrequent events.

TABLE 5. CROSSING HEADWATER ELEVATIONS

Event	Headwater Elevation			
	Existing	Bridge Replacement	Corrugated Metal Culvert	RC Box Culvert
2-Year	1152.57	1152.57	1151.74	1151.48
5-Year	1154.10	1154.10	1153.13	1152.78
10-Year	1155.72	1155.72	1154.87	1154.35
25-Year	1156.23	1156.23	1155.54	1154.97
50-Year	1156.67	1156.67	1156.23	1155.58
100-Year	1157.52	1157.52	1156.88	1156.02
500-Year	1159.01	1159.01	1160.15	1160.34
Overtopping Elevation = 1167 ft ASL				

A general decrease in water surface elevation upstream of the culvert/bridge location was seen, especially for the smaller storm events. This is due to an increase in cross sectional flow area from the existing bridge condition at lower elevations, combined with the proposed two stage ditch extension which increases cross-sectional area for the upstream channel in the proposed condition. Regardless, the high-water elevations remain below the overtopping point even for the 500-year event. The 500-year event does increase upstream channel water levels enough to flood out of the ditch banks for all modeled scenarios, including the existing bridge. Under this rainfall event, flow also floods out of the ditch banks upstream of the 550th Ave crossing.

It should be noted that for these model scenarios, two different cross-sectional geometries were used. For both the existing condition and the Proposed Bridge Replacement, only the existing/recently constructed two-stage ditch alongside the downstream constructed sideslope flattening were modeled. For the Reinforced Concrete Box Culvert and the Corrugated Metal Pipe, the existing/constructed two-stage ditch alongside a proposed extension of the two-stage ditch was modeled. Similarly, the culvert replacement models incorporated an extension of the downstream constructed sideslope flattening up to the proposed crossing as well. This extension of the two-stage ditch and sideslope flattening was included to achieve a larger cross-sectional area to reduce flood-levels for the reduced crossing sizes, as well as to permit the proposed culverts to fit within the extents of the ditch. At a minimum, some sideslope flattening would be required between the proposed crossing and the constructed two-stage ditch should a culvert replacement option be selected, as it will be necessary to fit the culvert within the extents of the ditch. The extension of the two-stage ditch would result in 0.24 acres of permanent damages, whereas 3:1 sideslope flattening would result in increased acquisition, roughly 0.40 acres.

COST ESTIMATE

Preliminary cost estimates were generated based on past bid pricing for culvert and bridge replacements. The cost estimates were based on a 25-foot-wide crossing width and 2:1 bank side slopes. For all options it would be recommended to place Class III riprap on both ends of the proposed crossing to protect the embankments from erosion. Cost for removal of the existing structure as well as the existing concrete grade control structure within the bed of the channel was also considered. Additional Class III riprap was included within the cost estimate to create a head wall at the upstream end of the culvert to prevent head cutting from the open ditch, as stated earlier. For both culvert replacement options, several suppliers were contacted to provide a range of anticipated cost. Tables 6-11 below outline the cost for each option.

TABLE 6. COST ESTIMATE – BRIDGE REPLACEMENT

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 18,400.00	$ 18,400
102	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	150	$ 3.50	$ 525
103	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	50	$ 85.00	$ 4,250
104	INSTALL SEDIMENT CONTROL LOG	LF	100	$ 14.00	$ 1,400
105	REMOVE CONCRETE CHANNEL STRUCTURE	EA	1	$ 2,025.00	$ 2,025
106	REMOVE EXISTING BRIDGE	EA	1	$ 6,000.00	$ 6,000
107	CONSTRUCT TIMBER PANEL-LAM BRIDGE	EA	1	$ 267,000.00	$ 267,000
108	CONSTRUCT TIMBER ABUTMENTS & DRIVE PILES	EA	1	$ 84,000.00	$ 84,000
				SUBTOTAL CONSTRUCTION COST	**$ 383,600**
				10% UNFORSEEN	$ 38,360
				TOTAL CONSTRUCTION COST	**$ 421,960**
	TEMPORARY DAMAGES	AC	0.20	$ 650.00	$ 130
				TOTAL TIMBER PANEL-LAM BRIDGE IMPROVEMENT COST	**$ 422,090**

TABLE 7. COST ESTIMATE – CORRUGATED METAL CULVERT (CONTECH)

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 5,950.00	$ 5,950
102	144-INCH CORRUGATED METAL CULVERT CONTECH	LF	85	$ 760.00	$ 64,600
103	GRANULAR BEDDING MATERIAL	CY	50	$ 38.09	$ 1,905
104	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	500	$ 3.50	$ 1,750
105	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	100	$ 85.00	$ 8,500
106	INSTALL SEDIMENT CONTROL LOG	LF	100	$ 14.00	$ 1,400
107	AGGREGATE BASE (CV) (P), CLASS V (ACCESS ROAD)	CY	20	$ 50.84	$ 1,017
108	REMOVE CONCRETE CHANNEL STRUCTURE	EA	1	$ 2,025.00	$ 2,025
109	REMOVE EXISTING BRIDGE	EA	1	$ 6,000.00	$ 6,000
110	CLAY BORROW (P) (CV)	CY	150	$ 12.00	$ 1,800
111	CONCRETE SLOPED HEADWALL (CAST IN PLACE)	CY	150	$ 140.00	$ 21,000
112	INSTALL CULVERT DROP WALL (CAST IN PLACE)	EA	2	$ 4,000.00	$ 8,000
				SUBTOTAL CONSTRUCTION COST	**$ 123,946**
				20% UNFORSEEN	$ 24,789
				TOTAL CONSTRUCTION COST	**$ 148,736**
	TEMPORARY DAMAGES	AC	0.20	$ 650.00	$ 130
				TOTAL 144" CMP OPTION CONTECH IMPROVEMENT COST	**$ 148,866**

TABLE 8. COST ESTIMATE - CORRUGATED METAL CULVERT (TRUENORTH)

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 6,330.00	$ 6,330
102	144-INCH CORRUGATED METAL CULVERT TRUENORTH	LF	85	$ 850.00	$ 72,250
103	GRANULAR BEDDING MATERIAL	CY	50	$ 38.09	$ 1,905
104	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	500	$ 3.50	$ 1,750
105	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	100	$ 85.00	$ 8,500
106	INSTALL SEDIMENT CONTROL LOG	LF	100	$ 14.00	$ 1,400
107	AGGREGATE BASE (CV) (P), CLASS V (ACCESS ROAD)	CY	20	$ 50.84	$ 1,017
108	REMOVE CONCRETE CHANNEL STRUCTURE	EA	1	$ 2,025.00	$ 2,025
109	REMOVE EXISTING BRIDGE	EA	1	$ 6,000.00	$ 6,000
110	CLAY BORROW (P) (CV)	CY	150	$ 12.00	$ 1,800
111	CONCRETE SLOPED HEADWALL (CAST IN PLACE)	CY	150	$ 140.00	$ 21,000
112	INSTALL CULVERT DROP WALL (CAST IN PLACE)	EA	2	$ 4,000.00	$ 8,000
				SUBTOTAL CONSTRUCTION COST	**$ 131,976**
				20% UNFORSEEN	$ 26,395
				TOTAL CONSTRUCTION COST	**$ 158,372**
	TEMPORARY DAMAGES	AC	0.20	$ 650.00	$ 130
				TOTAL 144" CMP OPTION TRUENORTH IMPROVEMENT COST	**$ 158,502**

TABLE 9. COST ESTIMATE – REINFORCED CONCRETE BOX CULVERT (OLDCASTLE)

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 27,900.00	$ 27,900
102	10-FOOT x 12-FOOT RC BOX CULVERT OLDCASTLE	LF	45	$ 3,000.00	$ 135,000
103	10-FOOT x 12-FOOT RC BOX END TYPE 1 APRON	EA	2	$ 40,000.00	$ 80,000
104	INSTALL CULVERT DROP WALL	EA	2	$ 4,000.00	$ 8,000
105	GRANULAR BEDDING MATERIAL	CY	50	$ 38.09	$ 1,905
106	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	500	$ 3.50	$ 1,750
107	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	200	$ 85.00	$ 17,000
108	INSTALL SEDIMENT CONTROL LOG	LF	100	$ 14.00	$ 1,400
109	AGGREGATE BASE (CV) (P), CLASS V (ACCESS ROAD)	CY	20	$ 50.84	$ 1,017
110	REMOVE CONCRETE CHANNEL STRUCTURE	EA	1	$ 2,025.00	$ 2,025
111	REMOVE EXISTING BRIDGE	EA	1	$ 6,000.00	$ 6,000
112	CLAY BORROW (P) (CV)	CY	150	$ 12.00	$ 1,800
				SUBTOTAL CONSTRUCTION COST	**$ 283,796**
				10% UNFORSEEN	$ 28,380
				TOTAL CONSTRUCTION COST	**$ 312,176**
	TEMPORARY DAMAGES	AC	0.20	$ 650.00	$ 130
				TOTAL 10' X 12' BOX OPTION OLDCASTLE COST	**$ 312,306**

TABLE 10. COST ESTIMATE – REINFORCED CONCRETE BOX CULVERT (CEMCAST)

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 11,310.00	$ 11,310
102	10-FOOT x 12-FOOT RC BOX END TYPE 1 APRON	EA	2	$ 40,000.00	$ 80,000
103	INSTALL CULVERT DROP WALL	EA	2	$ 4,000.00	$ 8,000
104	GRANULAR BEDDING MATERIAL	CY	50	$ 38.09	$ 1,905
105	SEED MIX 25-142 W/MNDOT EROSION CONTROL BLANKET CATEGORY 3	SY	500	$ 3.50	$ 1,750
106	CLASS III RIPRAP WITH GEOTEXTILE FABRIC	CY	200	$ 85.00	$ 17,000
107	INSTALL SEDIMENT CONTROL LOG	LF	100	$ 14.00	$ 1,400
108	AGGREGATE BASE (CV) (P), CLASS V (ACCESS ROAD)	CY	20	$ 50.84	$ 1,017
109	REMOVE CONCRETE CHANNEL STRUCTURE	EA	1	$ 2,025.00	$ 2,025
110	REMOVE EXISTING BRIDGE	EA	1	$ 6,000.00	$ 6,000
111	CLAY BORROW (P) (CV)	CY	150	$ 12.00	$ 1,800
112	10-FOOT x 12-FOOT RC BOX CULVERT CEMCAST	LF	45	$ 2,300.00	$ 103,500
				SUBTOTAL CONSTRUCTION COST	**$ 235,706**
				10% UNFORSEEN	$ 23,571
				TOTAL CONSTRUCTION COST	**$ 259,277**
	TEMPORARY DAMAGES	AC	0.20	$ 650.00	$ 130
				TOTAL 10' X 12' BOX OPTION CEMCAST IMPROVEMENT COST	**$ 259,407**

TABLE 11. COST ESTIMATE – DRIVEWAY REALIGNMENT

Item No.	Item	Unit	Quantity	Unit Price	Amount
101	MOBILIZATION	LS	1	$ 7,130.00	$ 7,130
102	CONNECT EXISTING TILE (SIZE & MATERIAL MAY VARY)	EA	2	$ 500.00	$ 1,000
103	INSTALL 12-INCH ASI RISER ASSEMBLY W/TRASH GRATE	EA	3	$ 1,292.60	$ 3,878
104	INSTALL 12-INCH ASI OUTLET ASSEMBLY	EA	3	$ 1,210.40	$ 3,631
105	COMPACTED CLAY BORROW (P) (CV)	CY	4400	$ 10.20	$ 44,880
106	TOP SOIL STRIP & REDRESS (P) (EV)	CY	2650	$ 2.50	$ 6,625
107	ROAD EDGE SEEDING (SEED MIX: 25-142 WITH TYPE 3 MULCH)	AC	1	$ 1,388.40	$ 1,388
108	AGGREGATE BASE (CV) (P), CLASS V (ACCESS ROAD)	CY	1000	$ 50.84	$ 50,840
109	REMOVE EXISTING BRIDGE	EA	1	$ 6,000.00	$ 6,000
110	REMOVE AND REINSTALL EXISTING 15" HDPE SIDE INTAKE	EA	1	$ 700.00	$ 700
111	ROAD AND ROW GRADING AND TOPSOIL REMOVAL & DRESSING	CY	3000	$ 7.00	$ 21,000
112	SIDESLOPE REPAIR REDRESS AND SEEDING IN REMOVED BRIDGE AREA	LS	1	$ 1,500.00	$ 1,500
				SUBTOTAL CONSTRUCTION COST	**$ 148,572**
				20% UNFORSEEN	$ 29,714
				TOTAL CONSTRUCTION COST	**$ 178,287**
	TEMPORARY DAMAGES	AC	0.29	$ 650.00	$ 189
	LAND ACQUISTION/ PERMANENT DAMAGES	AC	2.64	$ 8,000.00	$ 21,120
				TOTAL ROAD REALIGNMENT IMPROVEMENT COST	**$ 199,595**

The options presented above would have varying life expectancies, as well as face differing challenges with respect to sourcing and lead time. Table 12 below details anticipated design life for each option along with lead time provided by suppliers.

TABLE 12. OPTION LIFE EXPECTANCY/LEAD TIME COMPARISON

Option	Cost	Lead Time	Life Expectancy
Reinforced Concrete Box Culvert (10' x 12')	$260k-$310k	6 Months+	100 Years
Timber Bridge Replacement	$420k	6 Months+	50-70 Years
Road Realignment	$200k	Contractor Availability	Indefinite, Some maintenance every few years
Corrugated Metal Pipe Culvert (144")	$150k-$160k	2 Weeks	40-50 Years

SUMMARY OF FINDINGS, CONCLUSIONS, + RECOMMENDATIONS

Based on the analysis that was performed, ISG found that any of the options proposed meet the necessary requirements and do not overtop the road on or below a 500-year storm.

Incorporating the proposed two-stage ditch extension to the constructed two-stage provides a more stable channel with lower velocities and peak water levels up to the 500-year storm event. Both culvert replacement options are recommended as they provide a stable, cost effective solution to replacement. The bridge replacement was seen as less desirable as it is estimated to be significantly more expensive than similar replacement options with minimal benefits and a shorter design life than the concrete box culvert. Finally, the road realignment could be considered as it is similar in cost to other options and would not require future replacement.

Please reach out to ISG with any questions regarding this memo.

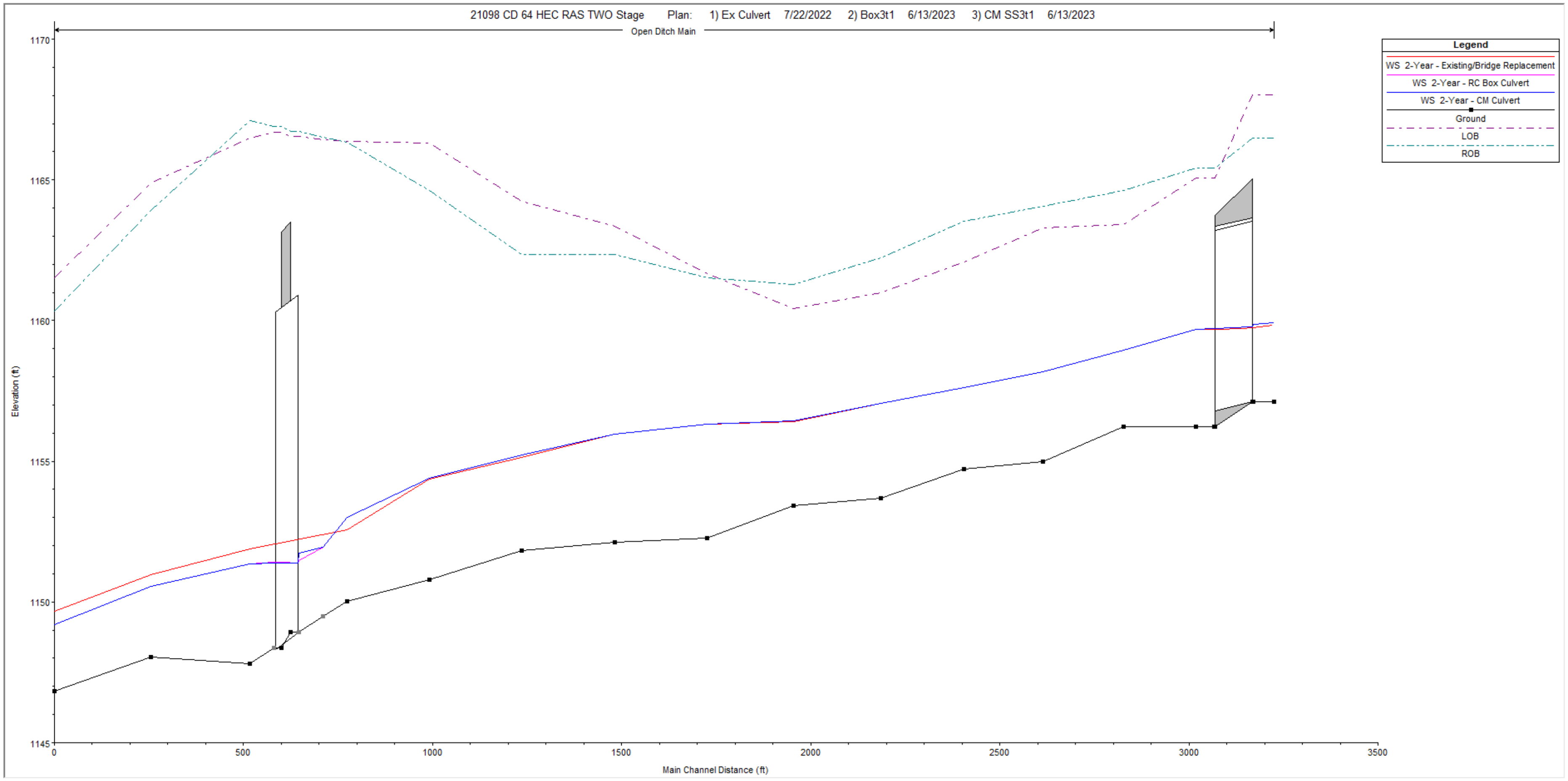
Sincerely,

Mark Origer

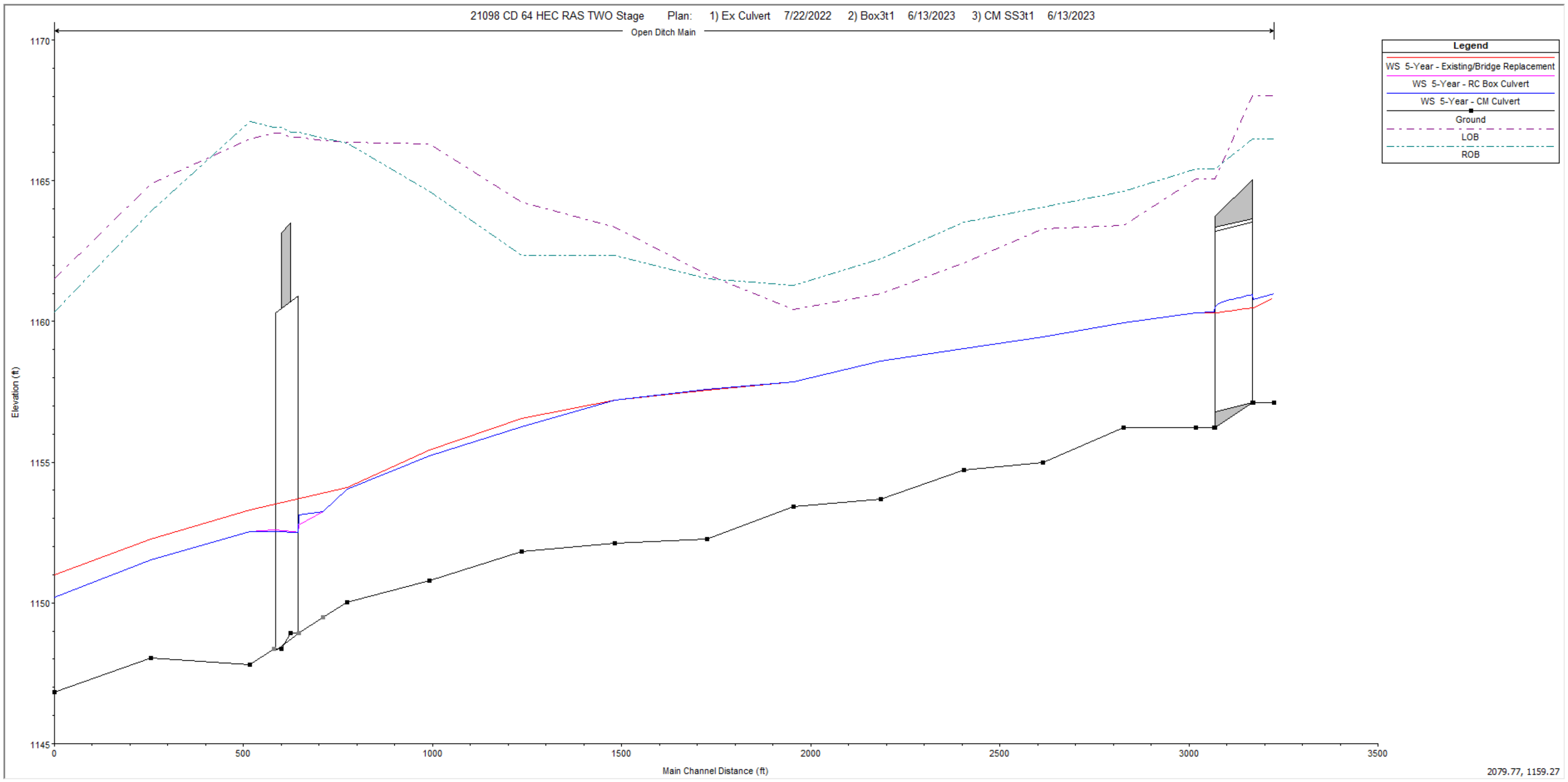
Mark Origer, PE
Civil Engineer

ATTACHMENTS

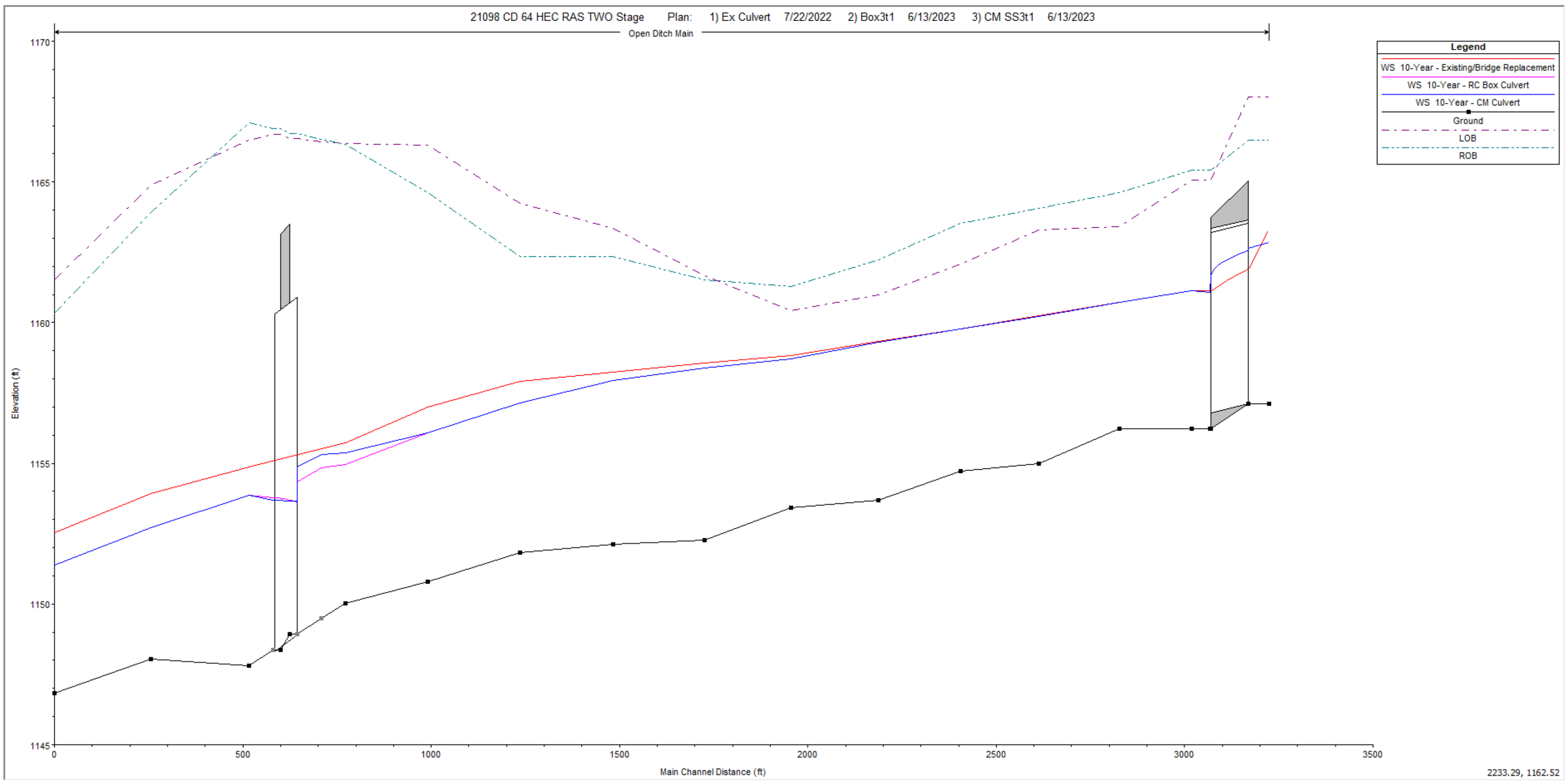
2-Year Profiles



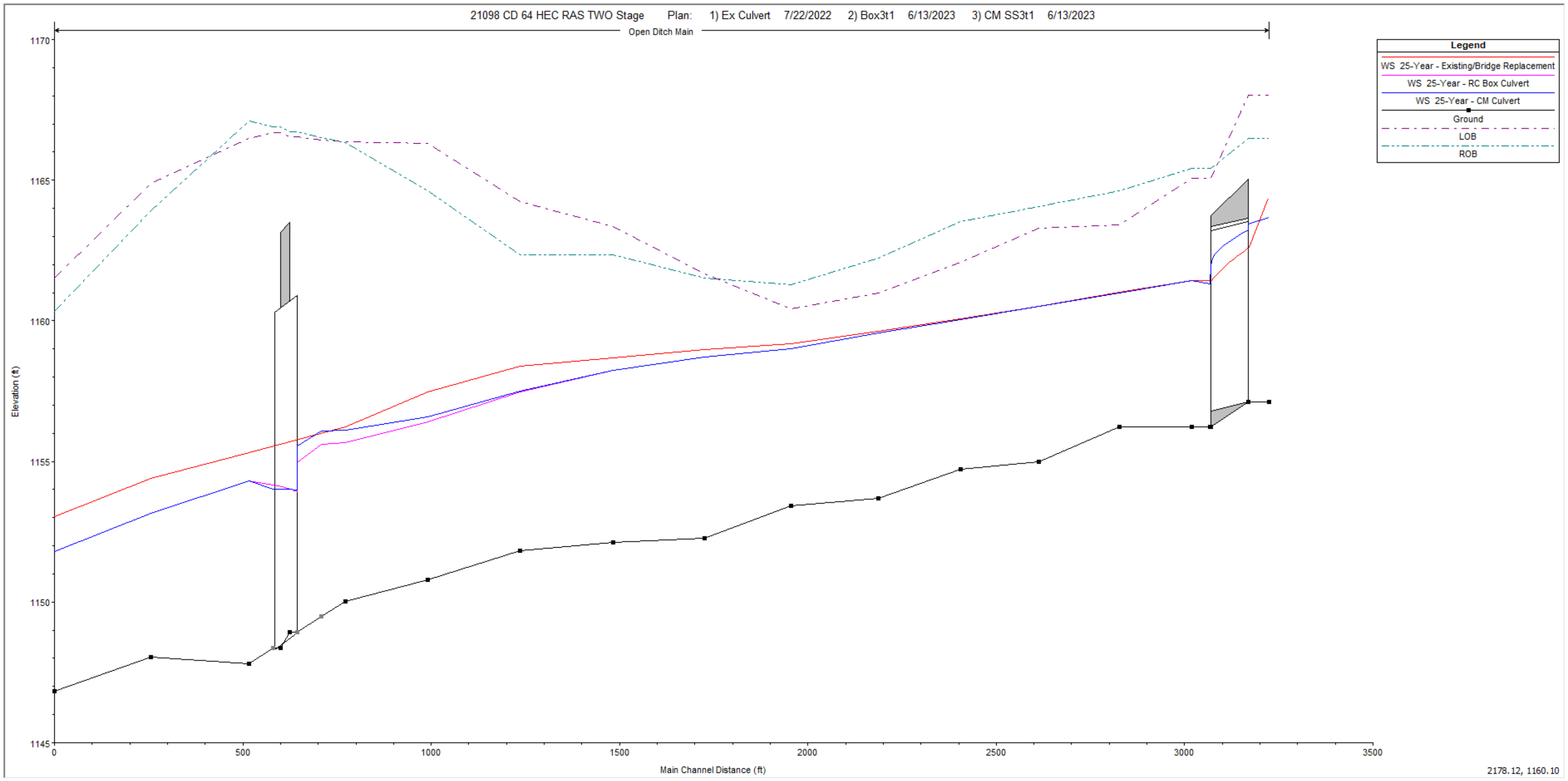
5-Year Profiles



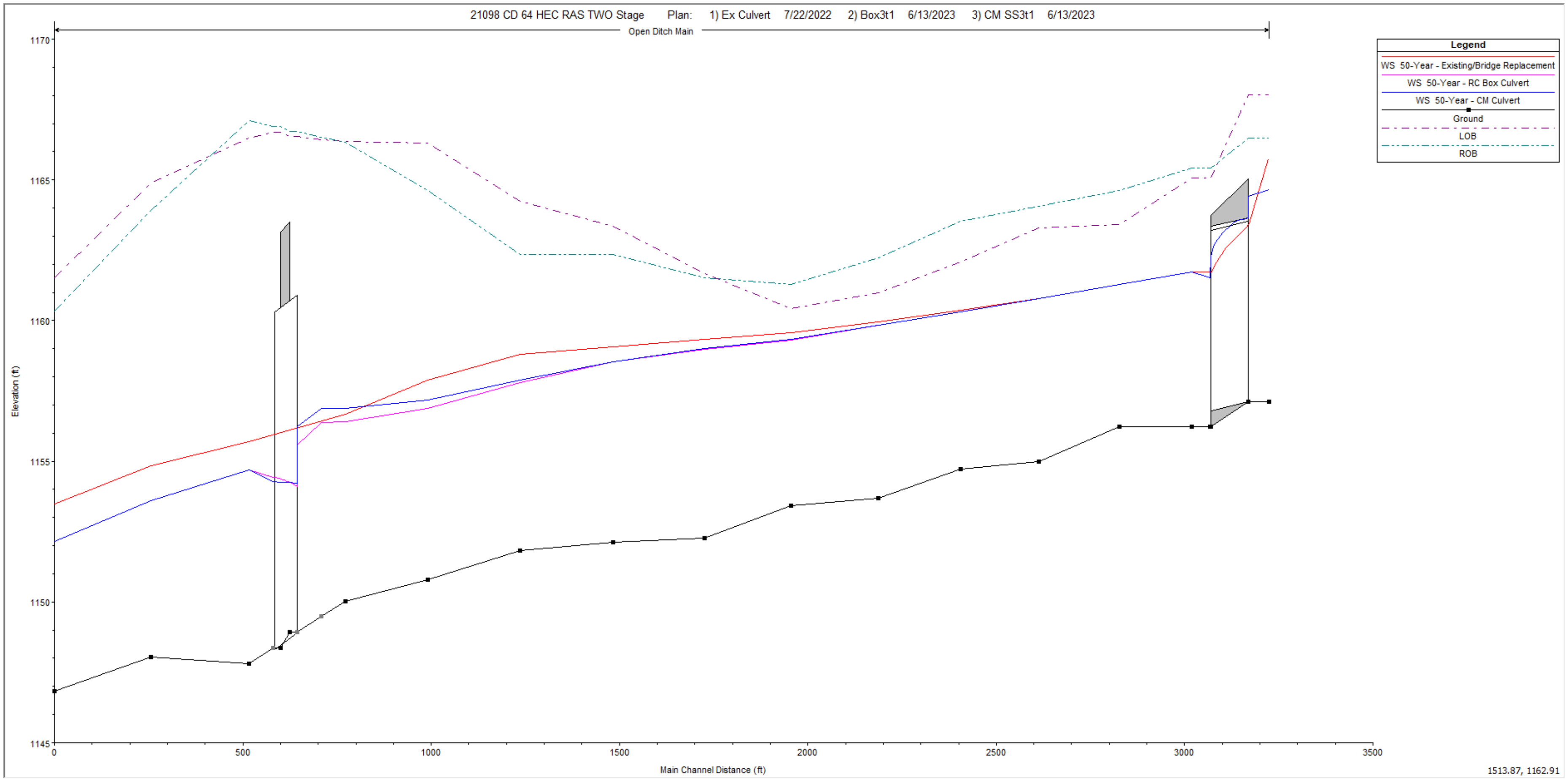
10-Year Profiles



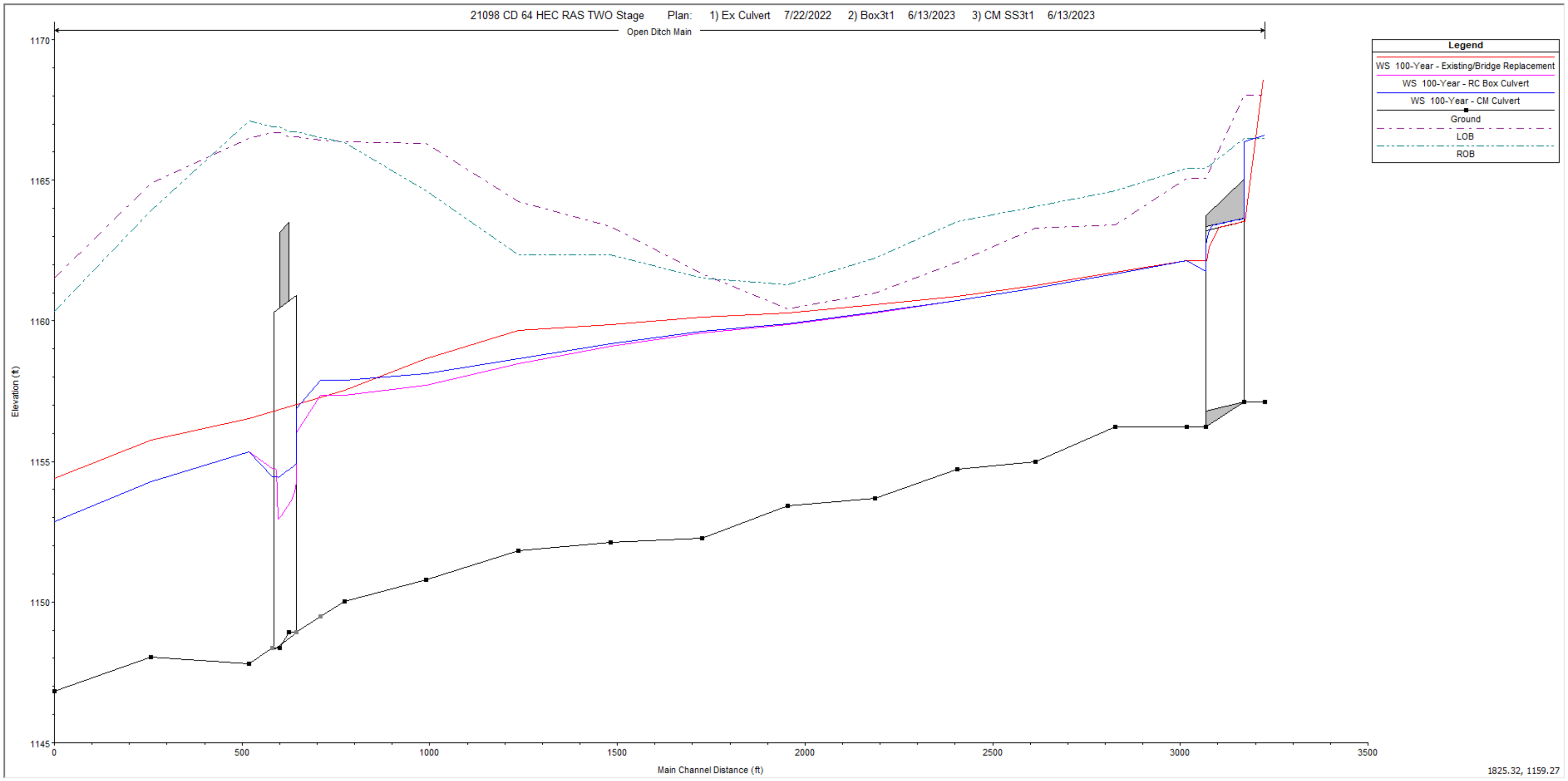
25-Year Profiles



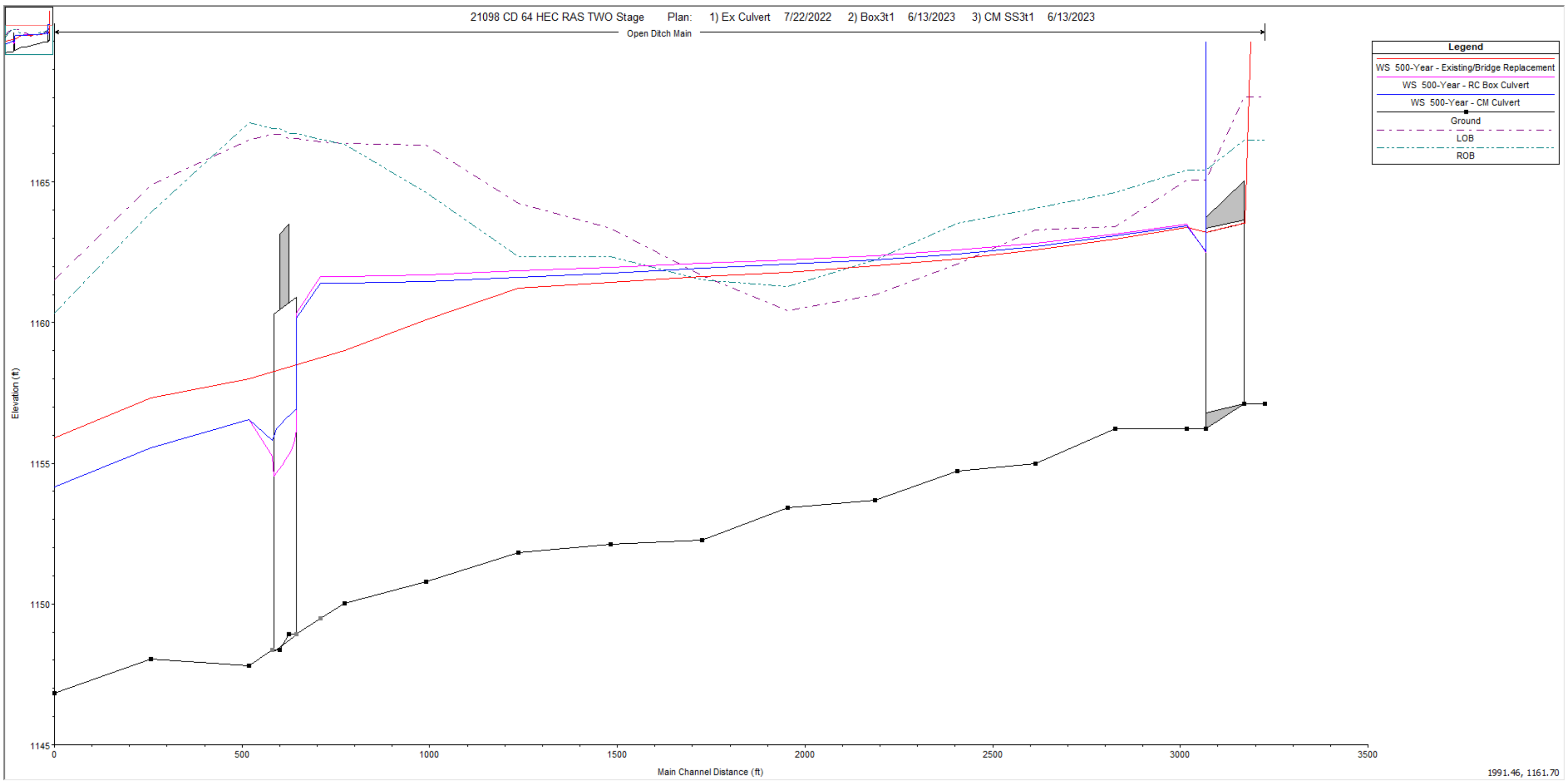
50-Year Profiles

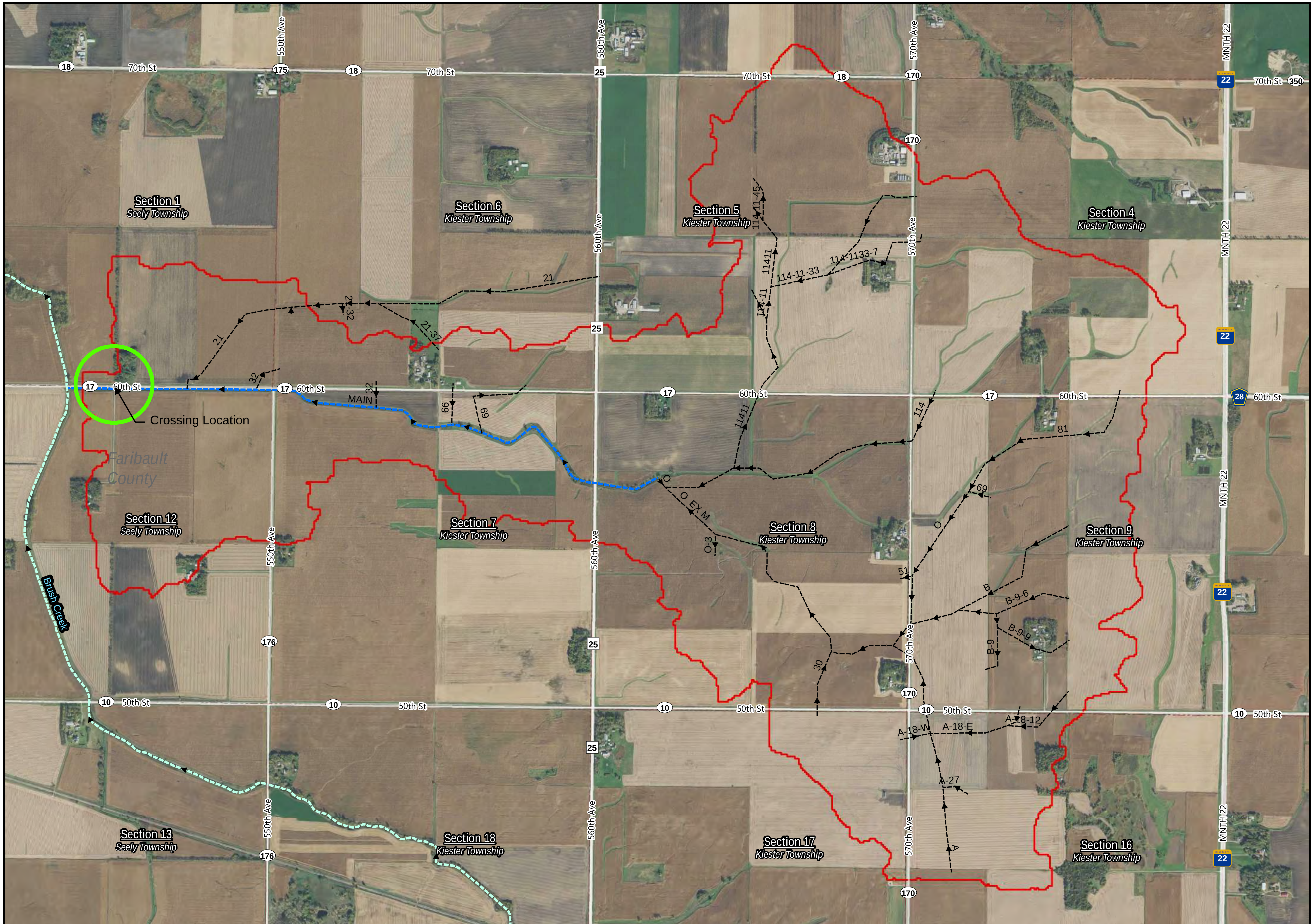


100-Year Profiles



500-Year Profiles





Crossings Map

County Ditch No 64

Faribault County, Minnesota

Wednesday, September 26, 2018

Legend

- Brush Creek
- OPEN CHANNEL
- TILE
- CD 64 Watershed

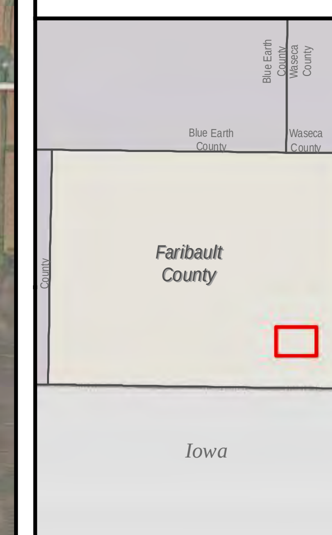
PN: 17-21098

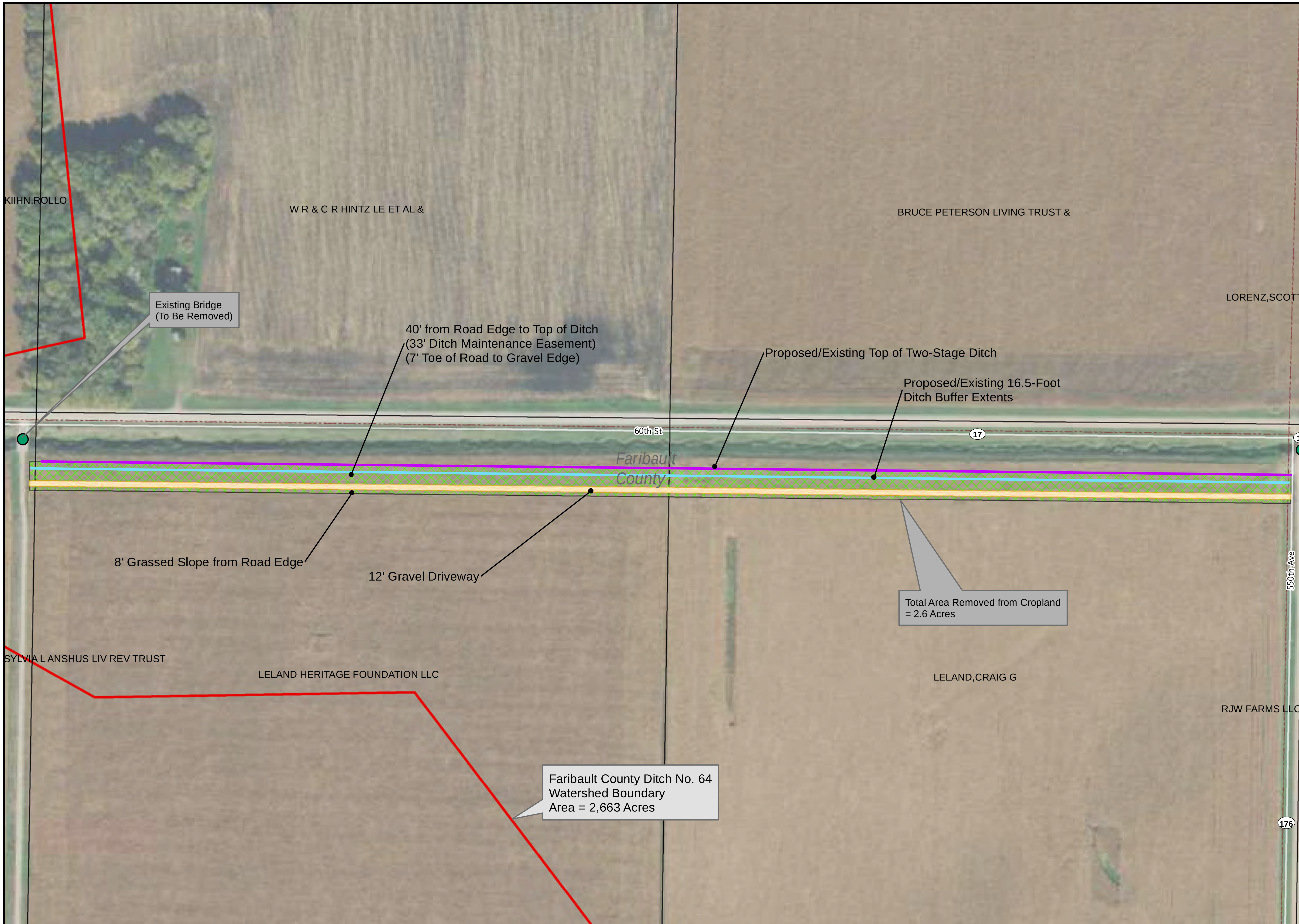
Source:

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

0 312.5 625 1,250 Feet

1 inch = 1,496 feet





ISG

Proposed Driveway Map
County Ditch No 64
Faribault County, Minnesota

Tuesday, March 14, 2023

Legend

- Bridges and Culverts
- Proposed/Existing Buffer Extent
- Proposed/Existing Ditch Top
- Proposed Driveway
- Road Buffer
- Parcels
- Watershed
- OPEN CHANNEL
- TILE

PN: 17-21098

Source:

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