

**CITY OF ST. FRANCIS
ST. FRANCIS, MN
COMMUNITY CENTER
23340 CREE STREET NW
Work Session Agenda**

July 23, 2018

6:00 pm

- 1) Riverbank Lane/Kings Hwy Street Improvement Discussion

MEMORANDUM

TO: Joe Kohlmann, City Administrator

FROM: Craig J. Jochum, City Engineer

DATE: July 19, 2018

RE: Assessment Scenarios

This memo updates the assessment cost for the scenario discussed at the June 25, 2018 work session for the Kings Highway and Riverbank Lane project. As discussed, with the residents at the June 11, 2018 work session, Scenario 1 would again be presented at the next work session. The two scenarios are summarized below:

Scenario 1 – Same as the original feasibility report which included stormwater improvements only. The cost split would be 60% City and 40% residents. This scenario does not include paving.

Scenario 2 – This scenario include the stormwater improvements and the paving. The residents would pay 100% of the pavement and the stormwater improvement costs would be split 74% City and 26% residents. This scenario is consistent with the City's current assessment policy. Per the policy, the City may consider increasing fund participation for stormwater items. The paragraph from the policy is as follows:

- H. Storm Sewer Improvements. Storm sewer improvements will continue to be a required portion of all new residential, commercial and industrial developments. Stormwater associated with road redevelopment projects shall be on a case-by-case basis, based on the appropriate engineering reports. Storm Sewer Improvements completed by the City shall be assessed at forty percent (40%) resident/sixty (60%) City of the total Storm Sewer Improvement cost. The City Council may consider increasing the City contribution by utilizing funds from the Stormwater Utility Fund, subject to City Council discretion and availability of funds.

The total estimated cost of this project with pavement is \$482,600. The cost breakdown is as follows:

Pavement	\$156,524
Stormwater Improvements	<u>\$326,076</u>
Total	\$482,600

The cost share is summarized on Table 1. The total, annual and monthly assessments for each scenario is summarized on Table 2. The assessment payments consider a 15 year pay period at 3.68% and a 10 year pay period at 5.0%.

Table 1
Summary of Cost Share

	Scenario 1	Scenario 2
City Cost Share	\$161,640	\$241,300
Assessment Totals	\$107,760	\$241,300
Project Totals	\$269,400	\$482,600

Table 2
Summary of Total, Monthly, and Annual Assessments

Scenario 1

Assessment Units	Total Assessments	15 years at 3.68%		10 years at 5.0%	
		Annual	Monthly	Annual	Monthly
29	\$3,716	\$327	\$27	\$485	\$41
31	\$3,476	\$306	\$26	\$450	\$38

Scenario 2

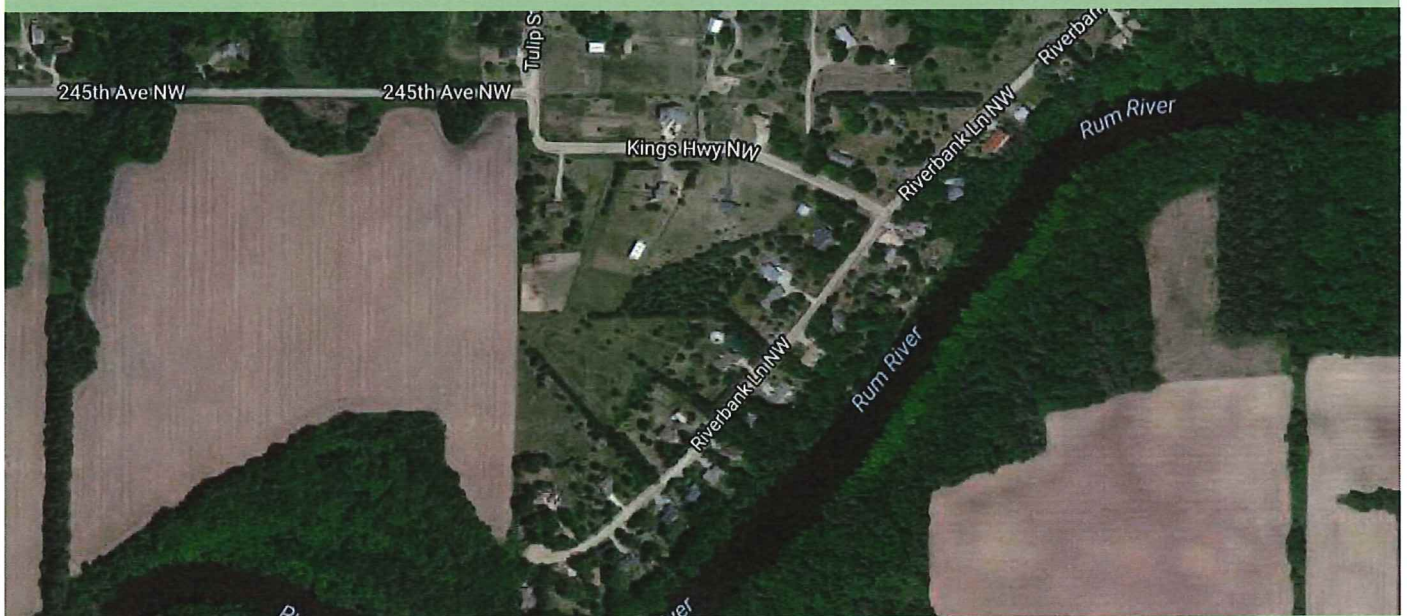
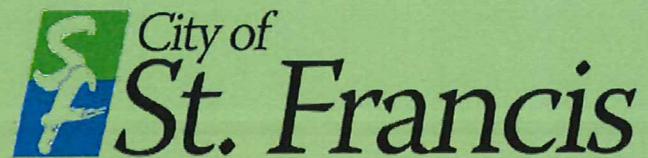
Assessment Units	Total Assessments	15 years at 3.68%		10 years at 5.0%	
		Annual	Monthly	Annual	Monthly
29	\$8,320	\$732	\$61	\$1,077	\$90
31	\$7,783	\$685	\$57	\$1,008	\$84

Feasibility Report for

Street and Drainage Improvements on Kings Highway and Riverbank Lane

City of St. Francis, MN

September 2017



Prepared by:



3601 Thurston Avenue

Anoka, MN

Phone: 763-427-5860

Fax: 763-427-0520

CERTIFICATION

**Feasibility Report
For**

**Street and Drainage Improvements on
Kings highway and Riverbank Lane**



I hereby certify that this plan, specification or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

By: PRELIMINARY
Craig J. Jochum, P.E.
License No. 23461

Date: September 1, 2017

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TITLE SHEET

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APPENDIX

A STORMWATER CALCULATIONS
B PRELIMINARY CONSTRUCTION PLANS

INTRODUCTION

The City Council authorized Hakanson Anderson to prepare a feasibility study for the improvement of Kings Highway and Riverbank Lane. The area considered in this report is shown on Exhibit A. Provided herein are recommendations for construction, preliminary cost estimates, estimated assessment costs, and preliminary construction plans.

EXISTING CONDITIONS

Kings Highway is approximately 1,420 feet long from 245th Avenue to Riverbank Lane. The other street, Riverbank Lane, is approximately 2,230 feet long from the westerly cul-de-sac to the City limits. The total length of both streets is approximately 3,650 feet. There has been a number of reviews and discussions regarding this area over the past 20 years. Many of the issues are related to stormwater runoff and erosion. Both of these roads currently have a gravel surface.

PROPOSED IMPROVEMENTS

Three improvement scenarios were reviewed as part of this study. The scenarios include completing drainage improvements without paving the road, completing drainage improvements with paving the roads, and the third scenario reviewed constructing municipal services along with the stormwater and street improvements.

Scenario 1

Scenario 1 would include only completing stormwater improvements. These improvements would include:

1. Reconstruct the existing ditches;
2. Remove and replace existing culverts and install flared end sections;
3. Construction ditch backslopes were needed; and
4. Lower road where necessary to accommodate ditching.

The estimated cost of this scenario for Riverbank Lane and Kings highway is \$162,000 and \$66,202 respectively. The construction costs are shown in detail on Tables A-1 and A-2. The total project cost is summarized below:

Stormwater Improvements Only					
	Kings Highway Construction Cost	Riverbank Lane Construction Costs	Total Estimated Construction Costs	18% Construction Contingency & Overhead	Total Estimated Project Cost
Total Project Cost	\$66,202	\$162,103	\$228,305	\$41,095	\$269,400

Scenario 2

Scenario 2 would include the improvements discussed above and would include paving the streets. The proposed typical sections are shown on the construction plans, which are included in Appendix B. The estimated cost of this scenario for Riverbank Lane and Kings highway is \$129,780 and \$260,965 respectively. The construction costs are shown in detail on Tables A-3 and A-4. The total project cost is summarized below:

Street and Stormwater Improvements					
	Kings Highway Construction Cost	Riverbank Lane Construction Costs	Total Estimated Construction Costs	18% Construction Contingency & Overhead	Total Estimated Project Cost
100% Road Const.	\$66,778	\$116,584	\$183,362	\$33,005	\$216,367
100% Stormwater Const.	\$47,152	\$119,972	\$167,124	\$30,082	\$197,206
50% Road & 50% Stormwater	\$15,850	\$24,409	\$40,259	\$7,247	\$47,506
Total Road Cost	\$74,703	\$128,789	\$203,492	\$36,629	\$240,120
Total Stormwater Cost	\$55,077	\$132,177	\$187,254	\$33,706	\$220,959
		Project Totals	\$390,746	\$70,335	\$461,079

Scenario 3

Scenario 3 would include the improvements from Scenario 1 and 2 and would include constructing the municipal water distribution system and wastewater collection system. The estimated construction cost to complete the municipal utilities is \$594,143.00, which is shown on Table A-5.

PROPOSED ASSESSMENTS

Project costs would be assessed to abutting property owners which are shown on Exhibit A. There is a total of 31 benefitting lots within St. Francis and a total of 29 separate owners. The table below summarizes the proposed assessment for each scenario based on 29 and 31 unit assessments. The assessments are based on the City's current assessment policy, which is 100% assessment for road improvements and 40% assessment on stormwater improvements.

Assessment Units	Scenario 1	Scenario 2	Scenario 3
29	\$3,716	\$11,328	\$31,816
31	\$3,476	\$10,597	\$29,763

EXHIBITS

TABLES

(A1 – A5)

Table A-1

**Preliminary Engineers Estimate
City of St. Francis
Riverbank Lane - Stormwater Improvements Only**

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
1	MOBILIZATION	1	LUMP SUM	\$4,500.00	\$4,500
2	CLEARING & GRUBBING	1	LUMP SUM	\$2,500.00	\$2,500
3	REMOVE CULVERTS	250	LIN FT	\$5.00	\$1,250
4	COMMON EXCAVATION (EV)	3100	CU YD	\$12.30	\$38,130
5	HAUL AND DISPOSE EXCESS MATERIAL	4030	CU YD	\$5.80	\$23,374
6	SALVAGE TOPSOIL	1116	CU YD	\$5.00	\$5,580
7	SALVAGED AGGREGATE (CV)	225	CU YD	\$25.75	\$5,794
8	AGGREGATE BASE (CV)	600	TON	\$16.00	\$9,600
8	15" CP PIPE CULVERT (SMOOTH)	510	LIN FT	\$41.05	\$20,936
9	15" CS PIPE APRON	36	EACH	\$225.00	\$8,100
10	15" RC PIPE APRON	5	EACH	\$950.00	\$4,750
11	15" RC PIPE CULVERT DESIGN 3006 CLASS III	236	LIN FT	\$80.00	\$18,880
12	27" DIAMETER CATCH BASIN	1	EACH	\$1,200.00	\$1,200
13	CASTING ASSEMBLY	1	EACH	\$600.00	\$600
14	SILT FENCE, TYPE MACHINE SLICED	1000	LIN FT	\$1.60	\$1,600
15	TRAFFIC CONTROL	1	LUMP SUM	\$500.00	\$500
16	SEDIMENT CONTROL LOG TYPE WOOD CHIP	100	LIN FT	\$3.15	\$315
17	FERTILIZER TYPE 1	630	POUND	\$0.80	\$504
18	HYDROSEEDING	2.1	ACRE	\$3,210.00	\$6,741
19	SEED MIXTURE 25-121	130	POUND	\$4.55	\$592
20	EROSION CONTROL BLANKETS	1000	SQ YD	\$2.80	\$2,800
21	HYDRAULIC NATURAL TACKIFIER	10164	SQ YD	\$0.35	\$3,557
22	CULVERT END CONTROLS	2	EACH	\$150.00	\$300

\$162,103

Total Estimated Construction Cost \$162,103

Table A-2

**Preliminary Engineers Estimate
City of St. Francis
Kings Highway - Stormwater Improvements Only**

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
1	MOBILIZATION	1	LUMP SUM	\$3,500.00	\$3,500
2	CLEARING & GRUBBING	1	LUMP SUM	\$2,500.00	\$2,500
3	REMOVE CULVERTS	180	LIN FT	\$5.00	\$900
4	COMMON EXCAVATION (EV)	1300	CU YD	\$12.30	\$15,990
5	HAUL AND DISPOSE EXCESS MATERIAL	1690	CU YD	\$5.80	\$9,802
6	SALVAGE TOPSOIL	667	CU YD	\$5.00	\$3,335
7	15" CP PIPE CULVERT (SMOOTH)	300	LIN FT	\$41.05	\$12,315
8	15" CS PIPE APRON	18	EACH	\$225.00	\$4,050
9	15" RC PIPE APRON	2	EACH	\$950.00	\$1,900
10	15" RC PIPE CULVERT DESIGN 3006 CLASS III	32	LIN FT	\$80.00	\$2,560
11	SILT FENCE, TYPE MACHINE SLICED	1000	LIN FT	\$1.60	\$1,600
12	TRAFFIC CONTROL	1	LUMP SUM	\$500.00	\$500
13	SEDIMENT CONTROL LOG TYPE WOOD CHIP	100	LIN FT	\$3.15	\$315
14	FERTILIZER TYPE 1	360	POUND	\$0.80	\$288
15	HYDROSEEDING	1.2	ACRE	\$3,210.00	\$3,852
16	SEED MIXTURE 25-121	73	POUND	\$4.55	\$332
17	EROSION CONTROL BLANKETS	100	SQ YD	\$2.80	\$280
18	HYDRAULIC NATURAL TACKIFIER	5808	SQ YD	\$0.35	\$2,033
19	CULVERT END CONTROLS	1	EACH	\$150.00	\$150

\$66,202

Total Estimated Construction Cost \$66,202

Table A-3

**Preliminary Engineers Estimate
City of St. Francis
Kings Highway - Street and Stormwater Improvements**

100% Road Costs

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
1	MILL BITUMINOUS SURFACE	5	SQ YD	\$9.50	\$48
2	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	24	LIN FT	\$4.30	\$103
3	SALVAGE MAILBOX	7	EACH	\$41.20	\$288
4	SUBGRADE PREPARATION	14	ROAD STA	\$150.00	\$2,100
5	AGGREGATE BASE CLASS 5	908	TON	\$16.00	\$14,528
6	SHOULDER BASE AGGREGATE CLASS 2	68	TON	\$45.65	\$3,104
7	BITUMINOUS MATERIAL FOR TACK COAT	216	GALLON	\$1.75	\$378
8	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B)	327	TON	\$54.45	\$17,805
9	TYPE SP 12.5 NON WEARING COURSE MIXTURE (2,B)	436	TON	\$52.31	\$22,807
10	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B) 3" THICK	30	SQ YD	\$19.48	\$584
11	6" CONCRETE DRIVEWAY PAVEMENT	60	SQ YD	\$59.51	\$3,571
12	FURNISH & INSTALL MAILBOX SUPPORT	7	EACH	\$150.00	\$1,050
13	SIGN PANELS TYPE C	10	SQ FT	\$41.20	\$412
					\$66,778

100% Stormwater Costs

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
14	CLEARING & GRUBBING	1	LUMP SUM	\$2,500.00	\$2,500
15	REMOVE CULVERTS	180	LIN FT	\$5.00	\$900
16	COMMON EXCAVATION (EV)	750	CU YD	\$12.30	\$9,225
17	HAUL AND DISPOSE EXCESS MATERIAL	975	CU YD	\$5.80	\$5,655
18	SALVAGE TOPSOIL	667	CU YD	\$5.00	\$3,335
19	SALVAGED AGGREGATE (CV)	50	CU YD	\$25.75	\$1,288
20	15" CP PIPE CULVERT (SMOOTH)	300	LIN FT	\$41.05	\$12,315
21	15" CS PIPE APRON	18	EACH	\$225.00	\$4,050
22	15" RC PIPE APRON	2	EACH	\$950.00	\$1,900
23	15" RC PIPE CULVERT DESIGN 3006 CLASS III	32	LIN FT	\$80.00	\$2,560
24	CONCRETE CURB & GUTTER	320	LIN FT	\$10.70	\$3,424
					\$47,152

50% Road Costs and 50% Stormwater Costs

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
25	MOBILIZATION	1	LUMP SUM	\$6,500.00	\$6,500
26	SILT FENCE, TYPE MACHINE SLICED	1000	LIN FT	\$1.60	\$1,600
27	TRAFFIC CONTROL	1	LUMP SUM	\$500.00	\$500
28	SEDIMENT CONTROL LOG TYPE WOOD CHIP	100	LIN FT	\$3.15	\$315
29	FERTILIZER TYPE 1	360	POUND	\$0.80	\$288
30	HYDROSEEDING	1.2	ACRE	\$3,210.00	\$3,852
31	SEED MIXTURE 25-121	73	POUND	\$4.55	\$332
32	EROSION CONTROL BLANKETS	100	SQ YD	\$2.80	\$280
33	HYDRAULIC NATURAL TACKIFIER	5808	SQ YD	\$0.35	\$2,033
34	CULVERT END CONTROLS	1	EACH	\$150.00	\$150
					\$15,850

Total Estimated Construction Cost \$129,780

Table A-4

**Preliminary Engineers Estimate
City of St. Francis
Riverbank Lane - Street and Stormwater Improvements**

100% Road Costs

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
1	MILL BITUMINOUS SURFACE	5	SQ YD	\$9.50	\$48
2	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	24	LIN FT	\$4.30	\$103
3	SALVAGE MAILBOX	23	EACH	\$41.20	\$948
4	SUBGRADE PREPARATION	23	ROAD STA	\$150.00	\$3,450
5	AGGREGATE BASE CLASS 5	1223	TON	\$16.00	\$19,568
6	SHOULDER BASE AGGREGATE CLASS 2	97	TON	\$45.65	\$4,428
7	BITUMINOUS MATERIAL FOR TACK COAT	362	GALLON	\$1.75	\$634
8	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B)	547	TON	\$54.45	\$29,784
9	TYPE SP 12.5 NON WEARING COURSE MIXTURE (2,B)	729	TON	\$52.31	\$38,134
10	TYPE SP 9.5 WEARING COURSE MIXTURE (2,B) 3" THICK	220	SQ YD	\$19.48	\$4,286
11	6" CONCRETE DRIVEWAY PAVEMENT	185	SQ YD	\$59.51	\$11,009
12	FURNISH & INSTALL MAILBOX SUPPORT	23	EACH	\$150.00	\$3,450
13	SIGN PANELS TYPE C	18	SQ FT	\$41.20	\$742
					\$116,584

100% Stormwater Costs

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
14	CLEARING & GRUBBING	1	LUMP SUM	\$2,500.00	\$2,500
15	REMOVE CULVERTS	250	LIN FT	\$5.00	\$1,250
16	COMMON EXCAVATION (EV)	2100	CU YD	\$12.30	\$25,830
17	HAUL AND DISPOSE EXCESS MATERIAL	2730	CU YD	\$5.80	\$15,834
18	SALVAGE TOPSOIL	1116	CU YD	\$5.00	\$5,580
19	SALVAGED AGGREGATE (CV)	225	CU YD	\$25.75	\$5,794
20	CONCRETE FLUME	2	EACH	\$721.00	\$1,442
21	15" CP PIPE CULVERT (SMOOTH)	510	LIN FT	\$41.05	\$20,936
22	15" CS PIPE APRON	36	EACH	\$225.00	\$8,100
23	15" RC PIPE APRON	5	EACH	\$950.00	\$4,750
24	15" RC PIPE CULVERT DESIGN 3006 CLASS III	236	LIN FT	\$80.00	\$18,880
25	27" DIAMETER CATCH BASIN	1	EACH	\$1,200.00	\$1,200
26	CASTING ASSEMBLY	1	EACH	\$600.00	\$600
27	CONCRETE CURB & GUTTER	680	LIN FT	\$10.70	\$7,276
					\$119,972

50% Road Costs and 50% Stormwater Costs

ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
28	MOBILIZATION	1	LUMP SUM	\$7,500.00	\$7,500
29	SILT FENCE, TYPE MACHINE SLICED	1000	LIN FT	\$1.60	\$1,600
30	TRAFFIC CONTROL	1	LUMP SUM	\$500.00	\$500
31	SEDIMENT CONTROL LOG TYPE WOOD CHIP	100	LIN FT	\$3.15	\$315
32	FERTILIZER TYPE 1	630	POUND	\$0.80	\$504
33	HYDROSEEDING	2.1	ACRE	\$3,210.00	\$6,741
34	SEED MIXTURE 25-121	130	POUND	\$4.55	\$592
35	EROSION CONTROL BLANKETS	1000	SQ YD	\$2.80	\$2,800
36	HYDRAULIC NATURAL TACKIFIER	10164	SQ YD	\$0.35	\$3,557
37	CULVERT END CONTROLS	2	EACH	\$150.00	\$300
					\$24,409

Total Estimated Construction Cost \$260,965

Table A-5

**Preliminary Engineers Estimate
City of St. Francis
Municipal Sewer and Water Improvements**

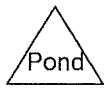
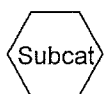
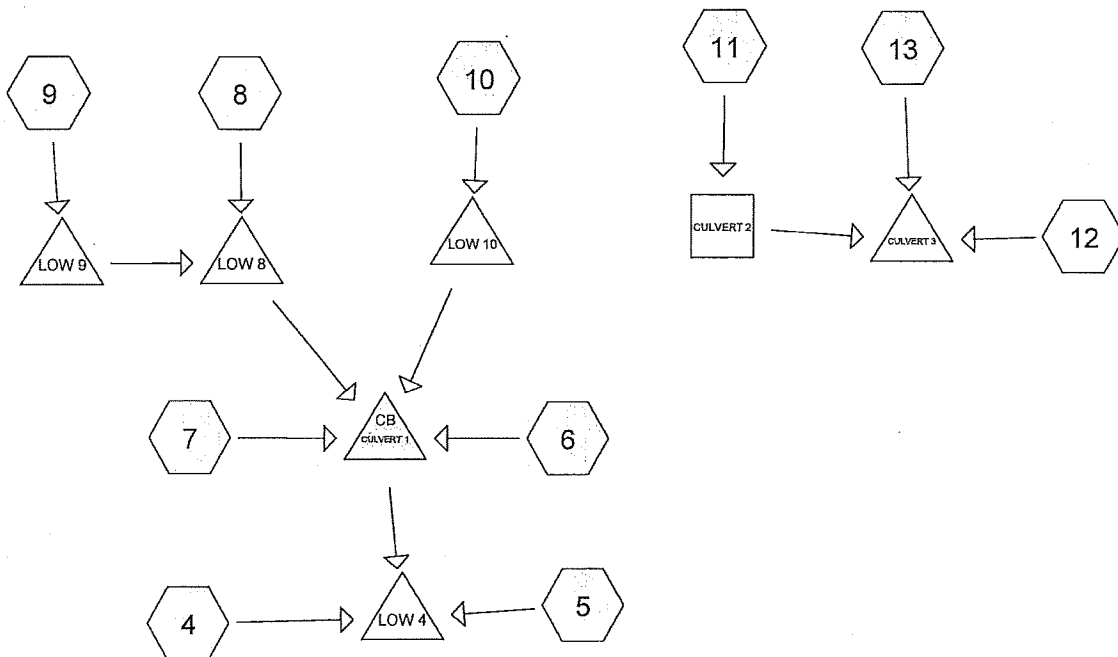
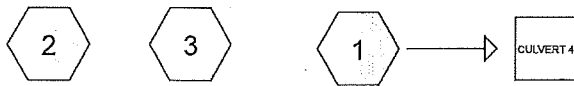
ITEM NO.	ITEM DESCRIPTION	ESTIMATED QUANTITY		UNIT PRICE	EXTENSION
1	MOBILIZATION	1	LUMP SUM	\$125,000.00	\$ 125,000.00
2	8" PVC PIPE SEWER	3,900	LIN FT	\$32.00	\$ 124,800.00
3	8" X 4" PVC WYE	31	EACH	\$250.00	\$ 7,750.00
4	4" PVC PIPE PLUG	31	EACH	\$50.00	\$ 1,550.00
5	4" PVC SANITARY SERVICE PIPE SDR 26	930	LIN FT	\$26.00	\$ 24,180.00
6	CLEAN AND VIDEO TAPE PIPE SEWER	3,900	LIN FT	\$2.00	\$ 7,800.00
7	1" CORPORATION STOP	31	EACH	\$165.00	\$ 5,115.00
8	6" GATE VALVE AND BOX	9	EACH	\$1,200.00	\$ 10,800.00
9	8" GATE VALVE AND BOX	6	EACH	\$1,600.00	\$ 9,600.00
10	1" CURB STOP AND BOX	31	EACH	\$200.00	\$ 6,200.00
11	HYDRANT	9	EACH	\$3,500.00	\$ 31,500.00
12	HYDRANT RISER	10	LIN FT	\$550.00	\$ 5,500.00
13	1" TYPE K COPPER PIPE	930	LIN FT	\$15.00	\$ 13,950.00
14	6" WATERMAIN	200	LIN FT	\$20.00	\$ 4,000.00
15	8" WATERMAIN	3,900	LIN FT	\$25.00	\$ 97,500.00
16	4" POLYSTYRENE INSULATION	20	SQ YD	\$42.00	\$ 840.00
17	DUCTILE IRON FITTINGS	1,200	POUND	\$5.75	\$ 6,900.00
18	CONSTRUCT DRAINAGE STRUCTURE DESIGN 4007	13	EACH	\$4,500.00	\$ 58,500.00
19	CASTING ASSEMBLY	13	EACH	\$666.00	\$ 8,658.00
20	ADDITIONAL GRAVEL	2,750	TON	\$16.00	\$ 44,000.00

\$ 594,143.00

Total Estimated Cost \$ 594,143.00

APPENDIX A

Stormwater Calculations



Routing Diagram for sf315Proposed Conditions (8-22-17)
 Prepared by Hakanson Anderson
 HydroCAD® 10.00-20 s/n 01341 © 2017 HydroCAD Software Solutions LLC

sf315Proposed Conditions (8-22-17)

Type II 24-hr 10-Year Rainfall=4.22"

Prepared by Hakanson Anderson

HydroCAD® 10.00-20 s/n 01341 © 2017 HydroCAD Software Solutions LLC

Page 2

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1:	Runoff Area=0.670 ac 34.33% Impervious Runoff Depth=0.98" Tc=10.0 min CN=62 Runoff=0.91 cfs 0.055 af
Subcatchment 2:	Runoff Area=0.920 ac 25.00% Impervious Runoff Depth=0.67" Tc=10.0 min CN=56 Runoff=0.74 cfs 0.051 af
Subcatchment 3:	Runoff Area=6.080 ac 4.11% Impervious Runoff Depth=0.11" Tc=20.0 min CN=41 Runoff=0.08 cfs 0.058 af
Subcatchment 4:	Runoff Area=11.020 ac 3.63% Impervious Runoff Depth=0.14" Tc=20.0 min CN=42 Runoff=0.20 cfs 0.128 af
Subcatchment 5:	Runoff Area=3.340 ac 11.98% Impervious Runoff Depth=0.33" Tc=15.0 min CN=48 Runoff=0.54 cfs 0.091 af
Subcatchment 6:	Runoff Area=1.410 ac 34.75% Impervious Runoff Depth=0.98" Tc=10.0 min CN=62 Runoff=1.92 cfs 0.115 af
Subcatchment 7:	Runoff Area=2.110 ac 3.32% Impervious Runoff Depth=0.11" Tc=10.0 min CN=41 Runoff=0.03 cfs 0.020 af
Subcatchment 8:	Runoff Area=4.140 ac 1.21% Impervious Runoff Depth=0.14" Tc=15.0 min CN=42 Runoff=0.08 cfs 0.048 af
Subcatchment 9:	Runoff Area=0.640 ac 0.00% Impervious Runoff Depth=0.26" Tc=10.0 min CN=46 Runoff=0.07 cfs 0.014 af
Subcatchment 10:	Runoff Area=3.870 ac 2.58% Impervious Runoff Depth=0.17" Tc=10.0 min CN=43 Runoff=0.11 cfs 0.054 af
Subcatchment 11:	Runoff Area=1.870 ac 22.99% Impervious Runoff Depth=0.57" Tc=10.0 min CN=54 Runoff=1.19 cfs 0.089 af
Subcatchment 12:	Runoff Area=0.820 ac 52.44% Impervious Runoff Depth=1.69" Tc=10.0 min CN=73 Runoff=2.08 cfs 0.115 af
Subcatchment 13:	Runoff Area=0.640 ac 10.94% Impervious Runoff Depth=0.23" Tc=10.0 min CN=45 Runoff=0.04 cfs 0.012 af
Reach CULVERT 2:	Avg. Flow Depth=0.24' Max Vel=7.17 fps Inflow=1.19 cfs 0.089 af 15.0" Round Pipe n=0.012 L=41.0' S=0.0437 ' Capacity=14.62 cfs Outflow=1.18 cfs 0.089 af
Reach CULVERT 4:	Avg. Flow Depth=0.28' Max Vel=4.51 fps Inflow=0.91 cfs 0.055 af 15.0" Round Pipe n=0.012 L=178.0' S=0.0146 ' Capacity=8.46 cfs Outflow=0.89 cfs 0.055 af
Pond CULVERT 1:	Peak Elev=919.47' Inflow=1.92 cfs 0.136 af 15.0" Round Culvert n=0.012 L=45.0' S=0.0036 ' Outflow=1.92 cfs 0.136 af
Pond CULVERT 3:	Peak Elev=905.80' Storage=13 cf Inflow=3.25 cfs 0.217 af Outflow=3.25 cfs 0.217 af
Pond LOW 10:	Peak Elev=918.31' Storage=2,330 cf Inflow=0.11 cfs 0.054 af Outflow=0.00 cfs 0.000 af
Pond LOW 4:	Peak Elev=919.89' Storage=15,427 cf Inflow=2.22 cfs 0.355 af Outflow=0.00 cfs 0.000 af
Pond LOW 8:	Peak Elev=922.23' Storage=2,091 cf Inflow=0.08 cfs 0.048 af Outflow=0.00 cfs 0.000 af
Pond LOW 9:	Peak Elev=928.14' Storage=598 cf Inflow=0.07 cfs 0.014 af Outflow=0.00 cfs 0.000 af

Total Runoff Area = 37.530 ac Runoff Volume = 0.851 af Average Runoff Depth = 0.27"
91.61% Pervious = 34.380 ac 8.39% Impervious = 3.150 ac

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Type II 24-hr 10-Year Rainfall=4.22"

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Summary for Subcatchment 1:

Runoff = 0.91 cfs @ 12.03 hrs, Volume= 0.055 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.230	98	Impervious
0.030	96	Gravel surface, HSG A
0.410	39	>75% Grass cover, Good, HSG A
0.670	62	Weighted Average
0.440	43	65.67% Pervious Area
0.230	98	34.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 2:

Runoff = 0.74 cfs @ 12.04 hrs, Volume= 0.051 af, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.230	98	Impervious
0.030	96	Gravel surface, HSG A
0.660	39	>75% Grass cover, Good, HSG A
0.920	56	Weighted Average
0.690	41	75.00% Pervious Area
0.230	98	25.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 3:

Runoff = 0.08 cfs @ 13.50 hrs, Volume= 0.058 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.250	98	Impervious
5.830	39	>75% Grass cover, Good, HSG A
6.080	41	Weighted Average
5.830	39	95.89% Pervious Area
0.250	98	4.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry,

Summary for Subcatchment 4:

Runoff = 0.20 cfs @ 13.02 hrs, Volume= 0.128 af, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.400	98	Impervious
0.100	96	Gravel surface, HSG A
10.520	39	>75% Grass cover, Good, HSG A
11.020	42	Weighted Average
10.620	40	96.37% Pervious Area
0.400	98	3.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry,

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Type II 24-hr 10-Year Rainfall=4.22"

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Summary for Subcatchment 5:

Runoff = 0.54 cfs @ 12.15 hrs, Volume= 0.091 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.400	98	Impervious
0.100	96	Gravel surface, HSG A
2.840	39	>75% Grass cover, Good, HSG A
3.340	48	Weighted Average
2.940	41	88.02% Pervious Area
0.400	98	11.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					Direct Entry,

Summary for Subcatchment 6:

Runoff = 1.92 cfs @ 12.03 hrs, Volume= 0.115 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.490	98	Impervious
0.070	96	Gravel surface, HSG A
0.850	39	>75% Grass cover, Good, HSG A
1.410	62	Weighted Average
0.920	43	65.25% Pervious Area
0.490	98	34.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 7:

Runoff = 0.03 cfs @ 13.37 hrs, Volume= 0.020 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.070	98	Impervious
2.040	39	>75% Grass cover, Good, HSG A
2.110	41	Weighted Average
2.040	39	96.68% Pervious Area
0.070	98	3.32% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 8:

Runoff = 0.08 cfs @ 12.60 hrs, Volume= 0.048 af, Depth= 0.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.050	98	Impervious
0.180	96	Gravel surface, HSG A
3.910	39	>75% Grass cover, Good, HSG A
4.140	42	Weighted Average
4.090	42	98.79% Pervious Area
0.050	98	1.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0					Direct Entry,

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Type II 24-hr 10-Year Rainfall=4.22"

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Summary for Subcatchment 9:

Runoff = 0.07 cfs @ 12.10 hrs, Volume= 0.014 af, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
0.080	96	Gravel surface, HSG A
0.560	39	>75% Grass cover, Good, HSG A
0.640	46	Weighted Average
0.640	46	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 10:

Runoff = 0.11 cfs @ 12.43 hrs, Volume= 0.054 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.100	98	Impervious
0.140	96	Gravel surface, HSG A
3.630	39	>75% Grass cover, Good, HSG A
3.870	43	Weighted Average
3.770	41	97.42% Pervious Area
0.100	98	2.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 11:

Runoff = 1.19 cfs @ 12.05 hrs, Volume= 0.089 af, Depth= 0.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.430	98	Impervious
0.050	96	Gravel surface, HSG A
1.390	39	>75% Grass cover, Good, HSG A
1.870	54	Weighted Average
1.440	41	77.01% Pervious Area
0.430	98	22.99% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Subcatchment 12:

Runoff = 2.08 cfs @ 12.02 hrs, Volume= 0.115 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.430	98	Impervious
0.050	96	Gravel surface, HSG A
0.340	39	>75% Grass cover, Good, HSG A
0.820	73	Weighted Average
0.390	46	47.56% Pervious Area
0.430	98	52.44% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

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Type II 24-hr 10-Year Rainfall=4.22"

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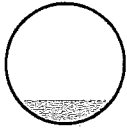
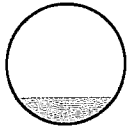
Summary for Subcatchment 13:

Runoff = 0.04 cfs @ 12.11 hrs, Volume= 0.012 af, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=4.22"

Area (ac)	CN	Description
* 0.070	98	Impervious
0.570	39	>75% Grass cover, Good, HSG A
0.640	45	Weighted Average
0.570	39	89.06% Pervious Area
0.070	98	10.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Summary for Reach CULVERT 2:Inflow Area = 1.870 ac, 22.99% Impervious, Inflow Depth = 0.57" for 10-Year event
Inflow = 1.19 cfs @ 12.05 hrs, Volume= 0.089 af
Outflow = 1.18 cfs @ 12.05 hrs, Volume= 0.089 af, Atten= 0%, Lag= 0.1 minRouting by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.17 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.98 fps, Avg. Travel Time= 0.2 minPeak Storage= 7 cf @ 12.05 hrs
Average Depth at Peak Storage= 0.24'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 14.62 cfs15.0" Round Pipe
n= 0.012
Length= 41.0' Slope= 0.0437 '/
Inlet Invert= 923.42', Outlet Invert= 921.63'**Summary for Reach CULVERT 4:**Inflow Area = 0.670 ac, 34.33% Impervious, Inflow Depth = 0.98" for 10-Year event
Inflow = 0.91 cfs @ 12.03 hrs, Volume= 0.055 af
Outflow = 0.89 cfs @ 12.05 hrs, Volume= 0.055 af, Atten= 2%, Lag= 1.1 minRouting by Stor-Ind+Trans method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.51 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.68 fps, Avg. Travel Time= 1.8 minPeak Storage= 36 cf @ 12.04 hrs
Average Depth at Peak Storage= 0.28'
Bank-Full Depth= 1.25' Flow Area= 1.2 sf, Capacity= 8.46 cfs15.0" Round Pipe
n= 0.012
Length= 178.0' Slope= 0.0146 '/
Inlet Invert= 917.60', Outlet Invert= 915.00'**Summary for Pond CULVERT 1:**Inflow Area = 12.170 ac, 5.83% Impervious, Inflow Depth = 0.13" for 10-Year event
Inflow = 1.92 cfs @ 12.03 hrs, Volume= 0.136 af
Outflow = 1.92 cfs @ 12.03 hrs, Volume= 0.136 af, Atten= 0%, Lag= 0.0 min
Primary = 1.92 cfs @ 12.03 hrs, Volume= 0.136 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

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Type II 24-hr 10-Year Rainfall=4.22"

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Peak Elev= 919.47' @ 12.03 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	918.64'	15.0" Round Culvert L= 45.0' Square-edged headwall, Ke= 0.500 Inlet / Outlet Invert= 918.64' / 918.48' S= 0.0036 ' S= 0.0036 ' Cc= 0.900 n= 0.012, Flow Area= 1.23 sf

Primary OutFlow Max=1.87 cfs @ 12.03 hrs HW=919.46' (Free Discharge)

1=Culvert (Barrel Controls 1.87 cfs @ 3.12 fps)

Summary for Pond CULVERT 3:

Inflow Area = 3.330 ac, 27.93% Impervious, Inflow Depth = 0.78" for 10-Year event
 Inflow = 3.25 cfs @ 12.04 hrs, Volume= 0.217 af
 Outflow = 3.25 cfs @ 12.04 hrs, Volume= 0.217 af, Atten= 0%, Lag= 0.1 min
 Primary = 3.25 cfs @ 12.04 hrs, Volume= 0.217 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 905.80' @ 12.04 hrs Surf.Area= 34 sf Storage= 13 cf

Plug-Flow detention time= 0.1 min calculated for 0.216 af (100% of inflow)

Center-of-Mass det. time= 0.1 min (886.0 - 885.9)

Volume	Invert	Avail.Storage	Storage Description
#1	905.00'	341 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
905.00	0	0	0
906.00	42	21	21
907.00	149	96	117
908.00	300	225	341

Device	Routing	Invert	Outlet Devices
#1	Primary	905.00'	21.0" Round Culvert L= 43.0' Ke= 0.500 Inlet / Outlet Invert= 905.00' / 895.09' S= 0.2305 ' S= 0.2305 ' Cc= 0.900 n= 0.012, Flow Area= 2.41 sf
#2	Primary	907.00'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.17 cfs @ 12.04 hrs HW=905.79' (Free Discharge)

1=Culvert (Inlet Controls 3.17 cfs @ 3.02 fps)

2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond LOW 10:

Inflow Area = 3.870 ac, 2.58% Impervious, Inflow Depth = 0.17" for 10-Year event
 Inflow = 0.11 cfs @ 12.43 hrs, Volume= 0.054 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 918.31' @ 24.60 hrs Surf.Area= 8,452 sf Storage= 2,330 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	918.00'	188,395 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
918.00	6,465	0	0
920.00	19,184	25,649	25,649
922.00	37,434	56,618	82,267
924.00	68,694	106,128	188,395

Summary for Pond LOW 4:

Inflow Area = 26.530 ac, 5.69% Impervious, Inflow Depth = 0.16" for 10-Year event
 Inflow = 2.22 cfs @ 12.05 hrs, Volume= 0.355 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Peak Elev= 919.89' @ 25.15 hrs Surf.Area= 79,633 sf Storage= 15,427 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

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Type II 24-hr 10-Year Rainfall=4.22"

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Volume	Invert	Avail.Storage	Storage Description
#1	919.50'	329,343 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
919.50	0	0	0
920.00	102,761	25,690	25,690
922.00	200,892	303,653	329,343

Device	Routing	Invert	Outlet Devices
#1	Primary	920.10'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50			
Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88			

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=919.50' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond LOW 8:

Inflow Area = 4.780 ac, 1.05% Impervious, Inflow Depth = 0.12" for 10-Year event
 Inflow = 0.08 cfs @ 12.60 hrs, Volume= 0.048 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 922.23' @ 24.90 hrs Surf.Area= 12,431 sf Storage= 2,091 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	922.00'	68,919 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
922.00	5,934	0	0
924.00	62,985	68,919	68,919

Device	Routing	Invert	Outlet Devices
#1	Primary	922.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50			
Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88			

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=922.00' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond LOW 9:

Inflow Area = 0.640 ac, 0.00% Impervious, Inflow Depth = 0.26" for 10-Year event
 Inflow = 0.07 cfs @ 12.10 hrs, Volume= 0.014 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 928.14' @ 24.60 hrs Surf.Area= 4,660 sf Storage= 598 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

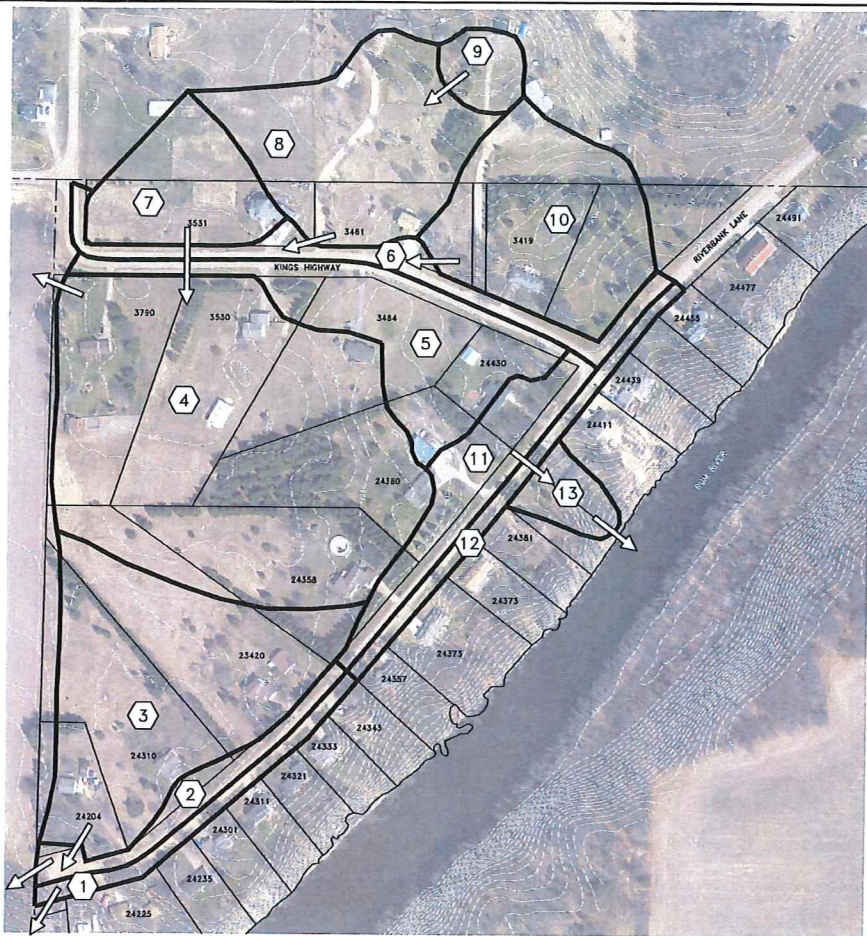
Volume	Invert	Avail.Storage	Storage Description
#1	928.00'	19,121 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
928.00	3,860	0	0
930.00	15,261	19,121	19,121

Device	Routing	Invert	Outlet Devices
#1	Primary	928.50'	10.0' long x 5.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50			
Coef. (English) 2.34 2.50 2.70 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88			

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=928.00' (Free Discharge)

1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

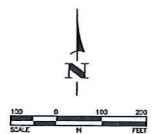


LEGEND

5 SUBCATCHMENT NUMBER

— DRAINAGE BOUNDARY

→ DRAINAGE ARROW



KINGS HIGHWAY AND RIVERBANK LANE
IMPROVEMENT PROJECT

FIGURE 1
PROPOSED DRAINAGE AREAS
CITY OF ST. FRANCIS, MINNESOTA

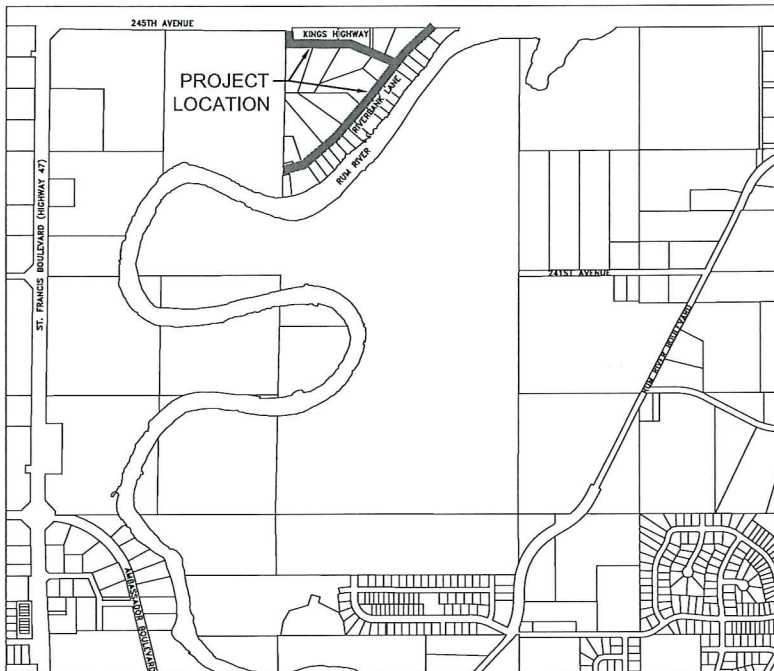
SF315



APPENDIX B

Preliminary Construction Plans

KINGS HIGHWAY AND RIVERBANK LANE IMPROVEMENT PROJECT CONSTRUCTION PLANS FOR SUBGRADE PREPARATION, BITUMINOUS SURFACING, AGGREGATE SHOULDERING, STORM SEWER AND MISCELLANEOUS CONSTRUCTION CITY OF ST. FRANCIS



GOVERNING SPECIFICATIONS

THE 2016 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.
ALL FEDERAL, STATE AND LOCAL LAWS, REGULATIONS, AND ORDINANCES SHALL BE COMPLIED WITH IN THE CONSTRUCTION OF THIS PROJECT.
ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM TO THE LATEST EDITION OF THE MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, INCLUDING THE LATEST FIELD MANUAL FOR TEMPORARY TRAFFIC CONTROL ZONE LAYOUTS.

SHEET INDEX THIS PLAN CONTAINS 10 SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	TYPICAL SECTIONS
3-7	CONSTRUCTION PLANS-RIVERBANK LANE
8-10	CONSTRUCTION PLANS-KINGS HIGHWAY

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

PRELIMINARY

CRAIG J. JOCHUM, P.E.
HAKANSON ANDERSON
DESIGN ENGINEER

23461 DATE 9/22/17
LIC. NO.

DATE	REVISION

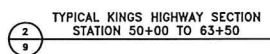
SHEET 1 OF 10 SHEETS

SF315

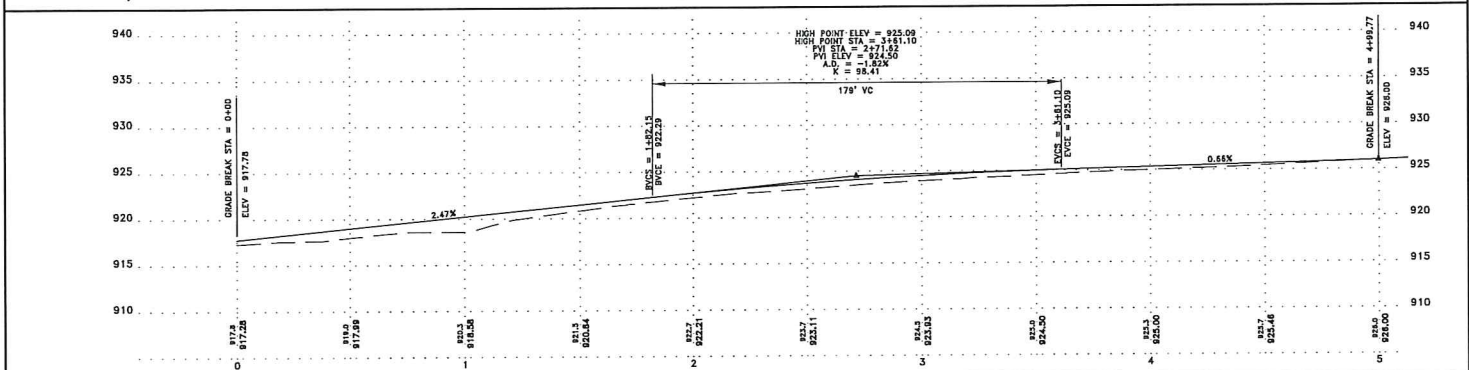
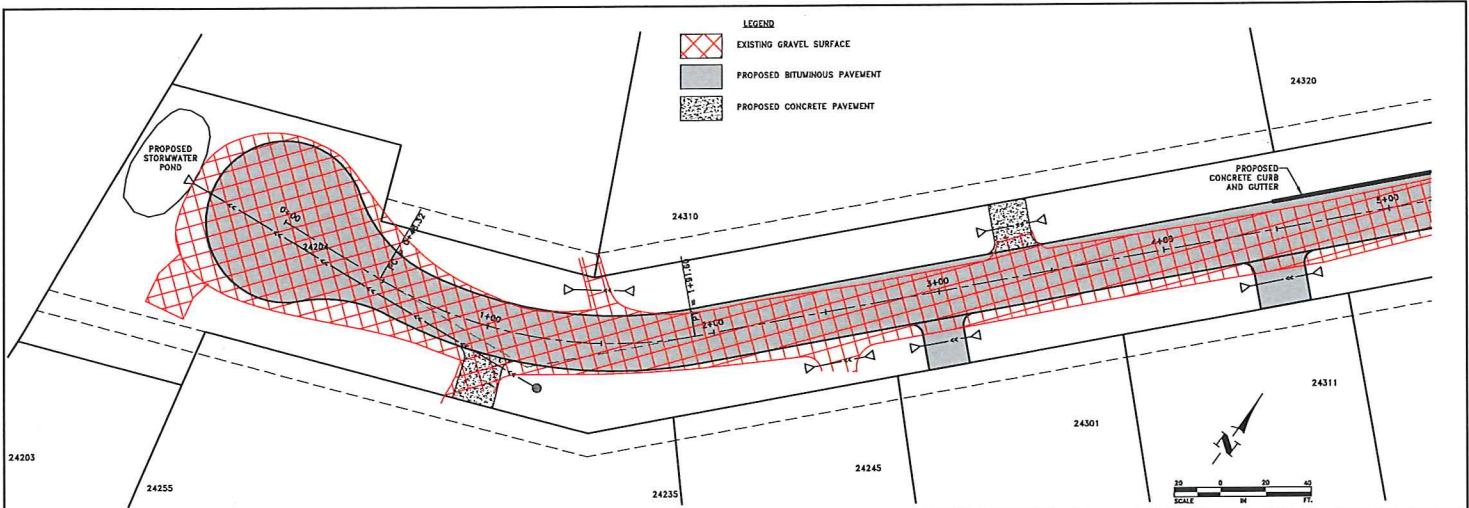
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**Hakanson
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Civil Engineers and Land Surveyors
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763-427-5860 FAX 763-427-0520

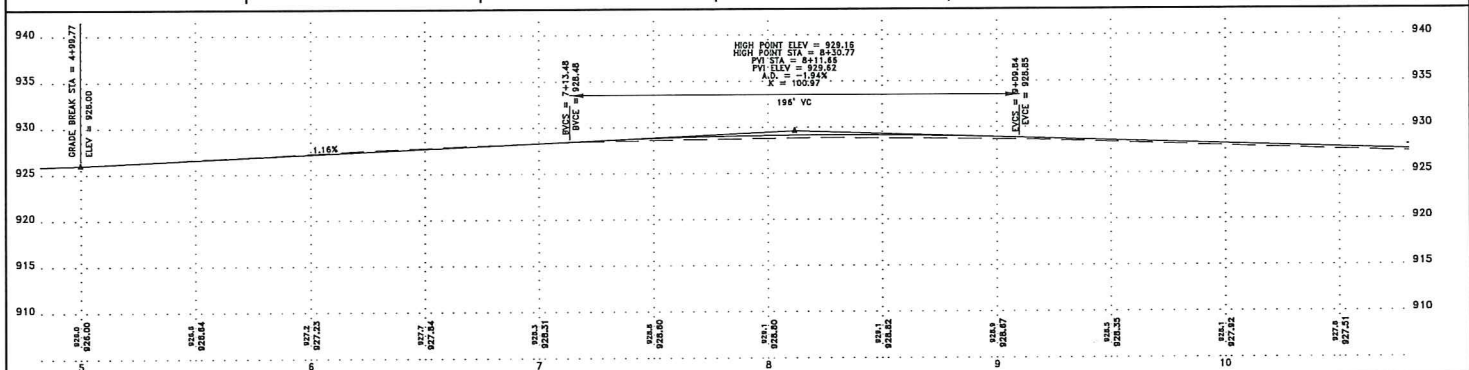
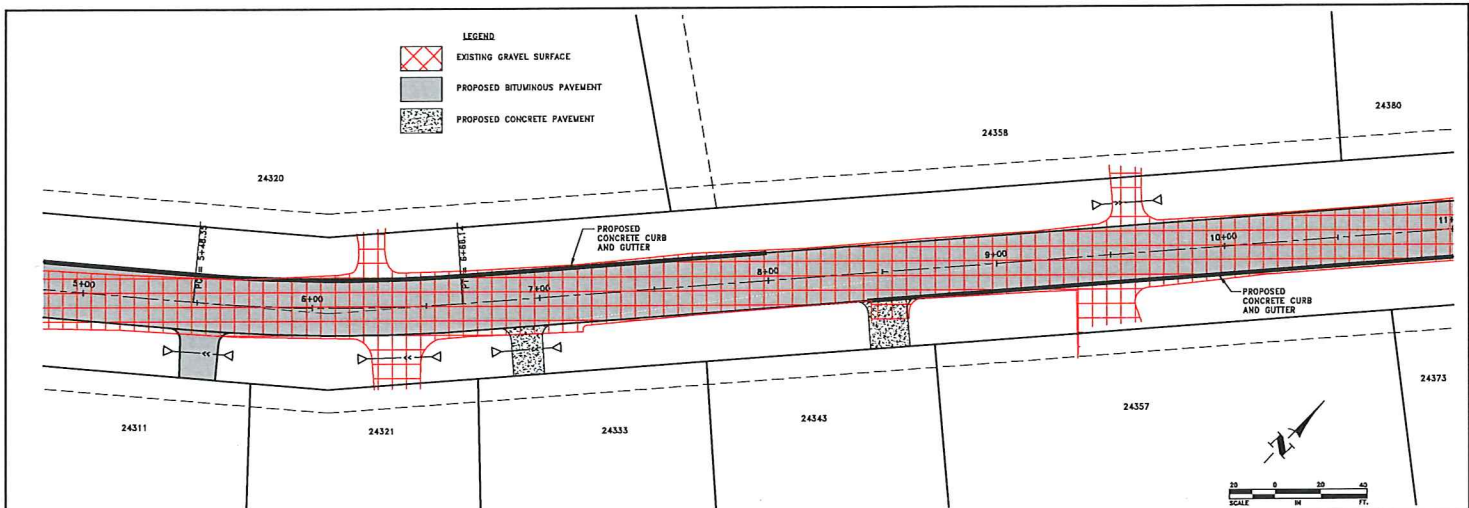
THE SUBSURFACE UTILITY INFORMATION ON THIS PLAN IS UTILITY QUALITY LEVEL D. THIS QUALITY LEVEL WAS DETERMINED ACCORDING TO THE GUIDELINES OF C/ASCE 38-02, ENTITLED "STANDARD GUIDELINES FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA."



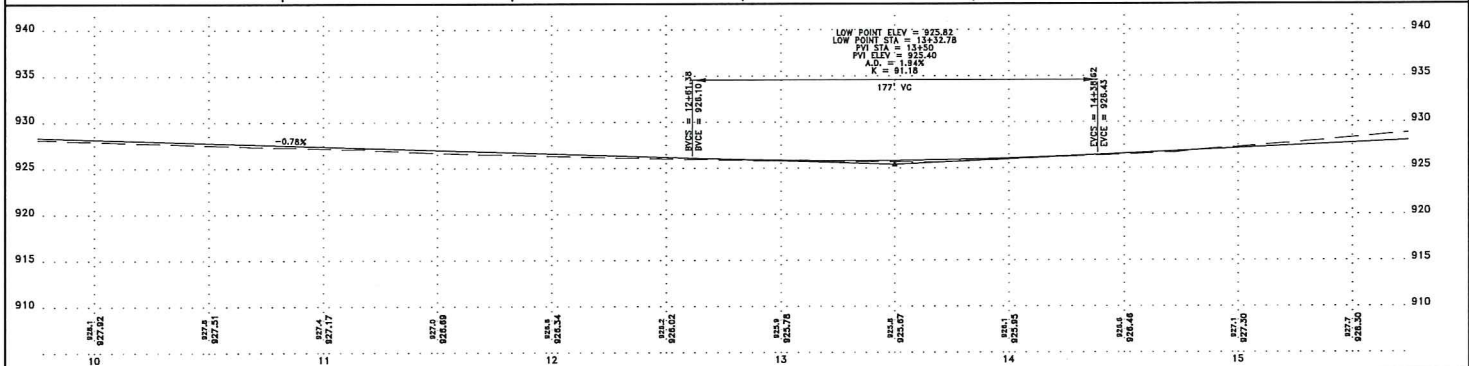
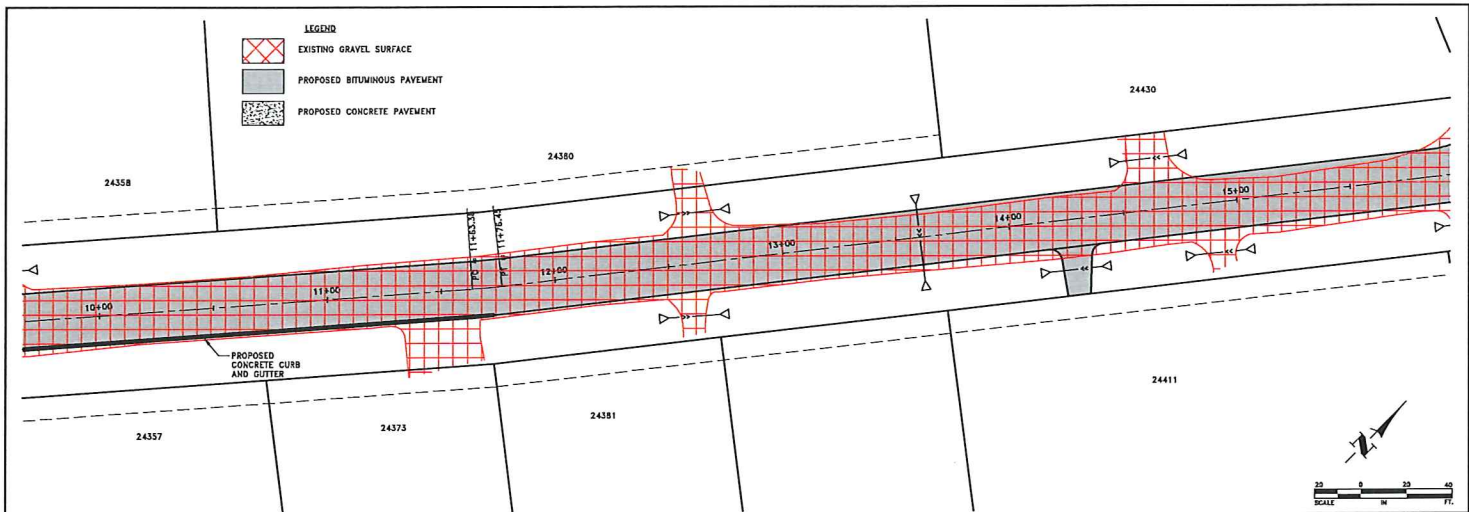
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SHEETS
SF31



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DATE	REVISION												



<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">DATE</th> <th style="text-align: left;">REVISION</th> </tr> </thead> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table>	DATE	REVISION									I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota. Date 8/22/07 JOCHUM, P.E. Lic. No. 23461	Hakanson Anderson Civil Engineers and Land Surveyors 3501 Thurston Ave., Anoka, Minnesota 55303 763-427-0550 FAX 763-427-0550 www.hakanson-anderson.com	KINGS HIGHWAY AND RIVERBANK LANE IMPROVEMENT PROJECT	CONSTRUCTION PLAN RIVERBANK LANE CITY OF ST. FRANCIS, MINNESOTA	SHEET 4 OF 10 SHEETS
DATE	REVISION														



DATE	REVISION	DESIGNED BY	CHECKED BY	DATE	REVISION	DESIGNED BY	CHECKED BY
8/22/07		J. JOCHIM	C. JOY				

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Date 8/22/07 by J. JOCHIM, P.E. Lic. No. 23461



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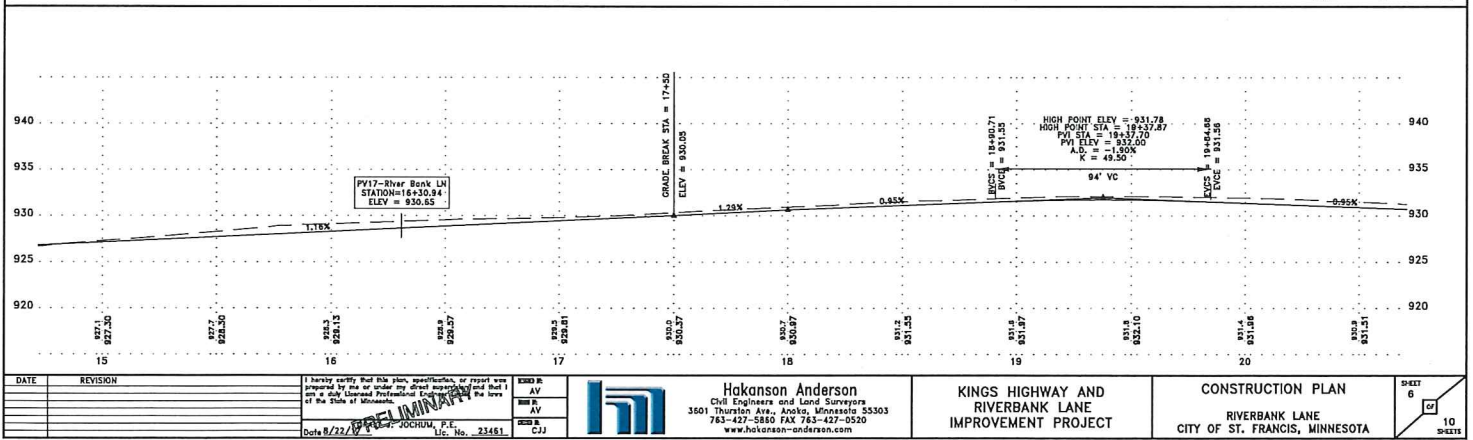
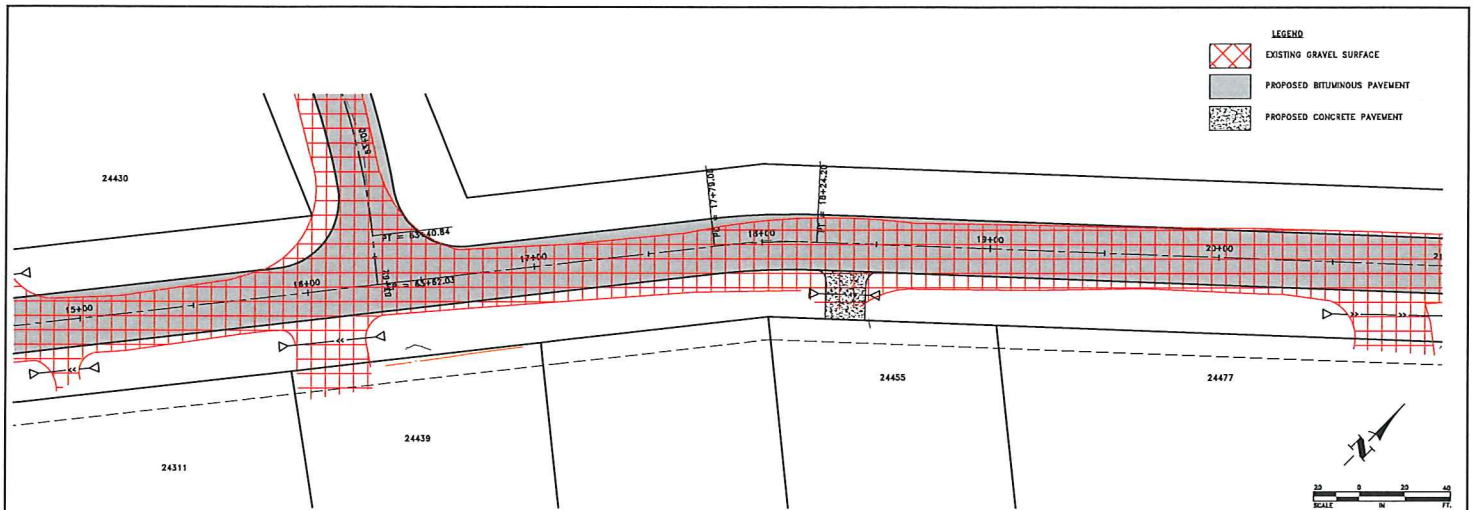
KINGS HIGHWAY AND RIVERBANK LANE IMPROVEMENT PROJECT

CONSTRUCTION PLAN
RIVERBANK LANE
CITY OF ST. FRANCIS, MINNESOTA

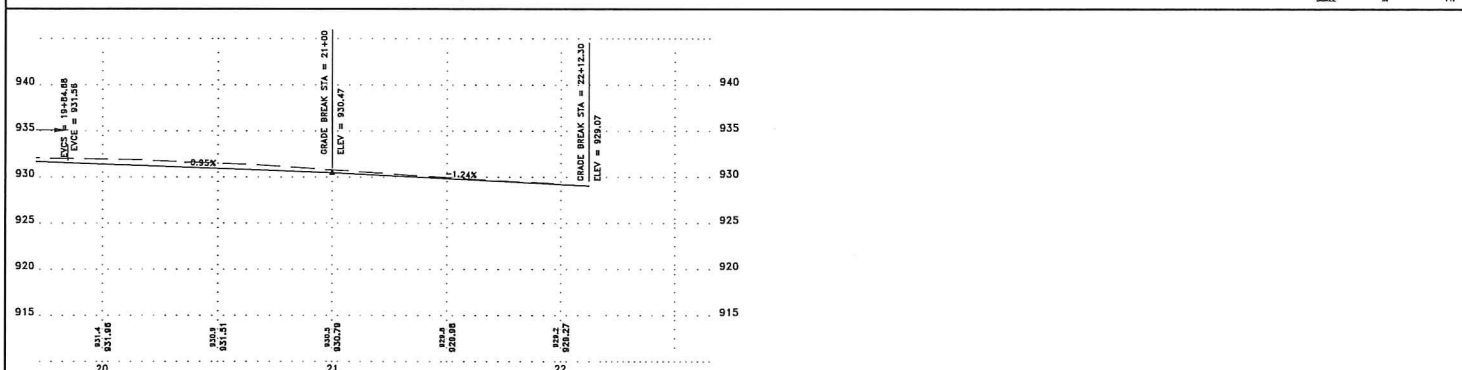
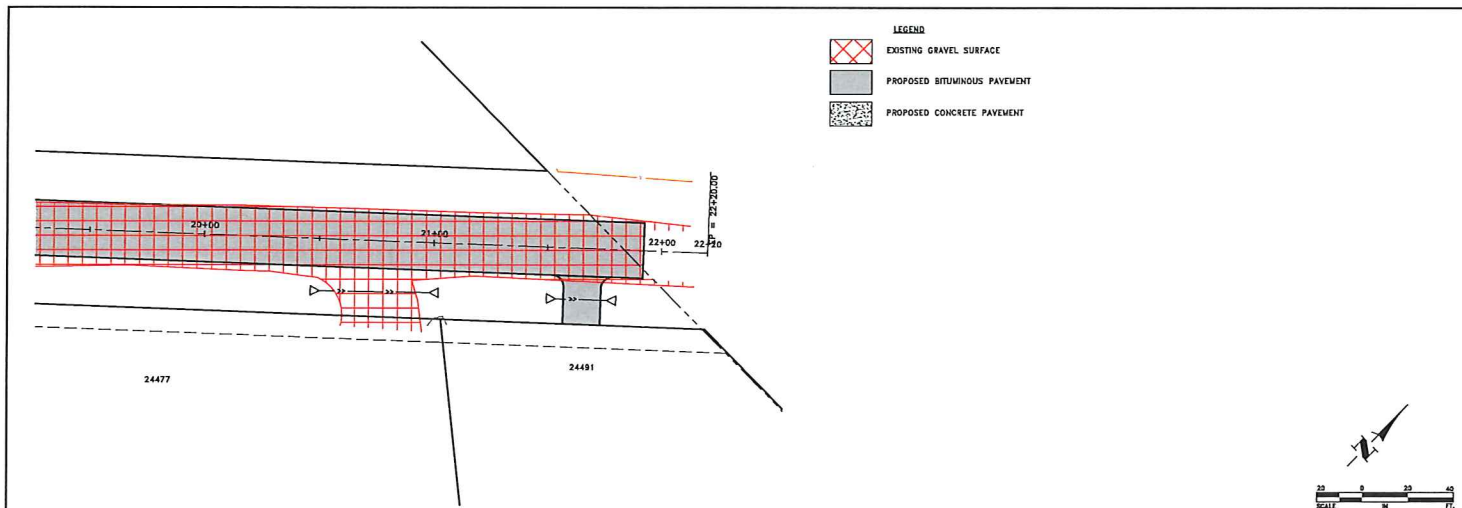
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DATE	REVISION	DESCRIPTION	DESIGNED BY	CHECKED BY	DATE	PROJECT	CONSTRUCTION PLAN	SHEET
8/22/12	1	PRELIMINARY	AV	AV	8/22/12	KINGS HIGHWAY AND RIVERBANK LANE IMPROVEMENT PROJECT	RIVERBANK LANE CITY OF ST. FRANCIS, MINNESOTA	6 OF 10



DATE	REVISION	DESCRIPTION	DESIGNED BY	CHECKED BY	DATE	PROJECT	CONSTRUCTION PLAN	SHEET
8/22/06	1	PRELIMINARY	AV	AV	8/22/06	KINGS HIGHWAY AND RIVERBANK LANE IMPROVEMENT PROJECT	RIVERBANK LANE CITY OF ST. FRANCIS, MINNESOTA	7 OF 10

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Date 8/22/06
 License No. 23481
 J. J. ZACHARY, P.E.

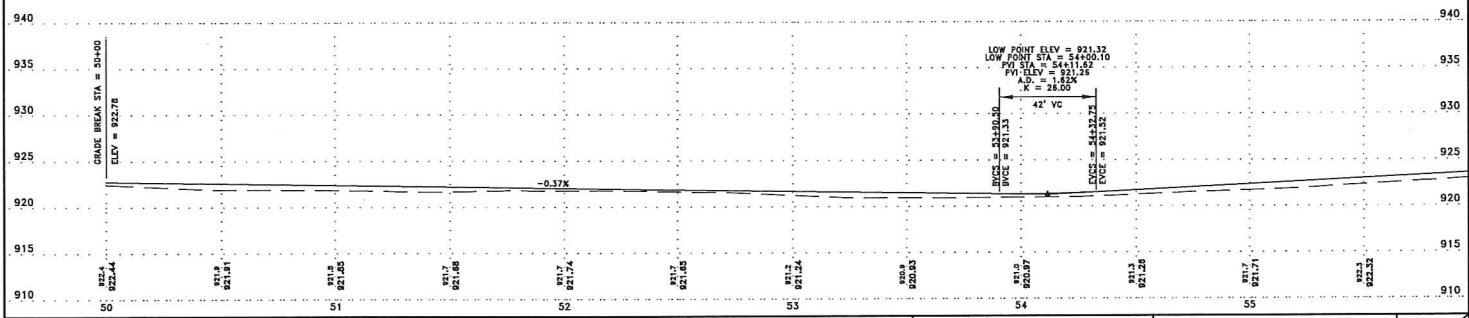
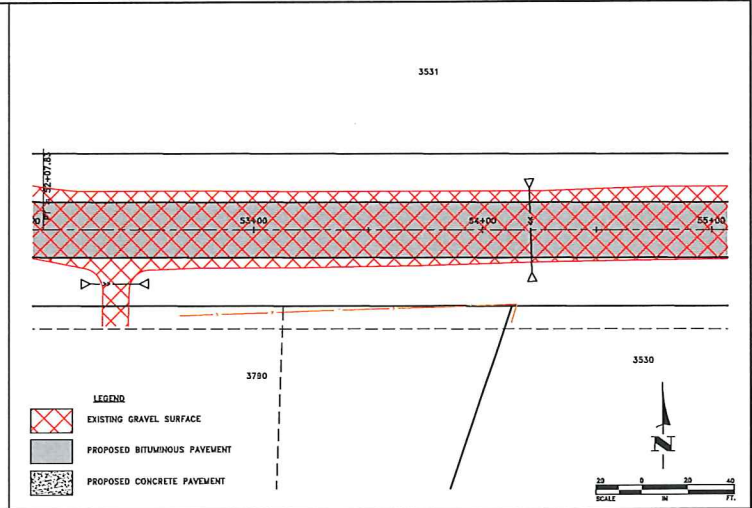
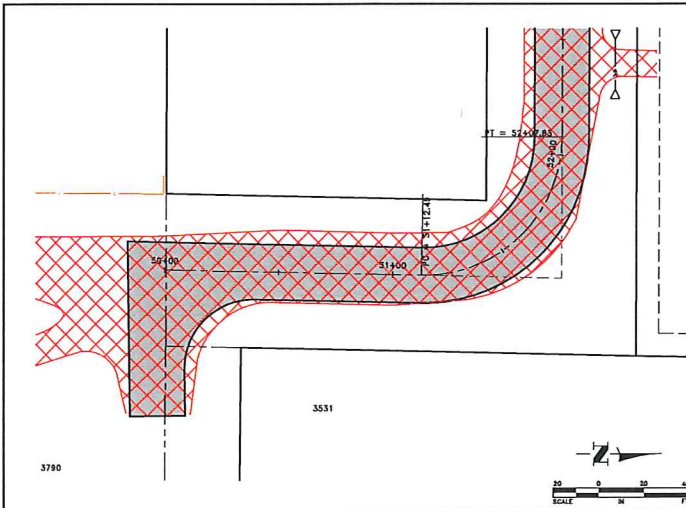
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KINGS HIGHWAY AND
 RIVERBANK LANE
 IMPROVEMENT PROJECT

CONSTRUCTION PLAN
 RIVERBANK LANE
 CITY OF ST. FRANCIS, MINNESOTA

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SF315



DATE	REVISION	DESCRIPTION	BY	CHKD BY
8/22/05	1	PRELIMINARY	AV	AV
8/22/05	2	REVISED	AV	AV
8/22/05	3	REVISED	AV	AV
8/22/05	4	REVISED	AV	AV
8/22/05	5	REVISED	AV	AV
8/22/05	6	REVISED	AV	AV
8/22/05	7	REVISED	AV	AV
8/22/05	8	REVISED	AV	AV
8/22/05	9	REVISED	AV	AV
8/22/05	10	REVISED	AV	AV

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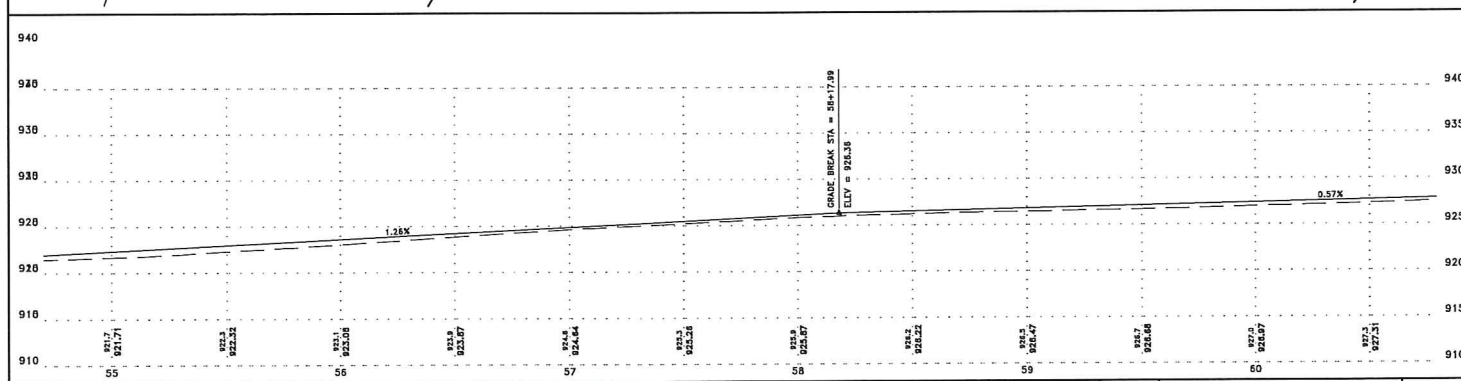


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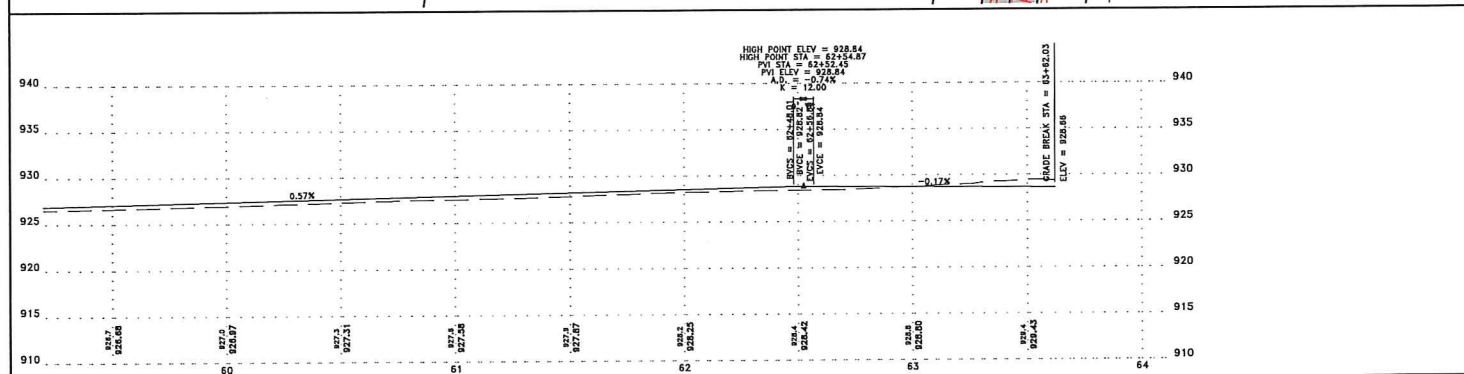
**KINGS HIGHWAY AND
 RIVERBANK LANE
 IMPROVEMENT PROJECT**

CONSTRUCTION PLAN
 KINGS HIGHWAY NW
 CITY OF ST. FRANCIS, MINNESOTA

Sheet 8 of 10
 SF315



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DATE	REVISION	I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer in the State of Minnesota at the time of preparation of this plan. DATE 8/22/2018 JOURNAL, P.E. No. 23461	ENGINEER AV CJ Hakanson Anderson Civil Engineers and Land Surveyors 3501 Thurston Ave., Anoka, Minnesota 55303 763-427-5850 FAX 763-427-9530 www.hakanson-anderson.com	KINGS HIGHWAY AND RIVERBANK LANE IMPROVEMENT PROJECT	CONSTRUCTION PLAN KINGS HIGHWAY NW CITY OF ST. FRANCIS, MINNESOTA	SHEET 10 OF 10
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