



City of Blaine

FEASIBILITY REPORT

PAVEMENT MANAGEMENT PROGRAM 132ND LANE/TAYLOR STREET RECONSTRUCTION

BLAINE, MN

February 19, 2020

Prepared for:
City of Blaine
10801 Town Square Drive NE
Blaine, MN 55449

WSB PROJECT NO. 014966-000



CERTIFICATION

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.



Eric M. Eckman, PE

Date: February 19, 2020

Lic. No. 49954

Quality Control Review By:



Nicholas Hentges, PE

Date: February 19, 2020

Lic. No. 44620

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EXECUTIVE SUMMARY

The proposed project will reconstruct 132nd Lane from Taylor Street to Central Avenue NE, Taylor Street from 129th Avenue to 132nd Lane, 132nd Avenue from Johnson Street to Central Avenue NE, 131st Lane from Lincoln Street to Central Avenue NE, 129th Avenue from Polk Street to Taylor Street, Pierce Street from Taylor Street to 132nd Lane, Lincoln Street from 131st Lane to 132nd Lane, and Johnson Street from Taylor Street to 132nd Lane. Proposed improvements include reclaiming existing bituminous pavement and reconstructing all curb and gutter. The scope of storm sewer improvements includes adding one additional catch basin at existing low points as well as any necessary storm manhole adjustments. A sump and SAFL baffle in the NW quadrant of the project will also be added to improve storm water control and quality. Minimal water or sanitary improvements are defined as part of this project, including water hydrant and curb stop replacements, sanitary manhole adjustments and minor sanitary sewer repair discussed in Section 3, Proposed Improvements. All streets listed will have appropriate traffic control signage and appurtenant construction.

The estimated cost of improvements is \$3,241,086 with \$950,012 proposed to be assessed over a fifteen-year period. The remaining portion of \$2,014,390 is proposed to be paid from the City's Pavement Management Program Fund.

The project is necessary, cost-effective and feasible and will result in a benefit to the properties proposed to be assessed.

1. PROJECT HISTORY

The Blaine City Council initiated the project and ordered the preparation of a feasibility report on October 7 2019, with Resolution No. 19-169

This report is based on field observations, record drawing information, 2017 aerial photography, and 2019 topographic survey.

2. PROJECT AREA CHARACTERISTICS

The project area includes the following streets:

- 132nd Lane from Taylor Street to Central Avenue NE
- Taylor Street from 129th Avenue to 132nd Lane
- 132nd Avenue from Johnson Street to Central Avenue NE
- 131st Lane from Lincoln Street to Central Avenue NE
- 129th Avenue from Polk Street to Taylor Street
- Pierce Street from Taylor Street to 132nd Lane
- Lincoln Street from 131st Lane to 132nd Lane
- Johnson Street from 131st Lane to 132nd Lane

Taylor Street was constructed in 1971 and received overlays in both 1999 (Filmore Street to 132nd Lane) and 2001 (129th Ave to Filmore Street).

The following roadways were constructed in 1971 and received overlays in 2001:

- Pierce Street
- Lincoln Street
- Johnson Street

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- 131st Lane

The following roadways were constructed in 1971 and received overlays in 1998:

- 132nd Avenue
- 132nd Lane

In addition to the work stated above, Blaine Public Works also paved a thin skim patch over majority of the above roadways to maintain the existing pavement until the proposed reconstruction project discussed in this feasibility report.

Borings taken in October 2019 indicate the roadways listed above have an existing section that consists of 3.5" of existing bituminous and 2-6" of existing gravel. The roads are an urban section with existing curb and gutter. The pavement has reached the point of failure with significant block, transverse and longitudinal cracking and has failed to a point where an overlay is not feasible.

The Anoka County Soil Survey indicates the predominant soil types in the project area to be Hydrologic Soil Group (HSG) A or A/D. Based on past projects in the area, the project is not anticipating groundwater to be present in the excavations at the assumed depths of the proposed storm sewer. If ground water is encountered during construction, it is our opinion that it can be drawn down with sumps dug alongside the trench. Deeper excavations below the groundwater table, in sand soils, will likely require a sand point dewatering system.

The proposed project is located in the Coon Creek Watershed District. No portion of the project will impact wetlands as identified on the City's wetland inventory map.

See Exhibit No. 1 for the project location.

See below for existing condition photos.

FEASIBILITY REPORT

132nd Lane – Existing Conditions



Taylor Street – Existing Conditions



FEASIBILITY REPORT

132nd Avenue – Existing Conditions



131st Lane – Existing Conditions



FEASIBILITY REPORT

129th Avenue – Existing Conditions



Pierce Street – Existing Conditions



FEASIBILITY REPORT

Lincoln Street – Existing Conditions



Johnson Street – Existing Conditions



FEASIBILITY REPORT

3. **PROPOSED IMPROVEMENTS**

The proposed improvements will include reconstruction of the existing street section, replacement of hydrants and adjustments of all existing sewer castings and rings. The improvements are necessary, cost-effective, and feasible. Each improvement is further described as follows:

A. **Sanitary Sewer**

Public Works and Engineering staff has reviewed the existing sanitary sewer along the project corridor. There is largely no problem with the existing mains, however there is one pipe in the NW quadrant of the project that will require spot replacement. Aside from this replacement, the extents of sanitary sewer scope on this project will include the adjustment of the existing manhole castings/rings on all sanitary manholes.

B. **Water Main**

Public works and engineering staff have reviewed the water main installation dates and water main break data along the project corridor and concur that the existing ductile iron water main installed in the early 1970's has no issues indicating the need for replacement or repair.

All existing hydrants will be removed and replaced within the project limits, these hydrants were originally constructed in the 1970's and due for replacement. All existing gate valve boxes will be adjusted that are located within the street typical sections. Curb stop condition will be assessed and all necessary replacements will be performed. No further water main improvements have been defined at this time.

C. **Street Construction**

The street typical section will be reconstructed with a section composed of 3-1/2 inches of bituminous pavement on 4" inches of reclaimed gravel base over a compacted subgrade. In addition, the following specific items pertain to the listed street:

- **132nd Lane, Taylor Street, 132nd Avenue, 131st Lane, 129th Avenue, Pierce Street, Lincoln Street, Johnson Street** – These existing streets are all urban road sections and will be reconstructed to the City Standard urban sectioned streets with concrete curb and gutter. All existing 'S' curb will be removed and replaced with type 'B' curb and gutter.

It is not anticipated that additional right-of-way will be needed for the project.

D. **Storm Drainage**

Storm sewer improvements will include adding a sump and SAFL baffle in the northwest quadrant of the project to improve storm water control and quality. In addition, one additional catch basin will be constructed at existing low points to supplement each existing catch basin.

The project will result in a new increase of less than 10,000 SF of impervious surface. However, since the project disturbance is more than an acre, a permit from Coon Creek Watershed District will be required.

4. **IMPACT OF PROPOSED IMPROVEMENTS**

The proposed street improvements will not create any new maintenance issues for the Public Works staff. City will work with affected property owners and the Contractor to resolve any

FEASIBILITY REPORT

situation that may arise during construction. Short term traffic delays, construction dust and noise and erosion will occur. Efforts to minimize these impacts include the restriction of work hours and dust and erosion control measures included in the project. Any disruptions that occur to existing yards, sprinkler systems and driveways will be restored.

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5. SUMMARY OF ESTIMATED PROJECT COSTS AND FUNDING

Project: 19-18

Description: 132nd Lane/Taylor Street Area Reconstruction

Cost Item	Percent	Amount
Construction Costs		
Street Construction		\$2,156,571
Watermain Construction		\$189,275
Sanitary Sewer Construction		\$15,675
Storm Sewer Construction		\$39,280
		\$ 2,400,801
Total Construction Costs		
Administrative Costs		
Engineering	18%	\$432,145
Assessment	1%	\$24,009
Legal	2%	\$48,017
Administration	4%	\$96,032
Capitalized Interest	8%	\$192,065
Bonding	2%	\$48,017
		\$ 840,285
Total Administrative Costs		
		\$ 3,241,086
TOTAL ESTIMATED PROJECT COSTS		

Temporary Funding Source

City Internal Funds

Permanent Funding Source

Assessments, Pavement Management Program Funds (PMP Funds)

Funding

Total Paid from Public Sanitary Utility Funds	\$21,162
Total Paid from Public Water Utility Funds	\$255,522
Total Generation from Assessments	\$950,012
Total Paid from PMP Funds	\$2,014,390

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6. ASSESSMENT METHODOLOGY

It is proposed that the project be assessed over 15 years in accordance with the City's Assessment Policy. It is proposed to assess this project using the linear foot method for the commercial/industrial/high density residential properties and unit method for the residential properties. Proposed assessments are based on 35% of the entire cost of the improved street section for residential properties and 50% of the entire cost of the improved street section for commercial/industrial/high density residential properties, and do not include costs for water main or sanitary sewer work.

See Exhibit No. 1 in Appendix C for the parcels proposed to be assessed and Exhibit Nos. 2 and 3 in Appendix C for the proposed assessment rolls.

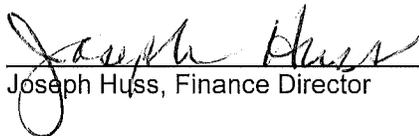
7. FINANCE

The proposed project will be temporarily financed by the City. Permanent funding will be provided by the Pavement Management Program Funds and the costs assessed to the benefiting parcels in accordance with current City Assessment Policy and Minnesota Statutes Chapter 429, Special Assessment Laws.

A. Finance Director Statement

With reference to this Feasibility Report for Improvement Project 19-18 as prepared by WSB dated February 19, 2020 I find the following:

1. The project will be temporarily funded through existing City internal funds whereupon permanent financing will be obtained through the Pavement Management Program Funds and assessments.
2. Sufficient moneys are currently available from the City's internal funds to temporarily fund the special assessment portion of the project. It is estimated that \$950,012 will be assessed.
3. Sufficient moneys are currently available from the City's Public Utility Funds to pay for proposed utility improvements for street reconstruction at an estimated cost of \$276,684.



Joseph Huss, Finance Director

FEASIBILITY REPORT

8. PROJECTED SCHEDULE

January 28, 2020	Public Information Meeting to discuss project and proposed assessments
February 19, 2020	Receive Feasibility Report Order Public Hearing
March 02, 2020	Hold Public Hearing Order Improvements and Order Preparation of Plans and Specifications
April 06, 2020	Approve Plans and Specifications Order Advertisement for Bids
May 5, 2020	Open Bids
May 18, 2020	Award Contract
May – September 2020	Construct Improvements
October 2020	Assess Project
2021	First assessment payment due with real estate taxes

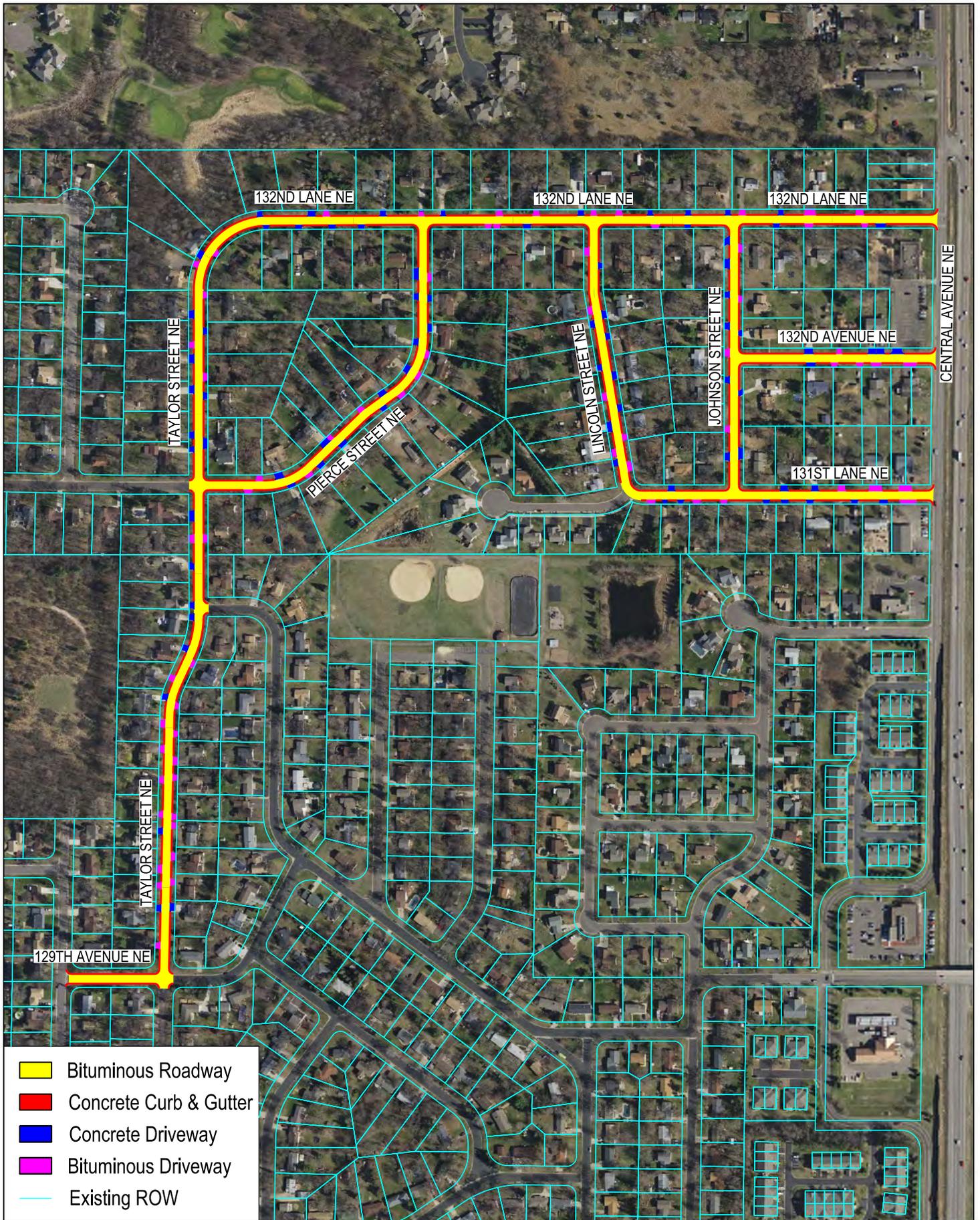
9. PROJECT FEASIBILITY AND RECOMMENDATION

The project as proposed is technically and financially feasible, cost effective and will result in a benefit to the properties proposed to be assessed. It is recommended that the Council accept this report, hold the public hearing and order the improvements.

FEASIBILITY REPORT

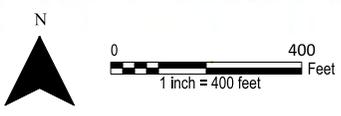
APPENDIX A

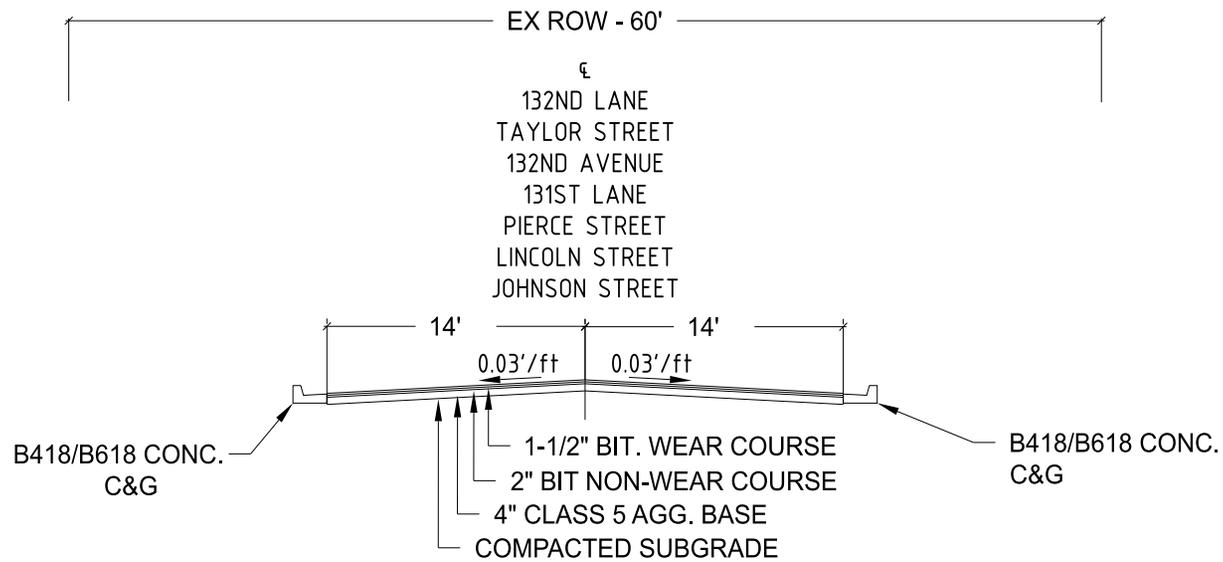
- Exhibit 1: Project Location
- Exhibit 2: Roadway Typical Sections
- Exhibit 3 - 5: Storm Sewer Design



- Bituminous Roadway
- Concrete Curb & Gutter
- Concrete Driveway
- Bituminous Driveway
- Existing ROW

Exhibit 1: Project Area Map
 132nd Lane, Taylor Street Area Reconstruction
 Feasibility Assessment Report
 City of Blaine





BlaineMN.gov

Exhibit 2: Roadway Typical Sections
 132nd Lane, Taylor Street Area Reconstruction
 Feasibility Assessment Report
 City of Blaine



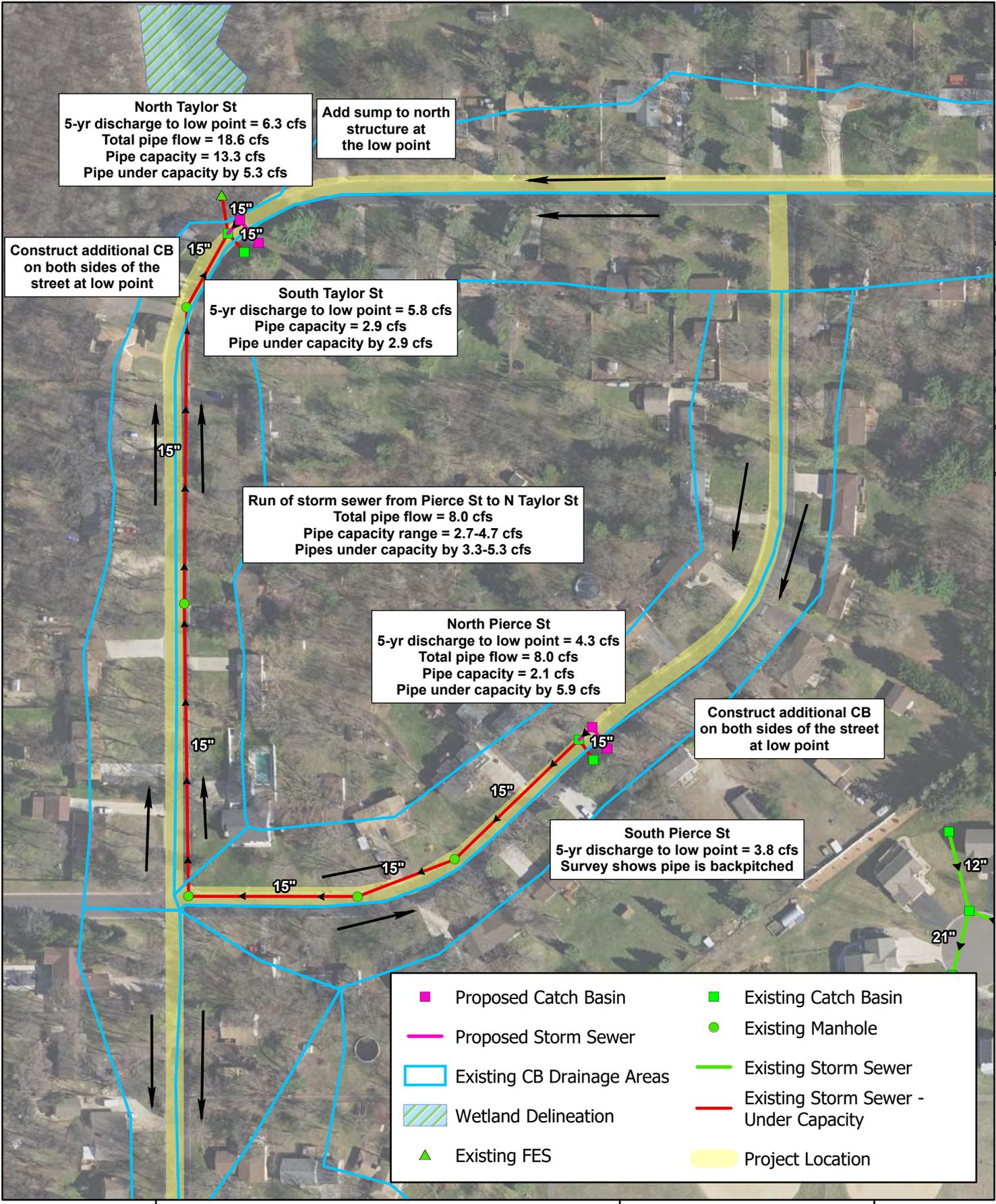
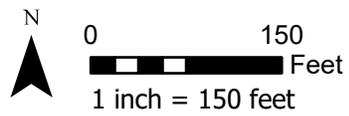


Exhibit 3 - Storm Sewer Design
 2020 Street Reconstruction - Area 2
 City of Blaine



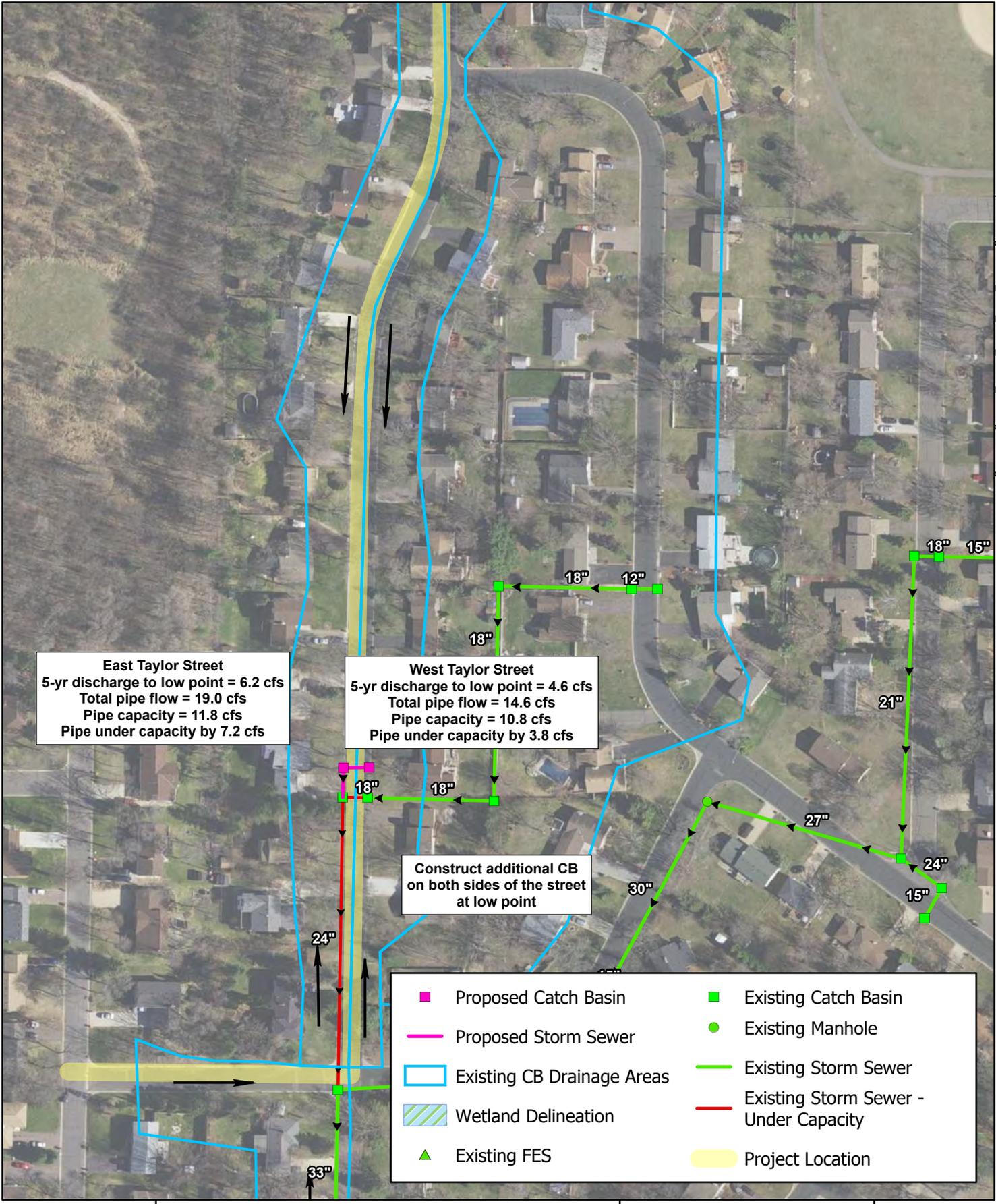
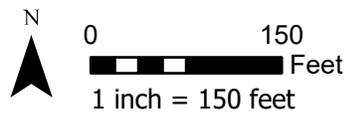


Exhibit 4 - Storm Sewer Design
 2020 Street Reconstruction - Area 2
 City of Blaine



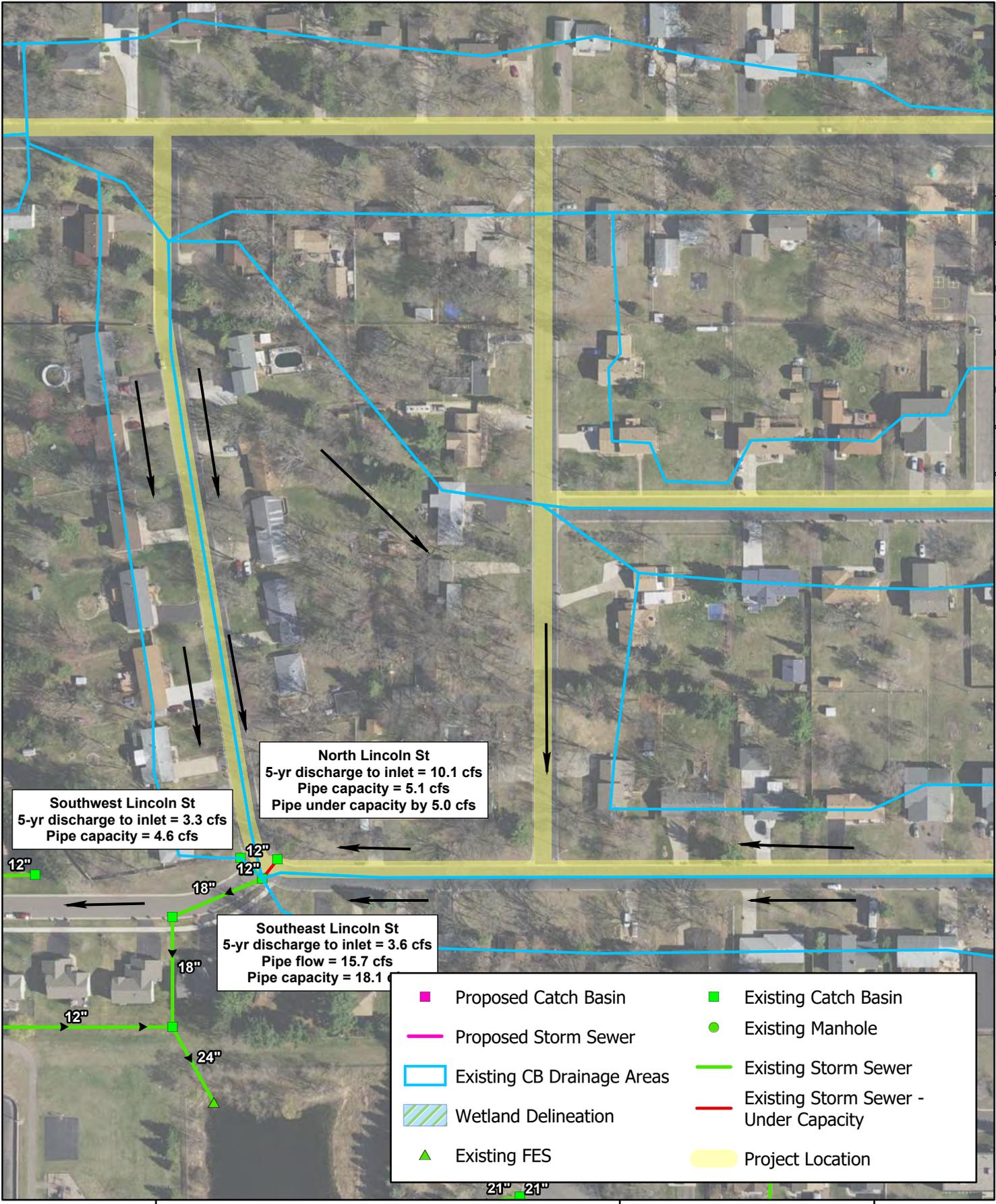
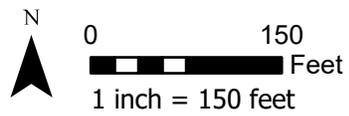


Exhibit 5 - Storm Sewer Design

2020 Street Reconstruction - Area 2
City of Blaine



APPENDIX B
Opinion of Probable Cost

OPINION OF PROBABLE COST

WSB Project 132nd Lane/Taylor Street Area Reconstruction
Project Location Blaine, MN
City Project No: 19-18
WSB Project No: 014966-000

Estimator Initials KJP
 Project Manager Initials NEH
 24-Jan-20

Item No.	MnDOT Specification No.	Extension Number	Description	Notes	Unit	Estimated Unit Price	Estimated Unit Price	Project Total		132ND LANE/TAYLOR STREET		
								Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost	
A. Street Construction												
1	2021.501	00010	2021.501/10	MOBILIZATION		LUMP SUM	\$233,300.00	\$244,965.00	1	\$244,965.00	1	\$244,965.00
2	2104.502	03300	2104.502/3300	SALVAGE SIGN		EACH	\$35.40	\$37.17	47	\$1,746.99	47	\$1,746.99
3	2104.502	03590	2104.502/3590	SALVAGE MAIL BOX SUPPORT		EACH	\$45.00	\$47.25	109	\$5,150.25	109	\$5,150.25
4	2104.503	00315	2104.503/315	REMOVE CURB & GUTTER		LIN FT	\$3.35	\$3.52	14328	\$50,398.74	14328	\$50,398.74
5	2104.503	00195	2104.503/195	SAWING CONCRETE PAVEMENT (FULL DEPTH)		LIN FT	\$4.30	\$4.52	1440	\$6,501.60	1440	\$6,501.60
6	2104.503	00205	2104.503/205	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)		LIN FT	\$1.85	\$1.94	1632	\$3,170.16	1632	\$3,170.16
7	2104.504	00080	2104.504/80	REMOVE CONCRETE DRIVEWAY PAVEMENT		SQ YD	\$9.25	\$9.71	2411	\$23,416.84	2411	\$23,416.84
8	2104.504	00110	2104.504/110	REMOVE BITUMINOUS DRIVEWAY PAVEMENT		SQ YD	\$7.25	\$7.61	2183	\$16,618.09	2183	\$16,618.09
9	2104.504	00120	2104.504/120	REMOVE BITUMINOUS PAVEMENT		SQ YD	\$3.80	\$3.99	32044	\$127,855.56	32044	\$127,855.56
10	2104.601	01310	2104.601/1310	REMOVE MISCELLANEOUS STRUCTURES		LUMP SUM	\$50,000.00	\$30,000.00	1	\$30,000.00	1	\$30,000.00
11	2106.507	00010	2106.507/10	EXCAVATION - COMMON		CU YD	\$20.20	\$21.21	5400	\$114,534.00	5400	\$114,534.00
12	2106.507	00130	2106.507/130	COMMON EMBANKMENT (CV)		CU YD	\$47.80	\$50.19	445	\$22,334.55	445	\$22,334.55
13	2112.604	00010	2112.604/10	SUBGRADE PREPARATION		SQ YD	\$0.40	\$0.42	32044	\$13,458.48	32044	\$13,458.48
14	2123.610	00410	2123.61/410	STREET SWEEPER (WITH PICKUP BROOM)		HOUR	\$131.00	\$137.55	45	\$6,189.75	45	\$6,189.75
15	2130.523	00010	2130.523/10	WATER		M GALLON	\$30.40	\$31.92	250	\$7,980.00	250	\$7,980.00
16	2131.506	00010	2131.506/10	CALCIUM CHLORIDE SOLUTION		GALLON	\$2.55	\$2.68	12000	\$32,130.00	12000	\$32,130.00
17	2211.507	00170	2211.507/170	AGGREGATE BASE (CV) CLASS 5		CU YD	\$10.00	\$10.00	5341	\$53,410.00	5341	\$53,410.00
18	2301.602	00071	2301.602/71	DRILL & GROUT REINF BAR (EPOXY COATED)		EACH	\$30.30	\$31.82	10	\$318.15	10	\$318.15
19	2357.506	00010	2357.506/10	BITUMINOUS MATERIAL FOR TACK COAT		GALLON	\$2.60	\$2.73	1602	\$4,373.46	1602	\$4,373.46
20	2360.504	23320	2360.504/23320	TYPE SP 12.5 WEAR CRS MIX(3,C)2.0" THICK		SQ YD	\$25.70	\$26.99	2183	\$56,103.10	2183	\$56,103.10
21	2360.509	23205	2360.509/23205	TYPE SP 12.5 NON WEAR COURSE MIX (3,B)		TON	\$73.80	\$77.49	3621	\$280,591.29	3621	\$280,591.29
22	2360.509	23300	2360.509/23300	TYPE SP 12.5 WEARING COURSE MIX (3,C)		TON	\$75.30	\$79.07	2716	\$214,740.54	2716	\$214,740.54

OPINION OF PROBABLE COST

WSB Project 132nd Lane/Taylor Street Area Reconstruction
Project Location Blaine, MN
City Project No: 19-18
WSB Project No: 014966-000

Estimator Initials KJP
 Project Manager Initials NEH

24-Jan-20

Item No.	MnDOT Specification No.	Extension Number	Description	Notes	Unit	Estimated Unit Price	Estimated Unit Price	Project Total		132ND LANE/TAYLOR STREET	
								Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost
23	2521.518	00040	2521.518/40		SQ FT	\$7.50	\$7.88	50	\$393.75	50	\$393.75
24	2521.518	00060	2521.518/60		SQ FT	\$8.00	\$8.40	100	\$840.00	100	\$840.00
25	2531.503	02080	2531.503/2080		LIN FT	\$14.30	\$15.02	10030	\$150,600.45	10030	\$150,600.45
26	2531.503	02315	2531.503/2315		LIN FT	\$20.20	\$21.21	4299	\$91,181.79	4299	\$91,181.79
27	2531.504	00060	2531.504/60		SQ YD	\$78.20	\$82.11	2411	\$197,967.21	2411	\$197,967.21
28	2540.602		2540.602/		EACH	\$101.00	\$106.05	109	\$11,559.45	109	\$11,559.45
29	2540.602	00140	2540.602/140		EACH	\$50.00	\$52.50	109	\$5,722.50	109	\$5,722.50
30	2563.601	00010	2563.601/10		LUMP SUM	\$9,600.00	\$10,080.00	1	\$10,080.00	1	\$10,080.00
31	2563.601	00100	2563.601/100		LUMP SUM	\$5,000.00	\$5,250.00	1	\$5,250.00	1	\$5,250.00
32	2564.602	01515	2564.602/1515		EACH	\$101.00	\$106.05	47	\$4,984.35	47	\$4,984.35
33	2573.501	00025	2573.501/25		LUMP SUM	\$7,410.00	\$7,780.50	1	\$7,780.50	1	\$7,780.50
34	2573.502	00110	2573.502/110		EACH	\$153.00	\$160.65	20	\$3,213.00	20	\$3,213.00
35	2573.503	00064	2573.503/64		LIN FT	\$2.90	\$3.05	15000	\$45,675.00	15000	\$45,675.00
36	2574.507	00100	2574.507/100		CU YD	\$32.30	\$33.92	1483	\$50,295.95	1483	\$50,295.95
37	2574.508	00013	2574.508/13		POUND	\$0.76	\$0.80	1930	\$1,540.14	1930	\$1,540.14
38	2575.504	00011	2575.504/11		SQ YD	\$4.80	\$5.04	8897	\$44,840.88	8897	\$44,840.88
39	2575.504	00073	2575.504/73		SQ YD	\$3.80	\$3.99	1500	\$5,985.00	1500	\$5,985.00
40	2575.505	00021	2575.505/21		ACRE	\$505.00	\$530.25	0.3	\$164.38	0.3	\$164.38
41	2575.508	25141	2575.508/25141		POUND	\$45.00	\$47.25	10	\$472.50	10	\$472.50
42	2575.523	00020	2575.523/20		SQ YD	\$3.80	\$3.99	1500.0	\$5,985.00	1500.0	\$5,985.00
						CONSTRUCTION TOTAL			\$1,960,518.39		\$1,960,518.39

OPINION OF PROBABLE COST

WSB Project 132nd Lane/Taylor Street Area Reconstruction
Project Location Blaine, MN
City Project No: 19-18
WSB Project No: 014966-000

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 24-Jan-20

132ND LANE/TAYLOR STREET												
Item No.	MnDOT Specification No.	Extension Number	Description	Notes	Unit	Estimated Unit Price	Estimated Unit Price	Project Total		Estimated Quantity	Estimated Cost	
								Estimated Quantity	Estimated Cost			
						+ 10% CONTINGENCY		\$196,052.00				\$196,052.00
						SUBTOTAL		\$2,156,570.39				\$2,156,570.39
						INDIRECT COST TOTAL (INDIRECT)		\$754,799.64				\$754,799.64
						TOTAL		2,911,370.02				\$2,911,370.02
B. Watermain Construction												
43	2104.502	00850	2104.502/850	REMOVE GATE VALVE & BOX	EACH	\$247.00	\$259.35	11	\$2,852.85	11	\$2,852.85	
44	2104.502	00880	2104.502/880	REMOVE HYDRANT	EACH	\$742.00	\$779.10	11	\$8,570.10	11	\$8,570.10	
45	2504.602	00010	2504.602/10	CONNECT TO EXISTING WATER MAIN	EACH	\$4,771.00	\$5,009.55	11	\$55,105.05	11	\$55,105.05	
46	2504.602	00020	2504.602/20	HYDRANT	EACH	\$4,770.00	\$5,008.50	11	\$55,093.50	11	\$55,093.50	
47	2504.602	00806	2504.602/806	6" GATE VALVE & BOX	EACH	\$2,030.00	\$2,131.50	11	\$23,446.50	11	\$23,446.50	
48	2504.602	3100	2504.602/3100	1" CURB STOP & BOX	EACH	\$900.00	\$900.00	30	\$27,000.00	30	\$27,000.00	
						CONSTRUCTION TOTAL		\$172,068.00				\$172,068.00
						+ 10% CONTINGENCY		\$17,207.00				\$17,207.00
						SUBTOTAL		\$189,275.00				\$189,275.00
						INDIRECT COST TOTAL (INDIRECT)		\$66,246.25				\$66,246.25
						TOTAL		255,521.25				\$255,521.25
C. Sanitary Construction												
49	2503.602	131	2503.602/131	RECONNECT TO EXISTING SANITARY SEWER SER	EACH	\$2,500.00	\$2,500.00	1	\$2,500.00	1	\$2,500.00	
50	2503.603	24010	2503.603/24010	10" PVC SANITARY SERVICE PIPE	LIN FT	\$100.00	\$100.00	2	\$200.00	2	\$200.00	
51	2506.502	06020	2506.502/6020	ADJUST FRAME & RING CASTING	EACH	\$550.00	\$577.50	20	\$11,550.00	20	\$11,550.00	
						CONSTRUCTION TOTAL		\$14,250.00				\$14,250.00
						+ 10% CONTINGENCY		\$1,425.00				\$1,425.00
						SUBTOTAL		\$15,675.00				\$15,675.00
						INDIRECT COST TOTAL (INDIRECT)		\$5,486.25				\$5,486.25
						TOTAL		21,161.25				\$21,161.25
D. Storm Sewer Construction												
52	2021.501	0010.000	2021.501/10	MOBILIZATION	LUMP SUM	\$5,000.00	\$5,000.00	1	\$5,000.00	1	\$5,000.00	
53	2104.502	00770	2104.502/770	REMOVE MANHOLE OR CATCH BASIN	EACH	\$450.00	\$472.50	1	\$472.50	1	\$472.50	
54	2503.503	19155	2503.503/19155	15" RC PIPE SEWER DES 3006 CL V	LIN FT	\$38.00	\$39.90	140	\$5,586.00	140	\$5,586.00	
55	2503.602	00320	2503.602/320	CONNECT TO EXISTING STORM SEWER	EACH	\$800.00	\$840.00	1	\$840.00	1	\$840.00	
56	2503.602	00360	2503.602/360	CONNECT INTO EXISTING DRAINAGE STRUCTURE	EACH	\$500.00	\$525.00	2	\$1,050.00	2	\$1,050.00	
57	2506.502	06000	2506.502/6000	CASTING ASSEMBLY	EACH	\$700.00	\$735.00	7	\$5,145.00	7	\$5,145.00	
58	2506.502	00300	2506.502/300	CONST DRAINAGE STRUCTURE DESIGN SPECIAL	EACH	\$742.00	\$779.10	3	\$2,337.30	3	\$2,337.30	

OPINION OF PROBABLE COST

WSB Project 132nd Lane/Taylor Street Area Reconstruction
Project Location Blaine, MN
City Project No: 19-18
WSB Project No: 014966-000

Estimator Initials KJP
 Project Manager Initials NEH

24-Jan-20

Item No.	MnDOT Specification No.	Extension Number	Description	Notes	Unit	Estimated Unit Price	Estimated Unit Price	Project Total		132ND LANE/TAYLOR STREET	
								Estimated Quantity	Estimated Cost	Estimated Quantity	Estimated Cost
59	2506.503	02420	2506.503/2420		LIN FT	\$350.00	\$367.50	12	\$4,410.00	12	\$4,410.00
60	2506.503	00190	2506.503/190		LIN FT	\$450.00	\$472.50	4	\$1,890.00	4	\$1,890.00
61	2506.503	04820	2506.503/4820		LIN FT	\$950.00	\$997.50	9	\$8,977.50	9	\$8,977.50
						CONSTRUCTION TOTAL			\$35,708.30		\$35,708.30
						+ 10% CONTINGENCY			\$3,571.00		\$3,571.00
						SUBTOTAL			\$39,279.30		\$39,279.30
						INDIRECT COST TOTAL (INDIRECT)			\$13,747.76		\$13,747.76
						TOTAL			53,027.06		\$53,027.06

APPENDIX C
Assessable Parcels

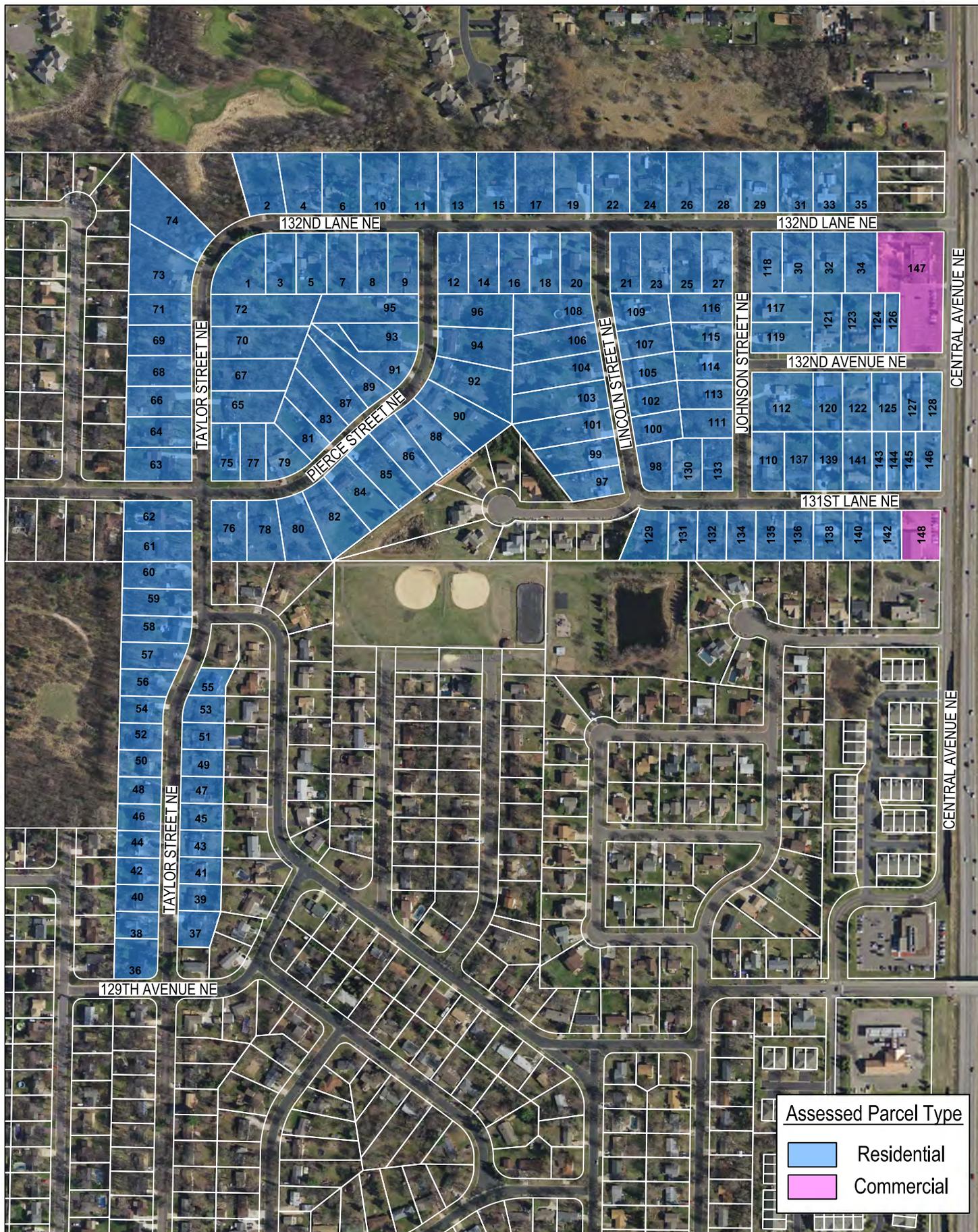
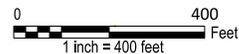


Exhibit 1: Project Assessment Map
 132nd Lane, Taylor Street Area Reconstruction
 Feasibility Assessment Report
 City of Blaine



PROJECT 19-18
 132ND LANE/TAYLOR STREET AREA RECONSTRUCTION PROJECT
132ND LANE/TAYLOR STREET AREA RECONSTRUCTION

CITY OF BLAINE
 EXHIBIT NO. 2 - SINGLE FAMILY RESIDENTIAL PROPERTY - PER UNIT
 PROPOSED ASSESSMENT ROLL

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ADMINISTRATIVE COSTS	\$754,799.64			
TOTAL COST	\$2,950,649.33			
	<u>RESIDENTIAL RATE</u>	x35%	TOTAL FRONT FOOTAGE	ASSESSMENT RATE PER FRONT FOOT
ASSESSABLE COST	\$1,032,727.27 /		16304.5 LF	= \$63.34

RESIDENTIAL PROPERTY

ASSESSMENT RATE		SINGLE FAMILY RESIDENTIAL ASSESSABLE FOOTAGE		AMOUNT ASSESSED		ASSESSABLE RESIDENTIAL LOT UNITS		ASSESSMENT RATE PER RESIDENTIAL LOT UNIT
\$63.34	X	14336.4 LF	=	\$908,069.72	/	146	=	\$6,219.66

PROPERTY PIN	PROPERTY ADDRESS	PROPERTY OWNER	ASSESSABLE RESIDENTIAL LOT UNITS	ASSESSMENT RATE PER RESIDENTIAL LOT UNIT	PROPOSED ASSESSMENT
053123220018	1050 132ND LN NE	BATSCHÉ DAVID W & KAREN D	1	\$6,219.66	\$6,219.66
053123220008	1055 132ND LN NE	LILLIGREN CHAS JR & MARY JO	1	\$6,219.66	\$6,219.66
053123220017	1056 132ND LN NE	MILFORD JR ROBERT	1	\$6,219.66	\$6,219.66
53123220007	1065 132ND LN NE	CHOLLETT JON R & SHERRI L M	1	\$6,219.66	\$6,219.66
053123220016	1066 132ND LN NE	NELSON GREGORY & ANNA WRIGHT	1	\$6,219.66	\$6,219.66
053123220006	1075 132ND LN NE	ONDRACEK JACQUELINE	1	\$6,219.66	\$6,219.66
53123220015	1076 132ND LN NE	BUDNICK DANIEL L & DIANE M	1	\$6,219.66	\$6,219.66
053123220014	1086 132ND LN NE	JENSEN PAULA	1	\$6,219.66	\$6,219.66
053123220013	1096 132ND LN NE	NURKKALA RUSSELL	1	\$6,219.66	\$6,219.66
53123220005	1105 132ND LN NE	MOREN CHAD	1	\$6,219.66	\$6,219.66
53123220004	1145 132ND LN NE	ANTAL ANDREW & CECILIA KOCON	1	\$6,219.66	\$6,219.66
053123220012	1150 132ND LN NE	WHITBY DALE R & DEBRA J	1	\$6,219.66	\$6,219.66
053123220003	1151 132ND LN NE	LEKO ELAINE E & MICHAEL T	1	\$6,219.66	\$6,219.66
53123220011	1160 132ND LN NE	RAMSTAD ANN E	1	\$6,219.66	\$6,219.66
53123220002	1161 132ND LN NE	POPE WILLIAM G	1	\$6,219.66	\$6,219.66
053123220010	1170 132ND LN NE	FRANKE BARBARA & MICHAEL	1	\$6,219.66	\$6,219.66
053123220001	1171 132ND LN NE	MOSHER CHARLES W & NAOMI J	1	\$6,219.66	\$6,219.66
053123220009	1180 132ND LN NE	HOYEZ CASSANDRA & JOHN UDZINSKI	1	\$6,219.66	\$6,219.66
053123210011	1181 132ND LN NE	WARDEN ROBERT	1	\$6,219.66	\$6,219.66
53123210022	1190 132ND LN NE	CHRISTENSEN BRETT J & KATHY A	1	\$6,219.66	\$6,219.66
053123210021	1250 132ND LN NE	SMITH JAVIN THOMAS & MARIA	1	\$6,219.66	\$6,219.66
053123210010	1251 132ND LN NE	KLUNGSETH NANCY	1	\$6,219.66	\$6,219.66
053123210020	1260 132ND LN NE	PARSONS DAWN	1	\$6,219.66	\$6,219.66
053123210009	1261 132ND LN NE	HOGSTAD GARY D & LAVONNE R	1	\$6,219.66	\$6,219.66
053123210019	1270 132ND LN NE	EIKLENBORG JENNIFER & TRAVIS	1	\$6,219.66	\$6,219.66
053123210008	1271 132ND LN NE	ZURN MICHAEL A & SUSAN C	1	\$6,219.66	\$6,219.66
53123210018	1280 132ND LN NE	FITZPATRICK DANIEL	1	\$6,219.66	\$6,219.66
053123210007	1281 132ND LN NE	CEKRO JADRANKO & MAJIJA	1	\$6,219.66	\$6,219.66
053123210006	1301 132ND LN NE	ZYTKOSKEE CANDACE & DAVID	1	\$6,219.66	\$6,219.66
053123210016	1310 132ND LN NE	LARSON KELLI	1	\$6,219.66	\$6,219.66
53123210005	1311 132ND LN NE	URMAN MARK A	1	\$6,219.66	\$6,219.66

PROJECT 19-18
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132ND LANE/TAYLOR STREET AREA RECONSTRUCTION

CITY OF BLAINE
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 PROPOSED ASSESSMENT ROLL

ASSESSMENT RATE BREAKDOWN			
CONSTRUCTION COSTS*	\$2,195,849.69	*(CONSTRUCTION COST DOES NOT INCLUDE WATER MAIN, SANITARY SEWER OR STORM SEWER COSTS)	
ADMINISTRATIVE COSTS	\$754,799.64		
TOTAL COST	\$2,950,649.33		
	<u>RESIDENTIAL RATE</u> x35%	TOTAL FRONT FOOTAGE	ASSESSMENT RATE PER FRONT FOOT
ASSESSABLE COST	\$1,032,727.27 /	16304.5 LF	= \$63.34

053123210015	1320 132ND LN NE	REYNERTSON CARISSA & ERIC	1	\$6,219.66	\$6,219.66
053123210004	1321 132ND LN NE	SCHROEDER JESSICA & ROBERT SIMBECK	1	\$6,219.66	\$6,219.66
053123210014	1330 132ND LN NE	KOEHLER ASHLEY & GABRIEL	1	\$6,219.66	\$6,219.66
53123210003	1331 132ND LN NE	KOCUR MARTHA	1	\$6,219.66	\$6,219.66
053123230001	12900 TAYLOR ST NE	PESTELLO SHIRLEY	1	\$6,219.66	\$6,219.66
53123230084	12907 TAYLOR ST NE	HUBBARD DANIEL L & JULIE A	1	\$6,219.66	\$6,219.66
53123230073	12908 TAYLOR ST NE	HUYNH HIEP & BE NAM NGUYEN	1	\$6,219.66	\$6,219.66
053123230083	12915 TAYLOR ST NE	METROPOLITAN COUNCIL	1	\$6,219.66	\$6,219.66
053123230072	12916 TAYLOR ST NE	PETERSON BONNIE	1	\$6,219.66	\$6,219.66
053123230082	12923 TAYLOR ST NE	BUXENGARD CARYN & WAYNE	1	\$6,219.66	\$6,219.66
053123230071	12924 TAYLOR ST NE	PERCY ERNEST C JR & ALICE E	1	\$6,219.66	\$6,219.66
053123230081	12931 TAYLOR ST NE	PETERSEN DEREK	1	\$6,219.66	\$6,219.66
053123230070	12932 TAYLOR ST NE	HORBUL WILLIAM	1	\$6,219.66	\$6,219.66
053123230080	12939 TAYLOR ST NE	DUAME BRIAN R	1	\$6,219.66	\$6,219.66
053123230069	12940 TAYLOR ST NE	WHALEY JOSEPH & PAMELA KAY	1	\$6,219.66	\$6,219.66
53123230079	12947 TAYLOR ST NE	STRIEBEL DUSTIN	1	\$6,219.66	\$6,219.66
053123230068	12948 TAYLOR ST NE	PERRY DAN & KAYLA	1	\$6,219.66	\$6,219.66
053123230078	13001 TAYLOR ST NE	WILABY WADE B	1	\$6,219.66	\$6,219.66
053123230067	13002 TAYLOR ST NE	PANTZE VAUGHN C & MCMAHON L L	1	\$6,219.66	\$6,219.66
053123230077	13009 TAYLOR ST NE	NELSON DAVID ALAN & NANCY LYNN	1	\$6,219.66	\$6,219.66
053123230066	13010 TAYLOR ST NE	REAMER JILL & TIMOTHY	1	\$6,219.66	\$6,219.66
053123230076	13017 TAYLOR ST NE	SCHACHEL RONALD W & JOYCE M	1	\$6,219.66	\$6,219.66
53123230065	13018 TAYLOR ST NE	KAHLE MYRON R & BARBARA J	1	\$6,219.66	\$6,219.66
053123230075	13025 TAYLOR ST NE	HOUSTON KAMIEL	1	\$6,219.66	\$6,219.66
53123230064	13026 TAYLOR ST NE	VANDENBERG LEW E & KAREN M	1	\$6,219.66	\$6,219.66
053123230063	13034 TAYLOR ST NE	LINCOLN RICHARD E JR	1	\$6,219.66	\$6,219.66
53123230062	13042 TAYLOR ST NE	YOUEL ROBERT M & NANCY K	1	\$6,219.66	\$6,219.66
053123230061	13050 TAYLOR ST NE	NOVOTNY BERNARD J & TOMIKO	1	\$6,219.66	\$6,219.66
053123230060	13064 TAYLOR ST NE	COUGHLIN ANN & MICHAEL	1	\$6,219.66	\$6,219.66
053123220057	13142 TAYLOR ST NE	BARRETT TANNER & JUSTIN RUBY	1	\$6,219.66	\$6,219.66
053123220056	13146 TAYLOR ST NE	STAHL GEORGE P JR	1	\$6,219.66	\$6,219.66
053123220055	13152 TAYLOR ST NE	LLOYD JOHN & SHELLEY	1	\$6,219.66	\$6,219.66
053123220054	13154 TAYLOR ST NE	DANIELSON DOUGLAS W & TONI	1	\$6,219.66	\$6,219.66
053123220046	13163 TAYLOR ST NE	STONELAKE STEVEN & KATHLEEN	1	\$6,219.66	\$6,219.66
53123220053	13164 TAYLOR ST NE	O'CONNELL PATRICIA	1	\$6,219.66	\$6,219.66
053123220047	13173 TAYLOR ST NE	REHM BRENT & MERRYCAROL	1	\$6,219.66	\$6,219.66
053123220052	13174 TAYLOR ST NE	FONDIE GERALD H & VICTORIA	1	\$6,219.66	\$6,219.66
053123220051	13200 TAYLOR ST NE	ALZEN GARY A & JANELL K	1	\$6,219.66	\$6,219.66
053123220048	13201 TAYLOR ST NE	MARSHALL BARNETTE & ESSIE	1	\$6,219.66	\$6,219.66
053123220050	13210 TAYLOR ST NE	SLATER JORGE A & ALICE J	1	\$6,219.66	\$6,219.66
053123220049	13211 TAYLOR ST NE	BREIDENSTEIN SHAWN	1	\$6,219.66	\$6,219.66
053123220020	13220 TAYLOR ST NE	GAVIC JESSE & KELSEY	1	\$6,219.66	\$6,219.66
053123220019	13226 TAYLOR ST NE	MARJAMA LILA H	1	\$6,219.66	\$6,219.66

PROJECT 19-18
 132ND LANE/TAYLOR STREET AREA RECONSTRUCTION PROJECT
132ND LANE/TAYLOR STREET AREA RECONSTRUCTION

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ASSESSABLE COST	\$1,032,727.27 /	16304.5 LF	= \$63.34

53123220045	13150 PIERCE ST NE	ABRAHAM RICHARD A & CAROL J	1	\$6,219.66	\$6,219.66
053123220033	13151 PIERCE ST NE	BECKLIN ELIZABETH	1	\$6,219.66	\$6,219.66
053123220044	13154 PIERCE ST NE	TOLEDO JOSHUA & LAURA	1	\$6,219.66	\$6,219.66
053123220032	13155 PIERCE ST NE	STEBERG STEVEN R & BEVERLY	1	\$6,219.66	\$6,219.66
053123220043	13158 PIERCE ST NE	CHRISTENSON HAL J & SHIRLEEN N	1	\$6,219.66	\$6,219.66
053123220031	13159 PIERCE ST NE	OLSON JAMES M & CYNTHIA M	1	\$6,219.66	\$6,219.66
053123220042	13162 PIERCE ST NE	SMITH KRISTEL	1	\$6,219.66	\$6,219.66
053123220030	13163 PIERCE ST NE	MAAHS KENNETH J & KARIN T	1	\$6,219.66	\$6,219.66
053123220041	13164 PIERCE ST NE	LEE MELISSA	1	\$6,219.66	\$6,219.66
053123220029	13167 PIERCE ST NE	WILKINS LILLOSA	1	\$6,219.66	\$6,219.66
053123220028	13171 PIERCE ST NE	PROPERTIES BY JSUN INC	1	\$6,219.66	\$6,219.66
053123220027	13175 PIERCE ST NE	QUIEN BETTY LOU	1	\$6,219.66	\$6,219.66
053123220040	13176 PIERCE ST NE	ANDERSON VICKY	1	\$6,219.66	\$6,219.66
053123220026	13179 PIERCE ST NE	HUBBARD KELTON	1	\$6,219.66	\$6,219.66
053123220038	13180 PIERCE ST NE	JOHNSON JESSICA & MICHAEL	1	\$6,219.66	\$6,219.66
053123220025	13183 PIERCE ST NE	RISTOW JAMES C & NICOLLE M	1	\$6,219.66	\$6,219.66
053123220065	13186 PIERCE ST NE	POPPENHAGEN RICHARD	1	\$6,219.66	\$6,219.66
053123220024	13191 PIERCE ST NE	HEYDA MITCHELL J & KONI L	1	\$6,219.66	\$6,219.66
053123220036	13200 PIERCE ST NE	STUMO PHILLIP E & MARION G	1	\$6,219.66	\$6,219.66
053123220023	13201 PIERCE ST NE	JANNIES WILLIAM	1	\$6,219.66	\$6,219.66
53123220035	13210 PIERCE ST NE	HAGLE JAMES E SR	1	\$6,219.66	\$6,219.66
53123220022	13211 PIERCE ST NE	LAND SANDRA	1	\$6,219.66	\$6,219.66
053123210064	13150 LINCOLN ST NE	ANDERSON DORIS & WILLIAM TRUSTEE	1	\$6,219.66	\$6,219.66
053123210047	13151 LINCOLN ST NE	DECKER DONALD	1	\$6,219.66	\$6,219.66
53123210065	13160 LINCOLN ST NE	ZACHMEIER NATHAN	1	\$6,219.66	\$6,219.66
53123210048	13161 LINCOLN ST NE	PAUL TERRY	1	\$6,219.66	\$6,219.66
53123210066	13170 LINCOLN ST NE	ZAMORA PAUL & ANITA E	1	\$6,219.66	\$6,219.66
53123210049	13171 LINCOLN ST NE	PERES JONATHAN	1	\$6,219.66	\$6,219.66
053123210067	13180 LINCOLN ST NE	KJELLBERG DANIEL	1	\$6,219.66	\$6,219.66
053123210068	13190 LINCOLN ST NE	HUNTER BRUCE C & NANCY M	1	\$6,219.66	\$6,219.66
053123210050	13191 LINCOLN ST NE	GUNDERSON RICHARD N	1	\$6,219.66	\$6,219.66
053123210069	13200 LINCOLN ST NE	MILLAR MINDY & RYAN	1	\$6,219.66	\$6,219.66
053123210051	13201 LINCOLN ST NE	PETERSON ALLISON & BRUCE	1	\$6,219.66	\$6,219.66
53123210070	13210 LINCOLN ST NE	MAYER THOMAS M & LORI ANN	1	\$6,219.66	\$6,219.66
053123210052	13211 LINCOLN ST NE	KOTTKE KEITH A & LORI M	1	\$6,219.66	\$6,219.66
053123210034	13151 JOHNSON ST NE	DUNHAM HOPE & LUCAS GETTY	1	\$6,219.66	\$6,219.66
053123210044	13162 JOHNSON ST NE	2015-1 IH2 BORROWER LP	1	\$6,219.66	\$6,219.66
053123210033	13171 JOHNSON ST NE	SPICER ERIN	1	\$6,219.66	\$6,219.66
053123210043	13172 JOHNSON ST NE	ABRAHAMSON ALAN	1	\$6,219.66	\$6,219.66
053123210042	13186 JOHNSON ST NE	WEINMANN RICHARD J & MONICA	1	\$6,219.66	\$6,219.66
053123210041	13204 JOHNSON ST NE	PULLEN GERALD L & KAREN F	1	\$6,219.66	\$6,219.66
53123210040	13214 JOHNSON ST NE	ANDERSEN COREY	1	\$6,219.66	\$6,219.66
053123210027	13215 JOHNSON ST NE	PROVENCHER PATRICIA & THEODORE	1	\$6,219.66	\$6,219.66

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053123210017	13233 JOHNSON ST NE	NOVAK JACOB		1	\$6,219.66	\$6,219.66
53123210028	1307 132ND AVE NE	PAYTON CHANTWAN & WALKER JABAAREY		1	\$6,219.66	\$6,219.66
53123210032	1316 132ND AVE NE	WILKERSON ROBERT C & ANDREA		1	\$6,219.66	\$6,219.66
053123210026	1317 132ND AVE NE	GAUSTAD GREGORY D & MARY C		1	\$6,219.66	\$6,219.66
53123210031	1320 132ND AVE NE	LEWSKI PROPERTIES LLC		1	\$6,219.66	\$6,219.66
053123210025	1323 132ND AVE NE	RADTKE RODNEY & LYNN		1	\$6,219.66	\$6,219.66
53123210081	1325 132ND AVE NE	HAILEMARIAM RAHEL		1	\$6,219.66	\$6,219.66
053123210030	1326 132ND AVE NE	BUMGARDNER ORRIN E & RUTH L		1	\$6,219.66	\$6,219.66
053123210082	1327 132ND AVE NE	THAO CAI & NHIA		1	\$6,219.66	\$6,219.66
53123210079	1334 132ND AVE NE	JOHNSON JR ALTON		1	\$6,219.66	\$6,219.66
053123210080	1336 132ND AVE NE	HARDU EVELYN & HORATIO		1	\$6,219.66	\$6,219.66
053123210062	1252 131ST LN NE	JANITSCHKE TAMARA & AARON WICK		1	\$6,219.66	\$6,219.66
053123210046	1253 131ST LN NE	FISH DEIDRE		1	\$6,219.66	\$6,219.66
053123210061	1262 131ST LN NE	BERNDT SHANE		1	\$6,219.66	\$6,219.66
053123210060	1272 131ST LN NE	DYBEVIK CHASIDY		1	\$6,219.66	\$6,219.66
53123210045	1273 131ST LN NE	SOLTIS DANIEL A & IRENE V		1	\$6,219.66	\$6,219.66
053123210059	1282 131ST LN NE	2015-3 IH2 BORROWER LP		1	\$6,219.66	\$6,219.66
053123210058	1306 131ST LN NE	HANSON JENNIFER & TROY		1	\$6,219.66	\$6,219.66
053123210057	1316 131ST LN NE	MILLER KIRK		1	\$6,219.66	\$6,219.66
053123210035	1319 131ST LN NE	GEHRIG SCOTT R & SUSAN H		1	\$6,219.66	\$6,219.66
053123210056	1326 131ST LN NE	WATKINS DOROTHY		1	\$6,219.66	\$6,219.66
053123210036	1329 131ST LN NE	DVORAK CATHY & SCOTT		1	\$6,219.66	\$6,219.66
053123210055	1332 131ST LN NE	SKRYNNIK NICKOLAY & OKSANA		1	\$6,219.66	\$6,219.66
053123210037	1335 131ST LN NE	BULLIS FRED C & SANDRA G		1	\$6,219.66	\$6,219.66
053123210054	1336 131ST LN NE	ELVIDGE DENNIS & KATHRYN		1	\$6,219.66	\$6,219.66
53123210072	1339 131ST LN NE	HEALY STEPHEN		1	\$6,219.66	\$6,219.66
53123210071	1341 131ST LN NE	KINARA DORIS		1	\$6,219.66	\$6,219.66
053123210074	1347 131ST LN NE	THOMAS AARON H		1	\$6,219.66	\$6,219.66
053123210073	1349 131ST LN NE	NEWMAN BRUCE T & CAROL A		1	\$6,219.66	\$6,219.66
TOTALS:				146	\$908,070.36	

PROJECT 19-18
 132ND LANE/TAYLOR STREET AREA RECONSTRUCTION PROJECT
132ND LANE/TAYLOR STREET AREA RECONSTRUCTION
 CITY OF BLAINE
 EXHIBIT NO. 3 - COMMERCIAL/INDUSTRIAL PROPERTY
 PROPOSED ASSESSMENT ROLL

ASSESSMENT RATE BREAKDOWN						
CONSTRUCTION COSTS	\$2,195,849.69	(CONSTRUCTION COST DOES NOT INCLUDE WATER MAIN OR SANITARY SEWER COSTS)			COMMERCIAL/ INDUSTRIAL/HIGH DENSITY RESIDENTIAL ASSESSMENT PERCENTAGE	COMMERCIAL/ INDUSTRIAL/HIGH DENSITY RESIDENTIAL ASSESSMENT RATE PER FRONT FOOT
ADMINISTRATIVE COSTS	\$754,799.64			TOTAL COST PER FRONT FOOT		
TOTAL COST	\$2,950,649.33		TOTAL FRONT FOOTAGE			
ASSESSABLE COST	\$2,950,649.33	/	16304.52	=	\$180.97	*
					50%	=
						\$90.49

PROPERTY PIN	PROPERTY OWNER	PROPERTY ADDRESS	ASSESSABLE FRONT FOOTAGE	ASSESSMENT RATE PER FRONT FOOT	PROPOSED ASSESSMENT
053123210083	THE WAY OF THE SHEPHERD	13200 CENTRAL AVE NE	342.5	\$90.49	\$30,994.40
053123210053	ELVIDGE DENNIS W & KATHRYN	13142 CENTRAL AVE NE	121.0	\$90.49	\$10,946.22
TOTALS:			463.5		\$41,940.62

APPENDIX D
Geotechnical Report



GEOTECHNICAL REPORT

2020 STREET IMPROVEMENTS – AREA 2 BLAINE MINNESOTA

January 3, 2020

Prepared for:
City of Blaine
10801 Town Square Drive NE
Blaine, MN 56449

CITY PROJECT NO. 19-18
WSB PROJECT NO. 014966-000

GEOTECHNICAL REPORT

**2020 STREET IMPROVEMENTS – AREA 2
CITY PROJECT 19-18
BLAINE, MINNESOTA**

**FOR
CITY OF BLAINE, MINNESOTA**

January 3, 2020



CERTIFICATION

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.



Darin E. Hyatt, PE

Date: January 3, 2020

Lic. No. 41316



January 3, 2020

Mr. Dan Schluender
City of Blaine
10801 Town Square Drive NE
Blaine, MN 56449

Re: Geotechnical Report
2020 Street Improvements – Area 2
Blaine, Minnesota
City Project No.: 19-18
WSB Project No.: 014966-000

Dear Mr. Schluender:

We have conducted a geotechnical subsurface exploration program for the above referenced project. This report contains our soil boring logs, an evaluation of the conditions encountered in the borings and our recommendations for subgrade preparation, underground utility installation, and other geotechnical related design and construction considerations.

If you have any questions concerning this report or our recommendations, or for construction material testing for this project, please call us at (952) 737-4660.

Sincerely,

WSB

Darin Hyatt, PE
Senior Geotechnical Engineer

Mark Osborn, PE
Geotechnical Project Engineer

Attachment
Geotechnical Report

DEH/tw

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TITLE SHEET

CERTIFICATION SHEET

LETTER OF TRANSMITTAL

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Appendix A

Soil Boring Exhibit

Logs of Test Borings

Symbols and Terminology on Test Boring Log

Notice to Report Users Boring Log Information

Unified Soil Classification System (USCS)

1. INTRODUCTION

1.1 Project Location

The proposed roadway improvements will be completed under City Project No. 19-18 in a location designated as Area 2. The project contains the following streets:

129th Avenue from Polk Street to Taylor Street
Taylor Street from 129th Avenue to 132nd Lane
132nd Lane from Taylor Street to Central Avenue
Pierce Street from Taylor Street and 132nd Lane
Lincoln and Johnson Streets from 132nd Lane to 131st Lane
131st Avenue from Lincoln Street to Central Avenue
132 Avenue from Johnson Street to Central Avenue

The approximate boring locations can be found on the Soil Boring Exhibit in **Appendix A**.

1.2 Project Description

The segments of roads addressed in this report are urban sections and all will undergo a full reconstruction which will replace the existing pavement section and curb and gutters. The reconstructs will be to an urban section following the City of Blaine's specification and standard.

The roadways will generally maintain the existing vertical and horizontal alignments.

A possible BMP addition/expansion may be included with this project for the area located to the northwest of the intersection of Taylor Street and 132nd Lane.

WSB has developed recommendations for this project in consideration of the proposed layout, loadings, and configurations as understood at this time. WSB must be made aware of the revised or additional information in order to evaluate the recommendations for continued applicability.

1.3 Purpose and Project Scope of Services

The City of Blaine authorized this work. In order to assist the design team in preparing plans and specifications, we have developed recommendations for pavement subgrade preparation and pavement thicknesses. As such, we have completed a subsurface exploration program and prepared a geotechnical report for the referenced site. This stated purpose was a significant factor in determining the scope and level of service provided. Should the purpose of the report change the report immediately ceases to be valid and use of it without WSB's prior review and written authorization shall be at the user's sole risk.

Our authorized scope of work has been limited to:

1. Mobilization / Demobilization of a Truck Mounted Drill Rig.
2. Clearing underground utilities utilizing the Gopher State One Call.
3. Drilling 12 standard penetration borings to a depth of about 5 to 14 ½ feet each.
4. Sealing the borings per Minnesota Department of Health procedures.
5. Perform soil classification and analysis.
6. Review of readily available project information and geologic data.
7. Providing this geotechnical report containing:
 - a. Summary of our findings.
 - b. Discussion of subsurface soil and groundwater conditions and how they may affect the proposed pavements.
 - c. Estimated R-value of the soils.
 - d. A discussion of soils for use as structural fill and site fill.

2. PROCEDURES

2.1 Boring Layout and Soil Sampling Procedures

WSB recommended the boring depths and selected the desired locations. Our field crew staked the boring locations using existing site features as guides. The approximate boring locations are shown on the Soil Boring Exhibit in **Appendix A** which is an aerial photo.

We drilled the borings on November 13 and 14, 2019, with a truck-mounted CME-55 drill rig operated by a two-person crew. The drill crew advanced the borings using continuous hollow stem augers. Drilling methods, crew chief, depths, sampling interval, casing usage, groundwater observations, test data, and other drilling information are indicated on the boring logs.

Generally, the drill crew sampled the soil in advance of the auger tip at two and one-half foot (2½') intervals of a depth to the borings termination depth. The soil samples were obtained using a split-barrel sampler which was driven into the ground during standard penetration tests in accordance with ASTM D 1586, Standard Method of Penetration Test and Split-Barrel Sampling of Soils.

The materials encountered were described on field logs and representative samples were containerized and transported to our laboratory for further examination and testing.

The samples were visually examined to estimate the distribution of grain sizes, plasticity, consistency, moisture condition, color, presence of lenses and seams, and apparent geologic origin. We classified the soils according to type using the Unified Soil Classification System (USCS). A chart describing the Unified Soil Classification System is included in **Appendix A**.

2.2 Groundwater Measurements and Borehole Abandonment

The drill crew observed the borings for free groundwater while drilling and after completion. These observations and measurements are noted on the boring logs. The crew then backfilled the borings in accordance with Minnesota Department of Health regulations.

2.3 Boring Log Procedures and Qualifications

The subsurface conditions encountered by the test borings are illustrated on the Logs of Test Borings in **Appendix A**. Similar soils were grouped into the strata shown on the boring logs, and the appropriate estimated USCS classification symbols were also added. The depths and thickness of the subsurface strata indicated on the boring logs were estimated from the drilling results.

The transition between materials (horizontal and vertical) is approximate and is usually far more gradual than shown. Information on actual subsurface conditions exists only at the specific locations indicated and is relevant only to the time exploration was performed. Subsurface conditions and groundwater levels at other locations may differ from conditions found at the indicated locations. The nature and extent of these conditions would not become evident until exposed by construction excavation. These stratification lines were used for our analytical purposes and, due to the aforementioned limitations, should not be used as a basis of design or construction cost estimates.

3. EXPLORATION RESULTS

3.1 Site and Geology

The standard penetration test borings were performed on the existing two-lane, bituminous paved urban roadways.

Geologic origins can be difficult to determine solely from boring samples. We referenced online geologic data of the area and used our experience to help determine geologic origin of the soils, however only a detailed geologic exploration would accurately determine the geologic history of the site.

The Anoka County Geologic Atlas indicated the surficial geology of the area is mostly lacustrine deposits from Glacial Lake Anoka. These deposits consist primarily of very fine to medium grained sands. At depth, sediments may contain interbedded silt and silty clay layers. These sediments may also be interbedded with sand and gravel deposits from meltwater streams.

3.2 Subsurface Soil and Groundwater Conditions

The boring profile generally consisted of a pavement section and fill materials overlying naturally deposited lacustrine sand.

Pavement Section

The bituminous thickness encountered in our borings ranged from about 3 1/2 to 7 inches and averaged just over 4 inches. The aggregate base ranged from about 2 to 9 inches and averaged under 4 1/2 inches. It should be noted that a discernable layer of aggregate base was not observed in Boring PB-3. It is likely that an aggregate base layer was present but it can be difficult to distinguish the difference between an aggregate base material and the underlying granular materials. This is especially true in a small diameter bore hole.

Fill

Many of our borings encountered fill below the pavement section. The fill consisted of sand with silt except at Boring PB-12 where silty sand fill was encountered. The fill was generally brown to dark brown in color and moist.

Lacustrine Deposit

Below the pavement section and fill materials (where encountered) our borings encountered lacustrine deposits. The lacustrine deposits consisted of sands that were fine-grained, various shades of brown and were generally moist, however, in Boring PB-12 they became waterbearing.

Table 1 below presents the approximate pavement section thickness and subgrade soils that were encountered within the borings.

Table 1: Roadway Soil Boring Profiles

Boring No.	Bituminous Thickness (inches)	Aggregate Base Thickness (inches)	Subgrade Soils (Upper 4 feet)
PB-1	4	4	Fill: Sand with silt
PB-2	4	4	Fill: Sand with silt
PB-3	7	nd	Sand
PB-4	3 1/2	3	Sand
PB-5	3 1/2	3	Sand
PB-6	4	2	Fill: Sand with silt

PB-7	3 ½	2 ½	Sand
PB-8	3 ½	4	Fill: Sand with silt
PB-9	4	5 ½	Fill: Sand with Silt
PB-10	3 ½	6	Fill: Sand with silt over sand
PB-11	5	4	Fill: Sand with silt
PB-12	4	9	Fill: Silty sand over sand

nd – Not Discernable

3.3 Strength Characteristics

The penetration resistance N-values of the materials encountered were recorded during drilling and are indicated as blows per foot (BPF). Those values provide an indication of soil strength characteristics and are located on the boring log sheets. Also, visual-manual classification techniques and apparent moisture contents were also utilized to make an engineering judgment of the consistency of the materials.

Table 2 presents a summary of the penetration resistances in the soils for the standard penetration test borings completed and remarks regarding the material strengths of the soils.

Table 2: Penetration Resistances

Soil Type	Classification	Penetration Resistances	Remarks
Fill	SP-SM, SM	2 to 12 BPF	Variable compaction
Lacustrine	SP	4 to 14 BPF	Very loose to medium dense; Generally loose

The preceding is a generalized description of soil conditions at this site. Variations from the generalized profile exist and should be assessed from the boring logs, the normal geologic character of the deposits, and the soils uncovered during site excavation.

3.4 Groundwater Conditions

WSB took groundwater level readings in the exploratory borings, reviewed the data obtained, and discussed its interpretation of the data in the text of the report.

Relatively permeable sand soils were predominately encountered in our borings and groundwater was only encountered in our deepest boring. In Boring PB-12, groundwater was encountered at a depth of about 13 ½ feet below ground surface.

Note that groundwater levels may fluctuate due to seasonal variations (e.g. precipitation, snowmelt and rainfall) and/or other factors not evident at the time of measurement.

4. ENGINEERING ANALYSIS AND RECOMMENDATIONS

4.1 Discussion

After removal of the existing pavement section, it is our opinion that the proposed pavement can generally be supported on the fill or lacustrine soils encountered in the borings.

4.2 Pavement Areas

After removal of the existing pavement section, we anticipate sand and sand with silt will be the predominate subgrade soil encountered, however, silty sand was encountered in Boring PB-12. We recommend proof roll tests on the subgrade soils to help identify areas that may require corrective action. The proof roll test should generally follow the requirements of MnDOT 2111, except a fully loaded tandem axle dump truck or a full water truck should be utilized for the proof roll. If the proof roll tests fail, corrective action will be required. Corrective actions may include scarifying, disking, moisture conditioning, and recompaction or excavation and replacement of the subgrade soils may be required.

Once the site has been prepared as recommended, we anticipate the subgrade will consist of a mixture of sands, sands with silt, and to a lesser extent silty sand. The MnDOT Flexible Pavement Design Guidance Memo from January 2017 indicates soils such as those anticipated have an estimated R-value of 20 to 70. Based on our experience, we recommend an estimated R-value of 50 be used for design of roadways for this project.

We have assumed that the roadways in this evaluation have an ADT of less than 500.

Based on the aforementioned ADT values we used the State Aid 10 Ton ESAL Traffic Forecast Calculator to calculate the Equivalent Single Axle Loads (ESAL's) for the roadway design. Our forecasting was based on a 10-ton road design and an urban vehicle classification on a typical 2-lane road. We estimated that traffic volumes would increase at an average rate of 1%. Our design is based on a standard twenty (20) year design life of the pavement section.

We calculated the 20-year flexible ESAL's to be on the order of 178,000.

Based on MnDOT's FlexPave excel design utilizing granular equivalent charts, we recommend the pavement sections indicated below in Table 3. It is our understanding that this section is consistent with the City of Blaine's standard pavement section.

Table 3: Recommended Flexible Pavement Section

Section	Thickness (inches)	Granular Equivalent
Bituminous Wear Course, MnDOT 2360	1 1/2	3.38
Bituminous non-Wear Course, MnDOT 2360	2	4.5
MnDOT Aggregate Base, MnDOT Class 5	4	4
TOTAL	-	11.88

We recommend that the bituminous pavement meet MnDOT Specification 2360. Aggregate base placement for pavement support should meet the gradation and quality requirements for Class 5, 5Q, or 6 per MnDOT Specification 3138. All aggregate base material should be compacted to 100 percent of its standard Proctor maximum dry density.

Within several years after initial paving, some thermal shrinkage cracks will develop. We recommend routine maintenance be performed to improve pavement performance and increase pavement life. Pavement should be sealed with a liquid bitumen sealer to retard water intrusion into the base course and

subgrade. Localized patch failures may also develop where trucks or buses turn on the pavement. When these occur, they should be cut out and patch repaired.

4.3 Backfill and Fill Selection and Compaction

It is our opinion the onsite non-organic sand soils may be reused as backfill and fill provided, they are moisture conditioned and can be compacted to their specified densities. Any wet soils excavated would need to be dried before reuse as an engineered fill. Backfills with cobbles larger than six inches (6") should not come in contact with utilities. We recommend that sandy soils be moisture conditioned to meet compaction specifications as determined from their standard Proctor tests (ASTM D-698). Sand fill should be spread in thin lifts (8-12 inches depending on compaction equipment) to allow for full depth compaction.

Table 4 indicates the recommended compaction levels.

Table 4: Recommended Level of Compaction for Backfill and Fill

Area	Percent of Standard Proctor Maximum Dry Density
Pavement: Within 3 feet of grading grade* Within 3 foot perimeter of structures such as manholes	100
Pavement: Greater than 3 feet below grading grade	95
Utility Trench (unless within 3 feet of pavement grading grade)	95
Landscaping (non-structural)	90

*Grading grade is defined as the bottom of the aggregate base.

4.4 Potential BMP

The proposed location of the potential BMP was not accessible to our drilling rig. Due to site constraints, the closest we could drill to the potential BMP was on the road adjacent to its proposed location. Due to this our boring (PB-12) encountered a pavement section and fill to a depth of about 4 ½ feet. Below this depth our boring encountered naturally deposited sand. The native sands encountered in our borings is quite uniform and consisted of a fine-grained sand (USCS Classification Symbol SP).

Based on an online version of the Design Infiltration Rates Table (last modified on August 14, 2019) from the Minnesota Storm Water Manual, poorly graded sand (SP) falls in to Hydrologic Soil Group A and has a recommend infiltration rate of 0.80 inches per hour.

4.5 Dewatering

Our borings encountered waterbearing sand soils at a depth of about 13 ½ feet in the deepest boring performed to evaluate a pond. Therefore, it is our opinion that dewatering will not be necessary for the planned roadway reconstructions.

4.6 Construction Considerations

Good surface drainage should be maintained throughout the work so that the site is not vulnerable to ponding during or after a rainfall. If water enters the excavations, it should be promptly removed prior to further construction activities. Under no circumstances should fill or concrete be placed into standing water.

Soil corrections at this site for foundations and pavement subgrades may not be continuous in all areas. We recommend tapering the fills back to native soils at a ten to one (10:1) slope.

4.7 Construction Safety

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P “Excavations and Trenches”. This document states that excavation safety is the responsibility of the contractor. Reference to this OSHA requirement should be included in the job specifications.

The responsibility to provide safe working conditions on this site, for earthwork, building construction, or any associated operations is solely that of the contractor. This responsibility is not borne in any manner by WSB.

4.8 Cold Weather Construction

It is our understanding that construction is unlikely to occur during the winter months. However, if the construction does continue into the winter months, we recommend the following guidelines.

Roadbed embankments should not be constructed during periods when the embankment material freezes while being placed and compacted, nor should any embankment material be placed on soil that is frozen to a depth greater than 4 inches. When the soils are frozen to a depth exceeding 4 inches, at a time when weather conditions are such that embankment construction could be continued without the material freezing as it is being placed and compacted, the contractor may be permitted to excavate the frozen soil and proceed with the embankment construction for so long as the weather will permit. The frozen soils should be pulverized or replaced with other suitable soils, as may be necessary to construct the embankments as specified. Only unfrozen fill should be used.

4.9 Field Observation and Testing

The soil conditions illustrated on the Logs of Test Borings in Appendix A are indicative of the conditions only at the boring locations. For this reason, we recommend that all excavations at this site be observed by a soils engineer or technician prior to fill or backfill placement to determine if the soils are capable of supporting the fill or backfill loads. These observations are necessary to judge if all unsuitable materials have been removed from within the planned construction area and an appropriate degree of lateral oversize has been provided.

WSB also recommends a representative number of field density tests be taken in all engineered fill and backfill placed to aid in judging its suitability. Fill placement and compaction should be monitored and tested to determine that the resulting fill and backfill conforms to specified density, strength or compressibility requirements. We recommend at least one compaction test for every 150 feet of utility trench at a vertical interval of two (2) feet. Prior to use, any proposed fill and backfill material should be submitted to the WSB laboratory for testing to verify compliance with recommendations and project specifications.

Dynamic Cone Penetrometer (DCP) tests can be completed in the aggregate base in lieu of density testing. We recommend following MnDOT Specification 2211.3.D.2.c.

WSB would be pleased to provide the necessary field observation, monitoring and testing services during construction.

4.10 Plan Review and Remarks

The observations, recommendations and conclusions described in this report are based primarily on information provided to WSB, obtained from our subsurface exploration, our experience, several necessary assumptions and the scopes of service developed for this project and are for the sole use of our client. We recommend that WSB be retained to perform a review of final design drawing and specifications to evaluate that the geotechnical engineering report has not been misinterpreted. Should there be any changes in the design or location of the structures related to this project or if there are any uncertainties in the report we should be notified. We would be pleased to review any project changes and modify the recommendations in this report (if necessary) or provide any clarification in writing.

The entire report should be kept together; for example, boring logs should not be removed and placed in the specifications separately.

The boring logs and related information included in this report are indicators of the subsurface conditions only at the specific locations indicated on the Soil Boring Exhibit and times noted on the Logs of Test Boring sheets in Appendix A. The subsurface conditions, including groundwater levels, at other locations on the site may differ significantly from conditions that existed at the time of sampling and at the boring locations.

The test borings were completed by WSB solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.

WSB has not performed any observations, investigations, studies or testing that is not specifically listed in the scope of service. WSB shall not be liable for failing to discover any condition whose discovery required the performance of services not authorized by the Agreement.

5. STANDARD OF CARE

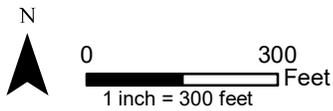
The recommendations and opinions contained in this report are based on our professional judgment. The soil testing and geotechnical engineering services performed for this project have been performed with the level of skill and diligence ordinarily exercised by reputable members of the same profession under similar circumstances, at the same time and in the same or a similar locale. No warranty, either express or implied, is made.

APPENDIX A

Soil Boring Exhibit
Log of Test Borings
Symbols and Terminology on Test Boring Log
Notice to Report Users Boring Log Information
Unified Soil Classification Sheet (USCS)



Soil Boring Exhibit
 Geotechnical Report
 2020 Street Improvements
 Blaine, MN
 WSB Project: 014966-000



LOG OF TEST BORING



PROJECT NAME: 2020 Street Improvements
 CLIENT/WSB #: 014966-000

PROJECT LOCATION: Blaine, MN

BORING NUMBER PB-1

PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot
						TYPE	No.				
0	4" OF BITUMINOUS 4" OF AGGREGATE BASE		Pavement Section								0 8 16
1	SAND WITH SILT, fine grained, brown to dark brown, moist	SP-SM	Fill			HSA	1				
2											
3						SB	2	10			10
4						HSA					
5											
6	SAND, fine grained, brown, moist, medium dense	SP	Lacustrine			SB	3	12			12
6	End of Boring 6.0 ft.										

GEOTECHNICAL N-PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS

START: 11/13/2019

END: 11/13/2019

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:		Logged By:	
								R. Kurth		DEH	
11/13/2019	2:30 pm	6	4.5	3.5	None		3 1/4" HSA 0' - 6.5'				
								Notes:			

LOG OF TEST BORING



PROJECT NAME: 2020 Street Improvements
 CLIENT/WSB #: 014966-000

PROJECT LOCATION: Blaine, MN

BORING NUMBER PB-2

PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot
						TYPE	No.				
0 - 0.5	4" OF BITUMINOUS 4" OF AGGREGATE BASE		Pavement Section								0 5.5 11
0.5 - 1.0	SAND WITH SILT, fine grained, brown to dark brown, moist	SP-SM	Fill			HSA	1				
1.0 - 3.0											
3.0 - 4.0						SB	2	7			
4.0 - 5.0						HSA					
5.0 - 6.0	SAND, fine grained, brown, moist, loose	SP	Lacustrine			SB	3	6			
6.0	End of Boring 6.0 ft.										

GEOTECHNICAL N-PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS

START: 11/13/2019

END: 11/13/2019

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:	Logged By:
11/13/2019	2:07 pm	6	4.5	4	None		3 1/4" HSA 0' - 6.5'	R. Kurth	DEH
								Notes:	

LOG OF TEST BORING



PROJECT NAME: 2020 Street Improvements
 CLIENT/WSB #: 014966-000

PROJECT LOCATION: Blaine, MN

BORING NUMBER PB-3

PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot
						TYPE	No.				
0 - 0.7	7" OF BITUMINOUS		Pavement Section								
0.7 - 1.0	SAND, fine grained, brown, moist, very loose to loose	SP	Lacustrine			HSA	1				
1.0 - 3.0											
3.0 - 3.5						SB	2	6			
3.5 - 4.0											
4.0 - 4.5						HSA					
4.5 - 6.0											
6.0	End of Boring 6.0 ft.					SB	3	4			

GEOTECHNICAL N-PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS

START: 11/13/2019

END: 11/13/2019

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:	Logged By:
11/13/2019	1:19 pm	6	4.5	3	None		3 1/4" HSA 0' - 6.5'	R. Kurth	DEH
								Notes:	

LOG OF TEST BORING



PROJECT NAME: 2020 Street Improvements
 CLIENT/WSB #: 014966-000

PROJECT LOCATION: Blaine, MN

BORING NUMBER PB-6

PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot						
						TYPE	No.				0	4	8				
0 - 0.5	4" OF BITUMINOUS 2" OF AGGREGATE BASE		Pavement Section														
0.5 - 6.0	SAND WITH SILT, fine grained, brown to dark brown, moist	SP-SM	Fill			HSA	1										
						SB	2	4									
						HSA											
						SB	3	3									
6.0	End of Boring 6.0 ft.																

GEOTECHNICAL N-VALUE PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS

START: 11/13/2019

END: 11/13/2019

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:	Logged By:
11/13/2019	2:51 pm	6	4.5	4	None		3 1/4" HSA 0' - 6.5'	R. Kurth	DEH
								Notes:	

LOG OF TEST BORING



PROJECT NAME: 2020 Street Improvements PROJECT LOCATION: Blaine, MN BORING NUMBER PB-8
 CLIENT/WSB #: 014966-000 PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot				
						TYPE	No.				0	5.5	11		
0 - 0.5	3.5" OF BITUMINOUS 4" OF AGGREGATE BASE		Pavement Section												
0.5 - 6.0	SAND WITH SILT, fine grained, dark brown, moist	SP-SM	Fill			HSA	1								
						SB	2	6							
						HSA									
						SB	3	7							
6.0	End of Boring 6.0 ft.														

GEOTECHNICAL N-PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS							START: 11/14/2019	END: 11/14/2019	
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:	Logged By:
11/14/2019	2:43 pm	6	4.5	3.5	None		3 1/4" HSA 0' - 6.5'	R. Kurth	DEH
								Notes:	

LOG OF TEST BORING



PROJECT NAME: 2020 Street Improvements
 CLIENT/WSB #: 014966-000

PROJECT LOCATION: Blaine, MN

BORING NUMBER PB-9

PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot
						TYPE	No.				
0 - 0.5	4" OF BITUMINOUS 5.5" OF AGGREGATE BASE		Pavement Section								0 6 12
0.5 - 1.0	SAND WITH SILT, fine grained, dark brown, moist	SP-SM	Fill			HSA	1				
1.0 - 3.0											
3.0 - 4.0						SB	2	6			
4.0 - 5.0						HSA					
5.0 - 6.0	SAND, fine grained, brown, moist, loose	SP	Lacustrine			SB	3	8			
6.0	End of Boring 6.0 ft.										

GEOTECHNICAL N-PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS

START: 11/14/2019

END: 11/14/2019

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:	Logged By:
11/14/2019	3:05 pm	6	4.5	3.5	None		3 1/4" HSA 0' - 6.5'	R. Kurth	DEH
								Notes:	

LOG OF TEST BORING



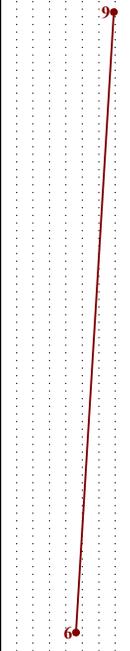
PROJECT NAME: 2020 Street Improvements
 CLIENT/WSB #: 014966-000

PROJECT LOCATION: Blaine, MN

BORING NUMBER PB-11

PAGE 1 OF 1

DEPTH (ft)	DESCRIPTION OF MATERIAL	USCS	GEOLOGIC ORIGIN	WL	Drilling Operation	SAMPLE		N	MC %	DD (PCF)	N-Value Plot
						TYPE	No.				
0 - 0.5	5" OF BITUMINOUS 4" OF AGGREGATE BASE		Pavement Section								0 6.5 13
0.5 - 1.0	SAND WITH SILT, fine grained, brown to dark brown, moist	SP-SM	Fill			HSA	1				
1.0 - 3.0											
3.0 - 3.5						SB	2	9			
3.5 - 4.0						HSA					
4.0 - 6.0											
6.0	End of Boring 6.0 ft.					SB	3	6			



GEOTECHNICAL N-PLOT - WSB.GDT - 1/2/20 12:28 - K:\014966-000\GEOTECH-CMT\GEOTECH\2020 BLAINE STREET IMP. BORING LOGS 11.21.GPJ

WATER LEVEL MEASUREMENTS

START: 11/14/2019

END: 11/14/2019

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER DEPTH	WATER ELEVATION	METHOD	Crew Chief:	Logged By:
11/14/2019	3:42 pm	6	4.5	4	None		3 1/4" HSA 0' - 4.5'	R. Kurth	DEH
								Notes:	

SYMBOLS AND TERMINOLOGY ON TEST BORING LOG

SYMBOLS			
Drilling and Sampling		Laboratory Testing	
<u>Symbol</u>	<u>Description</u>	<u>Symbol</u>	<u>Description</u>
HSA	3 1/4" LD. Hollow Stem Auger	MC	Moisture content, % (ASTM D2216)
FA	Flight Auger	DD	Dry Density, pcf
HA	Hand Auger	LL	Liquid Limit (ASTM D4318)
RC	Size A, B, or N rotary casing	PL	Plastic Limit (ASTM D4318)
CS	Continuous split barrel sampling		
DM	Drilling Mud		- Inserts in last column
JW	Jetting Water		
SB	2" O.D. split barrel sampling	Qu	Unconfined compressive strength, psf (ASTM D2166)
_L	2 1/2" or 3 1/2" OD split barrel liner sampler	Pq	Penetrometer Reading, tsf (ASTM D1558)
_T	2" or 3" thin walled tube sample	Ts	Torvane Reading, ts
W	Wash sample	G	Specific Gravity (ASTM D854)
B	Bag sample	SL	Shrinkage limits (ASTM D427)
P	Test Pit sample	OC	Organic Content (ASTM D2974)
_Q	BQ, NQ, or PQ wire line system	SP	Swell Pressure, tsf (ASTM D4546)
_X	AX, BX, or NX double tube barrel	PS	Percent swell under pressure (ASTM D4546)
N	Standard penetration test, blow per foot	FS	Free swell, % (ASTM D4546)
CR	Core recovery, percent	SS	Shrink swell, % (ASTM D4546)
WL	Water level	pH	
n/a	no measurement recorded	SC	Sulfate content, parts/million or mg/l
		CC	Chloride content, parts/million or mg/l
		C	One dimensional consolidation (ASTM D2435)
		Qc	Triaxial compression (ASTM D2850 and D4767)
		DS	Direct Shear (ASTM D3080)
		K	Coefficient of permeability, cm/sec (ASTM D2434)
		P	Pinhole Test (ASTM D4647)
		DH	Double hydrometer (ASTM D4221)
		MA	Particle size analysis (ASTM D422)
		R	Laboratory electrical resistivity, ohm-cm (ASTM G57)
		VS	Field vane shear (ASTM D2573)
		RQD	Rock quality designation, percent
		IR	Infiltration Test (ASTM D3385)

TERMINOLOGY							
Particle Sizes				Soil Layering and Moisture			
<u>Type</u>	<u>Size Range</u>	<u>Term</u>	<u>Visual Observation</u>				
Boulders	> 12"	Lenses	Small pockets of different soils				
Cobbles	3" - 12"	Lamination	< 1/4" thick stratum				
Coarse gravel	3/4" - 3"	Layer	1/4" - 12" thick stratum				
Fine gravel	#4 sieve - 3/4"	Stratified	Altering lenses of varying materials or colors				
Coarse sand	#4 sieve - #10 sieve	Varved	Altering laminations of clay, silt, fine sand, or colors				
Medium sand	#10 sieve - #40 sieve	Dry	Powdery, no noticeable water				
Fine sand	#40 sieve - #200 sieve	Moist	Damp, below saturation				
Silt	100% passing #200 sieve, and > 0.005 mm	Wet	MC above plastic limit				
Clay	100% passing #200 sieve, and < 0.005 mm	Waterbearing	Pervious soil below water table				
		Saturated	Cohesive soil with MC above liquid limit				
Gravel Content				Standard Penetration Resistance (N-value)			
Coarse-Grained Soils		Fine-Grained Soils		Cohesionless Soils		Cohesive Soils	
<u>% Gravel</u>	<u>Description</u>	<u>% Gravel</u>	<u>Description</u>	<u>N-Value</u>	<u>Relative Density</u>	<u>N-Value</u>	<u>Consistency</u>
2 - 15	A little gravel	2-5	Trace of gravel	0 - 4	Very loose	0 - 4	Very soft
16 - 30	With gravel	5 -15	a little gravel	5 - 10	Loose	5 - 8	Soft
31 - 49	Gravelly	16 - 30	with gravel	11 - 30	Medium dense	9 - 15	Firm
		31 - 49	Gravelly	31 - 50	Dense	16 - 30	Hard
				>50	Very dense	>30	Very hard

NOTICE TO REPORT USERS BORING LOG INFORMATION

Subsurface Profiles

The subsurface stratification lines on the graphic representation of the test borings show an approximate boundary between soil types or rock. The transition between materials is approximate and is usually far more gradual than shown. Estimating excavation depths, soil volumes, and other computations relying on the subsurface strata may not be possible to any degree of accuracy.

Water Level

WSB & Associates, Inc. took groundwater level readings in the exploratory borings, reviewed the data obtained, and discussed its interpretation of the data in the text of this report. The groundwater level may fluctuate due to seasonal variations caused by precipitation, snowmelt, rainfalls, construction or remediation activities, and/or other factors not evident at the time of measurement.

The actual determination of the subsurface water level is an interpretive process. Subsurface water level may not be accurately depicted by the levels indicated on the boring logs. Normally, a subsurface exploration obtains general information regarding subsurface features for design purposes. An accurate determination of subsurface water levels is not possible with a typical scope of work. The use of the subsurface water level information provided for estimating purposes or other site review can present a moderate to high risk of error.

The following information is obtained in the field and noted under "Water Level Measurements" at the bottom of the log.

Sample Depth:	The lowest depth of soil sampling at the time a water level measurement is taken.
Casing Depth:	The depth to the bottom of the casing or hollow stem auger at the time of water level measurement.
Cave-in Depth:	The depth at which a measuring tape stops in the bore hole.
Water Level:	The point in the bore hole at which free-standing water is encountered by a measure device from the surface.

Obstruction Depths

Obstructions and/or obstruction depths may be noted on the boring logs. Obstruction indicates the sampling equipment encountered resistance to penetration. It must be realized that continuation of drilling, the use of other drilling equipment or further exploration may provide information other than that depicted on the logs. The correlation of obstruction depths on the log with construction features such as rock excavation, foundation depths, or buried debris cannot normally be determined with any degree of accuracy. For example, penetration of weathered rock by soil sampling equipment may not correlate with removal by certain types of construction equipment. Using this information for estimating purposes often results in a high degree of misinterpretation.

Accurately identifying the obstruction or estimating depths where hard rock is present over the site requires a scope of service beyond the normal geotechnical exploration program. The risk of using the information noted on the boring logs for estimating purposes must be understood.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART		
COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)		
Clean Gravels (Less than 5% fines)		
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	
	GM	Silty gravels, gravel-sand-silt mixtures
	GC	Clayey gravels, gravel-sand-clay mixtures
Clean Sands (Less than 5% fines)		
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	SW	Well-graded sands, gravelly sands, little or no fines
	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	
	SM	Silty sands, sand-silt mixtures
	SC	Clayey sands, sand-clay mixtures
FINE GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)		
SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA		
GW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
GP	Not meeting all gradation requirements for GW	
GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line with P.I. greater than 7	
SW	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
SP	Not meeting all gradation requirements for GW	
SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP
 More than 12 percent GM, GC, SM, SC
 5 to 12 percent Borderline cases requiring dual symbols

