Public Works Committee **5. 3.**

Meeting Date: 05/15/2012

By: Len Linton, Engineering/Public Works

Title:

Consider Stormwater Improvements at 148 th Lane - A Continuation of Discussion Related to 2011 Flooding Concerns

Background:

Last summer the City experienced several significant rainfall events that lead to many localized flooding concerns, and resident complaints. The large volumes of precipitation that occurred over a short period of time appears to have elevated the groundwater within areas of the City, and prohibited the generous rate of infiltration that typically takes place in the Anoka sandplain. Throughout the summer and fall staff worked hard at registering and responding to the calls, and evaluating the situations on an individual basis to determine whether quick fixes could be implemented (culvert obstructions, re-ditching, etc.) to alleviate the immediate concerns.

This item was discussed at the Public Works Committee on August 15, 2011, and at that time staff summarized the areas of concern that were being investigated based upon citizen complaints received. The attached summary was presented at the meeting; which outlines the concern identified, actions steps to evaluate the concern, additional investigations that would be necessary to fully understand the situation, and recommendations for specific projects that could be implemented rather quickly and inexpensively. At that time we classified the issues into 3 categories:

1. Those that required no further action. They were evaluated and corrected, or did not need correcting because the water was fully contained within a dedicated drainage & utility easement (functioning as designed).
2. Those that required additional investigation and evaluation before deciding on a long term solution, and implementing corrective actions.
3. Those that had an identified recommendation for immediate action.

At that meeting the Committee briefly discussed the areas of concern, and directed staff to prepare plans and specifications for the items identified in category 3. Once this direction was ratified by the City Council on September 13, 2011, and the plans completed, it was too late in the season to secure bids and complete the improvements in 2011. It was then decided to delay construction until 2012, where some of the improvements could be completed by inclusion in a larger stormwater improvement plan set. Staff has finalized plans for these items, incorporated additional items that were approved at the Public Works Committee meeting in March, and now has these items out for bid. Depending on direction received tonight, for potential improvements to alleviate some of the outstanding concerns, additional plans will need to be prepared.

Notification:

The homeowners adjacent to his ponding area have been notified of the meeting, and have received a copy of the agenda.

Observations:

Staff prepared a brief RFP in the fall of 2011, to investigate the areas of concern, and distributed it to members of the City's consultant pool in the fall of 2011. The goal of this project was to have an independent third party evaluate the areas, provide options for corrective actions, and associated estimates to implement the work. Hakanson Anderson was awarded the project to undertake these investigations, and they have since completed their analysis and compiled a report that references potential solutions for each area identified. Attached to this case is the final report.

This item was introduced in general terms at the February Public Works Committee meeting, with the direction

being that staff would come back before the committee over the next several months to discuss the merits of each potential improvement in more detail. This case will focus on section one of the report - 148th Lane

The site is east of Nowthen Boulevard (CSAH 5), southeast of Ramsey Elementary School. There is a low area across three (3) lots south of 148th Lane, that was created as a stormwater pond for the area and wetland mitigation for the development. There is a storm sewer inlet to this area along the west edge, which drains the subdivision to the north. There is also an outlet from this area on the east end that connects to a pipe that runs easterly and parallel to 148th Lane. The invert of this outlet pipe is approximately 2.5 feet above the low point in the basin. The outlet pipe also connects to a structure in the boulevard of 148th Lane that takes storm water runoff from the roadway and directs it easterly as described above. The inverts on both these pipes are at approximately the same elevation, and therefore water may be entering this basin that is not intended to flow there from the stormwater system. It was also observed that the basin has several undulations in the ground surface that do not allow the water to evenly spread out across the entire drainage and utility easement; basically there appears to be three separate, somewhat isolated basins.

Hakanson Anderson explored several options for installing another outlet and determined that each option would not significantly affect the high water elevation in the basin, and would justify the costs associated with performing them. Additional easements would need to be acquired, and disruption of neighboring properties would occur. Staff is currently researching check valves that could be placed in the outlet pipe at the manhole to block drainage from the street and only allow water to exit the basin through this structure, thereby eliminating additional flow to the area.

Funding Source:

The funding source for these improvements is the storm water utility fund. It is estimated that regrading the basin and installing a backflow valve on the outlet pipe would cost approximately $7,500 to $12,500.

Staff Recommendation:

Staff recommends regrading the backyards of the three properties to better distribute water in the basin, and re-establish the original pond contours. It is further recommended to install a backflow valve on the outlet pipe to direct storm water runoff from 148th Lane to the intended downstream receiving body.

Committee Action:

Motion to recommend to the City Council that staff seek quotes to regrade the backyards of the three properties to better distribute water in the basin and re-establish the original pond contours, and to install a backflow valve on the outlet pipe to direct storm water runoff from 148th Lane to the intended downstream receiving body.

Attachments

Project Location Map

Section 1 of Hakanson Anderson Report

Form Review

Inbox	Reviewed By	Date
Len Linton (Originator)	Len Linton	05/11/2012 09:51 AM
Len Linton (Originator)	Len Linton	05/11/2012 11:08 AM
Kurt Ulrich	Kurt Ulrich	05/11/2012 11:54 AM
Form Started By: Len Linton		Started On: 05/09/2012 02:41 PM
Final Approval Date: 05/11/2012		

970

148TH LANE

15" RCP

15" RCP

15" RCP

5

3

2

1

4

Landscaping

INV=862.3

HEATER

BLOCK WALL

WOOD WALL

FENCE

860

862

864

866

868

2

18" RCP

18" RCP

3

PROPOSED PERMANENT DRAINAGE EASEMENT

PROPOSED STORM SEWER LOCATION FES INV=861.4

NOWTHEN BOULEVARD

GERMANIUM STREET

4

5

DNR WETLAND 658W

860

N

30 0 30 60

SCALE IN FEET

EXHIBIT 4
148TH LANE ALTERNATIVE 2 STORM SEWER

CITY OF RAMSEY, MINNESOTA

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Section 1
148th Lane

148th Lane

Description

As shown on Exhibit 1, a low area exists south of 148th Lane. A 15" outlet pipe drains the low area north and then east to DNR Wetland 658W. The invert of the outlet pipe is at elevation 862.3 and the bottom of the low area is at elevation 859.8. Water in the low area has to rise 2.5 feet prior to discharging. The water below the outlet infiltrates into the soil, which may take days depending on the condition of the soil.

The existing 100-year high water level (HWL) for the low area is 865.5. As shown on Exhibit 2, a drainage easement exists in the rear of Lots 2 through 5, Block 2 of Ramsey Commons 2nd Addition.

Alternatives

The following alternatives address the water elevation in the existing low area.

Alternative 1
In this alternative, a new outlet pipe would be installed between Lot 1 of Ramsey Commons 2nd Addition and Lot 2 of Sunny Ponds, as shown on Exhibit 3. It was assumed that the existing outlet pipe to the north would be removed. By installing an outlet pipe in this location, the invert of the outlet pipe can be lowered from 862.3 to 861.6. The following table summarizes the 100-year HWL's and estimated costs for each outlet pipe:

Outlet Pipe Size	100-Year HWL	Estimated Cost
Existing	865.5	N/A
15"	865.4	$16,264
18"	865.1	$31,566 *
24"	864.3	$45,381 *

* The existing pipe being connected to in Germanium Street is a 15" diamter. Installing the 18" and 24" outlets will require the removal and replacement of this pipe to match the size of the pipe being installed.

Tables 1 through 3 include the individual costs for this alternative.

Alternative 2
In this alternative, a new outlet pipe would be installed between Lots 2 and 3 of Sunny Ponds, as shown on Exhibit 4. It was assumed that the existing outlet pipe to the north would be removed. By installing an outlet pipe in this location, the invert of the outlet pipe can be lowered from 862.3 to 861.4. This alternative would require additional grading and the acquisition of a permanent easement on the property south of Ramsey Commons 2nd Addition and west of Sunny Ponds. The following table summarizes the 100-year HWL's and estimated costs for each outlet pipe:

Outlet Pipe Size	100-Year HWL	Estimated Cost
Existing	865.5	N/A
15"	865.3	$13,098
18"	865.0	$18,846 *
24"	864.3	$32,543 *

* The existing pipe being connected to in Germanium Street is a 15" diameter. Installing the 18" and 24" outlets will require the removal and replacement of this pipe to match the size of the pipe being installed.

Tables 4 through 6 include the individual costs for this alternative.

Alternative 3

In this alternative, the bottom of the low area would be filled to the same elevation as the outlet pipe invert. The pond would then drain dry and would not be sitting with water until it infiltrated. By filling the bottom of th e low area, the resultant 100-year HWL will be 866.2, 0.7 feet higher than the existing HWL. This higher HWL would end up outside the existing drainage and utility easement, creating the need for additional drainage easement.

The estimated cost to fill the low area is $15,321. Table 7 includes the individual costs for this alternative.

Further research is required to determine if this low area was designed to treat a water quality volume. The volume required would dictate if Alternatives 1 and 2 are viable options. Alternative 3 would not be viable, because the water quality volume is being eliminated in this alternative.

870

RAMSEY COMMONS
2ND ADDITION

148TH LANE

15" RCP

15" RCP

15" RCP

18" RCP

18" RCP

5

4

3

2

1

Landscaping

INV=862.3
HEADWALL

BLOCK WALL

WOOD WALL

FENCE

860

862

864

866

868

NOWTHEN BOULEVARD

DNR
WETLAND
658W

860

2

3

SUNNY PONDS

4

5

GERMANIUM STREET

N

30 0 30 60
SCALE IN FEET

EXHIBIT 1
148TH LANE EXISTING CONDITIONS

CITY OF RAMSEY, MINNESOTA

Feb 13, 2012 - 2:39pm
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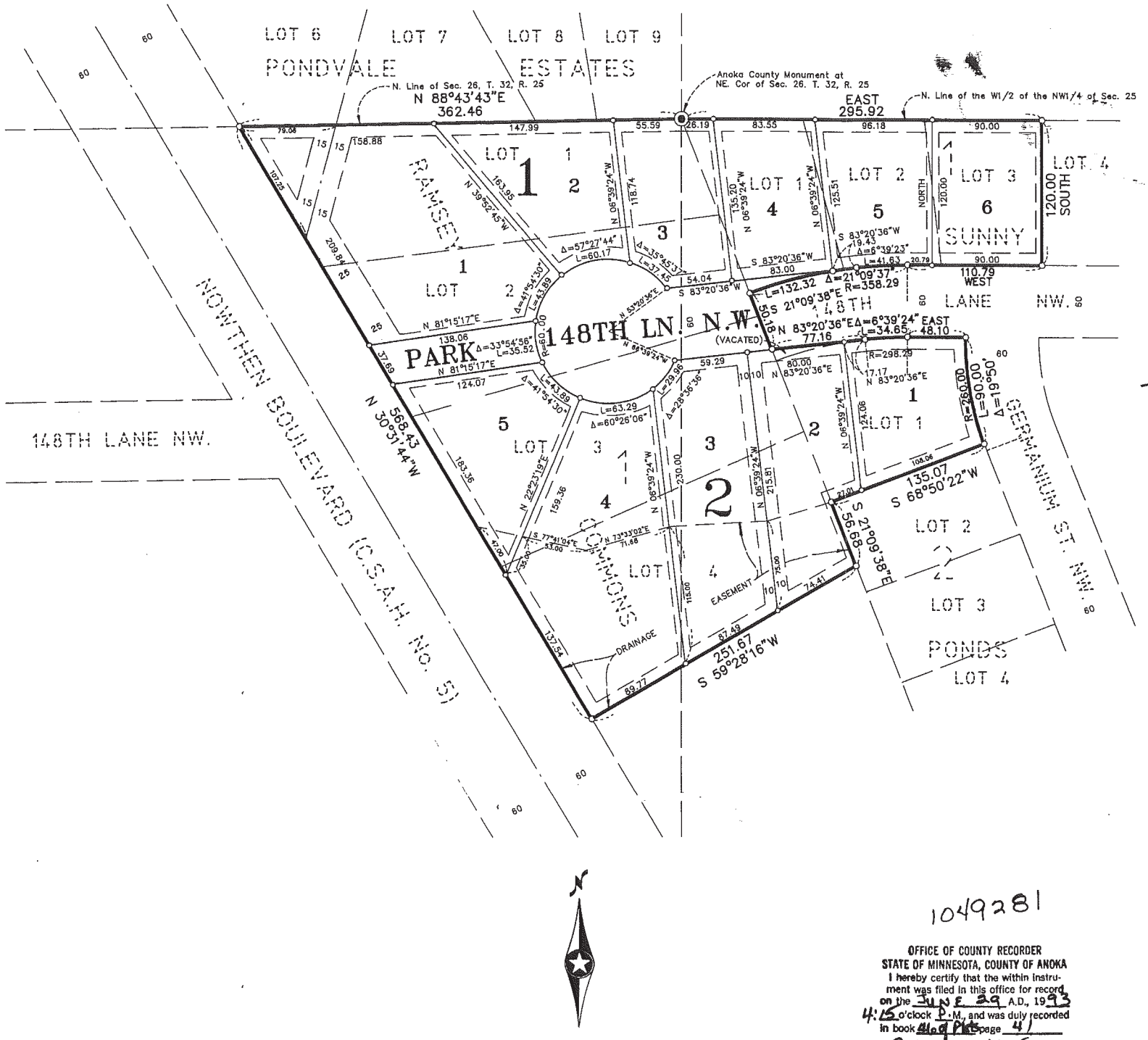
OFFICIAL PLAT

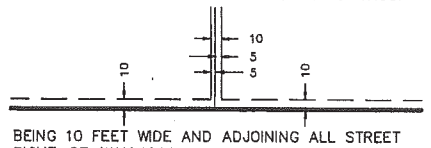
41.

RAMSEY COMMONS 2ND ADDITION

CITY OF RAMSEY — COUNTY OF ANOKA



DRAINAGE AND UTILITY EASEMENTS SHOWN THUS:



BEING 10 FEET WIDE AND ADJOINING ALL STREET RIGHT-OF-WAY LINES AND REAR LOT LINES AND 5 FEET WIDE AND ADJOINING ALL SIDE LOT LINES, UNLESS OTHERWISE SHOWN ON THE PLAT.

SCALE IN FEET

0 60 120 180

SCALE: 1 INCH = 60 FEET

○ DENOTES 1/2 INCH IRON PIPE SET.
◉ DENOTES ANOKA COUNTY MONUMENT.
NOTE: FOR THE PURPOSES OF THIS PLAT, THE NORTH LINE OF THE W1/2 OF THE NW1/4 OF SEC. 25, T. 32, R. 25 IS ASSUMED TO HAVE A BEARING OF EAST.

1049281

OFFICE OF COUNTY RECORDER
STATE OF MINNESOTA, COUNTY OF ANOKA
I hereby certify that the within instrument was filed in this office for record on the 21ST day of JUNE A.D., 1993 at 4:15 o'clock P.M., and was duly recorded in book 410 of Plats, page 41

Edward M. Troska
County Recorder
By D. Swanson
Deputy

CAINE & ASSOCIATES LAND SURVEYORS, INC.

KNOW ALL PERSONS BY THESE PRESENTS: That North Suburban Development, Inc., a Minnesota Corporation, owner and proprietor, and Doloras S. Fleischer, single, mortgagee of the following described property situated in the County of Anoka, State of Minnesota, to-wit:

Lots 1, 2 and 3, Block 1, and Lot 1, Block 2, all in SUNNY PONDS, according to the recorded plat thereof, Anoka County, Minnesota,

And that part of vacated 148th Lane N.W., as dedicated in the plat of SUNNY PONDS, according to the recorded plat thereof, Anoka County, Minnesota, lying north of the north line of Lot 1, Block 2, in said SUNNY PONDS and lying south of the following described line:

Commencing at the northeast corner of said Lot 1, Block 2; thence on an assumed bearing of West, along the north line of said Lot 1, Block 2, a distance of 48.10 feet; thence westerly continuing along said north line and along a tangential curve, concave to the south having a radius of 298.29 feet and a central angle of 6 degrees 39 minutes 24 seconds, a distance of 34.65 feet to the point of beginning of the line to be described; thence South 83 degrees 20 minutes 36 seconds West, a distance of 77.16 feet to the intersection with the northerly extension of the west line of said Lot 1, Block 2, and said line there terminating.

AND that North Suburban Development, Inc., a Minnesota Corporation, owner and proprietor, and Delano Skeim, single, mortgagee of the following described property situated in the County of Anoka, State of Minnesota, to-wit:

Lots 1, 2, 3 and 4, Block 1, RAMSEY COMMONS, according to the recorded plat thereof, Anoka County, Minnesota.

Have caused the same to be surveyed and platted as RAMSEY COMMONS 2ND ADDITION and do hereby donate and dedicate to the public for public use forever the lanes as shown on the plat. Also dedicating the drainage and/or utility easements as shown on the plat. Also dedicating to the County of Anoka the right of access onto County State Aid Highway No. 5 from Lot 1, Block 1 and from Lots 4 and 5, Block 2. In witness whereof said North Suburban Development, Inc. has caused these presents to be signed by its proper officer this 26TH day of MAY, 1993. Also in witness whereof said Doloras S. Fleischer has hereunto set her hand this 26TH day of MAY, 1993. Also in witness whereof said Delano Skeim has hereunto set his hand this 21ST day of MAY, 1993.

NORTH SUBURBAN DEVELOPMENT, INC.

J. A. Henkveld, as President

SIGNED:

Doloras S. Fleischer
Doloras S. Fleischer

SIGNED:

Delano Skeim
Delano Skeim

STATE OF MINNESOTA) The foregoing instrument was acknowledged before me this 26TH day of MAY, 1993, by J. A.
COUNTY OF ANOKA) Henkveld, President of North Suburban Development, Inc., a Minnesota corporation, on behalf of the corporation.

SHIRLEY D. CHENOWETH
NOTARY PUBLIC-MINNESOTA
ANOKA COUNTY
My Commission Expires 6-24-96

Shirley D. Chenoweth
Notary Public, ANOKA County, Minnesota
My Commission expires 6-24-96

STATE OF MINNESOTA) The foregoing instrument was acknowledged before me this 26TH day of MAY, 1993, by Doloras
COUNTY OF ANOKA) S. Fleischer, single.

SHIRLEY D. CHENOWETH
NOTARY PUBLIC-MINNESOTA
ANOKA COUNTY
My Commission Expires 6-24-96

Shirley D. Chenoweth
Notary Public, ANOKA County, Minnesota
My Commission expires 6-24-96

STATE OF MINNESOTA) The foregoing instrument was acknowledged before me this 21ST day of May, 1993, by Delano
COUNTY OF Anoka) Skeim, single.

MARGARET A. McINERNY
NOTARY PUBLIC—MINNESOTA
ANOKA COUNTY
My Commission Expires FEB. 28, 1996

Margaret A. McInerny
Notary Public, Anoka County, Minnesota
My Commission expires 2/28/96

I hereby certify that I have surveyed and platted the land described in the dedication on this plat as RAMSEY COMMONS 2ND ADDITION; that the plat is a correct representation of said survey; that all distances are correctly shown on said plat in feet and hundredths of a foot; that the monuments have been correctly placed in the ground as shown; that the outside boundaries are correctly designated on said plat; and that there are no wet lands or public highways to be designated on said plat other than as shown thereon.

Jeffrey N. Caine
Jeffrey N. Caine, Registered Land Surveyor
Minnesota Registration No. 12251

STATE OF MINNESOTA) The surveyors certificate was acknowledged before me a Notary Public, this 19th day of May, 1993,
COUNTY OF ANOKA) by Jeffrey N. Caine, Land Surveyor.

MOLLY W. CAINE
Notary Public-Minnesota
Anoka County
My Comm. Exp. 6-13-96

Molly W. Caine
Notary Public, Anoka County, Minnesota
My Commission expires 6-13-96

CITY OF RAMSEY

We hereby certify that the City Council of the City of Ramsey, Anoka County, Minnesota, duly accepted and approved the plat of RAMSEY COMMONS 2ND ADDITION at a regular meeting held this 11th day of May, 1993. If applicable, the written comments and recommendations of the Commissioner of Transportation and the County Highway Engineer have been received by the city or the prescribed 30 day period has elapsed without receipt of such comments and recommendations, as provided by Hinn. Statutes, Section 505.03, Subd. 2.

By Jean A. Robins Mayor By D. Schroeder Clerk

Checked and approved this 29th day of June, 1993

By M. D. Anderson
Anoka County Surveyor

I HEREBY CERTIFY THAT THE CURRENT AND DELINQUENT TAXES ON THE LANDS DESCRIBED WITHIN ARE
ENTERED
BY DEPU

RAMSEY
BLK 2

001ACRA 6-29-93 # 425 $30.00

EXHIBIT 2.
FINAL PLAT-RAMSEY COMMONS 2ND ADD.
CITY OF RAMSEY, MINNESOTA

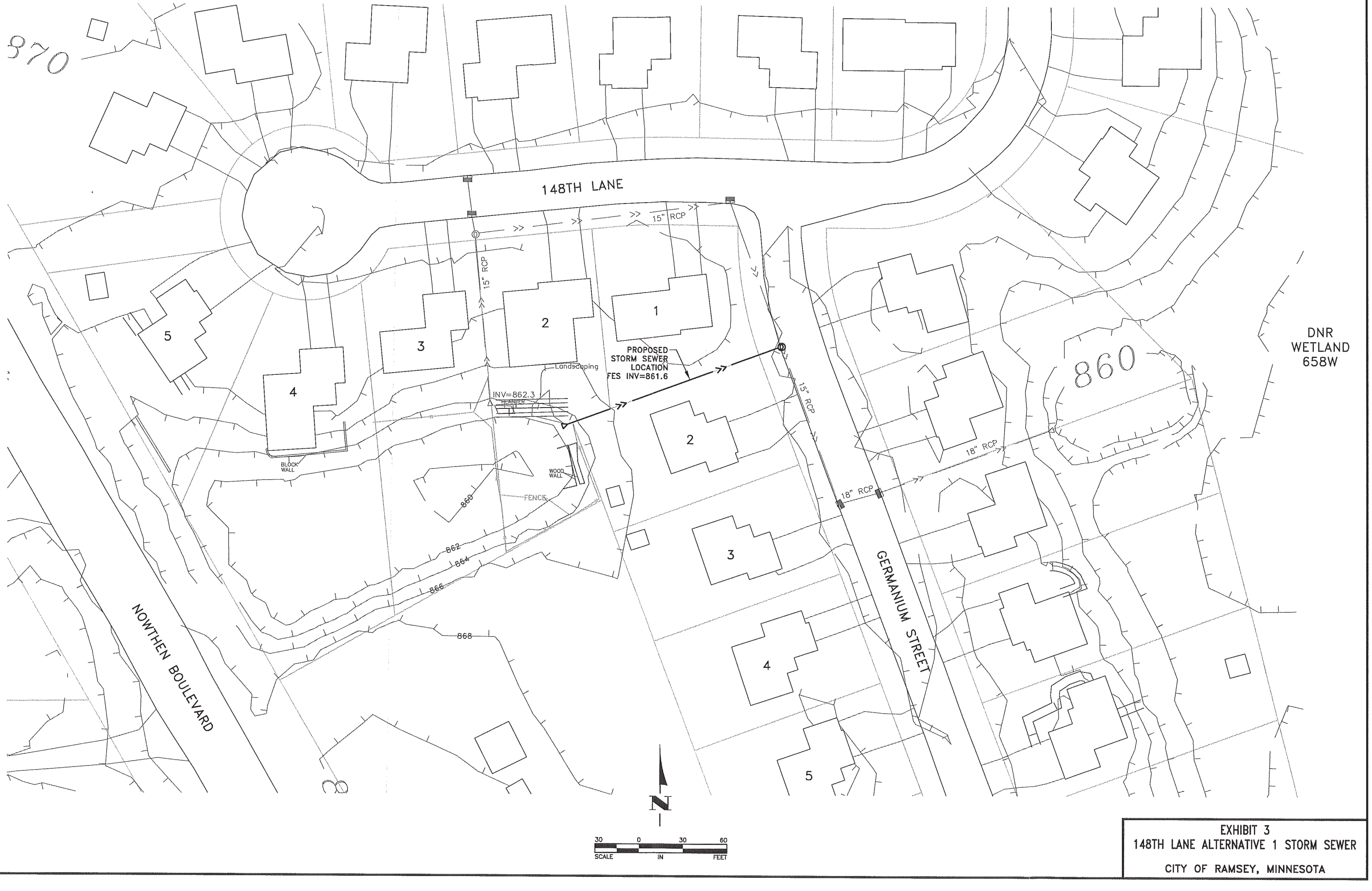


EXHIBIT 3
148TH LANE ALTERNATIVE 1 STORM SEWER
CITY OF RAMSEY, MINNESOTA

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970

148TH LANE

15" RCP

15" RCP

15" RCP

5

3

2

1

4

Landscaping

INV=862.3

HEATER

BLOCK WALL

WOOD WALL

FENCE

860

862

864

866

868

2

18" RCP

18" RCP

3

PROPOSED PERMANENT DRAINAGE EASEMENT

PROPOSED STORM SEWER LOCATION FES INV=861.4

NOWTHEN BOULEVARD

GERMANIUM STREET

4

5

DNR WETLAND 658W

860

N

30 0 30 60

SCALE IN FEET

EXHIBIT 4
148TH LANE ALTERNATIVE 2 STORM SEWER

CITY OF RAMSEY, MINNESOTA

Feb 13, 2012 - 2:41pm
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TABLE 1
148TH LANE
ALTERNATIVE 1A - 15" OUTLET

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$500.00	1	$500
2	CLEARING	TREE	$100.00	12	$1,200
3	GRUBBING	TREE	$100.00	12	$1,200
4	REMOVE STORM SEWER	LIN FT	$5.00	118	$590
5	REMOVE CONCRETE CURB	LIN FT	$10.00	20	$200
6	REMOVE BITUMINOUS PAVEMENT	SQ YD	$5.00	23	$115
7	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	40	$120
8	4" AGGREGATE BASE CLASS 5	SQ YD	$7.50	23	$173
9	4" BITUMINOUS PATCH	SQ YD	$28.00	23	$644
10	BULKHEAD MANHOLE	EACH	$500.00	1	$500
11	15" RC PIPE APRON	EACH	$300.00	1	$300
12	TRASH GUARD FOR 15" PIPE APRON	EACH	$150.00	1	$150
13	CONNECT TO EXISTING STORM SEWER	EACH	$1,000.00	1	$1,000
14	15" RC PIPE SEWER DESIGN 3006, CL V	LIN FT	$22.00	152	$3,344
15	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48 - 4020	EACH	$1,500.00	1	$1,500
16	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	$20.00	20	$400
17	TRAFFIC CONTROL	LUMP SUM	$300.00	1	$300
18	CONIFEROUS TREE 4' HT B&B	TREE	$200.00	12	$2,400
19	TURF ESTABLISHMENT	ACRE	$1,500.00	0.1	$150

Estimated Construction Cost	$14,786
Contingency (10%)	$1,479
Total Estimated Construction Cost	$16,264

TABLE 2
148TH LANE
ALTERNATIVE 1B - 18" OUTLET

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$800.00	1	$800
2	CLEARING	TREE	$100.00	12	$1,200
3	GRUBBING	TREE	$100.00	12	$1,200
4	REMOVE STORM SEWER	LIN FT	$5.00	233	$1,165
5	REMOVE CONCRETE CURB	LIN FT	$10.00	135	$1,350
6	REMOVE BITUMINOUS PAVEMENT	SQ YD	$5.00	150	$750
7	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	155	$465
8	4" AGGREGATE BASE CLASS 5	SQ YD	$7.50	150	$1,125
9	4" BITUMINOUS PATCH	SQ YD	$28.00	150	$4,200
10	BULKHEAD MANHOLE	EACH	$500.00	1	$500
11	18" RC PIPE APRON	EACH	$350.00	1	$350
12	TRASH GUARD FOR 18" PIPE APRON	EACH	$200.00	1	$200
13	CONNECT TO EXISTING STORM SEWER	EACH	$1,000.00	2	$2,000
14	18" RC PIPE SEWER DESIGN 3006, CL III	LIN FT	$23.00	267	$6,141
15	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48 - 4020	EACH	$1,500.00	1	$1,500
16	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	$20.00	135	$2,700
17	TRAFFIC CONTROL	LUMP SUM	$500.00	1	$500
18	CONIFEROUS TREE 4' HT B&B	TREE	$200.00	12	$2,400
19	TURF ESTABLISHMENT	ACRE	$1,500.00	0.1	$150

Estimated Construction Cost	$28,696
Contingency (10%)	$2,870
Total Estimated Construction Cost	$31,566

TABLE 3
148TH LANE
ALTERNATIVE 1C - 24" OUTLET

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$1,300.00	1	$1,300
2	CLEARING	TREE	$100.00	12	$1,200
3	GRUBBING	TREE	$100.00	12	$1,200
4	REMOVE STORM SEWER	LIN FT	$4.00	388	$1,552
5	REMOVE CONCRETE CURB	LIN FT	$5.00	155	$775
6	REMOVE BITUMINOUS PAVEMENT	SQ YD	$5.00	195	$975
7	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	175	$525
8	4" AGGREGATE BASE CLASS 5	SQ YD	$7.50	195	$1,463
9	4" BITUMINOUS PATCH	SQ YD	$28.00	195	$5,460
10	BULKHEAD MANHOLE	EACH	$500.00	1	$500
11	24" RC PIPE APRON	EACH	$450.00	2	$900
12	TRASH GUARD FOR 24" PIPE APRON	EACH	$300.00	2	$600
13	CONNECT TO EXISTING STORM SEWER	EACH	$1,000.00	1	$1,000
14	24" RC PIPE SEWER DESIGN 3006, CL III	LIN FT	$29.00	414	$12,006
15	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48 - 4020	EACH	$1,500.00	1	$1,500
16	CONSTRUCT DRAINAGE STRUCTURE DESIGN 60 - 4020	LIN FT	$2,000.00	2	$4,000
17	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	$20.00	155	$3,100
18	TRAFFIC CONTROL	LUMP SUM	$500.00	1	$500
19	CONIFEROUS TREE 4' HT B&B	TREE	$200.00	12	$2,400
20	TURF ESTABLISHMENT	ACRE	$1,500.00	0.2	$300

Estimated Construction Cost	$41,256
Contingency (10%)	$4,126
Total Estimated Construction Cost	$45,381

TABLE 4
148TH LANE
ALTERNATIVE 2A - 15" OUTLET

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$400.00	1	$400
2	CLEARING	TREE	$100.00	2	$200
3	GRUBBING	TREE	$100.00	2	$200
4	REMOVE STORM SEWER	LIN FT	$5.00	118	$590
5	REMOVE CONCRETE CURB	LIN FT	$10.00	20	$200
6	REMOVE BITUMINOUS PAVEMENT	SQ YD	$5.00	23	$115
7	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	40	$120
8	COMMON EXCAVATION	CU YD	$5.00	100	$500
9	4" AGGREGATE BASE CLASS 5	SQ YD	$7.50	23	$173
10	4" BITUMINOUS PATCH	SQ YD	$28.00	23	$644
11	BULKHEAD MANHOLE	EACH	$500.00	1	$500
12	15" RC PIPE APRON	EACH	$300.00	1	$300
13	TRASH GUARD FOR 15" PIPE APRON	EACH	$150.00	1	$150
14	CONNECT TO EXISTING STORM SEWER	EACH	$1,000.00	1	$1,000
15	15" RC PIPE SEWER DESIGN 3006, CL V	LIN FT	$22.00	152	$3,344
16	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48 - 4020	EACH	$1,500.00	1	$1,500
17	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	$20.00	20	$400
18	TRAFFIC CONTROL	LUMP SUM	$300.00	1	$300
19	CONIFEROUS TREE 4' HT B&B	TREE	$200.00	2	$400
20	TURF ESTABLISHMENT	ACRE	$1,500.00	0.1	$150

Estimated Construction Cost	$11,186
Contingency (10%)	$1,119
Permanent Easement ($1.15/ sq ft)	$794
Total Estimated Construction Cost	$13,098

TABLE 5
148TH LANE
ALTERNATIVE 2B - 18" OUTLET

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$500.00	1	$500
2	CLEARING	TREE	$100.00	2	$200
3	GRUBBING	TREE	$100.00	2	$200
4	REMOVE STORM SEWER	LIN FT	$5.00	153	$765
5	REMOVE CONCRETE CURB	LIN FT	$10.00	55	$550
6	REMOVE BITUMINOUS PAVEMENT	SQ YD	$5.00	61	$305
7	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	75	$225
8	COMMON EXCAVATION	CU YD	$5.00	100	$500
9	4" AGGREGATE BASE CLASS 5	SQ YD	$7.50	61	$458
10	4" BITUMINOUS PATCH	SQ YD	$28.00	61	$1,708
11	BULKHEAD MANHOLE	EACH	$500.00	1	$500
12	18" RC PIPE APRON	EACH	$350.00	1	$350
13	TRASH GUARD FOR 18" PIPE APRON	EACH	$200.00	1	$200
14	CONNECT TO EXISTING STORM SEWER	EACH	$1,000.00	2	$2,000
15	18" RC PIPE SEWER DESIGN 3006, CL III	LIN FT	$23.00	187	$4,301
16	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48 - 4020	EACH	$1,500.00	1	$1,500
17	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	$20.00	55	$1,100
18	TRAFFIC CONTROL	LUMP SUM	$500.00	1	$500
19	CONIFEROUS TREE 4' HT B&B	TREE	$200.00	2	$400
20	TURF ESTABLISHMENT	ACRE	$1,500.00	0.1	$150

Estimated Construction Cost	$16,412
Contingency (10%)	$1,641
Permanent Easement ($1.15/ sq ft)	$794
Total Estimated Construction Cost	$18,846

TABLE 6
148TH LANE
ALTERNATIVE 2C - 24" OUTLET

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$900.00	1	$900
2	CLEARING	TREE	$100.00	2	$200
3	GRUBBING	TREE	$100.00	2	$200
4	REMOVE STORM SEWER	LIN FT	$4.00	306	$1,224
5	REMOVE CONCRETE CURB	LIN FT	$5.00	75	$375
6	REMOVE BITUMINOUS PAVEMENT	SQ YD	$5.00	106	$530
7	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	95	$285
8	COMMON EXCAVATION	CU YD	$5.00	100	$500
9	4" AGGREGATE BASE CLASS 5	SQ YD	$7.50	106	$795
10	4" BITUMINOUS PATCH	SQ YD	$28.00	106	$2,968
11	BULKHEAD MANHOLE	EACH	$500.00	1	$500
12	24" RC PIPE APRON	EACH	$450.00	2	$900
13	TRASH GUARD FOR 24" PIPE APRON	EACH	$300.00	2	$600
14	CONNECT TO EXISTING STORM SEWER	EACH	$1,000.00	1	$1,000
15	24" RC PIPE SEWER DESIGN 3006, CL III	LIN FT	$29.00	334	$9,686
16	CONSTRUCT DRAINAGE STRUCTURE DESIGN 48 - 4020	EACH	$1,500.00	1	$1,500
17	CONSTRUCT DRAINAGE STRUCTURE DESIGN 60 - 4020	LIN FT	$2,000.00	2	$4,000
18	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	$20.00	75	$1,500
19	TRAFFIC CONTROL	LUMP SUM	$500.00	1	$500
20	CONIFEROUS TREE 4' HT B&B	TREE	$200.00	2	$400
21	TURF ESTABLISHMENT	ACRE	$1,500.00	0.2	$300

Estimated Construction Cost	$28,863
Contingency (10%)	$2,886
Permanent Easement ($1.15/ sq ft)	$794
Total Estimated Construction Cost	$32,543

TABLE 7
148TH LANE
ALTERNATIVE 3

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	$500.00	1	$500
2	CLEARING	TREE	$100.00	10	$1,000
3	GRUBBING	TREE	$100.00	10	$1,000
4	COMMON EXCAVATION	CU YD	$5.00	270	$1,350
5	GRANULAR BORROW	CU YD	$8.00	1166	$9,328
6	TURF ESTABLISHMENT	ACRE	$1,500.00	0.5	$750

Estimated Construction Cost	$13,928
Contingency (10%)	$1,393
Total Estimated Construction Cost	$15,321