



I hereby certify that this Feasibility 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.

Seng Thongvanh, PE 44666

11/18/15

Date



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INTRODUCTION

On August 24, 2015, the Prior Lake City Council adopted Resolution 15-137, which ordered the preparation of a Feasibility Report for improvements to the project area listed below:

Manitou Road (formerly Lila Lane), located within Section 26 & 35, Township 115, Range 22, as described on four plats: Kopps Bay Addition, Kopps Bay Second Addition, Mary Margaret First Addition, and Raspberry Ridge, Scott County, Minnesota.

Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, Timberglade Circle, Appaloosa Trail, and Highland Court located within Section 26 & 35, Township 115, Range 22, as described on three plats: Raspberry Ridge First Addition, Raspberry Ridge Second Addition, and Raspberry Ridge Third Addition, Scott County, Minnesota.

This report evaluates the feasibility of reconstructing the streets and the replacement of utilities in the project area. All existing infrastructure elements (streets, sanitary sewer, watermain, etc.) were evaluated, improvements recommended, cost estimates of the proposed improvements prepared and funding strategies developed in this report.

BACKGROUND

The City utilizes a Capital Improvement Program (CIP) to prioritize the infrastructure improvement needs within the City. The neighborhood proposed for improvement in 2016 includes Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, Timberglade Circle as shown on Exhibit 1. The proposed project also includes bituminous overlay of Appaloosa Trail and Highland Court. The deteriorated bituminous surface and aging underground infrastructure has aided in the selection of this neighborhood for further study.

The first project neighborhood meeting was held on September 15, 2015. The purpose of the meeting was to introduce City staff to the affected property owners and review the proposed improvement project. This meeting also provides an opportunity to ask questions and provide feedback to City staff regarding the proposed project. A project questionnaire was distributed to attendees at the meeting.

EXISTING CONDITIONS

Manitou Road

The properties located on Manitou Road were platted from as early as the 1950's to 1987. Kopps Bay Addition were the first properties to be platted on Manitou Road. The recorded plat with Scott County dates back to 1958. The plat for Kopps Bay Second Addition was recorded with Scott County in 1960. The plat for Mary Margaret First Addition was recorded with Scott County in 1986. The last properties to be platted were Raspberry Ridge located on the west side of Manitou Road, south end towards Lords Street. This plat was recorded with Scott County in 1987.

Street: The City of Prior Lake utilizes a Pavement Management program to rate existing public streets. Each street segment is given an Overall Condition Index (OCI) number based on information obtained from field survey relating to current road distress; items such as potholes and the quantity and size of cracks. The OCI for Manitou Road can be found on Exhibit 2. The OCI is a tool for comparing streets when considering where roadway improvements are most needed within the City. The street OCI is a number between 0-100, with 0 being the worst and 100 being a newly paved street. In general, an OCI less than 65 signals a need for some type of improvement. Mill and overlay is generally used for streets with an OCI between 45 and 65 and reclamation is warranted for streets with an OCI between 35 and 45. Full reconstruction is warranted for streets with an OCI below 35. A memo from the City's Public Works Department relating to pavement management for the proposed project area is included in Exhibit 2.

Manitou Road has an OCI of 10 and has a failing bituminous surface and bituminous curb. The existing road width on Manitou Road is 30 feet and is contained within a public right of way that is 50 feet in width. Bituminous paving originally took place in late 1970's when the utilities within the area were constructed. Manitou Road no longer meets minimum design standards and it is not cost effective to continue to patch the street. Soil borings performed on Manitou Road showed 3.5 to 6 inches of existing bituminous with 3 to 7 inches of aggregate base and underlain by mostly clayey sand.

Existing Pavement on Manitou Road



Sanitary Sewer: The existing sanitary sewer system for Manitou Road consists of 8” Vitrified Clay Pipe (VCP) that was installed in the late 1970’s. There is also an 8” VCP sanitary sewer line located along the lake that serves homes located on Manitou Road. This line was also installed in the late 1970’s. The televising indicates there are root intrusions, offset joints, broken pipe and sags within the sanitary sewer pipe.



Cracked sewer pipe

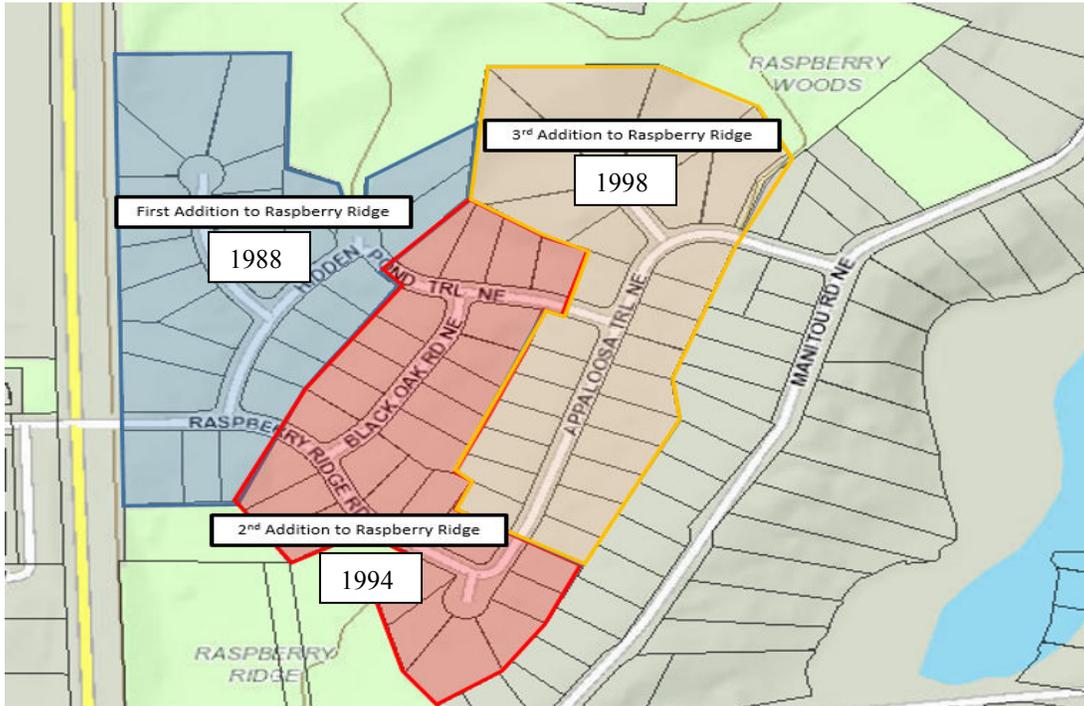
Watermain: The existing watermain system on Manitou consists of 12” Ductile Iron Pipe (DIP) that was installed in the late 1970’s. This line is a larger diameter watermain that serves as a distribution line for larger regions within the City and is part of the backbone of the City water supply system. Although the watermain material is what is used today, a history of breaks and deterioration due to soil condition warrants replacement. The memo and corresponding map from the Public Works Department shown on Exhibit 2 provides further details into the existing watermain’s history. The area also contains a 4” Cast Iron Pipe (CIP) watermain that is located along the lake. This line serves about nine properties that are located on Manitou Road.

Storm Sewer: There is currently no formal storm sewer system on Manitou Road. The only storm sewer inlets on Manitou Road are located where the road ends on the north side. The catch basins outlet to an overland swale just to the north. Stormwater for the majority of Manitou Road collects and drains towards the lake at various low points or settles within low areas along Manitou Road. Because this area was developed in the 1970’s, it did not include the types of stormwater rate control, water quality treatment, or volume control features that are today considered standard practice.

EXISTING CONDITIONS

Raspberry Ridge Neighborhood

The Raspberry Ridge Neighborhood was developed and constructed in three separate phases. A map showing the extent of each development addition is shown below.



The First Addition to Raspberry Ridge includes portions of Raspberry Ridge Road, Hidden Pond Trail, and Timberglade Circle. This addition was constructed in 1988.

The Second Addition to Raspberry Ridge includes portions of Raspberry Ridge Road, Black Oak Road, and Hidden Pond Trail. This addition was constructed in 1994.

The Third Addition to Raspberry Ridge includes Appaloosa Trail, Highland Court, and a short stretch of Hidden Pond Trail. This addition was constructed in 1998.

Street: All the streets within the Raspberry Ridge neighborhood are 32 feet in width and are built with concrete curb and gutter. The streets are contained within a public right of way that is 50 feet in width. The existing pavement condition for all three phases of the development vary, depending on the typical street section that was originally installed. The street section tended to get more substantial (thicker section) as the development progressed to the later phases, perhaps from lessons learned in the field during construction. The following table below shows the existing sections as shown in available record drawings.

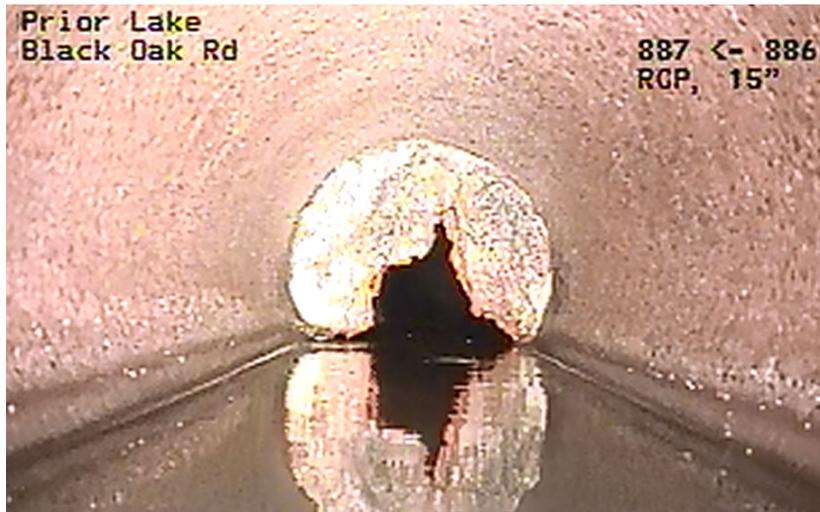
First Addition to Raspberry Ridge	1 ½” Bituminous Wear Course 3” Bituminous Base Course 4” Class 5 Aggregate Base
Second Addition to Raspberry Ridge	1 ½” Bituminous Wear Course 3” Bituminous Base Course 4” Class 5 Aggregate Base 12” 3” Minus Binder Rock
Third Addition to Raspberry Ridge	1 ½” Bituminous Wear Course 2 ½” Bituminous Base Course 8” Class 5 Aggregate Base
Third Addition to Raspberry Ridge Appaloosa Trail (Hidden Pond Trail to Manitou Road)	1 ½” Bituminous Wear Course 2 ½” Bituminous Base Course 6” Class 5 Aggregate Base 24” 3” Minus Binder Rock

The OCI numbers for the Raspberry Ridge Neighborhood is shown on Exhibit 2. The Pavement Management Program and Overall Condition Index numbers were discussed in the Manitou Road section. The OCI numbers for the streets in the neighborhood range from 19 to 50 and therefore are candidates for some type of improvement action. Different options are discussed in the proposed improvement section.

Soil borings performed for the Raspberry Ridge Neighborhood does not match the record drawings verbatim but does correlate to what the intended street sections should have been when completed. The soil borings completed within the First Addition to Raspberry Ridge shows 5 to 9 inches of existing bituminous with 3.5 to 7 inches of aggregate base underlain with a mixture of clayey sand fill. Borings completed within the Second Addition shows 4 to 6 inches of existing bituminous with 4 to 11.5 inches of aggregate base underlain with a mixture of clayey sand fill. Borings completed with the Third addition shows 6 inches of existing bituminous with 28 inches of aggregate base underlain with a mixture of clayey sand fill. The existing pavement conditions have reached a point in which maintenance by the use of bituminous overlay, sealcoating, or patching is of limited value.

Sanitary Sewer: The existing sanitary sewer system for the Raspberry Ridge Neighborhood include larger diameter collector pipes and standard size pipes. The 15” Reinforced Concrete Pipe (RCP) was installed in the early 1980’s and was part of a larger sanitary sewer project. This collector pipe serves larger areas to the northeast and connects to the Metropolitan Council interceptor located at County Road 21. The neighborhood also contains 8” PVC pipe that serves other reaches of the neighborhood not served by the 15” RCP sewer line. The televising completed did not show any deterioration or issues with the existing 8” PVC pipes that would

require complete replacement. The 8" PVC sanitary sewer pipes were installed between 1988 and 1998 when the infrastructure for the development was installed. Inspection of the 15" RCP sewer shows areas of cracked pipe, mineral deposits at joints, roots, and protruding services. Mineral deposits form at the joints or cracks of the pipe and are caused by infiltration of groundwater (picture of a deposit is shown below).



Mineral deposit at joint on 15" RCP Sewer: May block flow of wastewater

Watermain: The existing watermain system for the Raspberry Ridge Neighborhood was installed between 1988 to 1998 and consists of 6" DIP, 8" DIP, and 16" DIP. The 16" DIP watermain is a larger diameter distribution pipe that connects to the existing 12" DIP watermain on Manitou Road. The 16" DIP watermain is located on Raspberry Ridge Road, Hidden Pond Trail, and Timberglade Circle. The 6" DIP watermain is located on Appaloosa Trail and Highland Court. The 8" DIP watermain is located within the other portions of the Raspberry Ridge Neighborhood. The pipe material is currently what is used today.

Storm Sewer: The existing storm sewer system was installed between 1988 to 1998. The neighborhood contains concrete curb and gutter and therefore contains an extensive storm sewer collection system that includes storm inlets, pipes, and ponds. The storm sewer system contains various size reinforced concrete pipe (RCP) as well as individual draintile lines for some individual properties.

PROPOSED IMPROVEMENTS

Manitou Road

Street: Proposed street sections are shown on Exhibit 3. Proposed roadway improvements for Manitou Road include storm sewer, concrete curb and gutter, driveway restoration, and bituminous surfacing. In general, street widths in past reconstruction projects were replaced in kind or to City standard width.

The City is proposing to construct Manitou Road to its current width of 30 feet. The proposed width would be narrower than the City's standard residential street width of 32 feet but will be the same as the existing width. The benefits of the narrower street width from the City standard include additional green space or front yard, reduction in impervious area, reduction of assessments to benefiting properties, and reduction of natural resources required for construction of the roadway.

Even though the City standard street width is 32 feet, numerous roadways within the City limits are less than 32 feet wide. In an effort to reduce impervious surface and long term infrastructure replacement costs, the City has begun utilizing narrower street widths where appropriate. In general, street widths of 28-30 feet have been used but the City has also utilized street widths as narrow as 24 feet. These streets are usually located in older residential neighborhoods or if they are located within a new residential development, environmental sensitivity necessitated their approval. Due to the narrower width, on street parking on both sides of the street can create a situation that disrupts the free flow of traffic. Vehicles may encounter one another in an area that has cars parked on both sides of the roadway. In those cases, one car must wait while the other car proceeds through the area. For low volume roadways, typically this would not be an issue. As demonstrated at the Traffic Safety Committee meeting on October 2, 2008, emergency vehicle travel is not prohibited by a 28 foot wide street. If a neighborhood agrees that one side of the roadway should be signed "No Parking", the neighborhood can petition the City for this signage. Manitou Road is currently a dead end street that may extend to the north through the undeveloped property and will receive additional traffic, it recommended that the width of Manitou Road not be reduced.

Typical 28' wide street with parking on both sides



The standard city street section includes: 2 feet of granular borrow, 6 inches of Class 5 aggregate base, 2.5 inches of bituminous base course, and 1.5 inches of bituminous wear course. Sub-cutting the roadway and placement of the granular borrow enlarges the scope of the street reconstruction and increases the cost of the project. Due to rising cost of material for street construction, the Geotechnical Engineer has provided an alternative section to provide a cost savings but still meets 7-ton design for residential streets. The proposed alternative section includes 1 foot of granular borrow, 8 inches of Class 5 aggregate base, 2.5 inches of bituminous base course, 1.5 inches of bituminous wear course, and geotextile fabric. This section reduces the granular section from 2 feet to 1 foot and increases the aggregate base by 2 inches. The section also reduces the excavation depth required to install the street section and thereby reduces the amount of in place material that would need to be removed from the project site.

Sanitary Sewer: The proposed sanitary sewer improvements are shown on Exhibit 4. Televising of the sanitary sewer pipes indicates areas of root intrusion, offset joints, broken pipes and sags within pipes. Due to the age and areas of defects, the 8" VCP is proposed to be replaced with 8" PVC sewer pipe. The brittle nature of the clay pipe would also necessitate replacement since replacement of the adjacent utility (watermain) is proposed.

Watermain: The proposed watermain improvements are shown on Exhibit 5. A memo relating to the watermain issues within the project area from the City's Public Works department is also shown on Exhibit 2 with the corresponding watermain issues map. The memo provides maintenance and historical data relating to watermain work performed by Public Works for the project area. Due to the history of breaks and corrosive nature of the soils on Manitou Road, all watermain components are proposed to be replaced. The existing DIP watermain will be replaced with PVC watermain.

All water service connections on Manitou Road will be replaced from the mainline to the property line and new shutoff valves (curb stops) installed. Watermain system components such as gate valves and hydrants will also be replaced. It is anticipated that only existing hydrants would be replaced with no additional hydrants proposed.

Storm Sewer: The proposed storm water improvements are shown Exhibit 6. The storm sewer system improvements will consist of adding storm sewer inlet structures, pipes, and additional rate and volume control. The rate control features and pipe sizes will allow the storm sewer collection system to capture the 10-year event. The 100-year event will be safely conveyed through emergency overflow swales (EOF) within the project site. The storm water for the site will be conveyed (south) through the proposed storm sewer pipe and into the Raspberry Park area. The northern end of Manitou Road will convey storm water to an existing swale that is connected to an existing pond.

PROPOSED IMPROVEMENTS

Raspberry Ridge Neighborhood

Infrastructure in place within the Raspberry Ridge Neighborhood are between 20-30 years old. Engineering practices in place today would reason that watermain pipes, sanitary sewer pipes, and streets should last much longer, perhaps 50-70 years in ideal situations. Although infrastructure pipes should last longer than 20 years; environmental factors, standard practice, pipe material and installation methods may effect longevity of the installed pipe. The same case is true for streets. It would not be unreasonable to expect streets to last more than 20 years prior to complete replacement. Unfortunately, the streets within the neighborhood have meet their pavement design life of 20 years and not much longer.

Due to rising costs of infrastructure replacement, two options are being evaluated and presented to ensure best use of available funds. The two options are listed as Option A and Option B. Both options include reconstruction of Manitou Road and bituminous overlay of Appaloosa Trail and Highland Court.

Option A: This option evaluates the cost based on complete street reconstruction of Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, and Timberglade Circle and bituminous overlay of Appaloosa Trail and Highland Court.

Street: The proposed street sections are shown on Exhibit 3. Proposed roadway improvements for the Raspberry Ridge Neighborhood include upgrading storm sewer where appropriate, replacement of concrete curb and gutter, driveway restoration, and bituminous surfacing. The street widths are proposed to match the existing width of 32 feet.

The standard city street section includes: 2 feet of granular borrow, 6 inches of Class 5 aggregate base, 2.5 inches of bituminous base course, and 1.5 inches of bituminous wear course. Sub-cutting the roadway and placement of the granular borrow enlarges the scope of the street reconstruction and increases the cost of the project. Due to rising costs of material for street construction, the Geotechnical Engineer has provided an alternative section to provide a cost savings and still meets 7-ton design for residential streets. The proposed alternative section includes 1 foot of granular borrow, 8 inches of Class 5 aggregate base, 2.5 inches of bituminous base course, 1.5 inches of bituminous wear course, and geotextile fabric. This section reduces the granular section from 2 feet to 1 foot and increases the aggregate base by 2 inches. The section also reduces the excavation depth required to install the street section and thereby reduces the amount of in place material that would need to be removed from the project site.

Sanitary Sewer: The proposed sanitary sewer improvements are shown on Exhibit 4. Televising of the in place 8” PVC sanitary sewer pipe did not show any significant defects that would warrant total replacement. The 15” RCP sanitary sewer does show areas of defect. Since the pipe is concrete, it will continue to deteriorate due to the corrosive nature of sewer gases. Since this pipe is a major collector pipe, it is proposed that the pipe be rehabilitated with the use of

Cured In Place Pipe (CIPP). This method of rehabilitation is less intrusive and would not require open trench installation. Sections of this pipe are also deep and the alignment runs between existing homes, which prohibits open cut replacement of the pipe without substantial impacts to the adjacent homes.

Watermain: The proposed watermain improvements are shown on Exhibit 5. A memo relating to the watermain issues within the project area from the City's Public Works department is also shown on Exhibit 4. The memo provides maintenance and historical data relating to watermain work performed by Public Works for the project area. Due to the history of breaks and corrosive nature of the soils within the neighborhood, all watermain components are proposed to be replaced. The existing DIP watermain will be replaced with PVC watermain.

All water service connections within the Raspberry Ridge Neighborhood will be replaced from the mainline to the property line and new shutoff valves (curb stops) installed. Watermain system components such as gate valves and hydrants will also be replaced. It is anticipated that only existing hydrants would be replaced with no additional hydrants proposed.

Storm Sewer: The proposed storm water improvements are shown on Exhibit 6. Since the Raspberry Ridge Neighborhood was developed in the late 1980's and into the 1990's, the storm sewer system for the areas is adequate for the needs of the neighborhood. Minor updates to the system may be necessary to aid in areas with drainage issues or upgrade pipe size to meet storm event needs.

Option B: This option evaluates the cost based on use of street reclamation for Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, and Timberglade Circle and bituminous overlay of Appaloosa Trail and Highland Court. This option includes reconstruction of Manitou Road.

Street: The proposed street sections are shown on Exhibit 3. Proposed reclamation includes leaving the existing concrete curb and gutter in place and replacing the street section with the proposed section below. The existing curb and gutter would be evaluated for localized replacement where necessary. This option is less intrusive and minimizes impacts within the project area. Minor impacts and restoration to yards and driveways would be required where curb and gutter is replaced.

The standard city street section includes: 2 feet of granular borrow, 6 inches of Class 5 aggregate base, 2.5 inches of bituminous base course, and 1.5 inches of bituminous wear course. Sub-cutting the roadway and placement of the granular borrow enlarges the scope of the street reconstruction and increases the cost of the project. Due to rising costs of material for street construction, the Geotechnical Engineer has provided an alternative section to provide a cost savings and still meets 7-ton design for residential streets. The proposed alternative section includes 1 foot of granular borrow, 8 inches of Class 5 aggregate base, 2.5 inches of bituminous base course, 1.5 inches of bituminous wear course, and geotextile fabric. This section reduces the granular section from 2 feet to 1 foot and increases the aggregate base by 2 inches. The section also reduces the excavation depth required to install the street section and thereby reduces the amount of in place material that would need to be removed from the project site.

Sanitary Sewer: Proposed improvements are the same as for Option A. The proposed sanitary sewer improvements are shown on Exhibit 4. Televising of the in place 8” PVC sanitary sewer pipe did not show any significant defects that would warrant total replacement. The 15” RCP sanitary sewer does show areas of defect. Since the pipe is concrete, it will continue to deteriorate due to the corrosive nature of sewer gases. Since this pipe is a major collector pipe, it is proposed that the pipe be rehabilitated with the use of Cured In Place Pipe (CIPP). This method of rehabilitation is less intrusive and would not require open trench installation. Sections of this pipe are also deep and the alignment runs between existing homes which prohibits open cut replacement of the pipe without substantial impacts to adjacent homes.

Watermain: The proposed watermain improvements are shown on Exhibit 5. A memo relating to the watermain issues within the project area from the City’s Public Works department is also shown on Exhibit 2. The memo provides maintenance and historical data relating to watermain work performed by Public Works for the project area. Option A proposes to replace the existing watermain. With this option (Option B), the watermain would be rehabilitated with the use of lining. This method is similar to lining that is proposed for the sanitary sewer pipe. Lining provides trenchless rehabilitation of the pipes and minimizes impacts to the existing curb and gutter, allowing for use of reclamation for the street rehabilitation. Components such as gate valves and hydrants would also be replaced. Although savings would be realized with less impacts to rehabilitation of the street section, watermain lining is a fairly recent technology that comes at a substantial cost above open cut replacement. The technology is generally used in urban applications where surface disruption is prohibited or cost of restoration is substantial.

Water services would not be replaced with this option and individual curb stops would be evaluated and replaced if necessary.

Storm Sewer: The proposed storm water improvements are shown on Exhibit 6. Since the Raspberry Ridge Neighborhood was developed in the late 1980’s and into the 1990’s, the storm sewer system for the areas is adequate for the needs of the neighborhood. Minor updates to the system may be necessary to aid in areas with drainage issues or upgrade pipe size to meet storm event needs.

Option A vs Option B (Raspberry Ridge Neighborhood):

The two options presented above have a number of advantages and disadvantages to each. The table below provides a segregated view of what the pros and cons are of each option.

	PROS	CONS
Option A (Reconstruction)	<ul style="list-style-type: none"> -New concrete curb & gutter -Replacement of water services and curb stops -All new watermain pipe and components -Allows for use of narrower street widths for cost savings 	<ul style="list-style-type: none"> -Does not address watermain on Appaloosa Trail -Yard impacts -Driveway impacts -Longer construction duration and larger impact area -Higher cost than reclamation
Option B (Reclamation)	<ul style="list-style-type: none"> -Rehabilitation of watermain on Appaloosa -Minimal impacts to yards and driveways -Provides cost savings -Existing curb & gutter remains in place -Less excavation -Shorter duration for construction impacts 	<ul style="list-style-type: none"> -Water services not replaced -Curb & gutter not replaced -Cost savings not that substantial -Street widths must remain the same

ADDITIONAL PROJECT CONSIDERATIONS

Street Widths

The proposed street widths are provided in each of the corresponding sections. Manitou Road and the Raspberry Ridge Neighborhood Streets are proposed to be reconstructed to their existing width of 30 feet and 32 feet, respectively. As previously discussed, costs for street work has been on the rise. If Option A (Reconstruction) is selected for the Raspberry Ridge Neighborhood, additional cost savings could be realized with use of a narrower street width. A reduction of the streets to 30 feet instead of 32 feet would provide a savings of \$37,309 and reduction of the proposed assessment by approximately \$152/unit. Narrowing of the street widths would not be feasible with Option B (Reclamation) as the existing curb and gutter would remain in place.

Concrete Pavement Evaluation

The use of concrete pavement was reviewed for this project. Concrete pavement typically costs more up front, but has less maintenance over time. An annualized life cycle cost analysis was performed to compare bituminous paving versus concrete paving for this project. The analysis revealed that concrete paving cost \$0.64 per linear foot per year more than bituminous based on a 40 year service life. This amounts to a difference of nearly \$150,000 over the 40 year service life for the 1.18 miles of street in this neighborhood based on a similar level of service. In addition to the cost difference for maintaining the pavement, future utility repairs will also cost more if concrete were utilized.

The soils in this area need to be replaced under the streets for both the bituminous and concrete paving. If better soils were encountered, the upfront costs for concrete could be comparable to the cost of bituminous as soil correction under a concrete street is typically less than bituminous. Concrete must cure for a 5 day period before vehicles can travel on the pavement. Bituminous can be driven upon within 1 to 2 hours after placement. Using concrete paving presents access challenges to the neighborhood. Citizen expectations regarding access would need to be adjusted if concrete were utilized.

Driveway Reconstruction Program

Starting in 2008, the City introduced a Driveway Reconstruction Program as part of reconstruction projects. Residents within the project area could reconstruct their driveway using the City's Contractor. The driveway work was bid through the large City contract allowing for reduced pricing on the driveway work. Residents were required to pay the costs up front prior to construction based on the calculation and letter from the City's Engineering Department. In 2013, the City revised the program in order to streamline the process. Private driveway bid items were still included in the project bids but estimates and payments for the private driveway was between the property owner and contractor. The City was not involved in the transaction except for auditing of the contractor's quotes when requested by the property owner. This program in the revised form is proposed to be continued for the 2016 Improvement Project.

Street Lighting

Street lights are proposed for the project area. It is proposed that a total of 8 lights will be installed for Manitou Road at an estimated cost of \$27,000. The Raspberry Ridge Neighborhood currently has existing street lights. It is proposed that the 7 existing lights be replaced at a cost of \$6,000.

Typical Street Light



PROJECT FUNDING

Project Design

The design of the project will utilize existing City staff. It is anticipated that bid opening for this project will take place in March 2016. If a more aggressive timeline for bidding is desired, consultant assistance will be required.

Assessment Policy

Per the City's Assessment Policy, benefiting properties shall be assessed 40% of street and storm sewer cost for street reconstruction projects. The remaining 60% shall be paid through the general ad valorem property tax paid by the entire community.

Option A (Reconstruction) falls under street reconstruction as defined in the Assessment Policy and as such, all properties on Manitou Road and the Raspberry Ridge Neighborhood would be assessed in accordance with the policy (40% of street and storm sewer costs).

Reclamation is currently not addressed within the Assessment Policy. On past projects, reclamation was considered a maintenance activity and therefore was not assessed to the adjacent properties. The Assessment Review Work Group has reviewed the policy and recommends that the policy be revised to include reclamation as part of the policy. Reclamation is proposed to be added to the reconstruction section of the policy and assessment of reclamation work would emulate that of street reconstruction (40%). The policy revision would be undertaken by the City Council prior to presentation of this feasibility study.

Bituminous overlay proposed for Appaloosa Trail and Highland Court as part of Options A and B is considered a maintenance item and per the Assessment Policy will not be assessed.

Funding

It is also proposed that property owners benefitting from street improvements located on Manitou Road and the Raspberry Ridge Neighborhood be assessed 40% of street and storm sewer construction. The property tax levy will be used to finance the City's portion of the street reconstruction costs including all costs associated with the construction of trunk storm sewer. The Driveway Reconstruction Program will be entirely funded by private households participating in the program.

Estimate Costs

The following costs were prepared based upon an Engineer's Estimate (Exhibit 7) and are subject to change, depending on the final design of the project, required easements and/or right of way, soil conditions, bids received, and actual work performed.

<u>ITEM</u>	<u>OPTION A³</u>	<u>OPTION B⁴</u>
Street/Storm Sewer ¹	\$ 2,371,262	\$ 1,959,764
Watermain	\$ 1,108,064	\$ 1,737,209
Sanitary Sewer	\$ 991,454	\$ 938,325
Overlay	\$ 87,562	\$ 87,562
Water Quality	\$ 25,985	\$ 27,965
City's Indirect Costs ²	\$ 339,197	\$ 339,197
TOTAL PROJECT COST	\$ 4,923,524	\$ 5,090,052

¹Includes Street Lights

²City's Indirect Costs includes the following:

- Engineering
- Administration
- Financing

³Does not include rehabilitation of watermain on Appaloosa

⁴Includes \$312,650 for Appaloosa Trail watermain lining

Funding Sources and Special Assessments

The area proposed to be assessed is every lot, piece, and parcel within the City limits benefiting from said improvement, whether abutting or not, within the following described areas:

Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, Timberglade Circle, Appaloosa Trail, Highland Court

Specific property descriptions included in the above-described area, but not inclusive, are as follows:

Kopps Bay Addition	Raspberry Ridge First Addition
Kopps Bay Second Addition	Raspberry Ridge Second Addition
Mary Margaret First Addition	Raspberry Ridge Third Addition
Raspberry Ridge	Parts of S 26, T 115, R 22
	Parts of S 35, T 115, R 22

The improvement cost can be assessed on a unit basis to the benefiting properties as per the Assessment Policy adopted by the City Council on February 21, 1989, and as amended. The following shows the assessment distribution for the project area. See Exhibit 8 for the preliminary assessment roll and assessment map. The preliminary assessment calculations and background information can be found in Exhibit 9.

2016 IMPROVEMENT PROJECT - FUNDING		
Funding Source	Option A	Option B
Ad Valorem	\$ 1,622,068.94	\$ 1,353,644.36
Assessment (40%)	\$ 1,018,685.46	\$ 839,887.13
Utility Fund - Sewer	\$ 1,064,811.83	\$ 1,005,318.80
Utility Fund - Water	\$ 1,190,049.86	\$ 1,861,240.14
Water Quality Fund	\$ 27,907.64	\$ 29,961.62
Assessment (Per Unit) - Reclamation		\$ 6,533.03
Assessment (Per Unit) - Reconstruction	\$ 10,394.75	\$ 10,873.26
Total	\$ 4,923,523.73	\$ 5,090,052.05

Option A (Reconstruction):

Assessable Units: 98 Units
 Assessment Per Unit: \$10,395

Option B (Reclamation):

Assessable Units (Manitou Road): 46 Units
 Assessment Per Unit (Manitou Road): \$10,873

Assessable Units (Reclamation – Raspberry Ridge Neighborhood): 52 units
 Assessment Per Unit (Reclamation – Raspberry Ridge Neighborhood): \$6,533

For Option A the total estimated project cost is \$4,923,524 with an estimated assessment amount of \$1,018,686. The assessment amount represents 39% of the estimated bond amount of \$2,640,755. The appropriate funding sources are shown on the table above. This option does not address the watermain on Appaloosa Trail.

For Option B the total estimated project cost is \$5,090,052 with an estimated assessment amount of \$839,887. The assessment amount represents 38% of the estimated bond amount of \$2,193,531. The appropriate funding sources are shown on the table above. This option includes watermain lining on Appaloosa Trail, which Option A does not address. Watermain lining on Appaloosa Trail adds \$312,650 to the project cost. Without the Appaloosa Trail watermain lining, the total estimated project cost is \$4,777,402.

PRELIMINARY PROJECT SCHEDULE

The following project schedule outlines an approach to complete the assessable project in 2016:

ACTIVITY	DATE
Held First Informational Meeting	September 15, 2015
Accept Feasibility Study/Call for Public Hearing	November 23, 2015
Hold Second Informational Meeting	December 2015
Conduct Public Hearing/Accept Project/Order Plans and Specifications	January 2016
Hold Third Informational Meeting	January 2016
Approve Plans and Specifications/Order Advertisements for Bids	February 2016
Open Bids	March 2016
Accept Bids/Award Contract	May 2016
Begin Construction	May 2016
Complete Base Course of Bituminous Pavement	October 2016
Authorize Amount to be Assessed/Schedule Assessment Hearing	October 2016
Complete Final Course of Bituminous Pavement	July 2017

CONCLUSION AND RECOMMENDATION

The proposed improvement is necessary, cost effective, and feasible from an engineering standpoint and should be made as proposed.

Option B would provide an estimated cost savings of \$146,122 over Option A if the existing watermain on Appaloosa Trail is not rehabilitated. This amount represents a 3% savings of the overall project cost. Due to the minimal cost savings, it is recommended that reconstruction be used for the 2016 Improvement Project. Reconstruction provides for new concrete curb & gutter, watermain, water services, and curb stops. Option B leaves the existing curb & gutter in place, does not replace water services in the Raspberry Ridge Neighborhood, and does not replace individual shut off valves. Although the street section would be upgraded for this option, the curb & gutter is over 20 years old and would likely need replacement in the future.

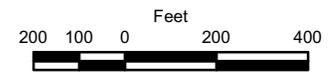
EXHIBIT 1
PROJECT AREA



City of Prior Lake
Minnesota
2015
2016 Improvement Project



- Reclamation/Recon
- Mill & Overlay



Last Updated July 2014
City of Prior Lake Public Works

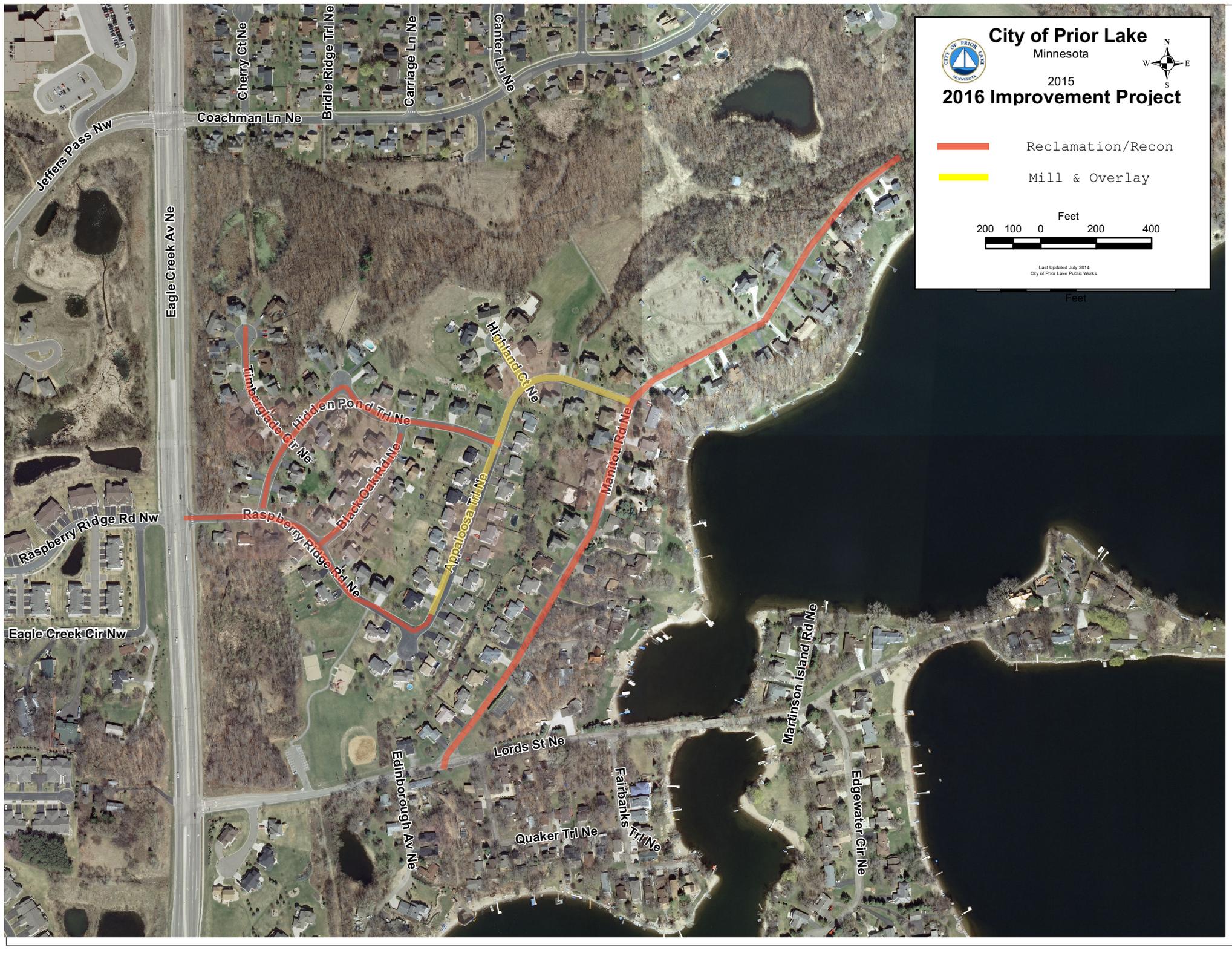


EXHIBIT 2
PUBLIC WORKS MEMORANDUM



17073 Adelmann Street SE
Prior Lake, MN 55372

Date: November 3, 2015

To: Seng Thongvanh, Project Engineer

From: Katy Gehler, Public Works Director
Jake Theisen, Maintenance Superintendent
Andy Stephes, Water Foreman
Jim Larson, Streets and Sewer Foreman

Re: Raspberry Ridge/Manitou Street and Utility Conditions

This memo summarizes the maintenance issues experienced in the Raspberry Ridge neighborhood and notes functional concerns and recommendations for pavement management and utility replacements.

Pavement Management

Manitou Road was constructed in the late 1970s and is well beyond the expected life of the pavement. The Raspberry Ridge neighborhood was developed over several years in three distinct phases from 1988-1998. Road construction standards changed over this ten year period which is evident in the condition of the pavement. In addition this area has been known for structurally poor soils. The attached figure shows the current OCIs. OCIs below a 45 have degraded where there are subgrade issues and an overlay is not a cost effective pavement management solution. Below is a summary of the pavement conditions by area:

1 - In areas noted with OCIs under 45 on the map, the pavements are exhibiting settlements in the subbase which has led to alligator cracking. Curb settlements are also prevalent. The settlements are best seen after rains when there are several areas that pool water. Without correcting the subgrade by adding granular material, re-compacting and stabilizing the failures will result in reflective cracking in an overlay within 1-2 years. It is not cost effective to complete an overlay at this point in the pavements degradation. Curb settlements should be addressed and the pavement should be reconstructed either through a reconstruction or reclamation which will allow for subgrade corrections and a near new pavement surface.

2 - Black Oak Road and Hidden Pond Trail from Black Oak Road to Appaloosa Trail was constructed with the second phase of the development. This pavement is starting to show settlements and has an OCI on the threshold of a reconstruction. Because of the subgrade issues this road is recommended to be reclaimed to address the subbase stability. If an overlay is completed it is likely that the subbase will continue to degrade decreasing the expected life of the overlay.

3 - Appaloosa Trail was constructed in the third phase of the development. This pavement is exhibiting transverse cracking in line with the age of the pavement. An overlay is recommended for this areas before they degrade to a point where settlements occur.

4 - Manitou currently has an OCI under 10. Public Works staff has completed several large patches to correct larger failures of the pavement and subbase. This road also was built without a modern drainage system including storm sewer and concrete curb and gutter.

Watermain

Public Works staff has responded to several watermain issues in this neighborhood. The failures started occurring primarily 5 years ago with three of the issues being identified in 2014. The attached map shows the location and type of repair. Two of the failed valves that were identified in 2014 have not been replaced in anticipation of this project.

All of the watermain failures have been caused by corrosion. Corrosive soils can severely pit ductile iron pipe leading to wall weakness and eventual failure without warning. Pipe failures have been caused by degradation of the pipe thickness to a point where it could not sustain the water pressure. The two valves that have been replaced failed due to the flange bolts being corroded away. The capped end of the pipe at CR21 failed due to corrosion of the bolts. With the significant increase in the occurrence of corrosion issues in this area over the last 5 years it is recommended that this line be replaced or lined before unplanned failures cause emergency replacements.



17073 Adelmann Street SE
Prior Lake, MN 55372

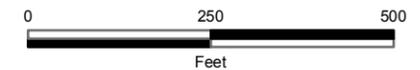
In addition a valve is needed at the cul-de-sac at the end of Raspberry Ridge Road to allow better system isolation for future shut downs.

Manitou/ Raspberry Ridge Improvements

Street Conditions Map

 Project Area (with current OCI)

Last Updated November 2015
City of Prior Lake GIS



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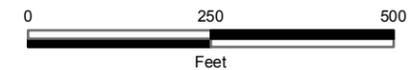


Manitou/ Raspberry Ridge Improvements

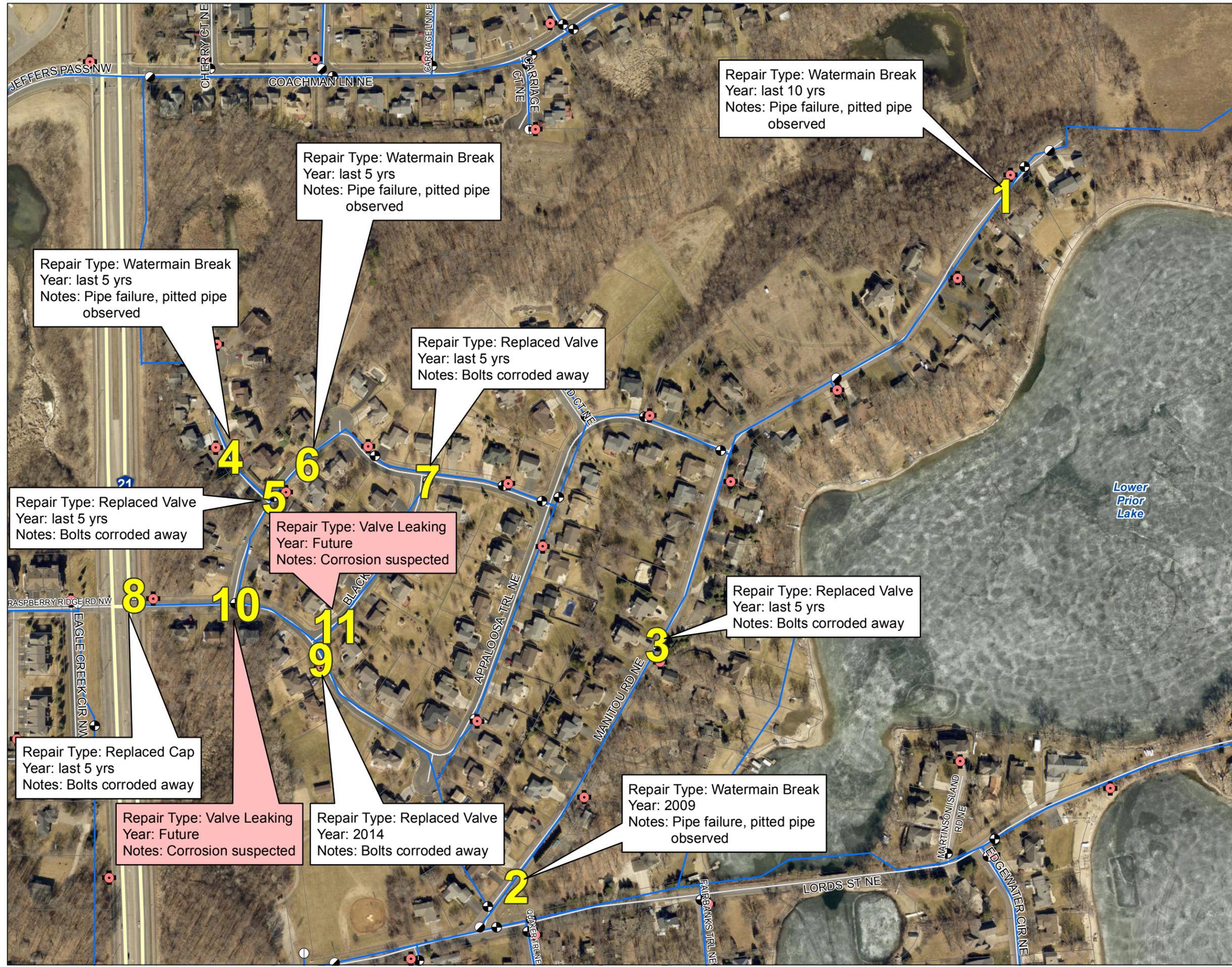
Water Issues

-  Hydrant
-  Butterfly
-  Curb Stop
-  Gate
-  Plug
-  Tapping
-  Water Mains

Last Updated November 2015
City of Prior Lake GIS



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Repair Type: Watermain Break
Year: last 10 yrs
Notes: Pipe failure, pitted pipe observed

Repair Type: Watermain Break
Year: last 5 yrs
Notes: Pipe failure, pitted pipe observed

Repair Type: Watermain Break
Year: last 5 yrs
Notes: Pipe failure, pitted pipe observed

Repair Type: Replaced Valve
Year: last 5 yrs
Notes: Bolts corroded away

Repair Type: Valve Leaking
Year: Future
Notes: Corrosion suspected

Repair Type: Replaced Valve
Year: last 5 yrs
Notes: Bolts corroded away

Repair Type: Replaced Valve
Year: last 5 yrs
Notes: Bolts corroded away

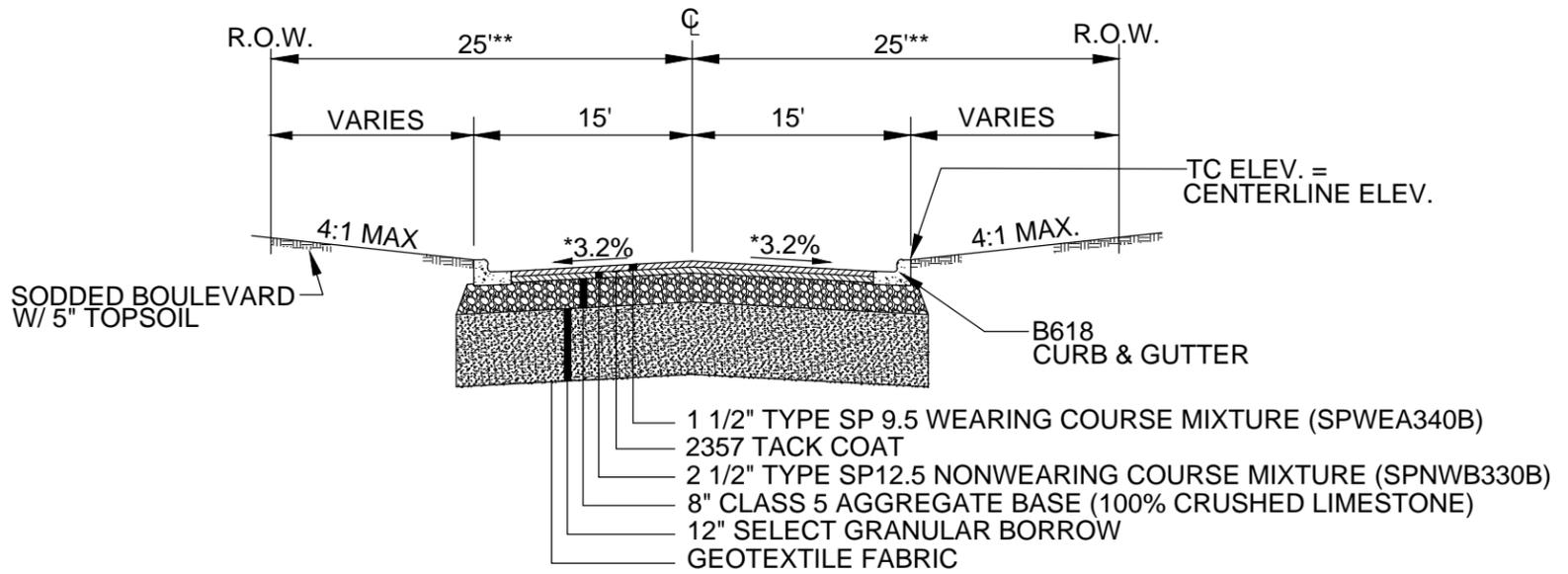
Repair Type: Replaced Cap
Year: last 5 yrs
Notes: Bolts corroded away

Repair Type: Valve Leaking
Year: Future
Notes: Corrosion suspected

Repair Type: Replaced Valve
Year: 2014
Notes: Bolts corroded away

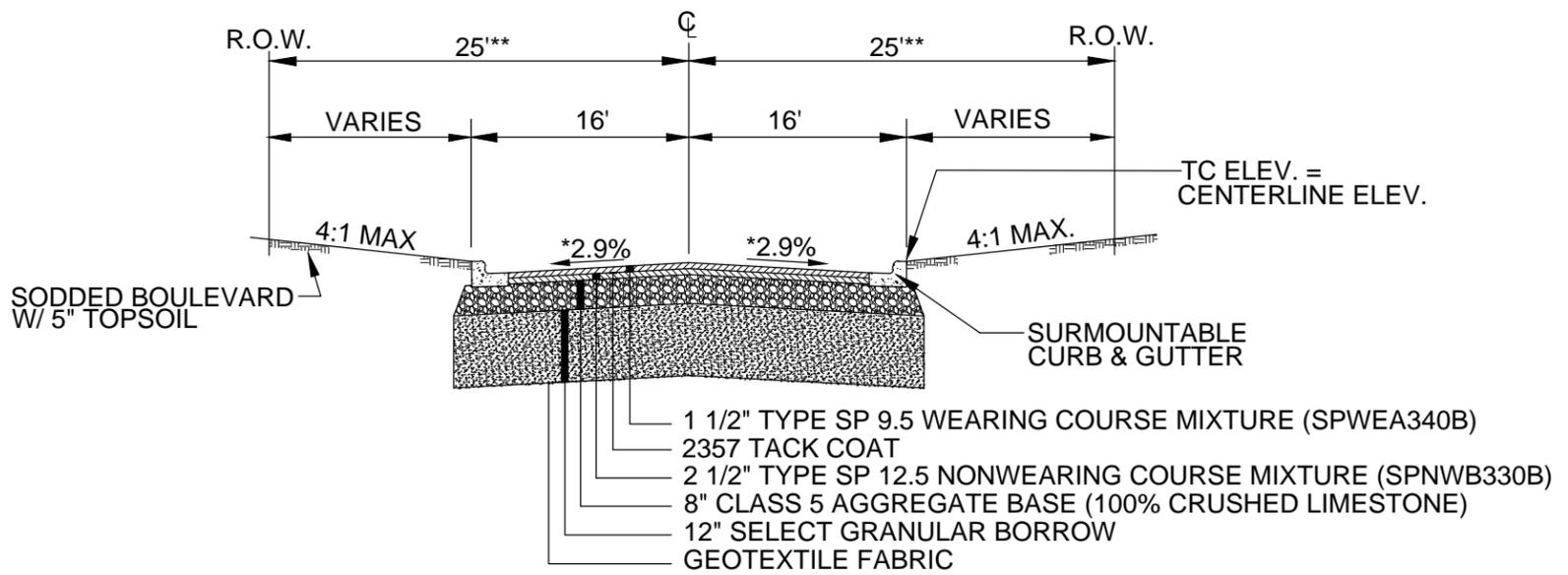
Repair Type: Watermain Break
Year: 2009
Notes: Pipe failure, pitted pipe observed

EXHIBIT 3
PROPOSED STREET SECTION



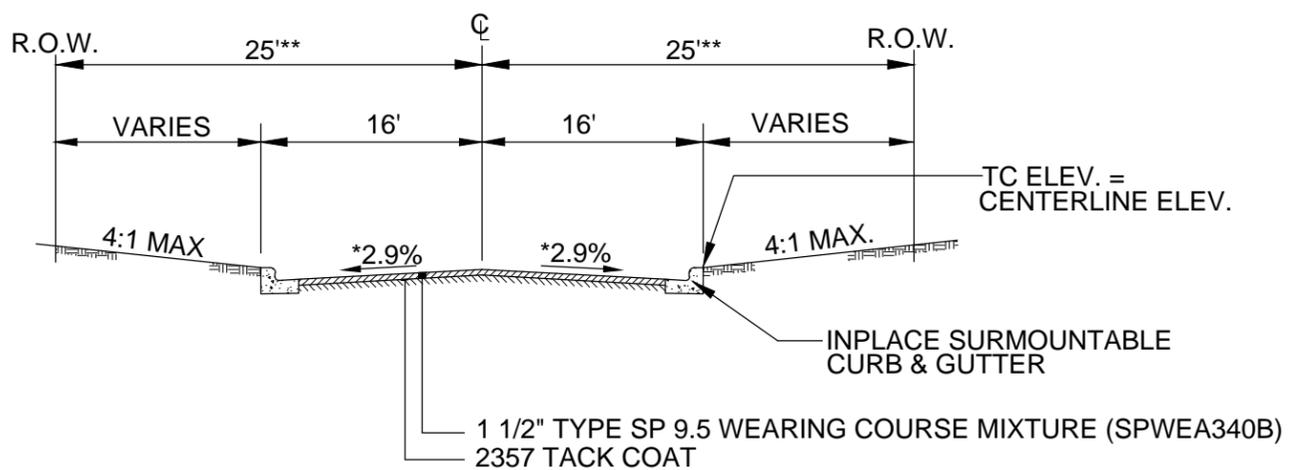
* CROWN MAY VARY AT INTERSECTIONS & CUL-DE-SACS, SEE PLANS AND CROSS SECTIONS
 ** R.O.W. VARIES THROUGHOUT PROJECT SEE HORIZONTAL PROFILE

TYPICAL STREET SECTION
 MANITOU ROAD



* CROWN MAY VARY AT INTERSECTIONS & CUL-DE-SACS, SEE PLANS AND CROSS SECTIONS
 ** R.O.W. VARIES THROUGHOUT PROJECT SEE HORIZONTAL PROFILE

TYPICAL STREET SECTION
 BLACK OAK, HIDDEN POND, RASPBERRY RIDGE, TIMBERGLADE

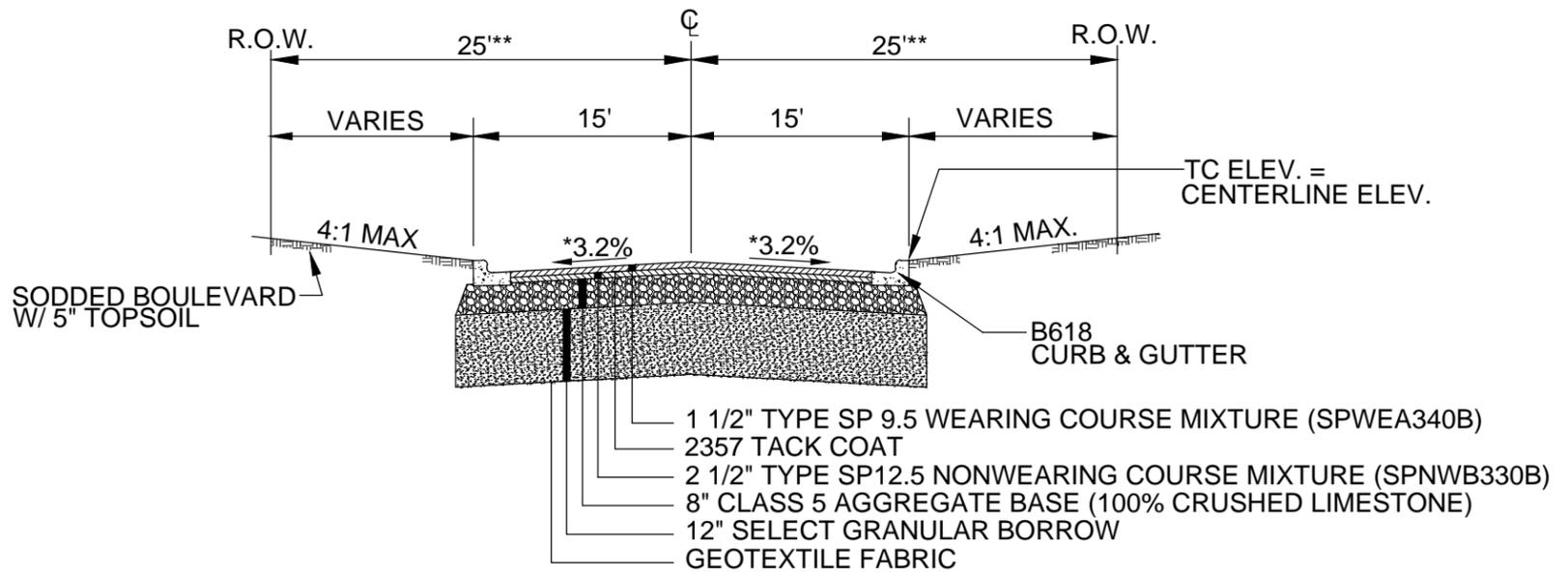


* CROWN MAY VARY AT INTERSECTIONS & CUL-DE-SACS, SEE PLANS AND CROSS SECTIONS
 ** R.O.W. VARIES THROUGHOUT PROJECT SEE HORIZONTAL PROFILE

TYPICAL STREET SECTION
 APPALOOSA TRAIL - OVERLAY

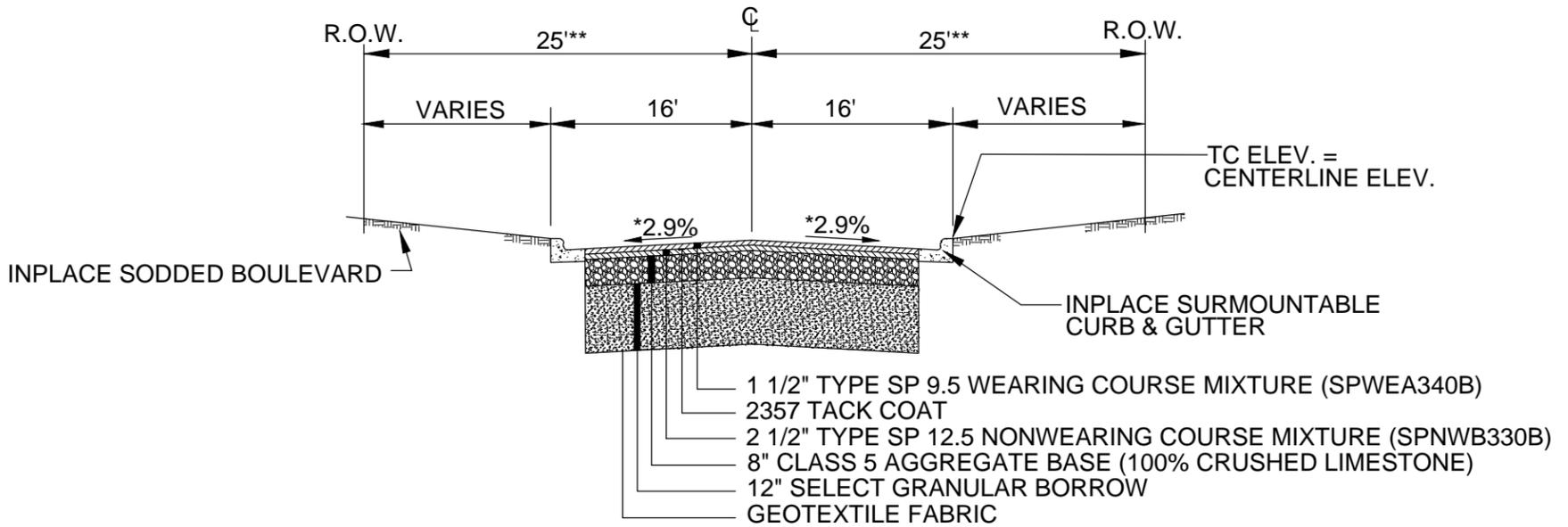


OPTION A - RECONSTRUCTION PROPOSED STREET SECTIONS



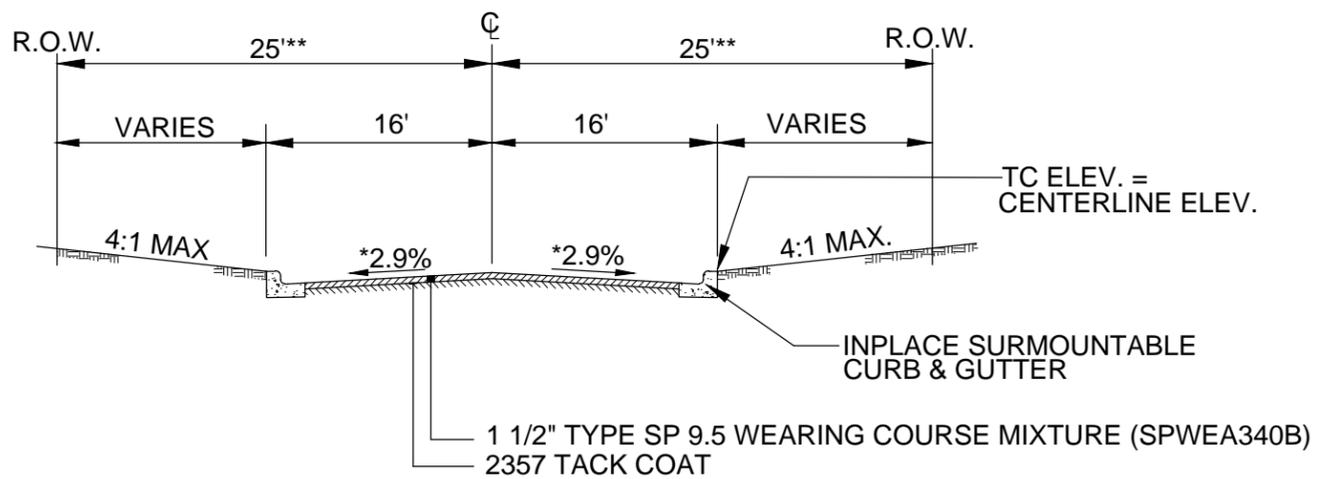
* CROWN MAY VARY AT INTERSECTIONS & CUL-DE-SACS, SEE PLANS AND CROSS SECTIONS
 ** R.O.W. VARIES THROUGHOUT PROJECT SEE HORIZONTAL PROFILE

TYPICAL STREET SECTION
 MANITOU ROAD



* CROWN MAY VARY AT INTERSECTIONS & CUL-DE-SACS, SEE PLANS AND CROSS SECTIONS
 ** R.O.W. VARIES THROUGHOUT PROJECT SEE HORIZONTAL PROFILE

TYPICAL STREET SECTION - RECLAMATION
 BLACK OAK, HIDDEN POND, RASPBERRY RIDGE, TIMBERGLADE



* CROWN MAY VARY AT INTERSECTIONS & CUL-DE-SACS, SEE PLANS AND CROSS SECTIONS
 ** R.O.W. VARIES THROUGHOUT PROJECT SEE HORIZONTAL PROFILE

TYPICAL STREET SECTION
 APPALOOSA TRAIL - OVERLAY



OPTION B - RECLAMATION PROPOSED STREET SECTIONS

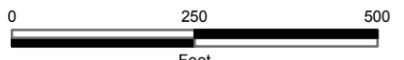
EXHIBIT 4
SANITARY SEWER

Street Improvement Project

Exhibit 4 - Sanitary Sewer

-  Sanitary Sewer Main - Lining
-  Manhole - Replace
-  Sanitary Sewer Main - Replace
-  Manhole
-  Sanitary Sewer Main
-  Force Main

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City of Prior Lake GIS



0 250 500
Feet

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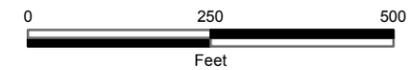


EXHIBIT 5
WATERMAIN

Street Improvement Project
Option A
Exhibit 5 - Watermain

-  Hydrant - Replace
-  Butterfly Valve - Replace
-  Gate Valve - Replace
-  Plug - Replace
-  Watermain - Replace
-  Hydrant
-  Butterfly
-  Gate
-  Plug
-  Water Mains

Last Updated November 2015
City of Prior Lake GIS

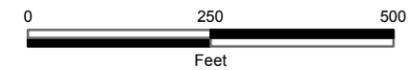


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**Street Improvement
Project
Option B
Exhibit 5 - Watermain**

-  Hydrant - Replace
-  Butterfly Valve - Replace
-  Gate Valve - Replace
-  Plug - Replace
-  Water Main - Line
-  Water Main - Replace
-  Hydrant
-  Butterfly
-  Gate
-  Plug
-  Water Mains

Last Updated November 2015
City of Prior Lake GIS



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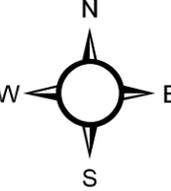
EXHIBIT 6
STORM SEWER



City of Prior Lake
Minnesota



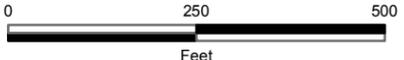
2016



Street Improvement Project
Exhibit 6 - Storm Sewer

-  Catch Basin - New
-  Flared End Section - New
-  Storm Pipes - New
-  Catch Basin - Replace
-  Access Manhole
-  CB Manhole
-  Valve
-  Flared End Section - Replace
-  Storm Main - Replace
-  Apron
-  Flared End Section
-  Manhole
-  Catch Basin
-  Flared End Section
-  Overflow
-  Storm Pipes

Last Updated November 2015
City of Prior Lake GIS



0 250 500
Feet

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EXHIBIT 7
ENGINEER'S ESTIMATE

**OPTION A - RECONSTRUCTION
ENGINEERS ESTIMATE
CITY OF PRIOR LAKE
2016 IMPROVEMENT PROJECT**

CITY PROJECT #TRN16-000001

SCHEDULE 1 - STREET - MANITOU RD, BLACK OAK RD, HIDDEN PONDS TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2021.501	MOBILIZATION	LUMP SUM	1	\$ 130,000.00	\$ 130,000.00
2	2101.502	CLEAR AND GRUB	TREE	78	\$ 400.00	\$ 31,200.00
3	2101.502	CLEAR AND GRUB (SHRUB)	SHRUB	80	\$ 110.00	\$ 8,800.00
4	2101.502	REMOVE CONCRETE CURB AND GUTTER	LIN FT	6840	\$ 4.00	\$ 27,360.00
5	2104.505	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	SQ YD	2040	\$ 4.50	\$ 9,180.00
6	2104.505	REMOVE CONCRETE DRIVEWAY PAVEMENT	SQ YD	727	\$ 9.00	\$ 6,543.00
7	2104.509	REMOVE SIGN POST	EACH	14	\$ 60.00	\$ 840.00
8	2104.511	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LIN FT	653	\$ 8.00	\$ 5,224.00
9	2104.513	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	2158	\$ 6.00	\$ 12,948.00
10	2104.521	SALVAGE & REINSTALL FENCE	LIN FT	200	\$ 25.00	\$ 5,000.00
11	2104.521	SALVAGE & REINSTALL LANDSCAPE EDGING	LIN FT	340	\$ 10.00	\$ 3,400.00
12	2104.521	SALVAGE & REINSTALL SPRINKLER SYSTEM	LIN FT	340	\$ 20.00	\$ 6,800.00
13	2104.523	SALVAGE & REINSTALL MAILBOX	EACH	98	\$ 100.00	\$ 9,800.00
14	2104.618	SALVAGE & REINSTALL RETAINING WALL	SQ FT	220	\$ 35.00	\$ 7,700.00
15	2105.501	COMMON EXCAVATION	CU YD	26629	\$ 14.00	\$ 372,806.00
16	2105.507	SUBGRADE EXCAVATION	CU YD	400	\$ 14.00	\$ 5,600.00
17	2105.609	SELECT GRANULAR BORROW	TON	16020	\$ 12.00	\$ 192,240.00
18	2105.526	SELECT TOPSOIL BORROW	CU YD	2839	\$ 29.00	\$ 82,331.00
19	2105.604	GEOTEXTILE FABRIC TYPE V	SQ YD	26367	\$ 2.00	\$ 52,734.00
20	2105.543	3" MINUS 100% CRUSHED QUARRY LIMESTONE	TON	110	\$ 30.00	\$ 3,300.00
21	2105.543	1 1/2" SCREENED CLEAN AGGREGATE	TON	1134.7	\$ 30.00	\$ 34,041.00
22	2112.501	SUBGRADE PREPARATION	RS	60.6	\$ 250.00	\$ 15,150.00
23	2130.501	WATER DUST CONTROL	M GAL	181	\$ 50.00	\$ 9,050.00
24	2211.501	AGGREGATE BASE CLASS 5	TON	11347	\$ 20.00	\$ 226,940.00
25	2232.501	MILL BITUMINOUS SURFACE (STREET-FULL DEPTH)	SQ YD	23237	\$ 2.60	\$ 60,416.20
26	2232.501	MILL BITUMINOUS SURFACE (1.5")	SQ YD	335	\$ 8.00	\$ 2,680.00
27	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	1090	\$ 4.00	\$ 4,360.00
28	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (3,B)	TON	1872	\$ 74.00	\$ 138,528.00
29	2360.502	TYPE SP 12.5 NON-WEARING COURSE MIXTURE (3,B)	TON	3118	\$ 69.00	\$ 215,142.00
30	2360.503	TYPE SP 9.5 WEAR CRS MIX (3,B) 3" THICK DRIVEWAY PAVEMENT	SQ YD	2040	\$ 32.00	\$ 65,280.00
31	2411.618	MODULAR BLOCK RETAINING WALL	SQ FT	240	\$ 40.00	\$ 9,600.00
32	2506.521	ADJUST FRAME & RING CASTING (SANITARY)	EACH	17	\$ 450.00	\$ 7,650.00
33	2506.521	ADJUST CASTING WITH 1 1/2" EXTENSION RING	EACH	17	\$ 300.00	\$ 5,100.00
34	2531.507	6" CONCRETE DRIVEWAY PAVEMENT	SQ YD	727	\$ 51.00	\$ 37,077.00
35	2531.501	CONCRETE CURB AND GUTTER, B618	LIN FT	6248	\$ 13.00	\$ 81,224.00
36	2531.501	CONCRETE CURB AND GUTTER, SURMOUNTABLE	LIN FT	7480	\$ 12.50	\$ 93,500.00
37	2531.501	CONCRETE CURB AND GUTTER REPLACEMENT	LIN FT	686.4	\$ 30.00	\$ 20,592.00
38	2531.602	CONCRETE PEDESTRIAN CURB RAMP	EACH	3	\$ 1,000.00	\$ 3,000.00
39	2540.601	TEMPORARY MAILBOXES	LUMP SUM	1	\$ 3,000.00	\$ 3,000.00
40	2545.523	4" NON-METALLIC CONDUIT	LIN FT	550	\$ 16.00	\$ 8,800.00
41	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$ 10,000.00	\$ 10,000.00
42	2564.537	INSTALL SIGN TYPE SPECIAL (STREET NAME)	EACH	16	\$ 350.00	\$ 5,600.00
43	2564.537	INSTALL SIGN TYPE C	EACH	9	\$ 300.00	\$ 2,700.00
44	2564.602	INSTALL STEEL POST	EACH	14	\$ 200.00	\$ 2,800.00
45	2571.502	TREE 2.5" CAL B&B (VARIETY - SEE SPEC)	TREE	24	\$ 550.00	\$ 13,200.00
46	2571.505	SHRUB 18" HT (VARIETY - SEE SPEC)	SHRUB	30	\$ 80.00	\$ 2,400.00
47	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	2470	\$ 3.50	\$ 8,645.00
48	2573.530	STORM DRAIN INLET PROTECTION	EACH	33	\$ 180.00	\$ 5,940.00
49	2573.540	FILTER LOG TYPE WOOD FIBER BIOROLL	LIN FT	200	\$ 6.00	\$ 1,200.00
50	2573.602	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	4	\$ 2,000.00	\$ 8,000.00
51	2575.501	SEED AND MULCH - SEED MIXTURE 260 (TURF MIX)	ACRE	0.2	\$ 5,000.00	\$ 1,000.00

52	2575.505	SODDING TYPE LAWN	SQ YD	20270	\$ 5.00	\$ 101,350.00	
53	2575.523	EROSION CONTROL BLANKETS, CATEGORY 3	SQ YD	400	\$ 3.00	\$ 1,200.00	
54	2581.503	CROSSWALK MARKING EPOXY	SQ FT	120	\$ 12.00	\$ 1,440.00	
T	SCHEDULE 1 (STREET)					TOTAL	\$ 2,180,411.20

SCHEDULE 2 - STORM SEWER - MANITOU RD, BLACK OAK RD, HIDDEN PONDS TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE	
1	2104.501	REMOVE SEWER PIPE	LIN FT	455	\$ 10.00	\$ 4,550.00	
2	2104.509	REMOVE DRAINAGE STRUCTURE	EACH	6	\$ 450.00	\$ 2,700.00	
3	2104	SALVAGE AND REINSTALL STORM PIPE	LIN FT	330	\$ 40.00	\$ 13,200.00	
4	2105.61	EXPLORATORY EXCAVATION	HOUR	5	\$ 550.00	\$ 2,750.00	
5	2451.607	PIPE BEDDING MATERIAL	CU YD	385	\$ 40.00	\$ 15,400.00	
6	2501.515	24" RC PIPE APRON WITH TRASH GUARD	EACH	1	\$ 1,500.00	\$ 1,500.00	
7	2501.515	21" RC PIPE APRON WITH TRASH GUARD	EACH	1	\$ 1,300.00	\$ 1,300.00	
8	2502.541	4" PERF TP PIPE DRAIN (WITH GEOTEXTILE FILTER SOCK)	LIN FT	460	\$ 11.00	\$ 5,060.00	
9	2503.541	15" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	1380	\$ 40.00	\$ 55,200.00	
10	2503.541	18" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	400	\$ 45.00	\$ 18,000.00	
11	2503.541	21" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	710	\$ 52.00	\$ 36,920.00	
12	2503.541	24" RC PIP SEWER CL V DESIGN 3006 (STORM)	LIN FT	100	\$ 58.00	\$ 5,800.00	
13	2503.602	CONNECT TO EXISTING STORM SEWER	EACH	1	\$ 1,500.00	\$ 1,500.00	
14	2506.521	INSTALL CASTING (STORM)	EACH	34	\$ 500.00	\$ 17,000.00	
15	2505.503	RECONSTRUCT STORM SEWER MANHOLE	EACH	34	\$ 1,000.00	\$ 34,000.00	
16	2506.502	CONST DRAINAGE STRUCTURE DES (2'X3') (PLATE#301)	EACH	6	\$ 2,600.00	\$ 15,600.00	
17	2506.502	CONST DRAINAGE STRUCTURE DES 48-4022 (PLATE#300)	EACH	9	\$ 3,200.00	\$ 28,800.00	
18	2511.501	CLASS III RIPRAP	CU YD	18	\$ 120.00	\$ 2,160.00	
19	2576.500	POND EXCAVATION	LUMP SUM	1	\$ 30,000.00	\$ 30,000.00	
T	SCHEDULE 2 (STORM SEWER)					TOTAL	\$ 291,440.00

SCHEDULE 3 - SANITARY SEWER - MANITOU RD, BLACK OAK RD, HIDDEN PONDS TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE	
1	2104.501	REMOVE SEWER PIPE (SANITARY)	LIN FT	3690	\$ 12.00	\$ 44,280.00	
2	2104.501	REMOVE SEWER PIPE (SANITARY SERVICE)	LIN FT	1694	\$ 10.00	\$ 16,940.00	
3	2104.509	REMOVE MANHOLE	EACH	16	\$ 550.00	\$ 8,800.00	
4	2105.601	DEWATERING	LUMP SUM	1	\$ 4,000.00	\$ 4,000.00	
5	2105.610	EXPLORATORY EXCAVATION	HOUR	5	\$ 550.00	\$ 2,750.00	
6	2451.607	PIPE BEDDING MATERIAL	CU YD	280	\$ 40.00	\$ 11,200.00	
7	2503.602	CONNECT TO EXISTING MANHOLES (SAN)	EACH	3	\$ 1,500.00	\$ 4,500.00	
8	2503.602	RECONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	44	\$ 400.00	\$ 17,600.00	
9	2503.602	8"X4" PVC SDR 26 WYE	EACH	44	\$ 400.00	\$ 17,600.00	
10	2503.603	4" PVC SEWER SDR 26	LIN FT	1694	\$ 28.00	\$ 47,432.00	
11	2503.603	8" PVC SEWER SDR 35	LIN FT	3690	\$ 45.00	\$ 166,050.00	
12	2506.521	INSTALL CASTING (SANITARY)	EACH	17	\$ 600.00	\$ 10,200.00	
13	2505.503	RECONSTRUCT SANITARY SEWER MANHOLE	EACH	17	\$ 1,000.00	\$ 17,000.00	
14	2506.501	SANITARY MANHOLE EXTRA DEPTH (>8FT)	LIN FT	76	\$ 150.00	\$ 11,400.00	
15	2506.502	48" DIAMETER SANITARY MANHOLE	EACH	16	\$ 3,200.00	\$ 51,200.00	
16	2505.602	TRACER WIRE ACCESS BOX DRIVEWAY CASTING ASSEMBLY	EACH	4	\$ 300.00	\$ 1,200.00	
17	0.000	15" SEWER CIPP	LIN FT	3370	\$ 150.00	\$ 505,500.00	
T	SCHEDULE 3 (SANITARY)					TOTAL	\$ 937,652.00

SCHEDULE 4 - WATERMAIN - MANITOU RD, BLACK OAK RD, HIDDEN PONDS TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2140.501	REMOVE WATERMAIN	LIN FT	6813	\$ 10.00	\$ 68,130.00
2	2104.504	REMOVE WATER SERVICE PIPE	LIN FT	3736	\$ 4.00	\$ 14,944.00
3	2104.509	REMOVE HYDRANT WITH GATE VALVE & BOX	EACH	14	\$ 450.00	\$ 6,300.00
4	2104.509	REMOVE GATE VALVE & BOX	EACH	13	\$ 200.00	\$ 2,600.00
5	2104.509	REMOVE CURB STOP & BOX	EACH	98	\$ 100.00	\$ 9,800.00
6	2105.601	DEWATERING	LUMP SUM	1	\$ 3,000.00	\$ 3,000.00
7	2105.61	EXPLORATORY EXCAVATION	HOUR	10	\$ 550.00	\$ 5,500.00
8	2451.607	PIPE BEDDING MATERIAL	CU YD	900	\$ 40.00	\$ 36,000.00
9	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	6	\$ 1,800.00	\$ 10,800.00
10	2504.602	HYDRANT WITH 6" GATE VALVE & BOX	EACH	15	\$ 5,800.00	\$ 87,000.00
11	2504.602	16" GATE VALVE AND BOX	EACH	4	\$ 9,000.00	\$ 36,000.00
12	2504.602	12" GATE VALVE AND BOX	EACH	5	\$ 8,000.00	\$ 40,000.00
13	2504.602	8" GATE VALVE AND BOX	EACH	7	\$ 2,500.00	\$ 17,500.00
14	2505.602	6" GATE VALVE AND BOX	EACH	0	\$ 2,000.00	\$ -
15	2506.602	4" GATE VALVE AND BOX	EACH	1	\$ 1,500.00	\$ 1,500.00
16	2504.602	16" SADDLE	EACH	27	\$ 450.00	\$ 12,150.00
17	2504.602	12" SADDLE	EACH	44	\$ 400.00	\$ 17,600.00
18	2504.602	8" SADDLE	EACH	23	\$ 350.00	\$ 8,050.00
19	2504.602	6" SADDLE	EACH	3	\$ 300.00	\$ 900.00
20	2504.602	4" SADDLE	EACH	8	\$ 300.00	\$ 2,400.00
21	2504.602	1" CORPORATION STOP	EACH	98	\$ 300.00	\$ 29,400.00
22	2504.602	1" CURB STOP & BOX	EACH	98	\$ 400.00	\$ 39,200.00
23	2504.602	RECONNECT WATER SERVICE	EACH	98	\$ 250.00	\$ 24,500.00
24	2504.603	16" PVC WATERMAIN C-905	LIN FT	2085	\$ 64.00	\$ 133,440.00
25	2504.603	12" PVC WATERMAIN C-900	LIN FT	2840	\$ 52.00	\$ 147,680.00
26	2504.603	8" PVC WATERMAIN C-900	LIN FT	1745	\$ 37.00	\$ 64,565.00
27	2504.603	6" PVC WATERMAIN C-900	LIN FT	425	\$ 30.00	\$ 12,750.00
28	2504.603	4" PVC WATERMAIN C-900	LIN FT	802	\$ 26.00	\$ 20,852.00
29	2504.603	1" PE-4710 WATER SERVICE SDR-9	LIN FT	3748	\$ 22.00	\$ 82,456.00
30	2504.602	TEMPORARY WATER SERVICE	EACH	96	\$ 550.00	\$ 52,800.00
31	2504.608	DUCTILE IRON FITTINGS	LBS	11590	\$ 5.50	\$ 63,745.00
32	2506.602	CURB STOP BOX DRIVEWAY CASTING ASSEMBLY	EACH	9	\$ 300.00	\$ 2,700.00
T SCHEDULE 4 (WATERMAIN)					TOTAL	\$ 1,054,262.00

SCHEDULE 5 - OVERLAY - APPALOOSA TRAIL, HIGHLAND COURT

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2021.501	MOBILIZATION	LUMP SUM	1.00	\$ 2,000.00	\$ 2,000.00
2	2232.501	MILL BITUMINOUS SURFACE (1.5")	SQ YD	5544.00	\$ 8.00	\$ 44,352.00
3	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	278.00	\$ 4.00	\$ 1,112.00
4	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (3,B)	TON	477.00	\$ 74.00	\$ 35,298.00
5	2531.501	CONCRETE CURB AND GUTTER REPLACEMENT	LIN FT	160.00	\$ 30.00	\$ 4,800.00
6	2531.602	CONCRETE PEDESTRIAN CURB RAMP	EACH	0.00	\$ 1,000.00	\$ -
7	2581.503	CROSSWALK MARKING EPOXY	SQ FT	0.00	\$ 12.00	\$ -
T SCHEDULE 5 (OVERLAY)					TOTAL	\$ 87,562.00

TOTAL (TRN16-000001)

**SCHEDULE 1 - STREET - MANITOU RD, BLACK OAK RD, HIDDEN PONDS TRL,
RASPBERRY RIDGE RD, TIMBERGLADE CIR**

\$ 2,180,411.20

**SCHEDULE 2 - STORM SEWER - MANITOU RD, BLACK OAK RD, HIDDEN PONDS
TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR**

\$ 291,440.00

**SCHEDULE 3 - SANITARY SEWER - MANITOU RD, BLACK OAK RD, HIDDEN
PONDS TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR**

\$ 937,652.00

**SCHEDULE 4 - WATERMAIN - MANITOU RD, BLACK OAK RD, HIDDEN PONDS TRL,
RASPBERRY RIDGE RD, TIMBERGLADE CIR**

\$ 1,054,262.00

SCHEDULE 5 - OVERLAY - APPALOOSA TRAIL, HIGHLAND COURT

\$ 87,562.00

TOTAL ESTIMATE

\$ 4,551,327.20

**OPTION B - MANITOU ROAD
ENGINEERS ESTIMATE
CITY OF PRIOR LAKE
2016 IMPROVEMENT PROJECT**

CITY PROJECT #TRN16-000001

SCHEDULE 1 - STREET - MANITOU RD

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2021.501	MOBILIZATION	LUMP SUM	1	\$ 80,000.00	\$ 80,000.00
2	2101.502	CLEAR AND GRUB	TREE	60	\$ 400.00	\$ 24,000.00
3	2101.502	CLEAR AND GRUB (SHRUB)	SHRUB	50	\$ 110.00	\$ 5,500.00
4	2101.502	REMOVE CONCRETE CURB AND GUTTER	LIN FT	40	\$ 4.00	\$ 160.00
5	2104.505	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	SQ YD	866	\$ 4.50	\$ 3,897.00
6	2104.505	REMOVE CONCRETE DRIVEWAY PAVEMENT	SQ YD	379	\$ 9.00	\$ 3,411.00
7	2104.509	REMOVE SIGN POST	EACH	4	\$ 60.00	\$ 240.00
8	2104.511	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LIN FT	340	\$ 8.00	\$ 2,720.00
9	2104.513	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	950	\$ 6.00	\$ 5,700.00
10	2104.521	SALVAGE & REINSTALL FENCE	LIN FT	100	\$ 25.00	\$ 2,500.00
11	2104.521	SALVAGE & REINSTALL LANDSCAPE EDGING	LIN FT	200	\$ 10.00	\$ 2,000.00
12	2104.521	SALVAGE & REINSTALL SPRINKLER SYSTEM	LIN FT	200	\$ 20.00	\$ 4,000.00
13	2104.523	SALVAGE & REINSTALL MAILBOX	EACH	44	\$ 100.00	\$ 4,400.00
14	2104.618	SALVAGE & REINSTALL RETAINING WALL	SQ FT	100	\$ 35.00	\$ 3,500.00
15	2105.501	COMMON EXCAVATION	CU YD	11371	\$ 14.00	\$ 159,194.00
16	2105.507	SUBGRADE EXCAVATION	CU YD	200	\$ 14.00	\$ 2,800.00
17	2105.609	SELECT GRANULAR BORROW	TON	6748	\$ 12.00	\$ 80,976.00
18	2105.526	SELECT TOPSOIL BORROW	CU YD	1524	\$ 29.00	\$ 44,196.00
19	2105.604	GEOTEXTILE FABRIC TYPE V	SQ YD	11108	\$ 2.00	\$ 22,216.00
20	2105.543	3" MINUS 100% CRUSHED QUARRY LIMESTONE	TON	50	\$ 30.00	\$ 1,500.00
21	2105.543	1 1/2" SCREENED CLEAN AGGREGATE	TON	479.7	\$ 30.00	\$ 14,391.00
22	2112.501	SUBGRADE PREPARATION	RS	28.4	\$ 250.00	\$ 7,100.00
23	2130.501	WATER DUST CONTROL	M GAL	85	\$ 50.00	\$ 4,250.00
24	2211.501	AGGREGATE BASE CLASS 5	TON	4797	\$ 20.00	\$ 95,940.00
25	2232.501	MILL BITUMINOUS SURFACE (STREET-FULL DEPTH)	SQ YD	10413	\$ 2.60	\$ 27,073.80
26	2232.501	MILL BITUMINOUS SURFACE (1.5")	SQ YD	140	\$ 8.00	\$ 1,120.00
27	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	446	\$ 4.00	\$ 1,784.00
28	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (3,B)	TON	766	\$ 74.00	\$ 56,684.00
29	2360.502	TYPE SP 12.5 NON-WEARING COURSE MIXTURE (3,B)	TON	1276	\$ 69.00	\$ 88,044.00
30	2360.503	TYPE SP 9.5 WEAR CRS MIX (3,B) 3" THICK DRIVEWAY PAVEMENT	SQ YD	866	\$ 32.00	\$ 27,712.00
31	2411.618	MODULAR BLOCK RETAINING WALL	SQ FT	100	\$ 40.00	\$ 4,000.00
32	2506.521	ADJUST FRAME & RING CASTING (SANITARY)	EACH	0	\$ 450.00	\$ -
33	2506.521	ADJUST CASTING WITH 1 1/2" EXTENSION RING	EACH	0	\$ 300.00	\$ -
34	2531.507	6" CONCRETE DRIVEWAY PAVEMENT	SQ YD	379	\$ 51.00	\$ 19,329.00
35	2531.501	CONCRETE CURB AND GUTTER, B618	LIN FT	6248	\$ 13.00	\$ 81,224.00
36	2531.501	CONCRETE CURB AND GUTTER, SURMOUNTABLE	LIN FT	0	\$ 12.50	\$ -
37	2531.501	CONCRETE CURB AND GUTTER REPLACEMENT	LIN FT	312.4	\$ 30.00	\$ 9,372.00
38	2531.602	CONCRETE PEDESTRIAN CURB RAMP	EACH	0	\$ 1,000.00	\$ -
39	2540.601	TEMPORARY MAILBOXES	LUMP SUM	1	\$ 1,500.00	\$ 1,500.00
40	2545.523	4" NON-METALLIC CONDUIT	LIN FT	150	\$ 16.00	\$ 2,400.00
41	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$ 5,000.00	\$ 5,000.00
42	2564.537	INSTALL SIGN TYPE SPECIAL (STREET NAME)	EACH	2	\$ 350.00	\$ 700.00
43	2564.537	INSTALL SIGN TYPE C	EACH	4	\$ 300.00	\$ 1,200.00
44	2564.602	INSTALL STEEL POST	EACH	4	\$ 200.00	\$ 800.00
45	2571.502	TREE 2.5" CAL B&B (VARIETY - SEE SPEC)	TREE	10	\$ 550.00	\$ 5,500.00
46	2571.505	SHRUB 18" HT (VARIETY - SEE SPEC)	SHRUB	10	\$ 80.00	\$ 800.00
47	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	1420	\$ 3.50	\$ 4,970.00
48	2573.530	STORM DRAIN INLET PROTECTION	EACH	8	\$ 180.00	\$ 1,440.00
49	2573.540	FILTER LOG TYPE WOOD FIBER BIOROLL	LIN FT	100	\$ 6.00	\$ 600.00

50	2573.602	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	1	\$ 2,000.00	\$ 2,000.00
51	2575.501	SEED AND MULCH - SEED MIXTURE 260 (TURF MIX)	ACRE	0.2	\$ 5,000.00	\$ 1,000.00
52	2575.505	SODDING TYPE LAWN	SQ YD	11654	\$ 5.00	\$ 58,270.00
53	2575.523	EROSION CONTROL BLANKETS, CATEGORY 3	SQ YD	400	\$ 3.00	\$ 1,200.00
54	2581.503	CROSSWALK MARKING EPOXY	SQ FT	0	\$ 12.00	\$ -
T SCHEDULE 1 (STREET)					TOTAL	\$ 978,313.80

SCHEDULE 2 - STORM SEWER - MANITOU RD

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2104.501	REMOVE SEWER PIPE	LIN FT	455	\$ 10.00	\$ 4,550.00
2	2104.509	REMOVE DRAINAGE STRUCTURE	EACH	6	\$ 450.00	\$ 2,700.00
3	2104	SALVAGE AND REINSTALL STORM PIPE	LIN FT	0	\$ 40.00	\$ -
4	2105.61	EXPLORATORY EXCAVATION	HOUR	5	\$ 550.00	\$ 2,750.00
5	2451.607	PIPE BEDDING MATERIAL	CU YD	385	\$ 40.00	\$ 15,400.00
6	2501.515	24" RC PIPE APRON WITH TRASH GUARD	EACH	1	\$ 1,500.00	\$ 1,500.00
7	2501.515	21" RC PIPE APRON WITH TRASH GUARD	EACH	1	\$ 1,300.00	\$ 1,300.00
8	2502.541	4" PERF TP PIPE DRAIN (WITH GEOTEXTILE FILTER SOCK)	LIN FT	460	\$ 11.00	\$ 5,060.00
9	2503.541	15" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	1380	\$ 40.00	\$ 55,200.00
10	2503.541	18" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	400	\$ 45.00	\$ 18,000.00
11	2503.541	21" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	710	\$ 52.00	\$ 36,920.00
12	2503.541	24" RC PIP SEWER CL V DESIGN 3006 (STORM)	LIN FT	100	\$ 58.00	\$ 5,800.00
13	2503.602	CONNECT TO EXISTING STORM SEWER	EACH	1	\$ 1,500.00	\$ 1,500.00
14	2506.521	INSTALL CASTING (STORM)	EACH	1	\$ 500.00	\$ 500.00
15	2505.503	RECONSTRUCT STORM SEWER MANHOLE	EACH	1	\$ 1,000.00	\$ 1,000.00
16	2506.502	CONST DRAINAGE STRUCTURE DES (2'X3') (PLATE#301)	EACH	6	\$ 2,600.00	\$ 15,600.00
17	2506.502	CONST DRAINAGE STRUCTURE DES 48-4022 (PLATE#300)	EACH	9	\$ 3,200.00	\$ 28,800.00
18	2511.501	CLASS III RIPRAP	CU YD	18	\$ 120.00	\$ 2,160.00
19	2576.500	POND EXCAVATION	LUMP SUM	1	\$ 30,000.00	\$ 30,000.00
T SCHEDULE 2 (STORM SEWER)					TOTAL	\$ 228,740.00

SCHEDULE 3 - SANITARY SEWER - MANITOU RD

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2104.501	REMOVE SEWER PIPE (SANITARY)	LIN FT	3690	\$ 12.00	\$ 44,280.00
2	2104.501	REMOVE SEWER PIPE (SANITARY SERVICE)	LIN FT	1694	\$ 10.00	\$ 16,940.00
3	2104.509	REMOVE MANHOLE	EACH	16	\$ 550.00	\$ 8,800.00
4	2105.601	DEWATERING	LUMP SUM	1	\$ 4,000.00	\$ 4,000.00
5	2105.610	EXPLORATORY EXCAVATION	HOUR	5	\$ 550.00	\$ 2,750.00
6	2451.607	PIPE BEDDING MATERIAL	CU YD	280	\$ 40.00	\$ 11,200.00
7	2503.602	CONNECT TO EXISTING MANHOLES (SAN)	EACH	3	\$ 1,500.00	\$ 4,500.00
8	2503.602	RECONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	44	\$ 400.00	\$ 17,600.00
9	2503.602	8"X4" PVC SDR 26 WYE	EACH	44	\$ 400.00	\$ 17,600.00
10	2503.603	4" PVC SEWER SDR 26	LIN FT	1694	\$ 28.00	\$ 47,432.00
11	2503.603	8" PVC SEWER SDR 35	LIN FT	3690	\$ 45.00	\$ 166,050.00
12	2506.521	INSTALL CASTING (SANITARY)	EACH	0	\$ 600.00	\$ -
13	2505.503	RECONSTRUCT SANITARY SEWER MANHOLE	EACH	0	\$ 1,000.00	\$ -
14	2506.501	SANITARY MANHOLE EXTRA DEPTH (>8FT)	LIN FT	76	\$ 150.00	\$ 11,400.00
15	2506.502	48" DIAMETER SANITARY MANHOLE	EACH	16	\$ 3,200.00	\$ 51,200.00
16	2505.602	TRACER WIRE ACCESS BOX DRIVEWAY CASTING ASSEMBLY	EACH	4	\$ 300.00	\$ 1,200.00
17	0.000	15" SEWER CIPP	LIN FT	0	\$ 150.00	\$ -
T SCHEDULE 3 (SANITARY)					TOTAL	\$ 404,952.00

SCHEDULE 4 - WATERMAIN - MANITOU RD

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	2140.501	REMOVE WATERMAIN	LIN FT	2840	\$ 10.00	\$ 28,400.00
2	2104.504	REMOVE WATER SERVICE PIPE	LIN FT	1656	\$ 4.00	\$ 6,624.00
3	2104.509	REMOVE HYDRANT WITH GATE VALVE & BOX	EACH	6	\$ 450.00	\$ 2,700.00
4	2104.509	REMOVE GATE VALVE & BOX	EACH	6	\$ 200.00	\$ 1,200.00
5	2104.509	REMOVE CURB STOP & BOX	EACH	44	\$ 100.00	\$ 4,400.00
6	2105.601	DEWATERING	LUMP SUM	1	\$ 3,000.00	\$ 3,000.00
7	2105.61	EXPLORATORY EXCAVATION	HOUR	5	\$ 550.00	\$ 2,750.00
8	2451.607	PIPE BEDDING MATERIAL	CU YD	400	\$ 40.00	\$ 16,000.00
9	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	3	\$ 1,800.00	\$ 5,400.00
10	2504.602	HYDRANT WITH 6" GATE VALVE & BOX	EACH	7	\$ 5,800.00	\$ 40,600.00
11	2504.602	16" GATE VALVE AND BOX	EACH	0	\$ 9,000.00	\$ -
12	2504.602	12" GATE VALVE AND BOX	EACH	5	\$ 8,000.00	\$ 40,000.00
13	2504.602	8" GATE VALVE AND BOX	EACH	0	\$ 2,500.00	\$ -
14	2505.602	6" GATE VALVE AND BOX	EACH	0	\$ 2,000.00	\$ -
15	2506.602	4" GATE VALVE AND BOX	EACH	1	\$ 1,500.00	\$ 1,500.00
16	2504.602	16" SADDLE	EACH	0	\$ 450.00	\$ -
17	2504.602	12" SADDLE	EACH	44	\$ 400.00	\$ 17,600.00
18	2504.602	8" SADDLE	EACH	0	\$ 350.00	\$ -
19	2504.602	6" SADDLE	EACH	0	\$ 300.00	\$ -
20	2504.602	4" SADDLE	EACH	8	\$ 300.00	\$ 2,400.00
21	2504.602	1" CORPORATION STOP	EACH	44	\$ 300.00	\$ 13,200.00
22	2504.602	1" CURB STOP & BOX	EACH	44	\$ 400.00	\$ 17,600.00
23	2504.602	RECONNECT WATER SERVICE	EACH	44	\$ 250.00	\$ 11,000.00
24	2504.603	16" PVC WATERMAIN C-905	LIN FT	0	\$ 64.00	\$ -
25	2504.603	12" PVC WATERMAIN C-900	LIN FT	2840	\$ 52.00	\$ 147,680.00
26	2504.603	8" PVC WATERMAIN C-900	LIN FT	0	\$ 37.00	\$ -
27	2504.603	6" PVC WATERMAIN C-900	LIN FT	115	\$ 30.00	\$ 3,450.00
28	2504.603	4" PVC WATERMAIN C-900	LIN FT	802	\$ 26.00	\$ 20,852.00
29	2504.603	1" PE-4710 WATER SERVICE SDR-9	LIN FT	1656	\$ 22.00	\$ 36,432.00
30	2504.602	TEMPORARY WATER SERVICE	EACH	42	\$ 550.00	\$ 23,100.00
31	2504.608	DUCTILE IRON FITTINGS	LBS	4895	\$ 5.50	\$ 26,922.50
32	2506.602	CURB STOP BOX DRIVEWAY CASTING ASSEMBLY	EACH	5	\$ 300.00	\$ 1,500.00
T	SCHEDULE 4 (WATERMAIN)				TOTAL	\$ 474,310.50
	TOTAL (TRN16-000001)					
	SCHEDULE 1 - STREET - MANITOU ROAD					\$ 978,313.80
	SCHEDULE 2 - STORM SEWER - MANITOU ROAD					\$ 228,740.00
	SCHEDULE 3 - SANITARY SEWER - MANITOU ROAD					\$ 404,952.00
	SCHEDULE 4 - WATERMAIN - MANITOU ROAD					\$ 474,310.50
	TOTAL ESTIMATE					\$ 2,086,316.30

**OPTION B - RASPBERRY RIDGE NEIGHBORHOOD RECLAMATION
ENGINEERS ESTIMATE
CITY OF PRIOR LAKE
2016 IMPROVEMENT PROJECT**

CITY PROJECT #TRN16-000001

SCHEDULE 1 - STREET - BLACK OAK RD, HIDDEN PONDS TRL, RASPBERRY RIDGE RD, TIMBERGLADE CIR

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE	
1	2021.501	MOBILIZATION	LUMP SUM	1	\$ 45,000.00	\$ 45,000.00	
2	2104.513	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	120	\$ 6.00	\$ 720.00	
3	2104.521	SALVAGE & REINSTALL SPRINKLER SYSTEM	LIN FT	500	\$ 20.00	\$ 10,000.00	
4	2105.501	COMMON EXCAVATION	CU YD	7137	\$ 14.00	\$ 99,918.00	
5	2105.609	SELECT GRANULAR BORROW	TON	7792	\$ 12.00	\$ 93,504.00	
6	2105.526	SELECT TOPSOIL BORROW	CU YD	360	\$ 29.00	\$ 10,440.00	
7	2105.604	GEOTEXTILE FABRIC TYPE V	SQ YD	14490	\$ 2.00	\$ 28,980.00	
8	2112.501	SUBGRADE PREPARATION	RS	32.8	\$ 250.00	\$ 8,200.00	
9	2130.501	WATER DUST CONTROL	M GAL	40	\$ 50.00	\$ 2,000.00	
10	2211.501	AGGREGATE BASE CLASS 5	TON	5222	\$ 20.00	\$ 104,440.00	
11	2232.501	MILL BITUMINOUS SURFACE (STREET-FULL DEPTH)	SQ YD	12822	\$ 2.60	\$ 33,337.20	
12	2232.501	MILL BITUMINOUS SURFACE (1.5")	SQ YD	247	\$ 8.00	\$ 1,976.00	
13	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	644	\$ 4.00	\$ 2,576.00	
14	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (3,B)	TON	1106	\$ 74.00	\$ 81,844.00	
15	2360.502	TYPE SP 12.5 NON-WEARING COURSE MIXTURE (3,B)	TON	1838	\$ 69.00	\$ 126,822.00	
16	2502.541	4" PERF TP PIPE DRAIN	LIN FT	1150	\$ 11.00	\$ 12,650.00	
17	2504.602	ADJUST VALVE BOX	EACH	5	\$ 130.00	\$ 650.00	
18	2504.602	ADJUST VALVE BOX WITH 1 1/2" EXTENSION RING	EACH	5	\$ 160.00	\$ 800.00	
19	2506.521	INSTALL CASTING (SANITARY)	EACH	17	\$ 750.00	\$ 12,750.00	
20	2506.521	INSTALL CASTING (STORM)	EACH	28	\$ 800.00	\$ 22,400.00	
21	2506.521	ADJUST CASTING WITH 1 1/2" EXTENSION RING	EACH	25	\$ 300.00	\$ 7,500.00	
22	2531.501	CONCRETE CURB AND GUTTER REPLACEMENT	LIN FT	1935	\$ 30.00	\$ 58,050.00	
23	2531.602	CONCRETE PEDESTRIAN CURB RAMP	EACH	4	\$ 1,000.00	\$ 4,000.00	
24	2545.523	4" NON-METALLIC CONDUIT	LIN FT	350	\$ 16.00	\$ 5,600.00	
25	2563.601	TRAFFIC CONTROL	LUMP SUM	1	\$ 1,500.00	\$ 1,500.00	
26	2564.537	INSTALL SIGN TYPE SPECIAL (STREET NAME)	EACH	14	\$ 350.00	\$ 4,900.00	
27	2564.537	INSTALL SIGN TYPE C	EACH	9	\$ 300.00	\$ 2,700.00	
28	2564.602	INSTALL STEEL POST	EACH	10	\$ 200.00	\$ 2,000.00	
29	2573.502	SILT FENCE, TYPE HEAVY DUTY	LIN FT	300	\$ 3.50	\$ 1,050.00	
30	2573.530	STORM DRAIN INLET PROTECTION	EACH	30	\$ 180.00	\$ 5,400.00	
31	2573.540	FILTER LOG TYPE WOOD FIBER BIOROLL	LIN FT	300	\$ 6.00	\$ 1,800.00	
32	2573.602	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	3	\$ 2,000.00	\$ 6,000.00	
33	2575.605	HYDROSEEDING	SQ YD	1002	\$ 2.50	\$ 2,505.00	
34	2581.503	CROSSWALK MARKING EPOXY	SQ FT	120	\$ 12.00	\$ 1,440.00	
T	SCHEDULE 1 (STREET)					TOTAL	\$ 803,452.20

SCHEDULE 2 - OVERLAY - APPALOOSA TRAIL, HIGHLAND COURT

ITEM #	SPEC. REF	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE	
1	2021.501	MOBILIZATION	LUMP SUM	1.00	\$ 2,000.00	\$ 2,000.00	
2	2232.501	MILL BITUMINOUS SURFACE (1.5")	SQ YD	5544.00	\$ 8.00	\$ 44,352.00	
3	2357.502	BITUMINOUS MATERIAL FOR TACK COAT	GAL	278.00	\$ 4.00	\$ 1,112.00	
4	2360.501	TYPE SP 9.5 WEARING COURSE MIXTURE (3,B)	TON	477.00	\$ 74.00	\$ 35,298.00	
5	2531.501	CONCRETE CURB AND GUTTER REPLACEMENT	LIN FT	160.00	\$ 30.00	\$ 4,800.00	
6	2531.602	CONCRETE PEDESTRIAN CURB RAMP	EACH	0.00	\$ 1,000.00	\$ -	
7	2581.503	CROSSWALK MARKING EPOXY	SQ FT	0.00	\$ 12.00	\$ -	
T	SCHEDULE 2 (OVERLAY)					TOTAL	\$ 87,562.00

SCHEDULE 1 - STREET - RASPBERRY RIDGE NEIGHBORHOOD

\$ 803,452.20

SCHEDULE 2 - OVERLAY - APPALOOSA, HIGHLAND COURT

\$ 87,562.00

TOTAL ESTIMATE

\$ 891,014.20

OPTION B - WATERMAIN LINING

ITEM #	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	6" WATERMAIN LINING	LIN FT	1690	\$ 185.00	\$ 312,650.00
2	8" WATERMAIN LINING	LIN FT	1745	\$ 200.00	\$ 349,000.00
4	16" WATERMAIN LINING	LIN FT	2085	\$ 275.00	\$ 573,375.00
T				TOTAL	\$ 1,235,025.00

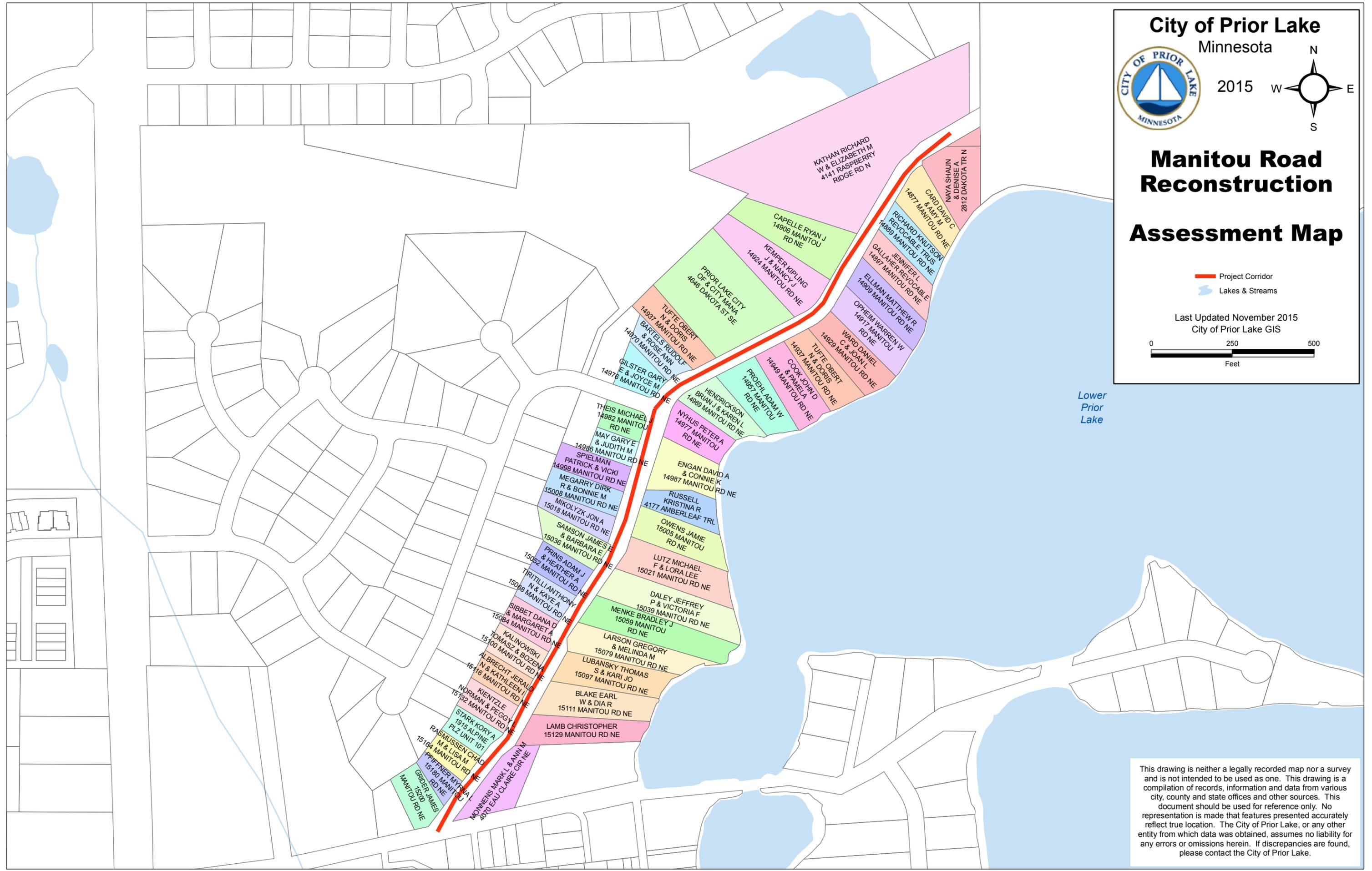
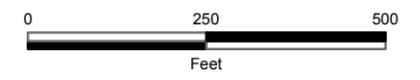
RASPBERRY RIDGE NEIGHBORHOOD	\$	922,375.00
APPALOOSA TRAIL/HIGHLAND COURT	\$	312,650.00
TOTAL (RASPBERRY RIDGE)	\$	1,235,025.00

EXHIBIT 8
PRELIMINARY ASSESSMENT
ROLLS/MAPS

Manitou Road Reconstruction Assessment Map

-  Project Corridor
-  Lakes & Streams

Last Updated November 2015
City of Prior Lake GIS



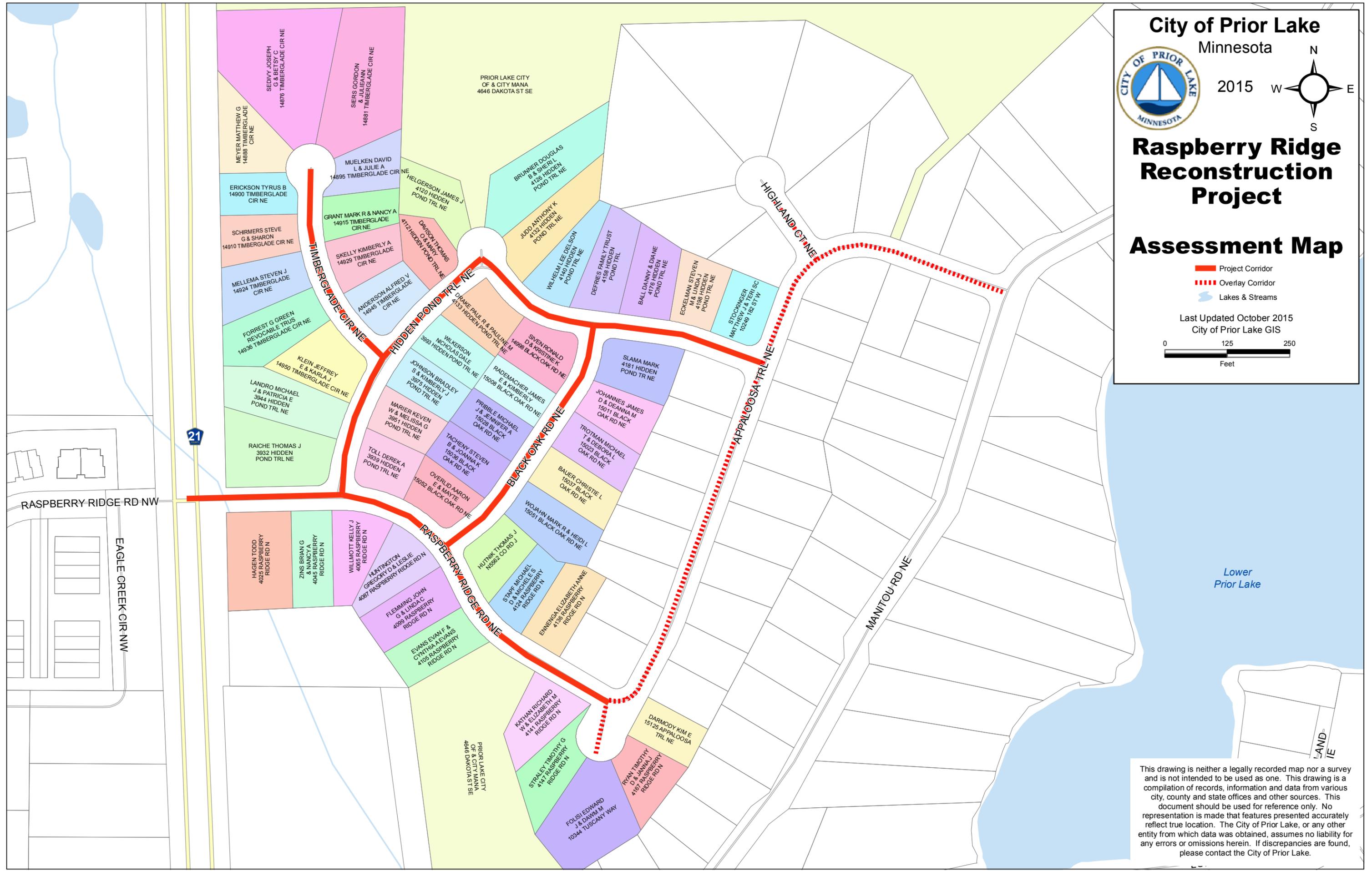
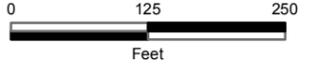
This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data from various city, county and state offices and other sources. This document should be used for reference only. No representation is made that features presented accurately reflect true location. The City of Prior Lake, or any other entity from which data was obtained, assumes no liability for any errors or omissions herein. If discrepancies are found, please contact the City of Prior Lake.

Raspberry Ridge Reconstruction Project

Assessment Map

-  Project Corridor
-  Overlay Corridor
-  Lakes & Streams

Last Updated October 2015
City of Prior Lake GIS

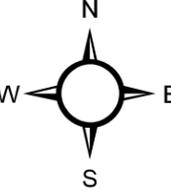


This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data from various city, county and state offices and other sources. This document should be used for reference only. No representation is made that features presented accurately reflect true location. The City of Prior Lake, or any other entity from which data was obtained, assumes no liability for any errors or omissions herein. If discrepancies are found, please contact the City of Prior Lake.

City of Prior Lake
Minnesota



2015

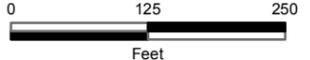


Appaloosa Overlay Project

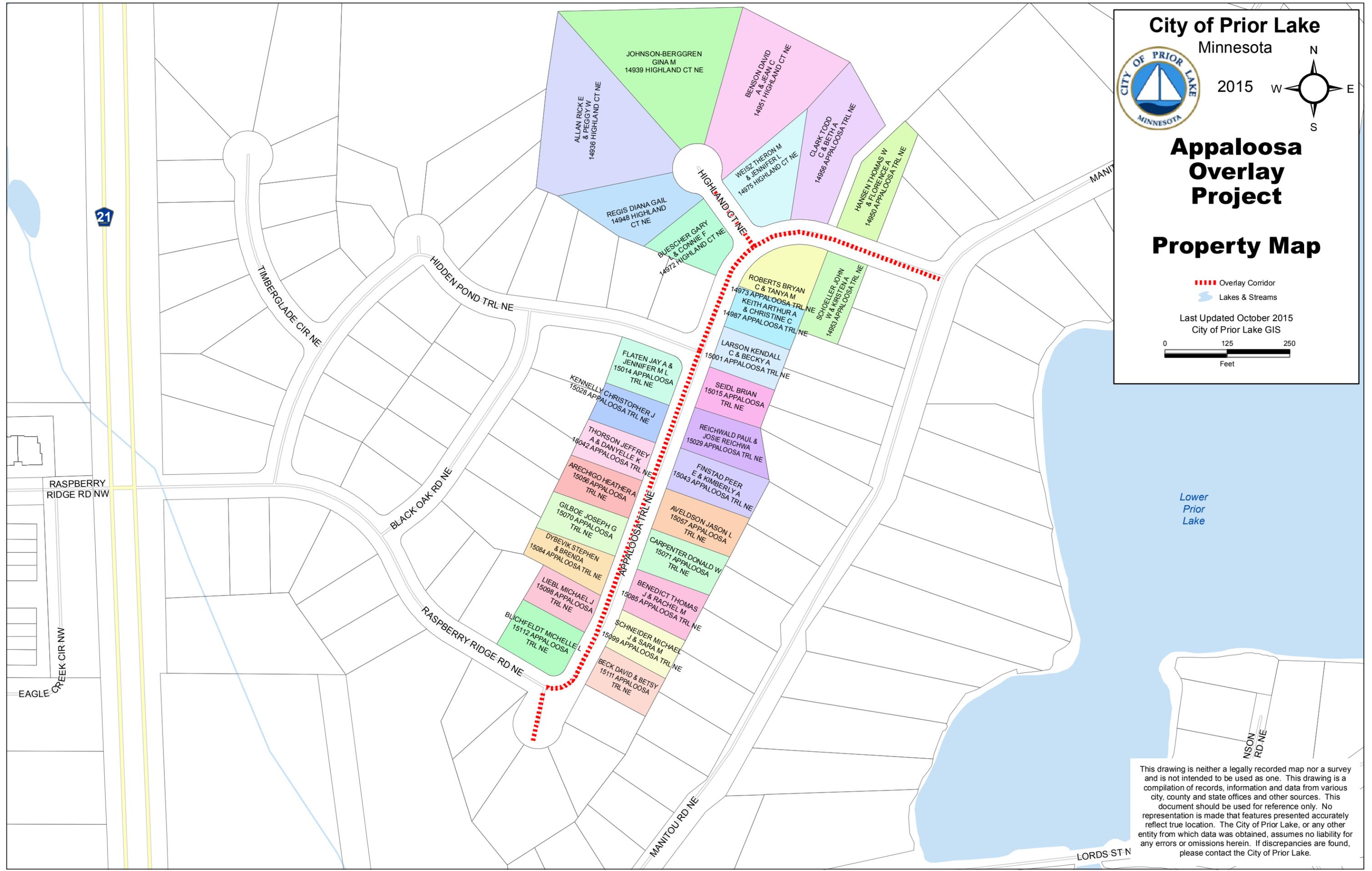
Property Map

- Overlay Corridor
- Lakes & Streams

Last Updated October 2015
City of Prior Lake GIS



0 125 250
Feet



This drawing is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data from various city, county and state offices and other sources. This document should be used for reference only. No representation is made that features presented accurately reflect true location. The City of Prior Lake, or any other entity from which data was obtained, assumes no liability for any errors or omissions herein. If discrepancies are found, please contact the City of Prior Lake.

DESCRIPTION: TRN 16-000001 MANITOU ROAD STREET IMPROVEMENT PROJECT							
	ASSESSMENT UNIT RATE (40%):	STREET AND STORM SEWER					
	ASSESSMENT CODE:						
	INTEREST RATE:						
	TERM:	10 YEAR STREETS					
	INITIAL YEAR:						
	ADDITIONAL INTEREST:						
	TOTAL UNITS:	46 STREETS					
	PAYMENT METHOD:	EQUAL PRINCIPAL					
No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
1	SubdivisionName MARY MARGARET 1ST ADDN Lot 001 Block 001 SubdivisionCd 25244	14970 MANITOU RD NE	25-244001-0	BARTELS RUDOLF & ROSE ANN 14970 MANITOU RD NE PRIOR LAKE MN 55372			
2	SubdivisionName MARY MARGARET 1ST ADDN Lot 002 Block 001 SubdivisionCd 25244	14976 MANITOU RD NE	25-244002-0	GILSTER GARY E & JOYCE M 14976 MANITOU RD NE PRIOR LAKE MN 55372			
3	SubdivisionName MARY MARGARET 1ST ADDN Lot 002 Block 002 SubdivisionCd 25244	14982 MANITOU RD NE	25-244005-0	THEIS MICHAEL J 14982 MANITOU RD NE PRIOR LAKE MN 55372			
4	SubdivisionName MARY MARGARET 1ST ADDN Lot 003 Block 002 SubdivisionCd 25244	14986 MANITOU RD NE	25-244006-0	MAY GARY E & JUDITH M 14986 MANITOU RD NE PRIOR LAKE MN 55372			
5	SubdivisionName MARY MARGARET 1ST ADDN Lot 004 Block 002 SubdivisionCd 25244	14998 MANITOU RD NE	25-244007-0	SPIELMAN PATRICK & VICKI 14998 MANITOU RD NE PRIOR LAKE MN 55372			
6	SubdivisionName MARY MARGARET 1ST ADDN Lot 005 Block 002 SubdivisionCd 25244	15008 MANITOU RD NE	25-244008-0	MEGARRY DIRK R & BONNIE M 15008 MANITOU RD NE PRIOR LAKE MN 55372			
7	SubdivisionName MARY MARGARET 1ST ADDN Lot 006 Block 002 SubdivisionCd 25244	15018 MANITOU RD NE	25-244009-0	MIKOLYZK JON A 15018 MANITOU RD NE PRIOR LAKE MN 55372			
8	SubdivisionName RASPBERRY RIDGE Lot 002 Block 001 SubdivisionCd 25253	15200 MANITOU RD NE	25-253002-0	GRIDER JAMES 15200 MANITOU RD NE PRIOR LAKE MN 55372			
9	SubdivisionName RASPBERRY RIDGE Lot 003 Block 001 SubdivisionCd 25253	15180 MANITOU RD NE	25-253003-0	PFIFFNER MYRNA L 15180 MANITOU RD NE PRIOR LAKE MN 55372			
10	SubdivisionName RASPBERRY RIDGE Lot 004 Block 001 SubdivisionCd 25253	15164 MANITOU RD NE	25-253004-0	RASMUSSEN CHAD M & LISA M 15164 MANITOU RD NE PRIOR LAKE MN 55372			
11	SubdivisionName RASPBERRY RIDGE Lot 005 Block 001 SubdivisionCd 25253	15148 MANITOU RD NE	25-253005-0	STARK KORY A 15148 MANITOU RD NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
12	SubdivisionName RASPBERRY RIDGE Lot 006 Block 001 SubdivisionCd 25253	15132 MANITOU RD NE	25-253006-0	KIENTZLE NORMAN & PEGGY L 15132 MANITOU RD NE PRIOR LAKE MN 55372			
13	SubdivisionName RASPBERRY RIDGE Lot 007 Block 001 SubdivisionCd 25253	15116 MANITOU RD NE	25-253007-0	ALBRECHT JERALD N & KATHLEEN I 15116 MANITOU RD NE PRIOR LAKE MN 55372			
14	SubdivisionName RASPBERRY RIDGE Lot 008 Block 001 SubdivisionCd 25253	15100 MANITOU RD NE	25-253008-0	KALINOWSKI TOMASZ & BOZENA 15100 MANITOU RD NE PRIOR LAKE MN 55372			
15	SubdivisionName RASPBERRY RIDGE Lot 009 Block 001 SubdivisionCd 25253	15084 MANITOU RD NE	25-253009-0	SIBBET DANA D & MARGARET A 15084 MANITOU RD NE PRIOR LAKE MN 55372			
16	SubdivisionName RASPBERRY RIDGE Lot 010 Block 001 SubdivisionCd 25253	15068 MANITOU RD NE	25-253010-0	TIRITILLI ANTHONY N & KAY N 15068 MANITOU RD NE PRIOR LAKE MN 55372			
17	SubdivisionName RASPBERRY RIDGE Lot 011 Block 001 SubdivisionCd 25253	15052 MANITOU RD NE	25-253011-0	PRINS ADAM J & HEATHER A 15052 MANITOU RD NE PRIOR LAKE MN 55372			
18	SubdivisionName RASPBERRY RIDGE Lot 012 Block 001 SubdivisionCd 25253	15036 MANITOU RD NE	25-253012-0	SAMSON JAMES E & BARBARA E 15036 MANITOU RD NE PRIOR LAKE MN 55372			
19	Section 26 Township 115 Range 022 P/O GOVT LOT 1 COM NW COR LOT 14 KOPPS BAY 2ND, NE 40' TO POB, E TO NE COR, N		25-926020-0	NAYA SHAUN & DENISE A 2812 DAKOTA TR N PRIOR LAKE MN 55372			
20	Section 26 Township 115 Range 022 P/O GOV'T LOT 1 BEG N LINE OF LILA LANE, SW 270.63, TO POB, NW 301.3, SW 119, SE 271.67, NE 102.63 TO BEG.		25-926022-0	TUFTE OBERT N & DORIS 14937 MANITOU RD NE PRIOR LAKE MN 55372			
21	SubdivisionName KOPP'S BAY ADDN Lot 1&2 SubdivisionCd 25051 P/O LYING W OF A LINE COM SW COR LOT 1 , N 77-59-00 E ALONG S LINE OF LOT 1 194.93' TO POB N 22-06-39 E 208.52' TO N LINE OF LOT 2 & THERE TERM EX W 55' FOR RD		25-051001-1	MONNENS MARK L & ANN M 4070 EAU CLAIRE CIR NE PRIOR LAKE MN 55372			
22	SubdivisionName KOPP'S BAY ADDN Lot 003 SubdivisionCd 25051 & P/O VACATED LILA LANE	15129 MANITOU RD NE	25-051003-0	LAMB CHRISTOPHER 15129 MANITOU RD NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
23	SubdivisionName KOPP'S BAY ADDN Lot 004 SubdivisionCd 25051 & SMALL PARCEL E'ERLY OF LOT 4 IN GOVT LOT 6 35-115-22	15111 MANITOU RD NE	25-051004-0	BLAKE EARL W & DIA R 15111 MANITOU RD NE PRIOR LAKE MN 55372			
24	SubdivisionName KOPP'S BAY ADDN Lot 005 SubdivisionCd 25051 & 55.29' ADJ. TO LOT ON WEST	15097 MANITOU RD NE	25-051005-0	LUBANSKY THOMAS S & KARI JO 15097 MANITOU RD NE PRIOR LAKE MN 55372			
25	SubdivisionName KOPP'S BAY ADDN Lot 006 SubdivisionCd 25051	15079 MANITOU RD NE	25-051006-0	LARSON GREGORY & MELINDA M 15079 MANITOU RD NE PRIOR LAKE MN 55372			
26	SubdivisionName KOPP'S BAY ADDN Lot 007 SubdivisionCd 25051	15059 MANITOU RD NE	25-051007-0	MENKE BRADLEY J 15059 MANITOU RD NE PRIOR LAKE MN 55372			
27	SubdivisionName KOPP'S BAY ADDN Lot 008 SubdivisionCd 25051	15039 MANITOU RD NE	25-051008-0	DALEY JEFFREY P & VICTORIA F 15039 MANITOU RD NE PRIOR LAKE MN 55372			
28	SubdivisionName KOPP'S BAY ADDN Lot 009 SubdivisionCd 25051	15021 MANITOU RD NE	25-051009-0	LUTZ MICHAEL F & LORA LEE 15021 MANITOU RD NE PRIOR LAKE MN 55372			
29	SubdivisionName KOPP'S BAY 2ND ADDN Lot 001 SubdivisionCd 25053	14997 MANITOU RD NE	25-053001-0	RUSSELL KRISTINA R 4177 AMBERLEAF TRL EAGAN MN 55123			
30	SubdivisionName KOPP'S BAY ADDN Lot 010 SubdivisionCd 25051	15005 MANITOU RD NE	25-051010-0	OWENS JAMIE 15005 MANITOU RD NE PRIOR LAKE MN 55372			
31	SubdivisionName KOPP'S BAY 2ND ADDN Lot 002 SubdivisionCd 25053	14987 MANITOU RD NE	25-053002-0	ENGAN DAVID A & CONNIE K 14987 MANITOU RD NE PRIOR LAKE MN 55372			
32	SubdivisionName KOPP'S BAY 2ND ADDN Lot 003 SubdivisionCd 25053	14977 MANITOU RD NE	25-053003-0	NYHUS PETER A 14977 MANITOU RD NE PRIOR LAKE MN 55372			
33	SubdivisionName KOPP'S BAY 2ND ADDN Lot 004 SubdivisionCd 25053	14969 MANITOU RD NE	25-053004-0	HENDRICKSON BRIAN J & KAREN L 14969 MANITOU RD NE PRIOR LAKE MN 55372			
34	SubdivisionName KOPP'S BAY 2ND ADDN Lot 005 SubdivisionCd 25053	14957 MANITOU RD NE	25-053005-0	PROEHL ADAM W 14957 MANITOU RD NE PRIOR LAKE MN 55372			
35	SubdivisionName KOPP'S BAY 2ND ADDN Lot 006 SubdivisionCd 25053	14949 MANITOU RD NE	25-053006-0	COOK JOHN D & PAMELA 14949 MANITOU RD NE PRIOR LAKE MN 55372			
36	SubdivisionName KOPP'S BAY 2ND ADDN Lot 007 SubdivisionCd 25053	14937 MANITOU RD NE	25-053007-0	TUFTE OBERT N & DORIS 14937 MANITOU RD NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
37	SubdivisionName KOPP'S BAY 2ND ADDN Lot 008 SubdivisionCd 25053	14929 MANITOU RD NE	25-053008-0	WARD DANIEL C & JOAN L 14929 MANITOU RD NE PRIOR LAKE MN 55372			
38	SubdivisionName KOPP'S BAY 2ND ADDN Lot 009 SubdivisionCd 25053	14917 MANITOU RD NE	25-053009-0	OPHEIM WARREN W 14917 MANITOU RD NE PRIOR LAKE MN 55372			
39	SubdivisionName KOPP'S BAY 2ND ADDN Lot 010 SubdivisionCd 25053	14909 MANITOU RD NE	25-053010-0	ELLMAN MATTHEW R 14909 MANITOU RD NE PRIOR LAKE MN 55372			
40	SubdivisionName KOPP'S BAY 2ND ADDN Lot 011 SubdivisionCd 25053	14897 MANITOU RD NE	25-053011-0	GALLAHER JENNIFER L 14897 MANITOU RD NE PRIOR LAKE MN 55372			
41	SubdivisionName KOPP'S BAY 2ND ADDN Lot 012 SubdivisionCd 25053	14889 MANITOU RD NE	25-053012-0	RICHARD KNUTSON REVOCABLE TRUS 14889 MANITOU RD NE PRIOR LAKE MN 55372			
42	SubdivisionName KOPP'S BAY 2ND ADDN Lot 014 SubdivisionCd 25053 EX COM NW COR, NE ALONG N LINE 40', S TO S LINE LOT 14 230.24 SE OF NW COR LOT 14, NW TO POB	14869 MANITOU RD NE	25-053014-0	NAYA SHAUN & DENISE A 2812 DAKOTA TR N PRIOR LAKE MN 55372			
43	SubdivisionName KOPP'S BAY 2ND ADDN Lot 013 SubdivisionCd 25053 & TRIANG TCT IN LOT 14 LYING ALONG NE'ERLY LINE OF LOT 13	14877 MANITOU RD NE	25-053013-0	CARD DAVID C & AMY M 14877 MANITOU RD NE PRIOR LAKE MN 55372			
44	Section 26 Township 115 Range 022 P/O GL 1 COM N COR LOT 11 KOPP BAY 2ND, NW 51.83' TO POB, NW 362.75', SW 61.86', S 367.57', NE 177' TO POB.	14906 MANITOU RD NE	25-926022-1	CAPELLE RYAN J 14906 MANITOU RD NE PRIOR LAKE MN 55372			
45	Section 26 Township 115 Range 022 P/O GL #1 BEG N COR OF 11 KOPP'S BAY 2ND, NW 51.83', SW 177' TO POB, NW 367.57', SW 66.57', SE 376.23', N 163.44' TO BEG	14924 MANITOU RD NE	25-926023-0	KEMPER KIPLING J & NANCY J 14924 MANITOU RD NE PRIOR LAKE MN 55372			
46	Section 26 Township 115 Range 022 P/O GOV'T LOT 1 BEG N COR OF 11 KOPS BAY 2ND, NW 51.83 TO POB, NW 301.77, NW 255.75, NE 977.21, S 212.7 SW TO BEG EX E 33		25-926026-0	KATHAN RICHARD W & ELIZABETH M 4141 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			

DESCRIPTION: TRN 16-000001 RASPBERRY RIDGE NEIGHBORHOOD IMPROVEMENT PROJECT							
	ASSESSMENT UNIT RATE (40%):	STREET AND STORM SEWER					
	ASSESSMENT CODE:						
	INTEREST RATE:						
	TERM:	10 YEAR STREETS					
	INITIAL YEAR:						
	ADDITIONAL INTEREST:						
	TOTAL UNITS:	52 STREETS					
	PAYMENT METHOD:	EQUAL PRINCIPAL					
No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
1	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 001 Block 001 SubdivisionCd 25258	4025 RASPBERRY RIDGE RD NE	25-258001-0	HAGEN TODD 4025 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
2	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 002 Block 001 SubdivisionCd 25258	4045 RASPBERRY RIDGE RD NE	25-258002-0	ZINS BRIAN G & NANCY A 4045 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
3	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 003 Block 001 SubdivisionCd 25258	4065 RASPBERRY RIDGE RD NE	25-258003-0	WILLMOTT KELLY J 4065 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
4	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 001 Block 002 SubdivisionCd 25258	3932 HIDDEN POND TRL NE	25-258004-0	RAICHE THOMAS J 3932 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
5	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 002 Block 002 SubdivisionCd 25258	3944 HIDDEN POND TRL NE	25-258005-0	LANDRO MICHAEL J & PATRICIA E 3944 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
6	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 003 Block 002 SubdivisionCd 25258	14950 TIMBERGLADE CIR NE	25-258006-0	KLEIN JEFFREY E & KARLA J 14950 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
7	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 004 Block 002 SubdivisionCd 25258	14936 TIMBERGLADE CIR NE	25-258007-0	FORREST G. GREEN REVOC TRUST 14936 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
8	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 005 Block 002 SubdivisionCd 25258	14924 TIMBERGLADE CIR NE	25-258008-0	MELLEMA STEVEN J 14924 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
9	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 006 Block 002 SubdivisionCd 25258	14910 TIMBERGLADE CIR NE	25-258009-0	SCHIRMERS STEVE G & SHARON 14910 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
10	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 007 Block 002 SubdivisionCd 25258	14900 TIMBERGLADE CIR NE	25-258010-0	ERICKSON TYRUS B 14900 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
11	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 008 Block 002 SubdivisionCd 25258	14888 TIMBERGLADE CIR NE	25-258011-0	MEYER MATTHEW G 14888 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
12	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 010 Block 002 SubdivisionCd 25258	14881 TIMBERGLADE CIR NE	25-258013-0	SIERS GORDON & JULIEANN 14881 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
13	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 011 Block 002 SubdivisionCd 25258	14895 TIMBERGLADE CIR NE	25-258014-0	MUELKEN DAVID L & JULIE A 14895 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
14	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 012 Block 002 SubdivisionCd 25258	14915 TIMBERGLADE CIR NE	25-258015-0	GRANT MARK R & NANCY A 14915 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
15	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 013 Block 002 SubdivisionCd 25258	14929 TIMBERGLADE CIR NE	25-258016-0	SKELLY KIMBERLY A 14929 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
16	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 014 Block 002 SubdivisionCd 25258	14945 TIMBERGLADE CIR NE	25-258017-0	ANDERSON ALFRED V 14945 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			
17	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 015 Block 002 SubdivisionCd 25258	4112 HIDDEN POND TRL NE	25-258018-0	DAVISON THOMAS O & MARY 4112 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
18	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 016 Block 002 SubdivisionCd 25258	4120 HIDDEN POND TRL NE	25-258019-0	HELGERSON JAMES J 4120 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
19	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 001 Block 003 SubdivisionCd 25258	3939 HIDDEN POND TRL NE	25-258020-0	TOLL DEREK A 3939 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
20	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 002 Block 003 SubdivisionCd 25258	3951 HIDDEN POND TRL NE	25-258021-0	MARIER KEVEN W & MELISSA G 3951 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
21	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 003 Block 003 SubdivisionCd 25258	3975 HIDDEN POND TRL NE	25-258022-0	JOHNSON BRADLEY S & KIMBERLY J 3975 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
22	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 004 Block 003 SubdivisionCd 25258	3993 HIDDEN POND TRL NE	25-258023-0	WILKERSON NICHOLAS DALE 3993 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
23	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 005 Block 003 SubdivisionCd 25258	4133 HIDDEN POND TRL NE	25-258024-0	DRAKE PAUL R & PAULINE M 4133 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
24	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 001 Block 004 SubdivisionCd 25258	4126 HIDDEN POND TRL NE	25-258025-0	BRUNNER DOUGLAS B & SHERI L 4126 HIDDEN POND TRL NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
25	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 002 Block 004 SubdivisionCd 25258	4132 HIDDEN POND TRL NE	25-258026-0	JUDD ANTHONY K 4132 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
26	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 001 Block 001 SubdivisionCd 25304	4198 HIDDEN POND TRL NE	25-304001-0	ECKELMAN STEVEN M & LINDA J 4198 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
27	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 002 Block 001 SubdivisionCd 25304	4176 HIDDEN POND TRL NE	25-304002-0	BALL DANNY & DIANE 4176 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
28	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 003 Block 001 SubdivisionCd 25304	4158 HIDDEN POND TRL NE	25-304003-0	DEFRIES FAMILY TRUST 4158 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
29	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 004 Block 001 SubdivisionCd 25304	4140 HIDDEN POND TRL NE	25-304004-0	DELSON WILHELM LEE 4140 HIDDEN POND TRL NE PRIOR LAKE MN 55372			
30	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 002 Block 002 SubdivisionCd 25304	4136 RASPBERRY RIDGE RD NE	25-304006-0	ENNENGA ELIZABETH ANNE 4136 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
31	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 003 Block 002 SubdivisionCd 25304	4124 RASPBERRY RIDGE RD NE	25-304007-0	STAPF MICHAEL D & MICHELE S 4124 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
32	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 004 Block 002 SubdivisionCd 25304	4110 RASPBERRY RIDGE RD NE	25-304008-0	HUTNIK THOMAS J N5562 CO RD J LADYSMITH WI 54848			
33	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 005 Block 002 SubdivisionCd 25304	15051 BLACK OAK RD NE	25-304009-0	WOJAHN MARK R & HEIDI L 15051 BLACK OAK RD NE PRIOR LAKE MN 55372			
34	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 006 Block 002 SubdivisionCd 25304	15037 BLACK OAK RD NE	25-304010-0	BAUER CHRISTIE L 15037 BLACK OAK RD NE PRIOR LAKE MN 55372			
35	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 007 Block 002 SubdivisionCd 25304	15023 BLACK OAK RD NE	25-304011-0	TROTMAN MICHAEL T & DEBORA L 15023 BLACK OAK RD NE PRIOR LAKE MN 55372			
36	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 008 Block 002 SubdivisionCd 25304	15011 BLACK OAK RD NE	25-304012-0	JOHANNES JAMES D & DEANNA M 15011 BLACK OAK RD NE PRIOR LAKE MN 55372			
37	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 009 Block 002 SubdivisionCd 25304	4181 HIDDEN POND TRL NE	25-304013-0	SLAMA MARK 4181 HIDDEN POND TR NE PRIOR LAKE MN 55372			
38	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 001 Block 003 SubdivisionCd 25304	14998 BLACK OAK RD NE	25-304014-0	SIVEN RONALD D & KRISTINE K 14998 BLACK OAK RD NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
39	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 002 Block 003 SubdivisionCd 25304	15008 BLACK OAK RD NE	25-304015-0	RADEMACHER JAMES E & KIMBERLY 15008 BLACK OAK RD NE PRIOR LAKE MN 55372			
40	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 003 Block 003 SubdivisionCd 25304	15028 BLACK OAK RD NE	25-304016-0	PRIBBLE MICHAEL J & JENNIFER A 15028 BLACK OAK RD NE PRIOR LAKE MN 55372			
41	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 004 Block 003 SubdivisionCd 25304	15036 BLACK OAK RD NE	25-304017-0	TACHENY STEVEN B & JOANNA K 15036 BLACK OAK RD NE PRIOR LAKE MN 55372			
42	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 005 Block 003 SubdivisionCd 25304	15052 BLACK OAK RD NE	25-304018-0	OVERLID AARON E & MAYTE 15052 BLACK OAK RD NE PRIOR LAKE MN 55372			
43	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 001 Block 004 SubdivisionCd 25304	4105 RASPBERRY RIDGE RD NE	25-304019-0	EVANS EVAN F & CYNTHIA A EVANS 4105 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
44	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 002 Block 004 SubdivisionCd 25304	4099 RASPBERRY RIDGE RD NE	25-304020-0	FLEMMING JOHN G & LINDA C 4099 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
45	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 003 Block 004 SubdivisionCd 25304	4087 RASPBERRY RIDGE RD NE	25-304021-0	HUNTINGTON GREGORY D & LESLIE 4087 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
46	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 002 Block 005 SubdivisionCd 25304	15125 APPALOOSA TRL NE	25-304023-0	DARMODY KIM E 15125 APPALOOSA TRL NE PRIOR LAKE MN 55372			
47	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 003 Block 005 SubdivisionCd 25304	4167 RASPBERRY RDG RD NE	25-304024-0	RYAN TIMOTHY D & JANNA J 4167 RASPBERRY RIDGE RD NE PRIOR LAKE MN 55372			
48	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 004 Block 005 SubdivisionCd 25304	4155 RASPBERRY RDG RD NE	25-304025-0	FOLISI EDWARD J & DAWM M 4155 RASPBERRY RIDGE RD NE PRIOR LAKE MN 55372			
49	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 005 Block 005 SubdivisionCd 25304	4147 RASPBERRY RDG RD NE	25-304026-0	STRALEY TIMOTHY G 4147 RASPBERRY RIDGE RD NE PRIOR LAKE MN 55372			
50	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 006 Block 005 SubdivisionCd 25304	4141 RASPBERRY RIDGE RD NE	25-304027-0	KATHAN RICHARD W & ELIZABETH M 4141 RASPBERRY RIDGE RD N PRIOR LAKE MN 55372			
51	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 001 Block 003 SubdivisionCd 25342	4212 HIDDEN POND TRL NE	25-342018-0	STOCKINGER MATTHEW J & TERI SC 10249 182ND ST W LAKEVILLE MN 55044			
52	SubdivisionName RASPBERRY RIDGE 1ST ADDN Lot 009 Block 002 SubdivisionCd 25258	14876 TIMBERGLADE CIR NE	25-258012-0	SEDIVY JOSEPH G & BETSY C 14876 TIMBERGLADE CIR NE PRIOR LAKE MN 55372			

DESCRIPTION:		TRN 16-000001 APPALOOSA TRAIL AND HIGHLAND COURT OVERLAY					
	ASSESSMENT UNIT RATE (40%):	STREET					
	ASSESSMENT CODE:						
	INTEREST RATE:						
	TERM:	10 YEAR STREETS					
	INITIAL YEAR:						
	ADDITIONAL INTEREST:						
	TOTAL UNITS:	28 STREETS					
	PAYMENT METHOD:	EQUAL PRINCIPAL					
No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
1	SubdivisionName MARY MARGARET 1ST ADDN Lot 003 Block 001 SubdivisionCd 25244	14950 APPALOOSA TRL NE	25-244003-0	HANSEN THOMAS W & FLORENCE A 14950 APPALOOSA TRL NE PRIOR LAKE MN 55372			
2	SubdivisionName MARY MARGARET 1ST ADDN Lot 001 Block 002 SubdivisionCd 25244	14953 APPALOOSA TRL NE	25-244004-0	SCHOELLER JOHN W & KIRSTEN A 14953 APPALOOSA TRL NE PRIOR LAKE MN 55372			
3	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 001 Block 002 SubdivisionCd 25304	15112 APPALOOSA TRL NE	25-304005-0	BLICHFELDT MICHELLE L 15112 APPALOOSA TRL NE PRIOR LAKE MN 55372			
4	SubdivisionName RASPBERRY RIDGE 2ND ADDN Lot 001 Block 005 SubdivisionCd 25304	15111 APPALOOSA TRL NE	25-304022-0	BECK DAVID & BETSY 15111 APPALOOSA TRL NE PRIOR LAKE MN 55372			
5	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 001 Block 001 SubdivisionCd 25342	15099 APPALOOSA TRL NE	25-342001-0	SCHNEIDER MICHAEL J & SARA M 15099 APPALOOSA TRL NE PRIOR LAKE MN 55372			
6	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 002 Block 001 SubdivisionCd 25342	15085 APPALOOSA TRL NE	25-342002-0	BENEDICT THOMAS J & RACHEL M 15085 APPALOOSA TRL NE PRIOR LAKE MN 55372			
7	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 003 Block 001 SubdivisionCd 25342	15071 APPALOOSA TRL NE	25-342003-0	CARPENTER DONALD W 15071 APPALOOSA TRL NE PRIOR LAKE MN 55372			
8	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 004 Block 001 SubdivisionCd 25342	15057 APPALOOSA TRL NE	25-342004-0	AVELDSOON JASON L & MICHELLE M 15057 APPALOOSA TRL NE PRIOR LAKE MN 55372			
9	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 005 Block 001 SubdivisionCd 25342	15043 APPALOOSA TRL NE	25-342005-0	FINSTAD PEER E & KIMBERLY A 15043 APPALOOSA TRL NE PRIOR LAKE MN 55372			
10	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 006 Block 001 SubdivisionCd 25342	15029 APPALOOSA TRL NE	25-342006-0	REICHWALD PAUL & JOSIE REICHWA 15029 APPALOOSA TRL NE PRIOR LAKE MN 55372			
11	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 007 Block 001 SubdivisionCd 25342	15015 APPALOOSA TRL NE	25-342007-0	SEIDL BRIAN 15015 APPALOOSA TRL NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
12	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 008 Block 001 SubdivisionCd 25342	15001 APPALOOSA TRL NE	25-342008-0	LARSON KENDALL C & BECKY A 15001 APPALOOSA TRL NE PRIOR LAKE MN 55372			
13	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 009 Block 001 SubdivisionCd 25342	14987 APPALOOSA TRL NE	25-342009-0	KEITH ARTHUR A & CHRISTINE C 14987 APPALOOSA TRL NE PRIOR LAKE MN 55372			
14	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 010 Block 001 SubdivisionCd 25342	14973 APPALOOSA TRL NE	25-342010-0	ROBERTS BRYAN C & TANYA M 14973 APPALOOSA TRL NE PRIOR LAKE MN 55372			
15	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 001 Block 002 SubdivisionCd 25342	15098 APPALOOSA TRL NE	25-342011-0	LIEBL MICHAEL J 15098 APPALOOSA TRL NE PRIOR LAKE MN 55372			
16	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 002 Block 002 SubdivisionCd 25342	15084 APPALOOSA TRL NE	25-342012-0	DYBEVIK STEPHEN & BRENDA 15084 APPALOOSA TRL NE PRIOR LAKE MN 55372			
17	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 003 Block 002 SubdivisionCd 25342	15070 APPALOOSA TRL NE	25-342013-0	GILBOE JOSEPH G 15070 APPALOOSA TRL NE PRIOR LAKE MN 55372			
18	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 004 Block 002 SubdivisionCd 25342	15056 APPALOOSA TRL NE	25-342014-0	ARECHIGO HEATHER A 15056 APPALOOSA TRL NE PRIOR LAKE MN 55372			
19	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 005 Block 002 SubdivisionCd 25342	15042 APPALOOSA TRL NE	25-342015-0	THORSON JEFFREY A & DANYELLE K 15042 APPALOOSA TRL NE PRIOR LAKE MN 55372			
20	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 006 Block 002 SubdivisionCd 25342	15028 APPALOOSA TRL NE	25-342016-0	KENNELLY CHRISTOPHER J 15028 APPALOOSA TRL NE PRIOR LAKE MN 55372			
21	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 007 Block 002 SubdivisionCd 25342	15014 APPALOOSA TRL NE	25-342017-0	FLATEN JAY A & JENNIFER M L 15014 APPALOOSA TRL NE PRIOR LAKE MN 55372			
22	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 002 Block 003 SubdivisionCd 25342	14972 HIGHLAND CT NE	25-342019-0	BUESCHER GARY L & CONNIE F 14972 HIGHLAND CT NE PRIOR LAKE MN 55372			
23	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 003 Block 003 SubdivisionCd 25342	14948 HIGHLAND CT NE	25-342020-0	REGIS DIANA GAIL 14948 HIGHLAND CT NE PRIOR LAKE MN 55372			
24	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 004 Block 003 SubdivisionCd 25342	14936 HIGHLAND CT NE	25-342021-0	ALLAN RICK E & PEGGY W 14936 HIGHLAND CT NE PRIOR LAKE MN 55372			
25	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 005 Block 003 SubdivisionCd 25342	14939 HIGHLAND CT NE	25-342022-0	JOHNSON-BERGGREN GINA M 14939 HIGHLAND CT NE PRIOR LAKE MN 55372			
26	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 006 Block 003 SubdivisionCd 25342	14951 HIGHLAND CT NE	25-342023-0	BENSON DAVID A & JEAN C 14951 HIGHLAND CT NE PRIOR LAKE MN 55372			

No.	Legal Description	Parcel Address	Parcel Number	Property Owner & Address	Assessible Units	Street Assessment	Total Assessment Amount
27	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 007 Block 003 SubdivisionCd 25342	14975 HIGHLAND CT NE	25-342024-0	WEISZ THERON M & JENNIFER L 14975 HIGHLAND CT NE PRIOR LAKE MN 55372			
28	SubdivisionName RASPBERRY RIDGE 3RD ADDN Lot 008 Block 003 SubdivisionCd 25342	14956 APPALOOSA TRL NE	25-342025-0	CLARK TODD C & BETH A 14956 APPALOOSA TRL NE PRIOR LAKE MN 55372			

EXHIBIT 9
PRELIMINARY ASSESSMENT
CALCULATIONS

OPTION A

ASSESSMENT CALCULATION - RECONSTRUCTION

2016 Improvement Project

Number of Units = 98

<u>Total Streets and Storm Sewer</u>	
Schedule 1 Street	\$2,180,411.20
Schedule 2 Storm Sewer	\$291,440.00
Street Lights MVEC	\$33,000.00

Total \$2,504,851.20

Subtractions

UTILITY IMPACT- UTILITY FUND

SCHEDULE	ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE		
1	2	CLEAR AND GRUB	TREE	39	\$400.00	\$ 15,600.00	Assume half	
1	3	CLEAR AND GRUB (SHRUB)	SHRUB	40	\$110.00	\$ 4,400.00	Assume half	
1	5	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	SQ YD	612	\$4.50	\$ 2,754.00	Assume 30%	
1	6	REMOVE CONCRETE DRIVEWAY PAVEMENT	SQ YD	218.1	\$9.00	\$ 1,962.90	Assume 30%	
1	10	SALVAGE & REINSTALL FENCE	LIN FT	200	\$25.00	\$ 5,000.00	Includes All	
1	11	SALVAGE & REINSTALL LANDSCAPE EDGING	LIN FT	340	\$10.00	\$ 3,400.00	Includes All	
1	12	SALVAGE & REINSTALL SPRINKLER SYSTEM	LIN FT	340	\$20.00	\$ 6,800.00	Includes All	
1	14	SALVAGE & REINSTALL RETAINING WALL	SQ FT	220	\$35.00	\$ 7,700.00	Includes All	
1	31	MODULAR BLOCK RETAINING WALL	SQ FT	240	\$40.00	\$ 9,600.00		
1	30	TYPE SP 9.5 WEAR CRS MIX (3,B) 3" THICK DRIVEWAY PAVEMENT	SQ YD	612	\$32.00	\$ 19,584.00		
1	45	TREE 2.5" CAL B&B (VARIETY - SEE SPEC)	TREE	24	\$550.00	\$ 13,200.00	Includes All	
1	46	SHRUB 18" HT (VARIETY- SEE SPEC)	EACH	30	\$80.00	\$ 2,400.00	Includes All	
1	52	SODDING TYPE LAWN	SQ YD	3040.5	\$5.00	\$ 15,202.50	Assume 15%	
					TOTAL	\$	107,603.40	

WATER QUALITY

SCHEDULE	ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE	
1	47	SILT FENCE, TYPE HEAVY DUTY	LIN FT	2470	\$ 3.50	\$ 8,645.00	
1	48	STORM DRAIN INLET PROTECTION	EACH	33	\$ 180.00	\$ 5,940.00	
1	49	FILTER LOG TYPE WOOD FIBER BIOROLL	LIN FT	200	\$ 6.00	\$ 1,200.00	
1	50	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	4	\$ 2,000.00	\$ 8,000.00	
1	51	SEED & MULCH- SEED MIXTURE 25-141 (TURF MIX)	ACRE	0.2	\$ 5,000.00	\$ 1,000.00	
1	53	EROSION CONTROL BLANKETS, CATEGORY 3	SQ YD	400	\$ 3.00	\$ 1,200.00	
					TOTAL	\$	25,985.00

Total After Subtractions = \$2,371,262.80

Street Costs	\$2,180,411.20
Storm Costs	\$291,440.00
Sanitary Costs	\$937,652.00
Watermain Costs	\$1,054,262.00
Overlay	\$87,562.00
Street Lighting	\$33,000.00

Total \$4,584,327.20

Indirect Cost Total = \$ 339,196.54
 Assessable Indirect percentage 51.73%
 Assessable Indirect Costs \$ 175,450.86

Add Assessable Indirect Costs \$2,546,713.66

Assessable Portion \$2,546,713.66

Assessment at 40% (X 0.4) = \$1,018,685.46

Assessment % Street/Storm costs = \$1,018,685.46

Assessment % of Overall Project = 20.69%

Bid Unit Rate (Divide by Units) = **\$10,394.75**

\$1,528,028.19

OPTION B

ASSESSMENT CALCULATION - MANITOU ROAD RECONSTRUCTION

2016 Improvement Project

Number of Units = 46

<u>Total Streets and Storm Sewer</u>	
Schedule 1 Street	\$978,313.80
Schedule 2 Storm Sewer	\$228,740.00
Street Lights MVEC	\$27,000.00

Total \$1,234,053.80

Subtractions

UTILITY IMPACT- UTILITY FUND

SCHEDULE	ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE		
1	2	CLEAR AND GRUB	TREE	30	\$400.00	\$ 12,000.00	Assume half	
1	3	CLEAR AND GRUB (SHRUB)	SHRUB	20	\$110.00	\$ 2,200.00	Assume half	
1	5	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	SQ YD	259.8	\$4.50	\$ 1,169.10	Assume 30%	
1	6	REMOVE CONCRETE DRIVEWAY PAVEMENT	SQ YD	113.7	\$9.00	\$ 1,023.30	Assume 30%	
1	10	SALVAGE & REINSTALL FENCE	LIN FT	100	\$25.00	\$ 2,500.00	Includes All	
1	11	SALVAGE & REINSTALL LANDSCAPE EDGING	LIN FT	200	\$10.00	\$ 2,000.00	Includes All	
1	12	SALVAGE & REINSTALL SPRINKLER SYSTEM	LIN FT	200	\$20.00	\$ 4,000.00	Includes All	
1	14	SALVAGE & REINSTALL RETAINING WALL	SQ FT	100	\$35.00	\$ 3,500.00	Includes All	
1	31	MODULAR BLOCK RETAINING WALL	SQ FT	100	\$40.00	\$ 4,000.00		
1	30	TYPE SP 9.5 WEAR CRS MIX (3,B) 3" THICK DRIVEWAY PAVEMENT	SQ YD	259.8	\$32.00	\$ 8,313.60		
1	45	TREE 2.5" CAL B&B (VARIETY - SEE SPEC)	TREE	10	\$550.00	\$ 5,500.00	Includes All	
1	46	SHRUB 18" HT (VARIETY- SEE SPEC)	EACH	10	\$80.00	\$ 800.00	Includes All	
1	52	SODDING TYPE LAWN	SQ YD	1748.1	\$5.00	\$ 8,740.50	Assume 15%	
					TOTAL	\$	55,746.50	

WATER QUALITY

SCHEDULE	ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE		
1	47	SILT FENCE, TYPE HEAVY DUTY	LIN FT	1420	\$ 3.50	\$ 4,970.00		
1	48	STORM DRAIN INLET PROTECTION	EACH	8	\$ 180.00	\$ 1,440.00		
1	49	FILTER LOG TYPE WOOD FIBER BIOROLL	LIN FT	100	\$ 6.00	\$ 600.00		
1	50	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	1	\$ 2,000.00	\$ 2,000.00		
1	51	SEED & MULCH- SEED MIXTURE 25-141 (TURF MIX)	ACRE	0.2	\$ 5,000.00	\$ 1,000.00		
1	53	EROSION CONTROL BLANKETS, CATEGORY 3	SQ YD	400	\$ 3.00	\$ 1,200.00		
					TOTAL	\$	11,210.00	

Total After Subtractions = \$1,167,097.30

Street Costs	\$978,313.80
Storm Costs	\$228,740.00
Sanitary Costs	\$404,952.00
Watermain Costs	\$474,310.50
Street Lighting	\$27,000.00

Total \$2,113,316.30

Indirect Cost Total =	\$ 339,196.54
Assessable Indirect percentage	24.57%
Assessable Indirect Costs	\$ 83,327.17

Add Assessable Indirect Costs \$1,250,424.47

Assessable Portion \$1,250,424.47

Assessment at 40% (X 0.4) = \$500,169.79

Assessment % Street/Storm costs = \$500,169.79

Assessment % of Overall Project = 20.39%

Bid Unit Rate (Divide by Units) = **\$10,873.26**

\$750,254.68

OPTION B

ASSESSMENT CALCULATION - RASPBERRY RIDGE NEIGHBORHOOD RECLAMATION

2016 Improvement Project

Number of Units = 52

<u>Total Streets and Storm Sewer</u>	
Schedule 1 Street	\$803,452.20
Street Lights MVEC	<u>\$6,000.00</u>
Total	\$809,452.20
<u>Subtractions</u>	

WATER QUALITY SCHEDULE	ITEM	DESCRIPTION	UNIT	QTY	UNIT PRICE	TOTAL PRICE
1	29	SILT FENCE, TYPE HEAVY DUTY	LIN FT	300	\$ 3.50	\$ 1,050.00
1	30	STORM DRAIN INLET PROTECTION	EACH	30	\$ 180.00	\$ 5,400.00
1	31	FILTER LOG TYPE WOOD FIBER BIOROLL	LIN FT	300	\$ 6.00	\$ 1,800.00
1	32	TEMPORARY ROCK CONSTRUCTION ENTRANCE	EACH	3	\$ 2,000.00	\$ 6,000.00
1	33	HYDROSEEDING	SQ YD	1002	\$ 2.50	\$ 2,505.00

TOTAL \$ 16,755.00

Total After Subtractions = \$792,697.20

Street Costs	\$803,452.20
Street Lighting	<u>\$6,000.00</u>

Total \$809,452.20

Indirect Cost Total =	\$ 339,196.54
Assessable Indirect percentage	16.69%
Assessable Indirect Costs	\$ 56,596.15

Add Assessable Indirect Costs \$849,293.35

Assessable Portion \$849,293.35

Assessment at 40% (X 0.4) = \$339,717.34

Assessment % Street/Storm costs = \$339,717.34

Bid Unit Rate (Divide by Units) = **\$6,533.03**

\$509,576.01

OPTION A

PROJECT SUPPORT COST SPLIT (RECONSTRUCTION)

Support Cost \$339,196.54

	Estimate	Assessable Portion	Utility Impact	Total	% Support Cost	Amount	Total
Street & Storm	\$2,504,851.20	\$2,371,262.80		\$2,371,262.80	51.73%	\$175,450.86	\$2,546,713.66
Watermain	\$1,054,262.00		\$53,801.70	\$1,108,063.70	24.17%	\$81,986.16	\$1,190,049.86
Sanitary Sewer	\$937,652.00		\$53,801.70	\$991,453.70	21.63%	\$73,358.13	\$1,064,811.83
Overlay	\$87,562.00			\$87,562.00	1.91%	\$6,478.75	\$94,040.75
Water Quality	\$25,985.00			\$25,985.00	0.57%	\$1,922.64	\$27,907.64
			TOTAL	\$4,584,327.20	100.00%	\$339,196.54	\$4,923,523.74

OPTION B

PROJECT SUPPORT COST SPLIT (RECLAMATION)

Support Cost \$339,196.54

	Estimated Cost	Assessable Portion	Utility Impact	Total	% Support Cost	Amount	Total
Manitou Recon Street & Storm	\$1,234,053.80	\$1,167,097.30		\$1,167,097.30	24.57%	\$83,327.17	\$1,250,424.47
Raspberry Ridge Neighborhood Reclamation	\$809,452.20	\$792,697.20		\$792,697.20	16.69%	\$56,596.15	\$849,293.35
Watermain	\$1,709,335.50		\$27,873.25	\$1,737,208.75	36.57%	\$124,031.39	\$1,861,240.14
Sanitary Sewer	\$910,452.00		\$ 27,873.25	\$ 938,325.25	19.75%	\$66,993.55	\$1,005,318.80
Overlay	\$87,562.00			\$87,562.00	1.84%	\$6,251.66	\$93,813.66
Water Quality	\$27,965.00			\$27,965.00	0.59%	\$1,996.62	\$29,961.62
			TOTAL	\$4,750,855.50	100.00%	\$339,196.54	\$5,090,052.04

2016 IMPROVEMENT PROJECT - FUNDING

Funding Source	Option A	Option B
Ad Valorem	\$ 1,622,068.95	\$ 1,353,644.35
Assessment (40%)	\$ 1,018,685.46	\$ 839,887.13
Utility Fund - Sewer	\$ 1,064,811.83	\$ 1,005,318.80
Utility Fund - Water	\$ 1,190,049.86	\$ 1,861,240.14
Water Quality Fund	\$ 27,907.64	\$ 29,961.62
Assessment (Per Unit) - Reclamation		\$ 6,533.03
Assessment (Per Unit) - Reconstruction	\$ 10,394.75	\$ 10,873.26
Total	\$ 4,923,523.74	\$ 5,090,052.04

EXHIBIT 10
GEOTECHNICAL REPORT



Element Materials Technology
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St Paul, MN
55114-1720 USA

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**Geotechnical Exploration Program
City of Prior Lake 2016 Street Improvements
Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road,
Timberglade Circle
Prior Lake, Minnesota
Element Materials Technology St. Paul Inc. Project No. ESP020835P**

Prepared for:

City of Prior Lake

October 23, 2015

Professional 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.

A handwritten signature in blue ink, appearing to read 'M. Straight', written over a horizontal line.

Mark Straight, P.E.
Senior Project Engineer
MN Reg. No. 41658

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October 23, 2015

City of Prior Lake
Attn: Mr. Seng Thongvanh, P.E.
4646 Dakota Street SE
Prior Lake, Minnesota 55372

RE: Geotechnical Exploration Program
City of Prior Lake 2015 Street Improvements
Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road,
Timberglade Circle
Prior Lake, Minnesota
Element Materials Technology St. Paul Inc. Project No. ESP020835P

Dear Mr. Thongvanh:

We have completed the geotechnical exploration and engineering analysis for the above referenced project. This report presents the results of our field and laboratory review programs, and provides recommendations concerning the soil and groundwater conditions as they relate to the proposed construction.

The soil samples will be retained in our laboratory for 30 days, at which time we will dispose of them. If you desire Element Materials Technology St. Paul Inc. to retain the samples longer than 30 days, please notify us.

We are pleased to be of service to you in this important phase of the project. If there are any questions regarding the information contained in this report or if we can be of further service to you, please contact Mark Straight directly at (651) 659-7447 or by email at mark.straight@element.com.

Respectfully Submitted,

ELEMENT MATERIALS TECHNOLOGY ST. PAUL INC.



Mark Straight, P.E.
Senior Project Engineer
MN Reg. No. 41658

1.0 INTRODUCTION

This report concerns our recent geotechnical exploration program at the site of the proposed 2016 Street Improvement Project in Prior Lake, Minnesota. We understand a geotechnical exploration program was required to depict the subsurface conditions in the proposed pavement reconstruction areas and provide boring logs depicting the subsurface conditions. This report presents the results of the field exploration, our laboratory testing, geotechnical review, and recommendations.

1.1 Scope of Work

We recently performed a geotechnical exploration program in accordance with our August 25, 2015, proposal and your subsequent authorization by the City of Prior Lake to proceed. The scope of our work for the project was as follows:

1. Arrange to have buried public utilities marked through the Gopher-State-One-Call System.
2. Explore the subsurface conditions by performance of fourteen (14) standard penetration test borings to unit depths ranging from approximately 14' to 20' in various roadway/pavement areas.
3. Visually classify the extracted soil samples and perform laboratory testing including moisture content, gradation tests and Atterberg Limit tests as needed to aid in soil classification and to determine engineering properties.
4. Prepare a formal geotechnical report which includes the following information:
 - a. Logs of the soil test borings showing the existing pavement profile where applicable, soil and groundwater data, including the N-values.
 - b. A site plan showing the approximate boring locations.
 - c. Written description of encountered soil and groundwater conditions.
 - d. Results of any laboratory testing performed.

- e. Pavement recommendations for bituminous pavement design for 7-ton standard for various roadways.
- f. Provide alternative concrete pavement design recommendations.

The scope of our work is intended for geotechnical purposes only. This scope is not intended to explore for the presence or extent of environmental contamination at the site.

2.0 FIELD TESTING PROGRAM

2.1 Soil Borings

A total of fourteen (14) soil test borings were drilled within various street areas between September 10 and 11, 2015. The approximate boring locations are shown on the attached site plan. The borings were field staked by our drill crew based on the plan provided by the City of Prior Lake. It is our understanding that the elevations of the borings were to be performed by others during the project survey and provided at a later date.

The standard penetration borings were performed with a truck mounted rotary drill rig using split-barrel sampling procedures. Water level observations were made in the boreholes during and upon completion of the drilling and sampling operations. During the field operations, the drill crew maintained logs of the subsurface conditions including changes in stratigraphy and the observed groundwater levels. The boring logs are attached.

After completion of the drilling operations, the boreholes were backfilled with auger cuttings to the existing surface. Soil borings drilled in existing pavement areas were patched at the surface with cold bituminous patch matching the thickness of the existing pavement.

Sampling and classification of soils were performed in general accordance with American Standards for Testing and Materials (ASTM) procedures, and are described on an attached sheet.

2.2 Surface Conditions

The soil borings were drilled within existing bituminous roadway areas of Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, and Timberglade Circle within the City of Prior Lake as depicted on the boring location plan. The majority of the street topography was relatively level with slight inclines and declines. Steeper incline and decline slopes were observed along Raspberry Ridge Road and Manitou Road.

Residential properties were located along the roadways. Prior Lake was located to the east of Manitou Road. The street areas were bounded by Eagle Creek Avenue to the west. A fair amount of trees and small vegetation was observed adjacent to the street areas within the residential properties. Please see attached boring location plan for additional information.

The surface of the observed pavements was generally in a poor to fair condition. The surface of the bituminous showed signs of medium to high severity weathering, with minor signs of pitting. We observed longitudinal and transverse cracking within several areas. Isolated portions of the pavement areas were observed to have fatigue (alligator) cracking or rutting. Some of the cracks observed in the pavement appeared to have been previously sealed. However, some cracks observed were not sealed or the previously sealed crack had expanded. Pavement patches were also observed in selected areas throughout the roadways.

Several utilities were observed overhead, mainly electric services. During the utility clearance process through the Gopher-State-One-Call system, several below grade utilities were identified and marked on the pavement by utility locate contractors. These included water, gas, sanitary sewer, storm sewer, phone and cable.

2.3 Subsurface Conditions

The subsurface conditions encountered at the test boring locations are shown on the test boring logs. The boring logs also indicate the possible geologic origin of the materials encountered. We wish to point out that the subsurface conditions at other times and locations

on the site may differ from those found at our test locations. If different conditions are encountered during construction, it is necessary that you contact us so that our recommendations can be reviewed.

The boring logs indicate a generalized soil profile consisting of fill at the surface underlain by layers of glacial till, fine alluvium, and glacial outwash. The borings generally terminated within glacial till.

Fill was encountered at the surface of all the borings. The fill extended to approximately 4' deep at boring locations B3, B5, B7, and B9 and up to 11' deep at boring locations B4 and B6. Generally, the fill was comprised of a layer of bituminous pavement at the surface ranging from approximately 3½" to 9" thick underlain by silty sand and gravel and/or crushed limestone aggregate ranging from 3" to 28" thick underlain by mixtures and layers of sandy lean clay, silty sand, and clayey sand, with various amounts of gravel. Organic inclusions were also encountered within the fill profile of soil boring B9. The encountered thicknesses of bituminous pavement and underlying aggregate base is noted on the boring logs at each boring location. The base aggregate as observed in its current condition may not meet the current requirements for Mn/DOT Specification 3138 Aggregate for Surface and Base Courses. The fill was found to be soft to firm, based on the penetration values (N-values) obtained during drilling activities.

The glacial till encountered below the surface fill was the primary soil type encountered within the street profiles. The glacial till was mainly comprised of sandy lean clay (CL) with various amounts of gravel. The glacial till was generally in a soft to firm condition, based on the penetration values (N-values) obtained during drilling activities. However, very soft layers of glacial till were also encountered within soil borings B5 and B6.

The glacial outwash encountered below the fill within borings B11, B12, B13 and B14 was mainly comprised of sand (SP) and silty sand (SM) with various amounts of gravel. The glacial outwash was in a loose to medium dense condition, based on the penetration values (N-values) obtained during drilling activities.

Fine alluvium comprised of silt (ML) was encountered within the glacial till layers of soil borings B3, B8, and B9. The fine alluvium was generally in a soft to firm condition based on the N-values obtained during drilling activities.

Based on normal human sensing, product odors were not detected within the soil samples collected at the site. This does not eliminate the possibility that petroleum based products may be present at other locations within the reconstruction project area away from our boring locations. Environmental screening and laboratory tests were not included in our work scope for this project. If environmentally impacted soils are encountered during construction we recommend additional testing be performed and the soils are properly handled and if needed disposed of.

2.4 Water Level Conditions

Water level observations were made during and after completion of the drilling operations. Groundwater was not encountered within borings B1-B2, B4, B6-B8, and B12-B14 at the time of drilling operations. Groundwater is most likely just beneath the depths of these shallow borings or due to the soil types encountered not risen to its hydrostatic level during drilling operations as the mottled soils would indicate. Groundwater was encountered within soil boring B3 at a depth of 7.3', soil boring B5 at a depth of 14.0', soil boring B9 at a depth of 10.5', soil boring B10 at a depth of 12.5', and within soil boring B11 at a depth of 15.0' below the drilling surface. The glacial till soil above the groundwater elevation in several borings showed signs of mottling and iron oxide staining. The mottled or iron oxide stained soil is an indication of water being present within the soil mass previously, most likely during previous periods of wet weather.

Since the clayey and silty soils encountered in the borings are relatively impervious or slow draining, it may take several days for groundwater in a borehole to rise to its hydrostatic level. If more accurate water level determinations are required, piezometers should be installed and the water level monitored over a period of time.

In general, water levels may fluctuate throughout the year depending on variations in the amount of precipitation, degree of evaporation, surface run-off characteristics and other related hydrogeological factors.

3.0 LABORATORY REVIEW AND TESTING

The soil samples obtained during the drilling operations were logged, labeled, sealed and delivered to our laboratory for further review. An Element geotechnical engineer classified the soil samples in general conformance with ASTM standards. Representative samples were submitted to the laboratory for Atterberg Limit, moisture content and gradation testing and the results are attached or shown on the boring logs.

4.0 REVIEW AND RECOMMENDATIONS

Based on the information obtained from our geotechnical work and our understanding or assumptions of the project data, we made our engineering review which resulted in recommendations which are presented in the following sections. If any of our understanding or assumptions are not correct, or if conditions observed during construction are significantly different than those encountered in our geotechnical work, we should be contacted immediately so we may review our recommendations.

4.1 Project Data

We understand the project will include street reconstruction on Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, and Timberglade Circle within the City of

Prior Lake as defined by the 2016 Improvement project. The street reconstruction area was bounded by Eagle Creek Avenue to the west, Prior Lake to the east, and Lords Street to the south. The street reconstruction areas are shown on the attached boring location plans.

It is our understanding that the reconstruction will include milling/excavating the existing pavement section where applicable and installing/repairing utilities as needed then placing a new pavement section upon approved subgrade. The exposed roadway subgrade would be test rolled and any soft areas detected by the test rolling would be corrected prior to continued construction. We were informed by the City that Manitou Road, Black Oak Road, Hidden Pond Trail, Raspberry Ridge Road, and Timberglade Circle will be reconstructed to a 7-ton design standard. We understand that replacement of storm sewer, watermain and sanitary sewer would also be performed along portions of the roadways.

Our design recommendations were based on a 20-year pavement design life with associated routine maintenance being performed as applicable to the types of 7-ton pavements being constructed. We were provided estimated traffic counts by the City assuming 10 trips per day/per house along the proposed roadways with possible additional trips for garbage carriers and school buses for use in our analysis.

4.2 Utility Installation

Utility plans were not available at the time of this report. Based on the borings, utilities placed within the upper 10' of subgrade will generally bear upon granular or cohesive fill or naturally deposited glacial outwash, glacial till or fine alluvium soil types. In many areas, the granular or cohesive fill could be found to be in a low density condition. In some areas, soft clays and/or soft existing fill may be encountered. This was especially apparent at boring locations B1, B3, B6, and B10.

If very soft soils or uncompacted fill soils are encountered at pipe invert elevation, these soils may not be suitable for pipe support. We recommend unsuitable fill or very soft natural soil be

over excavated, by a minimum of 1', to place a foundation or bedding for pipe support. Additional aggregate bedding material may be required if very soft wet conditions are encountered at the time of construction at the bottom of pipes/manholes, etc. Manholes or utility structures may require a minimum of 2' to 3' of aggregate bedding materials. Any organic materials found during construction should also be removed. Organic soils were encountered within soil borings B9 at the time of drilling operations. The foundation should be of coarse, granular material or pea gravel and/or approved aggregate equivalent. The granular or aggregate materials may be separated from the subgrade by geotextile fabric, especially in loose/wet conditions. We recommend at a minimum that the exposed soils in the utility trenches be recompacted prior to new utility placement unless groundwater is present.

After the foundation bedding and pipe placement, fill should be placed to attain final grades. Where pavement may be placed, the fill should be compacted to at least 95% of the Standard Proctor density (ASTM D: 698). Fill placed in the top 3 feet of subgrade for pavement should be compacted to at least 100% of the Standard Proctor density. In addition, the moisture content of the fill should be within 3% of the optimum as determined by the Standard Proctor test. Backfilling operations should be performed uniformly around structures as to not to damage them during construction. Selected on-site clays and silty soils may not be suitable for reuse as engineered fill within roadway areas due to their high moisture content and as a result their inability to obtain proper compaction during backfilling operations. As a result, some replacement of excavated soils with soils that can be readily compacted as structural backfill may be required.

Based on the soil borings isolated dewatering may be required to facilitate utility placement, especially in the area of soil boring B3 where groundwater was encountered at a depth of 7.3' below the drilling surface.

Proper shoring or sloping of the excavation for utility placements per OSHA guidelines should be provided for at all times. Care should be provided by the contractor as to not to damage surrounding structures/properties.

If exposed soils supporting the utilities are disturbed or become saturated they may no longer be able to support the utility. Care should be provided by the contractor as to not to disturb supporting soils otherwise additional corrective measures may be necessary.

4.3 Pavement Subgrade Preparation

Based on the borings, we recommend the subgrade preparation should consist of removing the existing pavement section where encountered and performing additional excavations where applicable to allow for placement of the new pavement section. The exposed soils should be recompacted to 100% of the standard Proctor density. Any organic soils where encountered within the upper 3' of existing road grade should also be excavated. This would include within the area of boring B9. Consideration should also be given to excavating clayey soils within the upper 3' of subgrade where encountered and replacing them with granular soils as described below to aid in increasing the R-value at these locations. Only limited soil corrections may be required where more granular soils were encountered while drilling (i.e. boring B14). These areas should be further evaluated during construction. However, if these soils are disturbed during utility placements and mixed with clayey soil types additional corrective work may be needed. Additional excavation may also be required to allow for proper placement of the new pavement section where thinner and/or no existing pavement and aggregate base or granular section were encountered.

Proper draitile systems would need to be incorporated into the design where more granular fill was placed/encountered at the surface underlain by relatively impervious clay soil types. The draitile should be placed at the bottom of the sand section, encapsulated with pea-gravel surrounded by geotextile fabric and properly connected to the storm sewer system and/or suitable outfalls. Any contaminated soils encountered during construction should be properly

tested and disposed of under standard construction practices per the Minnesota Department of Health (MDH) and Minnesota Pollution Control Agency (MPCA) guidelines.

After the recommended excavation and ordinary surface compaction of exposed soils, engineered fill may then be placed to attain final grades. We recommend all exposed soils are thoroughly surface compacted with a large vibratory self-propelled compactor. Fill placed in the upper three feet of the subgrade should be compacted to 100% of the Standard Proctor density. The moisture content should be within 3% below and the optimum as determined by the Standard Proctor test. Moisture conditioning the soil may be required to attain the proper soil compaction.

We recommend where additional fill is required within the upper 3' of subgrade be granular soils meeting Mn/DOT Specification 3149.2B Select Granular having no greater than 12% fines passing the #200 sieve and preferably no greater than 50% passing the #40 sieve. The subgrade surface, as well as the pavement surface, should be uniformly sloped to facilitate drainage of the base and sand subgrade material within the pavement system, and to avoid any ponding of water beneath the pavement.

We also recommend proof-rolling the pavement subgrade to aid in detecting any loose or unstable zones. This proof-rolling should be performed with a fully loaded tandem axle dump truck. In those areas where deflection or rutting is obvious, additional excavation or reworking may be necessary.

4.4 Pavement Thickness Design

Assuming the pavement subgrade preparation is performed as recommended in the preceding section and the subgrade soils are judged suitable based on a proof-roll test, we recommend the following pavement design be used:

7-Ton Street Section	Thickness
Mn/DOT Spec. 2360 Type SP12.5 Bituminous Wear Course	2"
Mn/DOT Spec. 2360 Type SP12.5 Bituminous Non-wear Course	2"
Mn/DOT Spec. 3138 Class 5 Aggregate Base - Crushed Limestone	8"
Mn/DOT Spec. 3149.2B Select Granular Fill	12" *
Mn/DOT Spec 3733 Type V Non-Woven Geotextile Fabric	--
Approved Subgrade	--

- * Based on the encountered conditions we would recommend that a slightly thicker street section be constructed at the far north end of Manitou Road (Boring B9). We recommend that 24" of sand for the last 200' of street be incorporated into the design.

Transition zone tapers should be constructed where reconstructed pavement connects to existing construction and where pavement section thicknesses vary to minimize differential movement between different pavement sections. The transition tapers should begin at the bottom of the lowest section and transition to the higher section at a grade of 20 horizontal to 1 vertical (20:1). Depending on the actual site conditions at the time of construction the transition zones may need to be adjusted to properly support the new pavement.

By reducing the sand section somewhat it is more likely that during periods of freezing and thawing that expansion and contraction of the subgrade soils may occur in a manner that may affect overall pavement performance. The City should be made aware that additional maintenance may likely be needed to sustain the pavement life with this option.

The thickness of each of the components of the street section indicated above is assumed a minimum for construction. The design also assumed the aggregate base will be compacted to a minimum of 100% of the Standard Proctor density and the bituminous pavement placed and compacted to a minimum of 92% of the maximum specific gravity. We recommend for increased pavement performance that Mn/DOT Class V supporting the pavement be comprised of crushed limestone aggregate base.

The City may consider utilization of a concrete pavement section in lieu of the bituminous pavement discussed above to add long term value to the street reconstruction projects. The

concrete pavement provides for a durable long lasting surface with relatively low maintenance costs. The concrete pavement is also a more reflective surface that can add both beauty and minimize street lighting. Typical concrete pavements may last thirty to forty years with proper construction and maintenance thus greatly extending the life cycle of the pavement.

We recommend placement of six (6) inches of compacted aggregate base supporting a minimum concrete slab thickness of five (5) inches for 7-ton roads after the subgrade is prepared as outlined above. The aggregate base provides a constructible base for concrete placement, reduces faulting, and helps dissipate loads. It is very critical for the proper performance of the concrete pavement section to be placed over approved subgrade. Proper soil compaction of the subgrade and around utilities is critical in the performance of the pavement and to minimize pavement settlements. If the subgrade fails the proof-rolling tests and is not suitable additional corrections and evaluation of the pavement section thicknesses should be performed. Additional pavement section thicknesses along with subgrade corrections may be required to properly support the concrete rigid pavement. Appropriate panel sizing, jointing, doweling, and edge reinforcement are critical for performance of the rigid pavement.

The concrete should have a minimum 28-day unit compressive strength of 4000 psi and a minimum flexural strength of 580 psi. We recommend specifying 5 to 8 percent air entrainment to provide resistance to freeze-thaw deterioration. The designer should also designate a maximum water-cement ratio of 0.45 using a water-cement ratio of 0.40 or less for concrete exposed to deicers. We recommend the pavement be constructed in accordance with the American Concrete Institute: ACI 330-“Guide for Design and Construction of Concrete Parking Lots”.

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Excavation Safety

All excavations should comply with the requirements of O.S.H.A. 29 CFR, Part 1926, Subpart P, "Excavation and Trenches". This document states that excavation safety is the responsibility of the contractor. Reference to these O.S.H.A. requirements should be included in the project specifications.

5.2 Quality Control Testing

We recommend that all geotechnical related work, including subgrade preparation, and engineered fill placement, be observed by the project geotechnical engineer or their representatives. The geotechnical engineer will perform appropriate testing to verify the geotechnical conditions that have been anticipated during preparation of this report.

As variations in soil conditions may exist at locations and elevations other than those of our borings, we recommend the geotechnical engineer be retained to observe the soil conditions during site preparation. We recommend in-place field density testing be performed in the compacted new fill as detailed in the Appendix.

5.3 Cold Weather Conditions

Construction during cold weather should be exercised with care. We have included a sheet entitled "Precautions for Excavating and Refilling During Cold Weather." Please refer to this sheet in the Appendix for specific details.

5.4 Soil Sensitivity

The silty and clayey soils at this site are susceptible to disturbance from construction traffic, especially in wet conditions. If the soils become disturbed, additional excavation may be required. Therefore, proper excavation equipment during construction should be used to minimize the potential for disturbance.

6.0 REMARKS

This report is for the exclusive use of the parties to which it is addressed. The soil testing and geotechnical engineering services performed by Element Materials Technology St. Paul Inc. for this project have been conducted in a manner with the level of skill and care ordinarily exercised by other members of the profession currently practicing in this area under similar budgetary and time constraints. No warranty, express or implied, is made.

- Attachments:**
- Soil Boring Location Plan (1 page)
 - Soil Boring Logs #B1-#B14 (14 pages)
 - Symbols and Terminology on Test Boring Logs (1 page)
 - Classification of Soils for Engineering Purposes (1 page)
 - Field Exploration Procedures (1 page)
 - Prerequisites for Sound Engineering Practice (1 page)
 - Construction Observations and Testing (1 page)
 - Cold Weather Precautions (1 page)



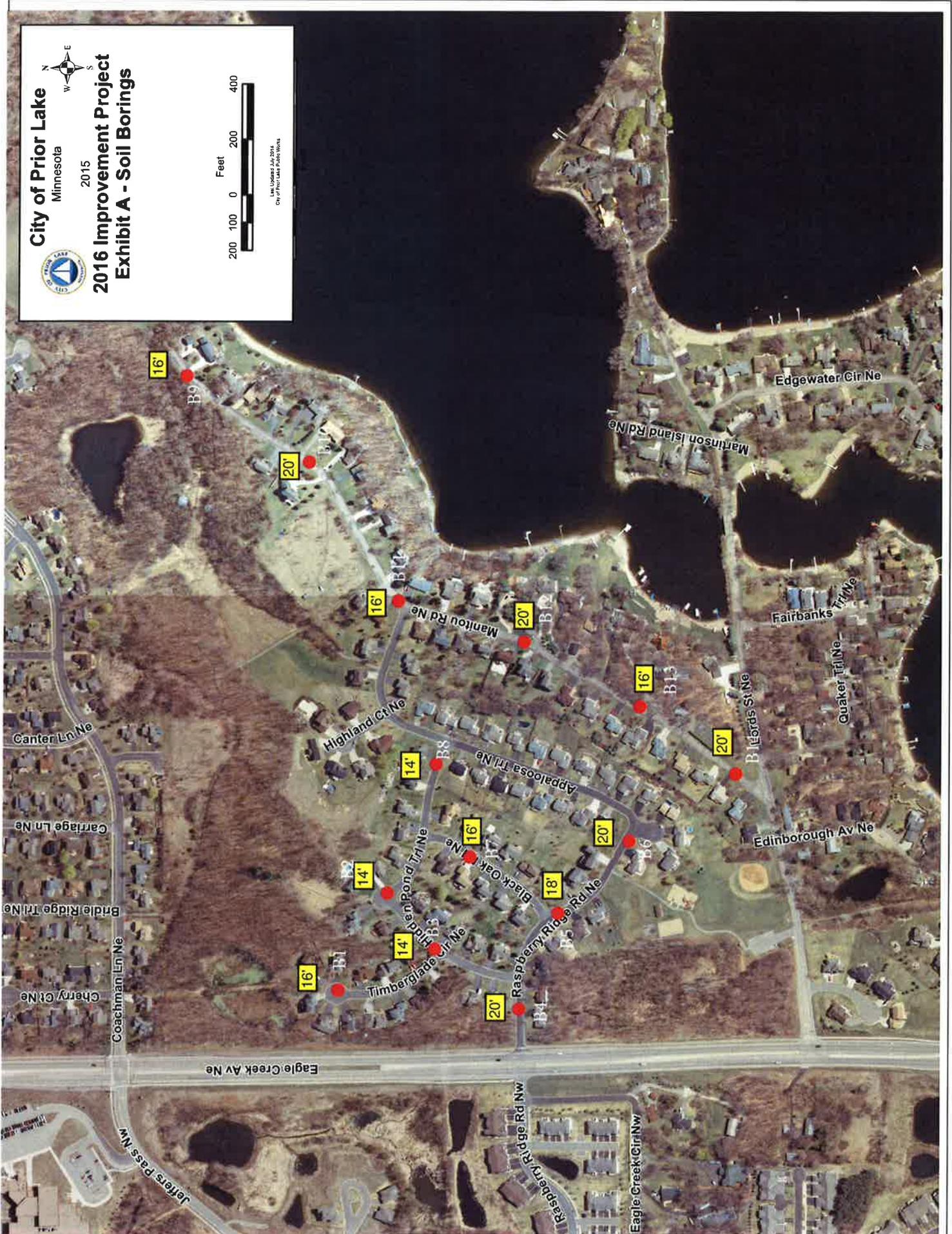
City of Prior Lake
Minnesota

2015

2016 Improvement Project Exhibit A - Soil Borings



As of Update July 2016
City of Prior Lake, Minnesota



CLIENT	City of Prior Lake	ARCHITECT/ENGINEER	City of Prior Lake
SITE	Prior Lake, Minnesota	PROJECT	2016 Street Improvements

Surface Elev.:	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
0.4	FILL, 5.25" of bituminous pavement	FILL		AS	1	AUGER	24			
1.0	FILL, 7" of silty sand & gravel aggregate base, dark brown to brown, moist			5	2	SS	24			
4.5	FILL, a mixture of clayey sand and sandy lean clay, with a little gravel, iron oxide staining, dark brown to brown, moist			8	3	SS	24	14		
	SANDY LEAN CLAY with a little gravel, gray and brown mottled, iron oxide staining, moist, soft to firm (CL)	GLACIAL TILL	5							LL = 26 PL = 15
				12	4	SS	18	17		
				10						
10.5	SANDY LEAN CLAY with a little gravel, gray mottled, moist, firm to hard (CL)			11	5	SS	18			
				22	6	SS	18			
				15						
16.0	End of Boring			29	7	SS	18			

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

None



element
materials technology
662 Cromwell Ave.
St. Paul, MN 55114
Telephone: 651-645-3601

STARTED	9/10/15	FINISHED	9/10/15
DRILL CO.	Element	DRILL RIG	367
DRILLER	Dunleavy	ASS'T DRILLER	BP
LOGGED BY	BH	APPROVED	MAS

CLIENT City of Prior Lake	ARCHITECT/ENGINEER City of Prior Lake
SITE Prior Lake, Minnesota	PROJECT 2016 Street Improvements

Hidden Pond Trail NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:										
0.5 FILL, 6" of bituminous pavement		FILL		AS	1	AUGER	24			
0.8 FILL, 3 1/2" of crushed limestone aggregate base, reddish brown, moist										
2.0 FILL, a mixture of clayey sand and sandy lean clay, with a little gravel, iron oxide staining, dark brown to brown, moist				9	2	SS	18	11		
FILL, sandy lean clay with a little gravel, gray and brown mottled, iron oxide staining, moist			5	13	3	SS	18			
6.0 SANDY LEAN CLAY with a little gravel, gray and brown mottled, lenses of fine grained sand at 9', iron oxide staining, moist, hard (CL)		GLACIAL TILL		18	4	SS	18			
			10	23	5	SS	18			
12.0 SANDY LEAN CLAY with a little gravel, gray mottled, moist, hard (CL)				27	6	SS	24			
14.0 End of Boring										

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

None



element
materials technology
662 Cromwell Ave.
St. Paul, MN 55114
Telephone: 651-645-3601

STARTED	9/10/15	FINISHED	9/10/15
DRILL CO.	Element	DRILL RIG	367
DRILLER	Dunleavy	ASS'T DRILLER	BP
LOGGED BY	BH	APPROVED	MAS

CLIENT City of Prior Lake	ARCHITECT/ENGINEER City of Prior Lake
SITE Prior Lake, Minnesota	PROJECT 2016 Street Improvements

Hidden Pond Trail NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.: 0.5 FILL, 6" of bituminous pavement		FILL		AS	1	AUGER	12			
1.0 FILL, 6" of crushed limestone aggregate base, reddish brown, moist				5	2	SS	12	14		
FILL, sandy lean clay, with a little gravel, lenses of clayey sand, gray and brown mottled, moist				6	3	SS	24	12		
4.0 SANDY LEAN CLAY with a little gravel, gray and brown mottled, lenses of fine grained waterbearing sand at 7.3', moist to wet, soft to firm (CL)		GLACIAL TILL	5	8	4	SS	24			
▽				14	5	SS	18			
9.0 SILT, with lenses of fine grained sand, gray, moist, firm (ML)		FINE ALLUVIUM	10	10	6	SS	18			
11.5 SANDY LEAN CLAY with a trace of gravel, gray and brown mottled, moist to wet, firm (CL)		GLACIAL TILL		11	7	SS	24			
14.0 End of Boring										

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNNND8.GDT 10/26/15

WATER LEVEL OBSERVATIONS

WL ▽ 7.3



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DRILL CO.	Element	DRILL RIG	367
DRILLER	Dunleavy	ASS'T DRILLER	BP
LOGGED BY	BH	APPROVED	MAS

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SITE Prior Lake, Minnesota	PROJECT 2016 Street Improvements

Surface Elev.:	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
0.8	FILL, 9" of bituminous pavement	FILL		AS	1	AUGER	24			
1.3	FILL, 7" of silty sand and gravel aggregate base, brown, moist			9	2	SS	24	10		
4.0	FILL, a mixture of clayey sand, silty sand, and sandy lean clay, with a little gravel, dark brown to grayish brown, moist			10	3	SS	24	12		
	FILL, sandy lean clay with a little gravel, gray and brown mottled, moist, firm to hard			17	4	SS	18			
				18	5	SS	18			
11.0	SANDY LEAN CLAY with a little gravel, gray and brown mottled, lenses of fine grained sand at 17', moist, firm to hard (CL)	GLACIAL TILL		16	6	SS	18			
				19	7	SS	18			
				22	8	SS	18			
20.0	End of Boring		20							

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNNND8.GDT 10/26/15

WATER LEVEL OBSERVATIONS

None



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Raspberry Ridge Road NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.: 0.3		FILL		AS	1	AUGER	24			
1.3		FILL		12	2	SS	24	11		
4.0		GLACIAL TILL	5	9	3	SS	24	12		
					6	4	SS	18		
			10		3	5	SS	18		
					3	6	SS	18		
			15		4	7	SS	18		
16.0					19	8	SS	18		
18.0										
End of Boring										

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

WL ∇ 14.0



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CLIENT

City of Prior Lake

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2016 Street Improvements

Raspberry Ridge Road NE

DEPTH (FT.)	GRAPHIC LOG	GEOLOGY	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
			BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:									
0.5	FILL, 6" of bituminous pavement	FILL	AS	1	AUGER	24			
1.3	FILL, 9" of a mixture of crushed limestone and silty sand and gravel aggregate base, brown, moist								
2.0	FILL, a mixture of clayey sand, silty sand, and sandy lean clay, with gravel, brown, moist		10	2	SS	24	10		
	FILL, sandy lean clay with a little gravel, brown mottled, soft to very soft		6	3	SS	24			
			4	4	SS	18			
			6	5	SS	18			
11.0	SANDY LEAN CLAY with a little gravel, brown to dark brown, moist, firm to hard (CL)	GLACIAL TILL	10	6	SS	18			
			15	7	SS	18			
			26	8	SS	18			
20.0	End of Boring		20						

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

None



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DRILLER	Dunleavy	ASS'T DRILLER	BP
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Black Oak Road NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:										
0.4	FILL, 4.5" of bituminous pavement	FILL		AS	1	AUGER	24			
0.7	FILL, 4" of crushed limestone aggregate base, reddish brown, moist									
2.0	FILL, a mixture of clayey sand, silty sand, and sandy lean clay, with a little gravel, reddish brown to dark brown, moist			14	2	SS	24	12		
4.0	FILL, sandy lean clay with a little gravel, gray and brown mottled, moist, firm	GLACIAL TILL		11	3	SS	24			
	SANDY LEAN CLAY with a little gravel, gray and brown mottled, moist, firm (CL)		5							
				9	4	SS	18			
				9	5	SS	18			
10.0	SANDY LEAN CLAY, with a little gravel, gray and brown mottled, moist, soft to firm (CL)		10							
				8	6	SS	18			
				11	7	SS	18			
16.0	End of Boring		15							

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

	None



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LOGGED BY	BH	APPROVED	MAS

CLIENT	ARCHITECT/ENGINEER
City of Prior Lake	City of Prior Lake

SITE	PROJECT
Prior Lake, Minnesota	2016 Street Improvements

Hidden Pond Trail NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N-VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:										
0.5	FILL, 6" of bituminous pavement	FILL		AS	1	AUGER	24			Possible 3" minus material.
	FILL, 28" of crushed limestone aggregate base, reddish brown, moist									
2.8	FILL, a mixture of clayey sand, silty sand, and sandy lean clay, with a little gravel, brown, moist			11	2	SS	24	11		
			5	10	3	SS	24			
6.5	SILT with lenses of fine grained sand, gray, iron oxide staining, moist, soft (ML)	FINE ALLUVIUM		6	4	SS	18			
			10	6	5	SS	18			
11.5	SANDY LEAN CLAY with a little gravel, gray, moist, firm (CL)	GLACIAL TILL		11	6	SS	24			
14.0	End of Boring									

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

None



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DRILLER	Dunleavy	ASS'T DRILLER	BP
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Manitou Road NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N-VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:										
0.5	FILL, 6" of bituminous pavement	FILL		AS	1	AUGER	24			
0.9	FILL, 7" of a mixture of crushed limestone and silty sand & gravel aggregate base, dark brown to brown, moist			7	2	SS	24	13		
4.0	FILL, a mixture of clayey sand and sandy lean clay, trace of organics, with a little gravel, iron oxide staining, dark brown to black, moist			11	3	SS	24			
6.5	SANDY LEAN CLAY with a little gravel, brown to dark brown, moist, firm (CL)	GLACIAL TILL	5							LL = 25 PL = 12
	SILT, dark brown, moist, firm (ML)	FINE ALLUVIUM		9	4	SS	18			
9.0	SANDY LEAN CLAY with a little gravel, lenses of fine grained waterbearing sand at 10.5' and 14.5', brown to dark brown, iron oxide staining, moist to wet, firm (CL)	GLACIAL TILL	10	12	5	SS	18			
				12	6	SS	18			
				15	7	SS	18			
16.0	End of Boring									

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

WL	▽	10.5
WL	▼	14.5



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SITE	Prior Lake, Minnesota	PROJECT	2016 Street Improvements

Manitou Road NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	ADDITIONAL DATA/REMARKS
Surface Elev.:										
0.4	FILL, 4.5" of bituminous pavement	FILL		AS	1	AUGER	24			
0.6	FILL, 3" of crushed limestone aggregate base, light brown, moist									
2.0	FILL, a mixture of clayey sand and sandy lean clay, with a little gravel, dark brown, moist			10	2	SS	24			
	FILL, sandy lean clay with a little gravel, brown mottled, iron oxide staining, moist, soft to very soft			8	3	SS	24			
			5							
				3	4	SS	18			
9.0	SANDY LEAN CLAY with a little gravel, lenses of fine grained waterbearing sand at 12.5', brown mottled, iron oxide staining, moist, hard (CL)	GLACIAL TILL		21	5	SS	18			
			10							
				22	6	SS	18			
			15							
				20	7	SS	18			
				25	8	SS	18			
20.0	End of Boring		20							

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

WL ∇ 12.5



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2016 Street Improvements

Manitou Road NE

DEPTH (FT.)	BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	TESTS	
							ADDITIONAL DATA/REMARKS	
Surface Elev.:								
0.3	AS	1	AUGER	24				
0.5								
	7	2	SS	24				
4.0								
	13	3	SS	24				
6.5								
	17	4	SS	18				
8.5								
	15	5	SS	18				
11.5								
	19	6	SS	18				
16.0								
	21	7	SS	18				

WATER LEVEL OBSERVATIONS

WL ∇ 15



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DRILLER	Dunleavy	ASS'T DRILLER	BP
LOGGED BY	BH	APPROVED	MAS

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT GPJ LOG A GINN08.GDT 10/26/15

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2016 Street Improvements

Manitou Road NE

Surface Elev.:

0.4 FILL, 4.5" of bituminous pavement
 0.8 FILL, 5" of silty sand & gravel aggregate base, dark brown to brown, moist
 FILL, a mixture of clayey sand and sandy lean clay, with a little gravel, iron oxide staining, dark brown to brown, moist, soft

6.0 SAND, with a trace of gravel, fine to medium grained, brown, loose to medium dense, moist (SP)

12.0 SANDY LEAN CLAY with a little gravel, lenses of fine grained sand, brown mottled, iron oxide staining, moist, firm (CL)

20.0 End of Boring

GRAPHIC LOG

GEOLOGY

DEPTH (FT.)

BLOWS/12" N - VALUE RQD

NUMBER

TYPE

IN. RECOVERED IN. DRIVEN

MOISTURE, %

DRY DENSITY PCF

ADDITIONAL DATA/REMARKS

SAMPLES

TESTS

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

None



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DRILLER Dunleavy ASS'T DRILLER BP

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p200=4.8%

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SITE Prior Lake, Minnesota	PROJECT 2016 Street Improvements

Manitou Road NE	GRAPHIC LOG	GEOLOGY	DEPTH (FT.)	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
				BLOWS/12" N - VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:										
0.5 FILL, 5.5" of bituminous pavement		FILL		AS	1	AUGER	24			
1.0 FILL, 7" of a mixture of crushed limestone and silty sand & gravel aggregate base, dark brown to brown, moist				18	2	SS	24			
FILL, a mixture of clayey sand and sandy lean clay, with a little gravel, iron oxide staining, dark brown to brown, moist				7	3	SS	24			
			5							
			7		4	SS	18			
8.5 SAND, with a trace of gravel, fine to medium grained, brown, moist, medium dense (SP)		GLACIAL OUTWASH		12	5	SS	18			p200=4.2%
			10							
11.5 SANDY LEAN CLAY with a little gravel, brown mottled, iron oxide staining, moist, firm to hard (CL)		GLACIAL TILL		12	6	SS	24			
				23	7	SS	24			
			15							
16.0 End of Boring										

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS None	 <p> element™ materials technology 662 Cromwell Ave. St. Paul, MN 55114 Telephone: 651-645-3601 </p>	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td>STARTED</td> <td>9/11/15</td> <td>FINISHED</td> <td>9/11/15</td> </tr> <tr> <td>DRILL CO.</td> <td>Element</td> <td>DRILL RIG</td> <td>367</td> </tr> <tr> <td>DRILLER</td> <td>Dunleavy</td> <td>ASS'T DRILLER</td> <td>BP</td> </tr> <tr> <td>LOGGED BY</td> <td>BH</td> <td>APPROVED</td> <td>MAS</td> </tr> </table>	STARTED	9/11/15	FINISHED	9/11/15	DRILL CO.	Element	DRILL RIG	367	DRILLER	Dunleavy	ASS'T DRILLER	BP	LOGGED BY	BH	APPROVED	MAS
STARTED	9/11/15	FINISHED	9/11/15															
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DRILLER	Dunleavy	ASS'T DRILLER	BP															
LOGGED BY	BH	APPROVED	MAS															

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2016 Street Improvements

Manitou Road NE

DEPTH (FT.)	GRAPHIC LOG	GEOLOGY	SAMPLES				TESTS		ADDITIONAL DATA/REMARKS
			BLOWS/12" N-VALUE RQD	NUMBER	TYPE	IN. RECOVERED IN. DRIVEN	MOISTURE, %	DRY DENSITY PCF	
Surface Elev.:									
0.3	FILL, 4" of bituminous pavement	FILL		1	AUGER	24			
0.6	FILL, 3.5" of silty sand & gravel aggregate base, dark brown to brown, moist								
	FILL, silty sand with a trace of gravel, brown, moist		13	2	SS	24			p200=28.9%
4.0	FILL, sand with gravel, fine to medium grained, brown, moist		17	3	SS	24	7		
6.0	SILTY SAND with a trace of gravel, mostly fine grained, brown, moist, medium dense (SM)	GLACIAL OUTWASH	17	4	SS	18			
9.0	SANDY LEAN CLAY with a little gravel, with lenses of fine grained sand, brown to dark brown, iron oxide staining, moist, firm (CL)	GLACIAL TILL	14	5	SS	18			
12.5	SILTY SAND with a trace of gravel, fine grained, brown, moist, medium dense (SM)	GLACIAL OUTWASH	23	6	SS	18			
14.5	SANDY LEAN CLAY with a little gravel, with lenses of fine grained sand, brown to dark brown, iron oxide staining, moist, hard (CL)	GLACIAL TILL	29	7	SS	18			
20.0	End of Boring		25	8	SS	18			

ELEMENT LOG ESP020835P PRIOR LAKE 2016 IMPROVEMENT PROJECT.GPJ LOG A GNN08.GDT 10/26/15

WATER LEVEL OBSERVATIONS

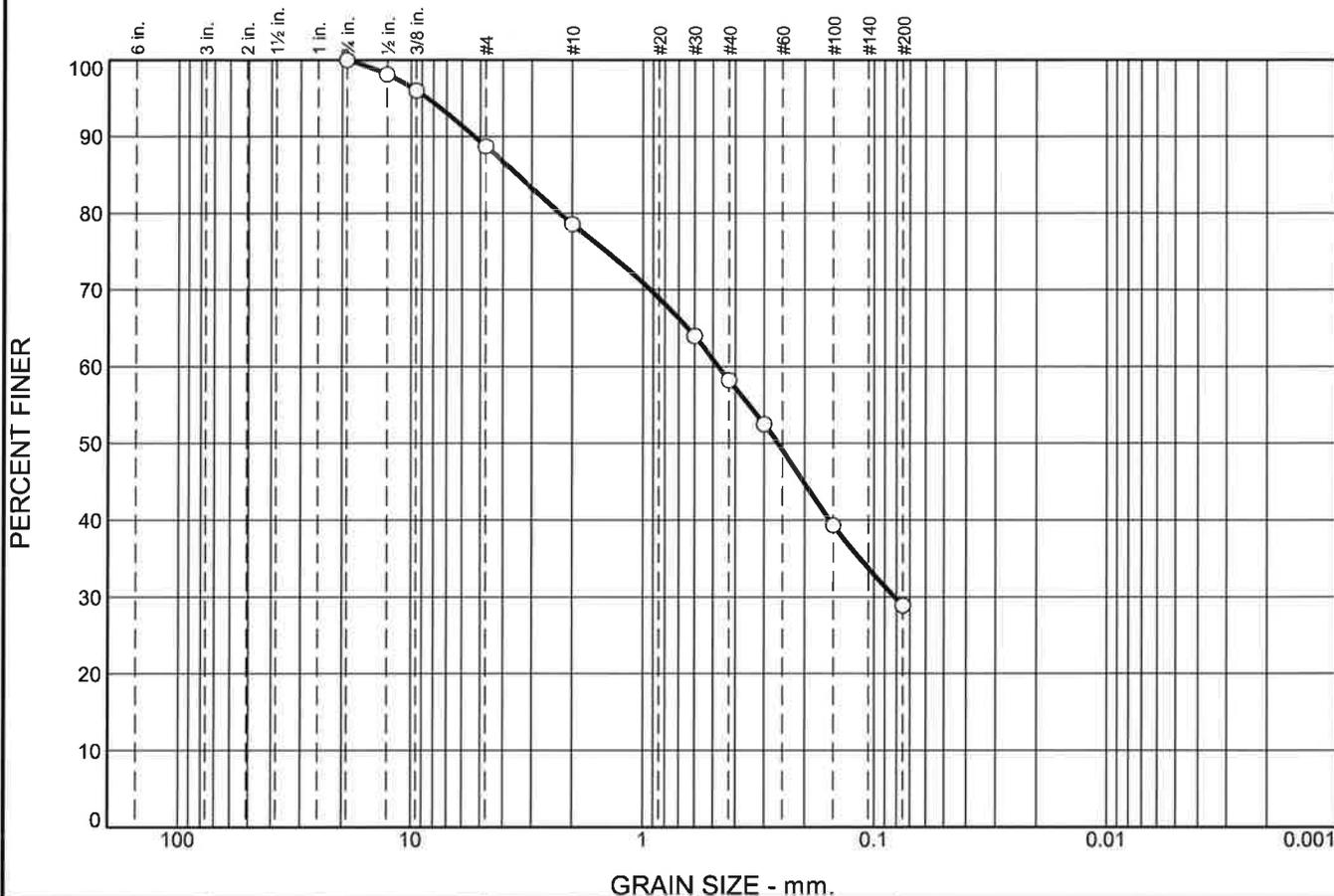
None



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Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	11.3	10.1	20.4	29.3	28.9	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4"	100.0		
1/2"	98.1		
3/8"	96.0		
#4	88.7		
#10	78.6		
#30	63.9		
#40	58.2		
#50	52.5		
#100	39.3		
#200	28.9		

Soil Description

SILTY SAND with a little gravel, fine to medium grained, brown, moist (SM)

Atterberg Limits

PL= LL= PI=

Coefficients

D₉₀= 5.3221 D₈₅= 3.4856 D₆₀= 0.4732
D₅₀= 0.2616 D₃₀= 0.0814 D₁₅=
D₁₀= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample discarded after completion of testing.

EAR-CONTROLLED DATA

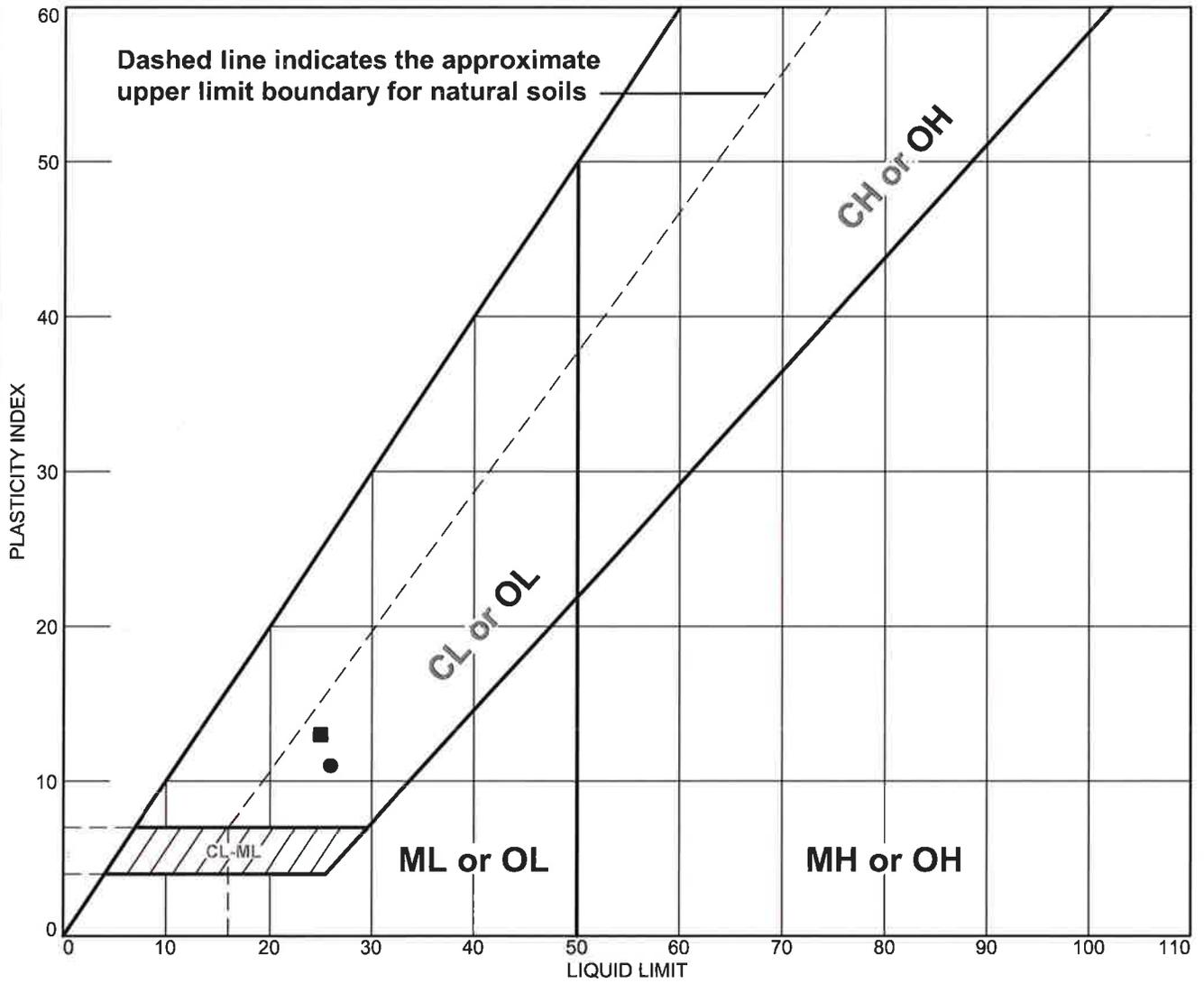
* (no specification provided)

Location: B14 Sample Number: S09880 Depth: 2'-4' Date: 10-23-15

Element Materials Technology St. Paul, MN	Client: City of Prior Lake Project: City of Prior Lake 2016 Street Improvement Project Project No: ESP020835P Figure
--	---

Tested By: A. Martin Checked By: M. Straight, PE

LIQUID AND PLASTIC LIMITS TEST REPORT



	Material Description	Sampled	Tested	Technician	LL	PL	PI	%<#40	USCS
○	Sandy lean clay, with a little gravel, gray and brown mottled (CL)	9-10-15	9-15-15	B. Hillesheim	26	15	11		CL
□	Sandy lean clay, with a little gravel, brown to dark brown (CL)	9-11-15	9-15-15	B. Hillesheim	25	12	13		CL

Project No. ESP020835P **Client:** City of Prior Lake
Project: City of Prior Lake 2016 Street Improvement Project

○ **Location:** B1 **Depth:** 5'-6' **Sample Number:** S09881
 □ **Location:** B9 **Depth:** 4'-6' **Sample Number:** S09882

○ The sample was discarded at the conclusion of testing.

Element Materials Technology
St. Paul, MN

Checked by: M. Straight
Title: Sr. Project Engineer
Figure

EAR-CONTROLLED DATA

SYMBOLS AND TERMINOLOGY ON TEST BORING LOGS

SYMBOLS							
Drilling and Sampling				Laboratory Testing			
Symbol	Description	Symbol	Description				
HSA	3-1/4" I.D. hollow stem auger	W	Water content, % (ASTM:D2216)**				
_FA	4", 6" or 10" diameter flight auger	D	Dry density, pcf				
_HA	2", 4" or 6" hand auger	LL	Liquid limit (ASTM:D4318)				
_DC	2-1/2", 4", 5" or 6" steel drive casing	PL	Plastic limit (ASTM:D4318)				
_RC	Size A, B or N rotary casing	--- Inserts in Last Column (Qu or RQD) ---					
PD	Pipe drill or cleanout tube	Qu	Unconfined compressive strength, psf (ASTM:D2166)				
CS	Continuous split barrel sampling	Pq	Penetrometer reading, tsf (ASTM:D1558)				
DM	Drilling mud	Ts	Torvane reading, tsf				
JW	Jetting water	G	Specific gravity (ASTM:D854)				
SB	2" O.D. split barrel sampling	SL	Shrinkage limits (ASTM:D427)				
_L	2-1/2" or 3-1/2" O.D. SB liner sample	OC	Organic content – Combustion method (ASTM:D2974)				
_T	2" or 3" thin walled tube sample	SP	Swell pressure, tsf (ASTM:D4546)				
3TP	3" thin walled tube using pitcher sampler	PS	Percent swell under pressure (ASTM:D4546)				
_TO	2" or 3" thin walled tube using Osterberg sampler	FS	Free swell, % (ASTM:D4546)				
W	Wash sample	SS	Shrink swell, % (ASTM:D4546)				
B	Bag sample	pH	Hydrogen ion content – Meter Method (ASTM:D4972)				
P	Test pit sample	SC	Sulfate content, parts/million or mg/l				
_Q	BQ, NQ, or PQ wireline system	CC	Chloride content, parts/million, or mg/l				
_X	AX, BX, or NX double tube barrel	C*	One dimensional consolidation (ASTM:D2435)				
N	Standard penetration test, blows per foot	Qc*	Triaxial compression (ASTM:D2850 and D4767)				
CR	Core recovery, percent	D.S.*	Direct shear (ASTM:D3080)				
WL	Water level	K*	Coefficient of permeability, cm/sec (ASTM:D2434)				
≡	Water level	P*	Pinhole test (ASTM:D4647)				
NMR	No measurement recorded, primarily due to the presence of drilling or coring fluid	DH*	Double hydrometer (ASTM:D4221)				
		MA*	Particle size analysis (ASTM:D422)				
		R	Laboratory electrical resistivity, ohm-cm (ASTM:G57)				
		E*	Pressuremeter deformation modulus, tsf (ASTM:D4719)				
		PM*	Pressuremeter test (ASTM:D4719)				
		VS*	Field vane shear (ASTM:D2573)				
		IR*	Infiltrometer test (ASTM:D3385)				
		RQD	Rock quality designation, percent				
* Results shown on attached data sheet or graph							
** ASTM designates American Society for Testing and Materials							
TERMINOLOGY							
Particle Sizes				Soil Layering and Moisture			
Type	Size Range	Term	Visual Observation				
Boulders	> 12"	Lamination	Up to 1/4" thick stratum				
Cobbles	3" – 12"	Varved	Alternating laminations of any combination of clay, silt, fine sand, or colors				
Coarse gravel	3/4" – 3"	Lenses	Small pockets of different soils in a soil mass				
Fine gravel	#4 sieve – 3/4"	Stratified	Alternating layers of varying materials or colors				
Coarse sand	#4 - #10 sieve	Layer	1/4" to 12" thick stratum				
Medium sand	#10 - #40 sieve	Dry	Powdery, no noticeable water				
Fine sand	#40 - #200 sieve	Moist	Damp, below saturation				
Silt	100% passing #200 sieve and > 0.005 mm	Waterbearing	Pervious soil below water				
Clay	100% passing #200 sieve and < 0.005 mm	Wet	Saturated, above liquid limit				
Gravel Content				Standard Penetration Resistance			
Coarse-Grained Soils		Fine-Grained Soils		Cohesionless Soils		Cohesive Soils	
% Gravel	Description	% Gravel	Description	N-Value	Relative Density	N-Value	Consistency
2 – 15	A little gravel	< 5	Trace of gravel	0 – 4	Very loose	0 – 4	Very soft
16 – 49	With gravel	5 – 15	A little gravel	5 – 10	Loose	5 – 8	Soft
		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

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

ASTM D2487 (Unified Soil Classification System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
COARSE-GRAINED SOILS	Gravels (More than 50 % of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5 % fines ^C)	$Cu \geq 4$ and $1 \leq Cc \leq 3^D$	GW	Well-graded gravel ^E	
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3]^D$	GP	Poorly graded gravel ^E	
	More than 50 % retained on No. 200 sieve	Gravels with Fines (More than 12 % fines ^G)		Fines classify as ML or MH	GM	Silty gravel ^{E,F,G}
				Fines classify as CL or CH	GC	Clayey gravel ^{E,F,G}
		Sands (50 % or more of coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5 % fines ^H)	$Cu \geq 6$ and $1 \leq Cc \leq 3^D$	SW	Well-graded sand ^I
				$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3]^D$	SP	Poorly graded sand ^I
FINE-GRAINED SOILS	Silt and Clays Liquid limit less than 50	inorganic	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}	
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}	
50 % or more passes the No. 200 sieve	Silt and Clays Liquid limit 50 or more	inorganic	Liquid limit - oven dried Liquid limit - not dried < 0.75	OL	Organic clay ^{K,L,M,N} Organic silt ^{K,L,M,O}	
			organic	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}
	organic	PI plots below "A" line		MH	Elastic silt ^{K,L,M}	
		HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat

^A Based on the material passing the 3-in. (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12 % fines require dual symbols:

- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

^D $Cu = D_{60}/D_{10}$ $Cc = (D_{30})^2 / D_{10} \times D_{60}$

^E If soil contains ≥ 15 % sand, add "with sand" to group name.

^F If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^G If fines are organic, add "with organic fines" to group name.

^H Sands with 5 to 12 % fines require dual symbols:

- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

^I If soil contains ≥ 15 % gravel, add "with gravel" to group name.

^J If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

^K If soil contains 15 to < 30 % plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains ≥ 30 % plus No. 200, predominantly sand, add "sand" to group name.

^M If soil contains ≥ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.

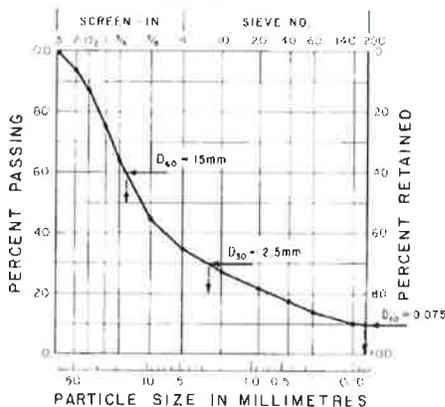
^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

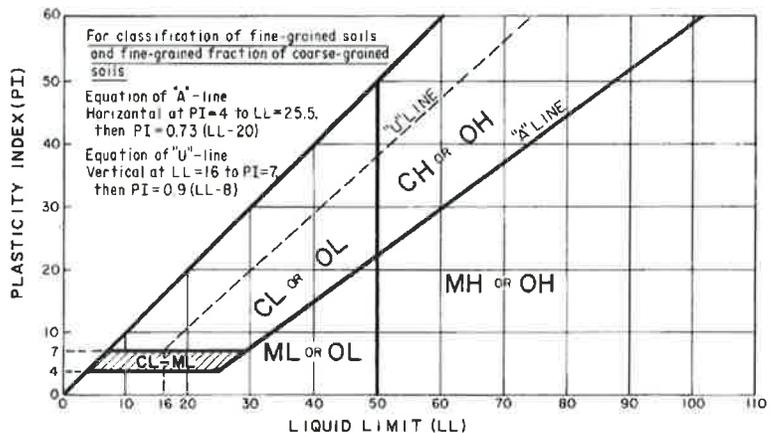
^P PI plots on or above "A" line.

^Q PI plots below "A" line.

SIEVE ANALYSIS



$$Cu = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200 \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{(2.5)^2}{0.075 \times 15} = 5.6$$



FIELD EXPLORATION PROCEDURES

Soil Sampling

Soil sampling was performed in accordance with ASTM D 1586. Using this procedure, a 2" O.D. split barrel sampler is driven into the soil by a 140 pound weight falling 30". After an initial set of 6", the number of blows required to drive the sampler an additional 12" is known as the penetration resistance, or N value. The N value is an index of the relative density of cohesionless soils and the consistency of cohesive soils. Thin wall tube samples were obtained according to ASTM D 1587 where indicated by the appropriate symbol on the boring logs. Rock core samples, if taken, were obtained by rotary drilling in accordance with ASTM D 2113. Power auger borings, if performed, were done in general accordance with ASTM D 1452.

Soil Classification

As the samples were obtained in the field, they were visually and manually classified by the crew chief in accordance with ASTM D 2488. Representative portions of the samples were then returned to the laboratory for further examination and for verification of the field classification. Logs of the borings indicating the depth and identification of the various strata, the N value, the laboratory test data, water level information and pertinent information regarding the method of maintaining and advancing the drill holes are attached. The descriptive terminology and symbols used on the boring logs are also attached.

PREREQUISITES FOR SOUND ENGINEERING PRACTICE

In order to properly evaluate the foundation soils at a building site, it is imperative for our firm to know exactly where the building will be placed, its size, and the elevation of the foundation elements. Without this information, a judgment regarding the adequacy of the preparatory foundation earthwork is not possible.

This project data is especially critical in situations when the excavation extends below the footing grade and compacted fill is required to attain building elevations. In these situations, the excavation would require lateral oversizing to provide suitable lateral distribution of the footing loads.

Offset batter boards of the building lines stakes provide the best on-site verification of the building location and size. It must be recognized that Element St. Paul does not practice in the field of surveying. Therefore, we must rely on staking by others. If Element St. Paul is required to perform the survey, we will retain a licensed surveyor and invoice our client for the amount per our current fee schedule. Provision of the building foundation plans is also important so that we may properly perform our engineering judgments.

If the construction is redesigned or otherwise moved subsequent to our work, we should be informed so our firm can assess if additional engineering observation is required or suggest sound engineering alternatives. We cannot be responsible for any soil foundation system if the structure has been relocated with respect to the excavation subsequent to our observations.

CONSTRUCTION OBSERVATIONS AND TESTING

The recommendations made in this report have been made based on the subsurface conditions found in the borings. It is possible that there are soil and water conditions on site that were not represented by the borings. Consequently, on-site observation during construction is considered integral to the successful implementation of the recommendations. We believe that qualified field personnel need to be on site at the times outlined below to observe the site conditions and effectiveness of the construction.

We recommend that the completed excavation and prepared subgrade be observed and tested by a soils engineer/technician prior to fill placement or construction of any foundation elements. These observations would be necessary to judge if all unsuitable materials have been removed from within the planned construction area and that an appropriate degree of lateral oversize has been provided for in those areas where fill will be placed below the bottom of foundation grade.

We recommend a representative number of field density tests be taken in all engineered fill placed to aid in judging its suitability. We suggest that at least one density test be performed for at least every 2,500 square feet of engineered fill placed for every 2' of fill depth. Additional tests should be taken where confined areas are compacted. Any proposed fill material should be submitted to the laboratory for tests to check compliance with our recommendations and project specifications.

PRECAUTIONS FOR EXCAVATING AND REFILLING DURING COLD WEATHER

The winter season in this area presents specific problems for foundation construction. Soils that are allowed to freeze undergo a moisture volume expansion, resulting in loss of density. These frost-expanded soils will consolidate upon thawing, causing settlement of any structure supported on them. To prevent this settlement, frost should not be allowed to penetrate into the soils below any proposed structure.

Ideally, winter excavation should be limited to areas small enough to be refilled to grade higher than footing grade on the same day. Typically, these areas should be filled to floor grade. Trenching back down to unfrozen soils for foundation construction can then be performed just prior to footing placement. The excavated trenches should be protected from freezing by means of insulating or heating during foundation construction. Backfilling of the foundation trenches should be performed immediately after the below-grade foundation construction is finished. In addition, any interior footings or footings designed without frost protection should be extended below frost depth, unless adequate precautions are taken to prevent frost intrusion until the building can be enclosed and heated.

In many cases, final grade cannot be attained in one day's time, even though small areas are worked. In the event final grade cannot be attained in one day's time, frost can be expected to develop overnight. Leaving a layer of loose soil on top of the compacted material overnight can minimize the depth of frost penetration. However, any frost that forms in this loose layer, or snow that accumulates, should be completely removed from the fill area prior to compaction and additional soil placement. Frozen soils or soils containing frozen material or snow should never be used as fill material.

After the structure has been enclosed, all floor slab areas should be subjected to ample periods of heating to allow thawing of the soil system. Alternatively, the frozen soil can be completely removed and be replaced with an engineered fill. The floor slab areas should be checked at random and representative locations for remnant areas of frost and density tests should be performed to document fill compaction to slab placement.

Due to the potential problems associated with fill placement during cold weather, a full-time, on-site soils technician should monitor any filling operations. Full-time monitoring aids in detecting areas of frozen material, or potential problems with frozen material within the fill, so the appropriate measures can be taken. The choice of fill material is particularly important during cold weather, since clean granular fill material can be placed and compacted more efficiently than silty and clayey soils. In addition, greater magnitudes of heaving can be expected with freezing of the more frost susceptible silts and clays.

If more specific frost information or cold weather data concerning other construction materials is required, please contact us.