



Marie Avenue Reconstruction Project – Phase 2

Feasibility Report

South St. Paul, Minnesota

City Project No. 2025-01

December 1, 2025

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Certification Sheet

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.



Kelsey J. Gelhar

Date: December 1, 2025

Lic. No. 60639

I. Executive Summary

This Feasibility Report was prepared for the Marie Avenue Reconstruction Project – Phase 2, City Project No. 2025-01. The proposed project includes the full reconstruction of six blocks of Marie Avenue between 9th Avenue and 15th Avenue, as shown in Figure 1 of Appendix A.

Street and pedestrian improvements include roadway reconstruction with 11-ft through lanes and 8-ft parking lanes, accessible sidewalks and crosswalks, and lighting improvements for pedestrian and traffic safety.

Public utility improvements along the project corridor include upgrades to the watermain system and lining of the sanitary sewer manholes. Storm sewer will be replaced and upgraded as necessary to address drainage concerns and meet watershed and MS4 design requirements.

The total estimated cost for the Marie Avenue Reconstruction Project – Phase 2 is approximately \$2,790,218.00. The estimated costs are detailed below and include a 10% contingency and 10% indirect costs.

Marie Avenue Reconstruction Phase 2 – Opinion of Probable Cost	
Proposed Improvement	Total Estimated Cost
Surface & Pedestrian Improvements	\$1,455,580.00
Watermain Improvements	\$691,890.00
Sanitary Sewer Improvements	\$75,686.00
Storm Sewer Improvements	\$297,740.00
Streetlight Improvements	\$269,322.00
Total	\$2,790,218.00

Funding for this project is proposed to come from Municipal State Aid (MSA), the City’s Infrastructure, Water Utility, Sanitary Sewer Utility, and Storm Sewer Utility funds, and Special Assessments to benefiting properties.

Marie Avenue Reconstruction Phase 2 – Funding Summary	
Proposed Funding	Total
Minnesota State Aid	\$500,000.00
Infrastructure Fund	\$1,142,043.14
Water Utility Fund	\$691,890.00
Sanitary Sewer Utility Fund	\$75,686.00
Storm Water Utility Fund	\$297,740.00
Special Assessments	\$82,858.86
Total	\$2,790,218.00

The Marie Avenue Reconstruction Project – Phase 2 can be substantially completed, including the final lift of bituminous pavement and all restoration items, in 2026.

Below is the preliminary project schedule:

Neighborhood Open House / Public Informational Meeting	November 18, 2025
Receive Feasibility Report, Schedule Improvement Hearing	December 1, 2025
Improvement Hearing, Order Project, Authorize Preparation of Plans & Specifications	January 5, 2026
Approve Plans and Specifications, Authorize Bidding/ Ad for Bid	January 2026
Bid Opening	February 2026
Council Receives Bids, Awards Project & Contract for Construction	March 2026
Begin Construction	Spring 2026
Substantial Completion of Construction	Fall 2026
Assessment Hearing	Fall 2026

II. Introduction

The Marie Avenue corridor is a vital area of South St. Paul, which connects the community to the South St. Paul Secondary School, Kaposia Library, Jefferson Park, City Hall, and several businesses. Goals for the improvements to Marie Avenue have been identified in multiple studies and plans over the years, including the Southview Hill Plan (2014), the Bicycle and Pedestrian Master Plan (2014), the 2040 Comprehensive Plan, and the City's 5-year Capital Improvement Plan (CIP).

Marie Avenue between 3rd Avenue and 9th Avenue was reconstructed in the summer of 2025 and was partly funded by a \$1,000,000 Safe Routes to School (SRTS) Grant from the federal government. The City received an additional \$1,000,000 SRTS Grant from the federal government to continue the improvements from 9th Avenue to 21st Avenue in 2026. Improvements identified in the SRTS application included increased multi-modal uses, such as ADA-compliant sidewalks and crosswalks, and the addition of bicycle lanes. Improvements to the streetlighting, signage, and roadway surface were also identified. In May of 2025, engineering staff reviewed the corridor with the City Council as building a new roadway to the SRTS standards would be costly and have significant impacts on residents. The City Council directed staff to return the grant funds and review other design options.

This project is proposed in the CIP to be funded through Municipal State Aid funds and the City's Infrastructure and Utility Funds. Special Assessments are also being utilized to help fund the reconstruction of Marie Avenue in accordance with Minnesota Statute Chapter 429.

This report will review the existing conditions in the project area and discuss the proposed improvements in detail. It will also provide preliminary cost estimates for the proposed improvements and funding sources.

III. Existing Conditions

A. Roadway and Pedestrian Facilities

A.1 Roadway

Marie Avenue from 9th Avenue to 15th Avenue is a local roadway and part of the City's Municipal State Aid system. Typical Annual Average Daily Traffic (AADT) counts for Marie Avenue in this area were taken in April 2025 and range from 1,764 to 2,475 vehicles a day. There are three 4-way stop-controlled intersections on the project corridor; at 9th Avenue (installed in 2025), at 12th Avenue, and at 15th Avenue.

The existing roadway right-of-way is 60 feet wide throughout the project corridor. The existing roadway measures approximately 44 feet wide from curb face to curb face. This allows for 12-foot travel lanes and 10-foot shoulders in the existing condition. The wide shoulders provide on-street parking for front-facing home and business access. Street parking is currently available along the project corridor on both the north and south sides of Marie Avenue.

Existing streetlight features are located at intersections and are attached to Xcel owned power poles.

The pavement along Marie Avenue is experiencing varying severity of distresses, including alligator, block, transverse, and longitudinal cracking. The asphalt is also delaminating, primarily in the parking lanes. City staff received multiple inquiries about pothole patching and when this portion of Marie Avenue would be reconstructed over the past years.

Braun Intertec took six soil borings along Marie Avenue between 9th Avenue and 15th Avenue. Borings show that the existing asphalt thicknesses range from 7-inches to 11-inches and the existing aggregate base thicknesses range from 4-inches to 11-inches. The fill soils are primarily silty sands and poorly graded sands with various amounts of gravel. Groundwater was not encountered in any of the borings at the time they were drilled. The Geotechnical Report prepared by Braun Intertec is included in Appendix B of this report.

A.2 Pedestrian Facilities

Marie Avenue is identified for arterial sidewalk, pedestrian mobility, and bicycle facility improvements in the City's adopted Bicycle and Pedestrian Plan (2014). Existing 5-ft wide concrete sidewalk is located on both the north and south side of the street between 9th Avenue and 12th Avenue. In some areas the existing sidewalk has a grass boulevard and abuts residential retaining walls. In other areas, the existing sidewalk extends from the back of the curb to buildings and parking lots. There is a striped and signed crosswalk at 10th Avenue and striped crosswalks at the 12th Avenue intersection. The intersection of 12th Avenue and Marie Avenue is a stop-controlled intersection.

The existing pedestrian facilities contain numerous obstructions that affect the safe travel of pedestrians. The sidewalk is in fair condition, but the pedestrian ramps fail to meet the current design requirements of the Americans with Disabilities Act (ADA). Many of the existing curb ramps have narrow openings and lack ADA-required landing areas and truncated domes.

B. Municipal Utilities

B.1 Watermain

The watermain infrastructure in this area is mainly comprised of 6-inch diameter and 8-inch diameter cast iron pipes. The water system was constructed in 1962 between 14th Avenue and 15th Avenue and in 1978 between 9th Avenue and 14th Avenue. The water main has reached or nearly reached the original design life of 50 to 100 years of service.

B.2 Sanitary Sewer

The existing sanitary sewer infrastructure in the project corridor runs along Marie Avenue and along the cross streets. Between 9th Avenue and 14th Avenue, 21-inch and 24-inch diameter reinforced concrete pipe (RCP) sewers were installed in 1978. Properties not served by sanitary sewer along Marie Avenue are connected to the sewer on the cross streets. The sanitary sewer was televised in September of 2025. Televising records indicate that the sanitary sewer is in good condition.

B.3 Storm Sewer & Drainage

The existing storm sewer infrastructure along Marie Avenue generally consists of intersection-based collection with a larger conveyance line running along Marie Avenue. The existing storm

sewer system consists of 12-inch to 60-inch diameter reinforced concrete pipe. Runoff from Marie Avenue between 15th Avenue and 9th Avenue is collected and conveyed to an existing trunk storm sewer along 9th Avenue N. All runoff from Marie Avenue ultimately discharges to the Mississippi River. The storm sewer was televised in September of 2025. Televising records indicate that the storm sewer is in good condition.

IV. Proposed Improvements

A. Roadway, Pedestrian Facilities, and Lighting

The roadway has aged and deteriorated to the point where full reconstruction is warranted. Reconstruction is intended to improve the pavement's design strength, provide opportunities for utility upgrades, and provide opportunities to install and replace pedestrian facilities to meet ADA requirements.

Marie Avenue is part of the Municipal State Aid system, and the roadway will be constructed according to MnDOT design standards. Staff is proposing a typical section of 11-foot driving lanes, 8-foot parking lanes on both sides of the street between 9th Avenue and 15th Avenue. See Figure 2 for the typical sections.

Street grades are proposed to closely match existing grades to minimize construction impacts on adjacent properties. The proposed roadway section includes 4 1/2 inches of asphalt pavement and 8 inches of aggregate base over an acceptable and compacted subgrade.

A 5-ft wide sidewalk that meets ADA standards for width and slope is proposed on the north side of the roadway. Where sidewalk and boulevard widths allow, boulevard tree planting will be considered. Pedestrian curb ramps and their associated crosswalks will be installed per ADA standards.

Proposed lighting improvements include new streetlights at the intersections and new pedestrian level-streetlights along the corridor where sidewalk is proposed. The proposed streetlight styles will be consistent with those recently installed on Concord Street, Concord Exchange, 7th Avenue S, and the 2025 Marie Ave Reconstruction Project.

B. Municipal Utilities

B.1 Watermain

Replacement of the watermain is proposed as part of this project due to the age of the watermain system. All crossings are proposed to be replaced with 8-inch diameter DIP so that Marie Avenue does not have to be impacted for future watermain work. All fittings, valves, and hydrants are proposed to be replaced with materials consistent with current City standards.

B.2 Sanitary Sewer

The sanitary sewer is in good condition in this area. Manhole lining and casting replacements are proposed to address inflow and infiltration.

B.3 Storm Sewer & Drainage

The proposed improvements will generally maintain the existing drainage patterns and discharge points. The proposed storm sewer improvements include removing and replacing the existing storm sewer system at intersections to meet current drainage design standards. The trunk line is in good condition and is proposed to remain in place.

The Marie Avenue Reconstruction Project – Phase 2 will disturb over one acre of land and require stormwater treatment to meet MS4 and watershed requirements. This area is fully developed, and due to existing utilities, site topography, and the project’s proximity to regional stormwater facilities, treatment options are limited to water quality structures.

C. Permits

In order to complete the proposed improvements, the following permits will be required from the following agencies:

- Minnesota Department of Health permit for watermain replacement and extension
- Minnesota Pollution Control Agency NPDES permit for land disturbance greater than 1 acre.
- Dakota County Right-of-Way for work at 15th Ave (County Road 8)

It is assumed that all proposed survey and utility improvements will be limited to the existing City right-of-way and easements. Right-of-entry agreements may be required for minor work outside the right-of-way to blend new improvements to existing yards or connect to existing utilities and services.

D. Public Involvement

A neighborhood meeting was held on November 18th, 2025, to introduce this project to the public. Nine different residents and property owners attended the meeting and asked questions about the project design and construction process. Topics discussed are listed below:

Design Topics

- Sidewalk replacement and extension
 - o Some residents expressed concerns about extending the sidewalk along the north side of Marie Avenue, some expressed support
 - o Residents asked if the sidewalk on the west side of 13th Avenue S would be extended to Marie Avenue
- Street design
- Boulevard trees
- Coordination with private utilities and private improvements (like outwalks and landscaping)

Construction Topics

- General construction timelines
- Access to the alleys
- Access for drop off and pick up at the Maple Tree Day School (1001 Marie Avenue)
- Coordination with garbage haulers, postal service, and private utilities

V. Financing

A. Opinion of Probable Cost

Appendix C of this report includes a detailed opinion of probable cost. The opinion of probable cost is based on the projected construction costs for 2026 and includes a 10% contingency and 10% indirect costs for legal and administrative items. The project costs are summarized in the following table:

Marie Avenue Reconstruction Phase 2 – Opinion of Probable Cost	
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Surface & Pedestrian Improvements	\$1,455,580.00
Watermain Improvements	\$691,890.00
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Streetlight Improvements	\$269,322.00
Total	\$2,790,218.00

B. Funding

Funding for this project is proposed to come from Municipal State Aid, Infrastructure Fund, Water Utility, Sanitary Sewer Utility, Storm Sewer Utility, and Special Assessments. The table below provides a summary of the funding sources.

Marie Avenue Reconstruction Phase 2 – Funding Summary	
Proposed Funding	Total
Minnesota State Aid	\$500,000.00
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Water Utility Fund	\$691,890.00
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Special Assessments	\$82,858.86
Total	\$2,790,218.00

C. Preliminary Assessment Roll

The City's Special Assessment Policy for road construction projects outlines that a portion of street costs shall be assessed to the benefiting properties. For 2026 street reconstruction projects, all abutting properties shall contribute at a rate of \$94.84 per linear foot of frontage, with the following exceptions:

- 75-foot maximum assessable front footage for residential properties
- Residential corner lots with the narrow side fronting the project are to be assessed
- Commercial, Industrial, Institutional, and High Density Residential (greater than a duplex) properties are assessed along all sides of the parcel with no maximum footage
- Assessments are capped at 5% of the estimated market value

A preliminary assessment roll is included in Appendix D of this report.

VI. Project Schedule

Below is the preliminary project schedule:

Neighborhood Open House / Public Informational Meeting	November 18, 2025
Receive Feasibility Report, Schedule Improvement Hearing	December 1, 2025
Improvement Hearing, Order Project, Authorize Preparation of Plans & Specifications	January 5, 2026
Approve Plans and Specifications, Authorize Bidding/ Ad for Bid	January 2026
Bid Opening	February 2026
Council Receives Bids, Awards Project & Contract for Construction	March 2026
Begin Construction	Spring 2026
Substantial Completion of Construction	Fall 2026
Assessment Hearing	Fall 2026

VII. Conclusion

Project costs are anticipated to be approximately \$2,790,218.00. Due to the poor condition of the roadway, the improvements herein are recommended for construction in 2026.

From an engineering perspective, the project as proposed can be considered necessary, cost-effective, and feasible. The city council will determine its economic feasibility.

APPENDIX A
FIGURES

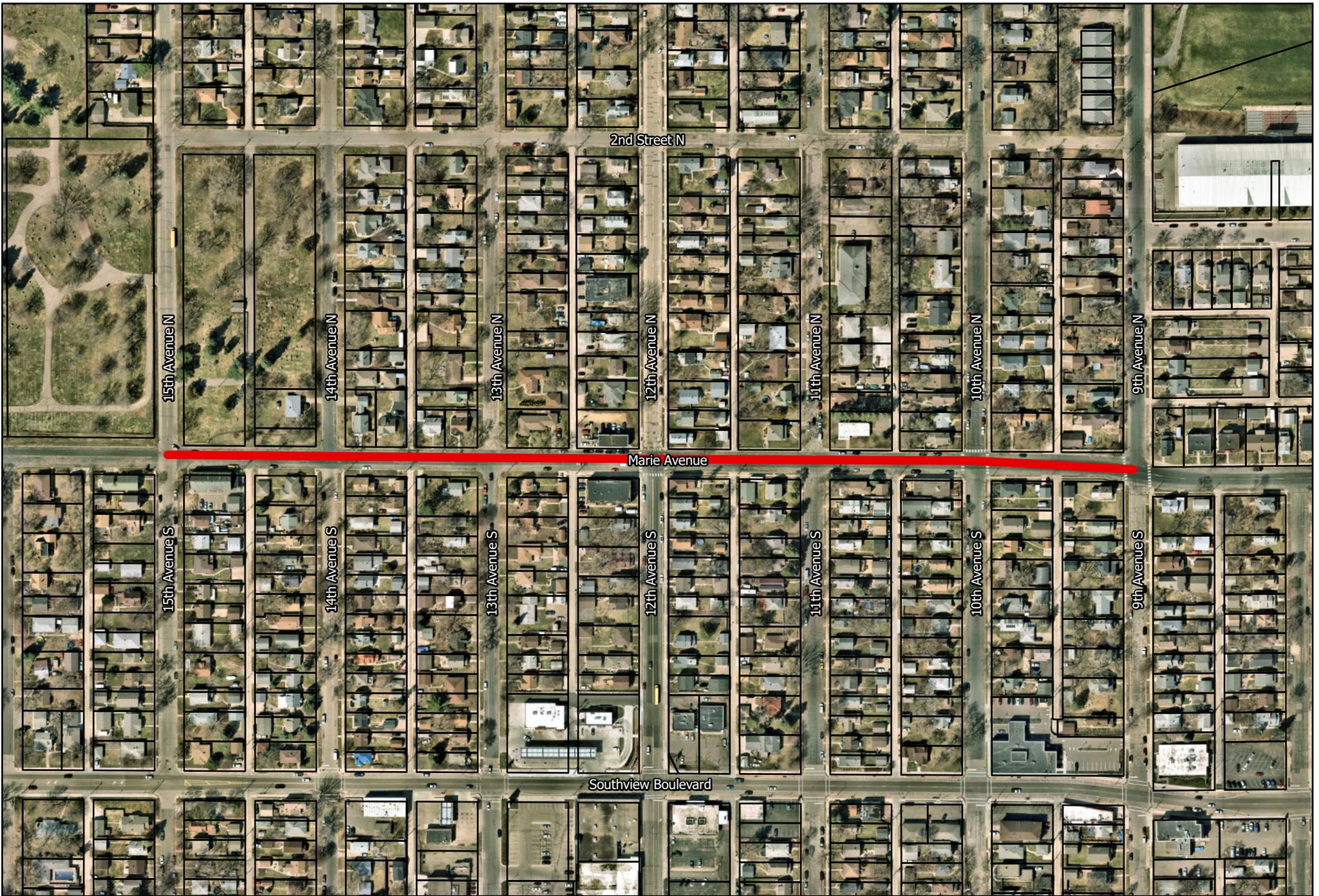
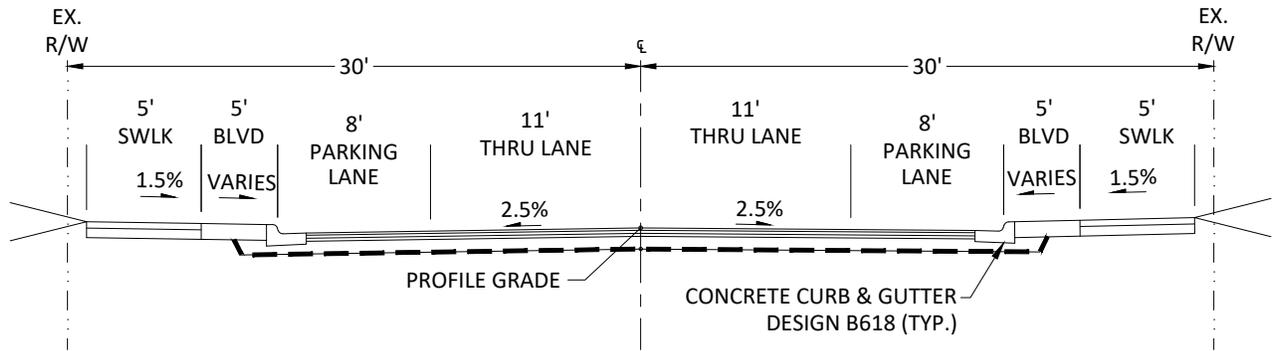
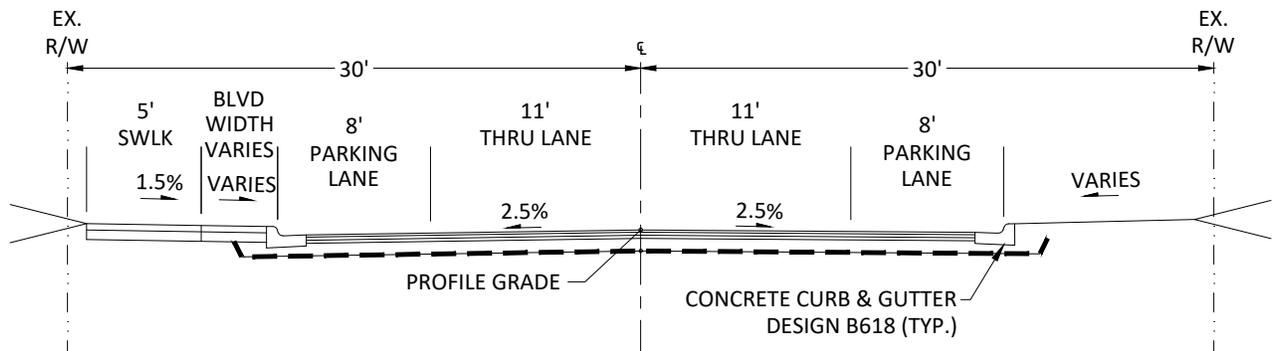


Figure 1- Project Location





MARIE AVENUE - 9TH AVENUE TO 12TH AVENUE
NOT TO SCALE



MARIE AVENUE - 12TH AVENUE TO 15TH AVENUE
NOT TO SCALE



FIGURE 2 - TYPICAL SECTIONS
MARIE AVENUE RECONSTRUCTION PROJECT - PHASE 2
FEASIBILITY REPORT

APPENDIX B
GEOTECHNICAL REPORT

Geotechnical Evaluation Report

Marie Avenue, Phase 2 and Phase 3

Phase 2: From 9th Avenue to 15th Avenue

Phase 3: From 15th Avenue to 21st Avenue

South St. Paul, Minnesota

Prepared for

Bolton & Menk, Inc.

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.

Kevin S. Zalec

Kevin S. Zalec, PE

Senior Manager, Senior Engineer

License Number: 47909

November 24, 2025



Braun Intertec Corporation

Project B2508789



November 24, 2025

Project B2508789

Kevin Kielb, PE
Bolton & Menk, Inc.
7533 Sunwood Drive Northwest, Suite 206
Ramsey, MN 55303

Re: Geotechnical Evaluation
Marie Avenue, Phase 2 and Phase 3
Phase 2: From 9th Avenue to 15th Avenue
Phase 3: From 15th Avenue to 21st Avenue
South St. Paul, Minnesota

Dear Mr. Kielb:

We are pleased to present this geotechnical evaluation report for the Marie Avenue Reconstruction, Phases 2 and 3 in South St. Paul, Minnesota.

Thank you for making Braun Intertec Corporation (Braun Intertec) your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Zach Semlak at 651.788.5071 (zsemlak@braunintertec.com) or Kevin Zalec at 952.995.2223 (kzalec@braunintertec.com).

Sincerely,

Braun Intertec Corporation



Zachary T. Semlak, EIT
Staff Engineer



Kevin S. Zalec, PE
Senior Manager, Senior Engineer

c: Zach Lingl, PE, Bolton & Menk, Inc.
Kelsey Gelhar, PE, City of South St. Paul



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Appendix

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- Log of Boring Sheets ST-1 through ST-12 (13 pages)
- Descriptive Terminology of Soil
- State Aid 10-Ton ESAL Traffic Forecast Calculator (3 pages)
- MnPAVE-Flexible Results

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1.0 Introduction

1.1 Project Description

This geotechnical evaluation report addresses the proposed design and reconstruction of Marie Avenue between 9th Avenue and 21st Avenue in South St. Paul, Minnesota. We understand this project is proposed as a reconstruction that will be broken out in two phases, Phase 2 in 2026 for 9th Avenue to 15th Avenue and Phase 3 in 2027 for 15th Avenue to 21st Avenue. The project will include construction of new bituminous pavements, new concrete curb & gutter, full or spot utility replacements and associated site work.

Table 1-1 provides additional project details regarding the Marie Avenue reconstruction project.

Table 1-1. Project Description

Project Component	Description	Source
Pavement type	Bituminous	Bolton & Menk, Inc. (BMI)
Pavement rehabilitation method	Reconstruction (split in two phases)	City of South St. Paul (City) / BMI
Pavement loads	Marie Avenue: <ul style="list-style-type: none"> ■ From 21st Ave to 15th Ave: 64,000 Bituminous ESALs* (BESALs) ■ From 15th Ave to 12th Ave: 148,000 BESALs ■ From 12th Ave to 9th Ave: 236,000 BESALs 	MnDOT Traffic Count Database System (TCDS) and State Aid ESAL Traffic Forecast Calculator. Assumed the most recent 2025 count for design with a general growth rate of 0.50 percent based on recent declining historical AADTs.
Utilities	Spot utility repairs, up to 10 feet below grade	Assumed
Grade changes	Street grades will be within 1 foot of existing.	Assumed

*Equivalent 18,000-lb single axle loads based on 20-year design.

We have described our understanding of the proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses, and/or recommendations.



1.2 Site Conditions

Currently, Marie Avenue exists a two-lane undivided bituminous paved roadway with associated parking lanes running east and west and surrounded by residential and commercial properties. Current grades range from 829.1 feet at Boring ST-12 to 932.3 feet at Boring ST-3, with general site grades sloping downward from the high point at Boring ST-3 to both the east and west along Marie Avenue.

1.3 Purpose

The purpose of our geotechnical evaluation was to characterize subsurface geologic conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and reconstruction of Marie Avenue.

1.4 Background Information and Reference Documents

We reviewed the following information:

- Geologic map titled C-57, *Surficial Geology of Dakota County, Plate 3*, prepared by the Minnesota Geological Survey, dated 2023.
- Aerial images viewed for Marie Avenue through the publicly available Dakota County GIS software, <https://gis.co.dakota.mn.us/dcgis/>.
- Email correspondence with the Bolton & Menk team regarding project scope.

1.5 Scope of Services

We performed our scope of services for the project in accordance with our Proposal for a Geotechnical Evaluation (Braun Intertec Proposal No. QTB214440), dated September 24, 2025. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and coordinating the clearing for the exploration locations of underground utilities. We selected and staked the new exploration locations. We acquired surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring Location Sketch included in the Appendix shows the approximate locations of the borings.
- Performing 12 standard penetration test (SPT) borings, denoted as ST-1 to ST-12, to depths of about 14 1/2 feet below existing grade. Boring ST-11 was unable to recover samples below a depth of about 4 1/2 feet. An additional boring (ST-11A) was offset and redrilled to obtain samples for classification.
- Performing laboratory testing on select samples to aid in soil classification and engineering analysis.



- Preparing this report containing a boring location sketch, logs of soil borings, a summary of the soils encountered, results of laboratory tests, and recommendations for pavement and utility subgrade preparation and the design of pavements including an assumed R-value.

Our scope of services did not include environmental services or testing and our geotechnical personnel performing this evaluation are not trained to provide environmental services or testing. We can provide environmental services or testing at your request.

2.0 Results

2.1 Geologic Overview

Figure 2-1 depicts the surficial geology for the Marie Avenue reconstruction area (phases 2 and 3). The area is generally underlain by glacial till clays associated with the Cromwell Formation (map unit 'Csm'), and alluvial silts and sands, glacial outwash sands (map unit 'Te').

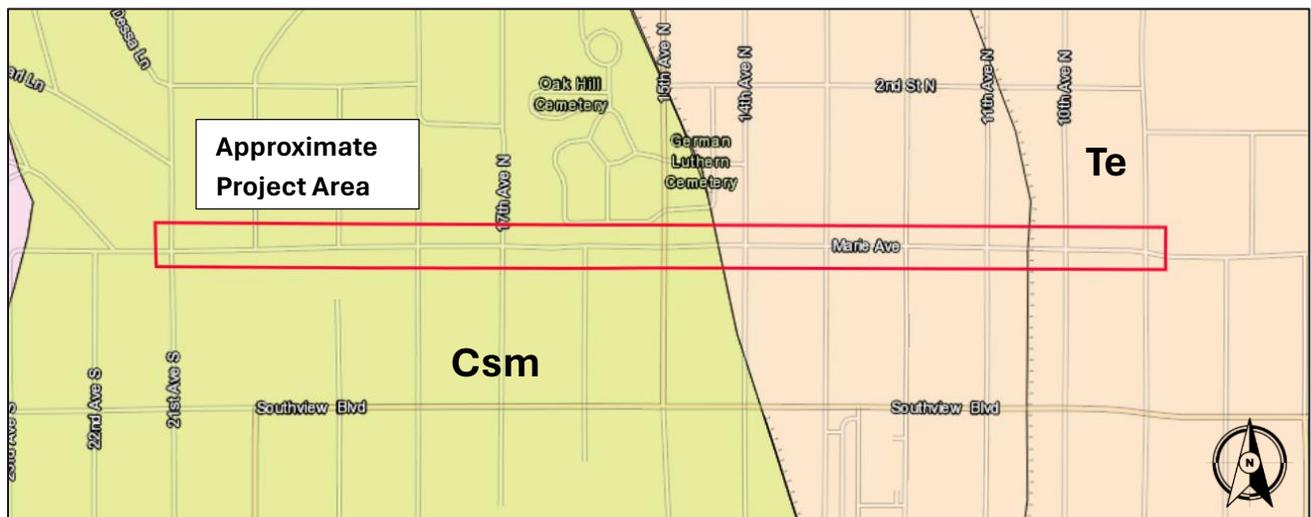


Figure 2-1. Surficial Geology of the Project Area

Figure extracted from Map C-57 from the Minnesota Geological Survey, Dakota County Plate 3.

We based the geologic origins used in this report on the soil types, laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain.



2.2 Boring Results

Table 2-1 provides a summary of the soil boring results, in the general order we encountered the strata. Please refer to the Log of Boring sheets in the Appendix for additional details. The Descriptive Terminology sheets in the Appendix include definitions of abbreviations used in the table below.

Table 2-1. Subsurface Profile Summary

Strata	Soil Type -ASTM Classification	Range of N-values	Commentary and Details
Pavement Section	---	---	<ul style="list-style-type: none"> Overall thickness ranged from about 12 to 22 inches. Bituminous thickness ranged from about 6 to 11 inches. Apparent aggregate base thickness ranged from about 4 to 11 inches.
Fill	SP, SP-SM, SM, SC, CL, CL-ML	4 to 14	<ul style="list-style-type: none"> Extended to depths below grade ranging from about 4 1/2 feet at Boring ST-8 to boring termination depth of Borings ST-2, ST-11/11A and ST-12. Highly variable, soils intermixed. Areas contain lenses of cohesive or fine-grained soils. Variable amounts of gravel; contains cobbles and has the potential to contain boulders. Slightly organic layers encountered within the fill layers in Borings ST-11 and ST-11A. Refer to respective boring logs attached in the Appendix. Boring ST-11 encountered gravel that caused little to no SPT recovery. Area may have high concentrations of gravelly material. Moisture condition generally moist.
Alluvial	CL, ML	5 to 6	<ul style="list-style-type: none"> Encountered in only Boring ST-1. Iron oxide staining encountered in the lean clay layer. Moisture condition generally moist.
Glacial deposits	SP, SP-SM	14 to 16	<ul style="list-style-type: none"> Not encountered in Borings ST-2, ST-11A or ST-12. Intermixed layers of glacial outwash and till. Variable amounts of gravel; may contain cobbles and boulders. N-values generally increased with depth. Moisture condition generally moist.
	SM, SC, CL	11 to 50 for 4 inches	

We did not perform gradation analysis on the apparent aggregate base material encountered as part of the pavement section, in accordance with our scope of work. Therefore, we cannot conclusively determine if the encountered material satisfies a particular specification, and it should not be assumed it is suitable for reuse.

For simplicity in this report, we define fill to mean existing, uncontrolled or undocumented.

2.3 Groundwater

We did not observe groundwater while advancing our borings. Therefore, it appears that groundwater is below the depths explored. Project planning should anticipate seasonal and annual fluctuations of groundwater.



2.4 Laboratory Test Results

We performed various laboratory tests on select soil samples to aid us in our evaluation. The Log of Boring sheets attached in the [Appendix](#) presents the results. [Table 2-2](#) provides the range of results for the moisture contents, percent passing the #200 sieve, organic contents and Atterberg limits.

[Table 2-2](#) present the results of our laboratory tests.

Table 2-2. Laboratory Classification Test Results

Laboratory Test	Range of Results	Comments
Moisture content (MC) tests, % (per ASTM D2216)	Cohesionless soils: 1 to 13 Cohesive soils: 10 to 29	Coarse-grained soils were typically dry to near the soil's probable optimum moisture content. Fine-grained soils were generally moist but anticipated to be at- to slightly-above the probable optimum moisture content.
Organic content (OC) tests, % (per ASTM D2974)	2	Considered slightly organic as classified by MnDOT definitions.
Percent of particles passing the #200 Sieve, % (per ASTM D1140)	1 to 18	USCS Classifications: SP, SP-SM, SM
Atterberg Limits, % (per ASTM D4318)	LL: 17 PL: 12 PI: 5	USCS Classification: CL-ML

3.0 Recommendations

3.1 Design and Construction Discussion

The recommendations provided herein are based on the information provided to us at the time of this report. As the project progresses through final design or elements of the project are adjusted, we should revisit our recommendations.

References to the MnDOT Specification in this report are to Minnesota Department of Transportation (MnDOT) Standard Specification for Construction, 2025 edition.

3.1.1 Reuse of Pavement Materials

From a materials perspective, milling or reclamation of the bituminous pavement materials for reuse as recycled aggregate base or as a component to new pavements is acceptable assuming the produced products meet the applicable project specifications, and these practices are acceptable to the City. Prior to reuse, the project should implement thorough quality control practices, including frequent sieve analyses, asphalt contents and other tests, to achieve desirable characteristics for any reclaimed material processed on site.



3.1.2 Reuse of On-Site Soils

Based on the completed laboratory testing program, the existing non-organic soils (both the naturally deposited soils and fill soils) on-site are generally considered suitable for reuse as engineered fill soil following moisture conditioning and compaction as outlined in this report.

Soils with organic contents of greater than 5 percent by weight should not be reused as pavement subgrade fill anywhere on the project. However, some of the slightly organic soils (organic contents ranging from 2 to 5 percent) may need to be subcut if encountered within the upper 3 feet of pavement subgrades. Organic soils can be stockpiled for use as a component in topsoil dressing, side slopes or in other areas where loads are not supported. Additionally, areas that encountered silt soils should not be reused on the project as the material is susceptible to strength loss.

Any materials to be used as engineered fill should be tested and approved by the engineer prior to placement.

3.1.3 Groundwater

Groundwater was not encountered in any of the borings performed for this project. Water that collects within excavations from rainfall events and/or surface runoff should be removed prior to utility or pavement structure placement and backfilling process occur. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as clays. Where granular soils are encountered at utility or subgrade invert elevations, the design team may want to consider additional means and methods for removing groundwater, as sumps and pumps have the potential to loosen the granular soils at excavated bottoms.

3.1.4 Construction Disturbance

The existing soils clay- and fine-grained soils (such as silty sands and silt layers) encountered on-site are highly susceptible to loss of strength when subjected to repeated construction traffic, additional moisture or disturbance. Disturbance of these soils may cause areas that were previously prepared, or that were suitable for pavement or utility support, to become unstable and require moisture conditioning and compaction. The contractor should use means and methods to limit the disturbance of these soils to the extent practical within the utility trench excavations. If disturbed, there is the potential that an additional subcut of these soils to depths of 2 feet may be necessary to re-establish a stable base for placement of engineered fill. In addition, a layer of stabilizing aggregate may be necessary to provide a stable working surface for construction.

3.1.5 Pavement

We understand that Marie Avenue is proposed to be constructed in two phases for the project. We have provided recommendations in [Section 3.3](#) providing a uniform pavement design across the corridor.

3.2 Site Grading and Subgrade Preparation

3.2.1 Utility Subgrade Stabilization

We anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils or perched water at invert grades, the



unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support. Project design and construction should not place utilities within the 1H:1V oversizing of foundations.

3.2.2 Utility Corrosion Potential

This site is mixed between sandy and clay-based soils. Based on our experience, the soils encountered in the borings are moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

3.2.3 Excavation Oversizing

When removing unsuitable materials below structures or pavements, we recommend the excavation extend outward and downward at a slope of 1H:1V (horizontal:vertical) or flatter.

3.2.4 Excavated Slopes

Based on the borings, we anticipate on-site soils in excavations will consist of both granular and cohesive fill soils. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1 1/2H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, “Excavations and Trenches.” This document states that excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

3.2.5 Engineered Fill Materials and Compaction

We recommend that subgrade fill materials and compaction are in accordance with the MnDOT specifications presented in [Table 3-1](#).

Table 3-1. Engineered Fill Materials and Compaction Specifications*

Material	Material Specification	Compaction Specification
Embankment fill, Utility trench backfill	Common Embankment MnDOT 2106.2.B.1	MnDOT 2106.3.G.1
Pavement subbase	Select Granular Material MnDOT 3149.2.B	MnDOT 2106.3.G.3
Below landscaped surfaces, where subsidence is not a concern	Non-Structural Grading Material MnDOT 2106.1.A.8	MnDOT 2106.3.G.2

* More select soils comprised of coarse sands with < 5% passing #200 sieve may be needed to accommodate work occurring in periods of wet or freezing weather.



We recommend spreading engineered fill in loose lifts of approximately 8 to 12 inches thick for granular soils and for cohesive soils (where encountered), we recommend spreading in loose lifts of approximately 6 to 8 inches thick.

We recommend performing moisture and density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements. The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under foundations during construction.

3.2.6 Subgrade Transitions

To reduce the potential for frost heave where granular and clayey soils are adjacent to each other, we recommend providing a transition between the soil types consisting of a 20:1 (H:V) transition to reduce the effects of abrupt soils changes. We recommend constructing the transition such that the granular backfill material overlays the adjacent non-granular soil backfill. Transitions in the transverse direction, such as at intersections, should be at least 4H:1V. Provide a similar taper for changing subcut depths or materials (i.e. differing in color, soil classification, moisture content, and density).

3.3 Pavement Reconstruction

3.3.1 Pavement Subgrade Preparation

We recommend the following steps for pavement subgrade preparation, understanding the site will have minimal grade changes (less than 1-foot).

1. Remove the existing bituminous pavement on Marie Avenue to expose the underlying subgrades.
2. Excavate the underlying subgrades down to proposed subgrade elevations, removing any organic soils (≥ 5 percent organics by weight), if encountered or present within 5 feet of the top of pavements to reduce the risk of settlement, instability and subsequent effects to roadway performance and maintenance.
3. After utility repairs have occurred and subgrades have been prepared, have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary. A contingency plan should include excavating below proposed subgrade elevations for wet or weak soils.
4. Slope subgrade soils to areas of sand, drain tile, or low points to promote drainage and allow for the removal of accumulating water.
5. Scarify, moisture condition and surface compact the subgrade with at least five passes of a large roller with a minimum drum diameter of 3 1/2 feet.
6. Place pavement engineered fill to grade and compact in accordance with [Section 3.2.5](#) to bottom of pavement section.
7. Test roll the pavement subgrade as described in [Section 3.3.2](#).



3.3.2 Pavement Subgrade Test Roll

After preparing the subgrade as described above and prior to the placement of the aggregate base, we recommend test rolling the subgrade soils in general accordance with MnDOT Specification 2111. We also recommend having a geotechnical representative observe the test roll. Areas that fail the test roll likely indicate soft or weak areas that will require additional soil correction work to support pavements.

The contractor should correct areas that display excessive yielding or rutting during the test roll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, chemical stabilization, and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous or concrete pavement.

3.3.3 Subgrade R-Value

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Given the subgrades encountered, which generally include a mixture of granular soils, fine-grained granular soils, or clayey soils in the upper 5 feet, we recommend using a design R-value of 18 for pavement design on the project. This value represents the more conservative soil type encountered. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve this value.

3.3.4 Design Sections

Table 3-2 provides proposed pavement sections, based on the soils support and traffic loads. This pavement section is designed based on the highest traffic loads reviewed from MnDOT’s Traffic Counts Database System (TCDS) for Marie Avenue.

The pavement sections listed below are adequate according to MnPAVE-Flexible design methodology and its available Monte Carlo simulation.

Table 3-2. Proposed Bituminous Pavement Section

Material	Thickness (inches)	Material	Material Specification
Bituminous wear course	1 1/2	SPWEA240B	MnDOT 2360
Bituminous wear course	2 1/2	SPNWB230B	MnDOT 2360
Aggregate base	8	Class 5 or 6	MnDOT 2211
Sand Subbase	12	Select Granular Material	MnDOT 3149
Approved subgrade	---	---	---

3.3.5 Subgrade Drainage

We recommend installing perforated drainpipes throughout pavement areas at low points, around catch basins, and behind curb in landscaped areas. We also recommend installing drainpipes along pavement



edges where grades promote drainage toward those edge areas. The contractor should place drainpipes in small trenches, extended at least 8 inches below the granular subbase layer, or below the aggregate base material where no subbase is present.

3.3.6 Bituminous Pavement Materials and Compaction

We recommend that the bituminous wear and non-wear courses meet the requirements of Specifications 2360.

We recommend compacting the aggregate base to meet the requirements of MnDOT Specification 2211.3.D.2.c (Penetration Index Method for the dynamic cone penetrometer [DCP]). We recommend compacting bituminous pavements to the specified densities listed in MnDOT Specification at least 92 percent of their maximum theoretical (Rice) density.

3.3.7 Performance and Maintenance

We based the above pavement designs on a 20-year performance life for bituminous. This is the amount of time before we anticipate the pavement will require major rehabilitation. This performance assumes routine maintenance, such as seal coating and crack sealing. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

Many conditions affect the overall performance of the exterior slabs and pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regard to bituminous pavements in particular, it is common to have thermal cracking develop within the first few years of placement and continue throughout the life of the pavement. We recommend developing a regular maintenance plan for filling cracks in exterior slabs and pavements to lessen the potential impacts for cold weather distress due to frost heave or warm weather distress due to wetting and softening of the subgrade.

3.3.8 Miscellaneous Bituminous Recommendations

When placing new pavement next to in-place pavement, we recommend providing a full-depth sawcut to ensure a uniform joint.

We recommend tack coat between all bituminous layers and prior to placing any bituminous mixtures on existing pavement in accordance with MnDOT Specification 2357.

4.0 Procedures

4.1 Penetration Test Borings

We drilled the penetration test borings with a truck-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance with ASTM D1586. The boring logs show the actual sample intervals and corresponding depths.



4.2 Exploration Logs

4.2.1 Log of Boring Sheets

The [Appendix](#) includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials and present the results of penetration resistance tests performed. The logs also present the results of laboratory tests performed on penetration test samples, and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

4.2.2 Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past .

4.3 Material Classification and Testing

4.3.1 Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. The [Appendix](#) includes a chart explaining the classification system we used.

4.3.2 Laboratory Testing

The exploration logs in the [Appendix](#) note most of the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

4.4 Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes or allowed them to remain open for an extended period of observation, as noted on the boring logs.



5.0 Qualifications

5.1 Variations in Subsurface Conditions

5.1.1 Material Strata

We developed our evaluation, analyses, and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation, and thickness, away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may re-evaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

5.1.2 Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

5.2 Continuity of Professional Responsibility

5.2.1 Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

5.2.2 Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.



5.3 Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

5.4 Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.

Appendix

Soil Boring Location Sketch

Log of Boring Sheets ST-1 through ST-12 (13 pages)

Descriptive Terminology of Soil

State Aid 10-Ton ESAL Traffic Forecast Calculator (3 pages)

MnPAVE-Flexible Results



 DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING



75' 0 150'

SCALE: 1"= 150'



Drawing Information

Project No:
B2508789

Drawing No:
B2508789

Drawn By: JAG
Date Drawn: 11/3/25
Checked By: KZ
Last Modified: 11/20/25

Project Information

Marie Avenue -
Phases 2 and 3

Marie Avenue from
9th Avenue to
21st Avenue

South St. Paul,
Minnesota

**Soil Boring
Location Sketch**

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-1	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252785.9	EASTING: 566626.2
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak	SURFACE ELEVATION: 917.6 ft		RIG: 7519	METHOD: 3 1/4" HSA
		SURFACING: Bituminous		WEATHER: Clear	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
915.8		PAVEMENT, 11 inches of bituminous over 10 inches of apparent aggregate base					
1.8		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		6-7-7 (14) 10"		8	P200=17%
913.1		FILL: SILTY SAND (SM), fine to medium-grained, with SILT layers, dark brown, moist	5	3-2-2 (4) 14"			
910.6		SANDY LEAN CLAY (CL), brown, moist, medium, iron oxide staining (ALLUVIUM)		2-2-3 (5) 18"		29	
908.1		SANDY SILT (ML), brown, moist, loose (ALLUVIUM)	10	2-3-3 (6) 18"			
905.1		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist, medium dense (GLACIAL TILL)		6-6-5-5 (11) 8"			
903.1							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-2	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252800.0	EASTING: 566981.5
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 929.2 ft	RIG: 7519	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
927.8		PAVEMENT, 7 inches of bituminous over 8 inches of apparent aggregate base					
927.2		FILL: SILTY SAND (SM), fine to medium-grained, brown, moist		2-2-10 (12)		5	
2.0		FILL: SANDY LEAN CLAY (CL), trace to with Gravel, dark brown, moist		10-17-16 (33)		6	Auger chatter from 5 to 10 feet
		<i>With Gravel begins at 5 feet</i>	5	2"			
				22-25-21 (46)			
				2"			
			10	22-20-21 (41)			
				2"			
914.7				13-15-15-17 (30)			
14.5		END OF BORING	15	16"			Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-3	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252798.1	EASTING: 567315.3
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak	SURFACE ELEVATION: 931.3 ft		RIG: 7519	METHOD: 3 1/4" HSA
		SURFACING: Bituminous		WEATHER: Clear	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
930.0		PAVEMENT, 9 inches of bituminous over 6 inches of apparent aggregate base					
1.3		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		7-8-7 (15) 10"			
			5	7-7-8 (15) 12"			Cobbles at 5 feet
				7-7-8 (15) 12"			
921.8		SILTY SAND (SM), fine to medium-grained, brown, moist, medium dense (GLACIAL TILL)	10	7-7-7 (14) 18"		5	P200=15%
				7-7-9-8 (16) 20"			
916.8		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-4	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252802.0	EASTING: 567567.6
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak	SURFACE ELEVATION: 918.9 ft		RIG: 7519	METHOD: 3 1/4" HSA
		SURFACING: Bituminous		WEATHER: Clear	

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
917.6		PAVEMENT, 9 inches of bituminous over 6 inches of apparent aggregate base					
1.3		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		6-5-5 (10) 0"		5	No recovery, sample grabbed from auger cuttings
914.4		FILL: CLAYEY SAND (SC), fine to medium-grained, with Gravel, brown, moist	5	28-30-34 (64) 0"			Possible cobbles from 4 to 10 feet
911.9		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, with Gravel, brown, moist		32-40-28 (68) 3"			No recovery, sample grabbed from auger cuttings
			10	12-13-15 (28) 3"			
906.4		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, brown, moist (GLACIAL TILL)		1-12-11-13 (23) 20"			
12.5							
904.4							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-5	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252812.1	EASTING: 567990.7
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak	SURFACE ELEVATION: 905.7 ft		RIG: 7519	METHOD: 3 1/4" HSA
		SURFACING: Bituminous		WEATHER: Clear	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
904.5		PAVEMENT, 6 inches of bituminous over 8 inches of apparent aggregate base					
1.2		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist <i>With Clay lenses at 2 1/2 feet</i>		6-6-7 (13) 4"		6	
901.2		FILL: SILTY CLAY (CL-ML), trace Gravel, brown, moist	5	6-6-7 (13) 15"		11	LL=17, PL=12, PI=5
898.7		CLAYEY SAND (SC), fine to medium-grained, trace Gravel, gray, moist, very stiff to hard (GLACIAL TILL)		10-15-15 (30) 18"			
7.0			10	16-20-50/4" (REF) 16"			
893.2		SANDY LEAN CLAY (CL), trace Gravel, gray, moist, very stiff (GLACIAL TILL)		10-13-13-20 (26) 24"			
12.5							
891.2							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-6	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252810.6	EASTING: 568293.3
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 881.9 ft	RIG: 7519	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
880.5		PAVEMENT, 6 inches of bituminous over 10 inches of apparent aggregate base					
1.4		FILL: SILTY SAND (SM), fine to medium-grained, with Gravel, brown, moist		7-10-12 (22) 15"			Cobbles from 2 to 7 feet
			5	12-20-19 (39) 1"			
874.9		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist, loose (GLACIAL OUTWASH)		4-5-4 (9) 18"		2	P200=1%
			10	4-5-4 (9) 18"			
				3-4-3-3 (7) 20"			
867.4		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-7	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252808.4	EASTING: 568655.7
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak	SURFACE ELEVATION: 856.0 ft		RIG: 7519	METHOD: 3 1/4" HSA
		SURFACING: Bituminous		WEATHER: Clear	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
854.7		PAVEMENT, 7 inches of bituminous over 7 inches of apparent aggregate base					
1.3		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		12-13-12 (25)			Cobbles from 4 to 12 feet
854.0		FILL: POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist	5	10-13-24 (37)		3	
2.0				13-17-30 (47)			
			10	17-19-21 (40)			
843.5		SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist, dense (GLACIAL TILL)		14-16-16-22 (32)			Water not observed while drilling.
841.5				16"			
14.5		END OF BORING	15				
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-8	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252806.0	EASTING: 568974.1
South St. Paul, Minnesota				START DATE: 11/13/25	END DATE: 11/13/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 847.0 ft	RIG: 7519	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
846.0		PAVEMENT, 8 inches of bituminous over 4 inches of apparent aggregate base					
1.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		12-10-10 (20) 1"		4	Cobbles from 2 to 14 1/2 feet
842.5		POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, brown, moist, medium dense (GLACIAL OUTWASH)	5	10-11-13 (24) 14"		3	P200=6%
4.5				16-14-12 (26) 14"			
			10	12-10-10 (20) 2"			
832.5				12-14-11-9 (25) 2"			
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-9	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252804.7	EASTING: 569307.4
South St. Paul, Minnesota				START DATE: 11/14/25	END DATE: 11/14/25
DRILLER: J. Tatro	LOGGED BY: Z. Semlak	SURFACE ELEVATION: 840.6 ft		RIG: 7519	METHOD: 3 1/4" HSA
		SURFACING: Bituminous		WEATHER: Clear	

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
839.1		PAVEMENT, 8 inches of bituminous over 10 inches of apparent aggregate base					
1.5		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		6-5-6 (11) 4"			
836.1		FILL: POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist	5	4-3-4 (7) 10"			
4.5		<i>Silt seams from 7 to 12 1/2 feet</i>		4-3-1 (4) 14"		7	P200=18%
			10	4-3-5 (8) 12"			
828.1		POORLY GRADED SAND (SP), fine to medium-grained, trace Gravel, brown, moist, loose (GLACIAL OUTWASH)		5-4-6-4 (10) 4"			
12.5							
826.1							
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-10	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252801.6	EASTING: 569636.8
South St. Paul, Minnesota				START DATE: 11/14/25	END DATE: 11/14/25
DRILLER: S. Kerrigan	LOGGED BY: Z. Semlak		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 834.0 ft	RIG: 7519	METHOD: 3 1/4" HSA			

Elev./ Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
832.6		PAVEMENT, 11 inches of bituminous over 11 inches of apparent aggregate base					
1.4		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		2-5-8 (13) 4"		5	No recovery
			5	6-5-7 (12) 8"			
				5-8-5 (13) 0"			
824.5		POORLY GRADED SAND (SP), fine to coarse-grained, brown, moist, medium dense to loose (GLACIAL OUTWASH)		2-5-7 (12) 14"			
9.5			10	7-5-5-7 (10) 14"			
819.5		END OF BORING	15				Water not observed while drilling.
14.5		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789					BORING: ST-11		
Geotechnical Evaluation					LOCATION: Captured with RTK GPS.		
Marie Avenue, Phases 2 & 3					DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)		
Marie Avenue from 9th Avenue to 21st Avenue					NORTHING: 252799.6	EASTING: 569886.1	
South St. Paul, Minnesota					START DATE: 11/14/25	END DATE: 11/14/25	
DRILLER: S. Kerrigan		LOGGED BY: Z. Semlak		SURFACING: Bituminous		WEATHER: Clear	
SURFACE ELEVATION: 830.7 ft		RIG: 7519		METHOD: 3 1/4" HSA			
Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
829.0		PAVEMENT, 9 1/2 inches of bituminous over 10 inches of apparent aggregate base					Auger chatter from 1 1/2 to 12 feet OC=2%
1.7		FILL: SILTY SAND (SM), fine to medium-grained, slightly organic, dark brown, moist		4-5-4 (9) 14"		12	
826.2		Boring was offset and redrilled as ST-11A	5	4-5-6 (11) 0"			No recovery from 4 1/2 feet to 14 1/2 feet
4.5				6-4-6 (10) 0"			
			10	5-7-6 (13) 0"			
816.2				5-5-4-2 (9) 0"			Water not observed while drilling.
14.5		END OF BORING	15				
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

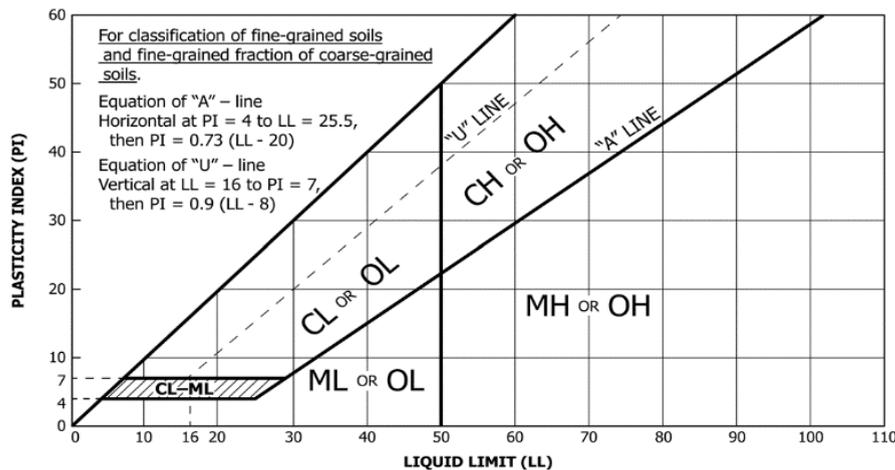
See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2508789				BORING: ST-11A	
Geotechnical Evaluation				LOCATION: Captured with RTK GPS.	
Marie Avenue, Phases 2 & 3				DATUM: NAD 1983 HARN Adj MN Dakota (US Feet)	
Marie Avenue from 9th Avenue to 21st Avenue				NORTHING: 252820.7	EASTING: 569886.8
South St. Paul, Minnesota				START DATE: 11/14/25	END DATE: 11/14/25
DRILLER: S. Kerrigan	LOGGED BY: Z. Semlak		SURFACING: Bituminous		WEATHER: Clear
SURFACE ELEVATION: 830.2 ft	RIG: 7519	METHOD: 3 1/4" HSA			

Elev./Depth ft	Water Level	Description of Materials (Soil-ASTM D2488 or 2487; Rock-USACE EM 1110-1-2908)	Sample	Blows (N-Value) Recovery	q _p tsf	MC %	Tests or Remarks
829.2		PAVEMENT, 7 inches of bituminous over 7 inches of apparent aggregate base					
1.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, dark brown, moist		10-9-11 (20) 14"			
			5	6-7-7 (14) 0"			No recovery, sample grabbed from auger cuttings
		<i>Slightly organic at 7 1/2 feet</i>		7-6-5 (11) 14"		13	OC=2%
			10	5-5-6 (11) 0"			No recovery, sample grabbed from auger cuttings
815.7				3-5-5-6 (10) 2"			
14.5		END OF BORING	15				Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			20				
			25				
			30				

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained on No. 4 sieve)	Clean Gravels (Less than 5% fines ^C)	$C_u \geq 4$ and $1 \leq C_c \leq 3^D$	GW	Well-graded gravel ^E	
		Gravels with Fines (More than 12% fines ^C)	$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$) ^D	GP	Poorly graded gravel ^E	
		Sands (50% or more coarse fraction passes No. 4 sieve)	Clean Sands (Less than 5% fines ^H)	$C_u \geq 6$ and $1 \leq C_c \leq 3^D$	SW	Well-graded sand ^I
			Sands with Fines (More than 12% fines ^H)	$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$) ^D	SP	Poorly graded sand ^I
	Fine-grained Soils (50% or more passes the No. 200 sieve)	Silt and Clays (Liquid limit less than 50)	Inorganic	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{KLM}
			Organic	Liquid Limit – oven dried Liquid Limit – not dried < 0.75	OL	Organic clay ^{KLMN} Organic silt ^{KLM O}
		Silt and Clays (Liquid limit 50 or more)	Inorganic	PI plots on or above "A" line	CH	Fat clay ^{KLM}
			Organic	Liquid Limit – oven dried Liquid Limit – not dried < 0.75	OH	Organic clay ^{KLMP} Organic silt ^{KLMQ}
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat	

- A. Based on the material passing the 3-inch (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. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
 E. If soil contains $\geq 15\%$ 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 $\geq 15\%$ gravel, add "with gravel" to group name.
 J. If Atterberg limits plot in hatched area, soil is 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 $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
 M. If soil contains $\geq 30\%$ 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.



Laboratory Tests			
DD	Dry density, pcf	q_p	Pocket penetrometer strength, tsf
WD	Wet density, pcf	q_u	Unconfined compression test, tsf
P200	% Passing #200 sieve	LL	Liquid limit
MC	Moisture content, %	PL	Plastic limit
OC	Organic content, %	PI	Plasticity index

Particle Size Identification

- Boulders..... over 12"
 Cobbles..... 3" to 12"
 Gravel
 Coarse..... 3/4" to 3" (19.00 mm to 75.00 mm)
 Fine..... No. 4 to 3/4" (4.75 mm to 19.00 mm)
 Sand
 Coarse..... No. 10 to No. 4 (2.00 mm to 4.75 mm)
 Medium..... No. 40 to No. 10 (0.425 mm to 2.00 mm)
 Fine..... No. 200 to No. 40 (0.075 mm to 0.425 mm)
 Silt..... No. 200 (0.075 mm) to .005 mm
 Clay..... < .005 mm

Relative Proportions^{L,M}

- trace..... 0 to 5%
 little..... 6 to 14%
 with..... $\geq 15\%$

Inclusion Thicknesses

- lens..... 0 to 1/8"
 seam..... 1/8" to 1"
 layer..... over 1"

Apparent Relative Density of Cohesionless Soils

- Very loose 0 to 4 BPF
 Loose 5 to 10 BPF
 Medium dense..... 11 to 30 BPF
 Dense..... 31 to 50 BPF
 Very dense..... over 50 BPF

Consistency of Cohesive Soils Per Foot **Approximate Unconfined Compressive Strength**

- Very soft..... 0 to 1 BPF..... < 0.25 tsf
 Soft..... 2 to 4 BPF..... 0.25 to 0.5 tsf
 Medium..... 5 to 8 BPF 0.5 to 1 tsf
 Stiff..... 9 to 15 BPF..... 1 to 2 tsf
 Very Stiff..... 16 to 30 BPF..... 2 to 4 tsf
 Hard..... over 30 BPF..... > 4 tsf

Moisture Content:

- Dry:** Absence of moisture, dusty, dry to the touch.
Moist: Damp but no visible water.
Wet: Visible free water, usually soil is below water table.

Drilling Notes:

Blows/N-value: Blows indicate the driving resistance recorded for each 6-inch interval. The reported N-value is the blows per foot recorded by summing the second and third interval in accordance with the Standard Penetration Test, ASTM D1586.

Partial Penetration: If the sampler could not be driven through a full 6-inch interval, the number of blows for that partial penetration is shown as #/x" (i.e. 50/2"). The N-value is reported as "REF" indicating refusal.

Recovery: Indicates the inches of sample recovered from the sampled interval. For a standard penetration test, full recovery is 18", and is 24" for a thinwall/shelby tube sample.

WOH: Indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WOR: Indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

Water Level: Indicates the water level measured by the drillers either while drilling (), at the end of drilling (), or at some time after drilling ().

Sample Symbols

	Standard Penetration Test		Rock Core
	Modified California (MC)		Thinwall (TW)/Shelby Tube (SH)
	Auger		Texas Cone Penetrometer
	Grab Sample		Dynamic Cone Penetrometer

State Aid 10 Ton ESAL Traffic Forecast Calculator

This ESAL calculator is for use with **default Heavy Commercial Traffic values**; click "User Defined Traffic Values" sheet below if you wish to enter your own Heavy Commercial Traffic values.

Instructions: All yellow boxes require an input value.

Dropdown choices are provided for Base Year (C18), Number of Lanes (C19), and Urban or Rural (C21).

You must click on cells C18, C19, and C21 to access the dropdown choices.

General Information

Date	11/14/2025	
Forecast Performed by	Braun Intertec Corporation	
Name of County or City	South St. Paul	
Project Number	B2508789	
Project Description	Reconstruction	
Route Number	MSAS 104 (Marie Avenue)	
Base Year (i.e. opening to traffic)	2027	
Number of Lanes (total both directions)	2 = typical 2 lane	
Current AADT	829	
Urban or Rural	Urban	
Historical AADT (enter a minimum of two years)	Year	AADT
Enter oldest traffic data here	2016	1,400
Enter second oldest traffic data here	2018	1,433
Enter third oldest traffic data here	2022	724
Enter fourth oldest traffic data here	2025	829
Base Year AADT	2027	550
20-Year AADT	2047	605
35-Year AADT	2062	646
Growth Rate	0.50%	

Vehicle Type	Vehicle Class %	ESAL Factors	
		Flexible	Rigid
2AX-6TIRE SU	1.38%	0.25	0.24
3AX+SU	0.06%	0.58	0.85
3AX TST	0.10%	0.39	0.37
4AX TST	0.19%	0.51	0.53
5AX+TST	1.48%	1.13	1.89
TR TR, BUSES	0.67%	0.57	0.74
TWIN TRAILERS	0.00%	2.40	2.33
Total	3.86%	NA	NA

20-Year Flexible Forecast (10 Ton) =	64,000
20-Year Rigid Forecast (10 Ton) =	94,000
35-Year Flexible Forecast (10 Ton) =	113,000
35-Year Rigid Forecast (10 Ton) =	167,000

Note: This ESAL Calculator provides reasonable estimation of ESAL's based on accurate AADT values. It is limited to an AADT value of 20,000. For roadways exceeding an AADT of 20,000, it is recommended to use the MnDOT ESAL Forecasting Tool found on MnDOT's Pavement Design web page at:

<http://www.dot.state.mn.us/materials/pvmtdesign/software.html>

State Aid 10 Ton ESAL Traffic Forecast Calculator

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Instructions: All yellow boxes require an input value.

Dropdown choices are provided for Base Year (C18), Number of Lanes (C19), and Urban or Rural (C21).

You must click on cells C18, C19, and C21 to access the dropdown choices.

General Information

Date	11/14/2025	
Forecast Performed by	Braun Intertec Corporation	
Name of County or City	South St. Paul	
Project Number	B2508789	
Project Description	Reconstruction - Phase 3	
Route Number	MSAS 104 (Marie Avenue)	
Base Year (i.e. opening to traffic)	2028	
Number of Lanes (total both directions)	2 = typical 2 lane	
Current AADT	1,764	
Urban or Rural	Urban	
Historical AADT (enter a minimum of two years)	Year	AADT
Enter oldest traffic data here	2016	2,800
Enter second oldest traffic data here	2018	2,867
Enter third oldest traffic data here	2022	1,873
Enter fourth oldest traffic data here	2025	1,764
Base Year AADT	2028	1,260
20-Year AADT	2048	1,386
35-Year AADT	2063	1,481
Growth Rate	0.50%	

Vehicle Type	Vehicle Class %	ESAL Factors	
		Flexible	Rigid
2AX-6TIRE SU	1.39%	0.25	0.24
3AX+SU	0.06%	0.58	0.85
3AX TST	0.10%	0.39	0.37
4AX TST	0.19%	0.51	0.53
5AX+TST	1.51%	1.13	1.89
TR TR, BUSES	0.66%	0.57	0.74
TWIN TRAILERS	0.00%	2.40	2.33
Total	3.91%	NA	NA

20-Year Flexible Forecast (10 Ton) =	148,000
20-Year Rigid Forecast (10 Ton) =	220,000
35-Year Flexible Forecast (10 Ton) =	262,000
35-Year Rigid Forecast (10 Ton) =	390,000

Note: This ESAL Calculator provides reasonable estimation of ESAL's based on accurate AADT values. It is limited to an AADT value of 20,000. For roadways exceeding an AADT of 20,000, it is recommended to use the MnDOT ESAL Forecasting Tool found on MnDOT's Pavement Design web page at:

<http://www.dot.state.mn.us/materials/pvmtdesign/software.html>

State Aid 10 Ton ESAL Traffic Forecast Calculator

This ESAL calculator is for use with **default Heavy Commercial Traffic values**; click "User Defined Traffic Values" sheet below if you wish to enter your own Heavy Commercial Traffic values.

Instructions: All yellow boxes require an input value.

Dropdown choices are provided for Base Year (C18), Number of Lanes (C19), and Urban or Rural (C21).

You must click on cells C18, C19, and C21 to access the dropdown choices.

General Information

Date	November 17, 2025	
Forecast Performed by	Braun Intertec Corporation	
Name of County or City	South St. Paul	
Project Number	B2508789	
Project Description	Reconstruction	
Route Number	MSAS 104 (Marie Avenue)	
Base Year (i.e. opening to traffic)	2028	
Number of Lanes (total both directions)	2 = typical 2 lane	
Current AADT	2,475	
Urban or Rural	Urban	
Historical AADT (enter a minimum of two years)	Year	AADT
Enter oldest traffic data here	2016	3,700
Enter second oldest traffic data here	2018	3,789
Enter third oldest traffic data here	2022	2,816
Enter fourth oldest traffic data here	2025	2,475
Base Year AADT	2028	1,990
20-Year AADT	2048	2,189
35-Year AADT	2063	2,338
Growth Rate	0.50%	

Vehicle Type	Vehicle Class %	ESAL Factors	
		Flexible	Rigid
2AX-6TIRE SU	1.39%	0.25	0.24
3AX+SU	0.07%	0.58	0.85
3AX TST	0.10%	0.39	0.37
4AX TST	0.20%	0.51	0.53
5AX+TST	1.53%	1.13	1.89
TR TR, BUSES	0.66%	0.57	0.74
TWIN TRAILERS	0.00%	2.40	2.33
Total	3.94%	NA	NA

20-Year Flexible Forecast (10 Ton) =	236,000
20-Year Rigid Forecast (10 Ton) =	351,000
35-Year Flexible Forecast (10 Ton) =	419,000
35-Year Rigid Forecast (10 Ton) =	623,000

Note: This ESAL Calculator provides reasonable estimation of ESAL's based on accurate AADT values. It is limited to an AADT value of 20,000. For roadways exceeding an AADT of 20,000, it is recommended to use the MnDOT ESAL Forecasting Tool found on MnDOT's Pavement Design web page at:

<http://www.dot.state.mn.us/materials/pvmtdesign/software.html>

MnPAVE 7.106 Design Summary

Hot-Mix Asphalt

MnPAVE File: MnPAVE B2508789 - Marie Avenue.mp7

20-yr Reliability: ^{fatigue} **100%** ^{rutting} **100%** (85% recommended) 5,000 cycles

Project Information

District: Metro

County: Dakota

City: South St. Paul

Project No.: B2508789

Route: Marie Avenue

Ref. Post: 21st Ave to 9th Ave

Letting Date: 11/17/2025

Designer: Bolton & Menk, Inc.

Soils Engineer: Braun Intertec Corporation

Climate Information

Seasons: 5

Location: 44° 42.92' Latitude, 93° 3.87' Longitude

Structural Information

Layer	Type	Subtype	Thickness, in.
1a	Hot-Mix Asphalt	B - PG58S-28, 5% Pb, Size A	1.50
1b		B - PG58S-28, 5% Pb, Size B	2.50
2	Aggregate Base	Class 5	8.00
3	Aggregate Subbase	Select Granular	12.00
4	Engineered Soil	SaL(sp) R5	6.00
5	Undisturbed Soil	Sandy Loam, sp	

Traffic Information

Speed: 35 mph

Growth Rate: 1%

Forecast #:

Design Flexible ESALs: 236,000

Notes

APPENDIX C
OPINION OF PROBABLE COST

OPINION OF PROBABLE COST

MARIE AVENUE RECONSTRUCTION PROJECT PHASE 2 (9TH AVENUE TO 15TH AVENUE)

ITEM NO.	MNDOT SPEC. NO.	ITEM DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL ESTIMATED PROJECT COST
1	2021.501	MOBILIZATION	LUMP SUM	\$50,000.00	1	\$50,000.00
2	2101.502	CLEARING	EACH	\$500.00	3	\$1,500.00
3	2101.502	GRUBBING	EACH	\$600.00	3	\$1,800.00
4	2104.502	REMOVE SIGN	EACH	\$100.00	22	\$2,200.00
5	2104.503	SAWING CONCRETE PAVEMENT (FULL DEPTH)	LIN FT	\$7.50	375	\$2,812.50
6	2104.503	SAWING BIT PAVEMENT (FULL DEPTH)	LIN FT	\$5.50	400	\$2,200.00
7	2104.503	REMOVE CURB AND GUTTER	LIN FT	\$5.00	3840	\$19,200.00
8	2104.503	REMOVE RETAINING WALL	LIN FT	\$75.00	200	\$15,000.00
9	2104.503	SALVAGE FENCE	LIN FT	\$75.00	125	\$9,375.00
10	2104.504	REMOVE CONCRETE DRIVEWAY PAVEMENT	SQ YD	\$15.00	500	\$7,500.00
11	2104.504	REMOVE BITUMINOUS DRIVEWAY PAVEMENT	SQ YD	\$8.00	50	\$400.00
12	2104.504	REMOVE BITUMINOUS PAVEMENT	SQ YD	\$4.00	9000	\$36,000.00
13	2104.518	REMOVE CONCRETE WALK	SQ FT	\$4.00	8500	\$34,000.00
14	2106.507	EXCAVATION - COMMON	CU YD	\$24.00	2488.89	\$59,733.33
15	2106.507	EXCAVATION - SUBGRADE	CU YD	\$24.00	2488.89	\$59,733.33
16	2106.507	SELECT GRANULAR EMBANKMENT (CV)	CU YD	\$24.00	2488.89	\$59,733.33
17	2106.507	COMMON EMBANKMENT (CV)	CU YD	\$28.00	125	\$3,500.00
18	2106.601	DEWATERING	LUMP SUM	\$5,000.00	1	\$5,000.00
19	2111.519	TEST ROLLING	ROAD ST	\$50.00	19.2	\$960.00
20	2112.519	SUBGRADE PREPARATION	ROAD ST	\$500.00	19.2	\$9,600.00
21	2123.61	STREET SWEEPER (WITH PICKUP BROOM)	HOUR	\$200.00	40	\$8,000.00
22	2123.61	1.5 CU YD BACKHOE	HOUR	\$350.00	5	\$1,750.00
23	2130.523	WATER	MGAL	\$75.00	25	\$1,875.00
24	2211.507	AGGREGATE BASE (CV) CLASS 5 (STREET)	CU YD	\$45.00	1742.2	\$78,400.00
25	2211.507	AGGREGATE BASE (CV) CLASS 5 (SIDEWALK)	CU YD	\$45.00	278.1	\$12,512.50
26	2331.603	JOINT ADHESIVE	LIN FT	\$2.00	3840	\$7,680.00
27	2360.504	TYPE SP 9.5 WEAR CRS MIX(3,C)3.0" THICK	SQ YD	\$45.00	57.5	\$2,587.50
28	2360.509	TYPE SP 12.5 WEARING COURSE MIX (3,C)	TON	\$88.00	696.08	\$61,255.04
29	2360.509	TYPE SP 12.5 NON WEAR COURSE MIX (3;C)	TON	\$84.00	1392.16	\$116,941.44
30	2521.518	4" CONCRETE WALK	SQ FT	\$8.00	12200	\$97,600.00
31	2521.518	6" CONCRETE WALK	SQ FT	\$17.00	2100	\$35,700.00
32	2531.503	CONCRETE CURB & GUTTER DESIGN B618	LIN FT	\$22.00	3840	\$84,480.00
33	2531.503	CONCRETE CURB DESIGN V6	LIN FT	\$48.00	1500	\$72,000.00
34	2531.504	6" CONCRETE DRIVEWAY PAVEMENT	SQ YD	\$90.00	700	\$63,000.00
35	2531.618	TRUNCATED DOMES	SQ FT	\$65.00	210	\$13,650.00
36	2557.603	INSTALL FENCE	LIN FT	\$150.00	125	\$18,750.00
37	2563.601	TRAFFIC CONTROL	LUMP SUM	\$25,000.00	1	\$25,000.00
38	2564.502	INSTALL SIGN TYPE C	EACH	\$150.00	15	\$2,250.00
39	2571.502	DECIDUOUS TREE 2" CAL B&B	EACH	\$750.00	30	\$22,500.00
40	2573.501	STABILIZED CONSTRUCTION EXIT	LUMP SUM	\$1,500.00	1	\$1,500.00
41	2573.501	EROSION CONTROL SUPERVISOR	LUMP SUM	\$3,500.00	1	\$3,500.00
42	2573.501	STORM DRAIN INLET PROTECTION	EACH	\$150.00	30	\$4,500.00
43	2573.503	SILT FENCE, TYPE MS	LIN FT	\$3.00	1920	\$5,760.00
44	2574.507	COMMON TOPSOIL BORROW	CU YD	\$45.00	426.67	\$19,200.00
45	2575.504	SODDING TYPE LAWN	SQ YD	\$10.00	2560	\$25,600.00
46	2582.503	4" SOLID LINE MULTI COMP	LIN FT	\$2.00	3840	\$7,680.00
47	2582.503	4" DBLE SOLID LINE MULTI COMP	LIN FT	\$2.00	1920	\$3,840.00
48	2582.518	CROSSWALK MULTI COMP	SQ FT	\$12.00	2100	\$25,200.00
49	2104.502	REMOVE CASTING	EACH	\$150.00	9	\$1,350.00
50	2503.603	LINING SANITARY SEWER MANHOLE - 4' DIA.	LIN FT	\$530.00	90	\$47,700.00
51	2506.502	CASTING ASSEMBLY (SANITARY)	EACH	\$1,500.00	9	\$13,500.00
52	2104.502	REMOVE GATE VALVE & BOX	EACH	\$500.00	14	\$7,000.00
53	2104.502	REMOVE CURB STOP & BOX	EACH	\$150.00	14	\$2,100.00

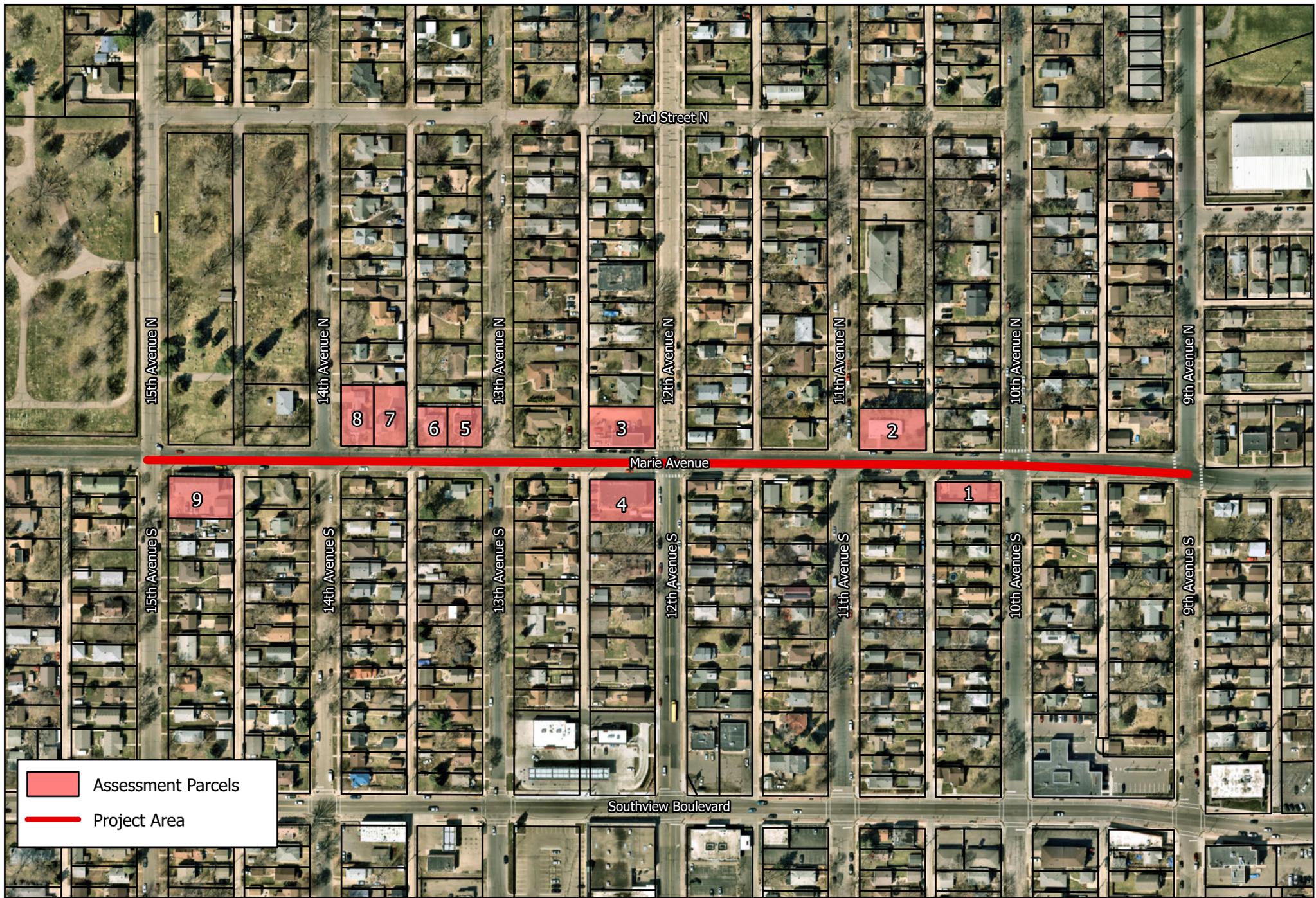
54	2104.502	REMOVE HYDRANT	EACH	\$800.00	6	\$4,800.00
55	2104.503	REMOVE WATER MAIN	LIN FT	\$15.00	2000	\$30,000.00
56	2104.503	REMOVE WATER SERVICE PIPE	LIN FT	\$10.00	420	\$4,200.00
57	2502.604	4" INSULATION	SQ YD	\$50.00	50	\$2,500.00
58	2504.601	TEMPORARY WATER SERVICE	LUMP SUM	\$27,000.00	1	\$27,000.00
59	2504.602	CONNECT TO EXISTING WATER MAIN	EACH	\$2,250.00	13	\$29,250.00
60	2504.602	CONNECT TO EXISTING WATER SERVICE	EACH	\$800.00	14	\$11,200.00
61	2504.602	HYDRANT	EACH	\$7,000.00	7	\$49,000.00
62	2504.602	1" CORPORATION STOP	EACH	\$750.00	14	\$10,500.00
63	2504.602	6" GATE VALVE & BOX	EACH	\$3,600.00	7	\$25,200.00
64	2504.602	8" GATE VALVE & BOX	EACH	\$4,500.00	14	\$63,000.00
65	2504.602	1" CURB STOP & BOX	EACH	\$800.00	14	\$11,200.00
66	2504.603	1" TYPE K COPPER PIPE	EACH	\$65.00	420	\$27,300.00
67	2504.603	6" WATERMAIN DUCTILE IRON CL 52	LIN FT	\$90.00	84	\$7,560.00
68	2504.603	8" WATERMAIN DUCTILE IRON CL 52	LIN FT	\$110.00	2000	\$220,000.00
69	2504.608	DUCTILE IRON FITTINGS	POUND	\$20.00	2000	\$40,000.00
70	2104.502	REMOVE DRAINAGE STRUCTURE	EACH	\$450.00	30	\$13,500.00
71	2104.503	REMOVE SEWER PIPE (STORM)	LIN FT	\$16.00	1051	\$16,816.00
72	2503.503	12" RC PIPE SEWER DES 3006 CL V	LIN FT	\$72.00	700	\$50,400.00
73	2503.503	15" RC PIPE SEWER DES 3006 CL V	LIN FT	\$78.00	500	\$39,000.00
74	2503.602	CONNECT TO EXISTING STORM SEWER	EACH	\$1,500.00	3	\$4,500.00
75	2503.602	CONNECT INTO EXISTING DRAINAGE STRUCTURE	EACH	\$1,500.00	15	\$22,500.00
76	2506.502	CASTING ASSEMBLY	EACH	\$1,500.00	8	\$12,000.00
77	2506.503	CONST DRAINAGE STRUCTURE DES 48-4020	LIN FT	\$675.00	30	\$20,250.00
78	2506.503	CONST DRAINAGE STRUCTURE DES 60-4020	LIN FT	\$950.00	10	\$9,500.00
79	2506.602	CONST DRAINAGE STRUCTURE DESIGN SPEC 1	EACH	\$3,200.00	18	\$57,600.00
80	2545.502	LIGHTING UNIT TYPE SPECIAL 1	EACH	\$5,100.00	20	\$102,000.00
81	2545.502	LIGHTING UNIT TYPE SPECIAL 2	EACH	\$6,750.00	6	\$40,500.00
82	2545.502	LIGHT FOUNDATION DESIGN E MODIFIED	EACH	\$1,500.00	26	\$39,000.00
83	2545.502	SERVICE CABINET	EACH	\$9,000.00	1	\$9,000.00
84	2545.502	EQUIPMENT PAD B (MOD)	EACH	\$2,000.00	1	\$2,000.00
85	2545.502	HANDHOLE	EACH	\$2,000.00	4	\$8,000.00
86	2565.603	2" NON-METALLIC CONDUIT	LIN FT	\$8.00	2208	\$17,664.00
87	2545.503	UNDERGROUND WIRE 1/C 6 AWG	LIN FT	\$2.00	2208	\$4,416.00
CONSTRUCTION TOTAL:						\$2,305,965.00
CONTINGENCY (10%):						\$230,597.00
SUBTOTAL:						\$2,536,562.00
INDIRECT (10%):						\$253,656.00
TOTAL:						\$2,790,218.00

APPENDIX D
PRELIMINARY ASSESSMENT ROLL

Preliminary Assessment Roll
Marie Avenue Reconstruction Project - Phase 2

2026 Reconstruction Assessment Rate (\$/LF): \$94.84 /LF

No.	Parcel ID	Address	Assessable Front Footage	Assessment Amount
1	364880002010	1001 MARIE AVE	124.22	\$11,781.02
2	362610002171	1020 MARIE AVE	126	\$11,949.84
3	361780000150	101 12TH AVE N	126.31	\$11,979.24
4	364880004020	1201 MARIE AVE	124.22	\$11,781.02
5	364740008150	1304 MARIE AVE	66.32	\$6,289.79
6	364740008151	1308 MARIE AVE	58	\$5,500.72
7	364740008181	1312 MARIE AVE	62.15	\$5,894.31
8	364740008180	1316 MARIE AVE	62.15	\$5,894.31
9	368390002300	101 15TH AVE S	124.30	\$11,788.61
TOTAL:				\$82,858.86



 Assessment Parcels
 Project Area



Preliminary Assessment Map

Marie Avenue Phase 2 Reconstruction Project
South St. Paul, MN

