



Feasibility Report

2025 Pavement Management Program Falcon Woods & Northome Pavement Management Project Project FH 25-01

Autumn Street, from Roselawn Avenue to Roselawn Avenue
Prior Avenue N, from Autumn Street to Howell Street North
Summer Street, from Moore Street to Howell Street N
Moore Street, from Summer Street to Garden Avenue
Howell Street N, from Summer Street to Garden Avenue
Garden Avenue, from Moore Street to Howell Street N
California Ave W, from Arona Street to Hamline Ave N
Idaho Ave W, from Snelling Ave N to Hamline Ave N
Iowa Ave W, from Curtis Field Park to Hamline Ave N

Prepared by: Erik Henricksen
City Engineer
City of Falcon Heights

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.

_____, P.E.
Licensed No. 59414

EXECUTIVE SUMMARY

This feasibility report has been prepared for the 2025 Pavement Management Project, FH 25-01. The project was initiated by council/staff as part of the City's Pavement Management Program. This report examines the proposed project including necessity, funding, estimated cost, cost effectiveness and overall feasibility of the project. A map showing the street locations can be found on Page 3.

Scope of Work

Falcon Woods Neighborhood (Full Depth Reclamation)

The Falcon Woods neighborhood, consisting of Autumn Street, Prior Avenue N, Summer Street, Moore Street, Howell Street N, and Garden Avenue, is proposed for pavement reclamation to address deficiencies in the pavement and base section of the roadways. This area is proposed for spot curb replacement, spot utility improvements, repair to select storm sewer manholes and catch basins, trail connection rehabilitation, and minor work in stormwater best management practices (BMP).

Northome Neighborhood (Full Depth Reclamation)

The Northome neighborhood, consisting of California Ave W, Idaho Ave W, and Iowa Ave W is also proposed for pavement reclamation to address deficiencies in the pavement and base section of the roadways. Spot curb replacement and repair to select sanitary sewer manholes are also proposed.

Project Cost

The total project cost is estimated to be \$2,030,500; with \$1,099,000 for the Falcon Woods Neighborhood and \$931,500 for the Northome Neighborhood. This also includes contingencies and overhead costs. Funding for the project will be provided through assessments from the benefitting properties, utility funds, street infrastructure funds, and Municipal State Aid (MSA) funds. A summary of the estimated project costs and funding sources by area are as follows:

Falcon Woods Neighborhood

Full Depth Reclamation Costs:	\$870,000
Storm Sewer Costs:	\$155,000
Sanitary Sewer Costs:	\$ 54,000
Trail Rehabilitations:	\$ 20,000

Funding:

Approximated Assessments:	\$348,000
Street Fund:	\$271,000
Municipal State Aid:	\$271,000
Storm Sewer Fund:	\$155,000
Sanitary Sewer Fund:	\$ 54,000

Northome Neighborhood

Full Depth Reclamation Costs:	\$915,000
Storm Sewer Costs:	\$ 0
Sanitary Sewer Costs:	\$ 16,500

Funding:

Approximated Assessments:	\$297,000
Street Fund:	\$309,000
Municipal State Aid:	\$309,000
Storm Sewer Fund:	\$ 0
Sanitary Sewer Fund:	\$ 16,500

Project Schedule

If this project is approved, the proposed project schedule is shown below. Council Action items are noted with a "CC":

CC Receive Feasibility Report and Set Improvement Hearing	December 11, 2024
Neighborhood Meeting	January, 2025
CC Improvement Hearing, Order Improvement, and Authorize Preparation of Plans & Specifications	January 22, 2025
CC Approve Plans & Specifications, and Order Advertisement for Bid	February 2025
Bid Opening	February 2025
CC Award Contract	March 2025
Construction Start	Summer 2025
Substantial Completion	Fall 2025
CC Set Assessment Hearing	October 2025
CC Assessment Hearing	October 2025

Recommendation

Based on the data within this report, the proposed 2025 Pavement Management Project, FH 25-01, is feasible, necessary, cost-effective and will benefit the City of Falcon Heights.



STREETS

Existing Conditions

Falcon Woods

The approximately 1.1 miles of streets in the Falcon Woods neighborhood were originally paved between 1960s and 1980s and the 1.2 miles of streets in the Northome neighborhood were originally paved between the 1940s and 1950s. The last time these street networks experienced substantial maintenance was in 2010 and 2011 when the streets underwent a sealcoat; which is a thin layer of aggregate placed over oil to help extend the life of the streets. All streets have an urban design with concrete curb and gutter and stormwater systems to convey drainage.

Autumn St, Prior Ave N, Summer St, Moore St, Garden Ave and Howell St N (Falcon Woods) are residential streets. They are 31 feet wide, with permitted parking allowed on both sides. The speed limit for these streets is 20 mph and staff are not aware of a speeding issue, nor have they received residents' comments about speeds. California Ave W, Idaho Ave W, and Iowa Ave W (Northome) are also residential streets. They are 31 feet wide, with parking allowed on both sides other than during the State Fair. The speed limit for these streets is 20 mph. Staff have received outreach from residents in this neighborhood regarding speeding along streets abutting the project area, such as Hoyt Ave to the south and Arona St, both outside the project limits. Neither project area has any striping or pavement markings that will be impacted by the project.

Because the streets being rehabilitated in both project areas are not official Municipal State Aid (MSA) routes, MSA traffic counts are not available. Falcon Woods has ingress/egress only from Roselawn Ave and experiences no cut-through traffic or other trip generators other than single family detached homes, thus the Average Daily Traffic (ADT) is reasonably assumed to be low. For flexible pavement design, the ADT was conservatively calculated at 900 for all streets in the neighborhood, based on trip generation rates for single-family detached housing (10 trips per day, 90 parcels in the neighborhood) from the Institute of Transportation Engineers (ITE) Manual. While the streets being rehabilitated in Northome also lack MSA counts, Arona St and Albert St, north/south connections between Larpenteur Ave and Hoyt Ave that collect traffic from the Northome project area, do have available count information. These count locations are positioned to collect traffic volumes generated from the Northome area, as well as any cut-through traffic. While they are not inclusive of every north south connection in the Northome area, it is reasonable to assume these are relatively characteristic of the ADT within the neighborhood, albeit conservative as there is likely cut-through being counted between Larpenteur Ave and Hoyt Ave. The average ADT between these counts is approximately 520. As a comparison to the methodology used to calculate the Falcon Woods ADT, each block within the project area has approximately 24 single-family detached homes, and based on the ITE Manual would be approximately 240.

Pavement condition scores were considered to determine the streets for the City's pavement management and capital improvements plan. Falcon Heights' pavement management system utilizes a pavement condition index (PCI) rating of 0 to 100. This rating is based on surficial pavement observations which identify key pavement defects such as fatigue cracking, rutting, thermal cracking, block cracking, potholes, raveling and weather, and edge cracking. Street

condition ratings are divided into three categories: “adequate” (66 to 100), “marginal” (36 to 65) and “problem” (0 to 35). The average PCI for Falcon Woods is 31. The average PCI for Northome is 32.

Falcon Heights contracted with a geotechnical engineering consultant to obtain geotechnical exploration in the Falcon Woods and Northome neighborhoods, these reports are attached in the Appendix. The observed pavement depth in the Falcon Woods area was generally 3.5 inches. Observed aggregate base ranged from 4 to 7 inches, which did contain some debris, including concrete and bituminous. The fill encountered below the base consisted of sandy soils, with seems of clay soils at three boring locations. The geotechnical report indicated the pavement distresses in the Falcon Woods area, and results of the subsurface explorations, indicate that the existing subgrade is generally sandy in nature and does not appear to be in need of major improvements yet the existing pavement has reached the end of its lifespan. The existing pavement sections are summarized in the table below:

Falcon Woods - Measured Existing Pavement Sections Table

Boring Location	Bituminous Pavement Thickness (in.)	Apparent Aggregate Base Thickness (in.)
ST-1	3.5	5
ST-2	3.5	7
ST-3	4	5
ST-4	4.5	5
ST-5	3	5.5
ST-6	3	5.5
ST-7	4	4

The observed pavement depth in the Northome area was generally 3.5 inches. The thicker pavement observed at C-4 from the table below was likely due to a roadway patch. Observed aggregate base ranged from 4.25 to 18.5 inches. The fill encountered below the base consisted of silty and clayey sand with variable amounts of gravel. The geotechnical report found the pavement cores analyzed were experiencing low to severe stripping, which represents the deterioration of the asphalt/aggregate bond in a bituminous pavement. When bituminous pavements exhibit moderate to severe degrees of stripping it is a key indicator the pavement has reached the end of its lifespan (8 of the 11 cores were moderate to severe). The existing pavement sections are summarized in the table below:

Northome - Measured Existing Pavement Sections Table

Boring Location	Bituminous Pavement Thickness (in.)	Apparent Aggregate Base Thickness (in.)
C-1	5	11
C-2	3.25	17.75
C-3	4	12

C-4	5.5	18.5
C-5	2.5	6.5
C-6	4	14
C-7	4.75	4.25
C-8	4.25	16
C-9	3.25	5.75
C-10	2	13
C-11	1.75	13.25

Proposed Improvements

Falcon Woods Proposed Improvements - Falcon Heights contracted with a geotechnical engineering consultant to obtain pavement borings throughout the project area. Based on the data and the minimal utility work required with this project, a full-depth reclamation is proposed. This would include grinding and mixing the existing pavement with the underlying base section. This strengthens the base of the roadway. Excess grounds are removed and a new, 3.5-inch asphalt section would be paved without changing the elevation of the roadway. Some areas may need subgrade correction if unsuitable soils are encountered. It has been identified that 35% of the curb requires replacement due to its condition (weathering, cracks, heaved panels impacting drainage, etc.). Cost for the street reconstruction is estimated at \$870,000.

Northome Proposed Improvements – Full depth reclamation of the pavement is also proposed as the method of pavement construction due to the findings of the geotechnical exploration, the OCI of the streets, and minimal utility work needed. Excess grounds are removed and a new, 3.5-inch asphalt section would be paved without changing the elevation of the roadway. Some areas may need subgrade correction if unsuitable soils are encountered. It has been identified that minor curb replacement is necessary due to its condition. Cost for the street reconstruction is estimated at \$915,000.

Trails

Existing Conditions

No trails are located within the Northome Neighborhood.

Falcon Woods has two bituminous pathways within the project area. An approximately 235 foot long, 8-foot wide, trail connects the Falcon Woods neighborhood to Prior Ave to the south off Garden Ave, and the second is an approximately 120 foot long, 5-foot wide, trail connects the neighborhood to the community park to the west off Moore St. These trails do not appear to be encumbered by a trail easement and any proposed improvements would require either trail easements or a temporary construction easement from the abutting property owners.

Proposed Improvements

The Moore St and Garden Ave trail connections are in need of rehabilitation as little maintenance has been performed since their installation in 1983. Given the 5-foot width and proximity of side-lot improvements (e.g. fencing, landscaping, etc.) associated with the Moore St connection, a reclaim machine or bituminous paving machine will not be a feasible rehabilitation option so the existing trail would need to be removed and replaced with a 5-foot concrete walk for constructability. The Garden Ave connection has adequate width and space for paving operations so the bituminous trail will be removed and a new path paved.

If any pathway is rehabilitated within this project, costs would not be assessed. This report assumes the funding would be split between Municipal State Aid and the Street Fund. Ongoing maintenance, including snow removal would be performed by the City.

Due to the constructability and encroachments near the Moore St connection that would need to be removed and relocated if paved (widened from 5-foot to 8-foot for paving operations), a 5-foot concrete walk is proposed, which matches the existing width of the connection. There are higher upfront costs associated with the installation of concrete versus paving bituminous, however the removal and relocation of encroachments due to widening the connection would cost the city more than the installation of concrete, and would have been more impactful with abutting property owners due to the small side-yards that currently exist. The Moore St connection is estimated to cost \$11,000 and the Garden Ave connection is estimated to be \$9,000. These estimated amounts include contingency and engineering/overhead costs.

Sanitary Sewer

Existing Conditions

The sanitary sewer system within the project areas were constructed in the 1950s and 1960s. Other than the south half of Falcon Woods, all of the sanitary pipe in Falcon Woods and Northome has been lined with Cure-In-Place-Pipe through the City's sanitary sewer rehabilitation program. This process creates a new pipe within the existing pipe. The south of Falcon Woods was televised and reviewed and the condition of the sanitary mains in this area were in good condition. The area has been identified as an area to continue to monitor for when the need arises to line the pipe based on the City's sanitary sewer rehabilitation program.

Proposed Improvements

Select sanitary sewer manholes in both project areas are proposed for minor rehabilitation work to include new, water-tight castings and lids, new concrete rings and installation of an inflow and infiltration barrier at the top of the manhole. These improvements are anticipated to reduce stormwater entering the sanitary sewer system, which increases downstream capacity and treatment costs. They will also reinforce the top of the manhole to prevent future settlements within the street. The cost estimates for these improvements are \$54,000 and \$16,500 in the Falcon Woods and Northome neighborhoods, respectively.

Stormwater and Drainage

Existing Conditions

The streets in both project areas are served by catch basins which collect water on the street and convey stormwater to the larger trunk system and downstream stormwater best management practices (BMPs), or stormwater ponds. Storm sewer structures within the Northome area were re-constructed when Arona St, Pascal St, and Albert St were rehabilitated in 2013 and are all pre-cast concrete. The Falcon Woods' storm sewer structures were constructed with various materials including brick and mortar, concrete barrel sections seated on top of pipe, and more conventional concrete structures (e.g. pre-cast concrete). The Falcon Woods stormwater that flows south drains into the U of M's Gortner Ave trunk system, and outlets into the Sarita Wetland on the campus.

The Northome project area conveys stormwater runoff to the north and south into the larger trunk systems located within Larpenteur Ave (flows headed north) and Hoyt Ave (flows headed south), which eventually cross the city line to St. Paul. The majority of the Falcon Woods neighborhood flows south to two existing stormwater BMPs located in the southwest and southeast corners of the neighborhood with a minor area in the northern portion of Falcon Woods routed north to Roselawn Ave.

Proposed Improvements

Based on staff inspection, no improvements are required within the Northome area due to the recent rehabilitation of all stormwater improvements, while in the Falcon Woods neighborhood deteriorated catch basins will be rehabilitated or replaced as part of the proposed project as well as the installation of two sump/baffle catch basins that are upstream of the two stormwater BMPs. These sump/baffle catch basins will reduce the amount of sediment and other deleterious material entering the stormwater ponds, reducing long-term maintenance costs and improving water quality. Additionally, the two stormwater BMPs will undergo replacement of flared end sections (inlets and outlets to the ponds) and minor removal of sediments and other deleterious material is proposed to improve the overall function and treatment of these BMPs. The cost estimate for these improvements is \$155,000.

As the proposed street improvements would disturb an area greater than one acre, the project is required by the Minnesota Pollution Control Agency (MPCA) to include a Storm Water Pollution Prevention Plan (SWPPP) and use erosion and sediment control best practices during construction, and obtain an MPCA Construction Permit. The Falcon Woods project sits within the Rice Creek Watershed District (drainage going to Roselawn), and the Capitol Region Watershed District (drainage going to the U of M), and the Northome neighborhood is wholly within the Capitol Region Watershed District. A Capitol Region Watershed District erosion and sediment control permit will be required, but a Rice Creek Watershed District erosion and sediment control permit will not be required as full depth reclamations are exempted.

The proposed improvements would not add enough impervious surface that would trigger either watershed district water quality or quantity requirements.

RIGHT-OF-WAY AND EASEMENTS

These project improvements are proposed within the existing right-of-way. No right-of-way acquisition is anticipated however as discussed under the “*Trails*” section of this report trail easements and/or temporary construction easements will be required for rehabilitation work associated with the Garden Ave and Moore St connections. While a grant of a temporary construction easement would allow the city to make the required repairs, a trail easement will also be pursued by staff in order to maintain in perpetuity the improvements. Upon execution of any permanent easements with the abutting property owners, the easements must be approved by City Council.

OUTSIDE AGENCY COORDINATION

The watermain system that services the project area is owned and operated by St. Paul Regional Water Services and they have indicated no improvements are planned for inclusion or coordination with this project.

The project area is within the Capitol Region Watershed District. Proposed improvements are not anticipated to warrant any stormwater requirements from the District.

During the design process, staff will do a Gopher State One Call for the project area to identify all small utility operators. The City will coordinate with small utilities to finalize relocates and other coordination items during design.

Lastly, any work abutting Ramsey County right-of-way (e.g. Hamline Ave) will coordinate the improvements and impacts during construction with the County and apply for all required permits.

ESTIMATED COSTS AND PROPOSED FUNDING

Proposed project costs for the 2025 PMP Improvement Project are summarized below. The cost estimate is based on recent construction projects of similar character and assumes that the proposed improvements would begin in 2025. All costs include 15% contingency, which considers unforeseen costs including inflation, unforeseen site conditions, etc., as well as 15% engineering costs such as geotechnical exploration and construction material testing, design, construction inspection, etc. Actual costs will be determined through competitive bids following final design for the project. The actual costs will be dependent upon the market conditions that exist at the time of the bidding.

The proposed street improvements are eligible for assessments according to the City of Falcon Heights Assessment Policy. Per City Policy, a portion of the street improvements will be assessed to the benefitting properties. Along with assessments, street costs will be financed through the Street Infrastructure Fund and Municipal State Aid. Typically, only roads that have been added to the City’s Municipal State Aid system (MSA) are eligible for funding through the City’s portion of state gas tax revenues. However, the City of Falcon Heights has a Certified Municipal State Aid Street system. As a result, the City can use MSA funds to pay for the City’s portion of the costs.

Storm sewer and sanitary sewer improvements will be funded from the appropriate infrastructure fund, and are not eligible for assessments.

	Estimated Cost	MSA	Street Infrastructure Funds	Assessments	Sanitary Sewer Fund	Storm Sewer Fund
Falcon Woods	\$870,000	\$271,000	\$271,000	\$348,000	\$54,000	\$155,000
Northome	\$915,000	\$309,000	\$309,000	\$297,000	\$16,500	-
Total	\$ 1,785,000	\$580,000	\$580,000	\$645,000	\$70,500	\$155,000

*Includes 15% Engineering & Contingency

If pathways are rehabilitated with this project in the Falcon Woods neighborhood, they will not be assessed based on past precedent. This report assumes the funding for pathway improvements would be split between Municipal State Aid Funding and the Street Infrastructure Fund (also included in the summary table above). This is consistent with past practice; the City did not assess for pathway replacement along Roselawn Ave in 2015 or the Ruggles connection in 2023. The table below shows the estimated costs with engineering & contingency and a funding breakdown for the pathway options.

	Estimated Cost	MSA	Street Infrastructure Funds	Assessments
Moore St Connection	\$11,000	\$5,500	\$5,500	-
Garden Ave Connection	\$9,000	\$4,500	\$4,500	-

*Includes 15% Engineering

PROPOSED ASSESSMENTS

Assessments will be levied to the benefitting properties as outlined in Minnesota State Statute Chapter 429 and the City's Assessment Manual, which is summarized below. The Northome neighborhood will utilize the front footage assessment unit. This neighborhood is a typical city-block layout with no curves or atypical front lot lines in which Falcon Heights has a precedent in using the front footage assessment unit. 39 of the 221 residential lots within the project area are corner lots and were assessed when Arona St, Pascal St, and Albert St were rehabilitated in 2013, which decreases the assessable frontage from 11,991 linear feet to 9,752 linear feet (LF). Based on the preliminary estimates this equates to an \$30.53/LF assessment, or an average of \$1635.00 per property. This average is slightly lower than historical ranges for full depth reclamation due to the high density of residential lots within the project area.

On September 11, 2024 the City Council approved an update to the Assessment Manual which clarified the basis for assessment determination. Based on this update, the Falcon Woods neighborhood will utilize the lot unit, or "per parcel" assessment determination, due to the atypical front lot lines and general unique layout of property frontage associated with the neighborhood. Based on preliminary estimates this equates to a \$3,850.00 assessment per parcel. This estimate is within historical ranges for full depth reclamation.

Assuming this project is completed by fall 2025, the final assessment amount would be determined at an assessment hearing in the fall of 2025 with a thorough review of the proposed assessments by the Council. The Council would also set the length of assessments and the interest rate at the hearing. In past projects, the assessments have been over 10 years for reconstruction projects at an interest rate 2% above the current rate of return on the City's portfolio.

PUBLIC INVOLVEMENT

The City hosted an open house for the Falcon Woods neighborhood on October 19, 2022 regarding the 2025 PMP project. This open house was attended by eight residents within the project area. A presentation was given that outlined the proposed improvements, project funding, assessments, and the proposed estimate at that time. Notes from this meeting indicate that the residents brought up the topic of sidewalks and where pedestrians walk as well as street light concerns. In October of 2024 the City provided additional information regarding the project to the Falcon Woods and Northome neighborhoods through the bi-annual newsletter.

The City will host a second neighborhood meeting in January 2025 prior to the improvement hearing scheduled on January 22, 2025. A presentation will be given regarding the proposed improvements, schedule, project funding, assessments and to gain additional feedback from the property owners. This will also be an opportunity to gain additional information from residents on potential improvements or known issues to be incorporated into the final design. Any additional comments or concerns raised at this meeting will be presented to Council on January 22, 2025.

PROPOSED PROJECT SCHEDULE

If this project is approved, the proposed project schedule is shown below. Council Action items are noted with a "CC":

CC Receive Feasibility Report and Set Improvement Hearing	December 11, 2024
Neighborhood Meeting	January, 2025
CC Improvement Hearing, Order Improvement, and Authorize Preparation of Plans & Specifications	January 22, 2025
CC Approve Plans & Specifications, and Order Advertisement for Bid	February 2025
Bid Opening	February 2025
CC Award Contract	March 2025
Construction Start	Summer 2025
Substantial Completion	Fall 2025
CC Set Assessment Hearing	October 2025

SUMMARY & RECOMMENDATIONS

Based on the information and analysis included in this report, the 2025 Street Rehabilitation Project, FH 25-01, is feasible, necessary and cost effective. The following is recommended:

1. The Falcon Heights City Council accept this feasibility study and report and order public hearing for January 22, 2025.
2. After receiving the appropriate staff reports, information and input from the public hearing, the City Council shall:
 - a. Determine whether to proceed with or reject the proposed public improvements;
3. Based on the outcome of the public hearing, the Council can order the proposed improvements and authorize the preparation of plans and specifications.

APPENDIX 1: OPINION OF PROBABLE COST

Falcon Woods - Streets				
STREET NAME	Estimate	15% Cont.	15% Eng.	Total
AUTUMN ST	\$157,897.50	\$23,684.63	\$23,684.63	\$205,266.75
PRIOR AVE	\$131,029.50	\$19,654.43	\$19,654.43	\$170,338.35
SUMMER, MOORE, GARDEN, HOWEL	\$379,960.50	\$56,994.08	\$56,994.08	\$493,948.65
			Total	\$869,553.75
Falcon Woods - Trails				
CONNECTION NAME	Estimate	15% Cont.	15% Eng.	Total
MOORE ST	\$8,514.00	\$1,277.10	\$1,277.10	\$11,068.20
GARDEN AVE	\$6,876.00	\$1,031.40	\$1,031.40	\$8,938.80
			Total	\$20,007.00
Falcon Woods - Storm				
STREET NAME	Estimate	15% Cont.	15% Eng.	Total
AUTUMN ST	\$12,900.00	\$1,935.00	\$1,935.00	\$16,770.00
PRIOR AVE	\$4,500.00	\$675.00	\$675.00	\$5,850.00
SUMMER, MOORE, GARDEN, HOWEL	\$113,000.00	\$9,450.00	\$9,450.00	\$131,900.00
			Total	\$154,520.00
Falcon Woods - Sanitary				
STREET NAME	Estimate	15% Cont.	15% Eng.	Total
AUTUMN ST	\$14,350.00	\$2,152.50	\$2,152.50	\$18,655.00
PRIOR AVE	\$3,550.00	\$532.50	\$532.50	\$4,615.00
SUMMER, MOORE, GARDEN, HOWEL	\$23,300.00	\$3,495.00	\$3,495.00	\$30,290.00
			Total	\$53,560.00

Northome - Streets				
STREET NAMES	Estimate	15% Cont.	15% Eng.	Total
IOWA AVE	\$235,575.00	\$35,336.25	\$35,336.25	\$306,247.50
IDAHO AVE	\$255,535.00	\$38,330.25	\$38,330.25	\$332,195.50
CALIFORNIA AVE	\$212,865.00	\$31,929.75	\$31,929.75	\$276,724.50
			Total	\$915,167.50
Northome - Sanitary				
STREET NAMES	Estimate	15% Cont.	15% Eng.	Total
IOWA AVE	\$3,550.00	\$532.50	\$532.50	\$4,615.00
IDAHO AVE	\$4,500.00	\$675.00	\$675.00	\$5,850.00
CALIFORNIA AVE	\$4,500.00	\$675.00	\$675.00	\$5,850.00
			Total	\$16,315.00

APPENDIX 2: DRAFT ASSESSMENT ROLLS

NORTHHOME DRAFT ASSESSMENT ROLL

Parcel ID	Building Number	Street Name	Street Suffix	Street Frontage (LF)	Assessment Rate (\$/LF)	Assessment Amount
222923210103	1391	IOWA	AVE	52	\$30.53	\$1,587.56
222923210014	1381	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210015	1375	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210076	1380	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210083	1379	IDAHO	AVE	53	\$30.53	\$1,618.09
222923210071	1354	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210111	1349	IOWA	AVE	54	\$30.53	\$1,648.62
222923210020	1349	CALIFORNIA	AVE	64	\$30.53	\$1,953.92
222923210105	1381	IOWA	AVE	54	\$30.53	\$1,648.62
222923210170	1390	IOWA	AVE	60	\$30.53	\$1,831.80
222923210098	1380	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210165	1360	IOWA	AVE	50	\$30.53	\$1,526.50
222923210082	1387	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210087	1359	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210107	1369	IOWA	AVE	54	\$30.53	\$1,648.62
222923210089	1349	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210016	1367	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210088	1355	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210081	1391	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210078	1390	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210018	1361	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210072	1358	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210075	1376	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210077	1386	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210110	1355	IOWA	AVE	54	\$30.53	\$1,648.62
222923210109	1359	IOWA	AVE	54	\$30.53	\$1,648.62
222923210108	1365	IOWA	AVE	54	\$30.53	\$1,648.62
222923210086	1365	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210085	1369	IDAHO	AVE	53	\$30.53	\$1,618.09
222923210070	1348	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210106	1375	IOWA	AVE	54	\$30.53	\$1,648.62
222923210104	1387	IOWA	AVE	54	\$30.53	\$1,648.62
222923210167	1372	IOWA	AVE	55	\$30.53	\$1,679.15
222923210092	1348	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210093	1354	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210094	1358	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210095	1364	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210096	1368	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210099	1386	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210169	1382	IOWA	AVE	55	\$30.53	\$1,679.15
222923210168	1376	IOWA	AVE	55	\$30.53	\$1,679.15
222923210100	1390	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210019	1357	CALIFORNIA	AVE	59	\$30.53	\$1,801.27
222923210017	1365	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210074	1368	CALIFORNIA	AVE	54	\$30.53	\$1,648.62

222923210073	1364	CALIFORNIA	AVE	54	\$30.53	\$1,648.62
222923210084	1375	IDAHO	AVE	56	\$30.53	\$1,709.68
222923210013	1387	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210164	1358	IOWA	AVE	50	\$30.53	\$1,526.50
222923210166	1366	IOWA	AVE	50	\$30.53	\$1,526.50
222923210097	1376	IDAHO	AVE	54	\$30.53	\$1,648.62
222923210012	1391	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210119	1432	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210048	1416	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210147	1452	IOWA	AVE	50	\$30.53	\$1,526.50
222923210133	1417	IOWA	AVE	50	\$30.53	\$1,526.50
222923210129	1437	IOWA	AVE	50	\$30.53	\$1,526.50
222923210116	1416	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210121	1442	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210046	1406	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210055	1452	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210132	1423	IOWA	AVE	50	\$30.53	\$1,526.50
222923210049	1422	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210050	1426	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210065	1417	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210038	1433	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210037	1437	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210042	1413	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210117	1422	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210144	1438	IOWA	AVE	50	\$30.53	\$1,526.50
222923210114	1406	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210047	1412	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210131	1427	IOWA	AVE	50	\$30.53	\$1,526.50
222923210060	1443	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210064	1423	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210120	1436	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210062	1433	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210035	1447	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210054	1446	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210053	1442	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210034	1453	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210052	1436	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210061	1437	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210123	1452	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210059	1447	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210134	1413	IOWA	AVE	50	\$30.53	\$1,526.50
222923210130	1433	IOWA	AVE	50	\$30.53	\$1,526.50
222923210058	1453	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210067	1407	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210066	1413	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210126	1453	IOWA	AVE	50	\$30.53	\$1,526.50
222923210127	1447	IOWA	AVE	50	\$30.53	\$1,526.50

222923210041	1417	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210036	1443	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210142	1430	IOWA	AVE	50	\$30.53	\$1,526.50
222923210143	1434	IOWA	AVE	50	\$30.53	\$1,526.50
222923210141	1422	IOWA	AVE	50	\$30.53	\$1,526.50
222923210115	1412	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210145	1442	IOWA	AVE	50	\$30.53	\$1,526.50
222923210146	1446	IOWA	AVE	50	\$30.53	\$1,526.50
222923210138	1408	IOWA	AVE	50	\$30.53	\$1,526.50
222923210139	1412	IOWA	AVE	52	\$30.53	\$1,587.56
222923210043	1407	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210140	1418	IOWA	AVE	50	\$30.53	\$1,526.50
222923210063	1427	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210135	1407	IOWA	AVE	50	\$30.53	\$1,526.50
222923210051	1432	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210128	1443	IOWA	AVE	50	\$30.53	\$1,526.50
222923210039	1427	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210118	1426	IDAHO	AVE	50	\$30.53	\$1,526.50
222923210040	1423	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923210122	1446	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220029	1506	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220115	1488	IOWA	AVE	75	\$30.53	\$2,289.75
222923220082	1471	IOWA	AVE	50	\$30.53	\$1,526.50
222923220037	1479	IDAHO	AVE	60	\$30.53	\$1,831.80
222923220012	1495	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220076	1497	IOWA	AVE	50	\$30.53	\$1,526.50
222923220016	1477	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220081	1477	IOWA	AVE	50	\$30.53	\$1,526.50
222923220079	1485	IOWA	AVE	50	\$30.53	\$1,526.50
222923220035	1489	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220018	1469	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220028	1502	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220039	1469	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220032	1505	IDAHO	AVE	60	\$30.53	\$1,831.80
222923220116	1494	IOWA	AVE	50	\$30.53	\$1,526.50
222923220117	1498	IOWA	AVE	50	\$30.53	\$1,526.50
222923220021	1468	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220013	1491	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220022	1470	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220026	1492	CALIFORNIA	AVE	96	\$30.53	\$2,930.88
222923220118	1504	IOWA	AVE	50	\$30.53	\$1,526.50
222923220111	1468	IOWA	AVE	50	\$30.53	\$1,526.50
222923220069	1494	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220071	1508	IDAHO	AVE	55	\$30.53	\$1,679.15
222923220038	1473	IDAHO	AVE	60	\$30.53	\$1,831.80
222923220065	1478	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220064	1472	IDAHO	AVE	60	\$30.53	\$1,831.80

222923220017	1471	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220015	1483	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220014	1485	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220024	1480	CALIFORNIA	AVE	51	\$30.53	\$1,557.03
222923220078	1489	IOWA	AVE	50	\$30.53	\$1,526.50
222923220009	1507	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220074	1507	IOWA	AVE	50	\$30.53	\$1,526.50
222923220080	1481	IOWA	AVE	50	\$30.53	\$1,526.50
222923220023	1476	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220027	1498	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220036	1485	IDAHO	AVE	60	\$30.53	\$1,831.80
222923220034	1493	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220033	1497	IDAHO	AVE	65	\$30.53	\$1,984.45
222923220075	1503	IOWA	AVE	50	\$30.53	\$1,526.50
222923220066	1482	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220067	1488	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220112	1472	IOWA	AVE	55	\$30.53	\$1,679.15
222923220119	1508	IOWA	AVE	50	\$30.53	\$1,526.50
222923220114	1484	IOWA	AVE	60	\$30.53	\$1,831.80
222923220025	1484	CALIFORNIA	AVE	53	\$30.53	\$1,618.09
222923220010	1503	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220083	1467	IOWA	AVE	50	\$30.53	\$1,526.50
222923220063	1468	IDAHO	AVE	55	\$30.53	\$1,679.15
222923220070	1502	IDAHO	AVE	60	\$30.53	\$1,831.80
222923220077	1493	IOWA	AVE	50	\$30.53	\$1,526.50
222923220068	1490	IDAHO	AVE	50	\$30.53	\$1,526.50
222923220113	1480	IOWA	AVE	60	\$30.53	\$1,831.80
222923220011	1497	CALIFORNIA	AVE	50	\$30.53	\$1,526.50
222923220053	1531	IDAHO	AVE	80	\$30.53	\$2,442.40
222923220108	1540	IOWA	AVE	67	\$30.53	\$2,045.51
222923220056	1561	IDAHO	AVE	60	\$30.53	\$1,831.80
222923220106	1530	IOWA	AVE	65	\$30.53	\$1,984.45
222923220107	1534	IOWA	AVE	65	\$30.53	\$1,984.45
222923220109	1546	IOWA	AVE	60	\$30.53	\$1,831.80
222923220134	1532	IDAHO	AVE	79	\$30.53	\$2,411.87
222923220136	1542	IDAHO	AVE	53	\$30.53	\$1,618.09
222923220140	1537	IOWA	AVE	70	\$30.53	\$2,137.10
222923220139	1543	IOWA	AVE	53	\$30.53	\$1,618.09
222923220135	1536	IDAHO	AVE	53	\$30.53	\$1,618.09
222923220141	1529	IOWA	AVE	70	\$30.53	\$2,137.10
222923220054	1547	IDAHO	AVE	80	\$30.53	\$2,442.40
222923220052	1525	IDAHO	AVE	80	\$30.53	\$2,442.40
222923220055	1551	IDAHO	AVE	90	\$30.53	\$2,747.70
NOT ASSESSED (CORNER LOT - SHORT SIDE)						
222923220030	1512	CALIFORNIA	AVE	50	\$ -	\$ -
222923220120	1512	IOWA	AVE	50	\$ -	\$ -
222923220072	1512	IDAHO	AVE	65	\$ -	\$ -

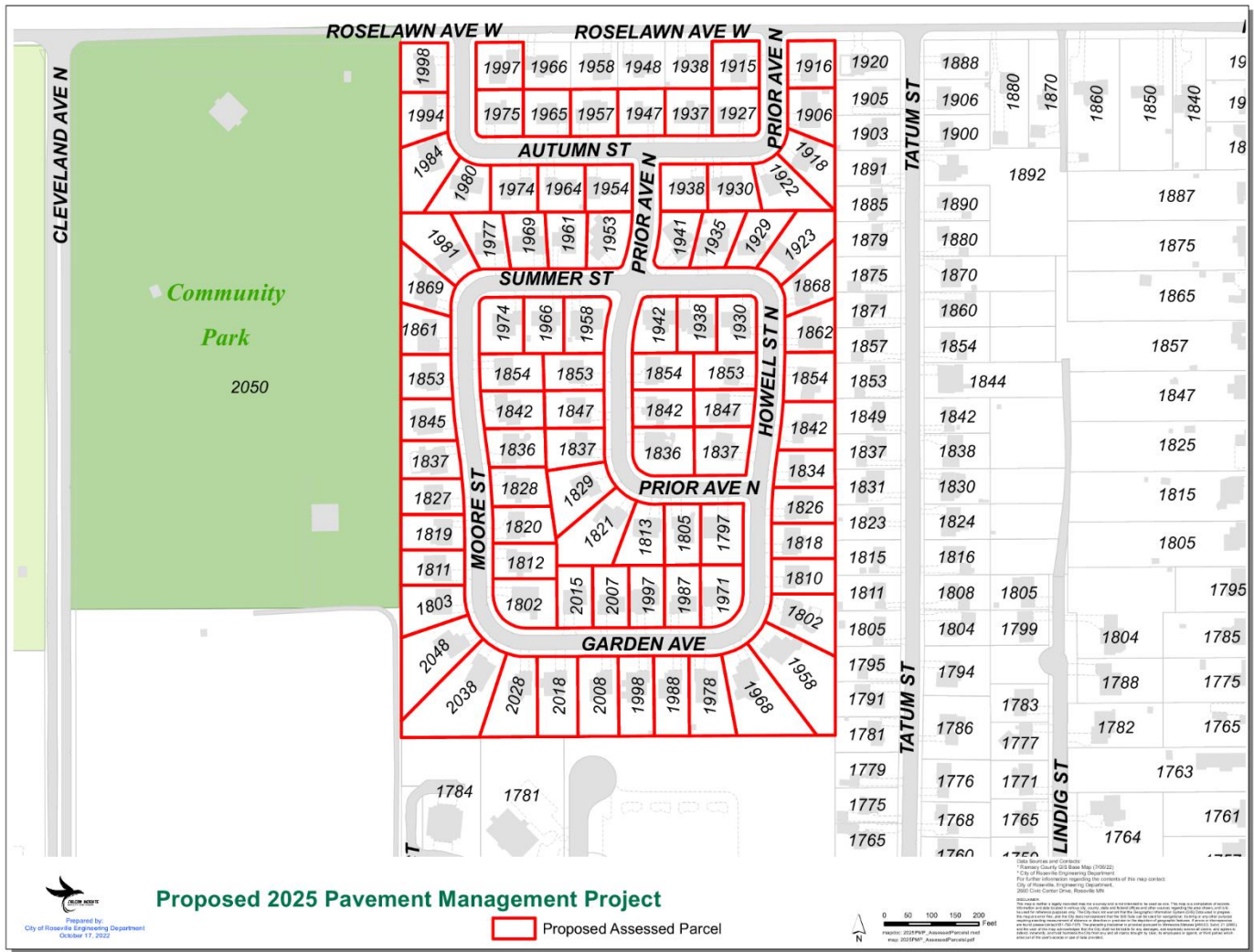
222923220133	1522	IDAHO	AVE	80	\$ -	\$ -
222923220008	1513	CALIFORNIA	AVE	50	\$ -	\$ -
222923220105	1524	IOWA	AVE	60	\$ -	\$ -
222923220031	1511	IDAHO	AVE	85	\$ -	\$ -
222923220142	1525	IOWA	AVE	72	\$ -	\$ -
222923220073	1513	IOWA	AVE	50	\$ -	\$ -
222923220040	1463	IDAHO	AVE	50	\$ -	\$ -
222923210148	1456	IOWA	AVE	50	\$ -	\$ -
222923210056	1456	CALIFORNIA	AVE	52	\$ -	\$ -
222923220020	1464	CALIFORNIA	AVE	50	\$ -	\$ -
222923210033	1457	CALIFORNIA	AVE	52	\$ -	\$ -
222923220110	1464	IOWA	AVE	50	\$ -	\$ -
222923210125	1457	IOWA	AVE	52	\$ -	\$ -
222923220062	1464	IDAHO	AVE	55	\$ -	\$ -
222923220084	1463	IOWA	AVE	50	\$ -	\$ -
222923220019	1463	CALIFORNIA	AVE	50	\$ -	\$ -
222923210057	1457	IDAHO	AVE	52	\$ -	\$ -
222923210124	1456	IDAHO	AVE	52	\$ -	\$ -
222923210044	1403	CALIFORNIA	AVE	54	\$ -	\$ -
222923210080	1395	IDAHO	AVE	51	\$ -	\$ -
222923210068	1403	IDAHO	AVE	54	\$ -	\$ -
222923210079	1396	CALIFORNIA	AVE	52	\$ -	\$ -
222923210045	1402	CALIFORNIA	AVE	54	\$ -	\$ -
222923210102	1395	IOWA	AVE	52	\$ -	\$ -
222923210136	1403	IOWA	AVE	54	\$ -	\$ -
222923210137	1402	IOWA	AVE	54	\$ -	\$ -
222923210011	1395	CALIFORNIA	AVE	56	\$ -	\$ -
222923210101	1396	IDAHO	AVE	51	\$ -	\$ -
222923210113	1402	IDAHO	AVE	54	\$ -	\$ -
222923210171	1394	IOWA	AVE	79	\$ -	\$ -
222923210181	1579	HAMLIN	AVE	118	\$ -	\$ -
222923210090	1341	IDAHO	AVE	54	\$ -	\$ -
222923210112	1341	IOWA	AVE	54	\$ -	\$ -
222923210069	1340	CALIFORNIA	AVE	54	\$ -	\$ -
222923210091	1340	IDAHO	AVE	54	\$ -	\$ -
222923210021	1345	CALIFORNIA	AVE	63	\$ -	\$ -

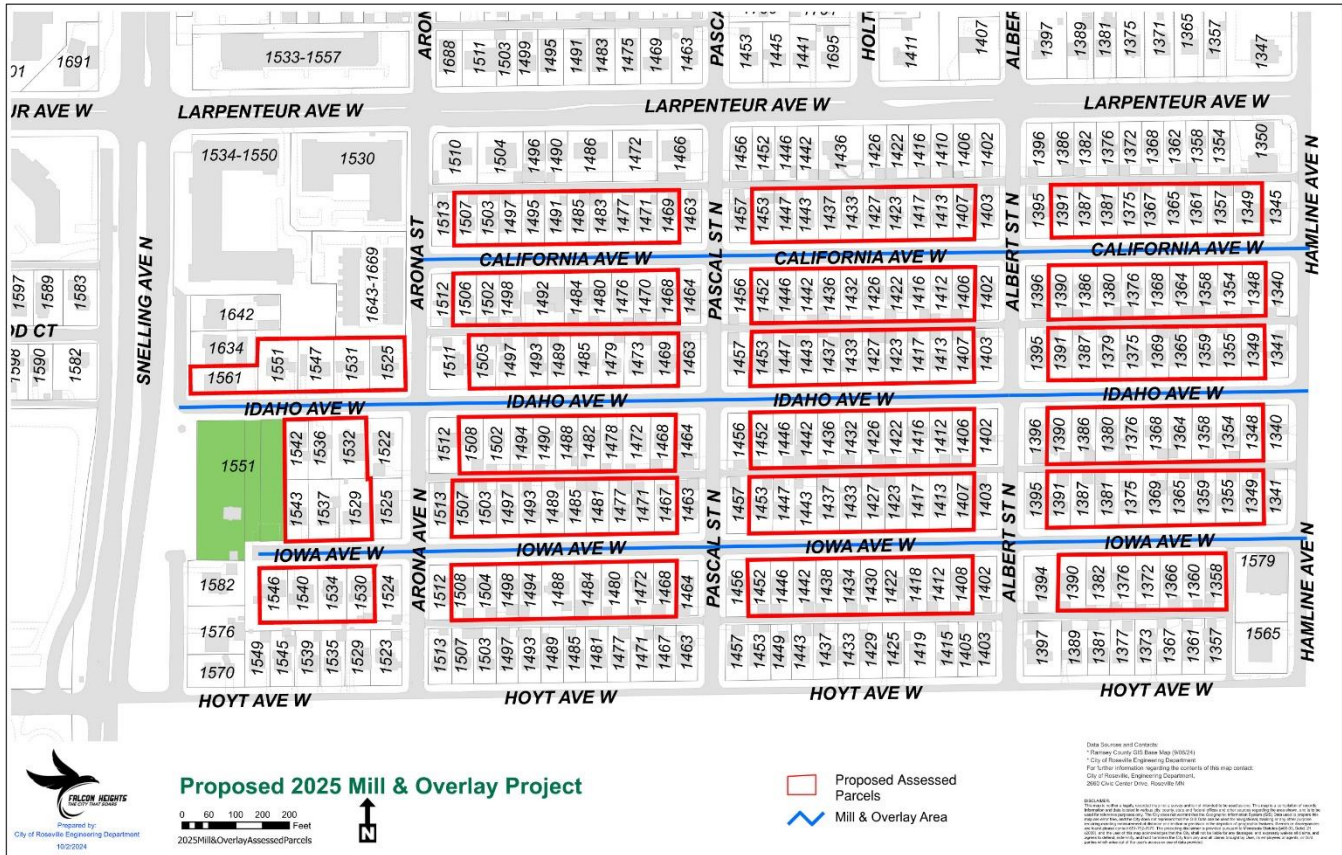
FALCON WOODS DRAFT ASSESSMENT ROLL

Parcel ID	Building Number	Street Name	Street Suffix	Assessment Rate (\$/PARCEL)	Assessment Amount
162923320048	2015	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320038	1842	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320047	2007	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320050	1812	MOORE	ST	\$3,850.00	\$3,850.00
162923310089	1805	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310092	1987	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320046	1997	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320041	1847	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320014	1994	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320015	1998	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320004	1997	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320006	1965	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320007	1957	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320008	1947	AUTUMN	ST	\$3,850.00	\$3,850.00
162923310075	1915	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310077	1937	AUTUMN	ST	\$3,850.00	\$3,850.00
162923310073	1906	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310074	1916	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310087	1847	HOWELL	ST	\$3,850.00	\$3,850.00
162923310088	1837	HOWELL	ST	\$3,850.00	\$3,850.00
162923320037	1836	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320042	1837	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320043	1829	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320044	1821	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320045	1813	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310090	1797	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310091	1971	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320049	1802	MOORE	ST	\$3,850.00	\$3,850.00
162923320051	1820	MOORE	ST	\$3,850.00	\$3,850.00
162923320052	1828	MOORE	ST	\$3,850.00	\$3,850.00
162923320053	1836	MOORE	ST	\$3,850.00	\$3,850.00
162923320054	1842	MOORE	ST	\$3,850.00	\$3,850.00
162923310078	1927	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320005	1975	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320022	1861	MOORE	ST	\$3,850.00	\$3,850.00
162923320009	1954	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320011	1974	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320027	1961	SUMMER	ST	\$3,850.00	\$3,850.00
162923320026	1969	SUMMER	ST	\$3,850.00	\$3,850.00
162923310069	1938	AUTUMN	ST	\$3,850.00	\$3,850.00
162923310067	1935	SUMMER	ST	\$3,850.00	\$3,850.00
162923310070	1930	AUTUMN	ST	\$3,850.00	\$3,850.00
162923310063	1862	HOWELL	ST	\$3,850.00	\$3,850.00
162923320039	1854	PRIOR	AVE	\$3,850.00	\$3,850.00
162923310061	1938	SUMMER	ST	\$3,850.00	\$3,850.00

162923310079	1854	HOWELL	ST	\$3,850.00	\$3,850.00
162923310086	1853	HOWELL	ST	\$3,850.00	\$3,850.00
162923310062	1930	SUMMER	ST	\$3,850.00	\$3,850.00
162923310068	1941	SUMMER	ST	\$3,850.00	\$3,850.00
162923320012	1980	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320013	1984	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320018	1942	SUMMER	ST	\$3,850.00	\$3,850.00
162923320019	1958	SUMMER	ST	\$3,850.00	\$3,850.00
162923320021	1974	SUMMER	ST	\$3,850.00	\$3,850.00
162923320023	1869	MOORE	ST	\$3,850.00	\$3,850.00
162923320024	1981	SUMMER	ST	\$3,850.00	\$3,850.00
162923320025	1977	SUMMER	ST	\$3,850.00	\$3,850.00
162923320028	1953	SUMMER	ST	\$3,850.00	\$3,850.00
162923310066	1929	SUMMER	ST	\$3,850.00	\$3,850.00
162923310064	1868	HOWELL	ST	\$3,850.00	\$3,850.00
162923310071	1922	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320040	1853	PRIOR	AVE	\$3,850.00	\$3,850.00
162923320055	1854	MOORE	ST	\$3,850.00	\$3,850.00
162923310072	1918	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320010	1964	AUTUMN	ST	\$3,850.00	\$3,850.00
162923320020	1966	SUMMER	ST	\$3,850.00	\$3,850.00
162923320036	1853	MOORE	ST	\$3,850.00	\$3,850.00
162923340077	1978	GARDEN	AVE	\$3,850.00	\$3,850.00
162923330008	2018	GARDEN	AVE	\$3,850.00	\$3,850.00
162923330005	1988	GARDEN	AVE	\$3,850.00	\$3,850.00
162923330006	1998	GARDEN	AVE	\$3,850.00	\$3,850.00
162923330007	2008	GARDEN	AVE	\$3,850.00	\$3,850.00
162923310084	1810	HOWELL	ST	\$3,850.00	\$3,850.00
162923340076	1968	GARDEN	AVE	\$3,850.00	\$3,850.00
162923330009	2028	GARDEN	AVE	\$3,850.00	\$3,850.00
162923330010	2038	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320029	2048	GARDEN	AVE	\$3,850.00	\$3,850.00
162923320033	1827	MOORE	ST	\$3,850.00	\$3,850.00
162923320056	1845	MOORE	ST	\$3,850.00	\$3,850.00
162923310083	1818	HOWELL	ST	\$3,850.00	\$3,850.00
162923310085	1802	HOWELL	ST	\$3,850.00	\$3,850.00
162923310081	1834	HOWELL	ST	\$3,850.00	\$3,850.00
162923320030	1803	MOORE	ST	\$3,850.00	\$3,850.00
162923320031	1811	MOORE	ST	\$3,850.00	\$3,850.00
162923320032	1819	MOORE	ST	\$3,850.00	\$3,850.00
162923320034	1837	MOORE	ST	\$3,850.00	\$3,850.00
162923310082	1826	HOWELL	ST	\$3,850.00	\$3,850.00
162923310080	1842	HOWELL	ST	\$3,850.00	\$3,850.00
162923340075	1958	GARDEN	AVE	\$3,850.00	\$3,850.00
162923310065	1923	SUMMER	ST	\$3,850.00	\$3,850.00

APPENDIX 3: DRAFT ASSESSMENT MAPS





Northome Neighborhood

APPENDIX 4: GEOTECHNICAL REPORT

[ON FOLLOWING PAGES]

Pavement Evaluation Report

Falcon Heights 2025 CIP Pavement Evaluation
Northome Neighborhood
Falcon Heights, Minnesota

Prepared for

City of Falcon Heights

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.



Heidi C. Olson, PE
Project Engineer
License Number: 57243
December 3, 2024



December 3, 2024

Project B2410775

Mr. Erik Henriksen
City of Falcon Heights
2077 Larpenteur Avenue W.
Falcon Heights, MN 55113

Re: Pavement Evaluation Report
Falcon Heights 2025 CIP Pavement Evaluation
Northome Neighborhood
City Project Number 25-01
Falcon Heights, Minnesota

Dear Mr. Henriksen:

We are pleased to present this Pavement Evaluation Report for the Falcon Heights 2025 CIP project in Northome Neighborhood in Falcon Heights, Minnesota.

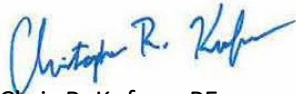
Thank you for making Braun Intertec your consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Heidi Olson at 612.597.6244 or holson@braunintertec.com.

Sincerely,

BRAUN INTERTEC CORPORATION



Heidi C. Olson, PE
Project Engineer



Chris R. Kufner, PE
Associate Director, Principal Engineer

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Exploration Location Sketch

Pavement Core Photo Log (C-1 to C-11)

A. Introduction

A.1. Project Description

Braun Intertec Corporation was contracted by the City of Falcon Heights to perform a pavement evaluation of the Northome neighborhood in Falcon Heights, Minnesota to determine the feasibility of mill-and-overlay for pavement improvements, or if another repair like full-depth reclamation is warranted. Table 1 summarizes the streets included in the project, which total about 1.3 miles in length.

As part of our work, it was requested that we perform pavement cores and hand auger borings.

Table 1. Northome Neighborhood Street Segments

Street	From	To	Approximate Length (feet)
California Avenue	Arona Street	Hamline Avenue	1,950
Idaho Avenue	Snelling Drive	Hamline Avenue	2,500
Iowa Avenue	330 feet west of Arona Street	Hamline Avenue	2,300
Total			6,750

We have attempted to describe our understanding of the proposed project to the extent it was reported to us. Depending on the extent of available information, assumptions may have been made based on our experiences with similar projects. If we have not correctly recorded or interpreted the project details, we should be notified. New or changed information could require additional evaluation, analyses and/or recommendations.

A.2. Purpose

The purpose of the pavement evaluation is to determine the thickness and condition of the in-place pavement materials for use in providing recommendations related to pavement repair.

A.3. Traffic Data

Traffic data was not provided and is not available on MnDOT's Traffic Mapping Application. However, based on the streets being residential, low-volume streets, we anticipate the Annual Average Daily Traffic (AADT) counts are less than 400 vehicles per day, and the estimated 20-year Equivalent Single Axle Loads (ESALs) for flexible pavement are less than 50,000.

A.4. Background Information and Reference Documents

To facilitate our evaluation, we were provided with or reviewed the following information or documents:

- Aerial Maps available from Google Earth®
- Minnesota Geological Survey
- Map of streets to be tested, as provided by the City
- Our discussions with the City of Falcon Heights.

A.5. Scope of Services

Our scope of services for this project was requested by Mr. Erik Henricksen via email on October 9, 2024. We performed our scope of services for the project in accordance with our Proposal QTB204819 dated October 24, 2024, and authorized on November 18, 2024. Tasks performed in accordance with our authorized scope of services included:

- Performing pavement cores and hand auger borings at 11 locations selected by Braun Intertec.
- Preparing this report to summarize our findings and results and to provide design and construction recommendations for the Northome Neighborhood pavement improvements.

B. Results

B.1. Pavement Core and Hand Auger Boring Results

A total of 11 pavement core and hand auger borings were performed on the streets. Locations are shown on the sketch provided in the Appendix. Results are provided in Table 2 and photographs of the cores are provided in the Appendix.

Directly beneath the apparent aggregate base, the hand auger borings encountered subgrade soil consisting of dark brown and brown silty and clayey sand with variable amounts of gravel. Although we did not perform laboratory testing on this material, we assume the subgrade soils have an R-value of 20.

Table 2. Pavement Core and Hand Auger Boring Results

Core	Roadway	Bituminous Thickness (inches)	Apparent Aggregate Base Thickness (inches)	Total Pavement Thickness (inches)	Core Condition Notes
C-1	California Avenue	5	11	16	Low to moderate severity stripping throughout
C-2		3.25	17.75	21	Low severity stripping in bottom 1"
C-3		4	12	16	Low severity stripping in bottom 1"
C-4	Idaho Avenue	5.5	18.5	24	Low to moderate severity stripping throughout
C-5		2.5	6.5	9	Low to moderate severity stripping throughout
C-6		4	14	18	Low severity stripping in bottom 1"
C-7		4.75	4.25	9	Low to severe stripping throughout, core separated at top 1"
C-8	Iowa Avenue	4.25	16	20.25	Low to moderate severity stripping throughout
C-9		3.25	5.75	9	Low to moderate severity stripping throughout
C-10		2	13	15	Low to moderate severity stripping throughout
C-11		1.75	13.25	15	Low to moderate severity stripping throughout

Stripping within cores represents the deterioration of the asphalt/aggregate bond in a bituminous pavement due to the presence of moisture. Stripping often begins at the bottom of the bituminous layer, where it may be in contact with saturated aggregate or soil, and then proceeds upward within the pavement.

Low-severity stripping is common in bituminous pavements over time. However, those that have stripped to medium to severe degrees typically are not considered candidates for rehabilitation approaches that may leave any damaged portion of the pavement in place, such as with a mill-and-overlay.

C. Recommendations

C.1. Discussion of Pavement Repair Options

Based on our discussions, we understand the city was originally considering mill-and-overlay for repair of the Northome Neighborhood streets. However, after further inspection of the streets after the submittal of our proposal, we understand the city is concerned that the streets may be beyond the benefit of mill-and-overlay, and are considering other repairs, such as Full Depth Reclamation (FDR).

Mill-and-overlay requires at least 1 inch of intact bituminous pavement left in place to support the milling and paving operations. Since this repair approach leaves a portion of the existing bituminous in place, reflective cracking will occur, typically within the first year. FDR is the process of pulverizing and blending the in-place bituminous and underlying aggregate base and placing the reclaim material back down as a new aggregate base layer. Reclamation equipment typically has a minimum reclaim depth of 6 inches, and the reclaim material is ideally more than 50% recycled asphalt pavement (RAP). A new bituminous overlay is paved over the compacted reclaim layer. This repair approach extends through the full bituminous section and therefore mitigates the possibility of reflective cracking.

Based on the results of the pavement cores and hand auger borings, bituminous thicknesses varied between about 1.75 and 5.5 inches, and aggregate base thicknesses varied between 4.25 and 18.5 inches. Based on the core conditions, each street has areas of moderate or severe stripping present, which is not ideal for mill-and-overlay. Additionally, the bituminous thickness on Iowa Avenue is 1.75- to 2-inches thick in some places, which would not leave enough existing bituminous in place to perform mill-and-overlay. Based on the bituminous and aggregate base thicknesses, we believe each of the streets are good candidates for FDR.

C.2. FDR Recommendations

C.2.a. Pulverization and Compaction

We recommend following MnDOT Specification 2215 for the reclaiming process. We recommend reclaiming to a depth of approximately 8 inches. We recommend removing excess reclaimed material to minimize grade changes. We anticipate approximately 3.5 inches of material will need to be removed. If desired, the excess reclaimed material can be used as fill, backfill, or aggregate base for other projects.

If undisturbed, we anticipate that any remaining aggregate base and the underlying subgrade will provide sufficient structure to support construction traffic.

C.2.b. Test Roll

Following compaction, we recommend exposed materials be test rolled to check for the presence of localized weak areas. The test roll should be performed with a fully loaded, tandem axle dump truck at walking speed.

The test roll should be observed by a geotechnical engineer or qualified observer. Any detected weak areas should be corrected with a subcut and backfilled with excess reclaimed material or other suitable material such as MnDOT Class 5 aggregate base or Select Granular.

C.2.c. Pavement Design

We recommend the pavement section in Table 3.

Table 3. Recommended Pavement Design

Layer	Thickness (inches)	Designation/MnDOT Spec.
Bituminous Wear	3.5 (two lifts)	SPWEA240C or SPWEA340C / 2360
Aggregate Base	4.5 (Reclaim)	Reclaim Material / 2215
	1 to 16 (Remaining in-place)	---

C.2.d. Materials and Compaction

For reclamation, we recommend that reclaimed materials meet MnDOT Specification 2215 for Reclamation. We recommend that the materials be compacted using the Penetration Index Method as per MnDOT Specification 2211.

All bituminous mixes should meet the requirements outlined in MnDOT Specification 2360. We recommend the bituminous be placed in lifts between 1 1/2 and 2 inches.

We recommend tack coat meeting MnDOT Specification 2357 be placed between the lifts and along vertical faces where paving will match adjacent pavement.

C.2.e. Performance and Maintenance

We based the above pavement design on a 20-year performance life. This is the amount of time before we anticipate the pavement will require rehabilitation. This performance life 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 pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. With regards to bituminous pavements, 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 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.

D. Procedures

D.1. Pavement Coring and Hand Auger Borings

Pavement coring and hand auger borings were performed on November 18, 2024. Exploration locations were selected by Braun Intertec and were conducted using a 4-inch core barrel. The bituminous pavement was repaired with a cold-mix bituminous patch immediately after coring.

Hand auger borings were performed within the core holes and were backfilled with the auger cuttings. The approximate thicknesses of the bituminous and underlying base materials at the explored locations were measured and recorded in the field.

E. Continuity of Professional Responsibility

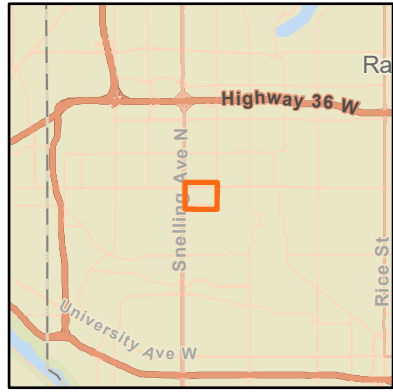
E.1. Use of Report

This report is for the exclusive use of the parties to which it has been addressed. 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.

E.2. 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



Coring Location Sketch



Core #: C-1
Pavement: 5 inches Agg Base: 11 inches
Location: California Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-2
Pavement: 3.25 inches Agg Base: 17.75 inches
Location: California Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-3
Pavement: 4 inches Agg Base: 12 inches
Location: California Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-4
Pavement: 5.5 inches Agg Base: 18.5 inches
Location: Idaho Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-5
Pavement: 2.5 inches Agg Base: 6.5 inches
Location: Idaho Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-6
Pavement: 4 inches Agg Base: 14 inches
Location: Idaho Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-7
Pavement: 4.75 inches Agg Base: 4.25 inches
Location: Idaho Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-8
Pavement: 4.25 inches Agg Base: 16 inches
Location: Iowa Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-9
Pavement: 3.25 inches Agg Base: 5.75 inches
Location: Iowa Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-10
Pavement: 2 inches Agg Base: 13 inches
Location: Iowa Avenue
Date: November 18, 2024

Project: B2410775

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Core #: C-11
Pavement: 1.75 inches Agg Base: 13.25 inches
Location: Iowa Avenue
Date: November 18, 2024

Project: B2410775

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Geotechnical Evaluation Report

Falcon Heights 2023 Pavement Management
Falcon Heights, Minnesota

Prepared for

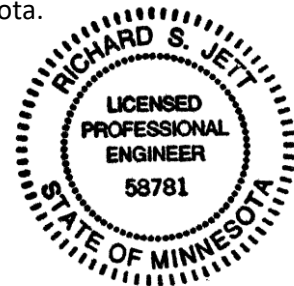
City of Falcon Heights

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.



Richard S. Jett, PE
Project Engineer
License Number: 58781
July 19, 2022



July 19, 2022

Project B2203417

Stephanie Smith, PE
City of Falcon Heights
2077 Larpenteur Avenue West
Falcon Heights, MN 55113

Re: Geotechnical Evaluation Report
Falcon Heights 2023 Pavement Management
Falcon Heights, Minnesota

Dear Ms. Smith:

We are pleased to present this Geotechnical Evaluation Report for the above-referenced project. The following report provides the results of our evaluation and should be read in its entirety.

Thank you for making 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 Richard Jett at 815.545.7059 (rjett@braunintertec.com) or Josh Kirk at 507.514.1348 (jkirk@braunintertec.com)

Sincerely,

BRAUN INTERTEC CORPORATION



Richard S. Jett, PE
Project Engineer



Joshua L. Kirk, PE
Account Leader, Senior Engineer

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Appendix

Soil Boring Location Sketch

Log of Boring Sheets ST-1 through ST-11

Pavement Core Photographs

Descriptive Terminology of Soil

A. Introduction

A.1. Project Description

This Geotechnical Evaluation Report addresses the planned improvements to select roadways located in Falcon Heights, Minnesota. Tables 1 and 2 below provide a summary of project details.

Table 1. Falcon Woods Area (Borings ST-1 through ST-7)

Aspect	Description
Streets Included	Autumn Street, Summer Street, Prior Avenue, Moore Street, Howell Street, and Garden Avenue.
Pavement Type	Bituminous pavement with aggregate base layer
Assumed Average Annual Daily Traffic (AADT)*	400 or less
Estimated ESAL's	46,000*

*Assumed value over a 20-year period.

Table 2. Garden Avenue Area (ST-8 through ST-11)

Aspect	Description
Streets Included	Garden Avenue from Hamline Avenue to Snelling Avenue
Pavement Type	Bituminous pavement with aggregate base layer
Assumed Average Annual Daily Traffic (AADT)*	850
Estimated ESAL's	90,000*

*Assumed value over a 20-year period.

The figure below shows an illustration outlining where pavement improvements are planned.

Figure 1. Street Improvement Layout

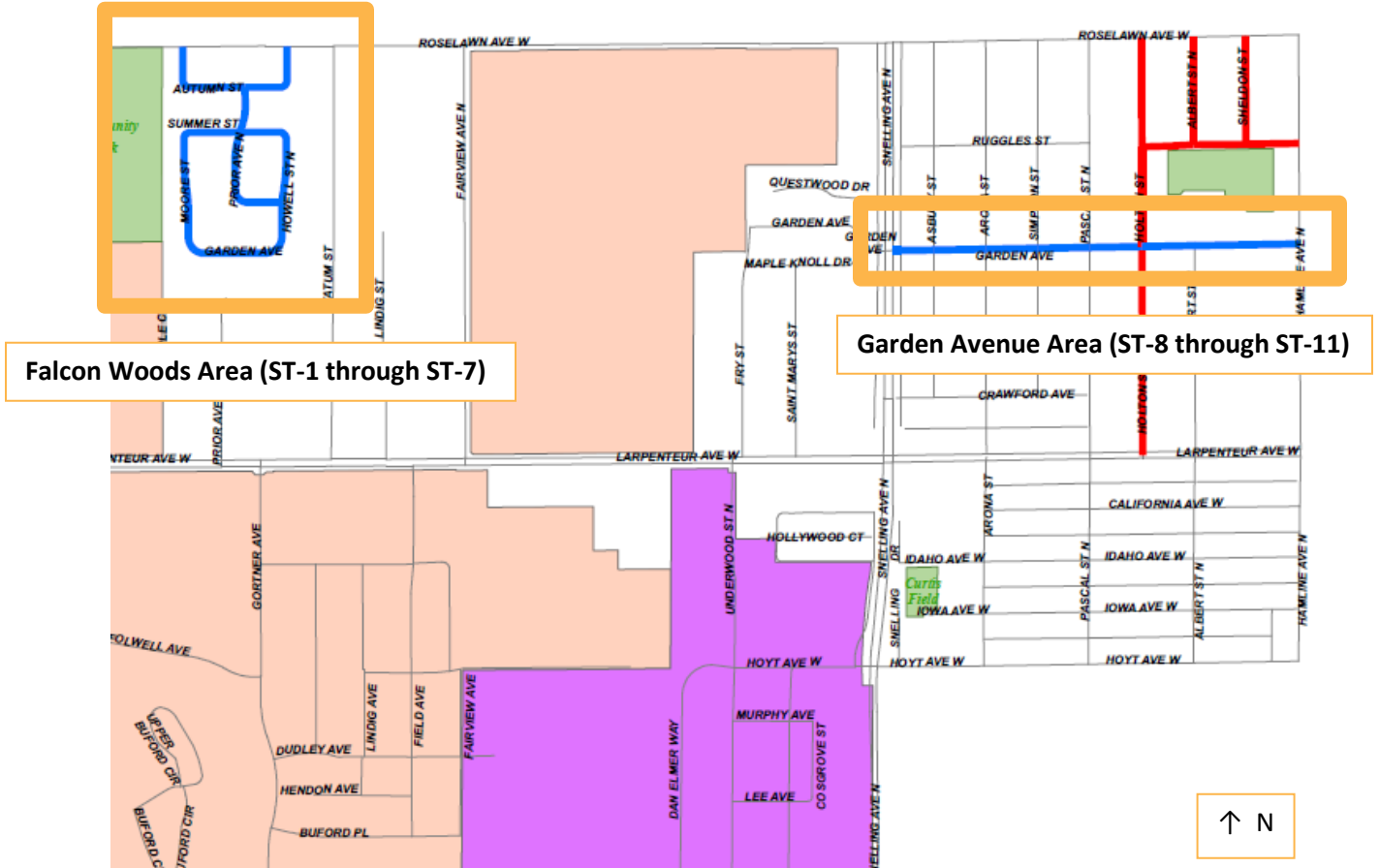


Figure furnished by the City of Roseville and dated March 8, 2022.

A.2. Current Roadway Designations

Garden Avenue, between Hamline Avenue and Snelling Avenue, is classified as an urban minor collector with an Average Annual Daily Traffic (AADT) ranging from 600 to 1000. The Falcon Woods neighborhood roadways, including Autumn Street, Summer Street, Prior Avenue, Moore Steet, Howell Street, and Garden Avenue (from Moore Street to Howell Street) are classified as residential roadways with an AADT of less than 600.

A.3. Purpose

The purpose of our geotechnical evaluation was to core the existing pavement, characterize the subsurface soil conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for use in the design and rehabilitation of the selected roadways.

A.4. Background Information and Reference Documents

We reviewed the following information:

- Proposed 2023 Pavement Management Map, furnished by the City of Roseville and dated March 8, 2022.

In addition to the provided source, we have used several publicly available sources of information including topography maps obtained from the Minnesota Department of Natural Resources (MnTOPO website) and Google Earth aerial photographs.

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.

A.5. Scope of Services

We performed our scope of services for the project in accordance with our Proposal for a Geotechnical Evaluation (QTB156087) dated April 4, 2022. 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 clearing the exploration location of underground utilities. The City of Falcon Heights selected and we staked/marked the new exploration locations in the field. We acquired the 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 11 standard penetration test (SPT) borings, denoted as ST-1 through ST-11, to nominal depths of 5 feet below grade across the site.
- Core the pavement at each boring location for a total of eleven pavement cores.
- 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 reconstruction/rehabilitation of the existing roadways and pavement design thicknesses.

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.

B. Results

B.1. Geologic Overview

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. We did not perform a detailed investigation of the geologic history for the site.

B.2. Visual Field Observations

We performed a site visit to visually observe the conditions of the existing pavements across both project areas following completion of the field work and laboratory testing. Visual observations, in combination with the results of the geotechnical evaluation, can offer additional insight into the subgrade conditions in areas where soil borings were not completed. In addition, these visual observations of the existing pavements can help determine the practicality of different rehabilitation options and how the previous pavement section has held up since its previous improvements.

In the Falcon Woods area (Borings ST-1 through ST-7), significant surface distress in the form of surface cracks and some raveling was observed throughout the entire project area. In general, minimal amounts of potholes and rutting were observed with localized areas exhibiting more distress, specifically rutting along Summer Street between Prior Avenue and Howell Street and potholes near the intersection of Howell Street and Prior Avenue. The roadways showed previous signs of maintenance, including bituminous patches and sealed surface cracks.

The Garden Avenue project area (ST-8 through ST-11) showed significant signs of distress in the form of surface cracks and raveling with occasional potholes throughout. Rutting was observed throughout the project area but was more heavily concentrated on the western half of Garden Avenue. The roadway showed previous signs of maintenance, including bituminous patches and sealed surface cracks. The adjacent curb and gutter also showed signs of distress in the form of settlement.

B.3. Existing Pavement Sections

Table 3 below outlines the existing pavement section thicknesses that were encountered during our geotechnical exploration.

Table 3. Existing Pavement Section Profile

Boring Location	In Place Measured Bituminous Pavement Thickness (in)	In-Place Measured Apparent Aggregate Base Thickness (in)
ST-1	3 1/2	5
ST-2	3 1/2	7
ST-3	4	5
ST-4	4 1/2	5
ST-5	3	5 1/2
ST-6	3	5 1/2
ST-7	4	4
ST-8	4	4
ST-9	4 1/2	7
ST-10	4	6
ST-11	7	5

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.

B.4. Boring Results

Tables 4 and 5 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 sheet in the Appendix includes definitions of abbreviations used in Tables 4 and 5.

Table 4. Subsurface Profile Summary – Falcon Woods Area (Borings ST-1 through ST-7)

Strata	Soil Type - ASTM Classification	N values Blows Per Foot (BPF)	Commentary and Details
Pavement section	N/A	N/A	- Observed bituminous pavement thicknesses ranged from 3 to 4 inches. - Apparent aggregate base thicknesses ranged from 4 to 7 inches. - Total pavement section thicknesses ranged from 8 to 10 1/2 inches.
Fill	SM, SP-SM, SC	7 to 40 BPF	- Observed below the pavement sections and extended to the termination depths of the borings. - Consisted of sandy soils at our exploration locations. - Moisture conditions were generally moist. - Seams of clay soils were encountered in Borings ST-2, ST-5, and ST-7. - Highly variable, soils intermixed. - Existing fill contained variable amounts of debris, including concrete and bituminous.

Table 5. Subsurface Profile Summary – Garden Avenue Area (ST-8 through St-11)

Strata	Soil Type - ASTM Classification	N values Blows Per Foot (BPF)	Commentary and Details
Pavement section	N/A	N/A	- Observed bituminous pavement thicknesses ranged from 4 to 7 inches. - Apparent aggregate base thicknesses ranged from 4 to 7 inches. - Total pavement section thicknesses ranged from 8 to 12 inches. - The thicker bituminous pavement encountered at Boring ST-11 is likely due to a boring being completed within a previously patched pothole.
Fill	SM, SP-SM	9 to 50 BPF	- Observed below the pavement sections and extended to the termination depths of the borings. - Fill consisted of sandy soils. - Moisture conditions were generally moist. - Slightly organic fill soils were encountered in boring ST-11 at a depth ranging from approximately 2 to 4 feet below existing grade. - Existing fill contained variable amounts of debris, including concrete debris.

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

B.5. 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. Should a more accurate determination of groundwater be needed, we recommend the completion of additional soil borings and the installation of piezometers.

B.6. Laboratory Test Results

The boring logs show the results of the laboratory testing we performed next to the tested sample depth.

The moisture content of select fill soil samples ranged from 3 to 14 percent moisture by weight. Sieve analysis tests (passing the #200 sieve only) performed on select fill soil samples indicated between 5 to 44 percent particles passing the #200 sieve by weight. Organic content tests performed on select

samples indicated between 1 to 2 percent organic material, by weight. These percentages classify the material as non- to slightly organic.

C. Recommendations

C.1. Design and Construction Discussion

C.1.a. Understanding of Project Scope

Based on the provided request for proposal dated March 28, 2022, we understand that the City of Falcon Heights is considering cost efficient improvements to the project areas consisting of pavement rehabilitation options and possible reconstruction should the conditions warrant. We assume there will likely not be any utility improvements or large-scale subgrade improvements planned for the Falcon Woods Area project. We expect that pavement rehabilitation options will be the first choice of the City of Falcon Heights.

C.1.b. General Pavement Conditions

Generally, pavement distress observed throughout the project site appears to be in the form of alligator cracking, some potholes, etc. Some rutting was observed in the Falcon Woods neighborhood but on a relatively minor scale. More significant rutting was observed in the Garden Avenue area. Both project areas showed previous signs of maintenance, including bituminous patches and sealed surface cracks.

C.1.c. Observations of Subgrade Soils

Subgrade soils in the Falcon Woods project area generally consisted of sandy fill subgrade soils with some zones of clay-based soils observed. The Garden Avenue project area generally contained sandy subgrade fill soils. Some debris, including concrete and bituminous, was encountered across both project areas. Based on the soil boring samples, the subgrade soils contain minimal organic material within the explored depths.

C.1.d. Pavement Improvement Options

Several options are available for pavement improvement. One option available is full reconstruction, which includes full removal of the existing pavement section, preparation of the subgrade soils (as needed), and placement of a new pavement section. Other options available include Full-Depth Reclamation (FDR), or mill and overlay techniques, which utilize the reuse of the existing pavement to reconstruct a new pavement section. These approaches do not include full removal of the existing pavement section and limits the opportunity to observe and improve the subgrade soils.

While the latter two approaches tend to be more economical, there is a small risk that unforeseen deficiencies in the existing subgrade may lead to future pavement impacts. If subgrade performance is expected to be an issue in the future, rehabilitation options may not be practical or economical to perform and will likely not provide the highest quality pavement over the long term.

If observation of the existing subgrade soils are a priority, we recommend reconstruction of the existing pavement section. This option would provide the highest quality pavement over the longest possible service life but is typically more expensive than other rehabilitation options. We would recommend the existing bituminous pavement and aggregate base layers be removed, the existing subgrade recompacted and minor soil corrections performed as needed, and a new pavement section, including bituminous and aggregate base, be placed.

C.2. Pavement Improvement Recommendations

The following sections provide our recommendations for each of the proposed improvement areas discussed in the RFP. In addition to our recommended approach, we understand there may be cost implications to the city. We encourage the city to investigate multiple approaches to improving the pavements, while understanding that each approach has a slightly different life cycle and subsequent maintenance cycle. While one approach may be the most cost-effective in the short term, the maintenance program may be more involved and have higher cost in the future.

C.2.a. Pavement Improvement Approach – Falcon Woods Area (ST-1 through ST-7)

Based on the results of our exploration, it appears that the existing pavement has reached the end of its lifespan. Based on the type of distress noted in the pavements, and the results of our subsurface exploration, it appears that the existing subgrade is generally sandy in nature and does not appear to be in need of major improvement. Therefore, pavement improvement techniques such as a mill and overlay, or a full-depth reclamation are feasible options. As noted previously, these techniques do not allow for observations of the underlying subgrade soils and improvements to the subgrade. The design team should analyze the cost and practicality associated with each option and choose the option that will best suit the budget, schedule, lifespan, and performance standards for the project. These options will often require more frequent maintenance compared with a full pavement reconstruction but are typically more cost effective during construction.

To perform an FDR of the existing pavements, the full thickness of the existing asphalt is pulverized and blended with a portion of the existing apparent aggregate base to form a new base layer for future asphalt placement. We recommend leaving a nominal section of the existing aggregate base layer in place so the underlying subgrade soils are not incorporated into the reclaimed material. The table below

provides recommended reclamation depths based on the borings performed. Note that pavement section thicknesses are likely to vary, so the contractor should be observing their reclamation during construction and making any necessary adjustments.

Table 6. Anticipated reclamation depths for FDR

Boring	Anticipated Depth (inches)
ST-1	6
ST-2	8
ST-3	7
ST-4	7
ST-5	6
ST-6	6
ST-7	6

We recommend that a minimum of 2 inches of aggregate base is left in place during reclamation operations. The contractor should make efforts to not reclaim the entire existing pavement section and disturb the underlying subgrade soils during reclamation operations.

FDR is typically more cost efficient to perform as compared to full reconstruction and will eliminate the existing near-surface distresses. We recommend a proofroll is performed once the reclaimed material is at pavement elevations. If areas of unsuitable soils are encountered, it may be difficult, but achievable to perform soil corrections; however the contractor will need to remove and store the reclaimed material to perform any subgrade corrections.

Another option available to the project team is to stabilize the reclaimed material using asphalt emulsions or cement. The asphalt emulsion is typically mixed with the reclaimed bituminous and apparent aggregate base material to create a stiffer layer immediately below the new asphalt layer. This option typically reduces the amount of reclaimed aggregate base and bituminous surface material needed for construction of the roadway.

C.2.b. Pavement Improvement Approach – Garden Avenue Area (ST-8 through ST-11)

Based on the results of our exploration, it appears that the existing pavement has reached the end of its lifespan. Due to the visually observed rutting that is occurring and the higher traffic volumes associated with Garden Avenue, it appears there may be subgrade-related issues contributing the distress observed

the pavements. We also understand that there is a planned replacement of the existing watermain along the alignment of Garden Avenue. As such, we recommend a complete reconstruction of Garden Avenue, which will provide the highest quality pavement and improve the subgrade conditions simultaneously. We recommend the existing bituminous pavement and aggregate be removed, the existing subgrade recompacted, and a new pavement section, including bituminous and aggregate base, be placed.

C.3. Site Grading and Excavations

This section outlines site grading recommendations for the full pavement reconstruction option as outlined in Section C.2.b. Included are recommendations for engineered fill soil types and classification, as well as compaction recommendations for both engineered fill soils and aggregate base material.

C.3.a. Engineered Fill Materials and Compaction

Table 7 below contains our recommendations for engineered fill materials.

Table 7. Engineered Fill Materials

Locations To Be Used	Engineered Fill Classification	Possible Soil Type Descriptions	Gradation	Additional Requirements
Pavement areas	Pavement fill	SP, SP-SM, SM	100% passing 3-inch sieve <30% passing No. 200 sieve	< 2% Organic Content (OC) Plasticity index (PI) < 15% Debris Free
- Drainage layer - Non-frost-susceptible	- Free-draining - Non-frost-susceptible fill - MnDOT select granular	SP, SP-SM	100% passing 1-inch sieve < 12% passing #200 sieve	See MnDOT 3149.2.B.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 12 inches thick. We recommend compacting engineered fill in accordance with the criteria presented below in Table 8. The project documents should specify relative compaction of engineered fill.

Table 8. Compaction Recommendations Summary - Soil

Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum, percentage points	
		Granular Soils (SP, SP-SM)	Silty Sand Soils (SM)
Within 3 feet of pavement subgrade	100	*	-2 to +1
More than 3 feet below pavement subgrade	95	*	-1 to +3

*The minimum moisture content should be no less than 5 percent and no more than 3 percentage points over optimum.

Table 9. Compaction Recommendations Summary – Aggregate Base

Material	Relative Compaction, percent (ASTM D698 – Standard Proctor)
Aggregate Base	100

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material.

We recommend performing density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.4. Pavements

C.4.a. Pavement Subgrade Preparation – Full Reconstruction

We recommend the following steps for pavement subgrade preparation, understanding the site will have a grade change of 1 foot or less. Note that project planning may need to require additional subcuts to limit frost heave.

1. Strip unsuitable soils consisting of existing pavements, organic soils, debris-laden soils, existing structures (if encountered), and other unsuitable soils from the area within 3 feet of the surface of the proposed pavement grade.
2. Have a geotechnical representative observe the excavated subgrade to evaluate if additional subgrade improvements are necessary. Based on the results of the borings, the contractor should anticipate that soil correction excavations of the existing fill may be needed to

provide a stable subgrade. Where needed, subcuts on the order of 2 to 3 feet should be sufficient in pavement areas at this site.

3. Slope subgrade soils to allow the removal of accumulating water.
4. Scarify, moisture condition, and surface compact the subgrade.
5. Place pavement engineered fill to grade and compact in accordance with Section C.3.d. to bottom of pavement and exterior slab section. See Section C.3.e. for additional considerations related to frost heave.
6. Proofroll the pavement or exterior slab subgrade as described in Section C.2.d.

C.4.b. Proofroll Observations

After preparing the subgrade as described in C.3.a for the Garden Avenue Area prior to placing the aggregate base, and after preparing the reclaimed material in the Falcon Woods areas, we recommend proofrolling the soils with a fully loaded tandem-axle truck. We also recommend having a geotechnical representative observe the proofroll. Areas that fail the proofroll 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 proofroll, as determined by the geotechnical representative. Possible options for subgrade correction include moisture conditioning and recompaction, subcutting and replacement with soil or crushed aggregate, and/or geotextiles. We recommend performing a second proofroll after the aggregate base material is in place, and prior to placing bituminous pavements

C.4.c. Design Sections

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Based on our experience with similar soils anticipated at the pavement subgrade elevation, we recommend pavement design assume an average R-Value of 20 for both project sites. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve this value. Tables 10 and 11 provides minimum recommended pavement sections, based on the soils support and traffic loads. We understand that the City of Falcon Heights requires all residential roadways to be designed, at a minimum, as a 7-ton roadway.

Table 10. Recommended Minimum Bituminous Pavement Sections – Falcon Woods Area (ST-1 through ST-7)

Use	7-ton roadway	7-ton roadway with stabilized aggregate base
Minimum asphalt thickness (inches)	3 1/2	2
Minimum aggregate base thickness (inches)	6	---
Minimum stabilized aggregate base thickness (inches)	---	5

Table 11. Recommended Minimum Bituminous Pavement Sections - Garden Avenue (ST-8 through ST-11)

Use	7-ton roadway
Minimum asphalt thickness (inches)	4
Minimum aggregate base thickness (inches)	8

C.4.d. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible pavements. We can provide recommendations for pavement material selection during final pavement design upon request.

C.4.e. 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 where exterior grades promote drainage toward those edge areas. The contractor should place drainpipes in small trenches, extended below the aggregate base material. The draitile systems should be tied to the existing storm sewer system for disposal of water runoff.

C.4.f. Performance and Maintenance

We based the above pavement designs on a 20-year performance life for pavements. This is the amount of time before we anticipate the pavement will require reconstruction. This performance life 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.

C.5. Utilities

We understand that there is a watermain replacement planned along the alignment of Garden Avenue. No utility work is planned in the Falcon Woods Area of the project. It should be noted that our soil borings did not extend deep enough to obtain soil conditions for some utilities.

C.5.a. Subgrade Stabilization

For exterior utilities, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as organic soils or debris/gravel-laden soils 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.

C.5.b. Utility Backfill

We recommend utility trench backfill adhere to the recommendations of Section C.3.a. The contractor should anticipate that zones of less desirable existing fill may need to be separated as well as moisture conditioned prior to placement as utility trench backfill.

D. Procedures

D.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. Pavement cores were also collected near each boring location.

We sealed penetration test boreholes in general accordance with MDH procedures.

D.2. Exploration Logs

D.2.a. 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 and other in-situ 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.

D.2.b. 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 testing 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.

D.3. Material Classification and Testing

D.3.a. 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.

D.3.b. Laboratory Testing

The exploration logs in the Appendix note the results of the laboratory tests performed on geologic material samples. We performed the tests in general accordance with ASTM procedures.

D.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.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. 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 reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. 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.

E.2. Continuity of Professional Responsibility

E.2.a. 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.

E.2.b. 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.

E.3. Use of Report

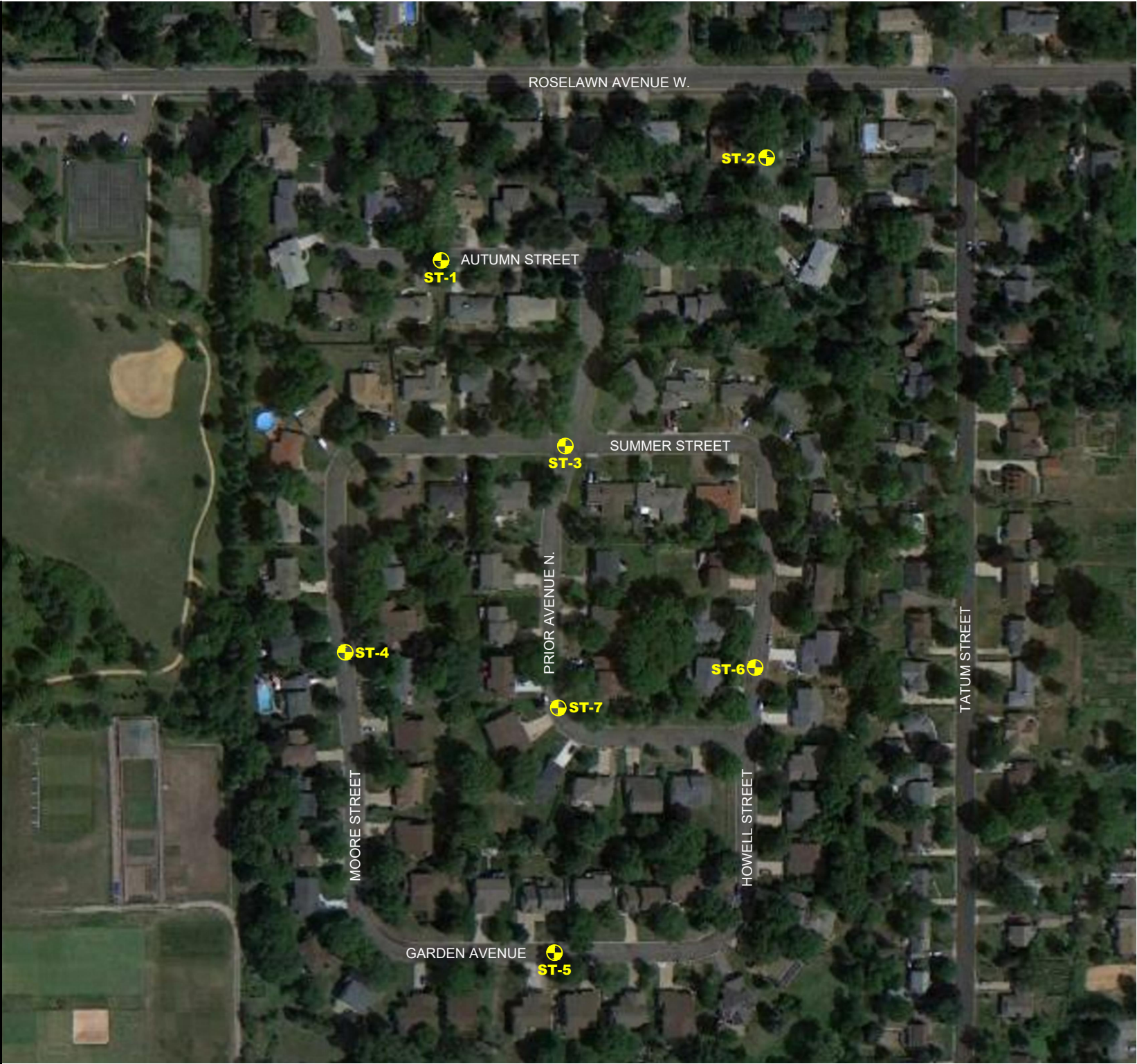
This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.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

F:\2022\B2203417\CAD\B2203417.dwg, Geotech,5/16/2022 4:49:11 AM



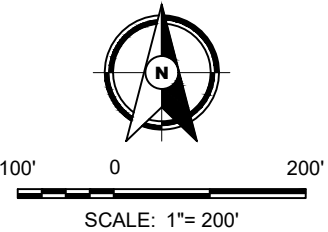
FALCON WOODS NEIGHBORHOOD



VICINITY MAP

NOT TO SCALE

 DENOTES APPROXIMATE LOCATION OF
STANDARD PENETRATION TEST BORING



GARDEN AVENUE

**BRAUN
INTERTEC**
The Science You Build On.

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Minneapolis, MN 55438
952.995.2000
braunintertec.com

Drawing Information

Project No:
B2203417

Drawing No:
B2203417

Drawn By: JAG
Date Drawn: 4/27/22
Checked By: RSJ
Last Modified: 5/16/22

Project Information

Falcon Heights 2023
Pavement Management

Garden Avenue and
the Falcon Woods
Neighborhood

Falcon Heights,
Minnesota

**Soil Boring
Location Sketch**

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-1			
					LOCATION: See attached sketch			
					NORTHING: 175582	EASTING: 551775		
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22			
SURFACE ELEVATION: 986.9 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous		WEATHER: Sunny		
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
986.1 0.8					11-16-7-6 (23) 16" 2-4-3-5 (7) 18" 1-4-4-5 (8) 15"		14	P200=44%
980.6 6.3		END OF BORING Boring then backfilled with auger cuttings						Water not observed while drilling.

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-2		
					LOCATION: See attached sketch		
					NORTHING: 175737	EASTING: 552265	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22		
SURFACE ELEVATION: 982.7 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous	WEATHER: Sunny		
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
981.8		PAVEMENT, 3 1/2 inches of bituminous over 7		13-6-5-2			
0.9		inches of apparent aggregate base		(11)			
979.7		FILL: SILTY SAND (SM), fine to medium-		17"			
3.0		grained, trace Gravel, contains seams of Clay,		3-3-4-5			
		dark brown to brown, moist		(7)			
		FILL: SILTY SAND (SM), fine to medium-		18"		13	
		grained, trace Gravel, contains seams of Clay,		6-5-8-11			
		brown, moist		(13)			
976.4		<i>Little Gravel at 5 feet</i>	5	15"			
6.3		END OF BORING					
		Boring then backfilled with auger cuttings					
			10				
			15				
			20				
			25				
			30				

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-3		
					LOCATION: See attached sketch		
					NORTHING: 175303	EASTING: 551962	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22		END DATE: 05/06/22	
SURFACE ELEVATION: 989.0 ft		RIG: 7514	METHOD: 2 1/4" HSA		SURFACING: Bituminous		WEATHER: Sunny
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
988.2		PAVEMENT, 4 inches of bituminous over 5		6-15-11-8			
0.8		inches of apparent aggregate base		(26)			
987.0		FILL: POORLY GRADED SAND with SILT (SP-		15"			
2.0		SM), fine to coarse-grained, little Gravel,		6-4-3-3			
		brown, moist		(7)		5	OC=1%
		FILL: SILTY SAND (SM), fine to medium-		20"			
		grained, trace Gravel, contains seams of		3-4-4-5			
		organic, contains bituminous debris, brown,	5	(8)			
		moist		14"			
982.7		END OF BORING					
6.3		Boring then backfilled with auger cuttings					
			10				
			15				
			20				
			25				
			30				

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-4		
					LOCATION: See attached sketch		
					NORTHING: 174993	EASTING: 551631	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22		END DATE: 05/06/22	
SURFACE ELEVATION: 984.9 ft		RIG: 7514		METHOD: 2 1/4" HSA		SURFACING: Bituminous	
						WEATHER: Sunny	

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
984.1		PAVEMENT, 4 1/2 inches of bituminous over 5		10-14-8-6			
0.8		1/2 inches of apparent aggregate base		(22)		8	P200=22%
982.9		FILL: SILTY SAND (SM), fine to coarse-grained, little Gravel, dark brown, moist		18"			
2.0		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, contains bituminous debris, dark brown, moist		10-12-18-18			
980.9				(30)			
4.0				6"			
		FILL: SILTY SAND (SC-SM), fine to medium-grained, trace Gravel, contains seams of Clay, brown, moist	5	12-13-10-10			
978.6				(23)			
6.3				22"			
		END OF BORING					Water not observed while drilling.
		Boring then backfilled with auger cuttings					
			10				
			15				
			20				
			25				
			30				

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-5		
					LOCATION: See attached sketch		
					NORTHING: 174541	EASTING: 551946	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22		
SURFACE ELEVATION: 984.0 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous	WEATHER: Sunny		
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
983.3 0.7		PAVEMENT, 3 inches of bituminous over 5 1/2 inches of apparent aggregate base		7-11-14-8 (25) 19"			Water not observed while drilling.
		FILL: SILTY SAND with GRAVEL (SM), fine to medium-grained, brown, moist		14-16-17-22 (33) 16"			
980.0 4.0		FILL: SILTY SAND (SM), fine to coarse-grained, trace Gravel, brown, moist	5	7-7-7-10 (14) 20"		6	
977.7 6.3		END OF BORING					
		Boring then backfilled with auger cuttings					
			10				
			15				
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-6			
					LOCATION: See attached sketch			
					NORTHING: 174970	EASTING: 552247		
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22			
SURFACE ELEVATION: 984.2 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous		WEATHER: Sunny		
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
983.5		PAVEMENT, 3 inches of bituminous over 5 1/2 inches of apparent aggregate base			6-12-21-14 (33)			
0.7		FILL: POORLY GRADED SAND with SILT and GRAVEL (SP-SM), fine to coarse-grained, brown, moist			20"			
					10-26-14-11 (40)		4	P200=7%
					18"			
					10-10-8-12 (18)			
				5	16"			
978.0		END OF BORING						Water not observed while drilling.
6.2		Boring then backfilled with auger cuttings						
				10				
				15				
				20				
				25				
				30				

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-7		
					LOCATION: See attached sketch		
					NORTHING: 174909	EASTING: 551951	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22		
SURFACE ELEVATION: 986.9 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous	WEATHER: Sunny		
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
986.2		PAVEMENT, 4 inches of bituminous over 4		2-10-15-18			
0.7		inches of apparent aggregate base		(25)		5	
984.9		FILL: SILTY SAND (SM), fine to coarse-		18"			
2.0		grained, little Gravel, dark brown to brown,		38-19-16-16			
		moist		(35)			
		FILL: SILTY SAND with GRAVEL (SM), fine to		14"			
		coarse-grained, brown, moist		50-30-8-8		8	
		Clay seams at 4 feet	5	(38)			
				16"			
980.6		END OF BORING					Water not observed while
6.3		Boring then backfilled with auger cuttings					drilling.
			10				
			15				
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-8		
					LOCATION: See attached sketch		
					NORTHING: 174560	EASTING: 556224	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22		
SURFACE ELEVATION: 968.4 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous	WEATHER: Sunny		
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
967.7		PAVEMENT, 4 inches of bituminous over 4 inches of apparent aggregate base		10-50 (50)			
0.7				10"			
966.4		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, contains concrete debris, dark brown, moist		10-10-8-12 (18)		5	P200=16%
2.0				20"			
964.4		FILL: SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, moist		10-9-10-12 (19)			
4.0		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to medium-grained, trace Gravel, contains seams of Silt, light brown, moist	5	22"			
962.1		END OF BORING					Water not observed while drilling.
6.3		Boring then backfilled with auger cuttings					
			10				
			15				
			20				
			25				
			30				

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Project Number B2203417 Geotechnical Evaluation Falcon Heights 2023 Pavement Mgmt Garden Avenue Falcon Heights, Minnesota					BORING: ST-10		
					LOCATION: See attached sketch		
					NORTHING: 174585	EASTING: 557813	
DRILLER: C. McClain		LOGGED BY: R. Jett		START DATE: 05/06/22	END DATE: 05/06/22		
SURFACE ELEVATION: 948.7 ft		RIG: 7514	METHOD: 2 1/4" HSA	SURFACING: Bituminous	WEATHER: Sunny		
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
947.9 0.8		PAVEMENT, 4 inches of bituminous over 6 inches of apparent aggregate base		11-11-9-5 (20) 16"		6	Water not observed while drilling.
		FILL: POORLY GRADED SAND with SILT (SP-SM), fine to coarse-grained, trace Gravel, contains seams of Clay, light brown, moist		8-9-7-9 (16) 18"			
944.7 4.0		FILL: POORLY GRADED SAND (SP), fine to coarse-grained, trace Gravel, light brown, moist	5	5-5-5-7 (10) 20"			
942.4 6.3		END OF BORING					
		Boring then backfilled with auger cuttings					
			10				
			15				
			20				
			25				
			30				

See Descriptive Terminology sheet for explanation of abbreviations

[illegible]

		
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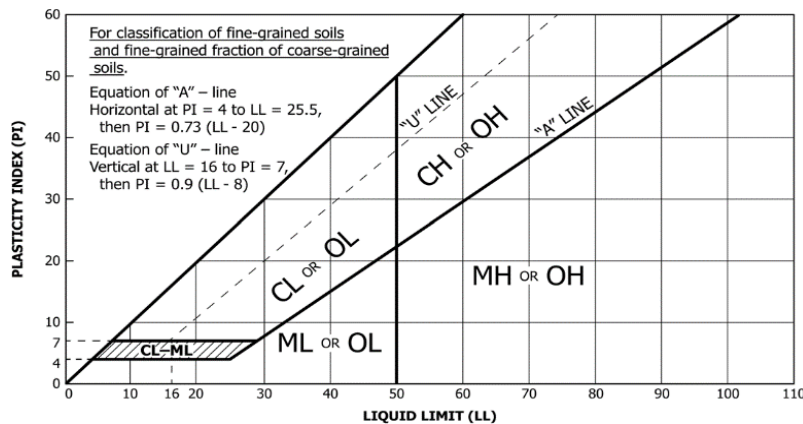
		
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Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Group Symbol	Soil Classification
					Group Name ^B
Coarse-grained Soils (more than 50% retained on No. 200 sieve)	Gravels (More than 50% of coarse fraction retained 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
			$C_u < 4$ and/or ($C_c < 1$ or $C_c > 3$) ^D	GP	Poorly graded gravel ^E
		Gravels with Fines (More than 12% fines ^C)	Fines classify as ML or MH	GM	Silty gravel ^{EFG}
			Fines Classify as CL or CH	GC	Clayey gravel ^{EFG}
	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
			$C_u < 6$ and/or ($C_c < 1$ or $C_c > 3$) ^D	SP	Poorly graded sand ^I
		Sands with Fines (More than 12% fines ^H)	Fines classify as ML or MH	SM	Silty sand ^{FGI}
			Fines classify as CL or CH	SC	Clayey sand ^{FGI}
Fine-grained Soils (50% or more passes the No. 200 sieve)	Silts and Clays (Liquid limit less than 50)	Inorganic	PI > 7 and plots on or above "A" line ^J	CL	Lean clay ^{KLM}
			PI < 4 or plots below "A" line ^J	ML	Silt ^{KLM}
		Organic	Liquid Limit – oven dried Liquid Limit – not dried <0.75	OL	Organic clay ^{KLMN} Organic silt ^{KLMQ}
			PI plots on or above "A" line	CH	Fat clay ^{KLM}
	Silts and Clays (Liquid limit 50 or more)	Inorganic	PI plots below "A" line	MH	Elastic silt ^{KLM}
			Liquid Limit – oven dried Liquid Limit – not dried <0.75	OH	Organic clay ^{KLMP} Organic silt ^{KLMQ}
		Organic			
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 ≥ 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.



DD Dry density, pcf
WD Wet density, pcf
P200 % Passing #200 sieve
MC Moisture content, %
OC Organic content, %

Laboratory Tests

q_p Pocket penetrometer strength, tsf
q_u Unconfined compression test, tsf
LL Liquid limit
PL Plastic limit
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

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