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Feasibility Report for **2022 Infrastructure Improvements Project** City of Jordan, MN

January 05, 2022





**Prepared by:** 

Bolton & Menk, Inc. 12224 Nicollet Avenue Burnsville, MN 55337

# Certification

Feasibility Report

for

#### 2022 Infrastructure Improvements Project

#### City of Jordan, MN

BMI Project No. 0T1.125691

#### January 2022

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.

By:

Sure Wheeler

Lukas Wheeler, P.E. License No. 57855

Date: January 05, 2022

# **Table of Contents**

1.0	I	NTRODUCTION	1
2.0	Ρ	ROJECT INITIATION & BACKGROUND	1
3.0	E	XISTING CONDITIONS	3
	Α.	Sanitary Sewer	3
	в.	Watermain	3
	С.	Streets	3
	D.	Pedestrian Facilities	3
	Ε.	Lighting	3
	F.	Alleys	3
4.0	Ρ	ROPOSED IMPROVEMENTS	4
	Α.	Sanitary Sewer Improvements	4
	в.	Watermain Improvements	4
	С.	Street Improvements	5
	D.	Pedestrian Improvements	5
	Ε.	Lighting	5
	F.	Alley Improvements	6
5.0	Ρ	PUBLIC INPUT	8
6.0	Т	RAFFIC & ACCESS	9
7.0	E	ASEMENTS AND PERMITS	9
8.0	E	STIMATED COSTS/FINANCING	9
9.0	P	PROJECT SCHEDULE 1	1
10.0	0	CONCLUSION 1	1

# Appendix

Appendix A: Figures Appendix B: Preliminary Cost Estimate Appendix C: Preliminary Assessment Roll & Map Appendix D: Geotechnical Report

#### **1.0 INTRODUCTION**

This report examines the proposed infrastructure improvements for the City of Jordan's 2022 Infrastructure Improvement's Project. The project consists of the combination of two sub project areas that are also identified in the City's Capital Improvement Plan (CIP). These improvements are scheduled for construction in 2022 in the CIP.

The first project area is the improvement of the streets and utilities in the Whispering Meadows business district (Seville Drive and El Dorado Drive). Improvements includes watermain replacement, sanitary sewer realignment, pavement resurfacing, spot curb and gutter replacement, and the addition of a new sidewalk.

The second project area includes four blocks of alley improvements along the alleys ½ block north of Second Street between Mertens Street and Rice Street. Proposed improvements for these four blocks of alley include grading the existing gravel alley ways and installing new pavement.

The above-mentioned project areas can be seen in Figure 1 in Appendix A at the end of this report.

This report will review the existing conditions in the project areas and discuss, in detail, the proposed improvements. It will also provide preliminary cost estimates for the proposed improvements with financing for the project comprising of a combination of the City's general tax levy, water enterprise fund, sanitary sewer enterprise fund, storm sewer enterprise fund, and special assessments.

#### 2.0 PROJECT INITIATION & BACKGROUND

The 2022 infrastructure Improvements Project was initiated at the October 4, 2021 City Council Meeting after being listed in the city of Jordan's Capital Improvement Program. The feasibility study and report have been completed to identify the infrastructure improvements needed in the proposed project areas, define estimated costs and preliminary assessments associated with the improvements, and document these findings for use by decision makers. This report will also be used as the basis for the final design component of the project. The report complies with the requirements of MN Statute 429 for levying special assessments to benefitting properties.

This report examines the proposed street and pedestrian improvements on the streets identified in the project area. The project areas consist of Whispering Meadows and 4 blocks of alleys in Jordan. The project areas are shown in Figure 1 below.



Figure 1: Project Location Map

The project scope involves:

- Whispering Meadows
  - Watermain Replacement
  - Sewer Realignment
  - Spot Storm Sewer replacement
  - Full depth street reclamation and bituminous paving
  - Spot replacement of damaged curb and gutter
  - New concrete sidewalk and ADA pedestrian facilities
  - Optional addition of street lighting
- Alley improvements (4 blocks)

A geotechnical evaluation of the project areas was completed in November 2021 to facilitate evaluation of existing street conditions and underlying soil conditions in Whispering Meadows. Questionnaires were sent to owners of property adjacent to all project areas in order to collect additional input on project needs. Input from the geotechnical report, City staff, field engineering review, and property owners was incorporated into the report recommendations.

#### **3.0 EXISTING CONDITIONS**

#### A. Sanitary Sewer

An existing sanitary sewer main runs between Seville Drive and El Dorado Drive. When the sewer was installed in 1997, it was to be constructed within a 10' easement along the property lines between 500/600 Seville Drive and 150/100 El Dorado Drive. City Staff recently found that the sewer was in fact installed outside of this easement and thus on private property. Existing businesses occupy 150 and 100 El Dorado Dr. The lots at 500 and 600 El Dorado Drive are currently undeveloped.

#### B. Watermain

The existing watermain in Whispering Meadows was constructed in 1998. The existing main is 8" ductile iron pipe with ductile iron fittings, which is a commonly used modern material, but the main is in very poor condition. City Public Works has responded to multiple watermain breaks in recent years including five breaks in 2021. During one of the recent watermain breaks, City public works staff noted that portions of the watermain with Whispering Meadows was in such poor condition that the watermain could be punctured simply by pushing one's finger through the existing ductile iron pipe. Although it is difficult to determine the exact cause for the poor condition of the watermain, it is speculated that a combination of corrosive soils and defective watermain materials have led to the accelerated degradation of the existing water main.

There are 11 active water services connected to the main, a majority of which are 6" ductile iron. This sized service is typical for supplying necessary flow for sprinkler systems within a commercial property. There are also several inactive services that are stubbed out to existing vacant lots.

#### C. Streets

The street segments in the Whispering Meadows area of the 2022 Infrastructure Improvements Project consist of approximately a ½ mile local roadway. These local roadways are relatively low volume, low speed roadways serving commercial properties. The street width is 30' from face of curb to face of curb. Per as-built record drawings, the existing pavement thickness is 4.5" with 10" of underlying aggregate base. Parking is available on both side of the street.

The street pavement in Whispering Meadows has deteriorated to a point where mill and overlay would no longer be effective, consistent with expectations given it has been approximately 25 years since the roadway was constructed. The existing pavement is showing pavement distresses such as longitudinal/lateral cracking and stripping. Many areas are showing increased deterioration with significant raveling, block cracking, alligator cracking, and pavement settlements.

#### **D.** Pedestrian Facilities

There is an existing 5-foot-wide sidewalk along the back of the curb on the south side of Seville Drive. This walk was installed as part of some recent adjacent site developments. This existing walk accounts for approximately 1/3 of the total roadway length. Existing pedestrian ramps are located at the east ends of El Dorado and Seville Drive, adjacent to Creek Lane. The remainder of the project area does not contain any existing pedestrian facilities.

#### E. Lighting

Whispering Meadows does not have any existing on street lighting. The businesses along Seville Dr and El Dorado Drive have lighting in their parking lots supplying some ambient light to the roadways. The City has received some comments from the public regarding lack of dedicated street lighting along the corridor.

#### F. Alleys

Four blocks of existing alley located 1/2 block north of TH 282 (Second St), between Mertens St

and Rice St are proposed to be improved. The existing alleys are approximately 10' wide and gravel. The exiting gravel requires routine maintenance by public works, particularly after significant rain events. Drainage issues including standing water withing the existing alleys have been reported by City Public Works as well as several residents. These drainage issues are a result of the existing longitudinal grades being very flat, not allowing for water to adequately drain from the alleys.

#### **4.0PROPOSED IMPROVEMENTS**

#### A. Sanitary Sewer Improvements

The bulk of the existing sanitary sewer main is in sufficient condition to remain. One sanitary sewer main segment is proposed to be relocated to the center of the easement. A new 8" PVC main, of size and slope consistent with the existing pipe, will be installed. One active sanitary sewer service (to 150 El Dorado Drive) will be extended to the new sanitary sewer main. The existing sanitary sewer pipe will be abandoned in place and filled with grout.

The portion of the main spanning between 500 and 600 Seville Drive is proposed to be left as is given the unknown of when/how the lots will develop and whether realignment of the sewer will be necessary/or feasible with future plans. At the time of development of these lots, an easement for the main could be pursued or relocation of the sanitary sewer by the developer could be discussed. Owners of the property at this time were consulted in preparation of this report and declined to pursue actions at this time.

#### **B.** Watermain Improvements

The watermain through the Whispering Meadows development is in need of replacement based on its history of costly watermain breaks. Four methods of watermain replacement/rehabilitation were evaluated:

- 1. Cured In Place Pipe (CIPP) lining rehabilitating the watermain by installing a structural liner through it
- 2. Pipe bursting pushing a new pipe through the existing pipe
- 3. Horizontal Directionally Drilling (HDD) tunneling in a new watermain on the opposite side of the street from the existing watermain
- 4. Traditional open excavation watermain replacement

Both Cured In Place Pipe (CIPP) lining and Pipe Bursting were first evaluated as compared to the existing watermain alignment, which the new/rehabilitated watermain would follow. These methods involve trenchless technology requiring pits be dug at the beginning of a run, end of a run, water services, hydrants, bends in the watermain, etc. In general, CIPP lining and pipe bursting are more expensive per linear foot than the more conventional open cut installation, however can be less intrusive in some cases. Given the winding/turning nature of the Whispering Meadows existing watermain alignment coupled with the relatively high number of service and hydrant connections over a short stretch requiring a significant number of pits, these methods were determined too costly as compared to other options.

Horizontal Direction Drilling (HDD) is another trenchless method that involves tunneling a new watermain in. The watermain tunneling operation can be curved so as to avoid the need for some excavations. This method was found to be infeasible due to a lack of space for a new watermain alignment within the Whispering Meadows right of way, however. The Minnesota Department of Health (MDH) requires that watermain maintains a minimum 10' horizonal offset from sanitary sewer and storm sewer. This spacing could not be accomplished while also avoiding conflict with other existing infrastructure proposed to remain in place, particularly storm sewer.

Traditional open excavation watermain replacement is the most often used method of watermain replacement because it is directly the least expensive method and carries lowest risk. The existing

watermain is located under the interior curb of Whispering Meadows curvilinear streets. Given the watermain location in this area, there are additional indirect associated costs such as overlying curb replacement and roadbed restoration. There is added cost associated with additional curb replacement attributed to this method of open trench replacement, however it is still the lowest cost option of all the alternative methods evaluated. While the lowest cost option, it also yields an additional benefit of new concrete curb/gutter being provided around the interior of the Whispering Meadows streets as compared to improvements completed with other options.

With open excavation removal and replacement of the watermain as the proposed method of improvement, the existing ductile iron pipe will be removed and a new PVC watermain will be installed along the same alignment. While the exact cause as to why the existing watermain was so heavily corroded is not known, the change to a PVC watermain in this area will prevent the same corrosion issue from occurring. Thicker-walled PVC is now a commonly used material for watermain construction. Approximately 230' of watermain along El Dorado Drive was replaced with PVC in the summer of 2021. This occurred after the City responded to several watermain breaks along the stretch. This stretch of pipe will remain in place. Existing hydrant leads, gate valves, individual water service leads to the ROW line will also be replaced with the watermain improvements.

#### C. Street Improvements

The roadways within Whispering Meadows are proposed to be resurfaced by way of full depth reclamation. This involves grinding up the existing bituminous surface along with the underlying aggregate base to a depth of 12" to make a new blended aggregate base material. A majority of the reclaim material will be stripped and stockpiled nearby while the watermain work is completed. The subgrade will be shaped and compacted. The reclaimed and recycled aggregate base will then be respread, shaped, and compacted. Three layers of new bituminous pavement will be paved back. The first layer of bituminous pavement will be 2" thick of non-wearing course and then two (2) 1.5" layers of wearing course.

A majority of the curb along the interior loop of Whispering Meadows will need to be replaced given it is within the excavation limits for the watermain replacement. The remaining existing curb and gutter will be analyzed to identify existing areas of poor drainage and damage as defined by the city's current quality standards. Pieces of the remaining curb found to be deficient, estimated to be 15%, will be removed and replaced with new concrete curb and gutter.

#### **D.** Pedestrian Improvements

A new 6' concrete walk is proposed along the outer loop of Whispering meadows. A 5' grass boulevard is proposed between the back of curb and concrete walk. A small portion of the proposed sidewalk in front of 169 El Dorado Drive will be installed at the back of the curb to avoid conflict with existing trees. The proposed walk will connect to existing concrete walks. The walk along Seville will connect to an existing 5' walk running along the back of curb on the south side of Seville. The sidewalk along El Dorado will connect to the existing concrete sidewalk running along Creek Lane. A new pedestrian ramp will be constructed at El Dorado and Creek Lane to accommodate the new walk.

#### E. Lighting

No on-street lighting currently exists within Whispering Meadows. Lighting was outside the original scope of the intended project, though some opportunity for efficiencies with incorporating lighting with this project exist, thus City staff felt it was appropriate to give council the opportunity to consider adding it to the project. Two options for proposed lighting were analyzed:

- 1. City owned lighting system
- 2. Xcel owned lighting system

Preliminary estimated upfront costs for both options can be reviewed in the detailed preliminary cost estimate in Appendix B.

There is no controlling standard that requires the City to retrofit the project area roadways with lighting. If this area were proposed as a new development, street lighting would be required of the developer as a City standard policy matter. The improvements proposed later in this report do not imply full replacement of all infrastructure or otherwise imply this standard relative to new development should govern, rather it is shared for reference as one consideration by decision makers relative to this unique situation

#### Option 1 - City Owned Lighting System

14 acorn style poles (consistent with the City's standard pole including those recently installed on Creek Lane north of the roundabout) would be installed around the perimeter of Whispering Meadows. All costs associated with a City owned system would be borne by the City and installed by the City's contractor. The City would be responsible for maintaining, upgrading, and replacing the system in the future. Power would be supplied by Xcel Energy via a nearby transformer and the City would pay Xcel Energy the typical rate for power. In general, the upfront costs for this option are higher, but with the anticipation that the lifecycle costs will be lower over 25 years.

#### Option 2 - Xcel Owned Lighting System

Xcel would install 7 cobra-head style poles near driveway entrances around the perimeter of Whispering Meadows. The style of the poles would be consistent with the existing Xcel owned poles running up Creek Lane. An Xcel owned system would be installed and maintained by Xcel. The upfront material costs would be charged to the City along with a monthly charge per pole to maintain the poles. Xcel would be responsible for upgrading/replacing the poles over time. The upfront costs of this option are lower, but the lifetime costs are expected to be more expensive than a City owned system.

#### F. Alley Improvements

#### 4 Blocks of Alley between Mertens St & Rice St, 1/2 block north of TH 282

The existing gravel within the alleys are proposed to be shaped and graded to ensure proper drainage. The four blocks of alley located ½ block north of TH 282 (Second St), between Mertens St and Rice St will have pavement installed over the existing/underlying gravel. Two of the four blocks had storm sewer installed as part the 2008 project. The existing storm sewer in the Varner Street and Rice Street alley is proposed to be extended to improve drainage. The other two alleys were analyzed, and it was determined that existing drainage deficiencies exist, but the addition of storm sewer is not feasible.

The existing grade in all four alleys is very flat and is causing drainage issues. The industry standard notes a minimum slope of 1.0% longitudinal grade for bituminous pavement to properly drain. This grade cannot be accomplished along three of the four alleys (excluding the Varner Street to Rice Street alley) proposed for improvement due to existing topography and more specifically, the elevation and close proximity of adjacent garages. Two options for surfacing of the alleys have been evaluated. The first option being a concrete alley and the second option being a bituminous alley with a concrete drainage pan running down the center. The concrete drainage pan would be installed along portions of the alleys with longitudinal grade less than 1.0%

#### Option 1 – Concrete Alley

Concrete can be formed/poured at flatter slopes (industry standard minimum slope of 0.5%). A completely concrete alley or the addition of the concrete drainage pan to the center of a bituminous alleys allows for water to drain longitudinally along the flatter slopes. A concrete alley is a higher initial cost option but can be expected to last longer than a bituminous alley. The estimated cost of *Prepared by: Bolton & Menk, Inc.* PROPOSED IMPROVEMENTS

this option is approximately \$65,000 per block and life span is estimated to be 60 years before concrete removal/replacement is desired. The Varner St to Rice Street alley is the only alley that can accomplish 1.0% longitudinal grade, and could have adequate drainage with bituminous pavement. If the concrete alley option is selected, it is suggested that the Varner – Rice Street alley be removed from the project for future implementation with a project with similar scope.

#### Option 2 - Bituminous Alley with Concrete Drainage Pan

This alternative proposes a 10' wide alley, all of which is constructed of bituminous with exception to a 2-foot-wide concrete drainage pan along portions of the alley with longitudinal grade under 1.0%. A suitable 0.5% longitudinal grade is established by forming at installing the concrete drainage pan at the specific elevation required. The adjacent bituminous can then be installed at cross slope of 2.0 to 3.0% slope toward the drainage pan. This same approach was done on the Mill – East St Alley in 2017.

A bituminous alley with a concrete drainage pan running down the center has a lower initial cost that will still allow for proper drainage but has a shorter expected life given the bituminous will deteriorate at a quicker rater over time. Bituminous rehabilitation options in the future will be limited, as milling/overlaying or reclaiming/resurfacing are not readily feasible given the concrete structure in the center. There are also inherent challenges with paving a 10' wide bituminous alley with a concrete drainage pan in the center. The estimated cost of this option is approximately \$45,000 per block and life span is estimated to be 30 years before bituminous removal/replacement is desired.

#### **5.0 PUBLIC INPUT**

A letter was sent to all residents adjacent to the proposed project areas notifying them of the proposed project. A questionnaire was included with the letter encouraging residents to supply any input they may have on the project including any existing drainage issues they have noticed and any other suggestions they would like to be considered as part of the project. Twelve residents returned the questionnaire. The comments received are bulleted as follows, *with the project team's corresponding review/consideration of each comment listed in italics*:

- Concerns regarding access during construction.
  - Communication during construction is key to assuring reasonable access is maintained while the necessary work is performed. Newsletters will be provided to residents during the construction process, a website will be routinely updated to with the latest information, and contact information for project team members provided to residents to facilitate this communication. In cases where access is to be hindered by construction, such as the unique cases where concrete is curing in front of driveways for a seven day period, specific notice will be provided in advance to affected properties.
- Drainage issues within the alleys were reported at various locations.
  - Each has been reviewed preliminarily and some will require further evaluation in concert with final design for more detailed potential solutions.
  - Driveway at 108 3<sup>rd</sup> Street: drainage issues were reported in the spring after snow melt and after large rain events. The grading of the alley will be analyzed for the potential of lowering the alley profile to promote drainage away from the driveway.
  - Garage at 313 2<sup>nd</sup> Street: Garage and driveway becomes flooded during spring thaw and large rain events. Opportunities to improve drainage will be analyzed during final design.
- Request to protect existing landscaping.
  - Grading limits to accomplish proper drainage will be analyzed during final design. Existing landscaping withing City Right of Way cannot always be protect, but the design team will considerately attempt to limit impacts.
- Concerns regarding the potential of special assessments and proposed amounts for the alley improvements were received. Several residents noted they do not use the alley and are not in favor of being assessed.
  - A portion of the alley improvements costs will be assessed. Based on City Policy, but at the discretion of the City Council, the alley improvements are proposed to be funded with 70% of costs by the City and 30% of costs by special assessments to adjacent private properties. Properties abutting or with access to the proposed improvements are proposed to be assessed.
- Concerns were received that Seville Drive is very rough.
  - The roadway pavement will be reconstructed as part of the improvements.

In January, the project team will reach out to these residents to respond to their questions and comments on the project generally as noted above in italics.

Special assessments are to be used to fund a portion of the Whispering Meadows street/pedestrian improvement costs and a portion of the alley improvement costs. A public improvement hearing will be held at a council meeting for the improvements prior to proceeding with final plans. This hearing is consistent with the MN Statute 429 process for special assessments. The council will also conduct a public hearing on the assessments prior to adopting the final assessments.

Additional correspondence will be sent to residents adjacent to the project areas as construction approaches including additional information on the proposed project, preliminary assessments, what to expect during construction, and an approximate project schedule.

#### 6.0 TRAFFIC & ACCESS

Traffic and driveway access will be maintained during construction. Some intermittent delays to access can be expected when the contractor is excavating for watermain at an entrance and or removing replacing existing curb and gutter and pavement at the entrance. Access restrictions will be minimized at some properties where multiple driveways exist, and work can be phased to be completed at driveways during alternating times. Any necessary disruptions in access will be communicated to businesses/residents during construction. Traffic control devices (barrels, cones, barricades, etc.) will be utilized to delineate areas with active construction. The contractor will maintain a drivable surface during construction, prior to bituminous paving. Areas of excavation for watermain improvements will be backfilled or barricaded off during non-working hours.

#### **7.0 EASEMENTS AND PERMITS**

The permanent proposed improvements will be constructed within the existing right-of-way and right of entry agreements where necessary. Acquisition of permanent right of way (ROW) is not proposed with this project.

A Minnesota Pollution Control Agency (MPCA) – General Storm Water Permit for Construction Activity under the National Pollutant Discharge Elimination System (NPDES) will be acquired for the project. Construction BMPs will be implemented within the project areas as necessary in compliance with the City's stormwater ordinance. Less than 1.0 acres of new impervious area is proposed to be generated by the project and therefore no permanent stormwater management (ponding, etc.) is proposed to be built with the project.

A Minnesota Department of Health (MDH) – Watermain plan review will be required for the project. The watermain design will adhere to MDH standards.

#### **8.0 ESTIMATED COSTS/FINANCING**

The estimated project cost to complete the improvements proposed herein are presented below. These costs include estimated construction costs, a 10% contingency, and soft (indirect) costs for finance, legal, administrative, and engineering. Soft costs for the project areas included in the capital improvement plan, generally including the pavement resurfacing and alley improvement areas, amounting to 18% of the estimated construction costs.

These cost estimates are based upon public construction cost information generated by historical prices bid by contractors for similar work. Since the consultant has no control over the cost of labor, materials, competitive bidding process, weather conditions, and other factors affecting the cost of construction, all cost estimates are opinions for general information of the client and no warranty or guarantee as to the accuracy of construction cost estimates is made. It is recommended that costs for project financing should be based upon actual, competitive bid prices with reasonable contingencies.

Location	Total Estimated Cost *Option 1 Alley	Total Estimated Cost **Option 2 Alley
Whispering Meadows Street Improvements	\$671,100	\$671,100
Whispering Meadows Watermain	\$514,000	\$514,000
Whispering Meadows Sanitary Sewer	\$79,200	\$79,200
Whispering Meadows Storm	\$66,200	\$66,200
Alley Improvements:	\$315,400	\$207,600
Total Estimated Cost	\$1,645,900	\$1,538,100

#### Table 2 – Estimated Cost Summary 2022 Infrastructure Improvements (See Appendix B for Detailed Cost Estimate)

\*Option 1 Alley: Concrete Alley

\*\*Option 2 Alley: Bituminous Alley with Concrete Drainage Pan

Optional Lighting Addition:	Total Estimated Cost
Whispering Meadows Lighting: City Owned	\$101,200
Whispering Meadows Lighting: Xcel Owned	\$20,000

Table 3 – Fu	nding Summary	2022	Infrastructure	Improvements	Project
I WOIC C I W	maning Stanning			mpiorements	1 10 1000

Item	Funds *Option 1 Alley	Funds **Option 2 Alley						
Street Fund	\$775,170	\$699,710						
Water Fund	\$514,000	\$514,000						
Sanitary Sewer Fund	\$79,200	\$79,200						
Storm Fund	\$66,200	\$66,200						
Special Assessments	\$211,330	\$178,990						
TOTALS	\$1,645,900	\$1,538,100						
*Option 1 Alley: Concrete Alley **Option 2 Alley: Bituminous Alley with Concrete Drainage Pan								

A portion of the Whispering Meadows street/pedestrian improvement and the alley improvements costs will be assessed. As per City policy but at the discretion of the City Council, the applicable improvements are proposed to be funded with 70% of costs by the City and 30% of costs by special assessments to adjacent private properties. Properties abutting or with access to the proposed improvements are proposed to be assessed. Preliminary assessments have been calculated on a front foot basis with benefitting property paying a respective proportion of 30% of the project costs to be assessed. If the Council elects to proceed with final design of improvements in the Whispering Meadows area as proposed, City Staff recommends benefit appraisals be obtained. Following receipt of the benefit appraisals, the City could choose to assess the lesser of the benefit appraisal amount or City policy based calculation.

The proposed assessments are proposed to be assessed over a term and based on the interest rate defined by the City's assessment policy or otherwise established by council resolution at the time of the assessment hearing. For this project based on the preliminary estimated assessment amounts, it

is anticipated assessments will be payable over a 5-year period at an interest rate 1.0 percent higher than the rate secured by the City for its bonds on this project.

The preliminary assessment roll can be seen in Appendix C. The proposed assessments and funding summary are based on preliminary estimated projects costs and are anticipated to be revised at the time of final assessment hearing based on the bids received.

#### 9.0 PROJECT SCHEDULE

The proposed project schedule is shown below:

Council Receives Feasibility (Preliminary Engineering) Report	January 10, 2022
Order the Public Improvement Hearing	January 10, 2022
Conduct the Public Improvement Hearing & Order Final Plans	February 14, 2022
Approve Plans & Specs; Authorize Ad for Bids	March 28, 2022
Council Reviews Bids, Order Special Assessment Hearing	April 25, 2022
Assessment Hearing; Award Bid	May 23, 2022
Construction (12 weeks)	June 2021 – October 2022

## 10.0 CONCLUSION

From an engineering standpoint, this project, as proposed, is feasible, cost effective, and necessary. It can best be accomplished by letting competitive bids for the work under one contract in order to complete the work in an orderly and efficient manner. The City, its financial consultant, and the persons assessed will have to determine` the economic feasibility of the proposed improvements.

Appendix A: Figures



#### 2022 Infrastructure Improvements Project

City of Jordan, Minnesota



Area Map October 2021





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# Appendix B: Preliminary Cost Estimate

#### PRELIMINARY ENGINEER'S ESTIMATE

2022 INFRASTRUCTURE IMPROVEMENTS CITY OF JORDAN, MN BMI PROJECT NO. 0T1.125691



	JORDAN	Deter	1/5/2022														
		Date.	1/5/2022							WHISPERIN	IG MEADOWS						
			ESTIMATED LINIT	ST	EET	WAT	ERMAIN	STORM	A SEWER	SANITA	RY SEWER	т	OTAL		OPTIONAL		
ITEM NO.	BID ITEM	UNIT OF MEASURE	PRICE												ING	XCEL OWNED	LIGHTING
				QUANTITY	ESTIMATED COST	QUANTITY	ESTIMATED COST	QUANTITY	ESTIMATED COST	QUANTITY	ESTIMATED COST	QUANTITY	ESTIMATED COST	QUANTITY ESTIMA	TED COST	QUANTITY	STIMATED COST
1	MOBILIZATION	LUMP SUM	\$65,000,00	0.40	\$26,000	0.30	\$19.500	0.05	\$3,250	0.05	\$3,250	0.80	\$52.000				
2	TRAFFIC CONTROL	LUMP SUM	\$32,500.00	0.40	\$13,000	0.30	\$9,750	0.05	\$1,625	0.05	\$1,625	0.80	\$26,000				
3	CLEAR AND GRUB TREE	EACH	\$500.00	9	\$4,500							9	\$4,500				
4	SALVAGE CASTING (SANITARY/STORM)	EACH	\$170.00					5	\$850	9	\$1,530	14	\$2,380				
5	REMOVE CASTING REMOVE CLIRB AND GUTTER (SPOT REPLACEMENT)	LIN FT	\$200.00	580	\$4.060							580	\$4,060				
7	REMOVE CURB AND GUTTER	LIN FT	\$6.00	2125	\$12,750							2125	\$12,750				
8	REMOVE BITUMINOUS PAVEMENT (DRIVEWAY)	SQ YD	\$5.00	390	\$1,950							390	\$1,950				
9	REMOVE CONCRETE PAVEMENT (WALK & DRIVEWAY)	SQ YD	\$7.00	25	\$175	2260	C11.000					25	\$175				
10	REMOVE WATERMAIN REMOVE HYDRANT	EIN FI	\$5.00			2360	\$11,800					2360	\$11,800				
12	ABANDON SANITARY SEWER	LIN FT	\$20.00							265	\$5,300	265	\$5,300				
13	REMOVE DRAINAGE STRUCTURE	EACH	\$600.00					5	\$3,000			5	\$3,000				
14	REMOVE STORM SEWER PIPE	LIN FT	\$25.00	6050	630.050			122	\$3,050			122	\$3,050				
15	RECLAIM BITUMINOUS PAVEMENT (IN PLACE)	SQYD	\$3.00	500	\$20,850							500	\$20,850				
17	SAWING CONCRETE PAVEMENT (FULL DEPTH) (WALKS AND DRIVEWAYS)	LIN FT	\$6.00	100	\$600							100	\$600				
18	COMMON EXCAVATION (P)	CU YD	\$30.00	970	\$29,100							970	\$29,100				
19	SALVAGE/STOCKPILE RECLAIM (P)	CU YD	\$5.00	1350	\$6,750							1350	\$6,750				
20	REINSTALL SALVAGED RECLAIM (P)	CU YD SO YD	\$10.00	1350	\$13,500							1350	\$13,500				
22	SUBGRADE EXCAVATION	CU YD	\$30.00	120	\$3,600							120	\$3,600				
23	BITUMINOUS MATERIAL FOR TACK COAT	GAL	\$3.00	390	\$1,170				1	1		390	\$1,170				
24	BITUMINOUS WEARING COURSE (SPWEA240C)	TON	\$75.00	1300	\$97,500			l				1300	\$97,500				
25	BITUMINOUS NON-WEARING COURSE (SPNWB230C)	TON	\$80.00	870	\$69,600		<u> </u>					870	\$69,600				
20	3" BITUMINOUS DRIVEWAY PAVEMENT (SPWEA240C)	SQ YD	\$30.00	390	\$11,700							390	\$11,700				
28	AGGREGATE SURFACEING CLASS 2	TON	\$25.00														
29	AGGREGATE BASE CLASS 5 (SALVAGED RECLAIM)	TON	\$15.00	220	\$3,300					-		220	\$3,300				
30	CONCRETE CURB & GUTTER - DESIGN B618	LIN FT	\$27.00	2125	\$57,375		+					2125	\$57,375				
32	4" CONCRETE WALK	SO FT	\$7.00	8000	\$18,300		<u> </u>					8000	\$18,500				
33	6" CONCRETE WALK (PEDESTRIAN RAMPS)	SQ YD	\$170.00	20	\$3,400							20	\$3,400				
34	6" CONCRETE ALLEY/DRIVEWAY PAVEMENT	SQ YD	\$80.00														
35	8" CONCRETE ALLEY APRON	SQ YD	\$100.00	180	\$16,200							180	\$16.300				
30	CONCRETE DRAINAGE PAN	SQ YD	\$90.00	180	\$16,200		<u> </u>					180	\$10,200				
38	TRUNCATED DOMES	SQ FT	\$65.00	12	\$780							12	\$780				
39	REINSTALL CASTING (SANITARY/STORM)	EACH	\$400.00					5	\$2,000	9	\$3,600	14	\$5,600				
40	ADJUST CASTING (SANITARY/STORM)	EACH	\$800.00			-		5	\$4,000			5	\$4,000				
41	DEWATERING	LUIMP SUM	\$400.00			1	\$800					1	\$25.000				
43	TEMPORARY WATER SERVICE (SPECIAL)	EACH	\$6,000.00			10	\$60,000					10	\$60,000				
44	CONNECT TO EXISTING WATERMAIN	EACH	\$2,000.00			4	\$8,000					4	\$8,000				
45	HYDRANT	EACH	\$7,000.00			5	\$35,000					5	\$35,000				
40	6" WATERMAIN C900 PVC	LIN FT	\$10.00			410	\$22,000					410	\$22,000				
48	8" WATERMAIN C900 PVC	LIN FT	\$70.00			1950	\$136,500					1950	\$136,500				
49	6" GATE VALVE & BOX	EACH	\$1,900.00			15	\$28,500					15	\$28,500				
50	8" GATE VALVE & BOX	EACH	\$2,700.00			4	\$10,800				61.000	4	\$10,800				
51	8" X 6" PVC SANITARY SEWER SERVICE WYE 6" PVC SANITARY SEWER SERVICE PIPE	LIN FT	\$1,000.00							25	\$1,000	25	\$1,000				
53	8" PVC SANITARY SEWER SERVICE PIPE	LIN FT	\$85.00							30	\$2,550	30	\$2,550				
54	10" PVC SANITARY SEWER SERVICE PIPE	LIN FT	\$95.00							265	\$25,175	265	\$25,175				
55	SANITARY MANHOLE	LIN FT	\$500.00				<u> </u>			13	\$6,500	13	\$6,500	<b> </b>			
57	CONNECT TO EXISTING SANITARY SEWER STRUCTURE	EACH	\$2,500.00							1	\$2,500	1	\$5,000				
58	CASTING (SANITARY MANHOLE)	EACH	\$800.00							1	\$800	1	\$800				
59	6" SOLID PVC UNDERDRAIN	LIN FT	\$45.00														
60	6" PVC UNDERDRAIN CLEANOUT	EACH	\$500.00				+		63.677		l		63	<b>├</b> ───			
67	12 RCP FIPE SEWER CE III DES 3006 (STORM) 12" PVC SEWER (STORM)	LIN FT	\$60.00 \$80.00					50	\$3,000			30	\$3,000				
63	15" RCP PIPE SEWER CL III DES 3006 (STORM)	LIN FT	\$65.00					12	\$780			12	\$780				
64	18" RCP PIPE SEWER CL III DES 3006 (STORM)	LIN FT	\$70.00					30	\$2,100	-		30	\$2,100				
65	21" RCP PIPE SEWER CL III DES 3006 (STORM)	LIN FT	\$70.00					20	\$1,400			20	\$1,400				
66 67	CONSTRUCT STORM MH DES 48" 4022 STORM CATCH BASIN - DESIGN R-1 2'X3'	EACH	\$2,500.00					2	\$5,000		<u> </u>	2	\$5,000				
68	CONNECT TO EXISTING STORM PIPE	EACH	\$1,800.00					6	\$10,800			6	\$10,800				
69	CONNECT TO EXISTING STORM STRUCTURE	EACH	\$1,800.00					1	\$1,800			1	\$1,800				
70	CASTING (STORM MANHOLE)	EACH	\$800.00														
71	HYDROMULCH & SEED MIX 25-151	SQ YD	\$2.00	2800	\$5,600							2800	\$5,600				
72	DECIDUOUS TREE 2.5" CAL B&B	TREE	\$45.00 \$750.00	4/0	\$6,750		<u> </u>		<u>                                     </u>			4/0	\$6,750				
74	CROSSWALK (MULTI COMP)	SQ FT	\$10.00	180	\$1,800							180	\$1,800				
75	LIGHTING UNIT	EACH	\$2,500.00			<u> </u>		<u> </u>		<u> </u>				14 \$3	5,000		
76	1" NON-METALLIC CONDUIT	LIN FT	\$6.00					L	-					4100 \$2	4,600		
78	SERVICE CABINET	EACH	\$2.00 \$7.500.00				<u> </u>		<u>                                     </u>					4100 \$8	,500		
79	CONNECT TO EXISTING POWER	EACH	\$3,000.00											1 \$3	,000		
80	XCEL OWNED LIGHTING SYTEM INSTALL	LUMP SUM	\$20,000.00			<u> </u>		<u> </u>		<u> </u>				L		1	\$20,000
81	LANDSCAPE ALLOWANCE	LUMP SUM	\$7,500.00	1	\$7,500	I	\$305.000	L	\$51.000	I	\$61.000	1.00	\$7,500	~	8.000		\$20,000
		10% CONTINGENCY:			\$51,700		\$39,600		\$5,100		\$6,100		\$1,025,000	\$7	,800	=	320,000
	ESTIMATED C	ONSTRUCTION COST:			\$568,700		\$435,600		\$56,100		\$67,100		\$1,127,500	\$8	5,800		\$20,000
	SOFT COSTS (SURVEY, GEOTECHNICAL, DESIGN, & CONSTRUCT	TION INSP, & ADMIN):			\$102,400		\$78,400		\$10,100		\$12,100		\$203,000	\$1	5,400		
		ISPERING MEADOWS	\$1,330,500		\$671,100		\$514,000		\$66,200		\$79,200		\$1,330,500		1 200	-	_
	SUBTOTAL XCEL OWNED LIGHTING (WHI	ISPERING MEADOWS)	\$20,000												1,200	-	\$20,000
	SUBTOTAL ALLEY OPTION	1 (CONCRETE ALLEY)	\$315,400											_		=	
			44444														

#### PRELIMINARY ENGINEER'S ESTIMATE

2022 INFRASTRUCTURE IMPROVEMENTS CITY OF JORDAN, MN BMI PROJECT NO. 0T1.125691



	·	Date: 1/	/5/2022																				
								ALLEY OPTION 1:	CONCRETE ALLEY				ALLLEY IM	IPROVEMENTS			ALLEY OPTIO	N 2: BITUMINUS ALL	EY WITH CONCRETE I	RAINAGE PAN			
ITEM NO	BID ITEM		ESTIMATED UNIT	MERTEN	S - WOOD	wood	- WEST	WEST - V	VARNER	VARN	ER - RICE	тс	DTAL	MERTENS	5 - WOOD	WOOD	- WEST	WEST -	VARNER	VARNE	R - RICE	тот	TAL
TENTING	. DID HEW	UNIT OF MEASURE	PRICE														· · · · · · · · · · · · · · · · · · ·						
				ESTIMATED QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST	QUANTITY	ESTIMATED COST	ESTIMATED QUANTITY	ESTIMATED COST												
1	MOBILIZATION	LUMP SUM	\$65,000.00	0.05	\$3,250	0.05	\$3,250	0.05	\$3,250	0.05	\$3,250	0.2	\$13,000	0.05	\$3,250	0.05	\$3,250	0.05	\$3,250	0.05	\$3,250	0.2	\$13,000
2	TRAFFIC CONTROL CLEAR AND GRUB TREE	EUMP SUM	\$32,500.00	0.05	\$1,625	0.05	\$1,625	0.05	\$1,625	0.05	\$1,625	0.2	\$6,500	0.05	\$1,625	0.05	\$1,625	0.05	\$1,625	0.05	\$1,625	0.2	\$6,500
4	SALVAGE CASTING (SANITARY/STORM)	EACH	\$170.00																				
5	REMOVE CASTING	EACH	\$200.00			1	\$200					1	\$200			1	\$200					1	\$200
6	REMOVE CURB AND GUTTER (SPOT REPLACEMENT)	LIN FT	\$7.00																				
7	REMOVE CURB AND GUTTER REMOVE BITUMINOUS PAVEMENT (DRIVEWAY)	LIN FT	\$6.00	84	\$504 \$700	84	\$504	81 30	\$486	41 50	\$246	290	\$1,740	84	\$504 \$700	84	\$504	81	\$486	41 50	\$246	290	\$1,740
9	REMOVE CONCRETE PAVEMENT (WALK & DRIVEWAY)	SQ YD	\$7.00	370	\$2,590	400	\$2,800	390	\$2,730	430	\$3,010	1590	\$11,130	30	\$210	60	\$420	50	\$350	90	\$630	230	\$1,610
10	REMOVE WATERMAIN	LIN FT	\$5.00																				
11	REMOVE HYDRANT	EACH	\$700.00															-					
12	ABANDON SANITARY SEWER	LIN FT	\$20.00																				
13	REMOVE DRAINAGE STRUCTORE	LIN FT	\$800.00																				
15	RECLAIM BITUMINOUS PAVEMENT (IN PLACE)	SQ YD	\$3.00																				
16	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	\$3.00	250	\$750	100	\$300	160	\$480	150	\$450	660	\$1,980	250	\$750	100	\$300	160	\$480	150	\$450	660	\$1,980
17	SAWING CONCRETE PAVEMENT (FULL DEPTH) (WALKS AND DRIVEWAYS)	LIN FT	\$6.00	60	\$360	90	\$540	80	\$480	110	\$660	340	\$2,040	60	\$360	90	\$540	80	\$480	110	\$660	340	\$2,040
18	COMMON EXCAVATION (P)	CU YD	\$30.00															-					
20	REINSTALL SALVAGED RECLAIM (P)	CU YD	\$5.00																				
21	SUBGRADE PREPARATION (P)	SQ YD	\$3.00	340	\$1,020	340	\$1,020	340	\$1,020	340	\$1,020	1360	\$4,080	340	\$1,020	340	\$1,020	340	\$1,020	340	\$1,020	1360	\$4,080
22	SUBGRADE EXCAVATION	CU YD	\$30.00	_												-		-	1				
23	BITUMINOUS MATERIAL FOR TACK COAT	GAL	\$3.00				<u> </u>							20	\$60	20	\$60	20	\$60	20	\$60	80	\$240
24	BITUMINOUS WEARING COURSE (SPWEA240C)	TON	\$75.00				<u> </u>				-			40	\$3,000	40	\$3,000	40	\$3,000	40	\$3,000	160	\$12,000
25	FULL DEPTH BITUMINOUS STREET PATCH	SO YD	\$80.00 \$150.00	28	\$4.200	28	\$4.200	27	\$4.050	14	\$2.100	97	\$14.550	28	\$4,200	28	\$4,200	40	\$4.050	40	\$2.100	97	\$14,550
27	3" BITUMINOUS DRIVEWAY PAVEMENT (SPWEA240C)	SQ YD	\$30.00	140	\$4,200			30	\$900	50	\$1,500	220	\$6,600	140	\$4,200			30	\$900	50	\$1,500	220	\$6,600
28	AGGREGATE SURFACEING CLASS 2	TON	\$25.00																				
29	AGGREGATE BASE CLASS 5 (SALVAGED RECLAIM)	TON	\$15.00	140	\$2,100	140	\$2,100	140	\$2,100	140	\$2,100	560	\$8,400										
30	CONCRETE CURB & GUTTER - DESIGN 8618	LIN FT	\$27.00	84	\$2,268	84	\$2,268	81	\$2,187	41	\$1,107	290	\$7,830	84	\$2,268	84	\$2,268	81	\$2,187	41	\$1,107	290	\$7,830
31	4" CONCRETE CORB & GUTTER - DESIGN BOLS (SPOT REPLACEMENT)	SO FT	\$32.00	100	\$700			100	\$700	130	\$910	330	\$2 310	100	\$700			100	\$700	130	\$910	330	\$2 310
33	6" CONCRETE WALK (PEDESTRIAN RAMPS)	SQ YD	\$170.00	100	<i></i>			100	\$100	150	2310	550	\$2,510	100	<i>9100</i>			100	\$700	150	3310	330	<i>\$2,310</i>
34	6" CONCRETE ALLEY/DRIVEWAY PAVEMENT	SQ YD	\$80.00	370	\$29,600	400	\$32,000	390	\$31,200	430	\$34,400	1590	\$127,200	30	\$2,400	60	\$4,800	50	\$4,000	90	\$7,200	230	\$18,400
35	8" CONCRETE ALLEY APRON	SQ YD	\$100.00	40	\$4,000	40	\$4,000	40	\$4,000	30	\$3,000	150	\$15,000	40	\$4,000	40	\$4,000	40	\$4,000	30	\$3,000	150	\$15,000
36	7" VALLEY GUTTER	SQ YD	\$90.00																				
37	CONCRETE DRAINAGE PAN TRUNCATED DOMES	SQ YD	\$90.00											110	\$9,900	50	\$4,500	70	\$6,300			230	\$20,700
39	REINSTALL CASTING (SANITARY/STORM)	EACH	\$400.00																				
40	ADJUST CASTING (SANITARY/STORM)	EACH	\$800.00			2	\$1,600			2	\$1,600	4	\$3,200			2	\$1,600			2	\$1,600	4	\$3,200
41	ADJUST VALVE BOX	EACH	\$400.00															-					
42	DEWATERING	LUIMP SUM	\$25,000.00																				
43	TEMPORARY WATER SERVICE (SPECIAL)	EACH	\$6,000.00																				
44	HYDRANT	EACH	\$2,000.00																				
46	DUCTILE IRON FITTINGS	POUND	\$10.00																				
47	6" WATERMAIN C900 PVC	LIN FT	\$60.00																				
48	8" WATERMAIN C900 PVC	LIN FT	\$70.00															-					
49	6" GATE VALVE & BOX	EACH	\$1,900.00															-					
51	8" X 6" PVC SANITARY SEWER SERVICE WYE	EACH	\$1.000.00																				
52	6" PVC SANITARY SEWER SERVICE PIPE	LIN FT	\$75.00																				
53	8" PVC SANITARY SEWER SERVICE PIPE	LIN FT	\$85.00																				
54	10" PVC SANITARY SEWER SERVICE PIPE	LIN FT	\$95.00								-							-					
55	SANITARY MANHOLE	LIN FT	\$500.00															-					
57	CONNECT TO EXISTING SANITARY SEWER SERVICE	EACH	\$2,500.00																				
58	CASTING (SANITARY MANHOLE)	EACH	\$800.00																				
59	6" SOLID PVC UNDERDRAIN	LIN FT	\$45.00			L	$\square$			151	\$6,795	151	\$6,795							151	\$6,795	151	\$6,795
60	6" PVC UNDERDRAIN CLEANOUT	EACH	\$500.00				<u> </u>			1	\$500	1	\$500						<u> </u>	1	\$500	1	\$500
61	12 IKUP PIPE SEWER (LI III DES 3006 (SI URM) 12" PVC SEWER (STORM)		\$60.00				<u> </u>	-											-				
63	15" RCP PIPE SEWER CL III DES 3006 (STORM)	LIN FT	\$65.00																				
64	18" RCP PIPE SEWER CL III DES 3006 (STORM)	LIN FT	\$70.00								-								<u> </u>				
65	21" RCP PIPE SEWER CL III DES 3006 (STORM)	LIN FT	\$70.00				<u> </u>																
66	CONSTRUCT STORM MH DES 48" 4022	EACH	\$2,500.00				<u> </u>				-												
67	STURM CATCH BASIN - DESIGN R-1, 2'X3' CONNECT TO EXISTING STORM PIPE	EACH	\$2,000.00				<u> </u>	-											-				
69	CONNECT TO EXISTING STORM STRUCTURE	EACH	\$1,800.00							1	\$1,800	1	\$1.800							1	\$1.800	1	\$1.800
70	CASTING (STORM MANHOLE)	EACH	\$800.00			1	\$800					1	\$800			1	\$800					1	\$800
71	HYDROMULCH & SEED MIX 25-151	SQ YD	\$2.00																				
72	COMMMON TOPSOIL BORROW	CU YD	\$45.00								-							-					
73	DECIDUOUS TREE 2.5" CAL B&B CROSSWALK (MULTECOMP)		\$750.00				<u> </u>	-											-				
75	LIGHTING UNIT	EACH	\$2,500.00				<u> </u>																
76	1" NON-METALLIC CONDUIT	LIN FT	\$6.00																				
77	UNDERGROUND WIRE	LIN FT	\$2.00			I				I									<b>↓</b>	I			
78	SERVICE CABINET	EACH	\$7,500.00			<u> </u>	⊢		L	<u> </u>	<u> </u>							∣	<u> </u>		<b>├</b> ──── <b> </b>		
79 20	CUNNECT 10 EXISTING POWER	EACH	\$3,000.00				<u> </u>				<u>   </u>										<u> </u>		
81	LANDSCAPE ALLOWANCE	LUMP SUM	\$7,500.00																				
		SUBTOTAL			\$58,000		\$57,000		\$55,000		\$66,000		\$237,000		\$42,000		\$36,000		\$36,000		\$41,000		\$156,000
		10% CONTINGENCY:			\$5,800		\$5,700		\$5,500		\$6,600		\$23,700		\$4,200		\$3,600		\$3,600		\$4,100		\$15,600
	SOFT COSTS (SURVEY, GEOTECHNICAL, DESICH, & CONTO	UCTION INSP. 8. ADMAIN			\$63,800		\$62,700		\$60,500		\$72,600		\$260,700		\$46,200		\$39,600		\$39,600		\$45,100		\$171,600
	SUFT CUSTS (SURVEY, GEUTECHNICAL, DESIGN, & CONSTR SUBTOTAL	WHISPERING MEADOWS	\$1,330.500		\$13,400		\$13,200		\$12,700		\$15,200		\$54,700		\$9,700		\$8,300		\$8,300		\$9,500	-	\$36,000
	SUBTOTAL CITY OWNED LIGHTING (V	VHISPERING MEADOWS)	\$101,200																				
	SUBTOTAL XCEL OWNED LIGHTING (V	VHISPERING MEADOWS)	\$20,000																				
	SUBTOTAL ALLEY OPTI	ON 1 (CONCRETE ALLEY)	\$315,400		\$77,200		\$75,900		\$73,200		\$87,800		\$315,400										
	SUBTOTAL ALLEY OPTION 2 (BIT ALLEY W/ CO	NURE TE DRAINAGE PAN)	\$207,600												\$55,900		\$47,900		\$47,900		\$54,600		\$207,600

# Appendix C: Preliminary Assessment Roll & Map

#### PRELIMINARY ASSESSMENT ROLL 2022 INFRASTRUCTURE IMPROVEMENTS CITY OF JORDAN, MN 1/5/2022

DRAFT

#### PRELIMINARY SPECIAL ASSESSMENT ROLL: WHISPERING MEADOWS

TOTAL ESTIMATED STREET PROJECT COST- WHISPERING MEADOWS 70% OF TOTAL ESTIMATED PROJECT COST - FUNDED BY CITY 30% OF TOTAL ESTIMATED PROJECT COST - FUNDED BY SPECIAL ASSESSMENTS

#### \$671,100.00 \$469,770.00

\$201,330.00

4430 \$45.45

TOTAL FRONT FOOTAGE ASSESED FRONT FOOT RATE

PID	Taxpayer Name	Taxpayer Address	Front Footage	Assessment Amount
220280030	RADERMACHER LEROY & MARILYN & FAMILY LP	500 2 ST W JORDAN, MN 55352	108	\$4,908.60
220500010	LEROY R & MARILYN RADERMACHER &	500 2 ST W JORDAN, MN 55352	303	\$13,771.35
220500020	AJP PROPERTIES LLC	169 ELDORADO DR JORDAN, MN 55352	230	\$10,453.50
220500030	JORDAN CITY	201 1 ST E JORDAN, MN 55352	126	\$5,726.70
220500040	JORDAN CITY	201 1 ST E JORDAN, MN 55352	76	\$3,454.20
220500050	SOUZA PROPERTIES LLC	301 EL DORADO DR JORDAN, MN 55352	111	\$5,044.95
220500060	SHIMKIDS LLC	2820 230 ST E PRIOR LAKE, MN 55372	285	\$12,953.25
220500071	LOKITALI PROPERTIES LLC	8115 FOXBERRY BAY SAVAGE, MN 55378	115	\$5,226.75
220500080	APOG PROPERTIES 1 LLC	10101 SAMPLE RD W # 110 CORAL SPRINGS, FL 33065	398	\$18,089.10
220500090	SAANA PROPERTIES LLC	2136 WINTERBERRY LN SHAKOPEE, MN 55379	399	\$18,134.55
220500100	MSP JORDAN LLC	1215 TOWN CENTRE DR # 130 EAGAN, MN 55123	230	\$10,453.50
220500110	MSP JORDAN LLC	1215 TOWN CENTRE DR # 130 EAGAN, MN 55123	227	\$10,317.15
220500120	RIVERLAND BANK	700 SEVILLE DR JORDAN, MN 55352	319	\$14,498.55
220500130	SCOTT COUNTY COMMUNITY DEVELOPMENT	323 NAUMKEAG ST S SHAKOPEE, MN 55379	70	\$3,181.50
220500220	CITY OF JORDAN	210 1 ST E JORDAN, MN 55352	154	\$6,999.30
220500240	CITY OF JORDAN	210 1 ST E JORDAN, MN 55352	164	\$7,453.80
220500072	ADVANTAGE LIFE HOLDINGS LLC	221 1ST ST E JORDAN, MN 55352	120	\$5,454.00
220890011	SCOTT COUNTY COMMUNITY DEVELOPMENT	323 NAUMKEAG ST S SHAKOPEE, MN 55379	119	\$5,408.55
220890014	SCOTT COUNTY COMMUNITY DEVELOPMENT	323 NAUMKEAG ST S SHAKOPEE, MN 55379	119	\$5,408.55
220890016	SCOTT COUNTY COMMUNITY DEVELOPMENT	323 NAUMKEAG ST S SHAKOPEE, MN 55379	119	\$5,408.55
220890013	SCOTT COUNTY COMMUNITY DEVELOPMENT	323 NAUMKEAG ST S SHAKOPEE, MN 55379	119	\$5,408.55
220990010	SCOTT COUNTY COMMUNITY DEVELOPMENT	323 NAUMKEAG ST S SHAKOPEE, MN 55379	519	\$23,588.55
			SUBTOTAL:	\$201,343.50

#### PRELIMINARY ASSESSMENT ROLL 2022 INFRASTRUCTURE IMPROVEMENTS CITY OF JORDAN, MN 1/5/2022

HAYDEN KENNETH P & ANN M

HAMER HELEN

PEABODY ALISON P

BORGMANN DAWN

AW PROPERTIES LLC

AW PROPERTIES LLC

SCHMITT JON M

STARK IAN K

DRAFT

220030480

220030490

220030500

220030510

220030520

220030530

220030540

220030550

	PRELIMINARY SPECIAL ASSESSMENT ROLL: MERTENS - WOOD ALLEY										
		OPTION 1: OPTION 2: CONCRETE ALLEY BIT ALLEY W/ DRAINAGE PAN									
TOTAL ESTIMATED PROJE	ECT COST- ALLEY IMPROVEMENTS	\$55,900.00	\$	77,200.00							
30% OF TOTAL ESTIMATE	D PROJECT COST - FUNDED BY CITY D PROJECT COST - FUNDED BY SPECIAL ASSESSMENTS	\$16,770.00	\$: \$2								
TOTAL FRONT FOOTAGE ASSESED FRONT FOOT R	ATE	601 <b>\$27.90</b>									
PID	Taxpayer Name	Taxpayer Address	Adjusted Front Footage	Option 1 Assessment Amount	Option 2 Assessment Amount						
220030460	HAWKINS HAVEN	316 3RD ST W JORDAN, MN 55352	60	\$2,312.15	\$1,674.21						
220030470	HAMER ARDWIN J & THERESA L	312 3 ST W JORDAN, MN 55352	60	\$2,312.15	\$1,674.21						

308 3 ST W JORDAN, MN 55352

304 3 ST W JORDAN, MN 55352

301 2 ST W JORDAN, MN 55352

305 2 ST W JORDAN, MN 55352

PO 175 JORDAN, MN 55352

PO 175 JORDAN, MN 55352

309 2ND ST W JORDAN, MN 55352

212 WOOD ST N JORDAN, MN 55352

\$2,312.15

\$2,312.15

\$2,312.15

\$1,502.90

\$1,502.90

\$1,541.43

\$1,734.11

\$2,235.07

60

60

60

39

39

40

45

58

\$1,674.21

\$1,674.21

\$1,674.21

\$1,088.24

\$1,088.24

\$1,116.14

\$1,255.66

\$1,618.40

220030560	GILPIN ROBERT R & DIANE L	321 2 ST W JORDAN, MN 55352	80	\$3,082.86	\$2,232.28
			SUBTOTAL:	\$23,160.02	\$16,770.01
	PRELIMINARY	SPECIAL ASSESSMENT ROLL: WOOD - WEST A	LLEY		
		OPTION 1: CONCRETE ALLEY	O BIT ALLEY V	PTION 2: V/ DRAINAGE PAN	
TOTAL ESTIMATED PROJE	CT COST- ALLEY IMPROVEMENTS	\$47,900.00	\$7	75,900.00	
70% OF TOTAL ESTIMATE	D PROJECT COST - FUNDED BY CITY	\$33,530.00	\$5	3,130.00	
30% OF TOTAL ESTIMATE	D PROJECT COST - FUNDED BY SPECIAL ASSESSMENTS	\$14,370.00	\$2	2,770.00	
TOTAL FRONT FOOTAGE		600		600	
ASSESED FRONT FOOT R	ATE	\$23.95		\$37.95	
PID	Taxpayer Name	Taxpayer Address	Adjusted Front Footage	Option 1 Assessment Amount	Option 2 Assessment Amount
220030570	FRATZKE ALEX	220 3RD ST W JORDAN, MN 55352	60	\$2,277.00	\$1,437.00
220030580	SCHNEIDER MASON T	216 3RD ST W JORDAN, MN 55352	45	\$1,707.75	\$1,077.75
220030590	BRANSON DANIEL A	212 3RD ST W JORDAN, MN 55352	45	\$1,707.75	\$1,077.75
220030600	NIKUNEN THOMAS N	208 3 ST W JORDAN, MN 55352	40	\$1,518.00	\$958.00
220030610	STEVENS MATTHEW SCOTT	8426 AMSDEN RIDGE CIR BLOOMINGTON, MN 55438	60	\$2,277.00	\$1,437.00
220030620	MCNAMARA BARBARA L	200 3RD ST W JORDAN, MN 55352	50	\$1,897.50	\$1,197.50
220030630	AERNI ADAM O & REBECCA A AERNI	201 2 ST W JORDAN, MN 55352	60	\$2,277.00	\$1,437.00
220030640	BARRINGTON GARY	205 2 ST W JORDAN, MN 55352	60	\$2,277.00	\$1,437.00
220030650	WARK GARY D & KAREN M	209 2 ST W JORDAN, MN 55352	60	\$2,277.00	\$1,437.00
220030660	A W PROPERTIES LLC	PO BOX 175 JORDAN, MN 55352	56	\$2,125.20	\$1,341.20
220030670	BUSCH WILLIAM G & MARIE J	217 2 ST W JORDAN, MN 55352	64	\$2,428.80	\$1,532.80
			SUBTOTAL:	\$22,770.00	\$14,370.00

#### PRELIMINARY ASSESSMENT ROLL 2022 INFRASTRUCTURE IMPROVEMENTS CITY OF JORDAN, MN 1/5/2022

DRAFT

	PRELIMINARY SPECIAL ASSESSMENT ROLL: WEST - VARNER ALLEY										
		OPTION 1: CONCRETE ALLEY	C BIT ALLEY \	PTION 2: V/ DRAINAGE PAN							
TOTAL ESTIMATED PRO	JECT COST- ALLEY IMPROVEMENTS	\$47,900.00	\$								
70% OF TOTAL ESTIMAT	FED PROJECT COST - FUNDED BY CITY	\$33,530.00	\$	51,240.00							
30% OF TOTAL ESTIMAT	FED PROJECT COST - FUNDED BY SPECIAL ASSESSMENTS	\$14,370.00	\$								
TOTAL FRONT FOOTAGE	E	601									
ASSESED FRONT FOOT	RATE	\$23.91									
PID	Taxpayer Name	Taxpayer Address	Adjusted Front Footage	Option 1 Assessment Amount	Option 2 Assessment Amount						
220021140	JANDA DAVID E	116 3 ST W JORDAN, MN 55352	60	\$2,192.35	\$1,434.61						
220021150	BARRINGER SETH A	112 3 ST W JORDAN, MN 55352	60	\$2,192.35	\$1,434.61						
220021160	KELLY TODD	108 3 ST W JORDAN, MN 55352	45	\$1,644.26	\$1,075.96						

220021150	BARRINGERSETTA	112 5 51 W JORDAN, WIN 55552	00	QE)152165	φ1) 10 H01
220021160	KELLY TODD	108 3 ST W JORDAN, MN 55352	45	\$1,644.26	\$1,075.96
220021170	OLSON KENNARD S & JONI D	206 VARNER ST N JORDAN, MN 55352	136	\$4,969.32	\$3,251.78
220021190	WARDEN NATHAN A & AUTUMN E	200 VARNER ST N JORDAN, MN 55352	61	\$2,228.89	\$1,458.52
220021200	FISHER AMANDA	105 2 ST W JORDAN, MN 55352	29	\$1,059.63	\$693.39
220021210	BULMAN JASON H	109 2 ST W JORDAN, MN 55352	60	\$2,192.35	\$1,434.61
220021220	NEFSTEAD STEVEN R & ROBIN L	113 2 ST W JORDAN, MN 55352	30	\$1,096.17	\$717.30
220021230	YOUNG JENNIFER A	1200 RIDGE ST JORDAN, MN 55352	60	\$2,192.35	\$1,434.61
220021240	OSTERBERG EDWIN	121 2ND ST W JORDAN, MN 55352	60	\$2,192.35	\$1,434.61
			SUBTOTAL:	\$21,960.02	\$14,370.00

	PRELIMINARY	SPECIAL ASSESSMENT ROLL: VARNER - RI	CE ALLEY		
		OPTION 1: CONCRETE ALLEY	O BIT ALLEY V	PTION 2: N/ DRAINAGE PAN	
TOTAL ESTIMATED PRO	JJECT COST- ALLEY IMPROVEMENTS	\$54,600.00	\$8	37,800.00	
70% OF TOTAL ESTIMA	TED PROJECT COST - FUNDED BY CITY	\$38,220.00	\$f	51,460.00	
30% OF TOTAL ESTIMA	TED PROJECT COST - FUNDED BY SPECIAL ASSESSMENTS	\$16,380.00	\$2	26,340.00	
TOTAL FRONT FOOTAG	iE	600		600	
ASSESED FRONT FOOT	RATE	\$27.30		\$43.90	-
PID	Taxpayer Name	Taxpayer Address	Adjusted Front Footage	Option 1 Assessment Amount	Option 2 Assessment Amount
220021260	KINKEAD ANGELIET R	207 VARNER ST JORDAN, MN 55352	120	\$5,268.00	\$3,276.00
220021270	KIRBY GREGORY	104 3RD ST E JORDAN, MN 55352	90	\$3,951.00	\$2,457.00
220021280	HESSIAN DAVID J	108 3 ST E JORDAN, MN 55352	30	\$1,317.00	\$819.00
220021290	MANNIE ROBERT D	112 3 ST E JORDAN, MN 55352	60	\$2,634.00	\$1,638.00
220021300	ALLMANN ANDREW M	117 2 ST E JORDAN, MN 55352	90	\$3,951.00	\$2,457.00
220021310	STIVERS PAIGE E	113 2ND ST E JORDAN, MN 55352	30	\$1,317.00	\$819.00
220021320	HAECHERL RYAN CHARLES	109 2ND ST E JORDAN, MN 55352	60	\$2,634.00	\$1,638.00
220021330	THILL MATTHEW	105 2ND ST E JORDAN, MN 55352	60	\$2,634.00	\$1,638.00
220021340	KREUSER DAN R	18856 NAYLOR AVE JORDAN, MN 55352	60	\$2,634.00	\$1,638.00
			SUBTOTAL:	\$26,340.00	\$16,380.00





MERTENS ST

City of Jordan







**2022 Ally Improvements** 

**BOLTON** & MENK November 2021













# Appendix D: Geotechnical Report

## **Geotechnical Evaluation Report**

City of Jordan 2022 Infrastructure Improvements Eldorado Drive and Seville Drive Jordan, Minnesota

Prepared for

## Bolton & Menk, Inc.

#### **Professional Certification:**

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Timothy J. Schappa, PE Project Engineer License Number: 40159 November 22, 2021

Project B2110449



November 22, 2021

Project B2110449

Luke Wheeler, PE Bolton & Menk, Inc. 12224 Nicollet Avenue Burnsville, MN 55337

Re: Geotechnical Evaluation City of Jordan 2022 Infrastructure Improvements Eldorado Drive and Seville Drive Jordan, Minnesota

Dear Mr. Wheeler:

We are pleased to present this Geotechnical Evaluation Report for the for the proposed 2022 infrastructure improvements to Eldorado and Seville Drive in Jordan, Minnesota. Please see the attached report for a detailed discussion on the field exploration results and our recommendations. The report 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 Tim Schappa at 651.319.3091 (tschappa@braunintertec.com) or Neil Lund at 952.995.2284 or (nlund@braunintertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION

Timothy J. Schappa, PE Project Engineer

Neil G. Lund, PE Technical Manager, Senior Engineer



AA/EOE

Descri	ption		Page
A.	Introdu	uction	1
	A.1.	Project Description	1
	A.2.	Site Conditions and History	2
	A.3.	Purpose	3
	A.4.	Background Information and Reference Documents	3
	A.5.	Scope of Services	4
В.	Results	s	5
	B.1.	Geologic Overview	5
	В.2.	Boring Results	5
	В.З.	Groundwater	6
	B.4.	Laboratory Test Results	7
C.	Recom	, imendations	7
	C.1.	Design and Construction Discussion	7
		C.1.a. Anticipated Grade Changes	7
		C.1.b. Reuse of Pavement Materials and On-Site Soils	8
		C.1.c. Utility Installation	8
		C.1.d. Groundwater	8
		C.1.e. Construction Disturbance	8
	C.2.	Subgrade Preparation	9
		C.2.a. Pavement Subgrade Preparation	9
		C.2.b. Engineered Fill Materials and Compaction	9
		C.2.c. Pavement Subgrade Test Roll	
	C.3.	Pavements	11
		C.3.a. Reconstruction	11
		C.3.b. Pavement Materials and Compaction	
		C.3.c. Performance and Maintenance	
	C.4.	Utilities	12
		C.4.a. Excavation Side Slopes	12
		C.4.b. Subgrade Stabilization	12
		C.4.c. Corrosion Potential	
D.	Proced	lures	
	D.1.	Penetration Test Borings	13
	D.2.	Exploration Logs	13
		D.2.a. Log of Boring Sheets	
		D.2.b. Geologic Origins	14
	D.3.	Material Classification and Testing	14
		D.3.a. Visual and Manual Classification	14
		D.3.b. Laboratory Testing	14
	D.4.	Groundwater Measurements	14
E.	Qualific	cations	14
	E.1.	Variations in Subsurface Conditions	14
	-	E.1.a. Material Strata	14
		E.1.b. Groundwater Levels	
	E.2.	Continuity of Professional Responsibility	
		E.2.a. Plan Review	
		E.2.b. Construction Observations and Testing	15

# **Table of Contents**



## Table of Contents (continued)

#### Description

#### 

#### Appendix

Soil Boring Location Sketch Log of Boring Sheets (ST-2 to ST-5) Descriptive Terminology of Soil ESAL Estimation Worksheets MnPAVE-Flexible Design Output





#### Page

## A. Introduction

#### A.1. Project Description

This Geotechnical Evaluation Report addresses the design and construction for the proposed infrastructure improvements to Eldorado and Seville Drive in Maple Grove, Minnesota. We understand the project will consist of street reconstruction with watermain replacement.

Aspect	Description
Pavement type(s)	Bituminous (Assumed based on existing pavements)
Assumed pavement loads	778,000 Bituminous ESALs* (Estimated from publicly available traffic information using the MnDOT State Aid ESAL Forecast Calculator)
Grade changes	Minimal (Assumed; profiles and cross-sections not available at the time of this report)
Rehabilitation methods	Full depth reclamation
Utilities	Watermain replacement in selected areas, with several options including open-cut, horizontal directional drilling (HDD) or pipe bursting

Table 1. Site Aspects and Grading Description

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



The figure below shows an illustration of the proposed site layout for the 2022 infrastructure improvements Project.



#### Figure 1. Existing Site Layout

Figure provided by Bolton and Menk, Inc..

## A.2. Site Conditions and History

The project area is a small commercial development off Creek Lane. Based on a review of historical imagery through the Minnesota Historical Aerial Photographs Online website and Google Earth<sup>®</sup>, the project area appears to have been undeveloped until the early-2000s when construction of the commercial development began. We were not provided with previous plans or a pavement history for the project streets.

Based on the Minnesota Department of Natural Resources (MNDNR) website MnTOPO, site grades ranged from about 756 feet above mean sea level (MSL) in the northern and western portion of the site up to about 766 feet above MSL in the south-central and southeastern portion. A ponding area exists



along the western portion of the site, adjacent to the roadway, with grades sloping down to about 748 feet MSL. Site grades remain relatively flat beyond the pond to the west and to the north and east. Site grades, however, rise significantly along the south and southeast to elevations greater than 800 feet MSL.



#### Figure 2. MnTOPO Image of Site

#### A.3. Purpose

The purpose of our geotechnical evaluation is to characterize subsurface geologic conditions at selected exploration locations, evaluate their impact on the project, and provide geotechnical recommendations for the design and construction of the proposed infrastructure improvements to Eldorado and Seville Drive.

## A.4. Background Information and Reference Documents

We were provided and/or reviewed the following documentation:

• Aerial photographs of the project site showing the pavement areas to be improved.



- Geologic Map of Scott County, Surficial Geology by Barbara A. Lusardi, dated 2006.
- Aerial imagery available through the Minnesota Historical Aerial Photographs Online website provided by the University of Minnesota, https://apps.lib.umn.edu/mhapo/.
- Traffic data available via the Minnesota Department of Transportation (MnDOT) Traffic Mapping Application, http://www.dot.state.mn.us/traffic/data/tma.html.

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 Geotechnical Evaluation (QTB148683), dated November 3, 2021. 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 clearing the exploration location of underground utilities. We selected and staked the exploration locations. 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 five standard penetration test borings at various locations within the proposed pavement areas to nominal depths of 5 feet below existing grade. Boring ST-3 was drilled prior to ST-1 and glanced the side of a large storm sewer pipe that was not located. The City was immediately called out to investigate. The storm sewer pipe and watermain pipe could not be located by the City near the location of ST-1 was therefore not drilled due to potential utility conflicts.



 Preparing this report containing a boring location sketch, logs soil borings, a summary of the soils encountered, and recommendations for utility and pavement subgrade preparation and the design of utilities and pavements.

Our scope of services did not include environmental services or testing, and we did not train the personnel performing this evaluation to provide environmental services or testing. We can provide these 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, in-situ and 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.** Boring Results

Table 2 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 include definitions of abbreviations used in Table 2.

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



<u>.</u>	Soil Type - ASTM		
Strata	Classification	N-values	Commentary and Details
	Not		<ul> <li>Bituminous thicknesses of about 4 1/2 to 6 inches.</li> </ul>
Pavement	Applicable	N/A	<ul> <li>Aggregate thicknesses of about 5 to 8 inches.</li> </ul>
	(N/A)		<ul> <li>Total pavement sections of about 9 1/2 to 14 inches thick.</li> </ul>
			<ul> <li>Present below the pavement materials in Borings ST-2 and</li> </ul>
			ST-3 to depths of about 7 and 9 feet below existing grade.
			<ul> <li>Generally, appears consistent with uncontrolled fill based on</li> </ul>
Fill	SC	7 to 27	the variable consistency and soil composition, including
			organic materials.
			<ul> <li>Grayish brown to dark brown in color.</li> </ul>
			<ul> <li>Moisture condition generally moist.</li> </ul>
			<ul> <li>Fine-grained sands.</li> </ul>
			<ul> <li>Loose to dense.</li> </ul>
Alluvium	SP, SP-SIVI,	4 to 34	Brown, gravish brown and grav in color.
	SM		<ul> <li>Contained variable amounts of gravel.</li> </ul>
			<ul> <li>Moisture condition generally moist to wet.</li> </ul>

#### Table 2. Subsurface Profile Summary

We did not perform gradation analysis on the apparent aggregate base material encountered as part of the pavement section and there cannot determine if the encountered material satisfies a particular specification.

#### **B.3.** Groundwater

Table 3 summarizes the depths where we observed groundwater; the attached Log of Boring sheets in the Appendix also include this information and additional details.

Location	Surface Elevation	Measured or Estimated Depth to Groundwater (feet)	Corresponding Groundwater Elevation (feet)
ST-2	752.9	10	743
ST-3	752.2	7 1/2	744 1/2
ST-4	762.1	12	750
ST-5	764.6	13	752



At the time of our observation, the groundwater surface elevation around the 2021 Street Rehabilitation Project appeared to range between elevations 843 to 852 feet. Groundwater may take days or longer to reach equilibrium in the silty subgrade soils within the borehole which was immediately backfilled in accordance with our scope of work.

## **B.4. Laboratory Test Results**

We performed laboratory testing on select samples including moisture content (MC) tests per ASTM D2216 and grain size tests per ASTM D1140 to evaluate the percent of particles passing the #200 sieve (P200). The tests results are summarized below in Table 4.

Location	Sample Depth (feet)	Classification (USCS)	MC (%)	P200 (%)
ST-2	2 1/2	Fill: Clayey Sand (SC)	11	40
ST-3	2 1/2	Fill: SC	13	38
ST-4	5	Silty Sand (SM)	8	33
ST-5	2 1/2	SM	7	26

Table 4. Laborator	v Classification	Test	Results
	y classification	1050	nesaits

The Log of Boring sheets attached in the Appendix present the results of the MC tests in the "MC" column and list the results of P200 tests in the "Tests or Remarks" column.

## C. Recommendations

## C.1. Design and Construction Discussion

#### C.1.a. Anticipated Grade Changes

Final grading plans were not available at the time of this report. We assume grade changes will closely match those of the existing roadways. We should be notified if grade changes exceed 1 foot.



#### C.1.b. Reuse of Pavement Materials and On-Site Soils

From a materials standpoint, reclamation of the existing bituminous pavement for reuse as recycled aggregate base or as a component of new pavements is acceptable assuming the produced products meet the applicable project specifications. We recommend implementing thorough quality control practices, including frequent sieve analyses, asphalt contents, and other tests, to achieve desirable characteristics for reclaimed material that will be processed on site or left in place.

#### C.1.c. Utility Installation

For the watermain replacement in select areas, we understand consideration is being given to providing options for installation that will likely consist of open-excavation, horizontal directional drilling (HDD) and/or pipe bursting. Based on the soils conditional encountered and depth to groundwater, an open-excavation approach appears to be the most feasible option, especially given the smaller quantities and select areas to be replaced. HDD and pipe bursting will require specialized equipment to be mobilized to the site that will likely increase construction costs considering the small amount of required replacement lengths (scale of economy).

#### C.1.d. Groundwater

Excavations for watermain replacement may encounter occasional zones of groundwater at the anticipated invert depths of 7 to 8 feet below grade. We recommend project planning anticipate temporary excavation dewatering for utility construction if utilizing open-cut methods. Based upon the borings, we anticipate sump pumps would be suitable for temporary dewatering. Some of the soils, such as the silty or clayey sands will collect water from precipitation or if water drains to the site. We recommend the contractor remove any water that collects in work areas before performing further work.

#### C.1.e. Construction Disturbance

The silty and clayey roadway subgrades will be sensitive to disturbance and strength loss if subjected to repeated vehicle traffic. Subexcavation and recompaction or replacement of subgrade soils may be required if they lose strength. The project team can minimize rework of the soils by provided a "blister" or layer of surficial soil above the proposed subgrade elevations or by placing an aggregate layer to act as a construction road.



#### C.2. Subgrade Preparation

#### C.2.a. Pavement Subgrade Preparation

We recommend the following steps for pavement subgrade preparation, understanding the new sections will generally match existing grades.

- Following pavement reclamation or removals, have a geotechnical engineer or an engineering technician working under the direction of the geotechnical engineer (geotechnical representative) observe the excavated subgrade to evaluate if additional subgrade improvements are necessary.
- Scarify, moisture condition, and surface compact to at least 100 percent of standard Proctor density for fine-grained soils or to the requirements of the MnDOT penetration index method for granular soils.
- 3. Place pavement engineered fill to grade where required and compact in accordance with Section C.2.b to bottom of pavement section.
- 4. Test roll the pavement subgrade as described in Section C.2.c.

In any case where granular embankments or backfill join non-granular soil embankments or backfill, provide a 20:1 (H:V) transition between the change in material to prevent an abrupt soils differential. Construct the 20:1 (H:V) transition such that the granular backfill material overlays the adjacent non-granular soil backfill. Provide a similar taper for changing subcut depths or materials (i.e., differing in color, soil classification, moisture content, and density).

#### C.2.b. Engineered Fill Materials and Compaction

If imported material is to be used, Table 5 contains our recommendations for engineered fill. Note that similar materials compared to existing should be used to the degree possible; importing different soils for backfill may create lenses that could trap water and result in differential frost heave and other performance issues. If longitudinal transitions in soil type are required, we recommend tapering them at a rate of 20H:1V (horizontal:vertical) or flatter. Transitions in the transverse direction, such as at intersections, should be at least 4H:1V (horizontal:vertical).



Material	Material Specification	Compaction Specification
Subgrade fill	Select Grading Material MnDOT 2105.1.A.6	MnDOT 2105.3.F.1
Optional pavement subbase fill	Select Granular Material MnDOT 3149.2.B.2	MnDOT 2105.3.F.1
Below landscaped surfaces, where subsidence is not a concern	Non-Structural Grading Material MnDOT 2105.1.A.8	MnDOT 2105.3.F.2

#### Table 5. Recommended Fill and Compaction Specifications\*

\*More select soils comprised of MnDOT 3149.2.J.2 Fine Filter Aggregate may be needed to accommodate work occurring in periods of wet or freezing weather.

We recommend spreading engineered fill in loose lifts approximately 12 inches thick. We recommend compacting engineered fill in accordance with the MnDOT specifications listed in Table 5 above. The project documents should specify relative compaction of engineered fill, based on the structure located above the engineered fill, and vertical proximity to that structure.

The project documents should not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material. Frost should not penetrate under pavements during construction.

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

#### C.2.c. Pavement Subgrade Test Roll

After preparing the subgrade as described above and prior to the placement of the sand subbase or aggregate base, we recommend test rolling the subgrade soils with a fully loaded tandem-axle truck in general accordance with MnDOT Specification 2111 (Test Rolling). We also recommend having a geotechnical representative observe the test roll. Areas that fail the test roll likely indicate soft or weak soils that will require additional correction work to support pavements.

We recommend performing a second test roll after the aggregate base material is in place, and prior to placing bituminous pavement.



#### C.3. Pavements

#### C.3.a. Reconstruction

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 R-value of 20. Note the contractor may need to perform limited removal of unsuitable or less suitable soils to achieve this value. Table 6 provides our recommended minimum pavement thickness design.

	Thickness		
Material	(inches)	Designation	Specification
Bituminous Wear	3 (2 lifts)	SPWEA340C	2360
Bituminous non-wear	2 (1 lift)	SPNWB330B	2360
Aggregate base	10*	Class 5 or 6	3138
Optional Sand subbase	12	Select Granular Material	3149.2.B.2

Table 6. Recommended Bituminous Pavement Section

\*If a subbase is included, the aggregate base section can be reduced to 6 inches.

#### C.3.b. Pavement Materials and Compaction

We recommend specifying materials based on those provided in Table 6.

Bituminous pavements should generally meet the requirements of Specification 2360, which includes gyratory tests to evaluate strength and air voids and density tests to evaluate compaction.

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

We recommend compacting aggregate base to a minimum of 100 percent of its maximum standard Proctor dry density or to the requirements of the Penetration Index Method as per MnDOT Specification 2211.



#### C.3.c. Performance and Maintenance

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

It is common to place the non-wear course of bituminous and then delay placement of wear course. For this situation, we recommend evaluating if the reduced pavement section will have sufficient structure to support construction traffic.

Many conditions affect the overall performance of pavements. Some of these conditions include the environment, loading conditions and the level of ongoing maintenance. Regarding 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.

#### C.4. Utilities

#### C.4.a. Excavation Side Slopes

Based on the borings, we anticipate on-site soils in excavations will generally consist of granular soils with variable fines contents. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1.5H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.

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

#### C.4.b. Subgrade Stabilization

For utilities, we anticipate the soils at typical invert elevations will be generally suitable for utility support. If any unsuitable and/or unstable materials (soft clays, silts, or organic soils) are encountered, some additional subcutting of up to 2 feet and replacement with sand or crushed rock will be required to



prepare a proper subgrade for pipe support, such as MNDOT Specification 3149.2G Aggregate Bedding. If crushed rock is used as pipe bedding, we recommend wrapping the aggregate in geotextile fabric to prevent the migration of fine-grained materials into the voids of the aggregate.

#### C.4.c. Corrosion Potential

Based on our experience, the soils encountered by the borings are moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

## D. Procedures

#### D.1. Penetration Test Borings

We drilled the SPT 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-foot intervals in general accordance to ASTM D1586. The Log of Boring Sheets show the actual sample intervals and corresponding depths.

## D.2. Exploration Logs

#### D.2.a. Log of Boring Sheets

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

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



#### D.2.b. Geologic Origins

We assigned geologic origins to the materials shown on the exploration 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 laboratory test results follow the exploration logs. 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. They then filled the boreholes with auger cuttings and/or grout as noted on the exploration 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







NOTE: ST-1 WAS NOT DRILLED



11001 Hampshire Avenue S Minneapolis, MN 55438 952.995.2000 braunintertec.com



Drawing Information

	B2110449
	Drawing No: B2110449
rawn By:	JAG
ate Drawn:	11/3/21
hecked By:	NGL
ast Modified:	11/16/21

Project Information

City of Jordan 2022 Infrastructure Improvement Project

Eldorado Drive and Seville Drive

Jordan, Minnesota

Soil Boring Location Sketch



SCALE: 1"= 100'



# LOG OF BORING

Project Number B2110449 Geotechnical Evaluation Gity of Jordan 2022 Infrastructure Improvement Project Eldorado Drive and Seville Drive Jordan, Minnesota DRILLER: C. McClain/X. Tross LOGGED BY: T. Schoppa START DATE: 11/08/21 END DRE: (Soli-ASTM D4248 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428 of 2487. Rock-USACE EM T Description of Materials (Soli-ASTM D428. Rock-USACE EM T Description of Materials (Soli-ASTM D428. Rock-USACE EM T Des	The Science	rou Build	d On.							Se	ee Descriptive	Terminol	ogy sheet	for explanation	of abbreviations
Geotechnical Evaluation City of Jordan 2022 Infrastructure Improvement Project Eldorado Drive and Seville Drive Jordan, Minnesota DRILLER: C. McClain/A. Tross LOGGED BY: T. Schappa DRILLER: C. McClain/A. Tross LOGGED BY: T. Schappa DRILLER: C. McClain/A. Tross LOGGED BY: T. Schappa Description of Materials Description of	Project	Nu	mbe	er B	211044	19					BORING:			ST-2	
Jordan, Minnesota         NoRTHING:         17138         EASTING:         415388           DRILLER:         C. McClain/A. Tross         LOGGED BY.         T. Schappa         START DATE:         1108/21         END ATE:         1108/21         END AT	Geotec City of Eldorad	hni Jor do [	cal E dan Drive	Eval 202 e an	uation 2 Infra d Sevi	structure li Ile Drive	mprove	ement	Proje	ct	LOCATION:	See atta	ched sket	ch	
DRILLER: C. McClarriA. Tross LOGGED BY: T. Schappa START DATE: 11/08/2 END DATE: 11/08/2 Busined Start Date: 11/08/2 SURFACING: Bituminous WEATHER: Sump Elev. / beginst Start Date: 11/08/2 SURFACING: Bituminous WEATHER: Sump Elev. / beginst Start D248 or 2487; Rock-USACE EM 1110-1-2308) 110-1-2308) 1110-1-2308) 1110-1-2308) 110-1-2308) 110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 1110-1-2308) 11110-1-2308) 111110-1-2308) 1111110-1-2308) 1111111-1-2308) 111111111-1-2308) 1111111111111-1-2308) 111111111111111111111111111111111111	Jordan	, Mi	nne	sota	a						NORTHING	: 1	71396	EASTING:	415368
Subsection       752.9 ft       Rig:       751.4       METHOD:       3 1/4"HSA       SURFACING:       Bituminous       WEATHER:       Sumplexity         Learning, the transmission of the sector plane of Materials       Description of Materials       Description of Materials       Blows       the sector plane of Materials       METHOD:       10       the sector plane of Materials       METHOD:       the sector plane of Materials       Tests or Remarks       Tests or Remarks         10.1       Inter of aparent agraphicate plane of materials       add and Lean Clay, grayish brown, moist       3.4-3       the sector plane of Materials       3.4-3	DRILLER:		C. Mc	Clain/	A. Tross	LOGGED BY:		T. Schap	pa		START DAT	E:	11/08/21	END DATE:	11/08/21
Elev./ Depth ft     Blows (Soil-ASTM D2480 rock-USACE EM 1110-1-2908)     Blows (N-Value) Blows (N-Value)     q. tsf     MC %     Tests or Remarks       751.9	SURFACE ELEVATION:		752.9	ft	RIG: 7	514	METHOD:	3 1/4	4" HSA		SURFACING	G: Bi	tuminous	WEATHER:	Sunny
751.9       PAVEMENT, 5 inches of bituminous over 7 inches of apparent aggregate base FILL: CLAYEY SAND (SC), intermixed with Silty Sand, and Lean Clay, grayish brown, moist       3-4-3 (7)       11       P200=40%         743.9       5       5-6-6 (12)       11       P200=40%         743.9       5       5-6-6 (12)       11       P200=40%         743.9       5       5-6-6 (12)       11       P200=40%         740.9       5       5-6-6 (11)       18*       6-5-6 (11)       6-5-6 (11)         740.9       SILTY SAND (SM), fine to medium-grained, trace Gravel, brown, wet, loose (ALLUVIUM)       3-2-3 (5)       3-2-3 (18*       3-2-3 (18*         738.4       END OF BORING       15- 20- 20- 20- 20- 20- 20- 20- 20-       5- 20- 20- 20- 20- 20- 20- 20- 20- 20- 20	Elev./ Depth ft	Water Level		(Soi	D I-ASTM [	escription of Ma D2488 or 2487; 1110-1-2908	iterials Rock-USA 3)	ACE EM	Como	oanpie	Blows (N-Value) Recovery	q₀ tsf	MC %	Tests or	Remarks
	751.9         1.0         743.9         743.9         740.9         12.0         738.4         738.4         14.5         - </td <td></td> <td></td> <td>PAV inch FILL Silty POC fine wet, SILT trace</td> <td>EMENT, es of app : CLAYE Sand, ar DRLY GR to medium TY SAND e Gravel, Borin</td> <td>5 inches of bitu parent aggregate Y SAND (SC), i nd Lean Clay, g ADED SAND w m-grained, trace dense (ALLUVI (SM), fine to m brown, wet, loo END OF BOF ng immediately</td> <td>minous ov <u>e base</u> ntermixed rayish bro ith SILT (§ e Gravel, I UM) edium-gra se (ALLU RING v backfille</td> <td>ver 7 with wn, moist SP-SM), brown, ained, VIUM)</td> <td></td> <td></td> <td>3-4-3 (7) 16" 5-6-6 (12) 18" 3-4-9 (13) 18" 6-5-6 (11) 16" 3-2-3 (5) 18"</td> <td></td> <td>11</td> <td>P200=40% Water observe feet with 11.5 in the ground</td> <td>ed at 10.0 feet of tooling while drilling.</td>			PAV inch FILL Silty POC fine wet, SILT trace	EMENT, es of app : CLAYE Sand, ar DRLY GR to medium TY SAND e Gravel, Borin	5 inches of bitu parent aggregate Y SAND (SC), i nd Lean Clay, g ADED SAND w m-grained, trace dense (ALLUVI (SM), fine to m brown, wet, loo END OF BOF ng immediately	minous ov <u>e base</u> ntermixed rayish bro ith SILT (§ e Gravel, I UM) edium-gra se (ALLU RING v backfille	ver 7 with wn, moist SP-SM), brown, ained, VIUM)			3-4-3 (7) 16" 5-6-6 (12) 18" 3-4-9 (13) 18" 6-5-6 (11) 16" 3-2-3 (5) 18"		11	P200=40% Water observe feet with 11.5 in the ground	ed at 10.0 feet of tooling while drilling.
	D0440475														<b>0</b>



# LOG OF BORING

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The Science Y	(ou Build	d On.							Se	e Descriptive	Terminolo	ogy sheet	for explanation	of abbreviations
Project	Nu	mbe	r B	211044	9					BORING:			ST-3	
City of Jordan 2022 Infrastructure Improvement Project								LOCATION: See attached sketch						
Eldorad	do E	Drive	an	d Sevil	le Drive	inprove		iioje	,01					
Jordan	, Mi	nnes	sota	a						NORTHING	: 17	1062	EASTING:	416173
DRILLER:		C. Mc	Clain/	A. Tross	LOGGED BY:		T. Scha	ppa		START DAT	E:	11/08/21	END DATE:	11/08/21
SURFACE ELEVATION:		752.2	ft	RIG: 75	514	METHOD:	3 1	1/4" HSA		SURFACING	G: Bit	uminous	WEATHER:	Sunny
Elev./ Depth ft	Water Level		(Soi	De I-ASTM D	escription of Ma 2488 or 2487; 1110-1-2908	iterials Rock-USA 3)	CE EM	-	Sample	Blows (N-Value) Recovery	q <sub>₽</sub> tsf	MC %	Tests or	Remarks
$ \begin{array}{c} - 751.4 \\ - 0.8 \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ - \\ -$			PAV inch FILL Silty dark POC fine brow POC med loos SILT sear very	EMENT, 4 es of appa : CLAYEY Sand, tra Sand, tra brown, m DRLY GRA to medium yn, wet, m DRLY GRA lium-grain e (ALLUV 'Y SAND ( ms of Lear loose (AL Boring	ADED SAND w n-grained, trace edium dense ( ADED SAND w n-grained, trace edium dense ( ADED SAND (S ed, trace Grave IUM) (SM), fine-grain n Clay, trace G LUVIUM) END OF BOF g immediately	bituminous base htermixed whish gray ith SILT (S Gravel, g ALLUVIUN SP), fine to al, brown, fine ravel, gray RING backfille	s over 5 with with SP-SM), grayish /) wet, ins (, wet, d			3-3-6 (9) 15" 7-9-18 (27) 12" 8-14-16 (30) 18" 4-5-5 (10) 16" 1-2-2 (4) 18"		13	P200=38% Water observe with 9.5 feet o the ground wh	ed at 7.5 feet f tooling in iile drilling.
B2110449		· · · · ·				Bra	un Interter	Corporat	ion		Print Date 1	1/22/2021	ST-	3 page 1 of 1



# LOG OF BORING

ce beschpave remainingly sheet for explanation of abbreviations
BORING: ST-4
LOCATION: See attached sketch
NORTHING: 170944 EASTING: 416603
START DATE: 11/08/21 END DATE: 11/08/21
SURFACING: Bitumionous WEATHER: Sunny
$\begin{array}{c c} Blows \\ (N-Value) \\ Recovery \end{array} \hspace{0.2cm} \begin{array}{c} q_{\scriptscriptstyle \rho} \\ tsf \end{array} \hspace{0.2cm} \begin{array}{c} MC \\ \% \end{array} \hspace{0.2cm} Tests \ or \ Remarks \end{array}$
9-13-14 (27) 16" 8-7-8 (15) 16" 8 11-9-8 (17) 8 P200=33%
15" 10-8-13 (21) 18"
3-3-3 (6) 12" Water not observed while
drilling.



# LOG OF BORING

The Science Y	'ou Buile	d On.							Se	e Descriptive	Termino	ogy sheet	for explanation	of abbreviations
Project	Nu	mbe	er Bá	211044	9					BORING:			ST-5	
Geotec	hni	cal E	Eval	uation						LOCATION:	See atta	ched sket	ch	
City of Eldorad	Jor do [	dan Drive	202 an	2 Infra d Sevi	structure l lle Drive	mprove	ement	Projec	ct					
Jordan	, Mi	nne	sota	1						NORTHING:	1	71064	EASTING:	417057
DRILLER:		C. Mc	Clain/	A. Tross	LOGGED BY:		T. Schap	pa		START DATE	E:	11/08/21	END DATE:	11/08/21
SURFACE ELEVATION:		764.6	ft	RIG: 7	514	METHOD:	3 1/	4" HSA		SURFACING	B: Bi	tuminous	WEATHER:	Sunny
Elev./ Depth ft	Water Level		(Soi	D I-ASTM [	escription of Ma 02488 or 2487; 1110-1-2908	aterials Rock-USA 3)	ACE EM	Sample		Blows (N-Value) Recovery	q <sub>p</sub> tsf	MC %	Tests or	Remarks
ft <u>763.4</u> <u>1.2</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u> <u>-</u>	⊻		PAV inch SILT gray (ALL	EMENT, es of app Y SAND , moist, n UVIUM) UVIUM)	6 inches of bitu barent aggregat (SM), fine-grain hedium dense t END OF BOF	rinous ov <u>e base</u> ned, trace o dense	er 8 Gravel,			Recovery 7-8-12 (20) 18" 8-12-16 (28) 18" 8-12-12 (24) 18" 6-15-19 (34) 18" 2-6-12 (18) 18"		7	P200=26% Water observ feet with 13.0 in the ground	ed at 13.0 feet of tooling while drilling.
								20 — — — — 25 — — — — 30 — — —						



	Criteria fe		Soil Classification			
	Group N	Group Symbol	Group Name <sup>B</sup>			
ç	Gravels	Clean Gr	avels	$C_u \ge 4$ and $1 \le C_c \le 3^D$	GW	Well-graded gravel <sup>E</sup>
ed o	(More than 50% of	(Less than 5% fines <sup>C</sup> )		$\rm C_u$ < 4 and/or $\rm (C_c$ < 1 or $\rm C_c$ > 3)^D	GP	Poorly graded gravel <sup>E</sup>
<b>d Soi</b> etain ve)	retained on No. 4	<b>Gravels with Fines</b> (More than 12% fines <sup>C</sup> )		Fines classify as ML or MH	GM	Silty gravel <sup>EFG</sup>
aineo )% re ) siev	sieve)			Fines Classify as CL or CH	GC	Clayey gravel <sup>E F G</sup>
e-gra an 50	Sands	Clean S	ands	$C_u \ge 6$ and $1 \le C_c \le 3^D$	SW	Well-graded sand <sup>1</sup>
oars e tha No	(50% or more coarse	(Less than 5	% fines <sup>H</sup> )	$\rm C_u$ < 6 and/or $\rm (C_c$ < 1 or $\rm C_c$ > 3)^D	SP	Poorly graded sand <sup>1</sup>
mor	fraction passes No. 4	Sands with Fines (More than 12% fines <sup>H</sup> )		Fines classify as ML or MH	SM	Silty sand <sup>FGI</sup>
)	sieve)			Fines classify as CL or CH	SC	Clayey sand <sup>FGI</sup>
		Inorganic		l plots on or above "A" line <sup>1</sup>	CL	Lean clay <sup>KLM</sup>
s the	Silts and Clays	morganic	PI < 4 or p	olots below "A" line	ML	Silt <sup>KLM</sup>
<b>ned Soil:</b> ·e passes ) sieve)	50)	Organic	ganic Liquid Limit – oven dried Liquid Limit – not dried <0.75		OL	Organic clay KLMN Organic silt KLMO
-grai mor 200		Inorganic	PI plots o	n or above "A" line	СН	Fat clay <sup>KLM</sup>
<b>Fine</b> - (50% or No.	Silts and Clays	inorganic	PI plots b	elow "A" line	MH	Elastic silt <sup>KLM</sup>
	more)	Organic	Liquid Lin Liquid Lin	nit – oven dried nit – not dried <0.75	ОН	Organic clay KLMP Organic silt KLMQ
Hig	hly Organic Soils	Primarily org	anic matter	dark in color, and organic odor	PT	Peat

Based on the material passing the 3-inch (75-mm) sieve. Α.

- If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, В. or both" to group name.
- Gravels with 5 to 12% fines require dual symbols: С. 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  $C_c = (D_{30})^2 / (D_{10} \times D_{60})$ D.  $C_u = D_{60} / D_{10}$ 
  - If soil contains  $\geq$  15% sand, add "with sand" to group name.
- Ε. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM. E.
- 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.
- If Atterberg limits plot in hatched area, soil is CL-ML, silty clay. J.
- If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is Κ. predominant.
- If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name. L.
- M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
- N.  $PI \ge 4$  and plots on or above "A" line.
- PI < 4 or plots below "A" line. 0.
- PI plots on or above "A" line. P
- Q. PI plots below "A" line.



#### Laboratory Tests

 $\mathbf{q}_{p}$ 

Ы

- DD Dry density, pcf WD Wet density, pcf
- P200 % Passing #200 sieve
- мс Moisture content, %
- oc Organic content, %
- Pocket penetrometer strength, tsf Unconfined compression test, tsf
- qυ Liquid limit LL
- PL Plastic limit
  - Plasticity index

Descriptive Terminology of Soil

Based on Standards ASTM D2487/2488 (Unified Soil Classification System)

	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 <sup>L, M</sup>
trace	0 to 5%

little 6 to 14%	
with≥ 15%	

#### **Inclusion Thicknesses**

lens	0 to 1/8"
seam	1/8" to 1"
laver	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
Verv dense	over 50 BPF

Consistency of	Blows	Approximate Unconfined
Cohesive Soils	Per Foot	<b>Compressive Strength</b>
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 (  $\Box$  ), at the end of drilling (  $\blacksquare$  ), or at some time after drilling ( **V**).

Sample Symbols											
$\square$	Standard Penetration Test		Rock Core								
X	Modified California (MC)		Thinwall (TW)/Shelby Tube (SH								
	Auger	$\mathbb{V}$	Texas Cone Penetrometer								
sur	Grab Sample	$\nabla$	Dynamic Cone Penetrometer								

# State Aid 10 Ton ESAL Traffic Forecast Calculator

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

Instructions: All yellow boxes require an input value.

Dropdown choices are provided for Base Year (C18), Number of Lanes (C19), and Urban or Rural (C21). You must click on cells C18, C19, and C21 to access the dropdown choices.

General Information			
Date		November 9, 2021	
Forecast Performed by		Tim Schappa	
Name of County or City		Jordan	
Project Number		B2110449	
Project Description	2022 Infra	structure Improveme	ent Project
Route Number		Creek Lane	
Base Year (i.e. opening to traffic)	2022		
Number of Lanes (total both directions)	2 = typical 2 lane		
Current AADT	5,600		
Urban or Rural	Urban		
Historical AADT (enter a minimum of two years)	Year	AADT	
Enter oldest traffic data here	2007	4,450	
Enter second oldest traffic data here	2010	4,410	
Enter third oldest traffic data here	2014	4,300	
Enter fourth oldest traffic data here	2018	5,600	
Base Year AADT	2022	5,600	
20-Year AADT	2042	7,480	
35-Year AADT	2057	8,880	
Growth Rate	1.6	8%	

Vahida Tuna	Vehicle Class	ESAL Factors	
venicie Type	%	Flexible	Rigid
2AX-6TIRE SU	1.42%	0.25	0.24
3AX+SU	0.07%	0.58	0.85
3AX TST	0.11%	0.39	0.37
4AX TST	0.22%	0.51	0.53
5AX+TST	1.64%	1.13	1.89
TR TR, BUSES	0.65%	0.57	0.74
TWIN TRAILERS	0.00%	2.40	2.33
Total	4.10%	NA	NA

20-Year Flexible Forecast (10 Ton) =	778,000
20-Year Rigid Forecast (10 Ton) =	1,160,000
35-Year Flexible Forecast (10 Ton) =	1,476,000
35-Year Rigid Forecast (10 Ton) =	2,202,000

Note: This ESAL Calculator provides reasonable estimation of ESAL's based on accurate AADT values. It is limited to an AADT value of 20,000. For roadways exceeding an AADT of 20,000, it is recommended to use the MnDOT ESAL Forecasting Tool found on MnDOT's Pavement Design web page at: http://www.dot.state.mn.us/materials/pvmtdesign/software.html

## **MnPAVE Design Summary**

MnPAVE 6.405 Simulation Input File: MnPAVE1

Confidence Level for Preliminary Life Estimate = 70%

Confidence and Reliability may not agree. Thickness and modulus are reduced when Confidence > 50%. Monte Carlo Reliability randomly selects values for each layer. Use Reliability for final design.

Preliminary I	Preliminary Life Estimate 20-Year Reliability (5,0		ity (5,000 cycles)
Fatigue	Rutting	Fatigue	Rutting
>50 years	24 years	99.9%	92.6%

#### **Project Information**

District	County	City	
Metro	Scott		
Project Number	Route	Reference Post	
		from to	
Letting Date	Constr	Construction Type	
11/22/21			
Designer		Soils Engineer	

#### **Climate Information**

Seasons	Location	
5	44° 38' Latitude, 93° 29' Longitude	

#### Structural Information (Design Level: Intermediate)

Layer	Туре	Subtype	Height (in.)
1	Hot-Mix Asphalt (Pb = 5.0%)	PG58-34 (2360F 1/2")	5.00
2	Aggregate Base	FDR	10.00
3	Engineered Soil	R-Value = 20 (CL)	12.00
4	Undisturbed Soil	Engineered Soil Modulus/2	

#### Traffic Information (Speed = 30 mph)

Load Type	First Year ESAL	Growth Rate	Axle Repetitions
ESAL	35,530	1.0% (simple)	778,000

Notes

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