CONSULTING GROUP

Report on Geotechnical Pavement Investigation

Spring Lake North Pavements Independence Township, Michigan

Latitude 42.722631˚ N
Longitude 83.398264˚ W

Prepared for:

Spring Lake North Subdivision HOA
5583 Adderstone Drive
Clarkston, Michigan 48346

G2 Project No. 243572
September 5, 2024

g2consultinggroup.com

Headquarters	1866 Woodslee St	Troy, MI 48083	P 248.680.0400	F 248.680.9745
Ann Arbor	1350 Eisenhower Pl	Ann Arbor, MI 48108	P 734.390.9330	F 734.390.9331
Chicagoland	1186 Heather Dr	Lake Zurich, IL 60047	P 847.353.8740	F 847.353.8742

CONSULTING GROUP

September 5, 2024

Mr. Benjamin Hastings
Spring Lake North Subdivision HOA
5583 Adderstone Dr.
Clarkston, MI 48346

RE: Report of Geotechnical Pavement Investigation
Spring Lake North Pavements
Adderstone Drive, Berwick Drive, Berwick Court, Golf View Drive, Ancroft Drive, Ancroft Court, And Campfire Circle
Independence Township, Michigan
G2 Project No. 243572

Dear Mr. Hastings:

In accordance with your request, we have completed a geotechnical pavement investigation for the proposed rehabilitation/reconstruction of the pavements within the Spring Lake North residential development located in Township of Independence, Michigan. This report presents the results of our observations and analyses and includes recommendations and construction considerations relative to the proposed pavement rehabilitation/reconstruction project.

We appreciate the opportunity to be of service to the Spring Lake North Subdivision HOA and look forward to discussing our findings. In the meantime, if you have any questions regarding this report or any other matter pertaining to the project, please call us.

Sincerely,

G2 Consulting Group, LLC

Jeffrey M. Hayball, P.E.
Project Manager

James L. Berry, P.E.
Project Consultant

JMH/JLB/ljv

Enclosures

EXECUTIVE SUMMARY

We understand the project consists of rehabilitation/reconstruction of the bituminous concrete pavements within the Spring Lake North residential development located within the Township of Independence, Michigan. The residential development consists of the following roadways: Adderstone Drive, Berwick Drive, Berwick Court, Golf View Drive, Ancroft Drive, Ancroft Court, and a portion of Campfire Circle. We anticipate the pavement receives mostly car traffic with occasional delivery vehicle and refuse collection trucks. The age of the pavements was not available upon completion of this report. However, based on review of Google Earth Historical Aerial Photographs, it appears the pavements were originally constructed in the early 1990s.

The pavements within the development are paved with full depth bituminous concrete sections and mountable curb and gutter. The bituminous concrete ranges in thickness -from 8 to 9-3/4 inches. Sandy clay fill with little gravel underlies the bituminous concrete within borings B-01 and B-02 and extends to depths of 18 inches and 15 inches, respectively. Medium compact gravelly sand fill is present below the bituminous concrete pavement within borings B-03 and B-05, extending to an approximate depth of 2 feet within boring B-03 and the explored depth of 4 feet within boring B-05. Native very stiff silty clay underlies the sandy clay fill within boring B-01 and extends to the explored depth of 4 feet. Native granular soils, consisting of loose to medium compact sand and gravelly sand, are present below the fill soils and/or bituminous concrete within the remaining borings and extends to the explored depth of 4 feet. No measurable groundwater was observed within the borings during or upon completion of drilling operations.

The pavements within the Spring Lake North Subdivision are generally in fair to poor condition. Subgrade soils over the area generally have good support characteristics, and core samples of the pavement were generally recovered intact. It appears much of the cracking and weathering distress is within the upper leveling and top course layers of the pavement. Considering the relatively thick bituminous concrete section present along the roadways and general condition of the pavement, we recommend rehabilitation of the pavements by cold milling followed by installation of a bituminous overlay. Single lift overlays are generally intended to extend the service life of pavements that are in relatively good condition. For this project, we recommend a two lift overlay, 4 inches thick, with localized full depth repairs and localized replacement for areas of damaged our poorly draining curb and gutter. We anticipate that a mill and two lift overlay pavement improvement option will provide an additional 15 to 20 years of serviceable life with normal maintenance. Please note some reflective cracking within the new overlay may occur within the first 3 years of service.

Based on the results of our analyses, we recommend the proposed mill and overlay consist of 1-1/2 inches of MDOT 5EML bituminous concrete wearing course, 2-1/2 inches of MDOT 4EML bituminous concrete leveling course. After milling and full depth patching, as required, a bituminous tack coat must be placed prior to placement of the overlays. We recommend all bituminous concrete materials limit binder from RAP to 17 percent of the total binder content (MDOT Tier 1 designation) and have a final binder of PG 64-22.

Do not consider this summary separate from the entire text of this report, with all the conclusions and qualifications mentioned herein. Details of our analysis and recommendations are discussed in the following sections and in the Appendix of this report.

PROJECT DESCRIPTION

We understand the project consists of rehabilitation/reconstruction of the bituminous concrete pavements within the Spring Lake North residential development located within the Township of Independence, Michigan. The residential development consists of the following roadways: Adderstone Drive, Berwick Drive, Berwick Court, Golf View Drive, Ancroft Drive, Ancroft Court, and a portion of Campfire Circle. We anticipate the pavement receives mostly automobile traffic with occasional delivery vehicle and refuse collection trucks. The age of the pavements was not available upon completion of this report. However, based on review of Google Earth Historical Aerial Photographs, it appears the pavements were originally constructed in the early 1990s.

The purpose of our investigation is to determine and evaluate the general pavement and subsurface conditions within the pavements and develop general recommendations for rehabilitation of the existing pavements.

SCOPE OF SERVICES

The field operations, laboratory testing, and engineering report preparation were performed under the direction and supervision of a licensed professional engineer. Our services were performed according to generally accepted standards and procedures in the practice of geotechnical engineering in this area. Our scope of services for this project consists of the following specific items:

1. We performed a cursory visual identification of the types and relative magnitudes of observable pavement distress.
2. We drilled a total of ten (10) pavement core/ soil borings within the Spring Lake North residential development extending to a depth of 4 feet below grade. Pavement core/hand auger borings B-01 and B-02 were performed along Adderstone Drive. Pavement core/hand auger borings B-03 through B-05 were drilled through the pavements of Berwick Drive. Pavement core/hand auger borings B-06 was performed within the pavements of Golf View Drive. Pavement core/hand auger boring B-07 was drilled through the pavements of Ancroft Court. Pavement core/hand auger boring B-08 was performed along Ancroft Drive. Pavement core/hand auger boring B-09 was drilled through the pavements of Berwick Court. Pavement core/hand auger boring B-10 was performed along Campfire Circle. We measured the existing pavement section materials (bituminous concrete) and identified the type and condition of subgrade soils.
3. We performed laboratory testing on samples obtained from the soil borings. Laboratory testing included visual engineering classification, natural moisture content, and unconfined compressive strength determinations.
4. We prepared this engineering report. Our report includes recommendations for existing pavement rehabilitation.

FIELD OPERATIONS

G2 Consulting Group, LLC, selected the number, depth, and location of the soil borings. The soil borings were located in the field by a G2 representative by measuring from existing site features and landmarks using conventional taping methods. The approximate soil boring locations are shown on the Soil Boring Location Plan, Plate No. 1. Ground surface elevations were not available at the time of the field investigation.

We used a gas powered core rig equipped with a 4-inch diameter diamond-tipped core barrel to core the pavement locations. Pavement cores were drilled through the full depth of the existing pavement structure to obtain an accurate determination of the pavement thickness.

Hand auger borings were performed using a 3-inch diameter hand auger. Within each hand-auger boring, soil samples were obtained at 2 feet and 4 feet and at transitions in soil types. The soil samples were placed in sealed containers in the field and brought to the laboratory for testing and classification.

A Dynamic Cone Penetrometer (DCP) test was performed within each hand auger boring at depths of 2 feet and 4 feet to evaluate the consistency of the in-situ soil. DCP testing involves driving a 1-1/2 inch diameter cone with a 45˚ vertex angle into the ground using a 15-pound weight dropped 20 inches after the cone is seated into the bottom of the hand auger borehole. The Dynamic Cone Penetrometer is driven successive 1-3/4 increments. The blow counts for each 1-3/4 inch increment are presented on the individual hand-auger soil boring logs.

During drilling operations, a G2 staff engineer maintained logs of the encountered subsurface conditions, including changes in stratigraphy and observed groundwater levels to be used in conjunction with our analysis of the subsurface conditions. The final hand-auger boring logs are based on the field logs and laboratory soil classification and testing. After completion of boring operations, the boreholes were backfilled with excavated soil and capped with cold patch.

LABORATORY TESTING

Representative soil samples were subjected to laboratory testing to determine soil parameters pertinent to pavement design and site preparation. An experienced geotechnical engineer classified the samples in general conformance with the Unified Soil Classification System.

Laboratory testing included natural moisture content and unconfined compressive strength determinations. The unconfined compressive strengths were determined using a spring loaded hand penetrometer. The hand penetrometer estimates the unconfined compressive strength to a maximum of 4-1/2 tons per square foot (tsf) by measuring the resistance of the soil sample to the penetration of a calibrated spring loaded cylinder.

The results of the moisture content and unconfined compressive strength laboratory tests are indicated on the soil boring logs at the depths the samples were obtained. We will hold the soil samples for 60 days from the date of this report. If you would like the samples, please let us know.

EXISTING PAVEMENT CONDITIONS

The development is paved with full depth bituminous concrete pavement sections and mountable concrete curb and gutter. The bituminous concrete ranges in thickness from 8 to 9-3/4 inches at the core sample locations. The existing pavements are in generally fair to poor condition based upon surface distress. Distress conditions include weathering and random cracking throughout the development with areas of secondary cracking, fatigue or alligator cracking, and localized areas of disintegrating pavement. It appears areas of crack sealing, cold patching, and surface patching have been performed in the past.

The pavements are crowned, allowing surface runoff water to drain onto Portland cement gutters and curbs present along the edge of the pavements. Portland cement concrete gutters and curbs drain into catch basins constructed into the gutter/curb line. The gutters are generally in fair condition with some sections of gutter/curbs have cracked or settled. The catch basins consist of brick and mortar atop of pre-cast concrete structures and are generally in fair to poor condition with cracking within the mortar joints portion of the structure.

EXISTING SUBSURFACE CONDITIONS

Sandy clay fill with little gravel underlies the bituminous concrete within borings B-01 and B-02 and extends to depths of 18 inches and 15 inches, respectively. Gravelly sand fill is present below the bituminous concrete pavement within borings B-03 and B-05, extending to an approximate depth of 2

feet within boring B-03 and the explored depth of 4 feet within boring B-05. Native silty clay underlies the sandy clay fill within boring B-01 and extends to the explored depth of 4 feet. Native granular soils, consisting of sand and gravelly sand, are present below the fill soils and/or bituminous concrete within the remaining borings and extends to the explored depth of 4 feet.

The gravelly sand fill is loose to medium compact with Dynamic Cone Penetrometer (DCP) Test N-values ranging from 8 to 12 blows per 1-3/4 inch drive. The native silty clay is very stiff in consistency with natural moisture contents of 15 and 16 percent and an unconfined compressive strength of 6,000 pounds per square foot (psf). The native granular soils are loose to medium compact with DCP Test N-values ranging from 7 to 14 blows per 1-3/4 inch drive.

The stratification depths shown on the soil boring logs represent the soil conditions at the boring locations. Variations may occur between borings. Additionally, the stratigraphic lines represent the approximate boundaries between soil types. The transition may be more gradual than what is shown. We have prepared the boring logs on the basis of laboratory classification and testing as well as field logs of the soils encountered.

No measurable groundwater was observed within the borings during or upon completion of drilling operations. Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation.

The Soil Boring Location Plan, Plate No. 1, Soil Boring Logs, Figure Nos. 1 through 10, and Photographic Documentation, Figure Nos. 11 through 15, are presented in the Appendix. The soil profiles described above are generalized descriptions of the conditions encountered at the boring locations. General Notes defining the nomenclature used on the boring logs and elsewhere in this report are presented on Figure No. 16.

PAVEMENT EVALUATION AND RECOMMENDATIONS

General

As noted, the pavements within the Spring Lake North Subdivision are generally in fair to poor condition. Subgrade soils over the area generally have good support characteristics, and core samples of the pavement were generally recovered intact. It appears much of the cracking and weathering distress is within the upper leveling and top course layers of the pavement. Considering the relatively thick bituminous concrete section present along the roadways and general condition of the pavement, we recommend rehabilitation of the pavements by cold milling followed by installation of a bituminous overlay. Single lift overlays are generally intended to extend the service life of pavements that are in relatively good condition. For this project, we recommend a two lift overlay, 4 inches thick, with localized full depth repairs and localized replacement for areas of damaged our poorly draining curb and gutter. We anticipate that a mill and two lift overlay pavement improvement option will provide an additional 15 to 20 years of serviceable life with normal maintenance. Please note some reflective cracking within the new overlay may occur within the first 3 years of service.

Milling and Overlay Recommendations

The existing bituminous concrete pavement should be cold milled to a nominal depth of 4 inches matching the existing cross slopes. Prior to overlay placement, any existing cracks or joints in the pavement surface wider than 1/8 inch should be cleaned, covered with emulsified tack, then fill with a hand patching bituminous concrete mix. Any areas of the pavement that exhibit excessive fatigue cracking or deterioration should be completely removed and replaced with a full depth bituminous concrete patch. The bituminous concrete should be saw-cut a minimum 2 feet laterally from the distressed area to be removed. The exposed subgrade must be evaluated for stability. Any unstable or unsuitable areas noted should be improved by compaction or removed and replaced with properly

compacted engineered fill. MDOT 21AA aggregate is recommended for subgrade undercut backfill on the project. Prior to placing the full-depth patch, a tack coat should be applied to the sides of the saw-cut pavement.

We recommend placing bituminous concrete in lifts of no greater than 2-1/2 inches in thickness to the milled surface grade in patch areas. All bituminous patching materials should consist of MDOT 4EML mixtures placed in appropriate lift thicknesses.

Subgrade undercuts, if required, should be evaluated by a qualified engineering technician to determine if subgrade stabilization is necessary. All engineered fill should be compacted to a density of at least 95 percent of the maximum density determined by the Modified Proctor (ASTM D 1557) method of testing. All engineered fill material should be placed and compacted at approximately the optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade.

Pavement Design

We performed pavement design analyses in accordance with the "AASHTO Guide for Design of Pavement Structures" to confirm the anticipated service life of the pavement renovation project. The subgrade soils will generally consist of loose to medium compact granular soils. Based on the existing subgrade soils, we have provided design pavement sections based on an effective subgrade resilient modulus of 9,000 pounds per square inch (psi).

It is our understanding the traffic within the existing development is primarily automobiles with occasional refuse collection and delivery trucks. For evaluation purposes, we estimated a vehicle service life loading of 100,000 18-kip equivalent single-axle loads (ESALs) over a 20-year design life. If any actual traffic volume information becomes available, G2 Consulting Group should be notified so we can reevaluate our recommendations. For evaluation purposes of bituminous mill/overlay section, we estimated the remaining life of the pavements at 35 percent and a condition factor of 0.81, with an existing pavement structural number of 2.72.

Based on the results of our analyses, we recommend the proposed mill and overlay consist of 1-1/2 inches of MDOT 5EML bituminous concrete wearing course, 2-1/2 inches of MDOT 4EML bituminous concrete leveling course. After milling and full depth patching, as required, a bituminous tack coat must be placed prior to placement of the overlays. We recommend all bituminous concrete materials limit binder from RAP to 17 percent of the total binder content (MDOT Tier 1 designation) and have a final binder of PG 64-22.

All pavement materials are specified within the 2020 Standard Specifications for Construction from the Michigan Department of Transportation. The bituminous pavement materials are described in Section 501 and can be assigned a structural coefficient number of 0.42. Any imported MDOT 21AA material can be assigned a structural coefficient number of 0.14.

Pavement Drainage and Maintenance

The pavement and subgrade should be properly sloped to promote effective surface and subsurface drainage and prevent water from ponding. We also recommend fill materials placed below the pavements consist of non-frost-susceptible aggregates or granular where possible. House sump pump drainage directly into the gutter can accelerate the deterioration of pavements. It is recommended that sump pump discharge be directed away from pavements or connected to an under drain system if possible.

Storm sewer catch basins and inlet structures should be inspected as part of the pavement rehabilitation project and any repointing or repairs performed, as necessary.

Regular timely maintenance should be performed on the bituminous pavement to reduce the potential deterioration associated with moisture infiltration through surface cracks. The owner should be prepared to seal the cracks with a hot-applied elastic crack filler as soon as possible after cracking develops and as often as necessary to block the passage of water to the subgrade soils.

GENERAL COMMENTS

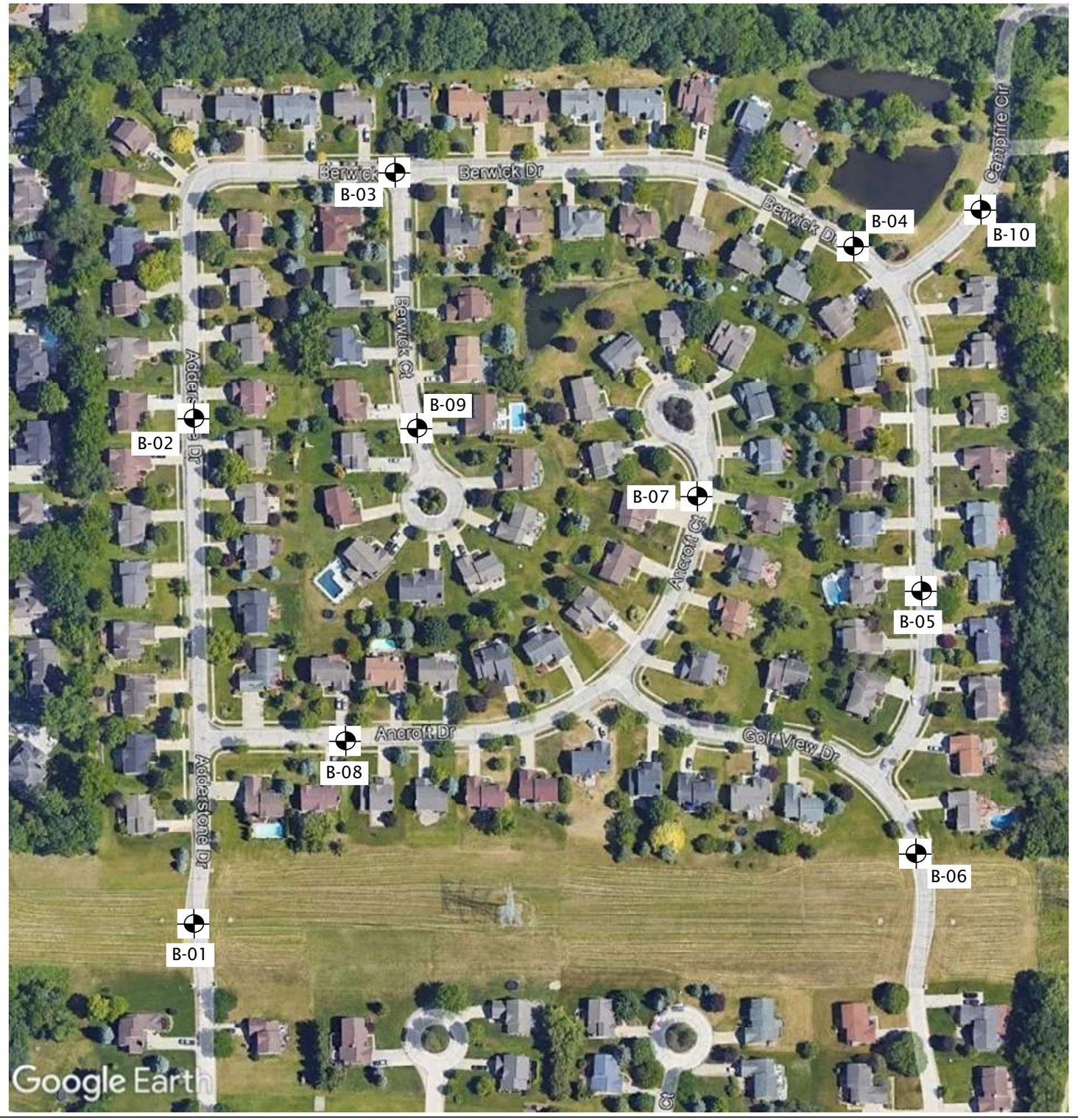
We have formulated the evaluations and recommendations presented in this report relative to site preparation and pavement construction on the basis of data provided to us relating to the general location for the proposed pavement improvements. Any significant change in this data should be brought to our attention for review and evaluation with respect to the prevailing subsurface conditions.

The scope of the present investigation was limited to evaluation of subsurface conditions for the support of the pavements and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this investigation. If changes occur in the design, location, or concept of the project, the conclusions and recommendations contained in this report are not valid unless G2 Consulting Group, LLC reviews the changes. G2 Consulting Group, LLC will then confirm the recommendations presented herein or make changes in writing.

We have based the analyses and recommendations submitted in this report upon the data from soil borings performed at the approximate locations shown on the Soil Boring Location Plans, Plate No. 1. This report does not reflect variations that may occur between the actual boring locations. The nature and extent of any such variations may not become clear until the time of construction. If significant variations then become evident, it may be necessary for us to re-evaluate our report recommendations.

Soil conditions at the site could vary from those generalized on the basis of soil borings made at specific locations. It is, therefore, recommended that G2 Consulting Group, LLC be retained to provide soil engineering services during the site preparation and pavement construction phases of the proposed project. This is to observe compliance with the design concepts, specifications, and recommendations. Also, this allows design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.

APPENDIX



N

Legend

Pavement Core/Hand Auger Soil Borings performed by G2 Consulting Group, LLC on August 12, 2024

Soil Boring Location Plan		
Spring Lake North Pavement Improvements Independence Township, Michigan		
G2 CONSULTING GROUP	Project No. 243572	
	Drawn by: JMH	
	Date: 8/28/24	Plate No. 1
	Scale: NTS	

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. B-01

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9-3/4 inches)						
		0.8						
		Fill: Brown Sandy Clay with little gravel						
		1.5		AS-1	20	16.4		6000*
		Very Stiff Brown and Gray Silty Clay with trace sand, gravel, and occasional sand seams						
		4.0		AS-2	20	15.2		6000*
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Adderstone Drive
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 1

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. **B-02**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (8 inches)						
		0.7						
		Fill: Brown Sandy Clay with little gravel						
		1.3		AS-1	7			
		Loose Brown Sand with trace silt and gravel						
		4.0		AS-2	9			
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Adderstone Drive

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 2

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. B-03

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9-1/2 inches)						
		0.8						
		Fill: Medium Compact Brown Gravelly Sand with trace silt		AS-1	12			
		2.0						
		Loose Brown Sand with trace silt and gravel		AS-2	9			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Berwick Drive

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 3

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. **B-04**

G2 CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9-1/4 inches)						
		0.8						
		Loose to Medium Compact Brown Gravelly Sand with trace silt		AS-1	10			
				AS-2	13			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Berwick Drive

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 4

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. **B-05**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9 inches)						
		0.8						
		Fill: Loose Dark Gray Gravelly Sand with trace silt		AS-1	8			
				AS-2	10			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Berwick Drive

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 5

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. **B-06**

G2 CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9-3/4 inches)						
		0.8						
		Medium Compact Brown Gravelly Sand with trace silt		AS-1	11			
				AS-2	13			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Golf View Drive

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 6

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. B-07

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (8-1/2 inches)						
		0.7						
		Medium Compact Brown Gravelly Sand with trace silt		AS-1	11			
				AS-2	14			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Ancroft Court

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 7

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. **B-08**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9-1/2 inches)						
		0.8						
		Loose to Medium Compact Brown Gravelly Sand with trace silt		AS-1	10			
				AS-2	13			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Ancroft Drive

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 8

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. **B-09**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (9-1/4 inches)						
		0.8						
		Loose to Medium Compact Brown Gravelly Sand with trace silt		AS-1	11			
				AS-2	9			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Berwick Court

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 9

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Project Name: Spring Lake North Pavements

Project Location: Independence Township, Michigan

G2 Project No. 243572

Latitude: N/A Longitude: N/A

Soil Boring No. B-10

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA				
DEPTH (ft)	PRO-FILE	GROUND SURFACE ELEVATION: N/A	DEPTH (ft)	SAMPLE TYPE/NO.	DCP BLOWS/ 1.75-INCHES	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCOF. COMP. ST. (PSF)
		Bituminous Concrete (8-3/4 inches)						
		0.7						
		Medium Compact Brown Gravelly Sand with trace silt		AS-1	12			
				AS-2	12			
		4.0						
		End of Boring @ 4 ft						
5			5					

Total Depth: 4 ft
Drilling Date: August 12, 2024
Inspector:
Contractor: G2 Consulting Group, LLC
Driller: A. Nolan

Drilling Method:
4 inch diameter diamond-tipped core barrel and 3 inch diameter hand auger

Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
Boring performed along Campfire Circle

Excavation Backfilling Procedure:
Auger cuttings and capped with cold patch

Figure No. 10

PAVEMENT CORE DCP 243572.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 8/28/24

Photographic Documentation
Spring Lake North Pavements
Independence Township, Michigan
G2 Project No. 243572

Photograph No. 1: Moderate severity transverse and secondary cracking with crack sealing along Adderstone Drive near boring B-01. View to the north.

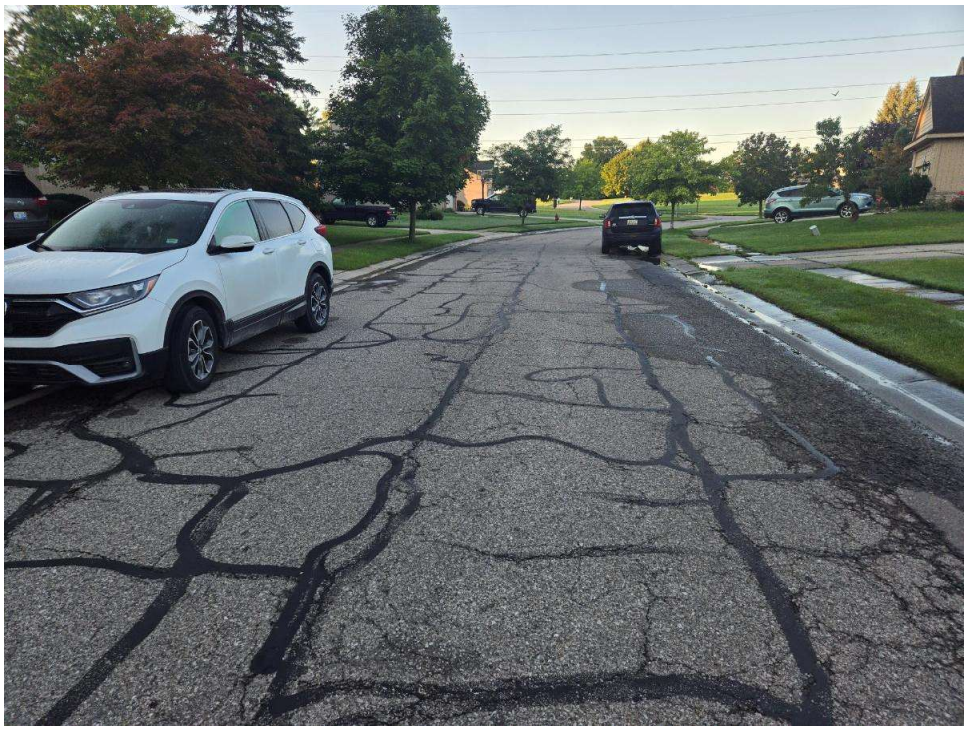
Photograph No. 2: Low to moderate severity longitudinal, transverse, and edge cracking with crack sealing along Adderstone Drive near boring B-02. View to the north.

Photographic Documentation
Spring Lake North Pavements
Independence Township, Michigan
G2 Project No. 243572

Photograph No. 3: Moderate severity longitudinal and fatigue cracking crack sealing along Berwick Drive near boring B-03. View to the east.

Photograph No. 4: Low severity edge and transverse cracking with crack sealing along Berwick Drive near boring B-04. View to the southeast.

Photographic Documentation
Spring Lake North Pavements
Independence Township, Michigan
G2 Project No. 243572



Photograph No. 5: Moderate to high severity transverse, longitudinal, secondary, and edge cracking with crack sealing along Berwick Drive near boring B-05. View to the south.

Photograph No. 6: Moderate severity transverse, longitudinal, secondary, and edge cracking with crack sealing along Golf View Drive near boring B-06. View to the south.

Photographic Documentation
Spring Lake North Pavements
Independence Township, Michigan
G2 Project No. 243572

Photograph No. 7: Moderate to high severity transverse, fatigue, and secondary cracking with surface patching and crack sealing along Ancroft Court near boring B-07. View to the north.

Photograph No. 8: Low to moderate severity transverse, longitudinal, and secondary cracking with crack sealing along Ancroft Drive near boring B-08. View to the west.

Photographic Documentation
Spring Lake North Pavements
Independence Township, Michigan
G2 Project No. 243572

Photograph No. 9: Moderate severity longitudinal, transverse, and edge cracking with cold patching and crack sealing alnog Berwick Court near boring B-09. View to the south.

Photograph No. 10: Moderate to high severity longitudinal, transverse, and secondary cracking with crack sealing along Campfire Circle near boring B-10. View to the northeast.

GENERAL NOTES TERMINOLOGY

Unless otherwise noted, all terms herein refer to the Standard Definitions presented in ASTM 653.

PARTICLE SIZE

Boulders		- greater than 12 inches
Cobbles		- 3 inches to 12 inches
Gravel	- Coarse	- 3/4 inches to 3 inches
	- Fine	- No. 4 to 3/4 inches
Sand	- Coarse	- No. 10 to No. 4
	- Medium	- No. 40 to No. 10
	- Fine	- No. 200 to No. 40
Silt		- 0.005mm to 0.074mm
Clay		- Less than 0.005mm

CLASSIFICATION

The major soil constituent is the principal noun, i.e. clay, silt, sand, gravel. The second major soil constituent and other minor constituents are reported as follows:

Second Major Constituent (percent by weight)	Minor Constituent (percent by weight)
Trace - 1 to 12%	Trace - 1 to 12%
Adjective - 12 to 35%	Little - 12 to 23%
And - over 35%	Some - 23 to 33%

COHESIVE SOILS

If clay content is sufficient so that clay dominates soil properties, clay becomes the principal noun with the other major soil constituent as modifier, i.e. sandy clay. Other minor soil constituents may be included in accordance with the classification breakdown for cohesionless soils, i.e. silty clay, trace sand, little gravel.

Consistency	Unconfined Compressive Strength (psf)	Approximate Range of (N)
Very Soft	Below 500	0 - 2
Soft	500 - 1,000	3 - 4
Medium	1,000 - 2,000	5 - 8
Stiff	2,000 - 4,000	9 - 15
Very Stiff	4,000 - 8,000	16 - 30
Hard	8,000 - 16,000	31 - 50
Very Hard	Over 16,000	Over 50

Consistency of cohesive soils is based upon an evaluation of the observed resistance to deformation under load and not upon the Standard Penetration Resistance (N).

COHESIONLESS SOILS

Density Classification	Relative Density %	Approximate Range of (N)
Very Loose	0 - 15	0 - 4
Loose	16 - 35	5 - 10
Medium Compact	36 - 65	11 - 30
Compact	66 - 85	31 - 50
Very Compact	86 - 100	Over 50

Relative Density of cohesionless soils is based upon the evaluation of the Standard Penetration Resistance (N), modified as required for depth effects, sampling effects, etc.

SAMPLE DESIGNATIONS

AS - Auger Sample – Cuttings directly from auger flight
BS - Bottle or Bag Samples
S - Split Spoon Sample - ASTM D 1586
LS - Liner Sample with liner insert 3 inches in length
ST - Shelby Tube sample - 3 inch diameter unless otherwise noted
PS - Piston Sample - 3 inch diameter unless otherwise noted
RC - Rock Core - NX core unless otherwise noted

STANDARD PENETRATION TEST (ASTM D 1586) - A 2.0 inch outside-diameter, 1-3/8 inch inside-diameter split barrel sampler is driven into undisturbed soil by means of a 140-pound weight falling freely through a vertical distance of 30 inches. The sampler is normally driven three successive 6-inch increments. The total number of blows required for the final 12 inches of penetration is the Standard Penetration Resistance (N).