A SALASO'BRIEN COMPANY

20 NW First St., Suite 400 | Evansville, IN 47708
812.425.4264
www.salasobrien.com/pci/

ADDENDUM NUMBER 2

Date: July 27, 2022

Project: Wells County Highway Garage Project
800 E 200 S
Bluffton, IN 46714

Owner: The Board of Commissioners of Wells County, Indiana
102 W. Market St.
Bluffton, IN 46714

CM: James S. Jackson Co., LLC
304 W. Market St., Suite 100
Bluffton, IN 46714

This Addendum No. 2 amends the original Drawings and Project Manual released for bids dated July 6th, 2022, for the project referenced above.

Receipt of this Addendum and any subsequent Addenda must be acknowledged on the Bid Proposal Form.

This Addendum contains six (6) items and includes attachments.

Item: Description:

Alternate

1-01 Increase from 8" to 12" for the Offsite Waterline Extension.

- The mainline pipe size shall be 12". All piping material shall be as stated on the construction drawings.
- All bends and fittings shall be 12".
- The top of pipe elevations shall be as shown on the utility profiles for the 8" pipe size (i.e., the bottom of the pipe will be 4" lower than the 8" design) to maintain the required pipe cover with existing grade.
- All mainline gate valves on the offsite extension shall be 12" and located as shown on the construction drawings.
- Fire hydrant tees shall be 12"x6" and located as shown on the construction drawings.
- The cross at S 200 Street and S Adams shall be 12" on all four legs and shall have 12" valves each way.
- The domestic and fire service tees to the proposed Maintenance Garage Facility shall be 12"x4" and 12"x8", respectively.

Specification Sections

1-02 Specification Section 003132 – GEOTHECHNICAL DATA: Please find attached the geotechnical report provided by Alt & Witzig Engineering, Inc.

1-03 Specification Section 079200 – JOINT SEALANTS: This section was inadvertently excluded in the construction documents. Please find this specification attached.

1-04 Specification Section 221329 – SANITARY SEWERAGE PUMPS: Please find attached specification to reflect the final design and clarify the requirements accordingly. The current design shall suffice and not include a grinder pump.

Drawings

1-05 Sheet A-101: Keynote #8 shall be modified to read, "DEDICATED PEDESTRIAN PATH – PROVIDE 4" PAINTED STRIPES AT 16" O.C. IN DIAGONAL PATTERN OVER SEALED CONCRETE."

1-06 Sheet A-602: The designation in the material schedule, "S. CONC." shall be modified to read, "PRODUCT EQUAL TO product equal to W.R. Meadows VOCOMP-20, water-based, acrylic, concrete curing and sealing compound."

Documents

1-07 Geotechnical Report

PRELIMINARY SUBSURFACE INVESTIGATION & GEOTECHNICAL RECOMMENDATIONS

PROPOSED HIGHWAY DEPARTMENT GARAGE
BLUFFTON, INDIANA
A&W PROJECT NO.: 21FW0022

PREPARED FOR:
WELLS COUNTY HIGHWAY DEPARTMENT
BLUFFTON, INDIANA

PREPARED BY:
ALT & WITZIG ENGINEERING, INC.
GEOTECHNICAL DIVISION

APRIL 16, 2021

Alt & Witzig Engineering, Inc.
208 East Collins Dr. • Ft. Wayne, Indiana 46825
(260) 484-0813 • Fax (260) 482-9652

April 16, 2021

Wells County Highway Department
1600 W. Washington Street
Bluffton, Indiana 46714
Attn: Mr. Nate Rumschlag

Report of Preliminary Subsurface Investigation and Geotechnical Recommendations

RE: Proposed Highway Department Garage
Bluffton, Indiana
Alt & Witzig File: 21FW0022

Dear Mr. Rumschlag:

In compliance with your request, we have conducted a subsurface investigation and geotechnical evaluation for the above referenced project. It is our pleasure to transmit an electronic copy of the report.

The results of our test borings and laboratory tests completed to date are presented in the appendix of the report. Our recommendations for the project are presented in the "Geotechnical Analysis and Recommendations" section of the report.

Often, because of design and construction details that occur on a project, questions arise concerning the soil conditions. If we can give further service in these matters, please contact us at your convenience.

Sincerely,
Alt & Witzig Engineering, Inc.

Daniel E. Desper, P.E.

Jason R. Bennett, P.E.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Alt & Witzig Engineering, Inc. has performed a preliminary subsurface investigation and geotechnical analysis for the proposed highway department garage located south side of East 200 North approximately 750 feet west of South 100 East (South Adams Street) in Bluffton, Indiana (Site). The subsurface investigation was conducted in conformance with the scope and limitations of our proposal dated March 15, 2021 (*A&W Proposal 2103FW009*). Authorization to perform this investigation was in the form of an Alt & Witzig Engineering, Inc. proposal that was accepted by the Wells County Highway Department.

In compliance with your request, we proposed to conduct six (6) borings. It is understood that a slab-on-grade highway department garage and a tower will be constructed.

Findings and Conclusions

Our borings encountered approximately twelve (12) inches of topsoil. Beneath the topsoil, medium stiff to stiff clays were encountered to a depth as great as eight and one-half (8½) feet. Below the medium stiff to stiff clays, medium stiff to very stiff clays were encountered to twenty-five (25) feet underlain by wet sand and gravel to auger refusal at twenty-eight (28) feet on possible bedrock. Additional, intermittent dry, sand and gravel layers were encountered at depths greater than ten (10) feet.

The shallow medium stiff to stiff clays typically exhibited slightly elevated moisture contents. If construction takes place during the wetter portions of the year, stabilization of the shallow soils may be necessary. Additionally, these soils are border line expansive soils. All fill placed at this site should be placed and compacted at optimum moisture to +2 percent over optimum moisture.

Net allowable soil bearing capacities ranging from 2,000 psf to 3,000 psf are preliminarily estimated for design of conventional spread and continuous wall footings.

INTRODUCTION

This report presents the results of a preliminary subsurface investigation for the proposed highway department garage located south side of East 200 North approximately 750 feet west of South 100 East (South Adams Street) in Bluffton, Indiana. This investigation was conducted for Wells County Highway Department of Bluffton, Indiana. Authorization to perform this investigation was in the form of a proposal prepared by Alt & Witzig Engineering, Inc. (*Alt & Witzig Proposal No. 2103FW009*) that was accepted by Wells County Highway Department.

It is understood that a slab-on-grade highway department garage and a communication tower will be constructed at the site. The building location and structural loading was not available at the time of this investigation. It is anticipated the garage will be moderately to lightly loaded. It is anticipated that structural loads will be transferred to the soils by continuous wall footings, if possible.

The purpose of this subsurface investigation was to determine the soil profile and the engineering characteristics of the subsurface materials in order to provide criteria for use by design engineers and architects in preparing the foundation design for the proposed structures.

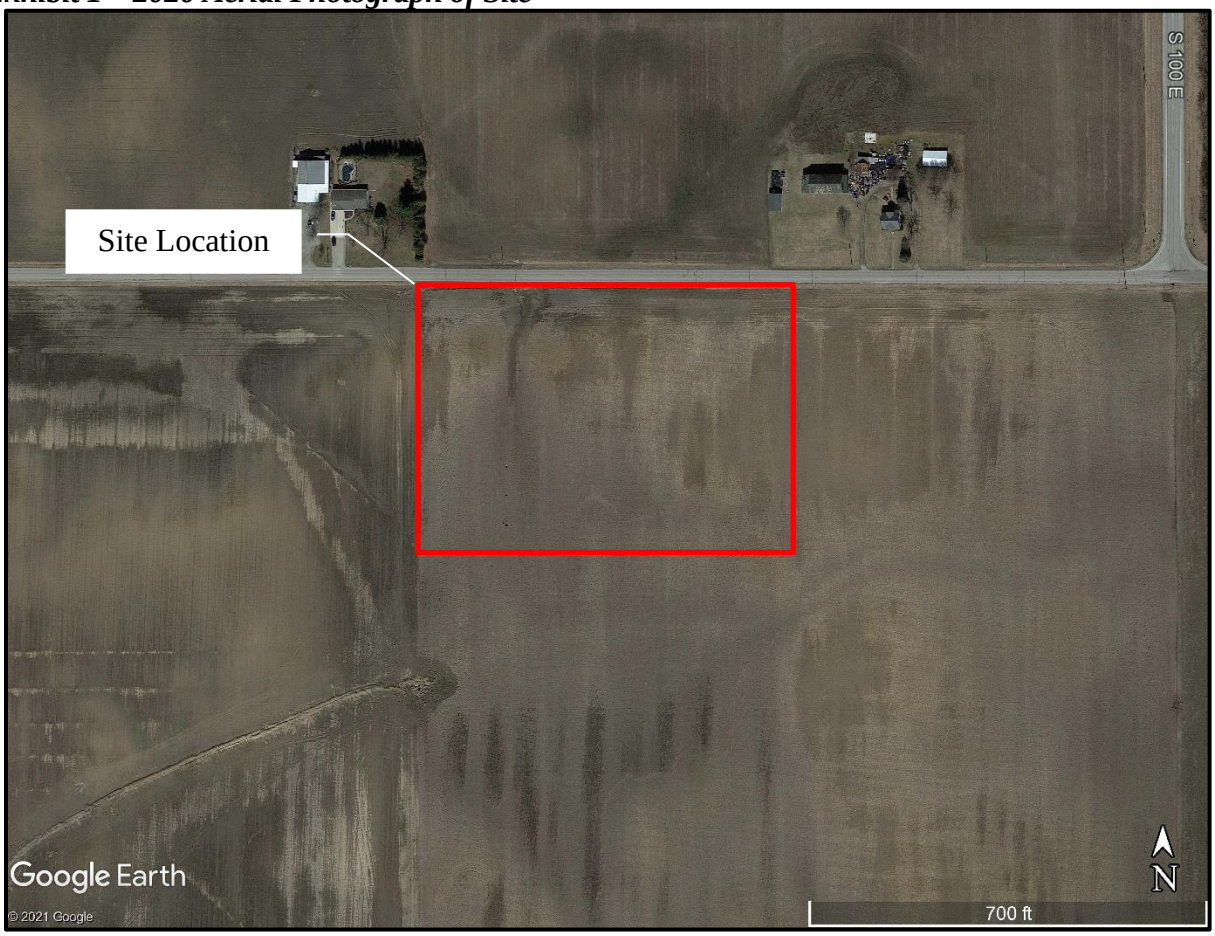
The scope of this investigation included a review of geological maps of the area; a review of geologic and related literature; a reconnaissance of the immediate sites; a subsurface exploration; field and laboratory testing; and an engineering analysis and evaluation of the encountered materials.

The scope or purpose of this geotechnical investigation did not, either specifically or by implication, provide any environmental assessment of the site.

DESCRIPTION OF SITE

The site of proposed highway department garage is located south side of East 200 North approximately 750 feet west of South 100 East (South Adams Street) in Bluffton, Indiana. The site may be located using the Bluffton, Indiana 7-½ Minute Topographic Map in Section 18, Township 26 North, Range 12 East. An aerial photograph of the site taken in 2020 is provided in *Exhibit 1* below.

Exhibit 1 – 2020 Aerial Photograph of Site



The site is currently a relatively flat agricultural field with an estimated ground surface elevation of 835 feet. Drainage on this site is primarily along the ground surface into low lying areas. The site is currently surrounded by agricultural land and residential structures.

FIELD INVESTIGATION

Boring Locations

Alt & Witzig Engineering, Inc. staked the locations of the borings using an undated aerial photograph with the requested boring locations. The aerial photograph with the requested boring locations, provided by Nate Rumschlag with Wells County Highway Department, was projected onto aerials provided by the Google Earth website allowing for the correlation of the approximate latitude and longitude coordinates with each boring location. These coordinates were then assigned as waypoints and uploaded into a handheld GPS unit. Utilizing the handheld GPS unit, the locations referred to on our boring logs and presented on the *Boring Location Plan* (Appendix A), were staked in the field.

Drilling and Sampling Procedures

Drilling operations were conducted on March 29, 2021. At the time the majority of our field activities were completed the temperatures ranged from 28º F to 55º F.

The soil borings were drilled using an ATV-mounted drilling rig equipped with a rotary head. Hollow-stem augers were used to advance the holes. The advancement of the borings was temporarily stopped at regular intervals in order to perform standard penetration tests in accordance with ASTM Procedure D-1586 to obtain the standard penetration value of the soil.

The standard penetration value is defined as the number of blows a 140 lb hammer, falling 30 inches, required to advance the split-spoon sampler 12 inches into the soil. The results of the standard penetration tests indicate the relative density and comparative consistency of the soils, and thereby provide a basis for estimating the relative strength and compressibility of the soil profile components.

The soil samples retained in the split-spoon sampling device as a result of the penetration tests were obtained, classified, and labeled for further laboratory investigation. Unless notified to the contrary, all samples will be disposed of two (2) months after the drilling date.

Water Level Measurements

Groundwater depths, during drilling operations, were estimated based on where water was observed on the sampling rods. Upon completion, and up to two and one-half (2½) hours after the completion of drilling activities, the depth to water was measured using a tape measure with a weighted end. It shall be noted that in granular soils, borings often experience caving or 'plugging' of the borehole opening due to sloughing of the granular soils after removal of the augers. The depth of cave/plug is also recorded on the *Boring Logs*. The depths presented on the *Boring Logs* are accurate only for the day on which they were recorded. The exact location of the water table shall be anticipated to fluctuate depending upon normal seasonal variations in precipitation and surface runoff.

Ground Surface Elevation

Ground surface elevations were not available at the time of this investigation. All depths and elevations referred to in this report are referenced from the ground surface existing at the time of this report.

LABORATORY INVESTIGATION

A laboratory investigation was conducted to ascertain additional pertinent engineering characteristics of the subsurface materials at the site of the proposed highway department garage. The laboratory testing program included:

- Visual classification of soils in accordance with ASTM D-2488.
- Moisture content determination in accordance with ASTM D-2216.
- Atterberg limit determination in accordance with ASTM D-4318.
- Samples of the cohesive soil were frequently tested in unconfined compression by use of a calibrated spring testing machine.
- A soil Penetrometer was used as an aid in determining the strength of the soil.

The values of the unconfined compressive strength as determined on soil samples from the split-spoon sampling must be considered, recognizing the manner in which they were obtained since the split-spoon sampling techniques provide a representative but somewhat disturbed soil sample.

SUBSURFACE CONDITIONS

Regional Setting

The site of the proposed highway department garage is located within the Central Till Plain of Indiana with an estimated ground surface elevation of 835 feet. According to the Indiana Geological Survey, bedrock is located at an approximate elevation of 800 feet consisting of dolomite and limestone from the Silurian Age. According to the *Custom Soil Resource Report for Wells County, Indiana* published by the United States Department of Agriculture Soil Conservation Service (USDS SCS), the majority of the soils covering this site are classified as Blount-Del Rey silt loam (BkB2), Del Rey-Blount silt loams (DeA), Milford silty clay loam (Mh), and Pewamo silty clay (Pm). The *Custom Soil Resource Report for Wells County, Indiana* has been included in *Appendix B* of this report.

Site-Specific Geologic Results

The types of foundation materials encountered have been visually classified and are described in detail on the *Boring Log* included in *Appendix A* of this report. The results of the field penetration tests, strength tests, water level observations and laboratory water contents are also presented on the *Boring Logs* in numerical form.

At the ground surface, our borings encountered approximately twelve (12) inches of topsoil. Beneath the topsoil, medium stiff to stiff clays were encountered to a depth as great as eight and one-half (8½) feet. Below the medium stiff to stiff clays, medium stiff to very stiff clays were encountered to twenty-five (25) feet underlain by wet sand and gravel to auger refusal at twenty-eight (28) feet on possible bedrock. Additional, intermittent dry, sand and gravel layers were encountered at depths greater than ten (10) feet.

Moisture content results of the shallow medium stiff to stiff clays ranged from 22.3% to 31.3%. The stiff to hard clays encountered at greater depths exhibited moisture contents ranging from 10.1% to 20.9%. Atterberg limit determinations indicated the clays in borings B-06 at 6.0 feet exhibited a liquid limit (LL) of 50, a plastic limit (PL) of 19, and a plasticity index (PI) of 31. The liquid limit, plastic limit, and plasticity index are similar to the values provided in the *Custom Soil Resource Report for Wells County, Indiana*.

Site-Specific Groundwater Elevations

The *Custom Soil Resource Report for Wells County, Indiana* indicates a groundwater level ranging from the natural ground surface to one and one-half (1½) feet below the natural ground surface.

Groundwater level measurements, taken during, upon completion, and up to two and oner-half (2½) hours after the completion of the boring operations indicated groundwater as shallow as twenty-three and one-half (23½) feet below the current ground surface. The exact location of the water table should be anticipated to fluctuate somewhat depending upon normal seasonal variations in precipitation and surface runoff. It should be noted that the groundwater level measurements recorded on the individual *Boring Logs* included in *Appendix A* of this report, are accurate only for the dates on which the measurements were performed.

Seismic Parameters

Based on the field and laboratory tests performed on the encountered subsurface materials and an assumption of similar soils conditions present at depths below the boring termination depth, this site should be considered a Site Class D in accordance with the 2015 International Building Code.

Maximum spectral response acceleration values of S_S=0.131 g and S_1=0.066 g are indicated for seismic design.

GEOTECHNICAL ANALYSIS & RECOMMENDATIONS

Project Description

It is understood that a slab-on-grade highway department garage and a communication tower will be constructed at this site. Building location along with structural loading was not available at the time of this investigation. It is anticipated the garage will be moderately to lightly loaded. It is anticipated that structural loads will be transferred to the soils by continuous wall footings, if possible. Once design plans and structural loads are available, they should be submitted top Alt & Witzig Engineering, Inc. for review.

Site Preparation

Excessively loose or organic soil can undergo high volume changes, which are detrimental to the behavior of shallow foundations, floor slabs, pavement, and fill material. Therefore, it is recommended that loose materials and topsoil be stripped from the construction areas and wasted or stockpiled for later use.

Stripping on the order of twelve (12) inches will be necessary to remove the topsoil across the site. The topsoil depths on our boring logs are not exact and may not represent variations between boring locations. Therefore, these thicknesses should be used for estimating purposes only. The amount of stripping will be dependent on the condition of the subgrade during earthmoving operations. Therefore, representative of Alt & Witzig Engineering, Inc. should verify the stripping depth at the time grading operations occur. It is also recommended that a representative of Alt & Witzig Engineering, Inc. verify the stripping depth in the field and the time earthmoving is taking place.

After stripping and prior to the placement of fill material, it is recommended that the exposed subgrade be proof-rolled with approved equipment to identify soft or yielding soils. It is further recommended that a representative of Alt & Witzig Engineering, Inc. be present to witness the proof-roll evaluation. If construction takes place during the wetter portions of the year, a majority of the shallow soils may not pass proof-roll. Any areas failing proof-rolling should be remediated as determined by the owner after consultation with Alt & Witzig Engineering. Chemical stabilization

may be necessary depending on the time of construction.

After completion of the proof-roll and any necessary remediation has been completed, it is recommended that proper control of subgrade compaction and fill, and structural fill replacement be maintained by a representative of Alt & Witzig Engineering, Inc. as per the *Recommended Specifications for Compacted Fills and Backfills*, presented in Appendix A of this report; thus minimizing volume changes and differential settlements which are detrimental to behavior of shallow foundations, floor slabs and pavements. All fill placed with the intent of supporting foundations and floor slabs and pavements should be compacted to 95% and 93%, respectively, of maximum dry density in accordance with ASTM D-1557. Additionally, the shallow soils across the site are border line expansive soils. Therefore, all fill placed at this site should be placed and compacted at optimum moisture to +2 percent over optimum moisture.

Foundation Recommendations

At the time of this investigation, site plans and grading were not available. However, it is understood that a slab-on-grade highway department garage building, and a communication tower will be constructed.

As indicated previously, typically medium stiff to stiff clays were encountered to eight and one-half (8½) feet underlain by stiff to very stiff clays. Net allowable soil bearing capacities ranging from 2,000 psf to 3,000 psf are preliminarily anticipated for design of conventional spread and continuous wall footings.

In order to alleviate the effects of seasonal variation in moisture content on the behavior of the footings and eliminate the effects of frost action, all exterior foundations and foundations subject to freeze-thaw cycles should be founded a minimum of three (3) feet below the final grade.

CONSTRUCTION CONSIDERATIONS

Groundwater

Groundwater level measurements, taken during, upon completion, and up to two and one-half (2½) hours after the completion of field operations indicated groundwater as shallow as twenty-three and one-half (23½) feet. The *Custom Soil Resource Report for Wells County, Indiana* indicates a groundwater level ranging from one-half (½) to one and one-half (1½) feet below the natural ground surface. The exact location of the water table will fluctuate depending upon normal seasonal variations in precipitation and surface runoff.

Depending upon the time of the year and the weather conditions when the excavations are made, seepage from surface runoff may occur into shallow excavations or soften the subgrade soils. Since these foundation materials tend to loosen when exposed to free water, every effort should be made to keep the excavations dry should water be encountered. Sump pumps or other conventional dewatering procedures should be sufficient for this purpose. It is further recommended that all concrete for footings be poured the same day as the excavation is made in order to prevent the softening of foundation soils from groundwater infiltration.

STATEMENT OF LIMITATIONS

This report is solely for the use of Wells County Highway Department and any reliance of this report by third parties shall be at such party's sole risk and may not contain sufficient information for purposes of other parties for other uses. This report shall only be presented in full and may not be used to support any other objectives than those set out in the scope of work, except where written approval and consent are provided by Wells County Highway Department and Alt & Witzig Engineering, Inc.

An inherent limitation of any geotechnical engineering study is that conclusions must be drawn on the basis of data collected at a limited number of discrete locations. The geotechnical parameters provided in this report were developed from the information obtained from the test borings that depict subsurface conditions only at these specific locations and on the particular date indicated on the boring logs. Soil conditions at other locations may differ from conditions encountered at these boring locations and groundwater levels shall be expected to vary with time. The nature and extent of variations between the borings may not become evident until the course of construction.

The exploration and analysis reported herein is considered in sufficient detail and scope to form a reasonable basis for site evaluation. The recommendations submitted are based on the available soil information and assumed design details enumerated in this report. If actual design details differ from those specified in this report, this information should be brought to the attention of Alt & Witzig Engineering, Inc. so that it may be determined if changes in the foundation recommendations are required. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of Alt & Witzig Engineering, Inc.

APPENDIX A

Recommended Specifications for Compacted Fills and Backfills
Undercut Detail for Footing Excavation in Unstable Material
Boring Location Plan
Boring Logs
General Notes

RECOMMENDED SPECIFICATIONS FOR COMPACTED FILLS AND BACKFILLS

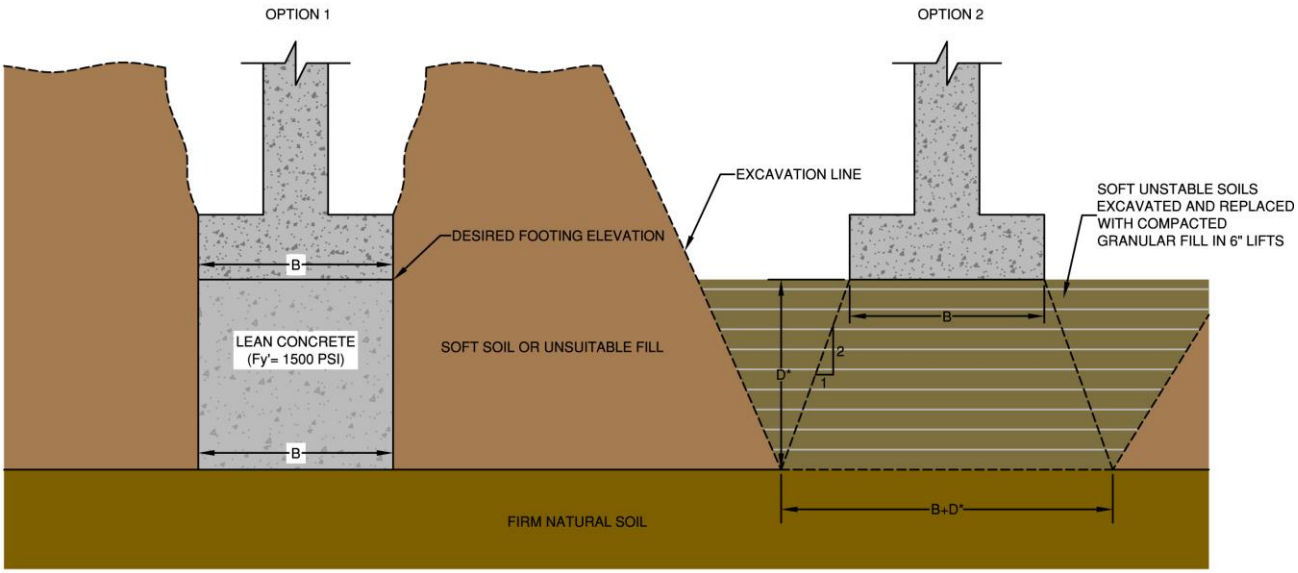
All fill shall be formed from material free of vegetable matter, rubbish, large rock, and other deleterious material. Prior to placement of fill, a sample of the proposed fill material should be submitted to Alt & Witzig Engineering, Inc. for approval.

The surface of each layer will be approximately horizontal but will be provided with sufficient longitudinal and transverse slope to provide for runoff of surface water from every point. The fill material should be placed in layers not to exceed eight (8) inches in loose thickness and should be sprinkled with water as required to secure specified compactions. Each layer should be uniformly compacted by means of suitable equipment of the type required by the materials composing the fill.

Under no circumstances should a bulldozer or similar tracked vehicles be used as compacting equipment. Material containing an excess of water so the specified compaction limits cannot be attained should be spread and dried to a moisture content that will permit proper compaction.

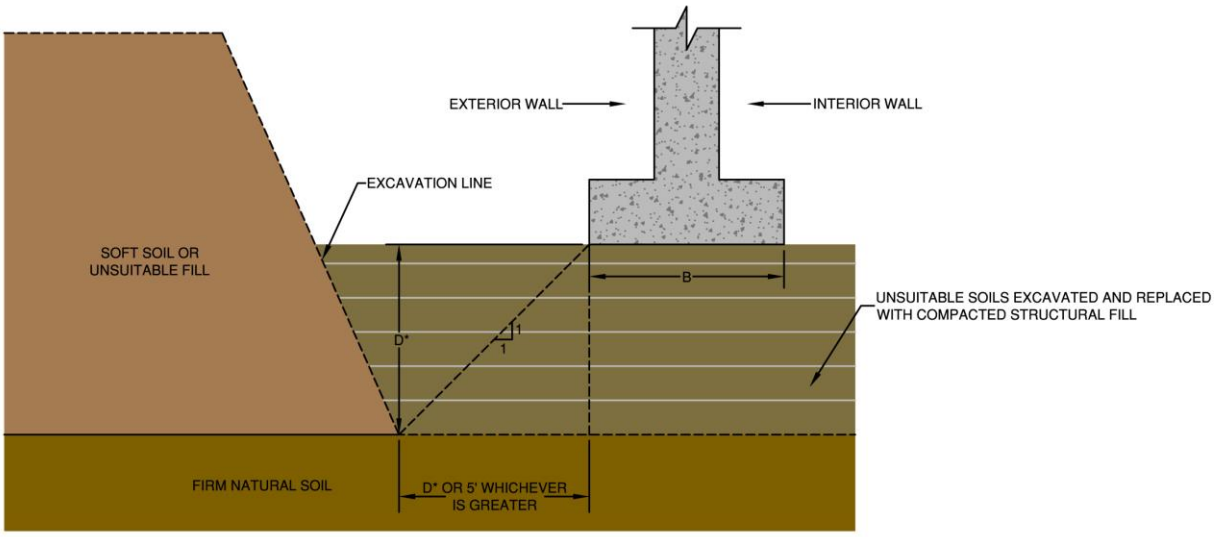
All fill should be compacted to the specified percent of the maximum density obtained in accordance with ASTM density Test D-1557 (95% of maximum dry density beneath footings and 93% beneath floor slabs and pavements). Additionally, the moisture content of all fill material must be at optimum moisture content to +2% over optimum moisture content during placement and compaction. Should the results of the in-place density tests indicate that the specified compaction limits are not obtained; the areas represented by such tests should be reworked and retested as required until the specified limits are reached.

UNDERCUT EXCAVATION FOR ISOLATED FOOTINGS IN UNSTABLE MATERIALS



D* IS DEPTH FOR SUITABLE SOILS

MASS EXCAVATION FOR FOOTINGS IN UNSTABLE MATERIALS



D* IS DEPTH FOR SUITABLE SOILS

Undercut Detail for Footing Excavation in Unstable Material

PROJECT: **Proposed Highway Department Garage**
LOCATION: Bluffton, Indiana
CLIENT: **Wells County Highway Department**
A&W File No.: 21FW0022

Alt & Witzig Engineering Inc.
208 E. Collins Drive ·Fort Wayne, IN 46825
TEL (260) 484-08130 · FAX (260) 482-9652
www.altwitzig.com

BORING LOCATION PLAN

PROJECT: **Proposed Highway Department Garage**
LOCATION: Bluffton, Indiana
CLIENT: **Wells County Highway Department**
A&W File No.: 21FW0022

Alt & Witzig Engineering Inc.
208 E. Collins Drive ·Fort Wayne, IN 46825
TEL (260) 484-08130 · FAX (260) 482-9652
www.altwitzig.com

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Wells County Highway Department**
PROJECT NAME **Wells County Highway Garage**
PROJECT LOCATION **Bluffton, IN**

BORING # **B-1**
ALT & WITZIG FILE # **21FW0022**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/21**
Date Completed **3/29/21**
Boring Method **HSA**
Driller **J. Livingston**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL	1.0										
	Brown and Gray Sandy Silty CLAY			1	SS			7	2.3	1.8	23.2	
			5	2	SS			11	3.1	2.8	22.6	
		7.5		3	SS			17		4.5	15.0	
	Brown CLAY											
		10.0	10	4	SS			28	5.0	4.5	15.7	
	Brown and Gray CLAY											
		15.0	15	5	SS			15	4.3	4.0	20.9	
	Gray CLAY	16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*
▼ After *1.5* hours *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Wells County Highway Department**
PROJECT NAME **Wells County Highway Garage**
PROJECT LOCATION **Bluffton, IN**

BORING # **B-2**
ALT & WITZIG FILE # **21FW0022**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/21**
Date Completed **3/29/21**
Boring Method **HSA**
Driller **J. Livingston**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL	1.0										
	Brown Sandy Silty CLAY			1	SS			8	2.6	2.0	22.3	
			5	2	SS			7	1.7	2.5	26.6	
		7.0										
	Brown Sandy CLAY			3	SS			18	5.4	4.5	16.4	
		10.0	10	4	SS			15	4.7	4.5	20.7	
	Gray Sandy CLAY											
			15	5	SS			14		1.5	20.5	
		16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Wells County Highway Department**
PROJECT NAME **Wells County Highway Garage**
PROJECT LOCATION **Bluffton, IN**

BORING # **B-3**
ALT & WITZIG FILE # **21FW0022**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/21**
Date Completed **3/29/21**
Boring Method **HSA**
Driller **J. Livingston**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL	1.0										
	Brown Silty Sandy CLAY			1	SS			10	4.1	3.8	22.4	
			5	2	SS			13	5.4	4.5	17.1	
				3	SS			20		1.8	18.0	
		8.5										
	Brown Silty Sandy CLAY with Shale	10.0	10	4	SS			7				
	Brown, Dry SAND and GRAVEL											
		14.5										
	Gray Sandy Silty CLAY	16.0	15	5	SS			8		2.8	16.6	
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
○ During Drilling *Dry ft.*
▽ At Completion *Dry ft.*
▼ After *2.0* hours *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Wells County Highway Department**
PROJECT NAME **Wells County Highway Garage**
PROJECT LOCATION **Bluffton, IN**

BORING # **B-4**
ALT & WITZIG FILE # **21FW0022**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/21**
Date Completed **3/29/21**
Boring Method **HSA**
Driller **J. Livingston**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Track ATV**

STRATA ELEV. / SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
TOPSOIL	1.0										
			1	SS			6	2.3	2.0	24.6	
Brown and Gray Silty Sandy CLAY		5	2	SS			8	1.6	1.5	27.5	
	7.5		3	SS			21	5.4	4.5	15.0	
Brown Sandy CLAY											
	10.0	10	4	SS			23	4.7	4.5	17.2	
Gray Sandy CLAY											
	15.5	15	5	SS			19				
Gray, Dry SAND and GRAVEL	16.0										
End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
During Drilling *Dry ft.*
At Completion *Dry ft.*
After *1.0* hours *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Wells County Highway Department**
PROJECT NAME **Wells County Highway Garage**
PROJECT LOCATION **Bluffton, IN**

BORING # **B-5**
ALT & WITZIG FILE # **21FW0022**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/21**
Date Completed **3/29/21**
Boring Method **HSA**
Driller **J. Livingston**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Track ATV**

STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL	1.0										
	Brown Silty Sandy CLAY			1	SS			9	2.3	2.3	23.4	
			5	2	SS			6	1.0	1.0	25.2	
		8.0		3	SS			15	5.4	4.5	14.5	
	Gray CLAY with a Trace of Gravel		10	4	SS			22	5.4	4.5	18.6	
			15	5	SS			12	5.4	4.5	12.2	
			20	6	SS			8		4.5	12.4	
		25.0	25	7	SS			20				
	Gray, Wet SAND and GRAVEL	28.0										
	Auger Refusal @ 28' End of Boring at 28 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
During Drilling *25.0 ft.*
At Completion *Dry ft.*
Caved At Completion *24.0 ft.*
After *1.5* hours *23.5 ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

BORING LOG

Alt & Witzig Engineering, Inc.

CLIENT **Wells County Highway Department**
PROJECT NAME **Wells County Highway Garage**
PROJECT LOCATION **Bluffton, IN**

BORING # **B-6**
ALT & WITZIG FILE # **21FW0022**

DRILLING and SAMPLING INFORMATION

Date Started **3/29/21**
Date Completed **3/29/21**
Boring Method **HSA**
Driller **J. Livingston**

Hammer Wt. **140** lbs.
Hammer Drop **30** in.
Spoon Sampler OD **2** in.
Rig Type **D-50 Track ATV**

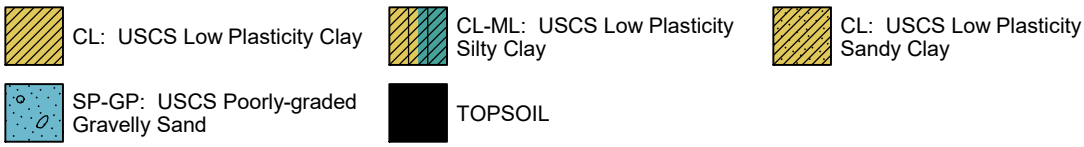
STRATA ELEV.	SOIL CLASSIFICATION / SURFACE ELEVATION	Strata Depth	Depth Scale	Sample No.	Sample Type	Sampler Graphics / Recovery Graphics	Ground Water	TEST DATA: Standard Penetration Test, N - blows/foot	TEST DATA: Qu-tsf Unconfined Compressive Strength	TEST DATA: PP-tsf Pocket Penetrometer	TEST DATA: Moisture Content % / *Dry Unit Weight (pcf)*	Remarks
	TOPSOIL	1.0										
	Brown Sandy Silty CLAY			1	SS			8	1.8	1.0	25.5	
			5	2	SS			10	1.6	2.0	31.3	
				3	SS			12			24.4	
		10.0	10	4	SS			7				
	Brown, Dry SAND and GRAVEL											
		15.0	15	5	SS			13		4.0	10.1	
	Gray Sandy CLAY	16.0										
	End of Boring at 16 feet											

Sample Type
SS - Driven Split Spoon
ST - Pressed Shelby Tube
CA - Continuous Flight Auger
RC - Rock Core
CU - Cuttings
CT - Continuous Tube

Groundwater
During Drilling *Dry ft.*
At Completion *Dry ft.*
After *2.5* hours *Dry ft.*

Boring Method
HSA - Hollow Stem Augers
CFA - Continuous Flight Augers
DC - Driving Casing
MD - Mud Drilling

MATERIAL GRAPHICS LEGEND



SOIL PROPERTY SYMBOLS

N: *Standard "N" penetration value. Blows per foot of a 140-lb hammer falling 30" on a 2" O.D. split-spoon.*

Qu: *Unconfined Compressive Strength, tsf* PP: *Pocket Penetrometer, tsf*

LL: *Liquid Limit, %* PL: *Plastic Limit, %* PI: *Plasticity Index, %*

DRILLING AND SAMPLING SYMBOLS

GROUNDWATER SYMBOLS

○ *Apparent water level noted while drilling.*

▽ *Apparent water level noted upon completion.*

▼ *Apparent water level noted upon delayed time.*

SAMPLER SYMBOLS

⊠ SS: Split Spoon

RELATIVE DENSITY & CONSISTANCY CLASSIFICATION (NON-COHESIVE SOILS)

TERM	*BLOWS PER FOOT*
Very Loose	0 - 5
Loose	6 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	>51

RELATIVE DENSITY & CONSISTANCY CLASSIFICATION (COHESIVE SOILS)

TERM	*BLOWS PER FOOT*
Very Soft	0 - 3
Soft	4 - 5
Medium Stiff	6 - 10
Stiff	11 - 15
Very Stiff	16 - 30
Hard	>31

Alt & Witzig Engineering, Inc.
4105 West 99th St.
Carmel, IN 46032
Telephone: 317-875-7000
Fax:

GENERAL NOTES

Project: Wells County Highway Garage

Location: Bluffton, IN

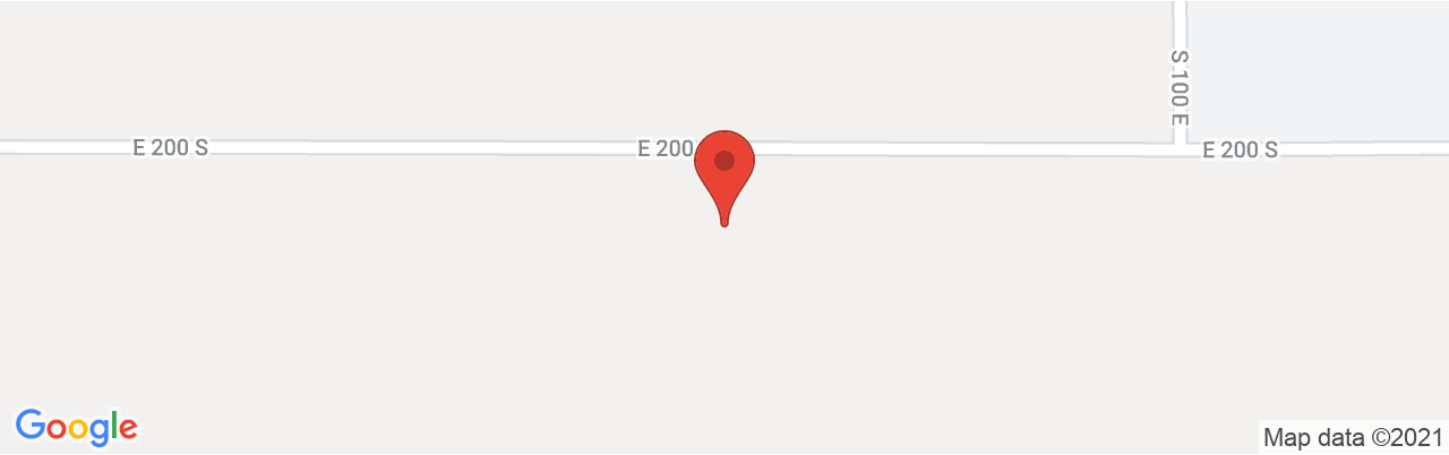
Number: 21FW0022

APPENDIX B

Seismic Design Parameters
Custom Soil Resource Report for Wells County, Indiana

Wells County Highway Garage

Latitude, Longitude: 40.712701, -85.207391



Date	4/8/2021, 2:45:15 PM
Design Code Reference Document	IBC-2015
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.131	MCE_R ground motion. (for 0.2 second period)
S_1	0.066	MCE_R ground motion. (for 1.0s period)
S_{MS}	0.21	Site-modified spectral acceleration value
S_{M1}	0.16	Site-modified spectral acceleration value
S_{DS}	0.14	Numeric seismic design value at 0.2 second SA
S_{D1}	0.106	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	B	Seismic design category
F_a	1.6	Site amplification factor at 0.2 second
F_v	2.4	Site amplification factor at 1.0 second
PGA	0.063	MCE_G peak ground acceleration
F_{PGA}	1.6	Site amplification factor at PGA
PGA_M	0.101	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	0.131	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.142	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.066	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.075	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.6	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.922	Mapped value of the risk coefficient at short periods
C_{R1}	0.882	Mapped value of the risk coefficient at a period of 1 s

DISCLAIMER

While the information presented on this website is believed to be correct, SEAOC /OSHPD and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in this web application should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. SEAOC / OSHPD do not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the seismic data provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the search results of this website.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Wells County, Indiana

April 19, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


85° 12' 31" W
85° 12' 14" W
40° 42' 48" N
40° 42' 40" N
651320
651360
651400
651440
651480
651520
651560
651600
651640
651680
4508490
4508450
4508410
4508370
4508330
4508290
4508250
E 200 S
DeA
Mh
DeA
BkB2
Mh
Pm
DeA
Soil Map may not be valid at this scale.
N
Map Scale: 1:1,800 if printed on A landscape (11" x 8.5") sheet.
Meters
0 25 50 100 150
Feet
0 50 100 200 300
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wells County, Indiana
Survey Area Data: Version 24, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 14, 2012—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BkB2	Blount-Del Rey silt loams, 1 to 4 percent slopes, eroded	3.6	26.5%
DeA	Del Rey-Blount silt loams, 0 to 1 percent slopes	2.4	17.4%
Mh	Milford silty clay loam, 0 to 2 percent slopes	7.1	52.0%
Pm	Pewamo silty clay loam, 0 to 1 percent slopes	0.6	4.0%
Totals for Area of Interest		**13.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Wells County, Indiana

BkB2—Blount-Del Rey silt loams, 1 to 4 percent slopes, eroded

Map Unit Setting

National map unit symbol: 5dsf
Elevation: 640 to 1,150 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 165 to 175 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Blount and similar soils: 55 percent
Del rey and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blount

Setting

Landform: Till plains, moraines
Landform position (two-dimensional): Shoulder, backslope, footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over clayey till

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1,Bt2 - 6 to 17 inches: clay
BCt - 17 to 23 inches: clay loam
C1,C2 - 23 to 60 inches: clay loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: F111BY502IN - WET TILL RIDGE
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Del Rey

Setting

Landform: Moraines, till plains
Landform position (two-dimensional): Shoulder, backslope, footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey lacustrine deposits

Typical profile

Ap - 0 to 6 inches: silt loam
Bt1-Bt4 - 6 to 37 inches: silty clay loam
C1,C2 - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F111BY102IN - LACUSTRINE FOREST
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Glynwood

Percent of map unit: 7 percent
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Pewamo

Percent of map unit: 3 percent
Landform: Depressions
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

DeA—Del Rey-Blount silt loams, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 5dsh
Elevation: 640 to 1,150 feet
Mean annual precipitation: 34 to 39 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 165 to 175 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Del rey and similar soils: 55 percent
Blount and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Del Rey

Setting

Landform: Moraines, till plains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey lacustrine deposits

Typical profile

Ap - 0 to 9 inches: silt loam
Bt1-Bt4 - 9 to 37 inches: silty clay loam
C1,C2 - 37 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 30 percent
Available water capacity: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F111BY102IN - LACUSTRINE FOREST

Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Description of Blount

Setting

Landform: Moraines, till plains
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over clayey till

Typical profile

Ap - 0 to 9 inches: silt loam
Bt1,Bt2 - 9 to 17 inches: clay
BCt - 17 to 23 inches: clay loam
C1,C2 - 23 to 60 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 20 to 40 inches to densic material
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.01 to 0.06 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 35 percent
Available water capacity: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: D
Ecological site: F111BY502IN - WET TILL RIDGE
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Minor Components

Pewamo

Percent of map unit: 5 percent
Landform: Depressions
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

Milford

Percent of map unit: 5 percent
Landform: Depressions
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

Mh—Milford silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2wp28
Elevation: 640 to 1,150 feet
Mean annual precipitation: 29 to 40 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 140 to 185 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Milford and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Milford

Setting

Landform: Lake plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Lacustrine deposits

Typical profile

Ap - 0 to 13 inches: silty clay loam
Bg1 - 13 to 28 inches: silty clay
Bg2 - 28 to 50 inches: silty clay loam
Cg - 50 to 79 inches: stratified silt loam to silty clay loam to silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: High (about 9.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F111BY101IN - LACUSTRINE FLATWOOD

Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

Minor Components

Del rey
Percent of map unit: 7 percent
Landform: Lake plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F111BY102IN - LACUSTRINE FOREST
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Houghton, undrained
Percent of map unit: 3 percent
Landform: Lake plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R111BY003IN - DEEP MUCK
Other vegetative classification: Mixed/Transitional (Mixed Native Vegetation)
Hydric soil rating: Yes

Pm—Pewamo silty clay loam, 0 to 1 percent slopes

Map Unit Setting
National map unit symbol: 2t6lv
Elevation: 700 to 1,300 feet
Mean annual precipitation: 32 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Pewamo and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pewamo

Setting
Landform: Depressions on till plains, drainageways on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Parent material: Wisconsin till derived from limestone and shale

Typical profile

Ap - 0 to 11 inches: silty clay loam
Btg1 - 11 to 34 inches: silty clay
Btg2 - 34 to 47 inches: silty clay
BCg - 47 to 57 inches: clay loam
Cg - 57 to 79 inches: clay loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F111BY501IN - TILL DEPRESSION
Hydric soil rating: Yes

Minor Components

Blount

Percent of map unit: 9 percent
Landform: Ground moraines on till plains, end moraines on till plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F111BY502IN - WET TILL RIDGE
Hydric soil rating: No

Minster

Percent of map unit: 6 percent
Landform: Depressions on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F111BY101IN - LACUSTRINE FLATWOOD
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

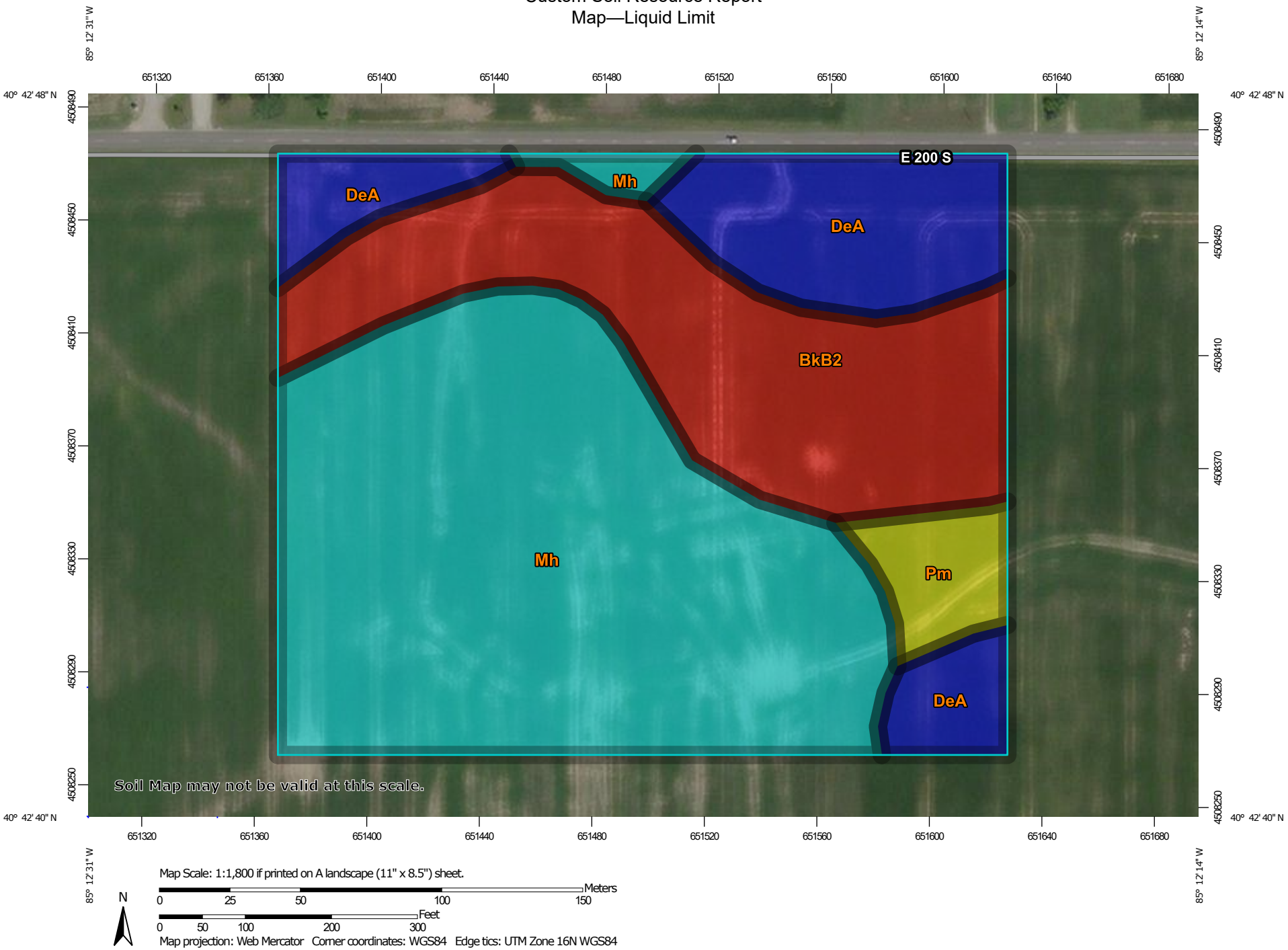
Liquid Limit

Liquid limit (LL) is one of the standard Atterberg limits used to indicate the plasticity characteristics of a soil. It is the water content, on a percent by weight basis, of the soil (passing #40 sieve) at which the soil changes from a plastic to a liquid state. Generally, the amount of clay- and silt-size particles, the organic matter content, and the type of minerals determine the liquid limit. Soils that have a high liquid limit have the capacity to hold a lot of water while maintaining a plastic or semisolid state.

Liquid limit is used in classifying soils in the Unified and AASHTO classification systems.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Liquid Limit



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- <= 39.0
- > 39.0 and <= 41.5
- > 41.5 and <= 43.1
- > 43.1 and <= 43.8
- Not rated or not available

Soil Rating Lines
- <= 39.0
- > 39.0 and <= 41.5
- > 41.5 and <= 43.1
- > 43.1 and <= 43.8
- Not rated or not available

Soil Rating Points
- <= 39.0
- > 39.0 and <= 41.5
- > 41.5 and <= 43.1
- > 43.1 and <= 43.8
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wells County, Indiana
Survey Area Data: Version 24, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 14, 2012—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Liquid Limit

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
BkB2	Blount-Del Rey silt loams, 1 to 4 percent slopes, eroded	39.0	3.6	26.5%
DeA	Del Rey-Blount silt loams, 0 to 1 percent slopes	43.8	2.4	17.4%
Mh	Milford silty clay loam, 0 to 2 percent slopes	43.1	7.1	52.0%
Pm	Pewamo silty clay loam, 0 to 1 percent slopes	41.5	0.6	4.0%
Totals for Area of Interest			**13.7**	**100.0%**

Rating Options—Liquid Limit

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Plasticity Index

Plasticity index (PI) is one of the standard Atterberg limits used to indicate the plasticity characteristics of a soil. It is defined as the numerical difference between the liquid limit and plastic limit of the soil. It is the range of water content in which a soil exhibits the characteristics of a plastic solid.

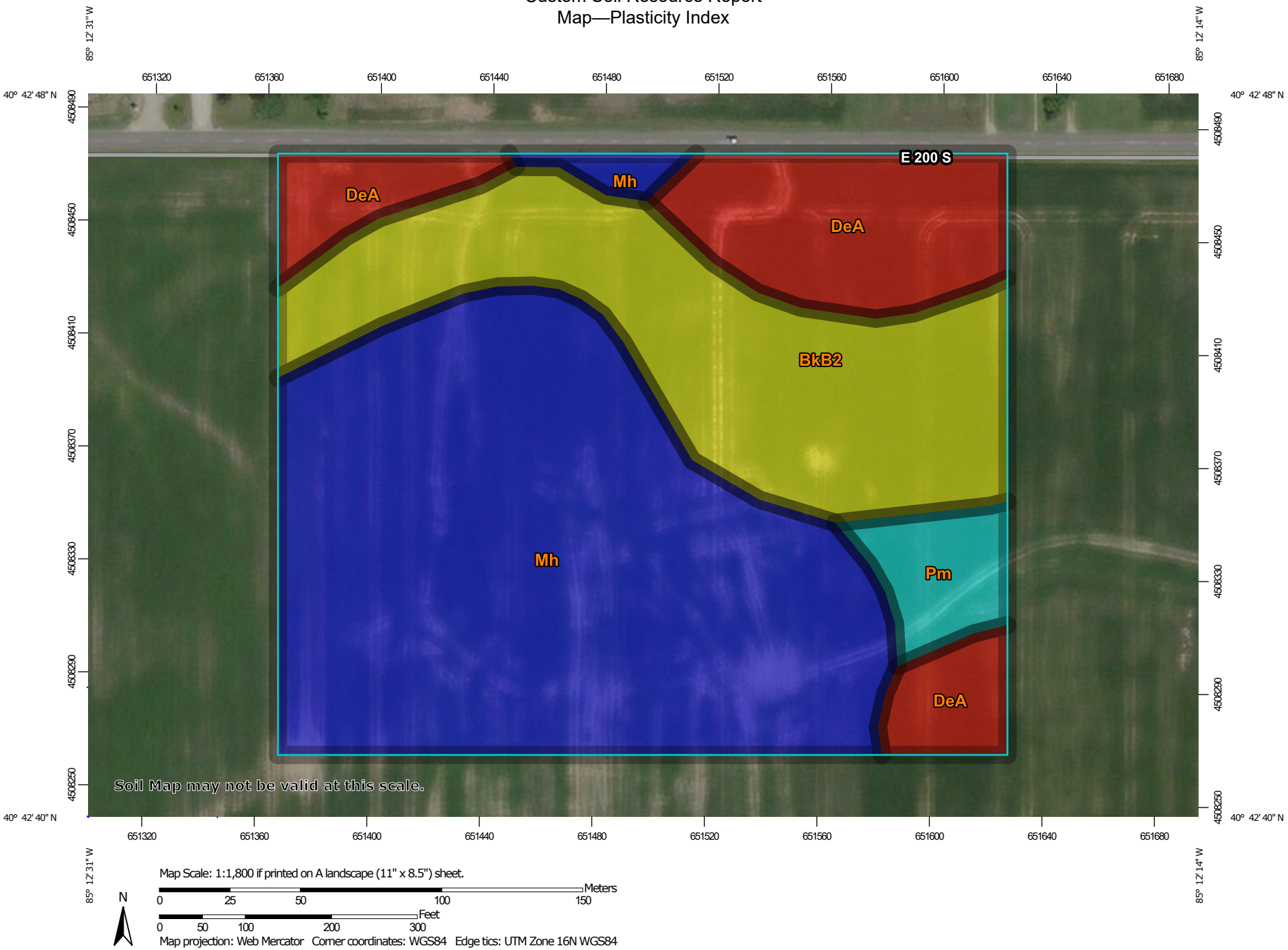
The plastic limit is the water content that corresponds to an arbitrary limit between the plastic and semisolid states of a soil. The liquid limit is the water content, on a percent by weight basis, of the soil (passing #40 sieve) at which the soil changes from a plastic to a liquid state.

Soils that have a high plasticity index have a wide range of moisture content in which the soil performs as a plastic material. Highly and moderately plastic clays have large PI values. Plasticity index is used in classifying soils in the Unified and AASHTO classification systems.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this

attribute for the component. For this soil property, only the representative value is used.

Map—Plasticity Index



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- <= 19.1
- > 19.1 and <= 19.8
- > 19.8 and <= 20.3
- > 20.3 and <= 22.0
- Not rated or not available

Soil Rating Lines
- <= 19.1
- > 19.1 and <= 19.8
- > 19.8 and <= 20.3
- > 20.3 and <= 22.0
- Not rated or not available

Soil Rating Points
- <= 19.1
- > 19.1 and <= 19.8
- > 19.8 and <= 20.3
- > 20.3 and <= 22.0
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wells County, Indiana
Survey Area Data: Version 24, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 14, 2012—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Plasticity Index

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
BkB2	Blount-Del Rey silt loams, 1 to 4 percent slopes, eroded	19.8	3.6	26.5%
DeA	Del Rey-Blount silt loams, 0 to 1 percent slopes	19.1	2.4	17.4%
Mh	Milford silty clay loam, 0 to 2 percent slopes	22.0	7.1	52.0%
Pm	Pewamo silty clay loam, 0 to 1 percent slopes	20.3	0.6	4.0%
Totals for Area of Interest			**13.7**	**100.0%**

Rating Options—Plasticity Index

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Water Features

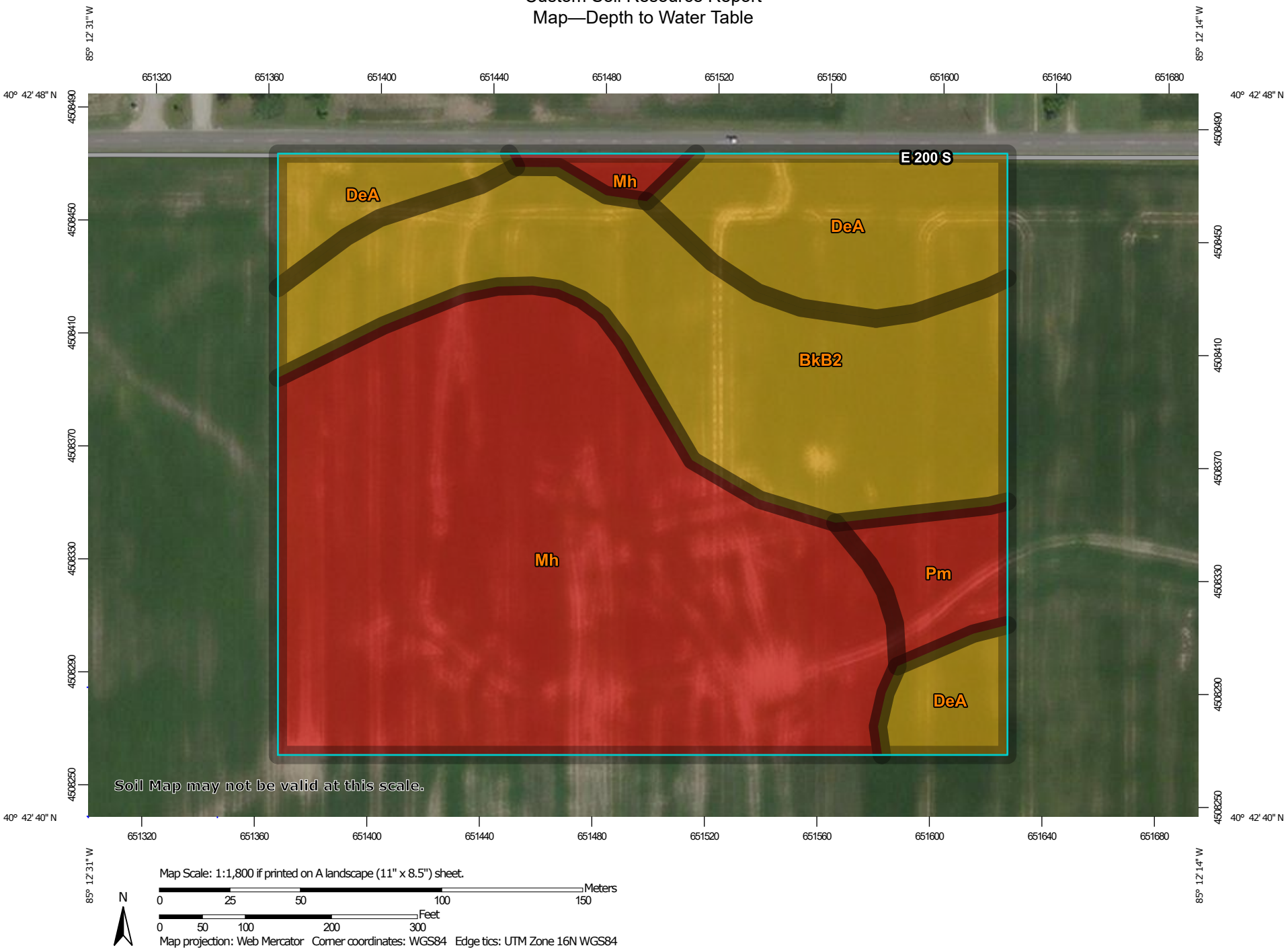
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Depth to Water Table



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Wells County, Indiana
Survey Area Data: Version 24, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 14, 2012—Apr 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
BkB2	Blount-Del Rey silt loams, 1 to 4 percent slopes, eroded	38	3.6	26.5%
DeA	Del Rey-Blount silt loams, 0 to 1 percent slopes	38	2.4	17.4%
Mh	Milford silty clay loam, 0 to 2 percent slopes	7	7.1	52.0%
Pm	Pewamo silty clay loam, 0 to 1 percent slopes	15	0.6	4.0%
Totals for Area of Interest			**13.7**	**100.0%**

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Nonstaining silicone joint sealants.
3. Mildew-resistant joint sealants.

1.2 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Colors of Exposed Joint Sealants.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers: Subject to compliance with requirements, undefined
   a. GE Construction Sealants; Momentive Performance Materials Inc.

B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Manufacturers: Subject to compliance with requirements, undefined
   a. Sika Corporation; Joint Sealants.
   b. The Dow Chemical Company.

C. Silicone, S, NS, 35, NT: Single-component, nonsag, plus 35 percent and minus 35 percent movement capability. nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT.

1. Manufacturers: Subject to compliance with requirements, undefined
   a. GE Construction Sealants; Momentive Performance Materials Inc.

b. The Dow Chemical Company.

D. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. GE Construction Sealants; Momentive Performance Materials Inc.
   b. The Dow Chemical Company.

E. Silicone, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. Sika Corporation; Joint Sealants.
   b. The Dow Chemical Company.

F. Silicone, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. Soudal USA.
   b. The Dow Chemical Company.

G. Silicone, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. May National Associates, Inc.; a subsidiary of Sika Corporation.
   b. Sika Corporation; Joint Sealants.

H. Silicone, S, P, 100/50, T, NT: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 100/50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. May National Associates, Inc.; a subsidiary of Sika Corporation.
   b. Sika Corporation; Joint Sealants.

I. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following
   a. May National Associates, Inc.; a subsidiary of Sika Corporation.

J. Silicone, M, P, 100/50, T, NT: Multicomponent, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade P, Class 100/50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. May National Associates, Inc.; a subsidiary of Sika Corporation.
   b. Sika Corporation; Joint Sealants.

2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following
   a. The Dow Chemical Company.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Manufacturers: Subject to compliance with requirements, provide products by the following
   a. GE Construction Sealants; Momentive Performance Materials Inc.

C. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. Franklin International.
   b. Tremco Incorporated.

2.5 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
   a. BASF Corporation.
   b. Construction Foam Products; a division of Nomaco, Inc.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove laitance and form-release agents from concrete.
2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Construction joints in cast-in-place concrete.
   b. Joints between plant-precast architectural concrete units.
2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT .
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Control and expansion joints on exposed interior surfaces of exterior walls.
   b. Vertical joints on exposed surfaces of concrete walls and partitions.
   c. Other joints as indicated on Drawings.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .

C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.
2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT .
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors .

END OF SECTION 079200

SECTION 221329 - SANITARY SEWERAGE PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Submersible sewage pumps.
2. Sewage-pump basins and basin covers.

B. Related Requirements:

1. Section 221343 "Facility Packaged Sewage Pumping Stations" for applications in site-construction sewage pumping.
2. Section 221429 "Sump Pumps" for applications in storm-drainage systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 CLOSEOUT SUBMITTALS

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. UL Compliance: Comply with UL 778 for motor-operated water pumps.

2.2 SUBMERSIBLE SEWAGE PUMPS

A. Submersible, Fixed-Position, Single-Seal Sewage Pumps :

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Grundfos Pumps Corporation.
2. Description: Factory-assembled and -tested sewage-pump unit.
3. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
4. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.

5. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron , nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
6. Pump and Motor Shaft: Stainless steel or steel, with factory-sealed, grease-lubricated ball bearings.
7. Seal: Mechanical.
8. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
    a. Motor Housing Fluid: Oil.
9. Controls:
    a. Enclosure: NEMA 250, Type 4X ; pedestal mounted.
    b. Switch Type: Mechanical-float type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
    c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
    d. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120 V ac, with transformer and contacts for remote alarm bell.

2.3 SEWAGE-PUMP BASINS AND BASIN COVERS

A. Basins: Factory-fabricated, watertight, cylindrical, basin sump with top flange and sidewall openings for pipe connections.

1. Material: HDPE .
2. Reinforcement: Mounting plates for pumps, fittings , guide-rail supports if used, and accessories.
3. Anchor Flange: Same material as or compatible with basin sump, cast in or attached to sump, in location and of size required to anchor basin in concrete slab.

B. Basin Covers: Fabricate metal cover with openings having gaskets, seals, and bushings; for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.

1. Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.

C. Capacities and Characteristics:

1. Capacity: 2350 gal..
2. Diameter: 60 inches.
3. Depth: 192 inches.
4. Inlet No. 1:
    a. Drainage Pipe Size: 6" NPS.
    b. Bottom of Sump to Centerline: 113 inches.
    c. Type: Hubbed outside.
5. Inlet No. 2:
    a. Drainage Pipe Size: 6" NPS.
    b. Bottom of Sump to Centerline: 86 inches.

c. Type: Flanged Hubbed outside.

6. Sidewall Outlet:
   a. Discharge Pipe Size: 4" NPS.
   b. Bottom of Sump to Centerline: 152 inches.
   c. Type: Hubbed outside .
7. Cover Material: Aluminium with polymer conrecte coating .
8. Cover Diameter: 60 inches, but not less than outside diameter of basin top flange.
9. Manhole Required in Cover: Yes .
10. Vent Size: 4" NPS.

2.4 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 220513 "Common Motor Requirements for Plumbing Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

B. Motors for submersible pumps shall be hermetically sealed.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Pump Installation Standards:

1. Comply with HI 1.4 for installation of centrifugal pumps.
2. Comply with HI 3.1-3.5 for installation of progressing-cavity sewage pumps.

B. Equipment Mounting:

1. Install progressing-cavity sewage pumps on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Comply with requirements for vibration isolation and seismic-control devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."
3. Comply with requirements for vibration isolation devices specified in Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 CONNECTIONS

A. Comply with requirements for piping specified in Section 221316 "Sanitary Waste and Vent Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

B. Where installing piping adjacent to equipment, allow space for service and maintenance.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Perform each visual and mechanical inspection.
2. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Pumps and controls will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 221329