WAYNE STATE UNIVERSITY

Division of Finance and Business Operations

Procurement & Strategic Sourcing
5700 Cass Avenue, suite 4200
Detroit, Michigan 48202
(313) 577-3734
FAX (313) 577-3747

August 9, 2019

Addendum 5
RFP Gateway Theatre Complex Project
dated July 19, 2019

Note: You must have attended the **mandatory** pre-bid meeting to participate in this bid opportunity**.**

Numerous simple questions have been submitted and the clarifications are as follows:

Question 1: Were the redline changes in Appendix 4 WSU General Conditions of Construction, Art. 9.01.2 and 9.04.1 made in error or it is the intent of WSU to have those redline changes, as they differ substantially from WSU current General Conditions of Construction on their website and they contradict the following article 9.04.2. ?

Answer: Modifications to the document are intentional and correct.

Question 2: Flooring types for Spaces 110, 110A-110E (Lobby spaces)
Answer: Lobby Spaces noted above to have CONC FIN-13 (polished concrete)

1) Please provide flooring types for Space 135 Audience Chamber

Answer: CONC FIN-2 sealed concrete with carpet at stepped aisles

2) Please provide flooring type for Space 145 Corridor

Answer: CONC FIN-2 sealed concrete

3) Is Section 033544 Polished Concrete Floors applicable to the project; if so please provide locations.

Answer: Lobby Spaces 110,110A-110E

4) Is Section 123551 Music Storage Casework applicable to the project; if so, please provide locations.

Answer: Not applicable to this project

Question: Can you provide specifications for the Access Control and Video Surveillance systems by CM? If specifications are not available, could you please provide a list of approved manufacturers?

Answer: Refer to TC500 series drawings

Question 3: Drawing C 2.2: In App 10 Specs/Addendum Manhole labeling has changed from the App 12 drawing set. Also, Manholes don't seem to line up with Drawing C2.3 (in the drawing set) and not all manholes are listed. Please clarify.
Answer: Appendix 12 drawings are the earlier DD documents for the project. Appendix 10 civil drawings provide details for the sewer and water work for the addition. Utilize Appendix 12 for pricing on the storm system going out the west side, including the treatment chamber and underground detention, and for the storm line going out the east side. Per our current plan set, appendix 10, the profiles shown on C2.3 align with the plan information on C2.2. The profile sheet only profiles the public sewer. Information for all other manholes and sewer is shown on C2.2. The treatment structure, underground detention, and east side storm outlet as shown in appendix 12 drawings have not been fully designed.

Question 4: Drawing C2.1: Can we assume that the combined sewer, manholes and the sanitary line noted from 1977 plans in the SE corner of the project, falls well below the foundations for the building and will not interfere with new construction?

Answer: Proposed foundation elevations and inverts are provided within the Documents.

Question 5: Drawing C2.1: For the section of abandoned combined sewer (noted from 1977), should this be filled or left in place as shown on the drawing?

Answer: Refer to demo note 10 on drawings.

Question 6: Drawing C2.2 indicates "Netbank" utility line, yet no reference to this service or ductbank can be found elsewhere in the documents. Please provide additional information regarding this system. How many conduits, is it concrete encased, where do the duct banks enter the building, is the cable to be furnished and installed by the electrical contractor or by the utility it serves?

Answer: Installation of the (3) three new netbanks are by others. The DTE ductbank is existing. Responders should include time and coordination for third party installation of DTE standard netbank foundations, platforms, equipment, etc. during our construction. Responders should reference documents, especially Appendix 10, and figure building service conduits to property line at an elevation coordinated by Utility. Utility shall provide pathway from property line to Utility structure. Responder to coordinate pulling Utility furnished cable into building for final connections.

Question 7: The environmental assessment shows borings up to 12'-0". Has an investigation been conducted below this elevation for foundation design?

Answer: In addition to posted information, see attached Testing Engineer & Consultants, Inc. Geotechnical Investigation Report #58871 dated June 20, 2018 for reference.

Question 8: For the Mackenzie House please confirm that any work associated with the house and surrounding work (landscaping) is assumed to be by others as designated by break line on Drawing C2.2.

Answer: For the purpose of this response, work within the stated Mackenzie Project is excluded.

Question 9: From the SSD drawings it appears that the system is only required below the new theater seating and lobby area. Does SSD need to run below the Lower Level rooms as well? Any special provisions for walls and slabs below grade?

Answer: Refer to limits shown within Appendix 17, and as follows: Run the SSD system to the orchestra pit basement wall. The system will have pipes that drop down along the wall to also run the pressure gradient there. The water proofing should be upgraded to a vapor proof product. We would recommend Geo-Seal BOND with BOND-B.

Question 10: Spec Section Metal Fabrications: Is a mockup truly required for MET FAB-25 and prior to commencing work? What is MET FAB-25 as it is not indicated in Section 2.3?

Answer: There is no MET FAB-25 for this project, a mock-up is not required.

Question 11: Enclosure: Provide the drawings and details for enclosure mockups required.

Answer: See attached PDF showing architectural mock-ups to be completed.

Question 12: The utility service entrance appears to be 208/120 but mechanical equipment is indicated as 480V. Please clarify if there is 480V power on the project.

Answer: DTE revised service entrance to 208/120V. 480V power will not be utilized for facility. 480V power is no longer available from DTE and all mechanical equipment will be revised to 208/120V power.

Question 13: Drawing E0.3 indicates a drawout breaker for the fire pump and a molded case breaker without an indicated OCP rating that is external from the main switchboard. Please clarify intent. Should these breakers be internal to the main switchboard and should they both be molded case breakers?

Answer: Drawout breakers are no longer a part of project scope.

Question 14: Specification section 261116.12.2.8.A requires switchboard secondary distribution breakers to be draw out breakers, but drawings indicated molded case breakers. Please clarify intent.

Answer: Drawout breakers are no longer a part of project scope.

Question 15: Please clarify main circuit breaker ratings and type for Switchboards 1 & 2.

Answer: Final ampacities will be incorporated during CD document preparation. Distribution panels reflect current requirements.

Question 16: Switchboard 2 has no circuit breaker ratings indicated. Please provide ratings.

Answer: Final ampacities will be incorporated during CD document preparation. Distribution panels reflect current requirements.

Question 17: It appears the fire pump overcurrent protective devices are not sized per NEC article 695. Code requires the fire pump main OCPD be sized for the locked rotor current of the fire pump, of which it currently is not. Please confirm intent.

Answer: Fire pump OCPD mounted on generator will be sized to accommodate 6x LRA on final documents.

Question 18: The fire pump needs to be tapped ahead of the main breaker, yet no separate section is indicated on the floor plans or one-line diagram. Please confirm intent.

Answer: Documents indicate tap ahead of the main, connections will be made within tap section of switchboard.

Question 19: Per Specification section 274100.1.6.A.3, the only AV contractors that are allowed to bid are all from out of state, are any Michigan contractors allowed to bid?

Answer: Local manufacturers, distributors, contractors, etc. are strongly encouraged and will continue to be reviewed during the Construction Document Phase of design. Also reference Appendix 10 for the DD Phase design narrative and Statement of Probable Cost estimate to be carried in response.

Question 20: The fire alarm specification indicates a VESDA or air sampling system is in the project but the system is not indicated on the drawings. Please confirm whether or not this system is included, if so please clarify scope.

Answer: Incipient detection is not required. Specifications will be revised further during CD phase.

Question 21: Will an Emergency Responder Radio Coverage System be required? These are required by code in new buildings unless there is adequate radio coverage within the facility.

Answer: Further review will take place during CD phase.

Question 22: Will the fire alarm systems for the existing building and new building be cross-tied together?

Answer: The facility will remain as two separate buildings. The two fire alarm systems shall be required to notify each other if buildings are in alarm.

Question 23: Specification section 271000.1.5.B indicates installation of active data equipment, telephone equipment, computers, video surveillance cameras and WAPS are not in the contract. FFE equipment matrix indicates these systems as installed by the CM. Please clarify intent.

Answer: See attached CIT Division of Labor Assumptions for general clarification. General telephone and computers not associated with performance systems are Owner furnished & installed; video surveillance cameras are contractor furnished & installed (Owner purchases licenses); WAPS are Owner furnished, contractor installed. If/where blue light phones, elevator phones, and/or Area of Refuge are necessary, they shall be contractor furnished & installed.

Question 24: Please confirm a lightning protection system is not required for the building.

Answer: Yes, facility will require lightning protection.

Question 25: Drawing E0.2, Electrical One-Line Diagram for the Valade center is not clear what is new vs. what is existing. Please clarify the scope of new work. Additionally there is what appears to be an unlabeled switchboard, please provide equipment information (eg: voltage, rating, MCB, etc.)

Answer: Existing service entrance to remain. A single new distribution panel will be provided and have OCPD in existing switchboard. All new connections to serve new panelboards, dimming equipment and AV equipment shall originate in this new distribution panel.

Question 26: Appendix 10/Addendum: Please confirm that the Electrical Room has been moved to the Lower Level as shown in Drawings A1.0B, A1.1B, E0.3, E3.0B, and E3.0C and is part of base bid. There is confusion on whether the acceptance of Add Alt Donor Room is driving the changes to the Electrical Room and Toilet Rooms.

Answer: Yes, electrical room has been moved to the lower level and is part of the base bid. Electrical and toilet room changes are unrelated to acceptance of donor room alt.

Question 27: Please confirm that Owner will handle any fees associated with contaminated and HAZMAT soils.

Answer: Responder is to assume all costs associated with contaminated and HAZMAT soils per authorities having jurisdiction, and disposed of at an Owner approved facility. Responder to review and consider all project geotechnical reports, WSU OEHS policies, current Due Care Plan, contractor specific safety policies, etc.

Question 28: Please confirm that Owner will handle any costs associated with containment of groundwater as well as disposal.

Answer: Responder is to assume all costs associated with containment of groundwater per authorities having jurisdiction, and disposed of at an Owner approved facility. Responder to review and consider all project geotechnical reports, WSU OEHS policies, current Due Care Plan, contractor specific safety policies, etc.

Question 29: Please provide date of anticipated 90% CDs which would trigger the 30 days to final GMP.

Answer: Approximately December 1, or as agreed to by the Project Team.

Question 30: Please provide date of early construction package to support a November 18, 2019 start onsite with civil and subgrade structural work. Confirm that construction will start in advance of a final GMP.

Answer: Certain design packages could be made available if all parties agree the Statement of Probable Cost is within Construction Cost Limitation (CCL). Some additional coordination between early bid packages and final SSD design will be necessary prior to bidding.

Question 31: LEED: Provide A/E's proposed Scorecard for achieving LEED Silver.

Answer: Attached is the most current LEED score sheet.

Question 32: Confirm whether or not M/WBE business is a requirement of this project.

Answer: M/WBE is not required, however the data is to be reported to Owner for internal use.

Question 33: What is the rental cost of the existing fencing around the jobsite that was provided by Walbridge? Should we assume the same monthly rental cost for the remainder of the project?

Answer: Rental of the panel sections/gates are currently from Industrial Fence. It is the intent of the Owner to take over the rental cost of that installed until CM mobilization or January 2020, whichever comes sooner. At that time it will be the responsibility of the CM to continue or replace as required and maintain through project completion.

Question 34: Has the owner awarded abatement work? If so, what is the timeline and duration for this work to be performed?

Answer: No. The current strategy is for third-party abatement to commence once Owner has moved into Phase 1. Phase 2 renovation work to follow completion of abatement and air testing.

All questions concerning this project must be emailed to: Robert Kuhn, Procurement & Strategic Sourcing at 313-577-3712 Email: ac6243@wayne.edu (copy to Valerie Kreher, Email: ab4889@wayne.edu) by August 09, 2019, 12:00 pm/noon.

Do not contact the Facilities Planning & Management, or other University Units, directly as this may result in disqualification of your proposal.

Thank you

Robert Kuhn,
Senior Buyer, Purchasing
313-577-3712

CC: Ryan Miller, Kenneth Doherty, Attendees list.

WSU - GATEWAY THEATER COMPLEX

WAYNE STATE UNIVERSITY

HamiltonAnderson
architecture landscape architecture urban design

HGA

420 NORTH 5TH STREET, SUITE 100
MINNEAPOLIS, MINNESOTA 55401
TELEPHONE: 612.758.4000

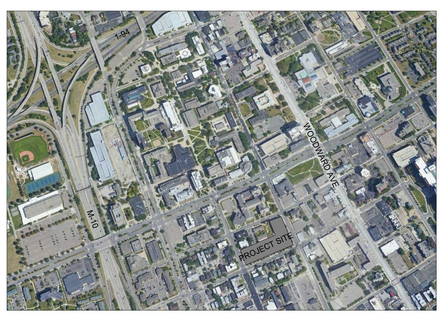
Detroit, MI

4715 CASS AVENUE & 4743 CASS AVENUE
WAYNE STATE PROJECT NO. 189-178578

HAMILTON ANDERSON PROJECT NO. 2016034.00

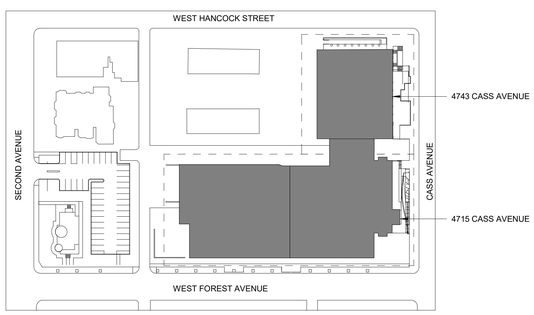
100% DESIGN DEVELOPMENT - JAN 30, 2019

LOCATION MAP:



NORTH

SITE MAP:



NORTH

PROJECT CONTACTS:

OWNER

Wayne State University FP&M
5454 Cass Ave.
Detroit, MI 48202

313.577.4310

CONTRACTOR

Walbridge
777 Woodward Ave. Suite 300
Detroit, MI 48226

313.963.8000
www.walbridge.com

DESIGN ARCHITECT MEP ENGINEER

HGA
420 5th Street N, Suite 100
Minneapolis, MN 55401

612.758.4000
www.hga.com

CIVIL ENGINEER

Spalding DeDecker
905 South Blvd East
Rochester Hills, MI 48307

800.598.1600
www.sda-eng.com

EXECUTIVE ARCHITECT LANDSCAPE ARCHITECT

Hamilton Anderson Associates
1435 Randolph St., Suite 200
Detroit, MI 48226

313.887.6298
www.hamilton-anderson.com

STRUCTURAL ENGINEER

DESI / NASR Consulting Engineers
6765 Daly Road
West Bloomfield, MI 48322

248.392.2010
www.desainasr.com

THEATRICAL / LIGHTING

Theatrical: Auerbach Pollock Friedlander
266 West 37th Street
New York, NY 10018
212.764.5630

Lighting: Auerbach Glasow
1045 Sansome Street, Suite 300
San Fransisco, CA 94111
415.392.7528

www.auerbachconsultants.com

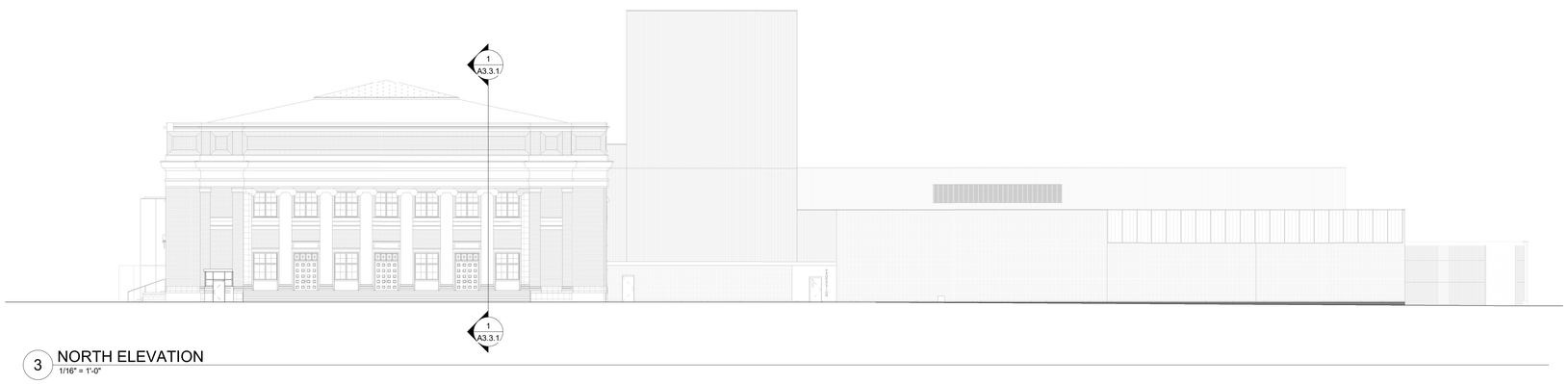
ACOUSTICS

Jaffe Holden
114-A Washington Street
Norwalk, CT 06864

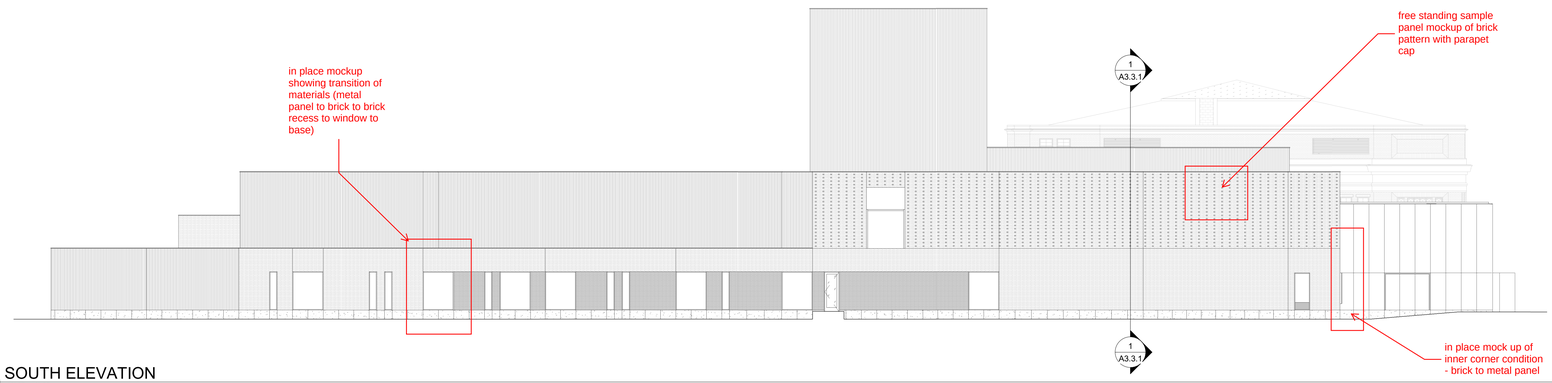
203.838.4168
www.jaffeholden.com

Sheet Size: 30" x 42"
- Template Version

4 WEST ELEVATION
1/16" = 1'-0"



3 NORTH ELEVATION
1/16" = 1'-0"



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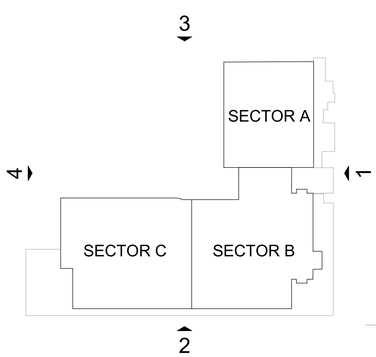

1 EAST ELEVATION
1/16" = 1'-0"

BIM 360://WSU Hilberry Gateway/A18-WSU Hilberry Gateway-3995001/00.rvt

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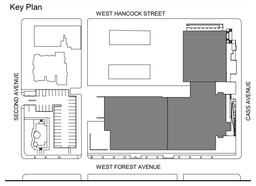
HGA

WAYNE STATE UNIVERSITY

Owner	Wayne State University FP&M 5454 Cass Ave Detroit, MI 48202 313.577.2424
Contractor	Walbridge 777 Woodward Ave. Suite 300 Detroit, MI 48202 313.963.8000
Executive Architect	Hamilton Anderson 1435 Randolph Street, Suite 200 Detroit, MI 48226 313.964.0270
Design Architect	HGA 420 5th Street N, Suite 100 Minneapolis, MN 55401 612.758.4000
MEP Engineer	HGA 420 5th Street N, Suite 100 Minneapolis, MN 55401 612.758.4000
Structural Engineer	DESAI / NASR Consulting Engineers Inc. 6765 Daly Road West Bloomfield, MI 48322 248.392.2010
Civil Engineer	Spalding DeDecker 905 South Blvd East Rochester Hills, MI 48307 800.598.1600
Landscape Architect	Hamilton Anderson 1435 Randolph Street, Suite 200 Detroit, MI 48226 313.964.0270
Theatrical	Auerbach Pollock Friedlander 266 West 37th Street New York, NY 10018 212.764.5630
Lighting	Auerbach Glasow 1045 Sansome Street, Suite 300 San Fransisco, CA 94111 415.392.7528
Acoustics / AV	Jaffe Holden 114-A Washington Street Norwalk, CT 06864 203.838.4168

DETROIT, MI

Key Plan



100% DESIGN DEVELOPMENT	JAN. 30, 2019

Project
WSU - GATEWAY THEATER COMPLEX

WSU PROJECT NO. 189-178578

Drawing Title
BUILDING ELEVATIONS

Project Number: 3995-001-00

Drawn By: Designer

Scale: As indicated

Seal:

FOR REFERENCE ONLY - NOT FOR CONSTRUCTION

Signature:

Drawing No:

A3.1.1

CIT PROJECT ASSUMPTIONS

NETWORK	
Design:	Final cable infrastructure design and installation must be approved by CIT and conform to WSU Standards: https://computing.wayne.edu/docs/wsu-communications-standards.pdf
Equipment:	The current list of approved network electronics equipment is available for review upon request from CIT
Purchase:	CIT to purchase network electronics equipment with Project account number and process through Wayne Buy
Installation:	CIT to install network electronics equipment
	FPM to install network and cable infrastructure

WIRELESS:	
Design:	Provide uniform wireless coverage in common, office and lab areas of the building
	When planning for Wireless coverage CIT plans for coverage first and density second.
	C&IT engineers for minimal values of -62 dBm everywhere.
	Wireless access points should be placed approximately 40 to 75 feet away from each other, the closer the better for coverage.
	Planning for 802.11ac, due to bandwidth requirements, we will need a more dense allocation of APs.
	Depending upon where there is line of sight from the AP, intrusions of signals within the frequency, degradation of signal strength due to
	building architecture or other unseen hindrances, placement of APs will deviate from this standard by increasing in AP density.
	Our design guideline is 140 devices per A/P.
	A/P devices are dual band which supports A/B/G/N/AC standards. This design allows support of both 2.4GHz and 5GHz bands.
	Wireless supports any wireless device a client or guest brings into the building which includes but not limited to the following:
	Door Locks, TV Video Streaming, Gaming Devices, Cell Phones, Laptop Computers, Desktop Computers, Tablets
	Preliminary A/P design and coverage (signal strength) will be provided for review
Equipment:	July 2018: Aruba is the approved wireless equipment. Aruba APs (AP305 and AP315): https://www.arubanetworks.com/assets/ds/DS_AP300Series.pdf
	The current list of approved wireless equipment is available for review upon request from CIT
	Aruba wireless equipment requires single data jack.
	Aruba APs will take advantage or M-Gig (Multi-Gig) capabilities. This means that newer devices can support increased bandwidth from 1 Gb up to 2.5Gb using the same physical connection
Purchase:	CIT to purchase wireless equipment and licenses with Project account number and process through Wayne Buy
Installation:	FPM to install wireless equipment and cable infrastructure
	Where possible, all APs should be connected to the ceiling grid in the centermost section of the classroom.
	All APs should be connected to data jacks located above the ceiling tiles.

CAMERAS	
Design:	WSUPD has sole responsibility for surveillance camera design per University Policy *11-1 Video Surveillance Policy*
	Final design and installation must be approved by WSUPD/CIT and conform to WSU Standards: https://computing.wayne.edu/docs/wsu-communications-standards.pdf
	Customer must be consulted on coverage areas
	Any other coverage in the building is customer designated locations.
	WSU PD camera life safety locations:
	Perimeter
	Ingress/Egress
	External to building
	1st Floor Elevator/Stairwells
Equipment:	All security cameras make and model specified in the design installation must be listed on the WSU VMS compatibility list. The current list is available for design upon request from CIT
	All cameras are to be IP cameras.
	All cameras will require a POE port on network switch.
	All Video Management System (VMS) support must come from a VMS provider certified in our current version.
	Each camera will require a single data line terminated in a C&IT approved connection for its location.
Purchase:	FPM to purchase Camera Equipment
	CIT to purchase Camera server and licenses with Project account number and process through Wayne Buy
Installation:	FPM to install cameras and cable infrastructure
	The final placement and positioning of cameras is to be coordinated with CIT and approved by WSUPD.

VOICE SERVICES	
Design:	1 data cable to desk for PC and Phone connectivity
	Power to phone provided via network switches equipped with PoE (Power Over Ethernet)
	If building loses power, VoIP phone service will be unavailable. If phone service up time is critical FP&M must install generator/UPS for switches to allow continuous phone operation
	Minimum cable specification is CAT6E or greater
	Assumes cabling for Elevator and Blue Light phones are **home run to MDF**
	UPS to support Elevator and Blue light phones terminating in the MDF.
	Customers will determine if existing WSU phone numbers will be moved from existing location to new location or if new phone numbers required.
Equipment:	The current list of approved voice services equipment is available for review upon request from CIT
Purchase:	CIT to process ***one time intallation of phone service and equipment*** with Project account number and process through CIT bill back system.
	Recurring phone service cost are customer account responsibility.
	FPM to purchase Elevator, Blue Light and Emergency Elevator System phone equipment
Installation:	CIT to install ***phone service*** for Blue Light, Elevator, Area of Refuge and customer
	CIT or Department's local IT support staff or DeskTech to install VoIP equipment
	FPM to install Elevator and Blue Light phone equipment
	FPM to install cable infrastructure

Testing Engineers & Consultants, Inc.

Wayne State University
Facilities Planning and Management
5454 Cass Avenue
Detroit, Michigan 48202

GEOTECHNICAL INVESTIGATION

FOR

Proposed Hillberry Gateway
Detroit, Michigan

TEC Report: 58871

By:

Testing Engineers & Consultants, Inc.
1343 Rochester Road
P.O. Box 249
Troy, Michigan 48099-0249
(248) 588-6200

June 20, 2018

Testing Engineers & Consultants, Inc.
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(248) 588-6200 or (313) T-E-S-T-I-N-G • Fax (248) 588-6232
www.testingengineers.com

Engineering Client Success

TEC Report: 58871
Date Issued: June 20, 2018

Mr. Marc Ledent, Project Manager
Wayne State University
Facilities Planning and Management
5454 Cass Avenue
Detroit, Michigan 48202

Re: Geotechnical Investigation for
Proposed Hillberry Gateway
Detroit, Michigan

Dear Mr. Ledent:

Please find enclosed the results of a geotechnical investigation performed at the above referenced site. This geotechnical report presents our field and laboratory results; engineering analysis; and our recommendations for design of foundation and slabs, as well as important construction considerations.

As you may know, Testing Engineers & Consultants, Inc. (TEC) has fifty two years of experience in Quality Control Testing and Construction Inspection and, furthermore, we have an as-needed contract with Wayne State University. We would be pleased to provide these services on this project.

Should you have any questions regarding this report, please let us know. It has been a pleasure to be of service to you.

Respectfully submitted,
TESTING ENGINEERS & CONSULTANTS, INC.

Carey J. Suhan, P.E.,
Vice President, Geotechnical
& Environmental Services

CJS/ln
Enclosure
cc: Wayne State University, Attn: Ms. Treesa John, Facilities Planner

Testing Engineers & Consultants, Inc.

Mr. Marc Ledent
Wayne State University
June 20, 2018

TEC Report: 58871

TABLE OF CONTENTS

Mr. Marc Ledent
Wayne State University
June 20, 2018

TEC Report: 58871

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation for the proposed Hillberry Gateway building located at W. Forest Avenue between 2nd Avenue and Cass Avenue in Detroit, Michigan. Authorization to perform this investigation was given by Ms. Treesa John, Facilities Planner on May 1, 2018 in the form of Purchase Order P0861306. The work was performed in accordance with TEC Proposal 060-18-0115Rev3 dated April 24, 2018.

Based on information provided, we understand that the project will consist of moving the existing McKenzie House from south of the existing Hillberry Theater to the west part of the site. McKenzie House will be placed on a basement. A new building will be constructed connecting to the existing Hillberry Theater. It is understood that the building will be single story, with the slab on grade. The theater seating will slope upward above the existing ground surface.

The purpose of this investigation was to obtain information necessary to determine basic engineering properties of soils at the site through a series of test borings and laboratory tests performed on the soil samples obtained during the field investigation. This information has been evaluated to provide the general recommendations for site development preparations, foundation requirements, floor slab designs and other geotechnical information.

2.0 FIELD INVESTIGATION

Twenty-three test borings were drilled on the site at the locations shown on the Test Boring Location Plan. The locations are accurate to within a short distance of the locations shown on the location plan included in the appendix. The test borings were drilled from May 6 to May 21, 2018 and June 6, 2018 with truck-mounted auger equipment to depths ranging from 30 to 153'7" feet. In addition a Boring No. 18 was drilled to a depth of 14.5 feet where an obstruction was encountered. Boring Nos. 19 and 20 were drilled at the initial planned McKenzie House location and they were replaced with Boring Nos. 19A and 20A. Boring No. 8 needed to be abandoned to allow car traffic out. It was moved about 20 feet and drilled to completion depth. The borings were drilled with truck-mounted auger equipment using hollow stem augers followed by wash drilling for the deep borings to depths ranging from 10 to 153.5 feet.

Drilling methods and standard penetration tests were performed in general accordance with the current ASTM D1452 and D1586 procedures, respectively. These procedures specify that a standard 2-inch O.D. split-barrel sampler be driven by a 140-pound hammer with a free fall of 30 inches. The number of hammer blows required to drive the split-barrel sampler through

2.0 FIELD INVESTIGATION (Cont'd)

three successive 6-inch increments is recorded on the Test Boring Log. The first 6-inch increment is used for setting the sampler firmly in the soil and the sum of the hammer blows for the second and third increments is referred to as the "Standard Penetration Index" (N). N values were obtained with an automatic trip hammer.

From the standard penetration test a soil sample is recovered in the liner sampler tubes that are located inside the split-barrel sampler. Upon recovery of a soil sample, the liner tubes are removed from the split-barrel sampler and placed in a container which is sealed to minimize moisture losses during transportation to the laboratory. Standard penetration tests are usually made at depths of 2 ½, 5, 7 ½ and 10 feet and at 5-foot depth intervals thereafter. These parameters may vary for a given project depending on the nature of the subsoils and the geotechnical information required.

Three Shelby tube (ST) samples were obtained (ASTM D1587). The Shelby tubes are thin walled tubes which are hydraulically pushed into the soil to obtain larger, less disturbed specimens for a better determination of the characteristics of cohesive deposits.

3.0 LABORATORY TESTING

The laboratory testing consisted of determining the unconfined compressive strength, the natural bulk density and the natural moisture content of the soil samples recovered in the liner sampler tubes and the Shelby tubes. In the unconfined compression tests, the compressive strength of the soil is determined by axially loading a soil sample until failure is observed or 15% strain, whichever occurs first. The above referenced test data are recorded on the boring logs. Some test results may deviate from the norm because of variations in texture, imperfect samples, presence of pebbles and/or sand streaks, etc. The results are still reported although they may not be relevant.

The particle size distribution of three granular soil samples was also determined. The distribution provides estimates of the permeability and permeability-related behavior of the granular soils. The results are included in the appendix.

In addition to the above tests, the Atterberg Limits of three fine-grained soil samples were determined. The Atterberg Limits are water contents at which cohesive fine-grained soils change behavior. They are used for soil classification, and they have been correlated to several important engineering properties of a soil. As such, they can be used to obtain inexpensive estimates of fine-grained soil behavior. The Atterberg Limits are included in the corresponding boring logs included in the appendix.

3.0 LABORATORY TESTING (Cont'd)

The laboratory tests apply to the samples tested and some results may not be representative of the soil mass because of variations in composition and texture as well as imperfect samples and presence of pebbles and/or sand streaks in cohesive samples.

Samples taken in the field are retained in our laboratory for 60 days and are then destroyed unless special disposition is requested by the client. Samples retained over a long period of time are subject to moisture loss and are then no longer representative of the conditions initially encountered.

4.0 GENERAL SUBSURFACE CONDITIONS

4.1 Subsoil Conditions

The soil conditions encountered in the borings are presented on the individual boring logs. Each log presents the soil types encountered at that location as well as laboratory test data, ground water data, and other pertinent information. Descriptions of the various soil consistencies, relative densities and particle sizes are given in the Appendix. Definitions of the terms and symbols utilized in this report may be found in ASTM D653.

Soil descriptions and depths shown on the test borings are approximate indications of changes from one soil type to another and are not intended to present an area of exact geological change or stratifications.

The subsurface conditions encountered in the borings have been generalized for the purpose of this analysis. Please refer to limitations regarding the uncertainties involved in such a generalization.

The soil strata encountered are described below:

<u>Asphalt</u>

A layer of asphalt (HMA) was encountered in Boring Nos. 8, 12, 15, 16, 17, 19 and 20. The thickness of the asphalt layer was found to vary from 2 ½ inches in Boring Nos. 8, 17 and 18 to 7 inches in Boring No. 1.

4.1 Subsoil Conditions (Cont'd)

Crushed Stone

A layer of crushed stone was encountered in most of the borings (Boring Nos. 2 to 7, Boring Nos. 9 to 11, Boring Nos. 13 and 14) and the thickness of the crushed stone was found to vary from 3 inches in Boring No. 11 to 10 inches in Boring No. 4.

Fill

A layer of fill was encountered in all the test borings below the asphalt or crushed stone layers. The fill was found to consist of brown to dark brown sand with some crushed stone and trace of brick to brown to gray clayey sand with trace of gravel. Trace of concrete was found at places in the borings. The thickness of the fill was found to vary from 5.5 feet in Boring No. 19 to 2 feet in Boring No. 5.

In Boring Nos. 7, 12, 15 and 18, deep fill was present in the borings. The fill extends from 8 feet in Boring No. 7 to 17 feet in Boring No. 15. Also, in Boring No. 8 a 1.68 feet thick layer of concrete was present at a depth of 0.92 to 2.6 feet.

Standard penetration values in the fill range from 3 to over 50 blows per foot with unconfined compressive strengths of 740 to 4,530 pounds per square foot (psf). Bulk densities range from 108 to 142 pounds per cubic foot (pcf) with moisture contents of 3.3 to 19.8 percent of the dry weight of the soil.

Native Deposit

The native deposit was found to consist of brown clay with some silt overlying gray clay with some silt and sand lenses. The brown colored soils extend to depths varying from 8 feet to 32 feet. Strong odor was present at shallow depths in Boring No. 1. Gray colored soils were found below the brown soils and extend to the terminal depth of the test borings. Trace of gravel was encountered within the gray soils.

In the deep borings hard clays to dense sands were encountered at depths of 136 ½ feet to 137 feet and extend to the end of the test borings. Standard penetration tests in the hard clays and dense sands were over 50 blows per foot. No methane gas was detected in the deep borings during drilling or at completion of the borings and removal of the augers.

In Boring Nos. 19A and 20A, borings for the new location of the McKenzie House, a petroleum odor was noted in the oxidized clay between 2.7 to 6.5 feet.

4.1 Subsoil Conditions (Cont'd)

Standard penetration values in the cohesive soils vary from 5 to 34 blows per foot. Bulk densities range from 109 to 141 pcf with moisture content varying from 11.0 to 45.2 percent of the dry weight of the soil. Unconfined compressive strengths for the clay soils vary from 740 to 20,020 psf. The lower unconfined compressive strength was due to the presence of sands and sandy lenses in the sample.

4.2 Ground Water Observations

Water level readings were taken in the bore holes during and after the completion of drilling. These observations are noted on the respective Test Boring Logs. Ground water was encountered at depths varying from 3 to 37 feet during drilling. After completion of the boring and removal of the augers the depth of the ground water was measured from 6 to 15 feet below the existing ground surface. It should be noted that no ground water was present at completion of 16 of the borings while two borings collapsed after removal of the augers. Also in the two deep borings no ground water measurements were taken after completion since water was used during drilling.

It should be noted that short-term ground water observations may not provide a reliable indication of the actual ground water table. In clayey soils this would be due to the slow rate of infiltration of water into the boreholes as well as the potential for water to become trapped in overlying layers of the granular soils during periods of heavy rainfall. It should be expected that ground water levels fluctuate with seasonal and climatic changes. Elevations of gray colored soils tend to indicate a ground water level of long term low static water table.

5.0 ANALYSIS AND RECOMMENDATIONS

5.1 Proposed Development

The proposed development is to consist of moving the existing McKenzie House present south of the existing Hillberry Theater to the west part of the site (area of Boring Nos. 19 and 20). A new theater building will be constructed in the area connecting the existing theater to the new one. The building will be single story, slab-on-grade.

5.2 Ground Water Conditions

The position of water levels found in test borings may vary somewhat depending on seasonal precipitation. At the level encountered in the borings, it should present little problems for

5.2 Ground Water Conditions (Cont'd)

design or construction of foundations. Some ground water problems could be present if utilities are to be constructed. If during foundation excavation ground water is encountered it should be controllable by direct pumping from excavations or properly prepared sumps. More comprehensive dewatering is expected to be necessary during deeper utility construction.

5.3 Recommended Earthwork Operations

5.3.1 Site Preparation

General Considerations

It appears that that the proposed finished grade will be close to the existing pavement grade and the remainder of our report assumes that grade changes will be limited to a foot or two. All earthwork operations should be performed under adequate specifications and properly monitored in the field.

It is always preferable to support slabs, pavements and, more so, buildings on native soils or engineered fill, because it is likely that the conditions encountered in test borings can be assumed to be representative of the conditions between the borings. In uncontrolled fill a similar assumption cannot be made and there is always an increased risk of differential settlements associated with support of structures on uncontrolled fill materials. The increased risk can be minimized by careful observation and subgrade preparation during construction, but it cannot be eliminated. If the greater risk of differential settlements is not acceptable, it will be necessary to remove some or all the existing fill and replace it with engineered fill.

The shallow soils encountered in the borings were mostly sandy soil, fill or native clays, excavations may be performed with sides sloping at a minimum 1 ½H:1V for the sandy soils to ½H:1V for the clayey soils. Construction traffic and excavated material stockpiles should be kept away from the edges of sloped excavations a distance at least equal to the full depth of the excavation.

Within the limits of areas to be developed, the surface asphalt, gravel layers and any old foundations should be removed prior to the site being graded. The resulting excavations should be backfilled with compacted engineered fill. The site should then be rolled with a vibrating roller to densify the loose sands. This should be followed by a proofroll to identify soft or yielding areas. It may be possible to stabilize soft areas with crushed stone or concrete. Soft spots that cannot be stabilized should be removed and replaced with compacted engineered fill.

5.3.1 Site Preparation (Cont'd)

It should be noted vibrations should be kept to a minimum in order not to damage existing old buildings.

Preparation of Subgrades for Grade-Slabs and Pavement

The following earthwork operations are recommended to prepare the subgrades for support of grade-slabs and pavement.

- Within the footprint of the proposed building and pavement areas the existing pavements, as well as unsuitable fill, if any, and other deleterious materials should be removed in their entirety from the surface. The suitability of the exposed subgrade should subsequently be examined by a qualified geotechnical engineer.

- Existing foundations and other below-grade structural elements, if any, should be removed in their entirety to expose suitable subgrade soils. Furthermore, any below-grade obstructions should be removed to a depth of at least 2½ feet below finished grade to avoid creating "hard spots" in the subgrade for pavements and slabs-on-grade. Depressions left by removal of obstructions and tree stumps should be backfilled expeditiously with engineered fill to avoid softening exposed subgrade soil.

- The exposed subgrade should be examined by a qualified geotechnical engineer to determine the suitability of the exposed materials. The suitability of existing fill and other potentially unsuitable materials should be based on their composition, i.e., amount of debris and organic matter, and on their stability to be checked by proof-rolling. Unsuitable materials including materials with more than 4 percent organic matter should be removed and replaced with engineered fill while suitable materials may be improved in place.

- Prior to fill placement in fill areas, and after rough grade has been achieved in cut areas, the subgrade should be thoroughly proof-rolled in the presence of an experienced geotechnical engineer. A heavy rubber-tired vehicle such as a loaded dump truck or scraper should be used for proofrolling.

- After rough grading and prior to placement of fill in fill areas the exposed subgrade should be thoroughly proof-rolled and compacted in the presence of an experienced geotechnical engineer to identify areas of unsuitably loose/soft materials and to provide a uniformly compacted subgrade. The subgrade soils should be compacted

5.3.1 Site Preparation (Cont'd)

to a minimum of 95 percent of their Modified Proctor density (ASTM D1557). Loose or soft subgrade materials which exhibit excessive pumping and yielding during proofrolling should be stabilized by aeration, drying and compaction if weather conditions are favorable. If this is not possible, the unsuitable soils should be removed and replaced with engineered fill or, during the wet season, with crushed aggregate, possibly placed over a geogrid. Proofrolling of sandy subgrades should be performed with a heavy, self-propelled vibratory roller. Proofrolling of clayey subgrades should be performed with a fully loaded tandem-axle truck or a similar piece of pneumatic-tired construction equipment.

- Deep existing fill should be removed and replaced with engineered fill. In pavement and floor slab areas we recommend that it be removed to at least 2 feet below floor slab and pavement inverts. In foundation areas we recommended that the fill be removed and replaced to at least one foundation width below foundation inverts. At places after the fill is removed and excavations cleaned 1" X 3"crushed stone could be used as engineered fill. The 1" X 3" should be placed in layers, 9" to 12" thick, and compacted with the bucket of the excavator. The upper 6 inches should consist of crushed stone meeting MDOT 21AA specification and compacted to a density of (minimum) 95% of its ASTM D-1557 proctor value.

The fill present below the existing pavement (asphalt or crushed stone) in general consists of brown to dark brown sand with trace of gravel. This material should be examined in the field and laboratory by a geotechnical engineer prior to being used on the site as select fill.

Engineered backfill required for construction excavations or fill required to achieve desired grades should preferably consist of clean and well graded granular soils. On-site material should be satisfactory for use, particularly for balancing and grading the site. Fill should be placed in uniform layers not more than 9 inches in thickness with the soils in each layer compacted to a minimum of 95% of the maximum density as determined by ASTM D1557. Fill should be at approximately the optimum moisture content during placement and compaction. Furthermore, frozen material must not be used as fill and fill should not be placed on frozen ground.

Compaction Method	Maximum Loose Lift Thickness
Hand-operated vibratory plate or light roller in confined areas	4 inches
Hand-operated vibratory drum roller weighing at least 1000 pounds	6 inches

5.3.1 Site Preparation (Cont'd)

Compaction Method	Maximum Loose Lift Thickness
Vibratory drum roller, minimum dynamic force, 20,000 pounds	9 inches
Vibratory drum roller, minimum dynamic force, 30,000 pounds	12 inches
Sheep's-foot roller	8 inches

Materials placed as engineered fill to raise the grade beneath slabs and pavements should be placed at approximately their optimum moisture content and compacted to achieve 95 percent of their maximum dry density as determined by the Modified Proctor compaction test (ASTM D-1557). Fill placed in landscaped areas may be compacted to 88 percent of their Modified Proctor density.

When determining the lateral extent of compaction, the compaction should extend 10 feet beyond the foundations of structures and five feet beyond the edge of pavements plus a one-on-one slope to the original grade. Trench backfill should be compacted to the same standard as the soils adjacent to the trench.

It is imperative that fill within the building, particularly thicker fill, in former pits and foundations must be properly placed and compacted under continuous density monitoring.

Since the on-site soils vary from clay sands, lateral support structure or side sloping with a minimum ½H:1 ½V and 1½H:1V ratio will be required for the anticipated excavations for clays and deep sands, respectively. Care must be exercised when excavating adjacent to existing foundations to avoid undermining them. Soils exposed in the bases of all satisfactory foundation excavations should be protected against any detrimental change in conditions such as from disturbances, rain or freezing. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, all footing concrete should be placed the same day the excavation is made. If this is not possible, the footing excavations should be adequately protected.

5.4 Foundation Recommendations

The native on-site soils or well prepared engineered fill are suitable for support of the proposed structures on shallow foundations. Foundations should bear on soil deposits that have adequate strength to develop bearing capacity and sufficient stiffness to limit settlement for reasonably-sized footings with the anticipated loads. Local building codes and climatic conditions require that exterior foundations be placed at a minimum depth of 3 ½ feet below

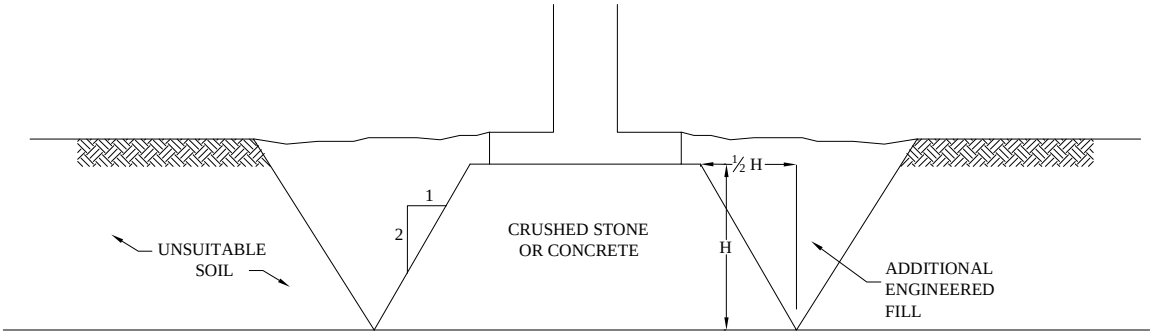
5.4 Foundation Recommendations (Cont'd)

finished grade to provide for adequate frost protection. Interior foundations may be below the floor at a lesser depth if not exposed to frost penetration. Regardless of the loads, the foundations must be larger than the superstructure they support along with construction tolerances.

The native stiff to very stiff clay usually encountered at depths of about 2 to 8 feet soils or well prepared engineered fill are acceptable for support of the proposed structure on shallow foundations. At minimum depths, foundations can be designed for a maximum net allowable bearing pressure of 5,000 psf. Similar procedures could be followed for foundation preparation for the historic building. Where the soils are quite loose we recommend that the soils be removed beneath any foundations to a depth of one foundation width, but no less than two feet. The removed sand could be placed back as compacted engineered fill. Foundations could then be designed for a net allowable bearing capacity of 3,000 psf. If the backfill is crushed aggregate a bearing capacity of 4,000 psf could be used.

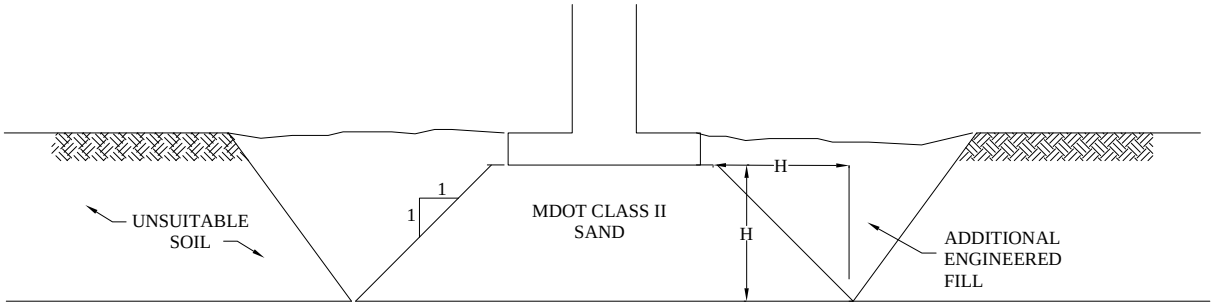
Engineered fill placed for foundation support must extend wider than the foundation as shown in the following sketches.

ENGINEERED STONE FILL UNDER FOUNDATIONS



5.4 Foundation Recommendations (Cont'd)

ENGINEERED SAND FILL UNDER FOUNDATIONS



Basement foundations for McKenzie House may be designed for 5,000 psf also on the stiff clay. This assumes that the foundations will bear no deeper than 10 feet and not be wider than 3 feet square.

The recommended design bearing pressures should provide a factor of safety of about 2.5 to 3 against shear failure and limit differential settlements between adjacent columns to less than ¾ inch.

From a review of the borings and assumptions made about the lower lying soils a seismic site class of D is recommended for design. This is based off of the Michigan Building Code, which incorporates the International Building Code.

5.5 Floor Slabs

Floor slabs are expected to be placed on existing fill compacted at the surface and native soils. The subgrade resulting from the recommended site preparation should provide fair to good support for slabs-on-grade. Placement of slabs on several feet of existing fill could result in greater than normal slab settlements.

Exposed subgrades deteriorate over time, however, and if left alone for a while the prepared subgrade should again be thoroughly proofrolled immediately prior to placement of fill to raise the grade to verify its suitability. Any disturbed materials encountered during the proofroll

5.5 Floor Slabs (Cont'd)

should be re-compacted or removed and replaced with engineered fill. Subgrade soils for slabs on grade and pavements should be protected against frost during winter construction. Any frozen soils should be thawed and compacted, or removed and replaced with engineered fill prior to slab-on-grade and pavement construction.

To permit slab settlement without damaging other structural elements, the slab should be detailed with isolation joints at walls and around footings. As an alternate to construction of isolation joints at column footings, the footings could be separated from the slab with a minimum of six inches of compacted granular fill. Based upon the encountered subgrade soils, the stipulated subgrade preparation procedures and the expected fill to raise the grade, an estimated standard Modulus of Subgrade Reaction (30-inch diameter plate) of 150 pounds per cubic inch may be used for design. To improve the uniformity of support, the slab should be placed on a minimum of six inches of clean compacted granular fill meeting MDOT Class II grading requirements or dense graded crushed aggregate.

The slab performance can be improved through a number of details. Shrinkage cracks can be controlled by installing welded wire fabric or fibers in the slab. Cracking can also be reduced through the use of control joints.

Water vapor normally passes through concrete and evaporates from its surface if the concrete is not sealed. Even good quality, well-consolidated concrete is not impermeable to the slow passage of water vapor. Many floor coverings and floor finishes/seals are impermeable, that is, they act like a vapor retarder and the build-up of moisture beneath them is likely to damage the covering/finish. Even when such coverings/finishes are not used, moisture can condense beneath objects on the floor promoting creation of mildew and molds. Furthermore, where the subgrade consists of saturated cohesive soils, water from curing concrete can increase the moisture in the subgrade soils and, in turn, decrease their modulus of subgrade reaction.

For the above reasons, we generally recommend that damp-proofing in the form of a vapor retarder be provided beneath floor slabs that will receive an impermeable floor covering/finish as well as where the floor/room will be used for a purpose that makes passage of water through the floor undesirable.

It should be understood that placement of a vapor retarder beneath a concrete slab reduces but does not eliminate moisture transmission through the slab and suppliers of potential floor covering/finish should be consulted with regard to moisture transmission tolerances. We recommend that the vapor retarder be placed in accordance with American Concrete Institute (ACI) recommendations.

5.6 Pavements and Drives

The subgrade resulting from the site preparation, as outlined in the recommended earthwork operations section, will provide a fair subgrade for support of pavements. The pavement should be properly crowned and shaped in order to provide effective surface drainage and prevent water ponding. A 1.5 percent slope is recommended. Edge drains along the perimeter of the pavement and finger drains around catch basins are recommended to prevent water from infiltrating the subgrade. All drains should be connected to storm sewer or other outlets.

For automobile drives and minimal truck traffic the following section is recommended:

1 ½ inch bituminous concrete wearing course (MDOT 5E1)
2 ½ inch bituminous concrete leveling course (MDOT 3C)
10 inches untreated aggregate base (MDOT 21AA)

The leveling course may be reduced to 2 inches and the aggregate base to 8 inches in automobile parking areas. Areas of more significant truck traffic may require a thicker cross section.

The pavement recommendations presented above are intended to provide a serviceable pavement for an extended period of time. However, all pavements show deterioration with time and require regular maintenance such as occasional repairs of cracks and pot holes. The need for such maintenance efforts is not necessarily indicative of premature pavement failure. The serviceable life of the pavement can be substantially reduced if maintenance and minor repair is not performed in a timely manner.

Sidewalks and other concrete pavements should be placed on a minimum of 4 inches of clean compacted sand meeting MDOT Class II specifications or MDOT 21AA which will remain more stable during concrete placement.

5.7 Limitations

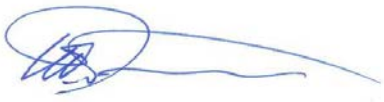
The field and laboratory data, analysis and recommendations presented in this report are based on the field conditions during the time of this investigation. These conditions are not expected to change. Based on our field and laboratory data these conditions are expected to be indicative of the site. Changes and unforeseen conditions may be encountered during the construction period. We strongly suggest that a more detailed site investigation is performed when the location of the structures is finalized. Furthermore, a geotechnical engineer familiar with the site be present during field work to ensure that proper construction procedures are followed.

6.0 DESIGN REVIEW AND FIELD MONITORING

The evaluations and recommendations presented in this report relative to site preparation and building foundations have been formulated on the basis of assumed and provided data relating to the location, type and finished grades for the proposed structure and adjacent areas. Any significant change in this data should be brought to our attention for review and evaluation with respect to the prevailing subsoil conditions.

When the building and foundation plans are finalized, a consultation should be arranged with us for a review to verify that the evaluations and recommendations have been properly interpreted.

Soil conditions at the site could vary from those generalized on the basis of test borings made at specific locations. It is therefore recommended that Testing Engineers & Consultants, Inc. be retained to provide soil engineering services during the site preparation, excavation and foundation phases of the proposed project. This is to observe compliance with the design concepts, specifications and recommendations. Also, this provides opportunity for design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction.



Harry I. Papadopoulos, PhD
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HIP/CJS/ln
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Testing Engineers & Consultants, Inc.

Mr. Marc Ledent
Wayne State University
June 20, 2018

TEC Report: 58871

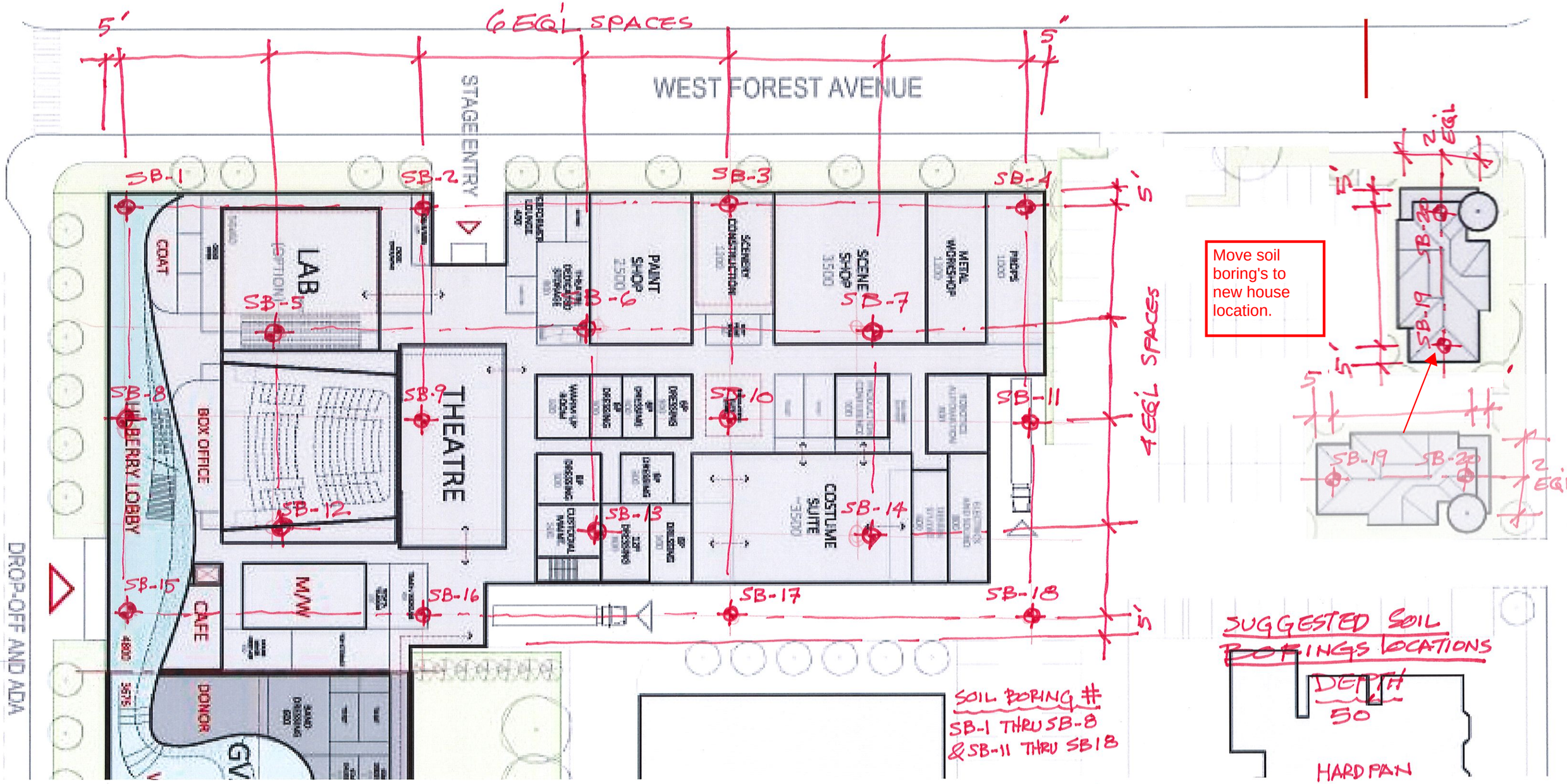
APPENDIX

Test Boring Location Plan

Logs Of Test Borings

Sieve Analysis Results

General Notes For Soil Classification



TEST BORING LPOCATION PLAN

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 1 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/10/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.08	ASPHALT (1")			
	LS	2	1.7		19.8	129	
		3					
2.5		3		Loose Moist Dark Brown Sand With Some Crushed Stone & Trace Of Brick-FILL			
	LS	2			12.8	138	4200
		3	4.5	Firm Moist Brown Oxidized CLAY With Some Silt			
5.0		4					
			6	Firm Moist Brown Oxidized CLAY With Some Silt			
	LS	5			30.5	118	5690
		8		Stiff Moist Variegated CLAY With Some Silt & Wet Seams & Strong Odor			
7.5		11	8				
	LS	5		Extremely Stiff Moist Brown CLAY With Some Silt	13.0	134	10550
		11					
10.0		20					
			12				
12.5				Stiff Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seam			
	LS	3			13.7	132	5520
		5					
15.0		7					
			16				
17.5				Firm Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seams			
	LS	3			15.3	133	2880
		4					
20.0		6					
22.5			23				
	LS	2			16.6	128	1400
		4		Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seams			
		5					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 29'6"

At Completion: None

Boring No. 1

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 1 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/10/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			26				
27.5	LS	3 5 6		Firm Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seams	11.2	136	2390
30.0			32				
32.5	LS	2 3 5		Plastic Moist Gray CLAY With Some Silt	15.3	131	1240
35.0							
37.5	LS	2 3 5	38	Firm Moist Gray CLAY With Some Silt	15.6	135	2060
40.0			41				
42.5	LS	2 3 4		Plastic Moist Gray CLAY With Some Silt	16.0	132	1480
45.0							
47.5	LS	2 3 4	50		17.3	131	1240
				Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 29'6"

At Completion: None

Boring No. 1

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 2 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/9/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33	Crushed STONE (4")			
	LS	4			17.5	130	
		4	2.2	Loose Moist Brown Sand With Trace Of Gravel-FILL			
2.5		5					
	LS	3		Firm Moist Brown Oxidized CLAY With Some Silt & Sand	18.2	127	3870
		4					
5.0		4					
			5.5				
	LS	5		Extremely Stiff Moist Brown Oxidized CLAY With Some Silt & Trace Of Gravel	12.8	134	12830
		11					
7.5		16					
	LS	6			13.2	133	9060
		11					
10.0		16					
			12.5				
12.5				Extremely Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3			13.0	137	8320
		7					
15.0		9					
17.5							
	LS	6			11.0	140	
		8					
20.0		10					
			21				
22.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3			14.5	132	3710
		5					
		6					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 2

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 2 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/9/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	3 5 7					
30.0							
32.5							
	LS	3 4 5			15.5	130	2310
35.0							
			37				
37.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 5			14.6	136	1240
40.0							
42.5							
	LS	2 3 4			16.2	134	1240
45.0							
47.5							
	LS	2 3 4			16.8	130	1480
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 2

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Fax (248) 588-6232

Boring No.: 3 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.42	Crushed STONE (5")			
	LS	7 7 8			7.7	135	
2.5				Medium Compact Moist Brown Sand With Trace Of Gravel-FILL			
			3.5				
	LS	2 3 4		Plastic Moist Variegated CLAY With Some Silt	35.6	109	3000
5.0			5.5				
	LS	5 11 18		Stiff Moist Brown CLAY With Some Silt	11.4	139	13100
7.5			8				
	LS	5 13 20		Extremely Stiff Moist Brown CLAY With Some Silt	11.8	139	13840
10.0							
12.5			13				
	LS	4 7 9		Stiff Moist Gray Oxidized CLAY With Some Silt, Trace Of Gravel & Sand Seams	13.5	125	4040
15.0							
17.5							
	LS	4 6 10			14.0	130	7420
20.0			21				
				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
22.5							
	LS	4 5 7			14.7	132	3870

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 3'0"

At Completion: None

Boring No. 3

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Boring No.: 3 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5			28				
	LS	4 5 6		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	15.0	135	4530
30.0							
32.5							
	LS	3 5 6			15.3	123	
35.0							
37.5							
	LS	3 4 5			12.0	137	5850
40.0							
			42				
42.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 4 4			18.2	132	
45.0							
47.5							
	LS	2 3 3			18.7	131	1400
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 3'0"

At Completion: None

Boring No. 3

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Boring No.: 4 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.83	Crushed STONE (10")			
	LS	5 7 7			11.3	137	
2.5			3.3	Medium Compact Moist Brown Sand With Trace Of Gravel-FILL			
	LS	3 4 5		Stiff Moist Brown Oxidized CLAY With Some Silt, Sand Seams & Gray Layer At 4'	20.6	123	4200
5.0							
	LS	2 6 9	6.5		13.9	136	7660
7.5				Stiff Moist Brown Oxidized CLAY With Some Silt			
	LS	4 11 18	8.5	Hard Moist Brown Oxidized CLAY With Some Silt	12.7	138	20020
10.0							
12.5			13				
	LS	5 8 13		Extremely Stiff Moist Gray Oxidized CLAY With Some Silt & Trace Of Gravel	11.9	135	14010
15.0							
17.5			17	Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	4 5 7			13.7	137	10720
20.0							
22.5							
	LS	3 5 5			13.7	134	2880

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 3'0"

At Completion: None

Boring No. 4

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Boring No.: 4 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	3 4 5			16.0	131	2880
30.0							
32.5							
	LS	3 3 5			18.0	132	2390
35.0							
37.5							
	LS	2 4 5			16.7	133	
40.0							
42.5							
	LS	2 3 4			13.7	134	2230
45.0							
47.5							
	LS	2 4 4	50	Bottom of Borehole at 50'	14.0	133	

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 3'0"

At Completion: None

Boring No. 4

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Boring No.: 5 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/10/2018

Completed: 5/10/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.25	Crushed STONE (3")			
	LS	3 4 5	2	Loose Moist Brown Clayey Sand With Trace Of Gravel & Brick-FILL	8.9	139	5770
2.5							
	LS	2 5 7		Stiff Moist Brown Oxidized CLAY With Some Silt	11.5	138	7000
5.0			5.5				
	LS	7 14 18		Extremely Stiff Moist Brown Oxidized CLAY With Some Silt	10.4	136	16400
7.5			8.5				
	LS	6 13 19		Extremely Stiff Moist Gray Oxidized CLAY With Some Silt	13.4	134	12360
10.0							
			12				
12.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	4 6 8			13.8	134	7910
15.0							
17.5							
	LS	4 5 7			13.7	136	4040
20.0			21				
				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
22.5							
	LS	3 4 5			13.9	137	2640

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 5

Testing Engineers & Consultants, Inc.

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Boring No.: 5 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/10/2018

Completed: 5/10/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5			28				
	LS	3 4 6		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	16.4	127	1730
30.0							
32.5							
	LS	2 4 5			15.9	129	1810
35.0							
37.5							
	LS	2 3 4			16.6	131	1480
40.0							
42.5							
	LS	2 3 4			16.9	134	1240
45.0							
			47				
47.5				Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Sand Seams			
	LS	3 5 7			12.6	137	1810
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 5

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
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Boring No.: 6 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/9/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.42	Crushed STONE (5")			
	LS	9			9.6	140	
		11					
2.5		12		Medium Compact Moist Brown Fine Sand & Gravel With Trace Of Silt & Clay-FILL			
	LS	3	4		19.5	128	3870
		3					
5.0		5		Firm Moist Brown Oxidized CLAY With Some Silt			
			5.5				
	LS	5		Extremely Stiff Moist Brown CLAY With Some Silt	13.6	131	14500
		11					
7.5		16					
			8				
	LS	5		Stiff Moist Brown CLAY With Some Silt	12.6	119	4040
		12					
10.0		20					
			12				
12.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	4			11.6	139	6500
		6					
15.0		7					
17.5							
	LS	3			13.4	139	5110
		5					
20.0		8					
22.5							
	LS	3			14.3	134	4450
		5					
		6					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 37'0"

At Completion: Caved In 35'10"

Boring No. 6

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Boring No.: 6 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/9/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	7 8 8			13.8	136	
30.0							
32.5			33				
	LS	3 4 6		Medium Compact Very Moist Gray Clayey SILT & Sand	14.6	129	1650
35.0							
			37				
37.5				Loose Wet Gray Clayey Fine SAND			
	LS	3 4 5			16.8	126	
40.0							
42.5							
	LS	3 4 8			12.6	135	3300
			44.8				
45.0				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
			47				
47.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			17.1	127	1650
			50				
				Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 37'0"

At Completion: Caved In 35'10"

Boring No. 6

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
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Boring No.: 7 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/9/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33	Crushed STONE (4")			
	LS	3 7			11.5	136	2880
2.5		27/5"		Medium Compact Moist Brown Sand & Clay Layers-FILL			
	LS	5 6			13.2	136	
5.0		7					
			5.5				
	LS	2	6.5	Loose Moist Gray Clayey Sand With Clayey Layers-FILL	13.8	134	
		3					
7.5		3					
			8	Loose Wet Brown Sand-FILL			
	LS	5 12		Extremely Stiff Moist Brown CLAY With Some Silt	13.2	136	11540
10.0		21					
			12.5				
12.5							
	LS	3		Firm Moist Gray CLAY With Some Silt, Trace Of Gravel, Sand Seams & Wet Seams	13.7	136	3460
		5					
15.0		8					
17.5							
	LS	3			14.9	130	2310
		5					
20.0		8					
22.5							
	LS	3			11.8	141	2880
		4					
		6					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 6'6" & 19'

At Completion: None

Boring No. 7

Testing Engineers & Consultants, Inc.

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Boring No.: 7 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/9/2018

Completed: 5/9/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	3 5 6			15.3	129	3380
30.0							
32.5							
	LS	3 4 6			15.3	136	2800
35.0							
37.5							
	LS	3 4 6			17.0	127	
40.0							
			42				
42.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 4 4			17.3	133	1240
45.0							
47.5							
	LS	2 4 4			16.1	134	1150
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 6'6" & 19'

At Completion: None

Boring No. 7

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
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Fax (248) 588-6232

Boring No.: 8 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/10/2018

Completed: 5/10/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.21				
			.92	ASPHALT (2 1/2")			
	LS	32			7.5		
		48/6"					
2.5			2.6	Moist Dark Brown Clayey Sand With Gravel & Trace Of Brick-FILL (8 1/2")			
	LS	3			12.5	138	9810
		5		CONCRETE			
5.0		9					
				Extremely Stiff Moist Brown Oxidized CLAY With Some Silt			
	LS	5			14.0	130	15740
		10					
7.5		16					
	LS	5			13.3	137	12940
		12					
10.0		19					
12.5			12.5				
				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3			13.0	138	5930
		6					
15.0		8					
17.5							
	LS	4			14.1	133	6180
		5					
20.0		7					
22.5							
	LS	4			13.8	132	4610
		5					
		7					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 8

Testing Engineers & Consultants, Inc.

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Boring No.: 8 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/10/2018

Completed: 5/10/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	3 5 6			15.2	136	4120
30.0							
32.5							
	LS	3 4 5			14.9	135	2470
35.0							
			37				
37.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 4 4			15.6	128	1650
40.0							
42.5							
	LS	2 3 4			45.2	104	990
45.0							
47.5							
	LS	2 3 3			17.4	130	1240
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 8

Testing Engineers & Consultants, Inc.

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Boring No.: 9 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-150'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/16/2018

Completed: 5/16/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33	Crushed STONE (4")			
	LS	4 6 10			12.9	140	4530
2.5			3	Stiff Moist Dark Gray Clay With Some Silt & Brown Layers-FILL			
	LS	4 7 10		Stiff Moist Brown Oxidized CLAY With Some Silt LL=24 PL=11 PI=13	11.7	136	6020
5.0							
	LS	6 10 14			12.5	136	6760
7.5							
	LS	8 15 19	9		12.2	140	8080
10.0				Extremely Stiff Moist Brown CLAY With Some Silt			
			12				
12.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	4 7 9			12.6	139	5930
15.0			16				
17.5				Firm Moist Gray CLAY With Some Silt, Trace Of Gravel & Occasional Sand Seams			
	LS	4 5 7			14.8	129	3380
20.0							
22.5							
	LS	3 5 6			13.5	137	2390

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 9

Testing Engineers & Consultants, Inc.

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Boring No.: 9 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-150'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/16/2018

Completed: 5/16/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5			28				
	LS	3 5 6		Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Occasional Sand Seams	15.5	131	1650
30.0							
32.5							
	LS	3 4 5			15.7	135	1900
35.0							
			37				
37.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 3			17.0	133	1070
40.0							
42.5							
	LS	2 4 4			15.2	133	1400
45.0							
47.5							
	LS	4 3 4			16.3	135	1150

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 9

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 9 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-150'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/16/2018

Completed: 5/16/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
52.5							
	LS	2 3 4			15.6	135	1240
55.0							
57.5							
	LS	2 3 3			19.4	126	1070
60.0							
62.5							
	LS	2 3 3			18.2	126	1150
65.0							
67.5							
	LS	2 3 4			18.2	126	1400
70.0							
72.5							
	LS	2 3 4			17.6	131	1240

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 9

Testing Engineers & Consultants, Inc.

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(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 9 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-150'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/16/2018

Completed: 5/16/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
77.5			78				
	LS	2 2 3		Soft Moist Gray CLAY With Some Silt & Trace Of Gravel	31.0	116	910
80.0							
82.5							
	LS	2 3 3			35.9	115	580
85.0							
87.5							
	LS	2 2 3			18.0	126	820
90.0			91				
92.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			20.4	123	1320
95.0							
97.5							
	LS	3 5 6			19.8	130	1650

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 9

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 9 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-150'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/16/2018

Completed: 5/16/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
102.5							
	LS	2 4 5			22.6	120	1150
105.0							
107.5							
	LS	2 4 5			20.9	125	1150
110.0							
112.5							
	LS	3 5 7			23.4	123	
115.0							
117.5							
	LS	2 4 6			24.6	120	1240
120.0							
122.5							
	LS	3 5 5			34.0	117	

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 9

Testing Engineers & Consultants, Inc.

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(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 9 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-150'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/16/2018

Completed: 5/16/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
127.5							
	LS	2 4 5			27.4	116	1240
130.0							
132.5							
	LS	3 4 5			29.7	114	1480
135.0							
			137				
137.5				Compact Moist Gray SAND With Gravel Seam			
	LS	11 15 34	139.5		18.5	41	
140.0				Hard Moist Gray CLAY With Some Silt			
142.5							
	LS	19 29 39			15.3	132	16150
145.0							
			146.5				
147.5				Dense Moist Dark Gray SAND			
	LS	34 62 84			9.6	134	
			150	Bottom of Borehole at 150'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 9

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33	Crushed STONE (4")			
	LS	11			9.5	131	1230
		14					
2.5		7	3	Medium Compact Moist Brown Clayey Sand With Crushed Concrete-FILL			
	LS	3	4	Firm Moist Dark Gray Clay With Some Silt-FILL	10.7	121	
		4					
5.0		5					
				Firm Moist Brown Oxidized CLAY With Some Silt & Sand Seams			
	LS	3	7	LL=22 PL=13 PI=9	14.6	132	3550
		4					
7.5		7					
				Extremely Stiff Moist Brown CLAY With Some Silt			
	LS	5			12.4	136	8240
		10					
10.0		15					
			12.5				
12.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	4			13.7	134	2470
		7					
15.0		10					
			17				
17.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3			14.2	131	3050
		5					
20.0		8					
22.5			23				
	LS	6			12.6	136	4040
		5		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
		6					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			26				
27.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 5 6			14.5	137	2550
30.0							
32.5			33				
	LS	2 4 5		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	14.1	137	1890
35.0							
37.5							
	LS	2 4 5			16.5	128	1810
40.0							
42.5							
	LS	3 4 5			15.6	134	1650
45.0							
47.5							
	LS	2 3 4			16.0	132	1650

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

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Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
52.5							
	LS	5 3 4			15.3	131	1810
55.0							
57.5							
	LS	2 3 4			18.2	133	1560
60.0							
62.5							
	LS	2 3 4			17.9	126	1400
65.0							
67.5							
	LS	2 3 4			18.6	131	1230
70.0							
72.5							
	LS	3 4 4			21.4	118	1230

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

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Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
77.5			78				
	LS	3 3 4		Soft Moist Gray CLAY With Some Silt & Trace Of Gravel	29.8	113	990
80.0			81				
82.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 3			24.1	121	1560
85.0							
87.5							
	LS	2 3 3			17.3	131	1400
90.0							
92.5							
	LS	2 3 4			19.3	130	1480
95.0							
97.5							
	LS	2 3 4			19.5	131	1650

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

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Fax (248) 588-6232

Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
102.5							
	LS	2 4 5			20.1	128	1480
105.0							
107.5							
	LS	2 4 5			20.9	122	1730
110.0							
112.5							
	LS	2 4 6			20.2	129	1320
115.0							
117.5							
	LS	2 4 5			25.7	122	1650
120.0							
122.5							
	LS	3 4 5			28.1	121	1650

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
127.5							
	LS	2 4 5			27.8	119	1810
130.0							
132.5							
	LS	2 4 5			29.1	121	1240
135.0							
			136.5				
137.5				Compact Moist Gray SAND With Gravel Seams			
	LS	15 35 45	139		7.1	145	
140.0				Hard Moist Gray CLAY With Some Silt			
142.5							
	LS	22 100/5"	144		14.3	135	16320
145.0				Hard Moist Gray CLAY With Some Silt, Trace Of Gravel & Occasional Sand Seam			
			146				
147.5				Dense Moist Gray Fine SAND			
	LS	37 72 100/4.5"			19.0	121	

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

Testing Engineers & Consultants, Inc.

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(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 10 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers, Wash Bore 10'-153.7'

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/18/2018

Completed: 5/21/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
152.5	LS	100/2"	152				
			153.7	Hard Moist Gray CLAY With Some Silt & Trace Of Gravel			
155.0				Bottom of Borehole at 153.7'			
157.5							
160.0							
162.5							
165.0							
167.5							
170.0							
172.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: N/A

Boring No. 10

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 11 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/11/2018

Completed: 5/12/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.25	Crushed STONE (3")			
	LS	3 4 5			16.9	132	
2.5				Stiff Moist Dark Brown Clay With Some Silt & Sand Seams-FILL			
	LS	2 4 5	4.5		17.2	131	6760
5.0				Plastic Moist Brown Oxidized CLAY With Some Silt			
	LS	2 2 3			20.7	129	1480
7.5			8				
	LS	6 12 17		Extremely Stiff Moist Brown CLAY With Some Silt	13.3	139	13020
10.0							
			12.5				
12.5	ST			Stiff Moist Brown CLAY With Some Silt Shelby Tube Sample, 13' - 15' Full Recovery	12.6	138	4160
15.0	LS	3 5 6			13.4	138	5610
	ST		17		13.9	138	5270
17.5				Firm Moist Brown CLAY With Some Silt Shelby Tube Sample, 17' - 19' Full Recovery			
	LS	3 5 6			15.1	137	2230
20.0							
	ST				13.2	139	3370
22.5				Shelby Tube Sample, 21' - 23' Full Recovery			
			23				
	LS	3 5 7		Plastic Brown CLAY With Some Silt	14.3	133	1980

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 14'10"

At Completion: None

Boring No. 11

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 11 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/11/2018

Completed: 5/12/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			27				
27.5				Firm Brown CLAY With Some Silt			
	LS	2 4 5			17.2	127	2230
30.0							
			32				
32.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			16.8	128	1570
35.0							
37.5			38				
	LS	2 3 5		Firm Moist Gray CLAY With Some Silt & Trace Of Gravel	14.8	135	2230
40.0			41				
				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
42.5							
	LS	2 4 4			16.2	135	1570
45.0							
47.5							
	LS	2 3 4			15.8	131	1570
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 14'10"

At Completion: None

Boring No. 11

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 12 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/14/2018

Completed: 5/14/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.38				
			1.1	ASPHALT (4 1/2")			
	LS	8			3.9	142	
		10					
2.5		10	3	Moist Dark Brown Sand-FILL			
	LS	3		Medium Compact Moist Brown Sand With Trace Of Brick-FILL	3.3	116	
		2					
5.0		3		Loose Moist Brown Fine Sand With Some Silt & Trace Of Gravel-FILL			
	LS	3			13.0	127	
		2					
7.5		3	8				
	LS	2		Very Loose Moist Brown Sand-FILL	5.0	112	
		2					
10.0		1					
12.5							
	LS	3	14		13.5	124	4940
		2					
15.0		2		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
17.5							
	LS	3			14.0	134	4530
		6					
20.0		8					
22.5							
	LS	4			14.3	130	4700
		6					
		8					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 13'0"

At Completion: Caved In 3'0"

Boring No. 12

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 12 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/14/2018

Completed: 5/14/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			26				
27.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 5 8			16.0	129	3130
30.0							
32.5			33				
	LS	4 6 7		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	12.4	133	1480
35.0							
37.5							
	LS	2 3 4			15.9	131	1240
40.0							
42.5			43				
	LS	2 3 4		Soft Moist Gray CLAY With Some Silt & Trace Of Gravel	16.3	132	820
45.0							
47.5							
	LS	2 3 3			21.1	123	990
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 13'0"

At Completion: Caved In 3'0"

Boring No. 12

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 13 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/11/2018

Completed: 5/11/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33				
	LS	8	1.5	Crushed STONE (4")	7.1	136	
		4	2.3				
2.5		4		Medium Compact Moist Brown Sand & Concrete-FILL			
	LS	2		Loose Moist Brown Sand-FILL	18.2	131	5850
		4	4.5				
5.0		6		Stiff Moist Dark Brown CLAY With Some Silt & Sand Seams-Possible Fill			
	LS	4			13.8	134	11950
		8		Extremely Stiff Moist Brown Oxidized CLAY With Some Silt			
7.5		12	8				
	LS	4		Hard Moist Brown Oxidized CLAY With Some Silt	13.1	134	16650
		10					
10.0		16					
			12				
12.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3			14.4	131	3210
		5					
15.0		6					
17.5			18				
	LS	4		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	12.8	139	5110
		5					
20.0		7					
22.5			23				
	LS	5			19.3	128	
		9		Medium Compact Wet Gray SAND			
		11					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 23'0"

At Completion: None

Boring No. 13

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 13 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/11/2018

Completed: 5/11/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			26				
27.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 4 6			13.4	137	2880
30.0							
32.5							
	LS	2 4 6			16.6	131	2640
35.0							
37.5							
	LS	3 3 4			17.4	133	2230
40.0							
			41				
42.5				Soft Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			15.4	131	820
45.0							
			46				
47.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			18.7	130	1400
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 23'0"

At Completion: None

Boring No. 13

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 14 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/11/2018

Completed: 5/11/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33	Crushed STONE (4")			
	LS	3 2 3			22.2	121	
2.5				Plastic Moist Dark Brown Clay With Some Silt, Sand Seams & Trace Of Glass-FILL			
	LS	2 3 5	4.5		23.3	125	
5.0				Firm Moist Brown Oxidized CLAY With Some Silt			
	LS	2 3 3			23.8	122	3460
7.5			8				
	LS	6 10 16		Extremely Stiff Moist Brown Oxidized CLAY With Some Silt	14.2	132	11012
10.0							
12.5			12.5				
	LS	3 6 8		Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel	12.7	135	5770
15.0							
17.5							
	LS	3 5 6			13.3	132	4200
20.0			21				
22.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 4 6			16.3	135	2640

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 38'0"

At Completion: None

Boring No. 14

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 14 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/11/2018

Completed: 5/11/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	3 4 5			14.5	136	5710
30.0							
32.5							
	LS	2 4 6			15.7	131	3210
35.0							
37.5							
	LS	2 3 4		Wet Sand Seam At 38'0"	15.9	132	2220
40.0							
42.5			43				
	LS	2 4 5		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	15.9	128	1150
45.0							
47.5			48				
	LS	3 6 11		Stiff Moist Gray CLAY With Some Silt, Trace Of Sand, Gravel & Sand Seams	18.1	144	5110
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 38'0"

At Completion: None

Boring No. 14

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 15 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.42	ASPHALT (5")			
	LS	6 7			9.1	131	
2.5		10	3	Medium Compact Moist Brown Sand With Trace Of Gravel-FILL			
	LS	3 3		Loose Moist Brown Sand-FILL	8.7	129	
5.0		4					
	LS	2 2			13.6	118	
7.5		3					
	LS	2 4			4.8	127	
10.0		5					
12.5			13				
	LS	3 2		Loose Wet Brown Sand-FILL	12.6	131	
15.0		2					
			17				
17.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 5					
20.0		7					
22.5							
	LS	4 7			12.3	139	3870
		9					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 13', 28' & 48'

At Completion: 9'5"

Boring No. 15

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 15 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	5 9 10			10.1	143	3210
30.0			32				
32.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 4 5			15.7	129	1980
35.0							
37.5							
	LS	3 4 5			14.7	136	1650
40.0							
42.5							
	LS	2 4 5			15.1	137	
45.0							
47.5			48				
	LS	7 14 20		Compact Wet Gray SAND With Trace Of Gravel	10.1	141	
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 13', 28' & 48'

At Completion: 9'5"

Boring No. 15

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 16 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/14/2018

Completed: 5/14/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.46				
			.83	ASPHALT (5 1/2")			
	LS	2			14.2	136	4780
		4					
2.5		4		Moist Dark Gray Clay With Some Silt-FILL (4 1/2")			
			3				
	LS	2		Stiff Moist Brown Oxidized CLAY With Some Silt & Sand Seams-Possible Fill	14.4	127	740
		3					
5.0		4					
			5.5				
				Soft Moist Brown Oxidized CLAY With Some Silt & Sand Seams-Possible Fill			
	LS	4			15.6	132	6010
		7					
7.5		11		Stiff Moist Brown Oxidized CLAY With Some Silt			
	LS	5			18.1	130	7330
		8					
10.0		12					
			12.5				
12.5				Extremely Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	4			12.4	138	9560
		6					
15.0		8					
			16				
				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
17.5							
	LS	3			12.4	136	6180
		5					
20.0		7					
22.5							
	LS	3			14.3	134	4940
		5					
		6					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 16

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 16 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/14/2018

Completed: 5/14/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			26				
27.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 4 5			14.9	137	2970
30.0							
32.5			33				
	LS	2 4 5		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	15.9	134	1980
35.0							
			37				
37.5				Soft Moist Gray CLAY With Some Silt, Trace Of Gravel & Sand Seams			
	LS	2 3 4			17.4	130	740
40.0							
			41				
42.5				Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Sand Seams			
	LS	2 3 4			16.1	128	1150
45.0							
47.5							
	LS	2 5 5			18.6	126	1320
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 16

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 17 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.21	ASPHALT (2 1/2")			
	LS	4 3 3			18.1	108	
2.5			3	Plastic Moist Dark Gray Clay With Some Silt, Trace Of Crushed Concrete & Brick-FILL			
	LS	3 4 6		Stiff Moist Brown Oxidized CLAY With Some Silt & Sand Seams	11.2	136	4450
5.0			5.5				
	LS	6 9 12		Stiff Moist Brown Oxidized CLAY With Some Silt	12.1	137	7660
7.5							
	LS	7 15 17	9		13.3	135	4040
10.0				Stiff Moist Brown Oxidized CLAY With Some Silt & Sand Seams			
12.5			12.5				
	LS	10 7 10		Medium Compact Moist Gray SAND With Trace Of Gravel & Wet Seam	29.3	115	
15.0			16				
17.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 5 7			14.1	138	4610
20.0			21				
22.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 5 7			14.8	132	2640

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 14'6"

At Completion: 15'0"

Boring No. 17

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 17 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5							
	LS	3 4 6			14.8	136	3130
30.0							
32.5			33				
	LS	3 4 5		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	15.4	136	1480
35.0							
37.5							
	LS	2 4 5			17.7	134	1400
40.0							
			42				
42.5				Soft Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 3			16.0	134	990
45.0							
			46				
47.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			17.0	129	1480
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 14'6"

At Completion: 15'0"

Boring No. 17

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 18 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.21				
			.58	ASPHALT (2 1/2")			
	LS	7					
		8					
2.5		8	3	Moist Dark Gray Clayey Sand With Some Gravel-FILL (4 1/2")			
	LS	4		Medium Compact Moist Brown Sand-FILL			
		3					
5.0		3		Loose Moist Brown Silty Fine Sand With Trace Of Gravel-FILL			
	LS	4					
		4					
7.5		5					
	LS	4					
		4					
10.0		4					
12.5			13				
	LS	1		Loose Wet Brown SAND			
		2	14.5				
15.0		4		Bottom of Borehole at 14.5'			
17.5							
20.0							
22.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered:

At Completion:

Boring No. 18

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 19 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.33				
	LS	7	1.5	ASPHALT (4")	17.5	132	
		4					
2.5		3		Medium Compact Moist Brown SAND With Trace Of Crushed Concrete			
	LS	2			17.2	132	
		3		Plastic Moist Dark Brown Clay With Some Silt, Trace Of Concrete & Brick-FILL			
5.0		4					
			5.5				
	LS	2	7	Extremely Stiff Moist Brown Oxidized CLAY With Some Silt LL=26 PL=15 PI=11	16.4	129	10550
		3					
7.5		9					
	LS	7		Extremely Stiff Moist Brown CLAY With Some Silt	13.4	132	14670
		13					
10.0		19					
			12.5				
12.5							
	LS	4		Extremely Stiff Moist Gray Oxidized CLAY With Some Silt & Trace Of Gravel	13.5	133	8410
		7					
15.0		9					
			17				
17.5							
				Firm Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seam			
	LS	3			12.5	136	3710
		5					
20.0		5					
22.5							
	LS	3			15.0	135	2470
		4					
		5					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 19'0"

At Completion: None

Boring No. 19

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 19 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5	LS	2 3 3	30		15.4	136	
30.0				Bottom of Borehole at 30'			
32.5							
35.0							
37.5							
40.0							
42.5							
45.0							
47.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 19'0"

At Completion: None

Boring No. 19

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 20 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.38				
	LS	6 6/2"	1.6	ASPHALT (4 1/2")	13.0		
2.5			2.7	Medium Compact Moist Brown SAND & Crushed Stone			
	LS	5 8 12		Medium Compact Moist Concrete & Brick-FILL	14.8	129	15660
5.0			6	Extremely Stiff Moist Brown Oxidized CLAY With Some Silt			
	LS	5 11 17	8	Hard Moist Brown Oxidized CLAY With Some Silt	13.3	135	17390
7.5							
	LS	5 13 21		Extremely Stiff Moist Brown CLAY With Some Silt	14.1	131	14670
10.0							
			11.5				
12.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	5 7 9			14.0	133	4530
15.0			16				
17.5				Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Wet Sand Seam			
	LS	3 5 7			14.6	135	
20.0							
22.5							
	LS	4 5 5			17.2	132	

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 21'0"

At Completion: None

Boring No. 20

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 20 **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/8/2018

Completed: 5/8/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5	LS	2 4 4	30		17.0	127	1980
30.0				Bottom of Borehole at 30'			
32.5							
35.0							
37.5							
40.0							
42.5							
45.0							
47.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 21'0"

At Completion: None

Boring No. 20

Testing Engineers & Consultants, Inc.

1343 Rochester Road - PO Box 249 - Troy, Michigan - 48099-0249
(248) 588-6200 or (313) T-E-S-T-I-N-G
Fax (248) 588-6232

Boring No.: 18A **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.42	Crushed Stone-FILL (5")			
	LS	4 4 5			21.6	100	
2.5			2.7	Loose Moist Brown Sand With Clay Layers-FILL			
	LS	2 3 4	4.5	Firm Moist Dark Gray Clay With Some Silt & Trace Of Brick-FILL	17.0	124	2800
5.0				Firm Moist Brown Oxidized CLAY With Some Silt			
	LS	4 7 11			12.5	134	7090
7.5			8				
	LS	5 12 19		Stiff Moist Brown Oxidized CLAY With Some Silt	13.0	129	7830
10.0							
12.5			12.5				
	LS	4 7 9		Stiff Moist Brown CLAY With Some Silt	12.8	132	5030
15.0			16				
17.5				Firm Moist Gray CLAY With Some Silt, Trace Of Gravel & Sand Seams			
	LS	3 6 8			13.8	137	3130
20.0							
22.5							
	LS	3 5 6			14.9	134	2800

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 18A

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Fax (248) 588-6232

Boring No.: 18A **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Hollow Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 5/15/2018

Completed: 5/15/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5			28				
	LS	4 5 6		Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Sand Seams	13.2	136	1650
30.0			32				
32.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 3 4			17.4	133	1810
35.0							
37.5			38				
	LS	2 4 4		Soft Moist Gray CLAY With Some Silt & Trace Of Gravel	14.6	129	820
40.0							
42.5							
	LS	2 3 3			47.8	105	990
45.0							
			47				
47.5				Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	2 4 5			13.7	134	1480
			50	Bottom of Borehole at 50'			

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: None

At Completion: None

Boring No. 18A

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Fax (248) 588-6232

Boring No.: 19A **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 6/6/2018

Completed: 6/6/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.63	ASPHALT (7 1/2")			
	LS	11 12			9.1	110	
2.5		24	2.7	Compact Moist Crushed Concrete, Trace Of Brick & Asphalt-FILL			
	LS	3 5		Stiff Moist Brown Oxidized CLAY With Some Silt, Wet Sand Seam & Petroleum Odor	18.0	131	6180
5.0		6					
	LS	3 6	6.5		14.9	135	5690
7.5		10		Stiff Moist Brown Oxidized CLAY With Some Silt & Trace Of Gravel			
	LS	4 11			9.6	140	4120
10.0		17					
12.5			12.5				
	LS	3 6		Firm Moist Gray CLAY With Some Silt & Trace Of Gravel	12.3	134	2800
15.0		10					
			17				
17.5				Plastic Moist Gray CLAY With Some Silt, Trace Of Gravel & Sand Seams			
	LS	3 3			14.6	129	1320
20.0		4					
22.5							
	LS	2 3			16.8	131	1480
		5					

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 6'0"

At Completion: None

Boring No. 19A

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Fax (248) 588-6232

Boring No.: 19A **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 6/6/2018

Completed: 6/6/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5	LS	2 3 4	30		15.2	134	1320
30.0				Bottom of Borehole at 30'			
32.5							
35.0							
37.5							
40.0							
42.5							
45.0							
47.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 6'0"

At Completion: None

Boring No. 19A

Testing Engineers & Consultants, Inc.

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Fax (248) 588-6232

Boring No.: 20A **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 6/6/2018

Completed: 6/6/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
			.58				
			1.2	ASPHALT (7")			
	LS	5 7 7			24.2	120	1980
2.5			3	Moist Brown Sand With Trace Of Gravel-FILL			
	LS	2 3 3		Plastic Moist Brown & Dark Gray Clay With Some Silt & Trace Of Brick-FILL	16.2	136	2310
5.0			5.5				
	LS	2 4 6		Firm Moist Variegated CLAY With Some Silt & Petroleum Odor	16.3	127	2060
7.5			8	Firm Moist Variegated CLAY With Some Silt			
	LS	3 3 2	9.5	Loose Wet Gray Clayey SAND	15.5	129	9390
10.0			11	Plastic Moist Gray Oxidized CLAY With Some Silt			
12.5				Stiff Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	5 7 9			13.4	133	
15.0			17				
17.5				Firm Moist Gray CLAY With Some Silt & Trace Of Gravel			
	LS	3 4 6			14.1	136	2060
20.0							
22.5			23				
	LS	3 4 5		Plastic Moist Gray CLAY With Some Silt & Trace Of Gravel	17.0	127	1240

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 8'0"

At Completion: 7'10"

Boring No. 20A

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Fax (248) 588-6232

Boring No.: 20A **Job No.:** 58871

Client: Wayne State University

Type of Rig: Truck

Drilling Method: Solid Stem Augers

Ground Surface Elevation:

Project: Proposed Hillberry Gateway

Location: Detroit, Michigan

Drilled By: I. Mickle

Started: 6/6/2018

Completed: 6/6/2018

Depth (ft)	Sample Type	N	Strata Change	Soil Classification	w	d	qu
27.5	LS	3 4 4	30		16.2	131	1150
30.0				Bottom of Borehole at 30'			
32.5							
35.0							
37.5							
40.0							
42.5							
45.0							
47.5							

"N" - Standard Penetration Resistance
SS - 2").D. Split Spoon Sample
LS - Sectional Liner Sample
ST - Shelby Tube Sample
AS - Auger Sample

w - H2O, % of dry weight
d - Bulk Density, pcf
qu - Unconfined Compression, psf
DP - Direct Push
RC - Rock Core

Water Encountered: 8'0"

At Completion: 7'10"

Boring No. 20A

Testing Engineers and Consultants, Inc.

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MECHANICAL ANALYSIS TEST REPORT

PROJECT: Proposed Hillberry Gateway
Wayne State University
LOCATION: Detroit, Michigan
CLIENT: Wayne State University

TEC REPORT NUMBER: 58871

DATE: Tuesday, June 19, 2018

Material Description: Brown Fine Sand & Gravel With Trace of Silt & Clay

Date Sampled: 5/9/18

Sample Source / Depth: B-6 @ 2.5'

Sampled By: I. Mickle

Sample Location:

TEC Lab Sample Number:

Intended Use:

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"		0.0	100.0	
1"	38.9	28.9	71.1	
3/4"	38.9	28.9	71.1	
1/2"	56.4	41.9	58.1	
3/8"	60.9	45.2	54.8	
#4	66.6	49.5	50.5	
#10	74.0	55.0	45.0	
#20	81.3	60.4	39.6	
#30	84.1	62.5	37.5	
#40	88.5	65.8	34.2	
#100	108.5	80.6	19.4	
#200	121.5	90.3	9.7	
Total Sample	134.6	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	134.6
Weight After Wash (g)	121.5
Loss in Weight (g)	13.1
Loss by Wash (%)	9.7%

Tested By: R. Pruitt

Reviewed By: G. Putt

Test Method: ASTM C117/C136 ____ AASHTO T11/T27 ____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249
248-588-6200 or 313 T-E-S-T-I-N-G
Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Proposed Hillberry Gateway
Wayne State University
LOCATION: Detroit, Michigan
CLIENT: Wayne State University

TEC REPORT NUMBER: 58871

DATE: Tuesday, June 19, 2018

Material Description: Brown Fine Sand With Some Silt & Trace of Gravel

Date Sampled: 5/14/18

Sample Source / Depth: B-12 @ 7.5'

Sampled By: I. Mickle

Sample Location:

TEC Lab Sample Number:

Intended Use:

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"				
3/4"				
1/2"		0.0	100.0	
3/8"	1.3	0.5	99.5	
#4	8.7	3.3	96.7	
#10	18.9	7.1	92.9	
#20	37.9	14.2	85.8	
#30	50.7	19.0	81.0	
#40	73.5	27.5	72.5	
#100	159.5	59.8	40.2	
#200	228.1	85.5	14.5	
Total Sample	266.9	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	266.9
Weight After Wash (g)	228.1
Loss in Weight (g)	38.8
Loss by Wash (%)	14.5%

Tested By: R. Pruitt

Reviewed By: G. Putt

Test Method: ASTM C117/C136 ____ AASHTO T11/T27 ____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers and Consultants, Inc.

1343 Rochester Road PO Box 249 Troy, Michigan 48099-0249
248-588-6200 or 313 T-E-S-T-I-N-G
Fax 248-588-6232

MECHANICAL ANALYSIS TEST REPORT

PROJECT: Proposed Hillberry Gateway
Wayne State University
LOCATION: Detroit, Michigan
CLIENT: Wayne State University

TEC REPORT NUMBER: 58871

DATE: Tuesday, June 19, 2018

Material Description: Brown Fine Sand With Trace of Gravel

Date Sampled: 5/15/18

Sample Source / Depth: B-18 @ 5'

Sampled By: I. Mickle

Sample Location:

TEC Lab Sample Number:

Intended Use:

Remarks:

AGGREGATE ANALYSIS

Sieve No.	Total Weight Retained	Total Percent Retained	Total Percent Passing	Specification Range
3"				
2-1/2"				
1-1/2"				
1"				
3/4"		0.0	100.0	
1/2"	1.6	0.6	99.4	
3/8"	5.2	2.1	97.9	
#4	13.7	5.4	94.6	
#10	26.4	10.4	89.6	
#20	40.9	16.1	83.9	
#30	48.1	19.0	81.0	
#40	56.2	22.2	77.8	
#100	123.9	48.9	51.1	
#200	179.8	71.0	29.0	
Total Sample	253.4	100.0	0.0	

SAMPLE DATA

Initial Sample Weight (g)	253.4
Weight After Wash (g)	179.8
Loss in Weight (g)	73.6
Loss by Wash (%)	29.0%

Tested By: R. Pruitt

Reviewed By: G. Putt

Test Method: ASTM C117/C136 ____ AASHTO T11/T27 ____ MTM 108/109 X

Remarks:

Respectfully Submitted:
Testing Engineers and Consultants, Inc.

Testing Engineers & Consultants, Inc.

Mr. Marc Ledent
Wayne State University
June 20, 2018

TEC Report: 58871

SOIL DESCRIPTIONS

In order to provide uniformity throughout our projects, the following nomenclature has been adopted to describe soil characteristics:

CONSISTENCY AND RELATIVE DENSITY

COHESIVE SOILS			GRANULAR SOILS	
UNCONFINED COMPRESSIVE STRENGTH, PSF	**"N" VALUES**	**CONSISTENCY**	**"N" VALUES**	**RELATIVE DENSITY**
Below 500	0 – 2	Very Soft	0 – 4	Very Loose
500 – 1,000	3 – 4	Soft	5 – 10	Loose
1,000 – 2,000	5 – 8	Plastic	11 – 30	Medium Compact
2,000 – 4,000	9 – 15	Firm	31 – 50	Compact
4,000 – 8,000	16 – 30	Stiff	50+	Dense
8,000 – 16,000	31 – 50	Ex. Stiff		
Over 16,000	51+	Hard		

Material Types By Particle Size	**ASTM D2487**
BOULDERS	Stones Over 12" In Diameter
COBBLES	Stones 3" To 12" In Diameter
GRAVEL	#4 To 3" Diameter
COARSE SAND	#10 To #4 Sieves
MEDIUM SAND	#40 To #10 Sieves

Mr. Marc Ledent
Wayne State University
June 20, 2018

TEC Report: 58871

SOIL DESCRIPTIONS (Cont'd)

Material Types By Particle Size	**ASTM D2487**
FINE SAND	#200 To #40 Sieves
SILT	Minus #200 Sieve Material, Fairly Non-Plastic, Falls Below "A"-Line
CLAY	Minus #200 Sieve Material Plastic Material That Has A Tendency To Stick Together, Can Be Rolled Into Fine Rods When Moistened; Falls Above "A"-Line
PEAT	Black Organic Material Containing Partially Decayed Vegetable Matter
MARL	Fresh Water Deposits Of Calcium Carbonate, Often Containing Percentages Of Peat, Clay & Fine Sand
SWAMP BOTTOM DEPOSITS	Mixtures Of Peat, Marl, Vegetation & Fine Sand Containing Large Amounts Of Decayable Organic Material

LEED v4 for BD+C: New Construction and Major Renovation

Project Checklist

Project Name: WSU Hilberry Gateway Project
Date: 2/1/2019

Responsibility	Y	?	N				
		0	1	Credit	Integrative Process		1
	15	1	16	**Location and Transportation**			**16**
n/A			16	Credit	LEED for Neighborhood Development Location		16
HAA Site	1			Credit	Sensitive Land Protection		1
HAA Site	2			Credit	High Priority Site		2
HAA Site	5			Credit	Surrounding Density and Diverse Uses		5
HAA Site	5			Credit	Access to Quality Transit		5
HAA Site	1			Credit	Bicycle Facilities		1
HAA Site	1			Credit	Reduced Parking Footprint		1
WSU		1		Credit	Green Vehicles		1
	6	1	3	**Sustainable Sites**			**10**
	Y			Prereq	Construction Activity Pollution Prevention		Required
n/a			1	Credit	Site Assessment		1
n/a			2	Credit	Site Development - Protect or Restore Habitat		2
HAA Site		1		Credit	Open Space		1
SD	3			Credit	Rainwater Management		3
HAA	2			Credit	Heat Island Reduction		2
HGA-MEP	1			Credit	Light Pollution Reduction		1
	2	5	4	**Water Efficiency**			**11**
HAA Site	Y			Prereq	Outdoor Water Use Reduction		Required
HGA-MEP	Y			Prereq	Indoor Water Use Reduction		Required
HGA-MEP	Y			Prereq	Building-Level Water Metering		Required
HAA Site		2		Credit	Outdoor Water Use Reduction		2
HGA-MEP	1	2	3	Credit	Indoor Water Use Reduction		6
HGA-MEP		1	1	Credit	Cooling Tower Water Use		2
HGA-MEP	1			Credit	Water Metering		1
	11	2	19	**Energy and Atmosphere**			**33**
WSU	Y			Prereq	Fundamental Commissioning and Verification		Required
HGA-MEP	Y			Prereq	Minimum Energy Performance		Required
HGA-MEP	Y			Prereq	Building-Level Energy Metering		Required
HGA-MEP	Y			Prereq	Fundamental Refrigerant Management		Required
WSU	6			Credit	Enhanced Commissioning		6
HGA-MEP	2		16	Credit	Optimize Energy Performance		18
HGA-MEP		1		Credit	Advanced Energy Metering		1
HGA-MEP		1		Credit	Demand Response		2
n/a			3	Credit	Renewable Energy Production		3
HGA-MEP	1			Credit	Enhanced Refrigerant Management		1
WSU	2			Credit	Green Power and Carbon Offsets		2

Responsibility	Y	?	N				
	4	4	5	**Materials and Resources**			**13**
HAA	Y			Prereq	Storage and Collection of Recyclables		Required
Walbridge	Y			Prereq	Construction and Demolition Waste Management Planning		Required
n/a			5	Credit	Building Life-Cycle Impact Reduction		5
Walbridge	2			Credit	Building Product Disclosure and Optimization - Environmental Product Declarations		2
Walbridge		2		Credit	Building Product Disclosure and Optimization - Sourcing of Raw Materials		2
Walbridge		2		Credit	Building Product Disclosure and Optimization - Material Ingredients		2
Walbridge	2			Credit	Construction and Demolition Waste Management		2
	5	3	5	**Indoor Environmental Quality**			**16**
HGA-MEP	Y			Prereq	Minimum Indoor Air Quality Performance		Required
WSU	Y			Prereq	Environmental Tobacco Smoke Control		Required
HGA-MEP		1		Credit	Enhanced Indoor Air Quality Strategies		2
HAA	1			Credit	Low-Emitting Materials		3
Walbridge	1			Credit	Construction Indoor Air Quality Management Plan		1
HGA-MEP	2			Credit	Indoor Air Quality Assessment		2
HGA-MEP	1			Credit	Thermal Comfort		1
HGA-MEP		2		Credit	Interior Lighting		2
n/a			3	Credit	Daylight		3
n/a			1	Credit	Quality Views		1
n/a			1	Credit	Acoustic Performance		1
	2	0	0	**Innovation**			**6**
Green power	1			Credit	Innovation		5
	1			Credit	LEED Accredited Professional		1
	3	0	1	**Regional Priority**			**4**
	1			Credit	Regional Priority: Specific Credit		1
	1			Credit	Regional Priority: Specific Credit		1
	1			Credit	Regional Priority: Specific Credit		1
			1	Credit	Regional Priority: Specific Credit		1
	48	16	54	**TOTALS**		Possible Points:	**110**

Certified: 40 to 49 points, **Silver:** 50 to 59 points, **Gold:** 60 to 79 points, **Platinum:** 80 to 110