PROJECT MANUAL

PROJECT:

NEW SMITH MIDDLE SCHOOL
GROUND IMPROVEMENTS

OWNER:

TROY SCHOOL DISTRICT
4400 Livernois Road
Troy, Michigan 48098

TMP PROJECT NO.: 22102
BID PACKAGE NO.: 03E

DATE: March 26, 2024

ISSUED FOR: Construction Documents

ARCHITECT

TMP ARCHITECTURE, INC.
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CONSTRUCTION MANAGER

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Southfield, Michigan 48034

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CIVIL ENGINEER CONSULTANT

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STRUCTURAL ENGINEER CONSULTANT

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Not Used

APPENDIXES

APPENDIX 1

Geotechnical Investigation Report – Smith Middle School **CD**

Dated March 12, 2024

END OF SECTION

SECTION 00 0115 - LIST OF DRAWINGS

LIST OF DRAWINGS

1.01 GENERAL

A. Drawings: Drawings consist of the Contract Drawings including drawings listed on the TITLE SHEET page of the separately bound drawing set titled NEW SMITH MIDDLE SCHOOL, dated 03-26-2024 and any subsequent Addenda and Contract modifications which may occur.

END OF SECTION

SECTION 00 3100 - AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.01 SUMMARY

A. Project Manual uses Appendixes to organize information that does not conform to 3-part specification formatting as defined by the Construction Specifications Institute (CSI).

1. Appendix information does not have a six-digit number or title as defined by CSI's MasterFormat.

1.02 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders as Information Available to Bidders, but will not be part of Contract Documents, as follows:

1. Geotechnical Report: Entitled Smith Middle School, dated March 12, 2024.
   a. Copy is attached to Project Manual in Appendix 1.

1.03 MISCELLANEOUS INFORMATION

A. Miscellaneous information relating to the project is available in the Appendixes as follows:

1. Includes information issued as an Appendix by Addendum or other subsequent Contract modification.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION -- NOT USED

END OF SECTION

SECTION 00 8200.02 - TMP ELECTRONIC FILES RELEASE FORM (FREE)

RE: AUTHORIZATION FORM FOR CAD FILE TRANSFERS
PROJECT NAME: _____
TMP PROJECT NO. : _____ BID PACK NO. _____

Dear Sir/Madam:

Per your request, TMP Architecture, Inc. will electronically transmit requested CAD files upon receipt of an original signed copy of this form which states the conditions of agreement and the receipt of the required compensation fee.

1. By acceptance it is understood and agreed that the data and medium being supplied is to be used only for the project referenced.
2. It is further understood and agreed that the undersigned will hold TMP Architecture, Inc. and its Consultants harmless and indemnify TMP Architecture, Inc. and its Consultants from all claims, liabilities, losses, and so forth, including attorney's fees arising out of the use or misuse of the transferred files.
3. It is understood and agreed that the items transmitted are prepared from CAD files current at the time of preparation. All files are [AutoCAD version 2014 dwg files].
4. This information does not waive the need to verify and review current field conditions and the status of Addenda and/or Bulletin documentation.
5. As a record of information to be transmitted, TMP Architecture, Inc. will prepare a duplicate electronic back-up for its record.
6. Compensation for providing this material will be as follows: **$0.00 / No Charge**
7. A signed copy of this form must be provided before files will be released. Please remit to [Construction Manager] to be forwarded to the Project Manager at TMP Architecture, Inc. and allow five working days for processing.

REQUESTED DRAWINGS: _____
_____
_____

FIRM REQUESTING FILES:

Company: _____
Address: _____
Signed:_____Date: _____
Printed Name / Title: _____
Email: _____

TO BE COMPLETED BY TMP ARCHITECTURE, INC.

Released(signed by): _____TMP Architecture, Inc.
Printed Name/Title:_____ Date: _____

END OF SECTION

SECTION 00 8200 - AVAILABILITY OF ELECTRONIC FILES

AVAILABILITY OF ELECTRONIC FILES

1.01 POLICY

A. As a service to Contractor, subcontractors, vendors, material suppliers and others needing electronic copies of Drawings, the Architect will provide CAD files electronically in accordance with the following policy:

1. By acceptance it is understood and agreed that the data and medium being supplied is to be used only for the project referenced.
2. It is further understood and agreed that the undersigned will hold TMP Architecture, Inc. and its Consultants harmless and indemnify TMP Architecture, Inc. and its Consultants from all claims, liabilities, losses, and so forth, including attorney's fees arising out of the use or misuse of the transferred files.
3. It is understood and agreed that the files transmitted are prepared from CAD files current at the time of preparation. All files are AutoCAD version 2014 dwg files.
4. This information does not waive the need to verify and review current field conditions and the status of Addenda and/or Bulletin documentation.
5. As a record of information to be transmitted, TMP Architecture, Inc. will prepare a duplicate electronic back-up for its record.
6. Compensation Fee for providing this material will be as follows: $0.00 / No Charge.
7. A signed copy of the Release Form must be provided before files will be released.

1.02 REQUEST PROCEDURE

A. To receive Drawing CAD files the Release Form must be completed in full and submitted to the Construction Manager to be forwarded to the Project Manager at TMP Architecture, Inc.

1. A signed copy of the Release Form must be submitted.
   a. Faxed or emailed copies will be accepted.
2. Upon remittance of the signed Release Form , allow five working days for processing.
3. Transmission of Drawings will be provided electronically .

1.03 RELEASE FORM

A. Release Form is located immediately after this Section. Refer to Section 00 8200.02 Electronic Files Release Form.

END OF SECTION

SECTION 01 2500.01 - TMP SUBSTITUTION REQUEST FORM

SUBSTITUTION REQUEST NUMBER: _____ DATE SUBMITTED: _____
TMP PROJECT NUMBER _____PROJECT NAME: _____

SPECIFIED ITEM

SPECIFICATION TITLE:_____
SPECIFICATION SECTION_____SPECIFICATION ARTICLE/PARAGRAPH: _____
SPECIFIED PRODUCT / DESCRIPTION: _____
SPECIFIED MANUFACTURER: _____
SPECIFIED PRODUCT / MODEL: _____
REASON SPECIFIED ITEM CANNOT BE PROVIDED: _____
_____
_____

PROPOSED SUBSTITUTION

DESCRIPTION OF PROPOSED SUBSTITUTION: _____
_____
PROPOSED MANUFACTURER: _____
ADDRESS: _____
WEBSITE: _____
PRODUCT / MODEL: _____
YEARS PRODUCT/MODEL HAS BEEN MANUFACTURED: _____
DIFFERENCES BETWEEN PROPOSED SUBSTITUTION AND SPECIFIED ITEM: _____
_____
_____
_____
_____
WILL PROPOSED SUBSTITUTION AFFECT OTHER PARTS OF WORK? ☐ NO ☐ YES
IF YES, EXPLAIN HOW: _____
_____
_____
_____
HOW WILL SUBSTITUTION BENEFIT THE OWNER: ☐ COST SAVINGS ☐ TIME SAVINGS ☐ OTHER
PROVIDE SPECIFIC DETAILS: _____
_____
_____
_____

THE FOLLOWING INFORMATION IS REQUIRED; CHECK TO INDICATE INFORMATION IS ATTACHED. (REQUEST WILL BE REJECTED WITHOUT REQUIRED DATA)

32.01

A. ☐ List of references where proposed product has been installed; include address, owner, architect, and date installed.
B. ☐ Product data sheets.
C. ☐ Applicable certificates and test reports.

D. ☐ Comparative Data: Provide point-by-point, side-by-side comparison of specified product and proposed substitution addressing essential attributes specified.

INDICATE WHICH OF THE FOLLOWING VOLUNTARY INFORMATION IS ATTACHED, IF ANY:
☐ DRAWINGS.
☐ SAMPLES.
☐ OTHER ITEMS: _____

SIGNATURE

THE UNDERSIGNED CERTIFIES:

The proposed substitution meets or exceeds the quality level of the specified product, equipment, assembly, or system.
To provide the same warranty for the substitution as for the specified product.
Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
The proposed substitution will have no adverse effects on other work.
The proposed substitution will not affect project schedule.
Waives claims for additional costs or time extension that may subsequently become apparent.

CONTRACTOR / COMPANY: _____
SIGNED BY: _____PRINTED NAME: _____
TITLE: _____
ADDRESS: _____
EMAIL: _____ PHONE: _____

ARCHITECT'S RESPONSE

A. During bidding, Architect will approve substitution requests by issuing an Addendum. Substitutions not approved by addendum are rejected.
B. During construction, Architect will notify Contractor in writing (see below) of decision to accept or reject request, and incorporate the substitution into the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments as provided for in the Conditions of the Contract.

☐ SUBSTITUTION APPROVED - PROVIDE SUBMITTALS PER SECTION 01 3000 AND RESPECTIVE SECTION FOR WHICH SUBSTITUTION WAS MADE.
☐ SUBSTITUTION REJECTED - PROVIDE SPECIFIED MATERIALS.

SIGNED BY: _____PRINTED NAME: _____
ARCHITECT'S COMMENTS: _____
_____
_____

END OF SECTION

SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

A. Section 01 2500.01 - TMP Substitution Request Form.

1.03 DEFINITIONS

A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
   1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
   2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
   2. Agrees to provide the same warranty for the substitution as for the specified product.
   3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
   4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
   5. Waives claims for additional costs or time extension that may subsequently become apparent.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
   1. Note explicitly any non-compliant characteristics.

C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
   1. Forms included in the Project Manual are adequate for this purpose, and must be used.

D. Limit each request to a single proposed substitution item.
   1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

A. Submittal Time Restrictions:

B. Substitution Request Form: TMP Substitution Request Form must be completed and provided at the beginning of each substitution request.
   1. Refer to Section 01 2500.01 - TMP Substitution Request Form.
   2. Submittals without a completed TMP Substitution Request Form will not be acknowledged, reviewed, or returned. Use only this form; other forms of submission are unacceptable.

C. Instructions to Bidders specifies time restrictions for submitting requests for substitutions during the bidding period.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

A. Substitution Request Form: TMP Substitution Request Form must be completed and provided at the beginning of each substitution request.
   1. Refer to Section 01 2500.01 - TMP Substitution Request Form.

2. Submittals without a completed TMP Substitution Request Form will not be acknowledged, reviewed, or returned. Use only this form; other forms of submission are unacceptable.

B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

C. Submit request for Substitution for Convenience within 14 days of discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.

1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
3. Bear the costs engendered by proposed substitution of:
   a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
   b. Other unanticipated project considerations.

D. Substitutions will not be considered under one or more of the following circumstances:

1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
2. Without a separate written request.

3.04 RESOLUTION

A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.

B. Architect will notify Contractor in writing of decision to accept or reject request.

1. During construction, Architect's decision following review of proposed substitution will be noted on the submitted form.
2. During bidding, Architect will approve substitution requests by issuing an Addendum. Substitutions not approved by addendum are rejected.

3.05 ACCEPTANCE

A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

A. See Section 01 7800 - Closeout Submittals, for closeout submittals.

END OF SECTION

SUBMITTAL AND SAMPLE TRANSMITTAL FORM

01 3000.01

CONST. MANAGER / CONTRACTOR	PROJECT	TMP PROJECT NO.	DATE SUBMITTED	SUBMITTAL NO.
Name and Address:	Title:	**22102 - BP03A**		
	Troy Smith Middle School	* ACTION CODES		Initial Submittal ☐
		R Reviewed – No Exceptions Taken		Resubmittal ☐
Email:	Location:	RN Reviewed with Corrections Noted		REVIEWED BY
	5835 Donaldson Troy, Michigan	RR Revise and Resubmit		TMP ☐
Phone:		X Not Approved – Resubmit		Consultant ☐
		NA No Action Taken – Not Reviewed		Reviewer:

SPECIFICATION SECTION NO.	SUBCONTRACTOR / MANUFACTURER	ITEM DESCRIPTION	NO. OF SAMPLES	NO. OF SAMPLES RETURNED	ACTION CODE *	DATE REVIEWED	DATE RETURNED
Transmittal shall be for one specification section only; do not submit items from multiple sections under the same transmittal. Multi-section submittals will be returned; stamped "X - Not Approved - Resubmit"							

Submittal Stamps may be placed on subsequent blank page.

CONTRACTOR COMMENTS	ARCHITECT COMMENTS	The undersigned certifies that the above submitted items have been reviewed in detail and are correct and in strict conformance with the Contract Documents except as otherwise noted. NOTE: Approval of items submitted does not relieve Contractor from complying with all requirements of the Contract Documents.
		CONTRACTOR NAME
		SIGNATURE

This page intentionally left blank for Submittal Stamps

SECTION 01 3000 - ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals for review, information, and project closeout.
B. Number of copies of submittals.
C. Requests for Interpretation (RFI) procedures.
D. Submittal procedures.

1.02 RELATED REQUIREMENTS

A. Section 01 3000.01 - TMP Submittal and Sample Transmittal Form.

1.03 REFERENCE STANDARDS

A. AIA G716 - Request for Information; 2004.
B. CSI/CSC Form 13.2A - Request for Information; Current Edition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:
   1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
   2. A resolution to an issue which has arisen due to field conditions and affects design intent.
B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
   1. Prepare a separate RFI for each specific item.
      a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
      b. Do not forward requests which solely require internal coordination between subcontractors.
   2. Prepare in a format and with content acceptable to Architect. Use one of the following:
      a. Use AIA G716 - Request for Information .
      b. Use CSI/CSC Form 13.2A - Request for Interpretation.
      c. Other format acceptable to Architect.
   3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
   1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.
   2. Improper RFIs: Requests not prepared in conformance to requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response and may include an explanatory notation.
   3. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, the Contract Documents, with no additional input required to clarify the question. They will be returned without a response and may include an explanatory notation.
      a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

1. Official Project name and number, and any additional required identifiers established in Contract Documents.
2. Discrete and consecutive RFI number, and descriptive subject/title.
3. Issue date, and requested reply date.
4. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
5. Annotations: Field dimensions and/or description of conditions which have engendered the request.
6. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.

E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.

F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
2. Note dates of when each request is made, and when a response is received.
3. Identify and include improper or frivolous RFIs.

G. Review Time: Architect will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 3:00 PM will be considered as having been received on the following regular working day.
1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.

H. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.
4. Notify Architect within seven calendar days if an additional or corrected response is required by submitting an amended version of the original RFI, identified as specified above.

3.02 SUBMITTAL SCHEDULE

A. Submit to Architect for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule.
2. Coordinate with Contractor's construction schedule and schedule of values.
3. Format schedule to allow tracking of status of submittals throughout duration of construction.
4. Arrange information to include scheduled date for initial submittal, specification number and title, description of item of work covered, and role and name of subcontractor.
5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.03 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:
   1. Product data.
   2. Shop drawings.
   3. Samples for selection.
   4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 7800 - Closeout Submittals.

3.04 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.05 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Correction Punch List for Substantial Completion.

B. Submit Final Correction Punch List for Substantial Completion.

C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 7800 - Closeout Submittals:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Other types as indicated.

D. Submit for Owner's benefit during and after project completion.

3.06 NUMBER OF COPIES OF SUBMITTALS

A. Electronic Documents: Submit one electronic copy.

B. Samples: Submit the number specified in individual specification sections, but not less than 3; one (minimum) of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

3.07 SUBMITTAL PROCEDURES

A. Transmittal Form: TMP Submittal and Sample Transmittal Form must be completed and provided at the beginning of each submittal.
   1. Refer to Section 01 3000.01 - TMP Submittal and Sample Transmittal Form.
   2. Submittals without a completed TMP Submittal and Sample Transmittal Form will not be acknowledged, reviewed, or returned.

B. Submittals shall be submitted in electronic form.
   1. Exceptions: Physical samples.

a. Physical Samples must be accompanied by an electronic copy and a hard/physical copy of the completed TMP Submittal and Sample Transmittal Form.

C. Electronic Submittals: Comply with the following:
1. Submittal process shall be through a data management system (i.e. Submittal Exchange) or other approved method agreed to by the Architect and Owner.
2. File Format: Portable Document Format (PDF).
3. File Naming: File naming shall be in the following format:
a. Specification section number, followed by a hyphen, and a consecutive number indicating sequential submittals for that section; followed by a general description of the submittal contents.
1) Examples:
(a) Section 07 9200; first submittal:
(1) 07 9200-01 Joint Sealants
(b) Section 07 9200; second submittal:
(1) 07 9200-02 Joint Sealant Color
b. Resubmittals. For revised resubmittals use original number and a sequential combination numerical and alphabetical suffix; hyphen followed by "R" and a two-digit consecutive number indicating sequential resubmittals for that particular submittal.
1) Examples:
(a) Section 07 9200; resubmittal of first submittal of section:
(1) 07 9200-01-R01 Joint Sealants.
(b) Section 07 9200; second resubmittal of first submittal of section:
(1) 07 9200-01-R02 Joint Sealants
(c) Section 07 9200; first resubmittal of second submittal of section:
(1) 07 9200-02-R01 Joint Sealant Color
4. Each Submittal shall be one file, complete with all attachments.
a. Multi-file submittal will not be acknowledged, reviewed, or returned.

D. General Requirements:
1. Use a single transmittal for related items.
a. Each transmittal shall be for one specification section only; do not submit items for multiple sections under the same transmittal.
1) Multi-section submittals will be acknowledged and returned; stamped "X - Not Approved - Resubmit".
2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
3. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
4. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
5. Schedule submittals to expedite the Project, and coordinate submission of related items.
a. For each submittal for review, allow 14 calendar days excluding delivery time to and from the Contractor.
b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 calendardays.
6. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
7. When revised for resubmission, identify all changes made since previous submission.
8. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
9. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.

10. Submittals not requested will be recognized and returned; stamped "NA - No Action Taken - Not Reviewed"

E. Product Data Procedures:
1. Submit only information required by individual specification sections.
2. Collect required information into a single submittal.
3. Submit concurrently with related shop drawing submittal.
4. Do not submit (Material) Safety Data Sheets for materials or products unless specifically called for in individual sections.

F. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
2. Do not reproduce Contract Documents to create shop drawings.
3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
4. Non-complying submittals will be acknowledged and returned; stamped "X - Not Approved - Resubmit".

G. Samples Procedures:
1. Transmit related items together as single package.
2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
3. Submit actual physical samples.
4. Electronic submittals will not be accepted unless prior approval is received from the Architect. Electronic samples without prior approval will be acknowledged and returned; stamped "X - Not Approved - Resubmit."

3.08 SUBMITTAL REVIEW

A. General: Submittals that do not conform to the requirements of this section will not be acknowledged, reviewed, or returned.

B. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.

C. Submittals for Information: Architect will acknowledge and may review. See below for actions to be taken.

D. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
1. Where more than one action has been indicated, each shall apply to that portion of the submittal for which the action is indicated.

E. Architect's review shall not indicate approval of dimensions, quantities or fabrication processes unless specific notations are made by the Architect regarding same.

F. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
a. "Reviewed - No Exceptions Taken", "Approved", or language with same legal meaning.
b. "Reviewed with Corrections Noted", "Approved as Noted, Resubmission not required", or language with same legal meaning.
1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
2. Not Authorizing fabrication, delivery, and installation:
a. "Revise and Resubmit", "Not Approved - Resubmit", or language with the same legal meaning.
1) Resubmit revised item, with review notations acknowledged and incorporated.
3. Not Authorizing manufacturer:
a. Rejected - Resubmit, or language with the same legal meaning.

G. Architect's and consultants' actions on items submitted for information:

1. Items for which no action was taken:
   a. "No Action Taken - Not Reviewed" or "Received" - to notify the Contractor that the submittal has been received for record only.

END OF SECTION

SECTION 01 4000 - QUALITY REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Submittals.
B. Quality assurance.
C. References and standards.
D. Testing and inspection agencies and services.
E. Contractor's design-related professional design services.
F. Control of installation.
G. Mock-ups.
H. Tolerances.
I. Manufacturers' field services.
J. Defect Assessment.

1.02 REFERENCE STANDARDS

A. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2021.
B. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.
C. ASTM E699 - Standard Specification for Agencies Involved in Testing, Quality Assurance, and Evaluating of Manufactured Building Components; 2016.

1.03 DEFINITIONS

A. Contractor's Professional Design Services: Design of some aspect or portion of the project by party other than the design professional of record. Provide these services as part of the Contract for Construction.
    1. Design Services Types Required:
        a. Design-Related: Design services explicitly required to be performed by another design professional due to highly-technical and/or specialized nature of a portion of the project. Services primarily involve engineering analysis, calculations, and design, and are not intended to alter the aesthetic aspects of the design.
B. Design Data: Design-related, signed and sealed drawings, calculations, specifications, certifications, shop drawings and other submittals provided by Contractor, and prepared directly by, or under direct supervision of, appropriately licensed design professional.

1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
B. Base design on performance and/or design criteria indicated in individual specification sections.

1.05 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
    1. Include a statement or certification attesting that design data complies with criteria indicated, such as building codes, loads, functional, and similar engineering requirements.
    2. Include signature and seal of design professional responsible for allocated design services on calculations and drawings.
C. Test Reports: After each test/inspection, promptly submit 1 copies of report to Architect and to Contractor.
    1. Include:

a. Date issued.
b. Project title and number.
c. Name of inspector.
d. Date and time of sampling or inspection.
e. Identification of product and specifications section.
f. Location in the Project.
g. Type of test/inspection.
h. Date of test/inspection.
i. Results of test/inspection.
j. Compliance with Contract Documents.
k. When requested by Architect, provide interpretation of results.

2. Test report submittals are for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.

D. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.
1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
2. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

1.06 QUALITY ASSURANCE

A. Testing Agency Qualifications:
1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time specialist and responsible officer.

B. Designer Qualifications: Where professional engineering design services and design data submittals are specifically required of Contractor by Contract Documents, provide services of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

1.07 REFERENCES AND STANDARDS

A. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

B. Obtain copies of standards where required by product specification sections.

C. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

1.08 TESTING AND INSPECTION AGENCIES AND SERVICES

A. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.

B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

C. Contractor Employed Agency:

1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, and ASTM E699.
2. Inspection agency: Comply with requirements of ASTM E329.
3. Laboratory Staff: Maintain a full time specialist on staff to review services.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
B. Comply with manufacturers' instructions, including each step in sequence.
C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
E. Have work performed by persons qualified to produce required and specified quality.
F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
B. Accepted mock-ups establish the standard of quality the Architect will use to judge the Work.
C. Integrated Exterior Mock-ups: Construct integrated exterior mock-up as indicated on drawings. Coordinate installation of exterior envelope materials and products as required in individual Specification Sections. Provide adequate supporting structure for mock-up materials as necessary.
D. Notify Architect 5 working days in advance of dates and times when mock-ups will be constructed.
E. Provide supervisory personnel who will oversee mock-up construction. Provide workers that will be employed during the construction at Project.
F. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
G. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
H. Obtain Architect's approval of mock-ups before starting work, fabrication, or construction.
   1. Make corrections as necessary until Architect's approval is issued.
I. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
J. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

A. See individual specification sections for testing and inspection required.
B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.
C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.
D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
E. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
F. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions when necessary.
B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4100 - REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:
   1. Barrier Free Code: Comply with the following:
      a. Michigan Building Code; 2015.
      b. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
   2. School Fire Safety Rules: Michigan School Fire Safety Rules; 2016.
      a. Includes NFPA 101-2012 - Life Safety Code; 2012, plus amendments.
   3. Building Code: Michigan Building Code; 2015.
   4. Plumbing Code: Michigan Plumbing Code; 2021.
   5. Mechanical Code: Michigan Mechanical Code; 2011.
   6. Electrical Code: NFPA 70 - National Electric Code; 2023.
      a. Includes 2023 Michigan Construction Code - Part 8 Electrical Code Rules.
   7. Elevator Code: Comply with the following:
      a. ASME A17.1 - Safety Code for Elevators and Escalators; 2010.
      b. ASME A18.1- Safety Standard for Platform Lifts and Stairway Chairlifts; 2011.
      c. Michigan Elevator Safety Board General Rules.
   8. Boiler Code: Michigan Boiler Code.
      a. Includes the following:
         1) ASME Boiler and Pressure Vessel Codes; 2019.
         2) National Board Inspection Code; 2019.
         3) PA 407 Skilled Trades Regulation Act; 2016.
   9. Energy Code: Michigan Energy Code; 2015.
      a. Includes ASHRAE Std 90.1 I-P-2013- Energy Standard for Buildings Except Low-Rise Residential Buildings; 2013.

B. Where specification sections reference more current standards or codes, comply with the more restrictive requirements unless notified in writing by Architect.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 4216 - DEFINITIONS

PART 1 GENERAL

1.01 SUMMARY

A. This section supplements the definitions contained in the General Conditions.

B. Other definitions are included in individual specification sections.

1.02 DEFINITIONS

A. Furnish: To supply, deliver, unload, and inspect for damage.

B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.

C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.

D. Project Manual: The book-sized volume that includes the procurement requirements (if any), the contracting requirements, and the specifications.

E. Provide: To furnish and install.

F. Supply: Same as Furnish.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 4219 - REFERENCE STANDARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Requirements relating to referenced standards.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with the reference standard of date of issue specified in this section, except where a specific date is established by applicable code.

C. Should specified reference standards conflict with Contract Documents, request clarification from the Architect before proceeding.

D. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of the Architect shall be altered by Contract Documents by mention or inference otherwise in any reference document.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION -- NOT USED

END OF SECTION

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Re-use of existing products.
B. Transportation, handling, storage and protection.
C. Product option requirements.
D. Substitution limitations.
E. Procedures for Owner-supplied products.
F. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
    1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.
D. Specific Products to be Reused: The reuse of certain materials and equipment already existing on the project site is required.
    1. Refer to Drawings and Section 02 4100 - Demolition.

2.02 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by Contract Documents.

2.03 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.
D. Available Products: Products specified by naming one or more Manufacturers as an Available Product indicates that these Manufacturers' products may be provided but other comparable products and Manufacturers not named may also be provided without submitting a request for substitution.

2.04 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver and place in location as directed; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

A. See Section 01 2500 - Substitution Procedures.

3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

3.03 TRANSPORTATION AND HANDLING

A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.

B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.

C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

D. Transport and handle products in accordance with manufacturer's instructions.

E. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

F. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

G. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Provide off-site storage and protection when site does not permit on-site storage or protection.

G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

H. Comply with manufacturer's warranty conditions, if any.

I. Do not store products directly on the ground.
J. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
K. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
L. Prevent contact with material that may cause corrosion, discoloration, or staining.
M. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
N. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 7000 - EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.
B. Requirements for alterations work, including selective demolition.
C. Pre-installation meetings.
D. Cutting and patching.
E. Surveying for laying out the work.
F. Cleaning and protection.
G. Starting of systems and equipment.
H. Demonstration and instruction of Owner personnel.
I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
J. General requirements for maintenance service.

1.02 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2019.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
    1. Structural integrity of any element of Project.
    2. Integrity of weather exposed or moisture resistant element.
    3. Efficiency, maintenance, or safety of any operational element.
    4. Visual qualities of sight exposed elements.
    5. Work of Owner or separate Contractor.
    6. Include in request:
        a. Identification of Project.
        b. Location and description of affected work.
        c. Necessity for cutting or alteration.
        d. Description of proposed work and products to be used.
        e. Effect on work of Owner or separate Contractor.
C. Project Record Documents: Accurately record actual locations of capped and active utilities.
D. Warranties: For each affected material under warranty, submit written verification, signed by manufacturer of existing materials, stating that the Owner's full warranty will remain in effect after cutting and patching operations have been completed

1.04 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.05 PROJECT CONDITIONS

A. Use of explosives is not permitted.
B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
D. Perform dewatering activities, as required, for the duration of the project.

E. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
F. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
   1. Provide dust-proof enclosures to prevent entry of dust generated outdoors.
   2. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
G. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
   1. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
H. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
   1. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.
   2. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.
I. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
J. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.06 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
B. Notify affected utility companies and comply with their requirements.
C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
F. Coordinate completion and clean-up of work of separate sections.
G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.07 WARRANTIES

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 6000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
C. Examine and verify specific conditions described in individual specification sections.
D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.
B. Seal cracks or openings of substrate prior to applying next material or substance.
C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
B. Require attendance of parties directly affecting, or affected by, work of the specific section.
C. Notify Architect 5 calendar days in advance of meeting date.
D. Prepare agenda and preside at meeting:
    1. Review conditions of examination, preparation and installation procedures.
    2. Review coordination with related work.
E. Record minutes and distribute copies within two days after meeting to participants, with 1 copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.
B. Promptly notify Architect of any discrepancies discovered.
C. Contractor shall locate and protect survey control and reference points.
D. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
E. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
F. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
G. Utilize recognized engineering survey practices.
H. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
2. Grid or axis for structures.
3. Building foundation, column locations, ground floor elevations.
4. Controlling lines and levels required for mechanical and electrical trades.

I. Periodically verify layouts by same means.

J. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

A. In addition to compliance with regulatory requirements, conduct construction operations in compliance with NFPA 241, including applicable recommendations in Appendix A.

B. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

C. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

D. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

E. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

F. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation only.
1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Architect before disturbing existing installation.
3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Keep areas in which alterations are being conducted separated from other areas that are still occupied.
1. Provide, erect, and maintain temporary dustproof partitions.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.
1. Where openings in exterior enclosure exist, provide construction to make exterior enclosure weatherproof.
2. Insulate existing ducts or pipes that are exposed to outdoor ambient temperatures by alterations work.

D. Remove existing work as indicated and as required to accomplish new work.
1. Remove items indicated on drawings.
2. Relocate items indicated on drawings.
3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
b. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.
5. Remove abandoned pipe, ducts, conduits, and equipment , including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

F. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.

G. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

H. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.

I. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.

J. Clean existing systems and equipment.

K. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.

L. Do not begin new construction in alterations areas before demolition is complete.

M. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

A. Whenever possible, execute the work by methods that avoid cutting or patching.

B. See Alterations article above for additional requirements.

C. Perform whatever cutting and patching is necessary to:
1. Complete the work.
2. Fit products together to integrate with other work.
3. Provide openings for penetration of mechanical, electrical, and other services.
4. Match work that has been cut to adjacent work.
5. Repair areas adjacent to cuts to required condition.
6. Repair new work damaged by subsequent work.
7. Remove samples of installed work for testing when requested.
8. Remove and replace defective and non-complying work.

D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

E. Employ skilled and experienced installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

G. Restore work with new products in accordance with requirements of Contract Documents.

H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 8400, to full thickness of the penetrated element.

J. Patching:
   1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
      a. This includes painted surfaces.
      b. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
   2. Match color, texture, and appearance.
   3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architectand Owner 7 calendar days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

D. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify that wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.11 DEMONSTRATION AND INSTRUCTION

A. See Section 01 7900 - Demonstration and Training.
B. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of Substantial Completion.
C. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
D. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
E. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.
F. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
G. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.

3.12 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.13 FINAL CLEANING

A. Use cleaning materials that are nonhazardous.
B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
E. Clean filters of operating equipment.
F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
G. Clean site; sweep paved areas, rake clean landscaped surfaces.
H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.14 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
B. Accompany Contractor on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.15 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.
B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7800 - CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Project record documents.
B. Operation and maintenance data.
C. Warranties and bonds.

1.02 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
B. Operation and Maintenance Data:
   1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
   2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
   3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
   4. Submit two sets of revised final documents in final form within 10 days after final inspection.
C. Warranties and Bonds:
   1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.
   2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
   3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROJECT RECORD DOCUMENTS

A. General:
   1. Project Record Documents include:
      a. Complete set of Record Drawings.
      b. Complete set of Record Submittals.
      c. Complete set of Specifications.
   2. Project Record Documents shall be submitted in electronic form.
      a. File Format: Portable Document Format (PDF).
      b. Files shall be named and organized in a searchable, easy to understand, system.
   3. Ensure entries are complete and accurate, enabling future reference by Owner.
   4. Record information concurrent with construction progress.
B. Record Drawings: Record Drawings shall include the following:
   1. Complete set of Drawings.
      a. Indicate and record actual construction including, but not limited to, the following:
         1) Show all systems and assemblies as they exist at completion of the Work.
         2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
         3) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
         4) Field changes of dimension and detail.
         5) Details not on original Contract drawings.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

C. Record Submittals: Record Submittals shall include the following:
   1. Complete set of Submittals, including resubmittals.
   2. Shop Drawings shall indicate all field changes and other variations from the Submittal as originally reviewed by Architect.
D. Specifications: Specifications shall include the following:
   1. Complete Project Manual including all specifications, front end material, reports, and information available to bidders, as originally bid.
   2. Addenda.
   3. Change Orders and other modifications to the Contract.

3.02 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:
   1. Product data, with catalog number, size, composition, and color and texture designations.
B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
C. Additional information as specified in individual product specification sections.
D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.
B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
D. Include color coded wiring diagrams as installed.
E. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
F. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
G. Provide servicing and lubrication schedule, and list of lubricants required.
H. Include manufacturer's printed operation and maintenance instructions.

I. Include sequence of operation by controls manufacturer.
J. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
K. Provide control diagrams by controls manufacturer as installed.
L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
M. Include test and balancing reports.
N. Additional Requirements: As specified in individual product specification sections.

3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. General:
   1. Operational and Maintenance Manuals include:
      a. Operational and maintenance data.
      b. Operational and maintenance data for materials and finishes.
      c. Operational and maintenance data for equipment and systems.
   2. Operational and Maintenance Manuals shall be submitted both in electronic form and as hard copy/durable manuals.
      a. Subject to Owner approval, hard copy/durable manuals may be omitted.
      b. Electronic File Format: Portable Document Format (PDF).
         1) Files shall be named and organized in a searchable, easy to understand, system similar to the descriptions for the hard copy/durable manuals
B. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
C. Where systems involve more than one specification section, provide separate tabbed divider for each system.
D. Binders: Commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 3 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.
E. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.
F. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
G. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.
H. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.
I. Text: Manufacturer's printed data, or typewritten data on 20 pound paper.
J. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
K. Arrangement of Contents: Organize each volume in parts as follows:
   1. Project Directory.
   2. Table of Contents, of all volumes, and of this volume.
   3. Operation and Maintenance Data: Arranged by system, then by product category.
      a. Source data.
      b. Operation and maintenance data.
      c. Field quality control data.
      d. Photocopies of warranties and bonds.

3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 GENERAL

1.01 SUMMARY

A. Demonstration of products and systems to be commissioned and where indicated in specific specification sections.

B. Training of Owner personnel in operation and maintenance is required for:
   1. All software-operated systems.
   2. HVAC systems and equipment.
   3. Plumbing equipment.
   4. Electrical systems and equipment.
   5. Items specified in individual product Sections.

C. Training of Owner personnel in care, cleaning, maintenance, and repair is required for:
   1. Roofing, waterproofing, and other weather-exposed or moisture protection products.
   2. Finishes, including flooring, wall finishes, ceiling finishes.
   3. Fixtures and fittings.
   4. Items specified in individual product Sections.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures; except:

B. Draft Training Plans: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
   1. Submit not less than four weeks prior to start of training.
   2. Revise and resubmit until acceptable.
   3. Provide an overall schedule showing all training sessions.
   4. Include at least the following for each training session:
      a. Identification, date, time, and duration.
      b. Description of products and/or systems to be covered.
      c. Name of firm and person conducting training; include qualifications.
      d. Intended audience, such as job description.
      e. Objectives of training and suggested methods of ensuring adequate training.
      f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
      g. Media to be used, such a slides, hand-outs, etc.
      h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.

C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
   1. Include applicable portion of O&M manuals.
   2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
   3. Provide one extra copy of each training manual to be included with operation and maintenance data.

1.03 QUALITY ASSURANCE

A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
   1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
   2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

B. Coordination: Coordinate demonstration and training of this section with project commissioning requirements.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 DEMONSTRATION - GENERAL

A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.

B. Demonstrations conducted during Functional Testing need not be repeated unless Owner personnel training is specified.

C. Demonstration may be combined with Owner personnel training if applicable.

D. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.
2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

E. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.

1. Perform demonstrations not less than two weeks prior to Substantial Completion.

3.02 TRAINING - GENERAL

A. Conduct training on-site unless otherwise indicated.

B. Do not start training until Functional Testing is complete, unless otherwise specified or approved by the Commissioning Authority.

C. Provide training in minimum two hour segments.

D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.

E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:

1. The location of the O&M manuals and procedures for use and preservation; backup copies.
2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
3. Typical uses of the O&M manuals.

F. Product- and System-Specific Training:

1. Review the applicable O&M manuals.
2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
4. Provide hands-on training on all operational modes possible and preventive maintenance.
5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
6. Discuss common troubleshooting problems and solutions.
7. Discuss any peculiarities of equipment installation or operation.
8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
9. Review recommended tools and spare parts inventory suggestions of manufacturers.
10. Review spare parts and tools required to be furnished by Contractor.
11. Review spare parts suppliers and sources and procurement procedures.

G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

END OF SECTION

SECTION 31 3331 – GROUND IMPROVEMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. Work shall consist of design, installation, monitoring, and testing a ground improvement system at the locations noted on the drawings and as specified herein. The quantity of Aggregate Piers, their spacing, diameter and depth shall be determined by the specialty contractor who shall be responsible for the design as well as the installation. It shall be the Aggregate Pier contractor's responsibility to determine and implement the systems and criteria to ensure the performance criteria is achieved.

B. The ground improvement system shall be either vibro stone columns or rammed piers. "Aggregate piers" referenced in these specifications refer to both vibro stone columns and rammed piers.

1.02 WORK INCLUDED

A. Provision of all equipment, material, labor, and supervision to design and install aggregate pier elements. Design shall rely on subsurface information presented in the project geotechnical report.

B. Removal of spoils from the site (which result from aggregate pier construction), removal of spoils off the working pad, footing excavation, and subgrade preparation following aggregate pier installation is not included.

C. Drawings and General Provisions of the Contract, including General and Supplemental Conditions.

1.03 APPROVED INSTALLERS

A. Installers of aggregate pier foundation systems shall have a minimum of 5 years of experience with the installation of aggregate piers and shall have completed at least 50 projects.

B. Contractors shall have demonstrated experience in the construction of similar size and types of projects. The Contractor shall adhere to all methods and standards described in this Specification.

C. The Aggregate Pier engineer shall have Errors and Omissions design insurance for the work. The insurance policy should provide a minimum coverage of $1 million per occurrence.

1.04 RELATED WORK

A. Section 033000 – Cast in Place Concrete

B. Section 312000 – Building Earthwork

C. Geotechnical Report

1.05 REFERENCE STANDARDS

A. Design: The ground improvement installer shall be responsible for design of a vibro stone column or rammed pier ground improvement system that meets the global stability, allowable bearing capacity, and settlement requirements stated on the contract plans. Industry recognized standards or design methods specific to the installer's equipment and construction methods shall be used.

B. Modulus Testing

1. ASTM D 1143 – Pile Load Test Procedures
2. ASTM D 1194 – Spread Footing Load Test.

C. Materials and Inspection

1. ASTM D 1241 - Aggregate Quality
2. ASTM D 422 – Gradation of Soils
3. ASTM D 1143 – Pile Load Test Procedures

D. Where specifications and reference documents conflict, the Aggregate Pier Designer (the Designer) shall make the final determination of the applicable document.

1.06 **CERTIFICATIONS AND SUBMITTALS**

A. The installer shall submit detailed design calculations and construction drawings to the Architect and to the Geotechnical Representative and the Structural Engineer of Record for approval at least three (3) weeks prior to the start of construction. All plans shall be sealed by a Professional Engineer in the State of Michigan (referred in this specification as “the Designer”).

B. Modulus Test Reports – A modulus test(s) shall be performed on a non-production Aggregate Pier element as required by the Designer to verify the design assumptions. The Installer shall furnish the General Contractor a description of the installation equipment, installation records, complete test data, analysis of the test data and recommended design parameter values based on the modulus test results. The report shall be prepared under supervision of a registered professional engineer.

C. Daily Progress Reports – The Installer shall furnish a complete and accurate record of aggregate pier installation to the General Contractor. The record shall indicate the pier location, length, average lift thickness and final elevations of the base and top of piers. The record shall also indicate the type and size of the densification equipment used. The Installer shall immediately report any unusual conditions encountered during installation to the General Contractor, to the Designer and to the Testing Agency.

PART 2 PRODUCTS

2.01 **MATERIALS**

A. Aggregate used by the Installer for element construction shall be pre-approved by the Designer and shall demonstrate suitable performance during modulus testing. Typical aggregate consists of Type 1 Grade B in accordance with ASTM D-1241-68, No. 57 stone, or other graded aggregate approved by the Designer.

B. For grouted Aggregate Pier elements, grout shall consist of a homogeneous mixture of Type II Portland Cement and clean, potable water. Documentation for other additives shall be submitted for review.

C. For Aggregate Pier elements constructed with cement-treated aggregate (CTA), the CTA shall consist of a mixture of Type II Portland Cement and well-graded aggregate. The minimum cement content shall be 6% by weight.

D. Potable water or other suitable source shall be used to increase aggregate moisture content where required. Access to water on site shall be provided to the Installer.

E. Installer to coordinate adequate and suitable marshalling areas on the project site for the use of the Installer for the storage of aggregate and equipment.

PART 3 DESIGN REQUIREMENTS

3.01 STONE COLUMN AND AGGREGATE PIER DESIGN

A. The Aggregate Pier design stiffness modulus value shall be verified by the results of the modulus test described in this specification.

B. Stone Columns or Aggregate piers shall be designed in accordance with generally accepted engineering practice and the methods described in Section 1 of these Specifications. The design shall meet the following criteria.

1. Minimum Allowable Bearing Pressure for Aggregate Pier Reinforced Soils: 3,000 psf.
2. Minimum Aggregate Pier Area Coverage (for square Spread Footings): 30%.
3. Estimated Total Long-Term Settlement for Footings: ≤1-inch.
4. Estimated Long-Term Differential Settlement of Adjacent Footings: ≤ ½-inch.
5. Settlement of Slabs-on-Grade: ≤1-inch.
6. The design submitted by the Installer shall consider the bearing capacity and settlement of all footings supported by aggregate piers and shall be in accordance with acceptable engineering practice and these specifications. Total and differential settlement shall be considered. The design life of the structure shall be 50 years.

C. The Stone Column or Aggregate Pier system shall be designed to preclude plastic bulging deformations at the top-of–pier design stress and to preclude significant tip stresses as determined from the shape of the telltale test curve from telltales installed in modulus test piers. The results of the modulus test shall be used to verify the design assumptions.

3.02 DESIGN SUBMITTAL

A. The Installer shall submit detailed design calculations, construction drawings, and shop drawings, (the Design Submittal), for approval at least three (3) weeks prior to the beginning of construction.

B. A detailed explanation of the design parameters for settlement calculations shall be included in the Design Submittal. Additionally, the quality control test program for stone columns or aggregate piers, meeting these design requirements, shall be submitted. All computer-generated calculations and drawings shall be prepared and sealed by a Professional Engineer, licensed in the State of Michigan.

PART 4 CONSTRUCTION

4.01 STONE COLUMNS

A. Aggregate used by the Installer for element construction shall be pre-approved by the Designer and shall demonstrate suitable performance during modulus testing. Typical aggregate

consists of Type 1 Grade B in accordance with ASTM D-1241-68, No. 57 stone, or other graded aggregate approved by the Designer.

B. Install stone columns with a down-hole vibrator capable of densifying the aggregate by forcing it radially into the surrounding soil. The vibrator shall be of sufficient size and capacity to construct stone columns to the diameters and lengths shown on the installer's approved construction drawings.

C. The probe and follower tubes shall be of sufficient length to reach the elevations shown on the installer's approved construction drawings. The probe, used in combination with the available pressure to the tip jet, shall be capable of penetration to the required tip elevation. Pre boring shall be permitted if it is specified in the installer's approved construction procedure submittal.

D. The probe and follower shall have visible markings at regular increments to enable measurement of penetration and repenetration depths.

E. Provide methods for supplying to the tip of the probe a sufficient quality of air or water to widen the probe hole to allow adequate space for stone backfill placement around the probe.

F. The probe shall penetrate into the foundation soil layer to the minimum depths required in the installer's construction plans.

G. Lift thickness shall not exceed 4 feet. After penetration to the treatment depth, slowly retrieve the vibrator in 12-inch to 18-inch increments to allow backfill placement.

H. Compact the backfill in each lift by repenetrating it at least twice with the vibrating probe to densify and force the stone into the surrounding soil.

I. Install stone columns so that each completed column is continuous throughout its length.

4.02 **RAMMED PIERS:**

A. All Aggregate Pier elements shall be pre-augered using mechanical drilling or excavation equipment. Installation of piers without pre-augering shall not be allowed because this technique results in significant disturbance and remolding of the matrix soils surrounding the piers.

B. If cave-ins occur during excavation such that the sidewalls of the hole are deemed to be unstable, steel casing or a drilling slurry shall be used to stabilize the excavation.

C. If cave-ins occur on top of a lift of aggregate such that the volume of the caved soils is greater than 10 percent of the volume of the aggregate in the lift, then the aggregate shall be considered contaminated and shall be removed and replaced with uncontaminated aggregate.

D. Special high-energy impact densification apparatus shall be employed to densify the Aggregate Pier elements during installation. The apparatus shall apply direct downward impact energy to each lift of aggregate.

E. A minimum tamper energy level of 250,000 foot-pounds of force per minute shall be applied by the energy source.

F. The bottom of the excavation shall be densified prior to the placement of the aggregate. If wet, soft or sensitive soils are present, open-graded aggregate, such as ASTM No.57 stone or other, shall be placed at the bottom of the excavation and compacted to stabilize the element bottom and may serve as the initial lift.

G. Densification shall be performed using a beveled tamper. The beveled tamper foot is required to adequately increase the lateral earth pressure in the matrix soil during installation.

H. Downward pressure shall be applied to the tamper shaft during tamping.

I. Each lift of aggregate shall be tamped for a minimum of 15 seconds.

4.03 **PLAN LOCATIONS AND ELEVATION OF AGGREGATE PIER ELEMENTS**

A. The center of each pier shall be within six inches of the plan locations indicated. The final measurement of the top of piers shall be the lowest point on the aggregate in the last compacted lift. Piers installed outside of the above tolerances and deemed not acceptable shall be rebuilt at no additional expense to the Owner.

4.04 **REJECTED AGGREGATE PIER ELEMENTS**

A. Aggregate pier elements improperly located or installed beyond the maximum allowable tolerances shall be abandoned and replaced with new piers unless the Designer approves other remedial measures. All material and labor required to replace rejected piers shall be provided at no additional cost to the Owner.

PART 5 QUALITY CONTROL

5.01 **QUALITY CONTROL REPRESENTATIVE**

A. The Installer shall have a full-time Quality Control (QC) representative to verify and report all QC installation procedures. The Installer shall immediately report any unusual conditions encountered during installation to the Design Engineer, the General Contractor, and to the Testing Agency. The QC procedures shall include the preparation of Aggregate Pier Progress Reports completed during each day of installation and containing the following information:

1. Footing and Aggregate Pier location.
2. Aggregate Pier length and drilled diameter.
3. Planned and actual Aggregate Pier elevations at the top and bottom of the element.
4. Average lift thickness for each Aggregate Pier.
5. Soil types encountered at the bottom of the Aggregate Pier and along the length of the element.
6. Depth to groundwater, if encountered.
7. Documentation of any unusual conditions encountered.
8. Type and size of densification equipment used.

5.02 **QUALITY CONTROL VERIFICATION PROGRAM**

A. The installer shall be responsible for the design of a verification program to assure the quality of the construction. The program shall verify that the installed ground improvement system satisfies the performance requirements noted on the contract plans and the design requirements determined by the ground improvement system designer. As a minimum, the verification program shall include the following:

1. Program to monitor performance of the ground improvement system during and after construction of the proposed structure or embankment to be supported. This program

may include installation of settlement plates, monitoring points, inclinometers, piezometers, or other instrumentation.

2. Stone column installation shall be monitored by an on-board computer monitoring system. The monitoring system shall log stone column number, time of installation, depth, hydraulic pressure applied during the boring process and during the compacting process. Recorded data for each stone column shall be plotted depth/pressure versus time. Installation records for each shall be made available upon request in electronic format within 24 hours of installation.

B. Proposed means and methods for verification that the installed aggregate piers meet the strength and/or stiffness criteria required by the design. This may include, but shall not be limited to, modulus or load tests on individual elements and/or groups, soil borings, and other methods as approved by the Engineer.

C. Quality control program to verify that the ground improvement system is installed in accordance with the designer's specifications and the requirements in this special provision. The quality control program shall include testing and observations by qualified personnel employed by the ground improvement installer or an independent testing laboratory.

PART 6 QUALITY ASSURANCE

6.01 OWNER'S INDEPENDENT QUALITY ASSURANCE

A. The Owner or General Contractor is responsible for retaining their observing Geotechnical Representative to provide Quality Assurance services.

6.02 RESPONSIBILITIES OF THE OWNER'S INDEPENDENT QUALITY ASSURANCE

A. The Geotechnical Representative shall monitor the modulus test element installation and testing. The Installer shall provide and install all dial indicators and other measuring devices.

B. The Geotechnical Representative shall monitor the installation of Aggregate Pier elements to verify that the production installation practices are similar to those used during the installation of the modulus test element(s).

C. With reference to Paragraph 4.01.A.5, the Geotechnical Representative shall monitor vibrations and immediately report to the Installer and General Contractor if specified tolerances are exceeded.

D. The Geotechnical Representative shall report any discrepancies to the Installer and General Contractor immediately.

E. The Geotechnical Representative shall observe the excavation, compaction and placement of the foundations as described in Section 7.05.

PART 7 RESPONSIBILITIES OF THE GENERAL CONTRACTOR

7.01 PREPARATION

A. The Installer shall locate and protect underground and aboveground utilities and other structures from damage during installation of the Aggregate Pier elements.

B. The General Contractor will provide the site to the Installer after earthwork in the area has been completed.

C. Site subgrade shall be established by the General Contractor within 6 inches of final design subgrade, as approved by the Design Engineer.

D. Aggregate Pier Excavation: Should any obstruction be encountered during drilling or excavation for aggregate piers, the Contractor shall be responsible for removing such obstruction, or the pier shall be relocated or abandoned. Obstructions include, but are not limited to, boulders, timbers, concrete, bricks, utility lines, etc., that prevent installing the aggregate piers to the required depth or cause the aggregate pier to drift from the required locations. Dense natural rock or weathered rock shall not be deemed obstructions, and piers may be terminated short of design lengths on such material if authorized by the Geotechnical Engineer.

7.02 UTILITY EXCAVATIONS

A. The General Contractor shall coordinate all excavations made subsequent to Aggregate Pier installations so that at least five feet of horizontal distance remains between the edge of any installed Aggregate Pier and the excavation. In the event that utility excavations are required at horizontal distances of less than five feet from installed Aggregate Piers, the General Contractor shall notify the Aggregate Pier Designer to develop construction solutions to minimize impacts on the installed Aggregate Piers.

B. Recommended procedures may include:

1. Using cement-treated base to construct portions of the Aggregate Piers subject to future excavations.

2. Replacing excavated soil with compacted crushed stone in the portions of excavations where the Aggregate Piers have been disturbed. The placement and compaction of the crushed stone shall meet the following requirements.

a. The crushed stone shall meet the gradation specified by the Designer.

b. The crushed stone shall be placed in a controlled manner using motorized impact compaction equipment.

c. The aggregate should be compacted to 95% of the maximum dry density as determined by the modified Proctor method (ASTM D-1557).

d. The Testing Agency shall be on site to observe placement, compaction, and provide density testing. The test results shall be submitted to the Designer and the General Contractor. The subcontractor shall provide notification to the Testing Agency and the Designer when excavation, placement, and compaction will occur and arrange for construction observation and testing.

7.03 FOOTING AND SUBGRADE PREPARATION

A. Excavation and subgrade preparation of all footing and slab subgrades shall be the responsibility of the General Contractor and performed in conformance with the Project Specifications and Aggregate Pier design submittal.

B. Excavations will expose the tops of Aggregate Pier elements and shall be made in a workman-like manner that protects the subgrade until structural fill or concrete placement. Procedures and equipment shall be selected to avoid subgrade/ Aggregate Pier element disturbance and exposure to water.

C. All excavations for footing bottoms supported by Aggregate Pier elements shall be prepared in the following manner by the General Contractor. Recommended procedures for achieving these goals are to:

1. Limit over-excavation below the bottom of the footing to 3-inches (including disturbance from the teeth of the excavation equipment).
2. Compaction of surface soil and top of Aggregate Pier elements shall be prepared using a motorized impact compactor ("Wacker Packer," "Jumping Jack," or similar). Sled-type tamping devices shall only be used in granular soils and when approved by the Designer. Loose or soft surficial soil over the entire footing bottom shall be recompacted or removed, respectively. The surface of the Aggregate Pier elements shall be recompacted prior to completing footing bottom preparation.
3. Place footing concrete immediately after footing excavation is made and approved, preferably the same day as the excavation. Footing concrete must be placed on the same day if the footing is bearing on moisture-sensitive soils. If same day placement of footing concrete is not possible, open excavations shall be protected from surface water accumulation. A lean concrete mud-mat may be used to accomplish this. Other methods must be pre-approved by the Designer.

D. The following criteria shall apply, and a written inspection report sealed by the project Geotechnical Engineer shall be furnished to the Installer to confirm:

1. That water has not been allowed to pond in the footing excavation at any time. Ponded water may soften the unconfined matrix soil between and around the Aggregate Pier elements and may have detrimental effects on the supporting capability of the Aggregate Pier reinforced subgrade.
2. That all Aggregate Pier elements designed for each footing have been exposed in the footing excavation.
3. That immediately before footing construction, the tops of all the Aggregate Pier elements exposed in each footing excavation have been inspected and recompacted as necessary with mechanical compaction equipment, and that the tops of any Aggregate Pier elements which may have been disturbed by footing excavation and related activity have been recompacted to a dry density equivalent to at least 95% of the maximum dry density obtainable by the modified Proctor method (ASTM D-1557).
4. That no excavations or drilled shafts have been made after installation of Aggregate Pier elements within horizontal distance of five feet from the edge of any pier, without the written approval of the Installer or Designer.

END OF SECTION

APPENDIXES

APPENDIX 1

Geotechnical Investigation

Dated March 12, 2024

Report on
Geotechnical Investigation

Smith Middle School
5835 Donaldson Road
Troy, Michigan 48085

Latitude 42.603756˚ N
Longitude 83.147882˚ W

Prepared for:

Lecole Planners, LLC
145 North Center Street B
Northville, Michigan 48167

G2 Project No. 230618
March 12, 2024

g2consultinggroup.com

Headquarters	1866 Woodslee St	Troy, MI 48083	P 248.680.0400	F 248.680.9745
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March 12, 2024

Ms. Michelle Kerns
Lecole Planners, LLC
145 North Center Street B
Northville, Michigan 48167

Re: Report on Geotechnical Investigation
Smith Middle School
5835 Donaldson Road
Troy, Michigan 48085
G2 Project No. 230618

Dear Ms. Kerns:

We have completed the geotechnical investigation for the proposed new Smith Middle School development in Troy, Michigan. This report presents the results of our observations and analyses, our recommendations for subgrade preparation, foundation and pavement design, and construction considerations as they relate to the geotechnical conditions on site.

We appreciate the opportunity to be of service to Lecole Planners and Troy School District and look forward to discussing the recommendations presented. In the meantime, if you have any questions regarding the report or any other matter pertaining to the project, please call us.

Sincerely,

G2 Consulting Group, LLC

Amy L. Schneider, P.E.
Project Manager, Associate

Noel J. Hargrave-Thomas, P.E.
Principal

ALS/NJHT/ljv

Enclosures

EXECUTIVE SUMMARY

We understand a new middle school campus will be constructed on the existing Smith Middle School property in Troy, Michigan. The new 103,661 square-foot middle school building will be constructed at the southwest side of the property, southwest of the existing building, and will have a finished floor elevation of 725.5 feet. New pavement areas will be constructed around the building including standard-duty bituminous concrete parking lots north and east of the proposed building, heavy-duty bituminous concrete drop-off loops adjacent to or surrounding the parking lots, two heavy-duty bituminous concrete access drives extending from Livernois Road, and a heavy-duty bituminous concrete access drive extending from Cotswold Drive.

Approximately 3 to 18 inches of crushed stone fill are present from the ground surface at borings B-27 and B-35. Approximately 1 to 14 inches of topsoil are present at the remaining boring locations with the exception of boring B-30 where approximately 24 inches of topsoil are present. Soft to very stiff sandy clay fill and silty clay fill with organic matter underlie the topsoil and stone fill at borings B-6, B-8, B-13, B-14, B-28, B-31 through B-35, B-37, B-38, B-42, B-44, and B-45 and extend to approximate depths ranging from 2 to 8 feet (Elevation 724-1/2 to 712-1/2 feet). A layer of buried topsoil was noted below the fill at borings B-33, B-38, and B-42. Loose to medium compact silty sand fill underlies the topsoil at boring B-7 and is present from the ground surface at boring B-25 and extends to approximate depths of 3 and 4 feet, respectively. Native soft to stiff silty clay and sandy clay are present below the fill or topsoil at borings B-6, B-20, B-25, B-26, B-27, B-30 through B-32, B-36, and B-38 and extend to approximate depths ranging from 3 to 8 feet (Elevation 732 to 714-1/2 feet). Native very stiff to hard silty clay, and to a lesser extent sandy clay, underlie the topsoil, fill, and lower native consistency cohesive soils and extend to the explored depths. Groundwater was encountered during drilling operations at borings B-5, B-27, B-30, B-31, B-32 through B-35, B-38, B-40, and B-44 at approximate depths ranging from 2 to 8 feet (Elevations 722-1/2 to 713-1/2 feet), typically with the existing fill. At boring B-36, groundwater was encountered at an approximate depth of 18 feet (~Elevation 705 feet). No measurable groundwater was encountered during or upon completion of drilling operations at the remaining boring locations.

Based on the proposed finished floor elevation of 725.5 feet, up to approximately 5-1/2 feet (increasing from north to south) of engineered fill are required across the building footprint to achieve proposed finished grades. Additionally, the existing fill soils, buried topsoil, and native soft to stiff sandy clay extending to approximate elevations ranging from 722-1/2 to 712-1/2 feet are not suitable for support of building foundations and marginally suitable for support of engineered fill to achieve finished grades and floor slabs. We recommend two options be considered for support of the proposed building and foundations including: **OPTION 1)** complete removal of the existing fill, buried topsoil, and native soft to stiff sandy clay to the underlying native very stiff to hard silty clay and replacement with engineered fill for support of shallow foundations, or **OPTION 2)** raising the site to proposed finished grades with engineered fill and installation of a ground improvement system, consisting of rammed aggregate piers or vibro compacted stone columns, for support of shallow foundations. Foundations bearing on a combination of the native very stiff to hard silty clay and engineered fill overlying native soils as described in OPTION 1 can be designed for a net allowable bearing capacity of 3,000 pounds per square foot (psf). Foundations designed to bear on the ground improvement system are able to achieve a cost optimized bearing capacity, typically ranging between 3,000 and 5,000 psf. Foundations bearing directly on the native very stiff to hard silty clay can be designed based on a net allowable bearing capacity of 4,000 psf. Further analyses will be required to determine the design parameters for ground improvement systems, performed by the ground improvement designer. Settlement of the existing fill and native soft to stiff sandy clay due to the overburden pressure from the additional fill to achieve finished grades must be evaluated by the design engineer. G2 Consulting Group, LLC (G2) must be on site during construction to observe the excavations, measure the bearing depths, and verify the adequacy of the bearing soils.

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

PROJECT DESCRIPTION

We understand a new middle school campus will be constructed on the existing Smith Middle School property in Troy, Michigan. The new 103,661 square-foot middle school building will be constructed at the southwest side of the property, southwest of the existing building, and will have a finished floor elevation 725.5 feet. A gymnasium will be situated at the northwest quadrant and the orchestra room will be located at the northeast quadrant, both of which will have high ceilings. The remainder of the structure will be classroom, office, or learning space. These areas are indicated on the Soil Boring Location Plan, Plate No. 1 in the Appendix. The structural loading conditions for the proposed building were not available at the time of this investigation. We anticipate column loads may be on the order of 100 to 150 kips and wall loads may range from 2 to 4 kips per lineal foot, with the higher loads anticipated in the areas of the gymnasium, orchestra, and two-story portion.

New pavement areas will be constructed around the building including standard-duty bituminous concrete parking lots north and east of the proposed building, heavy-duty bituminous concrete drop-off loops adjacent to or surrounding the parking lots, two heavy-duty bituminous concrete access drives extending from Livernois Road, and a heavy-duty bituminous concrete access drive extending from Cotswold Drive.

Existing and proposed grades were interpolated from the Grading & SESC Plans (Sheets C-4.1 and C-4.2) prepared by PEA Group, dated October 17, 2023. The north parking lot has proposed grades sloping downward to the perimeter of the lot, ranging from approximately Elevation 728-1/4 feet to 726 feet. The drop-off loop south of this lot has proposed grades sloping downward to the south, ranging from approximately Elevation 726 to 724 feet. The east parking lot has proposed grades sloping downward to the southeast, ranging from approximately Elevation 724 feet to 721 feet. The perimeter drop-off loop around this lot has finished grades sloping downward to the east and northeast, ranging from approximately Elevation 724 feet adjacent to the building to Elevation 718 feet at Cotswold Road. The north access drive extending to Livernois Road has proposed finished grades sloping upward from the north parking lot to the west, ranging from approximately Elevation 729 to 741 feet. The south access drive extending to Livernois Road has proposed finished grades sloping upward from the building to the west, ranging from approximately Elevation 724-1/2 to 738 feet.

If the proposed finished floor elevation, site grades, or estimated loaded conditions vary, G2 must be notified to evaluate the potential effect on the provided design and construction recommendations.

PREVIOUS INVESTIGATION

G2 previously performed two geotechnical investigations for the property which had different campus layouts. Our initial geotechnical investigation report was dated September 6, 2023 and was focused on the preliminary building layout. At the time of the initial investigation, the building was to be situated in the general location of the existing athletic field/running track. Soil borings B-1 through B-16 were performed in conjunction with this investigation. Our second geotechnical investigation report was dated December 29, 2023 and was focused on the pavements which were to be in the location of the existing residential properties along Livernois Road. Soil borings B-17 through B-27 were performed in conjunction with this investigation.

We have included all of the borings in this investigation for use in providing recommendations for the revised campus layout. However, borings B-17 through B-19, B-21 through B-24, and B-41 are outside the limits of the revised plan and will not be discussed in this report.

SCOPE OF SERVICES

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

Our scope of services for this project is as follows:

1. We drilled a total of forty-four soi borings in conjunction with the overall development. Soil borings B-10 through B-16 and B-27 through B-38 were drilled in or directly adjacent to the footprint of the proposed building extending to depths of 20 to 25 feet each below existing grade. Boring B-20 was drilled in the alignment of the north access drive and extended to a depth of 5 feet below existing grade. Borings B-25 and B-26 were drilled in the alignment of the south access drive and extended to a depth of 5 feet each below existing grade. Borings B-1 through B-9, B-39, and B-40 were drilled in the north parking lot and drop-off loop and extended to depths of 5 and 25 feet. Borings B-42 through B-45 were drilled in the east parking lot and drop-off loop and extended to a depth of 5 feet each.

2. We performed laboratory testing on representative samples obtained from the soil borings. Laboratory testing included visual engineering classification, natural moisture content, loss-on-ignition (L.O.I.), dry density, and unconfined compressive strength determination.

3. We prepared this engineering report. Our report includes recommendations regarding foundation types suitable for the encountered subsurface conditions, foundation and pavement design, and construction considerations related to site construction and associated development.

FIELD OPERATIONS

G2, in conjunction with Lecole Partners, selected the number, depth, and location of the soil borings based on the layout of the proposed building and site improvements. The soil boring locations were located in the field by measuring from existing site features using conventional taping methods in combination with using GPS assisted mobile technology and staked by a G2 staff engineer prior to drilling operations. The approximate soil boring locations relative to the existing site layout and proposed building are shown on the Soil Boring Location Plan, Plate No. 1. Ground surface elevations at the boring locations were interpolated from the topographic contour lines and spot elevations presented on the Grading & SESC Plans (Sheets C-4.1 and C-4.2) prepared by PEA Group, dated October 17, 2023.

The soil borings were drilled using both a truck-mounted drilling rig and an all-terrain vehicle (ATV) rotary drilling rig. Continuous flight, 2-1/4 inch inside diameter, hollow-stem augers were used to advance the boreholes to the explored depths. Within each soil boring, soil samples were obtained at intervals of 2-1/2 feet within the upper 10 feet and at intervals of 5 feet thereafter. These samples were obtained by the Standard Penetration Test method ASTM D 1586, which involves driving a 2-inch diameter split-spoon sampler into the soil with a 140-pound weight falling 30 inches. The sampler is generally driven three successive 6-inch increments with the number of blows for each increment recorded. The number of blows required to advance the sampler the last 12 inches is termed the Standard Penetration Resistance (N). The blow counts for each 6-inch increment and the resulting N-value are presented on the individual soil boring logs.

The soil samples were placed in sealed containers in the field and brought to the laboratory for testing and classification. During field operations, drilling representatives maintained boring logs of the subsurface conditions, including changes in stratigraphy and observed groundwater levels. The final boring logs are based on the field logs and laboratory soil classification and testing results. After completion of the drilling operations, the boreholes were backfilled with auger cuttings and capped with cold patch, where applicable.

LABORATORY TESTING

Representative soil samples were subjected to laboratory testing to determine soil parameters pertinent to pavement and foundation design and site preparation. An experienced geotechnical engineer classified the samples in general conformance with the Unified Soil Classification System. Laboratory testing included organic matter content (L.O.I), natural moisture content, dry density, and

unconfined compressive strength determinations. The organic matter content of representative samples was determined in accordance with ASTM Test Method D 2974, "Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils". The unconfined compressive strengths were determined by ASTM Test Method D2166 and a spring-loaded hand penetrometer. Per ASTM Test Method D2166, the unconfined compressive strength of cohesive soils is determined by axially loading a small cylindrical soil sample under a slow rate of strain. The unconfined compressive strength is defined as the maximum stress applied to the soil sample before shear failure. If shear failure does not occur prior to a total strain of fifteen percent, the unconfined compressive strength is defined as the stress at a strain of fifteen percent. The hand penetrometer estimates the unconfined compressive strength to a maximum of 4-1/2 tons per square foot (tsf) by measuring the resistance of the soil sample to the penetration of a calibrated spring-loaded cylinder.

The results of the moisture content, organic matter content, dry density, and unconfined compressive strength test are indicated on the soil boring logs at the depths the samples were collected. The results of the unconfined compressive strengths determined in accordance with ASTM Test Method D2166 are also presented graphically in the Appendix on Figure No. 45. We will hold the soil samples for 60 days from the date of this report, after which time they will be discarded. If you would like the samples, please let us know.

SOIL CONDITIONS

Building (Borings B-10 through B-16, B-27 through B-38)

Approximately 3 to 18 inches of crushed stone fill are present from the ground surface at borings B-27 and B-35. Approximately 5 to 14 inches of topsoil are present at the remaining boring locations with the exception of boring B-30 where approximately 24 inches of topsoil are present. Sandy clay fill and silty clay fill with organic matter underlie the topsoil and stone fill at borings B-13, B-14, B-28, B-31 through B-35, B-37, and B-38 and extend to approximate depths ranging from 2-1/2 to 8 feet (Elevations 724-1/2 to 712-1/2 feet). An approximately 12-inch layer of buried topsoil was noted below the fill at borings B-33 and B-38. Low consistency native sandy clay is present below the fill and topsoil at borings B-27, B-30, and B-31and extends to approximate depths ranging from 5-1/2 to 6 feet (Elevation 718 to 714-1/2 feet). Native silty clay and sandy clay underlie the topsoil, native low consistency sandy clay, and fill and extend to the explored depths.

The sandy clay fill and silty clay fill are generally stiff to very stiff in consistency with moisture contents ranging from 8 to 25 percent, unconfined compressive strengths ranging from 2,000 to 8,000 psf, and organic matter contents ranging from 1.0 to 4.0 percent. However, the sandy clay fill and silty clay fill below the topsoil at borings B-28 and B-33 and upper fill at boring B-34 are soft to medium in consistency with moisture contents ranging from 24 to 32 percent, unconfined compressive strengths ranging from 500 to 1,000 psf, and organic matter contents ranging from 2.3 to 5.7 percent. Layers of native stiff silty clay and sandy clay are present directly below the fill, topsoil, and soft to medium sandy clay at borings B-30, B-32, B-36, and B-38 with moisture contents ranging from 11 to 22 percent, a dry density of 127 pcf, and unconfined compressive strengths ranging from 2,000 to 3,000 psf. The remainder of the native silty clay and sandy clay is very stiff to hard in consistency with natural moisture contents ranging from 8 to 23 percent and unconfined compressive strengths ranging from 4,000 to 9,000 psf.

Pavements (Borings B-1 through B-9, B-20, B-25, B-26, B-39, B-40, and B-42 through B-45)

Approximately 1 to 14 inches of topsoil are present at the boring locations. Silty clay fill and sandy clay fill underlie the topsoil at borings B-6, B-8, B-42, B-44, and B-45 and extend to approximate depths ranging from 2 to 5 feet (~Elevation 722-1/2 to 714 feet). A layer of buried topsoil is present below the fill at boring B-42 and extends to the explored depth of 5 feet. Silty sand fill underlies the topsoil at boring B-7 and is present from the ground surface at boring B-25 and extends to approximate depths of

3 and 4 feet (Elevations 722-1/2 and 733 feet), respectively. Native silty clay and to a lesser extent sandy clay underlies the fill and topsoil at the remaining boring locations and extends to the explored depths 5 and 25 feet.

The silty clay fill and sandy clay fill are stiff to very stiff in consistency with moisture contents ranging from 13 to 19 percent, unconfined compressive strengths ranging from 3,000 to 8,000 psf, and organic matter contents ranging from 1.9 to 2.6 percent. The silty sand fill is loose to medium compact with N-values of 5 and 20 blows per foot and an organic matter content of 3.3 percent (boring B-25). Layers of medium to stiff native silty clay and sandy clay are present below the topsoil or fill at borings B-6, B-20, and B-26 with natural moisture contents ranging from 17 to 21 percent, a dry density of 120 pcf, and unconfined compressive strengths ranging from 1,000 to 3,000 psf. The remainder of the native silty clay and sandy clay is very stiff to hard in consistency with natural moisture contents ranging from 10 to 20 psf, a dry density of115 pcf, and unconfined compressive strengths ranging from 5,000 to 9,000 psf.

General

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

The Soil Boring Location Plan, Plate No. 1, Site Preparation Plan, Plate No. 2, Soil Boring Logs, Figure Nos. 1 through 44, and Unconfined Compressive Strength Test, Figure No. 45, are presented in the Appendix. The soil profiles described above are generalized descriptions of the conditions encountered at the boring locations. General Notes Terminology defining the nomenclature used on the boring logs and elsewhere in this report are presented on Figure No. 46.

GROUNDWATER CONDITIONS

Groundwater was encountered during drilling operations at borings B-6, B-27, B-28, B-30, B-31, B-32 through B-35, B-38, B-40, and B-44 at approximate depths ranging from 2 to 8 feet (Elevations 722-1/2 to 713-1/2 feet). At boring B-36, groundwater was encountered at an approximate depth of 18 feet (Elevation 705 feet). Upon completion of drilling operations, groundwater was measured at approximate depths ranging from 2 to 21 feet below existing grade (Elevations 721-1/2 to 703-1/2 feet) at borings B-6, B-27, B-28, B-30, B-31, B-33, B-34, B-35, B-36, B-38, and B-44. No measurable groundwater was encountered during or upon completion of drilling operations at the remaining boring locations.

Fluctuations in perched and long-term groundwater levels should be anticipated due to seasonal variations and following periods of prolonged precipitation. It should also be noted that groundwater observations made during drilling operations in cohesive soils are not necessarily indicative of the static groundwater level. This is due to the low permeability of such soils and the tendency of drilling operations to seal off the natural paths of groundwater flow.

SITE CONDITIONS

Smith Middle School is located at 5835 Donaldson Road in Troy, Michigan. The existing school building is situated at the northeast side of the property. The area south of the existing school is currently occupied by baseball fields. An athletic field with a perimeter running track is present west of the existing school and baseball fields are present south of the school, both in the footprint of the proposed new building. The fields and area surrounding the fields are currently grass covered with sand fill at the infields. A drainage swale and tree line run parallel to the west side of the track. The swale bisects the two access drives to Livernois but is not in the footprint of any of the other proposed structures or pavements. Martell Elementary School is adjacent to the south side of the middle school property. Bituminous concrete pavements are present north and east of the existing middle school building.

Surrounding properties are primarily residential in nature with a church north of the school. The existing topography within the proposed building footprint ranges from approximately Elevation 724 feet to 720-1/2 feet, sloping downward to the southeast. The drainage swale has elevations extending from approximately Elevation 724-1/2 feet along the west side of the track to Elevation 720 feet at the low point of the swale. Elevations then slope back upward to the west and the residential properties beyond. The drainage swale continues along the south property line and reaches a low elevation of approximately 713 feet at the southeast property corner. The existing school to the east has a finished floor elevation of 724.3 feet and grades slope downward from the building to the north, south, and east.

An underground fiber line extends along the west side of the existing school in a north / south direction, through the proposed building footprint. Additionally, underground storm basins are present at the interior perimeter of the athletic track and extend under the track alignment. The structures have inverts ranging from approximately Elevation 721-1/2 to 723 feet.

Residential properties are present west of the existing Middle School property, fronting Livernois Road. Three houses and associated garages / barns are present on these properties. Scattered mature trees are present around the residences with the remainder of the properties being grass covered. A slope and drainage ditch extend in a north /south direction between the existing Smith Middle School property and the residential properties. The southernmost property (in the area of borings B-25 and B-26) and the slope / ditch between the properties are heavily wooded.

Existing grades across the residential properties slope downward to the south, east, and southeast, ranging from approximately Elevation 742 feet at the northwest corner of the site adjacent to Livernois Road to Elevation 735 feet at the northeast corner of the residential properties and approximately Elevation 737 feet at the southwest corner of the property adjacent to Livernois Road to Elevation 727 feet at the southeast corner of the residential properties. At the intersection of the residential properties and the existing school property, a downward hill is present with a drainage swale at the bottom, with the lowest elevations ranging from approximately Elevation 720 to 722 feet. Grades then slope back up toward the proposed new building to an average of approximately Elevation 724 feet.

SITE PREPARATION

Based on the existing soil conditions and provided grading plan, a significant amount of earthwork will be required to develop the site. Earthwork operations are expected to consist of removing any existing topsoil, vegetation, trees, pavements, and fencing, demolition of existing utilities and foundations, backfilling the resulting excavations with engineered fill, undercutting unsuitable fill soils or installation of a ground improvement system for support of foundations, floor slabs, and engineered fill, subgrade preparation for support engineered fill and floor slabs, and placing engineered fill to achieve proposed grade. We recommend all earthwork operations be performed in accordance with comprehensive specifications and be properly monitored in the field by qualified geotechnical engineers and technicians.

At the start of earthwork operations, any vegetation, trees, associated root structures, topsoil, sidewalk, bituminous pavement, foundations, and athletic fencing should be completely removed from within the limits of any areas of development. Within the existing drainage swale, we anticipate soft and/or organic surface soil deposits may be present and should be completely removed to the underlying native very stiff to hard cohesive soil. The existing bleachers, goal posts, and associated foundations must be completely removed within the footprint of the proposed building, and resulting excavations must be backfilled with engineered fill.

Existing utilities in the footprint of the proposed building must be completely removed and excavations backfilled with engineered fill for support of shallow foundations, engineered fill, and floor slabs. Any existing utility lines that will be abandoned and lie outside the proposed building footprint and zone of influence of proposed foundations should either be completely removed or backfilled with cement grout.

Based on the proposed finished floor elevation of 725.5 feet, up to 5-1/2 feet of engineered fill will be required to achieve finished grades. The existing fill soils, buried topsoil, and soft to stiff sandy clay and silty clay extending to depths of up to 12 feet below finished grade are not suitable for direct support of additional engineered fill or foundations. Two options for site development and support of foundations and floor slabs are thoroughly discussed in the FOUNDATION RECOMMENDATIONS and FLOOR SLAB RECOMMENDATIONS sections of this report, including complete removal and replacement of the existing fill and underlying soft to stiff sandy clay or installation of a ground improvement system (stone columns or rammed aggregate piers).

Following satisfactory removal of any trees, vegetation, topsoil, sidewalk, and pavements and prior to placement of any engineered fill, the exposed cohesive subgrade (existing fill or native silty clay and sandy clay) should be thoroughly proof rolled with a tri-axle fully loaded dump truck. The subgrade should be monitored by a qualified geotechnical engineer or technician. Any unstable or unsuitable areas noted should be improved by additional compaction or removed and replaced with specified engineered fill. Any soils that are disturbed during earthwork operations should be removed and replaced with engineered fill.

Deep topsoil deposits (14 to 30 inches) were noted at borings B-26, B-30, and B-38. A budget for undercuts on the order of 25 to 30 percent of the pavement area at the west access drives, east parking lot, and east drop-off loop should be assumed in the bid phase in consideration of the loose granular fill, soft to medium cohesive soils, existing fill with organic matter, and buried topsoil anticipated at subgrade elevation, such as present in the vicinity of borings B-20, B-25, and B-42. The north parking lot and drop-off loop is anticipated to consist of predominantly native stiff to hard silty clay and sandy clay and stiff to very stiff sandy clay fill. In general, we anticipate these soils will be stable for support of engineered fill and pavements. The contractor should be prepared to use tri-axial geogrid to limit the undercut depths. Undercuts should be backfilled with MDOT 21AA limestone dense graded aggregate and drain tiles should be installed to connect to the stormwater management system to promote drainage and prevent water accumulation within the undercut excavations. A G2 representative must be on site during earthwork operations to observe these operations and provide recommendations on subgrade preparation.

We recommend earthwork operations be performed in the warm, dry summer months to minimize exposing the cohesive soils to moisture and undercut requirements. When exposed to significant traffic loads and precipitation events, undercuts of the cohesive soils should be anticipated. Areas of instability may develop under the repeated loading from heavy construction equipment or moisture. The contractor should be prepared to undercut any areas of instability that develop within the cohesive soils and place crushed limestone in combination with tri-axial geogrid, if necessary, to stabilize the subgrade soils. Recommendations for this should be provided by a representative of G2 on site. Additionally, we recommend the aggregate base for pavements be placed immediately after subgrade preparation operations have been completed to limit the amount of disturbance to the prepared subgrade.

Engineered fill should be free of organic matter, frozen soil, clods, or other harmful material. The fill should be placed in uniform horizontal layers that are not more than 9 inches in loose thickness. The engineered fill should be compacted to achieve a density of at least 95 percent of the maximum dry density as determined by the Modified Proctor compaction test (ASTM D 1557). All engineered fill material should be placed and compacted at approximately the optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade. Based on the presence of organic matter, we do not anticipate the existing fill will be suitable for reuse as engineered fill within the building footprint or proposed pavement areas. Any existing fill can be used within landscape areas.

We recommend using granular engineered fill within confined areas such as demolished utility trenches and foundation excavations. Granular engineered fill is generally more easily compacted than cohesive

soils within these confined areas. Additionally, the proper placement and compaction of backfill within these areas is imperative to provide adequate support for overlying foundations, floor slabs, and pavements.

FOUNDATION RECOMMENDATIONS

Based on the proposed finished floor elevation of 725.5 feet, up to approximately 2-1/2 feet of engineered fill are required across the north half of the building footprint and up to 5-1/2 feet of engineered are required across the south half of the building footprint. The existing fill soils and buried topsoil encountered within the building footing (which extend to approximate elevations ranging from 722-1/2 to 712-1/2 feet) are not suitable for support of building foundations. Additionally, we estimate the native soft to stiff sandy clay extending to elevations ranging from 718 to 714-1/2 feet at borings B-27, B-30, and B-31 will consolidate under the weight of the engineered fill to raise site grades; therefore, settlement plates to monitor consolidation associated with the overburden pressure would be required for an extended period of time prior to construction of foundations and floor slabs.

Based on the constructability issues associated with the existing fill, soft to medium sandy clay, and required engineered fill to raise site grades, we recommend two options be considered for support of the proposed building including 1) complete removal of the existing fill, buried topsoil, and native soft to medium sandy clay to the underlying native stiff to hard silty clay and replacement with granular engineered fill for support of shallow foundations, or 2) installation of a ground improvement system, consisting of rammed aggregate piers or vibro compacted stone columns, for support of shallow foundations.

OPTION 1 includes complete removal of the existing fill, buried topsoil, and soft to medium sandy clay within the building footprint and a minimum of 10 feet beyond. No existing fill soils are present at borings B-10 through B-12, B-15, B-16, B-29, and B-36. At these boring locations, the native very stiff to hard silty clay and sandy clay are suitable for direct support of engineered fill to raise site grades and building foundations. At the remaining boring locations, approximately 3 to 8-1/2 feet of existing fill, buried topsoil, and soft to stiff sandy clay must be removed to expose the underlying native very stiff to hard silty clay and sandy clay within the building footprint and a minimum of 10 feet beyond. The approximate thicknesses of the existing fill, topsoil, soft to medium sandy clay, and required engineered fill to achieve proposed finished grades are presented on Plate No. 2 in the Appendix, Site Preparation Plan.

Following removal of the existing fill, buried topsoil, and soft to stiff sandy clay, the resulting excavations should be backfilled with engineered fill. Once the undercut excavations have been backfilled, additional engineered fill can then be placed to raise the building footprint to the proposed finished grade. We recommend granular engineered fill (such as Class II or Class III sand or MDOT 21AA) to backfill excavations to a minimum elevation of 720 feet to minimize settlement associated with the proposed thick fill layer. To allow foundation excavations to be earth formed, cohesive engineered fill can be used above Elevation 720 feet, if desired. Foundations bearing on a combination of the native stiff to hard silty clay and engineered fill overlying native soils can be designed for a net allowable bearing capacity of 3,000 psf.

OPTION 2 includes the existing fill and soft to medium sandy clay remaining in place for support of additional engineered fill and subsequent installation of a ground improvement system, consisting of rammed aggregate piers or vibro-compacted stone columns, for support of shallow foundations. We anticipate a cost savings can be assumed by using the native very stiff to hard silty clay and sandy clay at the north end of the building for support of foundations (and floor slabs), as able by the design engineer provided differential settlement is not a concern. *G2 should work closely in the field with the contractor during topsoil removal to determine where native versus fill soils begin across the building footprint. This delineate the extent of suitable soils for support of engineered fill, floor slabs, and potentially foundations.*

For this option, engineered fill to achieve proposed finished grades can be cohesive or granular. Following placement of engineered fill to achieve proposed finished grades, a soil improvement system, such as rammed aggregate piers or vibro compacted stone columns, may be used to improve ground conditions and support the proposed building foundations and floor slabs without the extensive undercut requirements. Rammed aggregate soil improvement systems typically consist of drilling 30-inch diameter holes and ramming 1-foot lifts of aggregate into the excavations to improve the bearing capacity of the existing soils. Vibro compacted stone columns are constructed by vibrating a lance into the ground and placing aggregate through the lance to displace and compact the existing fill soils.

Conventional strip and spread footings are then designed to bear on the improved subgrade. The rammed aggregate pier and vibro stone column spacing and depth are evaluated along with the existing soil and groundwater conditions to achieve a cost optimized bearing capacity, typically ranging between 3,000 and 5,000 psf. Foundations bearing directly on the native very stiff to hard silty clay and sandy clay can be designed for a net allowable soil bearing capacity of 4,000 psf. Further analyses will be required by the ground improvement design engineer to determine the design parameters for the ground improvement systems. Settlement of the existing fill and native soft to stiff sandy clay due to the overburden pressure from the additional fill to achieve finished grades must be evaluated by the design engineer.

General

Exterior foundations should bear at a minimum depth of 3-1/2 feet below finished grade for protection against frost heave. Interior foundations can bear at shallower depths provided suitable bearing soils are present and foundations are protected from frost during construction operations. G2 must be onsite during construction to observe the excavations, measure the bearing depths, and verify the adequacy of the bearing soils.

Continuous wall or strip footings should be at least 12 inches in width and isolated spread footings should be at least 30 inches in their least dimension. If required to construct foundations at different levels, the adjacent foundations should be designed and constructed so the least lateral distance between the foundations is equivalent to or more than the difference in their bearing levels. To achieve a change in the level of a strip footing, the footing should be gradually stepped at a grade no steeper than two units horizontal to one unit vertical.

If the recommendations outlined in this report are adhered to, total and differential settlements for the completed structure should be within 1 inch and 1/2 inch, respectively. We expect settlements of these magnitudes are within tolerable limits for the type of addition proposed. We recommend all strip footings be suitably reinforced to minimize the effects of differential settlements associated with local variations in subsoil conditions.

FLOOR SLAB RECOMMENDATIONS

Assuming the existing fill will remain and a ground improvement system is installed, the floor slab should be designed to be supported by the ground improvement system. At the north side of the building footprint, the native very stiff to hard silty clay and sandy clay and engineered fill placed directly over the native cohesive soils are suitable for direct support of floor slabs. Therefore, we recommend the ground improvement system design engineer evaluate the potential for supporting floor slabs on a combination of native silty clay and the ground improvement system. *The extent of native soil on the north side of the building footprint must be evaluated delineated by a representative of G2 prior to placement of any engineered fill.*

We recommend at least 4 inches of pea gravel be placed between the subgrade and the bottom of the floor slab for use as a capillary break to reduce moisture transmission through the concrete floors and to reduce the potential for concrete curling. If moisture sensitive floor coverings are planned, or if

greater protection against vapor transmission is desired, a vapor barrier, consisting of at least 10-mil plastic sheeting, may be placed over the capillary break layer beneath floor slabs. We recommend all concrete floor slabs be suitably reinforced and separated from the foundation system to allow for independent movement.

PAVEMENT RECOMMENDATIONS

We understand the project includes construction of new bituminous parking lots and access drives. We anticipate subgrade soils after completion of site grading operations will be variable across the extent of the property. The subgrade at the access drives extending to Livernois Road is anticipated to consist of native medium to stiff silty clay and loose silty sand fill with organic matter. The subgrade at the north parking lot and drop-off loop is anticipated to consist of very stiff sandy clay fill with organic matter, medium compact silty sand fill, native very stiff to hard silty clay, and engineered fill to raise site grades. The subgrade at the east parking lot and drop-off loop is anticipated to consist of hard silty clay fill with organic matter, buried topsoil, native hard sandy clay, and engineered fill to raise site grades.

The subgrade should be properly prepared as outlined in the SITE PREPARATION section of this report. For purposes of this design, we have assumed a soil resilient modulus of 6,000 pounds per square inch (psi) for the predominantly very stiff to hard fill and native cohesive soils and engineered fill to raise site grades.

We have assumed a load of 175,000 equivalent single-axle loads (ESALS) over a 20-year design life for the heavy-duty bituminous pavement section and 50,000 ESALS for the standard-duty section. If actual traffic loading information becomes available, G2 must be notified so that we may review our design assumptions. For purposes of design, we recommend a serviceability loss of 2.0, a standard deviation of 0.45 for flexible pavements, and a reliability factor of 0.90. Based on the results of our analysis, we recommend the following pavement design cross-sections:

Standard-Duty Flexible Pavement Section		
Material	**Thickness**	**Structural Coefficient**
Bituminous Wearing Course (MDOT 5EML)	2 inches	0.42
Bituminous Leveling Course (MDOT 4EML)	2 inches	0.42
MDOT 21AA Dense Graded Limestone Aggregate Base	8 inches	0.14

Heavy-Duty Flexible Pavement Section		
Material	**Thickness**	**Structural Coefficient**
Bituminous Wearing Course (MDOT 5EML)	2 inches	0.42
Bituminous Leveling Course (MDOT 4EML)	3 inches	0.42
MDOT 21AA Dense Graded Limestone Aggregate Base	10 inches	0.14

All pavement materials are specified within the 2020 Standard Specifications for Construction from the Michigan Department of Transportation. The bituminous pavement materials are described in Section 501 and can be assigned a structural coefficient number of 0.42. Imported MDOT 21AA dense graded aggregate base material can be assigned a structural coefficient number of 0.14. We recommend that bituminous concrete utilize grade PG 68-22 binder, with no more than 17 percent of the overall binder content from reclaimed asphalt pavement (RAP) within the top wearing course layer.

CONSTRUCTION CONSIDERATIONS

We anticipate the contractor will be able to excavate foundations within open, neat excavations within the existing cohesive soils at the north side of the proposed building. However, where granular

engineered fill is utilized to backfill excavations or raise grades, caving and sloughing may occur during foundation excavation operations. Therefore, the contractor should be prepared to over excavate and form foundations, as necessary. The sides of the foundations should be constructed straight and vertical to reduce the risk of frozen soil adhering to the concrete and raising the foundation.

In general, we do not anticipate significant groundwater will be encountered within foundation excavations. However, perched groundwater should be anticipated within the fill soils. Seepage from the soft to stiff sandy clay should also be anticipated. In general, we believe any surface run-off or seepage can typically be controlled with properly constructed sumps and pumps. Groundwater should not be allowed to accumulate on the existing cohesive soils to avoid disturbing the subgrade stability or bearing soils.

Where excavations extend deeper than 5 feet and sufficient space is available, we recommend maximum slopes of 2 horizontal units to 1 vertical unit (2H:1V) for sloped excavations within the existing fill and native soft to stiff sandy clay, and 1H:1V within the native very stiff to hard silty clay. The tops of the slopes should be barricaded to prevent vehicles and storage loads within 10 feet of the tops of the slopes. If the temporary construction excavations are to be maintained during the rainy season, berms are suggested along the tops of the slopes to prevent runoff water from entering the excavation and eroding the slope faces.

All excavations should be safely sheeted, shored, sloped, or braced in accordance with MI-OSHA requirements. If material is stored or equipment is operated near an excavation, lower angle slopes or stronger shoring must be used to resist the extra pressure due to the superimposed loads. Care should be exercised when excavating near existing roadways or utilities to avoid undermining.

GENERAL COMMENTS

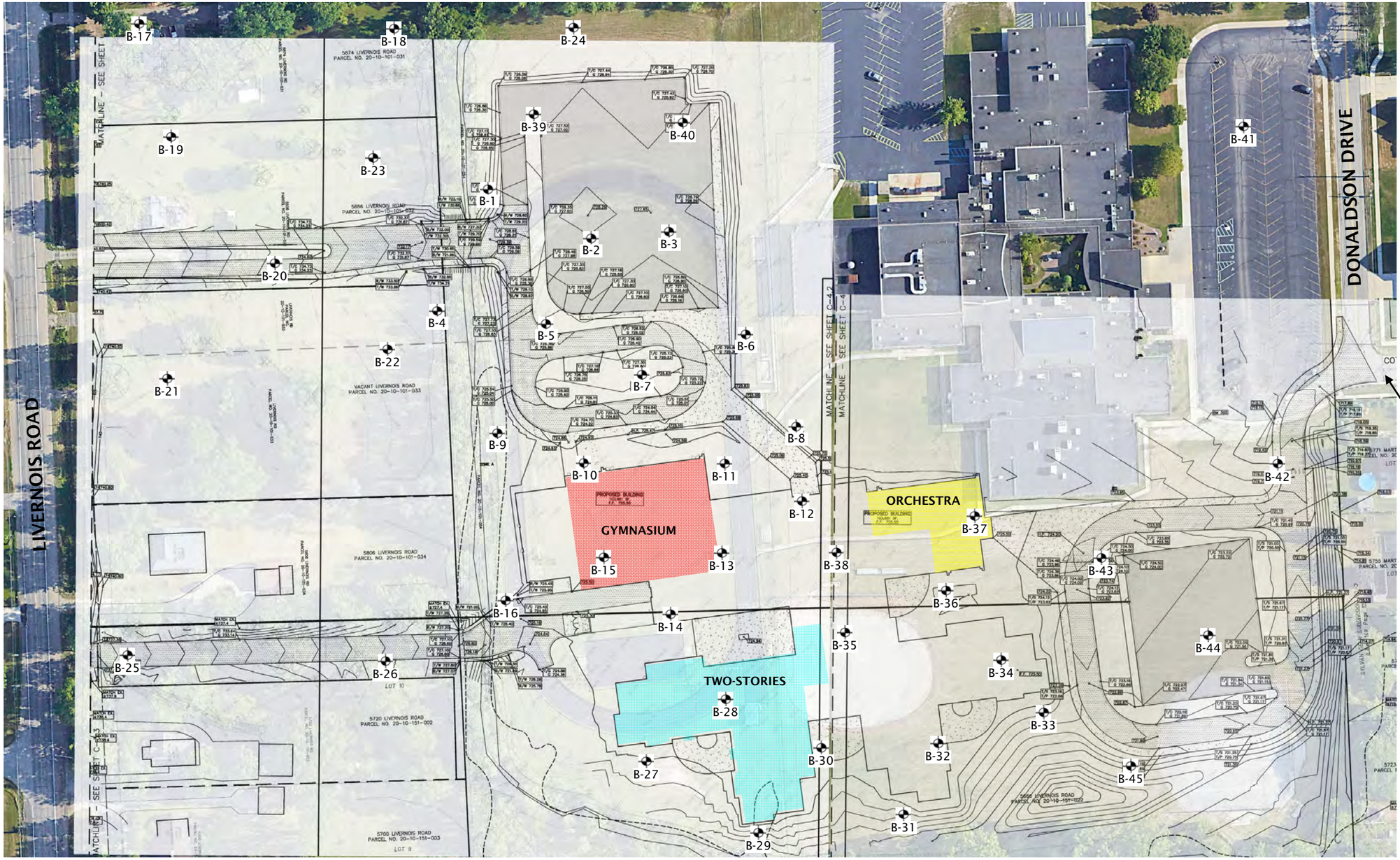
We have formulated the evaluations and recommendations presented in this report relative to site preparation and development on the basis of data provided to us relating to the project location, scope, and surface grade for the proposed site. Any significant change in this data should be brought to our attention for review and evaluation with respect to prevailing subsurface conditions. Furthermore, if changes occur in the design, location, or concept of the project, conclusions and recommendations contained in this report are not valid unless G2 Consulting Group, LLC reviews the changes. G2 Consulting Group, LLC will then confirm the recommendations presented herein or make changes in writing.

The scope of the present investigation was limited to evaluation of subsurface conditions for the proposed building and pavements and other related aspects of the development. No chemical, environmental, or hydrogeological testing or analyses were included in the scope of this investigation.

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

We recommend G2 Consulting Group, LLC observe all geotechnical related work, including foundation construction, subgrade preparation, and engineered fill placement. G2 Consulting Group, LLC will perform the appropriate testing to confirm the geotechnical conditions given in the report are found during construction.

APPENDIX



Legend

Soil Borings B-1 through B-16 Drilled by 2G Drilling on August 3, 4, 21, and 22, 2023
Soil Borings B-17 through B-27 Drilled by Strata Drilling on November 30, 2023
Soil Borings B-27 through 45 Drilled by Strata Drilling on February 5 and 6, 2024

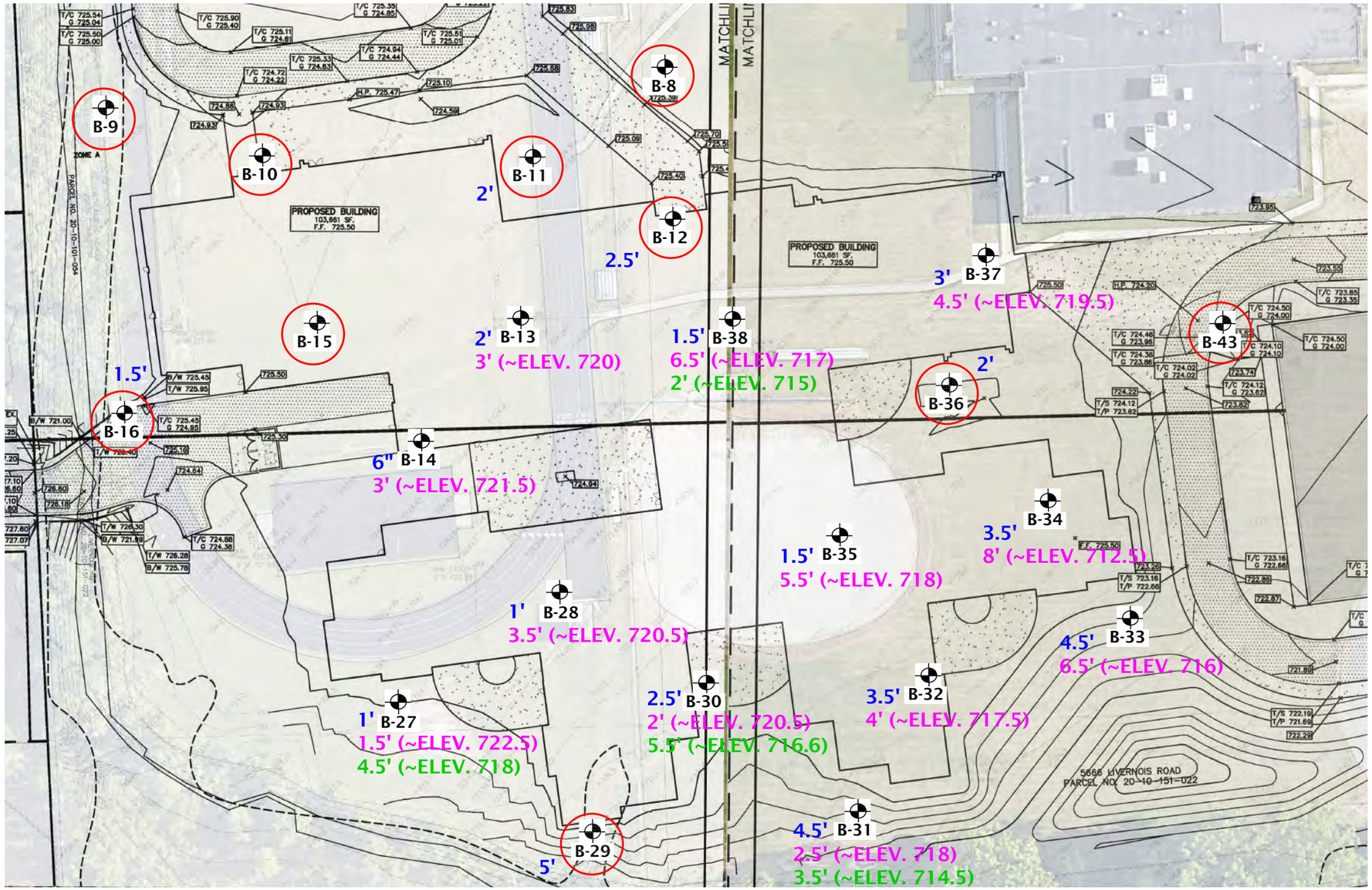
**B-4 not performed due to revised building alignment*

Soil Boring Location Plan

Smith Middle School - Revised Alignment
5835 Donaldson Road
Troy, Michigan 48085

2G CONSULTING GROUP

Project No. 230618	
Drawn by: ALS	
Date: 2/23/24	Plate No. 1
Scale: NTS	



Legend

◯	NATIVE STIFF TO HARD SILTY CLAY AND SANDY CLAY @ SUBGRADE ELEVATION
1'	APPROXIMATE THICKNESS OF ENGINEERED FILL REQUIRED TO ACHIEVE SUBGRADE BELOW FINISHED FLOOR
1.5' (~ELEV. 722.5)	APPROXIMATE THICKNESS OF FILL AND BURIED TOPSOIL LAYER (ELEVATION @ BOTTOM)
4.5' (~ELEV. 718)	APPROXIMATE THICKNESS OF NATIVE SOFT TO STIFF SANDY CLAY LAYER (ELEVATION @ BOTTOM)

SITE PREPARATION PLAN

Smith Middle School - Revised Alignment
5835 Donaldson Road
Troy, Michigan 48085

2G CONSULTING GROUP

Project No. 230618	
Drawn by: ALS	
Date: 2/23/24	Plate No. 2
Scale: NTS	

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-1**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (6 inches) 0.5							
		Very Stiff to Hard Brown Silty Clay with trace sand and gravel		S-1	5 4 3	7	11.9		9000*
719.0		4.0	5	S-2	4 3 4	7	12.7		6500*
				S-3	2 2 3	5	13.7		5000*
714.0			10	S-4	2 2 3	5	14.3		7000*
		Very Stiff to Hard Gray Silty Clay with trace sand and gravel		S-5	3 3 5	8	15.2		9000*
709.0			15						
				S-6	3 3 5	8	13.9		8500*
704.0			20						
				S-7	3 7 9	16	14.6		8000*
699.0		25.0	25						
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 3, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 1

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-2

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (8 inches) 0.7		S-1	6 8 8	16	11.0		9000*
720.5		Hard Brown Silty Clay with trace sand and gravel	5	S-2	6 12 18	30	11.4		9000*
				S-3	5 8 9	17	12.0		9000*
715.5		9.0	10	S-4	4 5 6	11	11.6		9000*
710.5			15	S-5	4 6 6	12	13.7		8500*
705.5		Very Stiff to Hard Gray Silty Clay with trace sand and gravel	20	S-6	3 3 5	8	13.9		5000*
700.5		25.0	25	S-7	4 5 5	10	13.1		6000*
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 3, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 2

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-3

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (4-1/2 inches) 0.4							
				S-1	3 4 5	9	14.5		9000*
719.5		Hard Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-2	4 9 13	22	14.8		9000*
		6.0		S-3	8 10 14	24	12.0		9000*
714.5		Hard Mottled Brown Silty Clay with trace sand and gravel	10	S-4	7 11 13	24	13.4		9000*
		13.0		S-5	3 4 7	11	13.2		6500*
709.5			15						
704.5		Very Stiff Gray Silty Clay with trace sand and gravel	20	S-6	4 5 8	13	13.4		6500*
699.5		25.0	25	S-7	5 6 8	14	12.4		6500*
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 21, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 3

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-5

CONSULTING GROUP

SUBSURFACE PROFILE

SOIL SAMPLE DATA

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Brown Silty Clay (7 inches) 0.6							
				S-1	5 8 8	16	11.2		9000*
720.0		Hard Brown Silty Clay with trace sand	5	S-2	6 8 12	20	12.3		9000*
		7.0		S-3	6 7 7	14	10.2		9000*
715.0			10	S-4	5 5 6	11	12.0		9000*
710.0			15	S-5	4 5 7	12	13.5		7000*
705.0		Very Stiff to Hard Gray Silty Clay with trace sand and gravel	20	S-6	4 5 7	12	12.2		7000*
700.0		25.0	25	S-7	4 5 8	13	12.8		6500*
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 3, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 4

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-6

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (7 inches) 0.6							
		Fill: Very Stiff Dark Brown Sandy Clay with trace silt, gravel, and organic matter (Organic Matter Content = 2.6%) 2.0		S-1	3 4 7	11	16.2		7000*
719.5		Stiff Brown Sandy Clay with trace silt and gravel	5	S-2	2 3 2	5	16.8	120	2500*
		6.0		S-3	6 8 10	18	12.5		9000*
714.5		Very Stiff to Hard Brown Sandy Clay with trace silt and gravel	10	S-4	10 11 12	23	11.4		6000*
		13.0							
709.5			15	S-5	4 6 10	16	13.6		5000*
704.5		Stiff to Very Stiff Gray Silty Clay with trace sand and gravel	20	S-6	3 4 6	10	13.8		3500*
699.5		25.0	25	S-7	5 7 9	16	13.6		5500*
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 22, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

Water Level Observation:
6 feet during drilling; 21 feet upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 5

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-7

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (5 inches) 0.4							
		Fill: Medium Compact Brown Silty Sand with trace clay and gravel		S-1	5 8 12	20			
		3.0							
720.5			5	S-2	4 6 10	16	17.2	113	8250
				S-3	5 6 9	15	13.7		9000*
		Hard Brown Silty Clay with trace sand and gravel							
715.5			10	S-4	6 8 11	19	12.8		9000*
		13.0							
710.5			15	S-5	3 4 6	10	12.7		8000*
		Very Stiff Gray Silty Clay with trace sand and gravel							
705.5			20	S-6	4 6 8	14	13.6		7500*
700.5		25.0	25	S-7	5 5	---	13.8		5500*
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 21, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 6

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-8**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (11 inches) 0.9							
		Fill: Stiff Black and Dark Brown Sandy Clay with trace silt, gravel, and organic matter (Organic Matter Content = 2.3%)		S-1	3 3 5	8	19.3		3000*
		4.0							
718.0			5	S-2	3 3 6	9	17.0	115	5240
				S-3	7 11 14	25	12.7		9000*
713.0		Very Stiff to Hard Mottled Brown Silty Clay with trace sand and gravel	10	S-4	7 13 15	28	12.4		9000*
		14.5							
708.0			15	S-5	6 8 13	21	12.5		8500*
703.0		Very Stiff to Hard Gray Silty Clay with trace sand and gravel	20	S-6	6 7 9	16	13.7		7500*
698.0		25.0	25	S-7	5 6 9	15	16.9		9000*
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 22, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 7

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-9**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (7 inches) 0.6							
				S-1	4 8 9	17	10.4		9000*
		Hard Brown and Gray Silty Clay with trace sand and gravel							
719.5			5	S-2	8 9 10	19	10.9		9000*
		6.0		S-3	6 6 8	14	11.9		9000*
714.5			10	S-4	5 6 8	14	12.6		9000*
				S-5	6 8 10	18	12.1		8000*
709.5		Very Stiff to Hard Gray Silty Clay with trace sand and gravel	15						
				S-6	5 6 8	14	12.5		7000*
704.5			20						
				S-7	6 9 11	20	13.9		6000*
699.5		25.0	25						
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 22, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 8

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-10

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (7 inches) 0.6		S-1	5 9 11	20	8.3		9000*
720.5		Hard Brown Silty Clay with trace with trace sand and gravel	5	S-2	4 6 11	17	12.6		9000*
				S-3	5 9 11	20	12.7		9000*
		9.0		S-4	5 8 10	18	12.7		9000*
715.5		Hard Brown and Gray Silty Clay with trace sand and gravel	10						
		12.0		S-5	12 15 20	35	12.8		9000*
710.5			15						
		Very Stiff to Hard Gray Silty Clay with trace sand and gravel		S-6	8 10 10	20	10.3		9000*
705.5			20						
				S-7	8 8 11	19	12.5		7000*
700.5		25.0	25						
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 4, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 9

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-11**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (6 inches) 0.5							
				S-1	4 5 4	9	15.4		8500*
719.0			5	S-2	4 3 4	7	12.0		7000*
		Very Stiff to Hard Brown Sandy Clay with trace silt and gravel		S-3	4 7 9	16	10.8		9000*
714.0			10	S-4	10 13 13	26	9.5		9000*
		12.0							
		Very Stiff Brown and Gray Silty Clay with trace sand and gravel		S-5	9 11 13	24	13.5		7500*
709.0			15						
		16.0							
				S-6	4 7 9	16	13.8		7000*
704.0			20						
		Very Stiff Gray Silty Clay with trace sand and gravel, occasional silt seams							
				S-7	4 6 8	14	12.7		6000*
699.0		25.0	25						
		End of Boring @ 25 ft							

Total Depth: 25 ft
Drilling Date: August 21, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 10

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-12

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (7 inches) 0.6							
		Hard Brown Sandy Clay with trace silt and gravel		S-1	8 12 7	19	10.0		9000*
		3.0							
718.0		Very Stiff Mottled Brown and Gray Silty Clay with trace sand and gravel	5	S-2	3 3 3	6	20.0	111	4940
		6.0							
				S-3	3 3 4	7	13.9		6000*
713.0		Very Stiff to Hard Brown Silty Clay with trace sand and gravel	10	S-4	6 9 12	21	12.2		9000*
		13.0							
708.0			15	S-5	7 10 12	22	12.2		9000*
		Very Stiff to Hard Gray Silty Clay with trace sand and gravel							
703.0		20.0	20	S-6	4 6 7	13	13.8		4500*
		End of Boring @ 20 ft							
698.0			25						

Total Depth: 20 ft
Drilling Date: August 22, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 11

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-13

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (5 inches) 0.4							
		Fill: Very Stiff Brown Sandy Clay with trace silt, gravel, and organic matter (Organic Matter Content = 1.1%)		S-1	4 3 4	7	14.3		5000*
		3.0							
718.0			5	S-2	3 3 4	7	17.7		8000*
				S-3	4 6 8	14	14.2		9000*
713.0		Very Stiff to Hard Mottled Brown Silty Clay with trace sand and gravel	10	S-4	8 12 17	29	13.6		9000*
708.0			15	S-5	3 4 7	11	16.9		7500*
		16.0							
		Hard Gray Silty Clay with trace sand and gravel							
703.0		20.0	20	S-6	3 4 7	11	13.1		8000*
		End of Boring @ 20 ft							
698.0			25						

Total Depth: 20 ft
Drilling Date: August 21, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 12

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-14**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (6 inches) 0.5							
		Fill: Very Stiff Dark Brown and Brown Sandy Clay with trace silt, gravel, and organic matter (Organic Matter Content = 1.6%)		S-1	3 3 4	7	15.0		6500*
		3.0							
719.5			5	S-2	1 2 3	5	17.0	116	8550
				S-3	9 12 13	25	13.1		9000*
		Very Stiff to Hard Brown Silty Clay with trace sand and gravel							
714.5			10	S-4	8 12 17	29	12.2		9000*
		13.0							
709.5			15	S-5	3 4 7	11	15.5		7000*
		Very Stiff Gray Silty Clay with trace sand and gravel							
704.5		20.0	20	S-6	2 4 8	12	12.7		8000*
		End of Boring @ 20 ft							
699.5			25						

Total Depth: 20 ft
Drilling Date: August 21, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 13

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-15

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Sandy Clay (6 inches) 0.5							
		Hard Brown Sandy Clay with trace silt and fine roots		S-1	4 7 9	16	14.6		9000*
		3.0							
720.0		Hard Brown and Gray Silty Clay with trace sand and gravel	5	S-2	6 11 10	21	18.9		9000*
		6.0		S-3	10 14 17	31	10.6		9000*
715.0		Hard Brown Silty Clay with trace sand and gravel	10	S-4	8 14 19	33	12.5		9000*
		12.0							
710.0			15	S-5	4 7 9	16	12.5		9000*
		Hard Gray Silty Clay with trace sand and gravel							
705.0		20.0	20	S-6	4 6 9	15	12.3		9000*
		End of Boring @ 20 ft							
700.0			25						

Total Depth: 20 ft
Drilling Date: August 4, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 14

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-16**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (6 inches) 0.5		S-1	3 4 5	9	12.9		9000*
718.5			5	S-2	3 9 13	22	12.1		9000*
		Hard Brown Silty Clay with trace sand and gravel		S-3	3 7 11	18	12.7		9000*
713.5			10	S-4	3 7 10	17	12.9		9000*
		12.0		S-5	4 4 7	11	13.1		7000*
708.5		Very Stiff Gray Silty Clay with trace sand and gravel	15						
703.5		20.0	20	S-6	4 5 8	13	13.1		7500*
		End of Boring @ 20 ft							
698.5			25						

Total Depth: 20 ft
Drilling Date: August 21, 2023
Inspector:
Contractor: 2G Drilling
Driller: H. Pace

Drilling Method:
2-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 15

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-17**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 742.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (16 inches) 1.3							
				S-1	2 2 5	7	17.4		5000*
		Very Stiff to Hard Brown Sandy Clay with trace silt and gravel							
737.0		5.0	5	S-2	8 14 16	30	10.1		9000*
		End of Boring @ 5 ft							
732.0			10						
727.0			15						
722.0			20						
717.0			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 16

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-18**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 736.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (8 inches) 0.7							
		Very Stiff Brown Silty Clay with little sand and trace gravel 2.5		S-1	3 7 7	14	15.1		8000*
731.0		Very Stiff Hard Brown Sandy Clay with trace silt and gravel 5.0	5	S-2	5 6 8	14	11.0		8000*
		End of Boring @ 5 ft							
726.0			10						
721.0			15						
716.0			20						
711.0			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 17

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-19**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 738.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (9 inches) 0.8							
		Medium Brown Sandy Clay with trace silt and gravel 2.5		S-1	0 2 2	4	16.8		1000*
733.5		Very Stiff Brown and Gray Silty Clay with trace sand and gravel 5.0	5	S-2	2 4 7	11	15.5		6000*
		End of Boring @ 5 ft							
728.5			10						
723.5			15						
718.5			20						
713.5			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
2-1/2 feet during drilling; 3-1/2 feet upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 18

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-20

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 735.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Clayey Sand (12 inches) 1.0							
				S-1	0 1 3	4	18.4		2000*
		Medium to Stiff Brown and Gray Silty Clay with trace sand and grave							
730.5		5.0	5	S-2	2 2 2	4	20.5		1000*
		End of Boring @ 5 ft							
725.5			10						
720.5			15						
715.5			20						
710.5			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
Standing water at ground surface during drilling; 3 feet upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 19

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-21

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 739.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Clayey Sand (10 inches) 0.8							
		Fill: Soft Dark Brown Silty Clay with trace sand, gravel, and organic matter, occasional wet sand seams (Organic Matter Content = 2.3%) 3.0		S-1	0 1 1	2	17.4		500*
734.5		Hard Brown and Gray Silty Clay with trace sand and gravel 5.0	5	S-2	3 6 9	15	11.8		8000*
		End of Boring @ 5 ft							
729.5			10						
724.5			15						
719.5			20						
714.5			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 20

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-22

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 734.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (11 inches) 0.9							
		Fill: Very Loose Brown Clayey Sand with trace silt, gravel, and organic matter (Organic Matter Content = 1.5%)		S-1	0 2 2	4			
		3.5							
729.0		Hard Brown and Gray Silty Clay with trace sand and gravel 5.0	5	S-2	2 4 6	10	13.8		8000*
		End of Boring @ 5 ft							
724.0			10						
719.0			15						
714.0			20						
709.0			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
2-1/2 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 21

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-23

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 736.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (8 inches) 0.7							
		Fill: Medium Sandy Clay with trace silt and gravel, occasional sand seams 2.0		S-1	2 2 3	5	19.7		4000*
731.5		Very Stiff to Hard Brown Silty Clay with trace sand and gravel 5.0	5	S-2	5 6 8	14	12.3		9000*
		End of Boring @ 5 ft							
726.5			10						
721.5			15						
716.5			20						
711.5			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 22

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-24

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (8 inches) 0.7							
		Fill: Hard Dark Brown Silty Clay with trace sand and gravel		S-1	5 7 7	14	11.4		8000*
		3.0							
720.0		Hard Brown Silty Clay with trace sand and gravel 5.0	5	S-2	6 7 8	15	13.0		9000*
		End of Boring @ 5 ft							
715.0			10						
710.0			15						
705.0			20						
700.0			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 23

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-25

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 737.0 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Fill: Loose Reddish Brown Silty Sand with trace clay, gravel, and organic matter (Organic Matter Content = 3.3%)		S-1	2 2 3	5	30.2		
		4.0							
732.0		Stiff Brown and Gray Silty Clay with trace sand and gravel 5.0	5	S-2	2 2 3	5	20.2		2500*
		End of Boring @ 5 ft							
727.0			10						
722.0			15						
717.0			20						
712.0			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 24

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-26

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 729.5 ft ±	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Sand (14 inches) 1.2							
		Stiff Brown Silty Clay with trace sand and gravel 3.0		S-1	2 3 4	7	17.2		3000*
724.5		Hard Brown and Gray Silty Clay with trace sand and gravel 5.0	5	S-2	3 4 8	12	13.0		6000*
		End of Boring @ 5 ft							
719.5			10						
714.5			15						
709.5			20						
704.5			25						

Total Depth: 5 ft
Drilling Date: November 30, 2023
Inspector:
Contractor: Strata Dilling, Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 25

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-27

G2 CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Fill: Crushed Stone							
		1.5		S-1	5 4 6	10	14.6		3000*
720.5		Medium to Stiff Brown Sandy Clay with trace silt and gravel, occasional wet sand seams	5	S-2	2 3 4	7	17.6		1500*
		6.0		S-3	6 10 14	24	14.9		9000*
		Hard Brown and Gray Silty Clay with trace sand and gravel							
715.5		8.0	10	S-4	6 13 16	29	11.3		9000*
		Hard Brown Silty Clay with trace sand and gravel							
		12.0		S-5	4 6 9	15	13.7		6000*
710.5		Very Stiff Gray Silty Clay with trace sand and gravel	15						
		20.0		S-6	4 7 9	16	13.2		6000*
705.5		End of Boring @ 20 ft	20						
700.5			25						

Total Depth: 20 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3-1/2 feet during drilling operations; dry upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 26

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-28

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Sandy Clay (5 inches) 0.4							
		Fill: Soft Brown Sandy Clay with trace silt, gravel, roots, organic matter, occasional wet sand seams (Organic Matter Content = 2.3%)		S-1	0 0 2	2	26.3		500*
		3.5							
719.0		Very Stiff Brown and Gray Silty Clay with trace sand and gravel	5	S-2	3 6 9	15	15.5		4500*
		6.0		S-3	7 10 13	23	14.3		9000*
714.0		Very Stiff to Hard Brown Silty Clay with trace sand and gravel	10	S-4	6 12 18	30	12.9		9000*
		14.0		S-5	4 7 10	17	18.4		5000*
709.0		Very Stiff Gray Silty Clay with trace gravel and sand	15						
704.0		20.0	20	S-6	5 7 9	16	13.6		7000*
		End of Boring @ 20 ft							
699.0			25						

Total Depth: 20 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 27

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-29

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 720.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (7 inches) 0.6							
				S-1	3 3 4	7	16.1		4500*
715.0			5	S-2	4 8 12	20	11.1		6000*
		Very Stiff to Hard Brown Silty Clay with trace sand and gravel		S-3	6 10 12	22	11.2		7000*
710.0			10	S-4	7 14 18	32	12.0		9000*
		11.0							
705.0			15	S-5	3 6 8	14	13.6		6000*
		Very Stiff Gray Silty Clay with trace sand and gravel							
700.0		20.0	20	S-6	4 6 9	15	13.8		5000*
		End of Boring @ 20 ft							
695.0			25						

Total Depth: 20 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 28

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-30

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 722.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (Organic Matter Content = 1.3%)							
		2.0		S-1	2 2 4	6	14.3		1500*
717.5		Medium Brown Sandy Clay with trace silt and gravel	5	S-2	0 1 4	5	13.6		
		5.5		S-3	6 7 9	16	11.4		3000*
		8.0							
712.5		Hard Brown Silty Clay with trace sand and gravel	10	S-4	7 13 18	31	13.0		9000*
		12.0							
707.5			15	S-5	3 6 8	14	14.0		4000*
		Very Stiff Gray Silty Clay with trace sand and gravel							
702.5		20.0	20	S-6	4 7 9	16	12.6		5000*
		End of Boring @ 20 ft							
697.5			25						

Total Depth: 20 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 29

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-31

CONSULTING GROUP

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 720.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (10 inches) 0.8							
		Fill: Medium to Stiff Dark Brown Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = 2.7%) 2.5		S-1	2 3 4	7	25.0		2000*
715.5		Medium to Stiff Brown Sandy Clay with trace silt and gravel, occasional wet silt seams	5	S-2	2 3 4	7	11.9		2000*
		6.0		S-3	7 11 14	25	10.1		7000*
		Very Stiff Brown Sandy Clay with trace sand and gravel 8.0							
710.5		Hard Brown Silty Clay with trace sand and gravel	10	S-4	6 12 19	31	10.8		9000*
		12.0		S-5	6 7 10	17	13.5		3000*
705.5		Stiff to Very Stiff Gray Silty Clay with trace sand and gravel	15						
700.5		20.0	20	S-6	4 6 9	15	14.0		7000*
		End of Boring @ 20 ft							
695.5			25						

Total Depth: 20 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3 feet during drilling operations; 17 feet upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 30

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-32

G2 CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 721.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (10 inches) 0.8							
		Fill: Stiff Dark Brown Silty Clay with trace sand, gravel, and organic matter, occasional wet silt seams (Organic Matter Content = 2.7%)		S-1	2 3 3	6	18.6		3000*
		4.0							
716.5		Stiff Brown Silty Clay with trace sand and gravel	5	S-2	0 2 4	6	21.5		2000*
		6.0		S-3	4 8 11	19	12.6		9000*
711.5		Hard Brown Silty Clay with trace sand and gravel	10	S-4	6 11 14	25	13.9		9000*
		12.0							
706.5			15	S-5	4 6 9	15	12.4		9000*
		Hard Gray Silty Clay with trace sand and gravel							
701.5		20.0	20	S-6	3 6 8	14	12.3		9000*
		End of Boring @ 20 ft							
696.5			25						

Total Depth: 20 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
3-1/2 feet during drilling operations; dry upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 31

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-33

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 720.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (7 inches) 0.6							
		Fill: Soft Dark Gray Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = 2.7%) 2.5		S-1	0 0 1	1	24.3		500*
715.5		Fill: Hard Brown Silty Clay with trace sand and gravel	5	S-2	3 4 5	9	14.5		9000*
		5.5							
		Buried Topsoil: Medium Dark Gray Silty Clay with sand, gravel, and organic matter 6.5		S-3	1 3 4	7	22.7		2000*
710.5		Very Stiff Brown and Gray Silty Clay with trace sand and gravel	10	S-4	3 4 6	10	18.5		7000*
		12.0							
705.5		Hard Brown Silty Clay with trace sand and gravel	15	S-5	9 16 22	38	13.1		9000*
		18.0							
700.5		Hard Gray Silty Clay with trace sand and gravel 20.0	20	S-6	6 10 13	23	13.7		9000*
		End of Boring @ 20 ft							
695.5			25						

Total Depth: 20 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
6 feet during drilling operations; 12 feet upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 32

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-34**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 721.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (13 inches) 1.1							
		Fill: Stiff to Very Stiff Brown Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = <1%)		S-1	3 4 4	8	7.8		8000*
716.5			5	S-2	3 3 4	7	14.1		3000*
		5.5							
		Fill: Medium Dark Gray Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = 5.7%)		S-3	1 2 3	5	31.9		1000*
		8.0							
711.5			10	S-4	2 4 6	10	20.5		8000*
		Very Stiff to Hard Brown and Gray Silty Clay with trace sand and gravel							
706.5			15	S-5	7 13 19	32	14.4		9000*
701.5		20.0	20	S-6	4 7 9	16	13.7		5500*
		End of Boring @ 20 ft							
696.5			25						

Total Depth: 20 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
8 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 33

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-35

CONSULTING GROUP

SUBSURFACE PROFILE

SOIL SAMPLE DATA

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Fill: Crushed Stone (3 inches) 0.3							
		Fill: Very Stiff Brown Silty Clay with trace sand and gravel 2.5		S-1	5 7 7	14	11.2		8000*
718.5		Fill: Very Stiff Dark Brown Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = 3.5%) 5.5	5	S-2	3 3 3	6	25.1		5500*
				S-3	4 5 7	12	15.4		7000*
713.5			10	S-4	4 7 8	15	13.7		9000*
		Very Stiff to Hard Mottled Brown and Gray Silty Clay with trace sand and gravel, occasional wet sand seams							
708.5			15	S-5	7 12 16	28	12.0		9000*
		18.0							
703.5		Very Stiff Gray Silty Clay with trace sand and gravel 20.0	20	S-6	6 9 11	20	13.4		5500*
		End of Boring @ 20 ft							
698.5			25						

Total Depth: 20 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
8 feet during drilling operations; 2 feet after 3 hours

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 34

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-36

CONSULTING GROUP

SUBSURFACE PROFILE

SOIL SAMPLE DATA

ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (8 inches) 0.7							
		Stiff to Very Stiff Brown Silty Clay with trace sand and gravel		S-1	3 3 3	6	14.2	127	2920
718.0		5.0	5	S-2	4 5 5	10	15.3		5000*
				S-3	6 10 12	22	12.6		9000*
713.0			10	S-4	7 13 16	29	13.1		9000*
		Very Stiff to Hard Brown Silty Clay with trace sand and gravel							
708.0			15	S-5	6 12 16	28	13.4		9000*
		18.0							
		Very Stiff Light Gray Silty Clay with trace sand and gravel, occasional wet sand seams							
703.0		20.0	20	S-6	4 7 10	17	14.5		5000*
		End of Boring @ 20 ft							
698.0			25						

Total Depth: 20 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
18 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 35

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-37

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (9 inches) 0.8							
		Fill: Very Stiff Brown Sandy Clay with trace silt and gravel, dark brown topsoil layers (Organic Matter Content = 4.0%)		S-1	5 10 12	22	22.0		7000*
719.0		4.5	5	S-2	10 6 7	13	18.0		8000*
		Very Stiff to Hard Brown Silty Clay with little sand and trace gravel		S-3	5 11 13	24	13.0		9000*
714.0			10	S-4	6 13 16	29	13.1		9000*
		12.0							
709.0		Hard Brown Silty Clay with trace sand and gravel	15	S-5	8 15 19	34	12.7		9000*
		18.0							
704.0		Hard Gray Silty Clay with trace sand and gravel 20.0	20	S-6	37 13 17	30	12.5		9000*
		End of Boring @ 20 ft							
699.0			25						

Total Depth: 20 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 36

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-38

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 723.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Sandy Clay (14 inches) 1.2							
		Fill: Very Stiff Brown Sandy Clay with trace gravel, silt and organic matter		S-1	4 6 6	12	11.2		8000*
718.5			5	S-2	3 5 5	10	12.7		6000*
		5.5							
		Buried Topsoil: Dark Brown Silty Clay with organic matter 6.5		S-3	0 2 4	6	21.6		3000*
		Stiff Brown and Gray Silty Clay with trace sand and gravel 8.5							
713.5			10	S-4	4 6 11	17	14.1		9000*
		Hard Brown Silty Clay with trace sand and gravel		S-5	9 16 20	36	15.0		9000*
708.5			15						
		18.0							
		Very Stiff Gray Silty Clay with trace sand and gravel 20.0		S-6	5 9 12	21	12.4		5000*
703.5			20						
		End of Boring @ 20 ft							
698.5			25						

Total Depth: 20 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
5-1/2 feet during drilling operations; 17 feet upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 37

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-39

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 725.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (8 inches) 0.7							
		Hard Brown Silty Clay with little sand and trace gravel		S-1	4 7 7	14	11.9		9000*
720.0		5.0	5	S-2	4 8 12	20	11.2		9000*
		End of Boring @ 5 ft							
715.0			10						
710.0			15						
705.0			20						
700.0			25						

Total Depth: 5 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 38

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-40**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 724.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (6 inches) 0.5							
		Hard Brown Silty Clay with little sand and trace gravel, occasional wet silt seams		S-1	5 8 10	18	12.4		9000*
719.5		5.0	5	S-2	7 12 16	28	12.5		9000*
		End of Boring @ 5 ft							
714.5			10						
709.5			15						
704.5			20						
699.5			25						

Total Depth: 5 ft
Drilling Date: February 5, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
2 feet during drilling operations; dry upon completion

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 39

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-41**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 721.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Bituminous Concrete (3 inches) 0.3							
		Milled Asphalt			10				
		2.0			9				
		Fill: Gravelly Sand with trace silt and clay		S-1	6	15	18.1		3000*
		3.5							
		Buried Topsoil: Dark Brown Silty Clay with trace sand 4.0			3				
716.0		Very Stiff Brown Silty Clay with trace sand and gravel 5.0	5	S-2	5	11			
					6				
		End of Boring @ 5 ft							
711.0			10						
706.0			15						
701.0			20						
696.0			25						

Total Depth: 5 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings and cold patch

Figure No. 40

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-42

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 721.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (3 inches) 0.3							
		Fill: Very Stiff Brown Silty Clay with trace sand, gravel, and organic matter (Organic Matter Content = 1.9%)		S-1	3 6 7	13	14.6		8000*
		4.5							
716.0		Buried Topsoil: Dark Brown Silty Clay with trace sand 5.0	5	S-2	1 2 3	5	17.8		2000*
		End of Boring @ 5 ft							
711.0			10						
706.0			15						
701.0			20						
696.0			25						

Total Depth: 5 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 41

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. B-43

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 722.0 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (8 inches) 0.7							
		Hard Brown Sandy Clay with trace silt and gravel		S-1	3 6 8	14	10.5		9000*
		4.0							
717.0		Very Stiff Brown Silty Clay with trace sand and gravel 5.0	5	S-2	3 5 8	13	18.1		5000*
		End of Boring @ 5 ft							
712.0			10						
707.0			15						
702.0			20						
697.0			25						

Total Depth: 5 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

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

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 42

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-44**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 720.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (1 inch) 0.1							
		Fill: Very Stiff Brown Silty Clay with trace sand and gravel, occasional wet sand seams below 4 feet		S-1	7 9 6	15	13.0		7000*
715.5		5.0	5	S-2	5 6 5	11	17.5		1000*
		End of Boring @ 5 ft							
710.5			10						
705.5			15						
700.5			20						
695.5			25						

Total Depth: 5 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

Water Level Observation:
4 feet during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 43

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No. 230618

Latitude: N/A Longitude: N/A

Soil Boring No. **B-45**

CONSULTING GROUP

SUBSURFACE PROFILE				SOIL SAMPLE DATA					
ELEV. (ft)	PRO-FILE	GROUND SURFACE ELEVATION: 718.5 ft	DEPTH (ft)	SAMPLE TYPE-NO.	BLOWS/ 6-INCHES	STD. PEN. RESISTANCE (N)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	UNCONF. COMP. STR. (PSF)
		Topsoil: Dark Brown Silty Clay (8 inches) 0.7							
		Fill: Stiff Brown Silty Clay with trace sand and gravel		S-1	4 4 5	9	12.7		3000*
713.5		4.8	5	S-2	3 3 2	5	17.7		1000*
		Topsoil: Dark Brown Silty Clay with trace sand 5.0							
		End of Boring @ 5 ft							
708.5			10						
703.5			15						
698.5			20						
693.5			25						

Total Depth: 5 ft
Drilling Date: February 6, 2024
Inspector:
Contractor: Strata Drilling Inc.
Driller: B. Sienkiewicz

Drilling Method:
3-1/4 inch inside diameter hollow stem auger

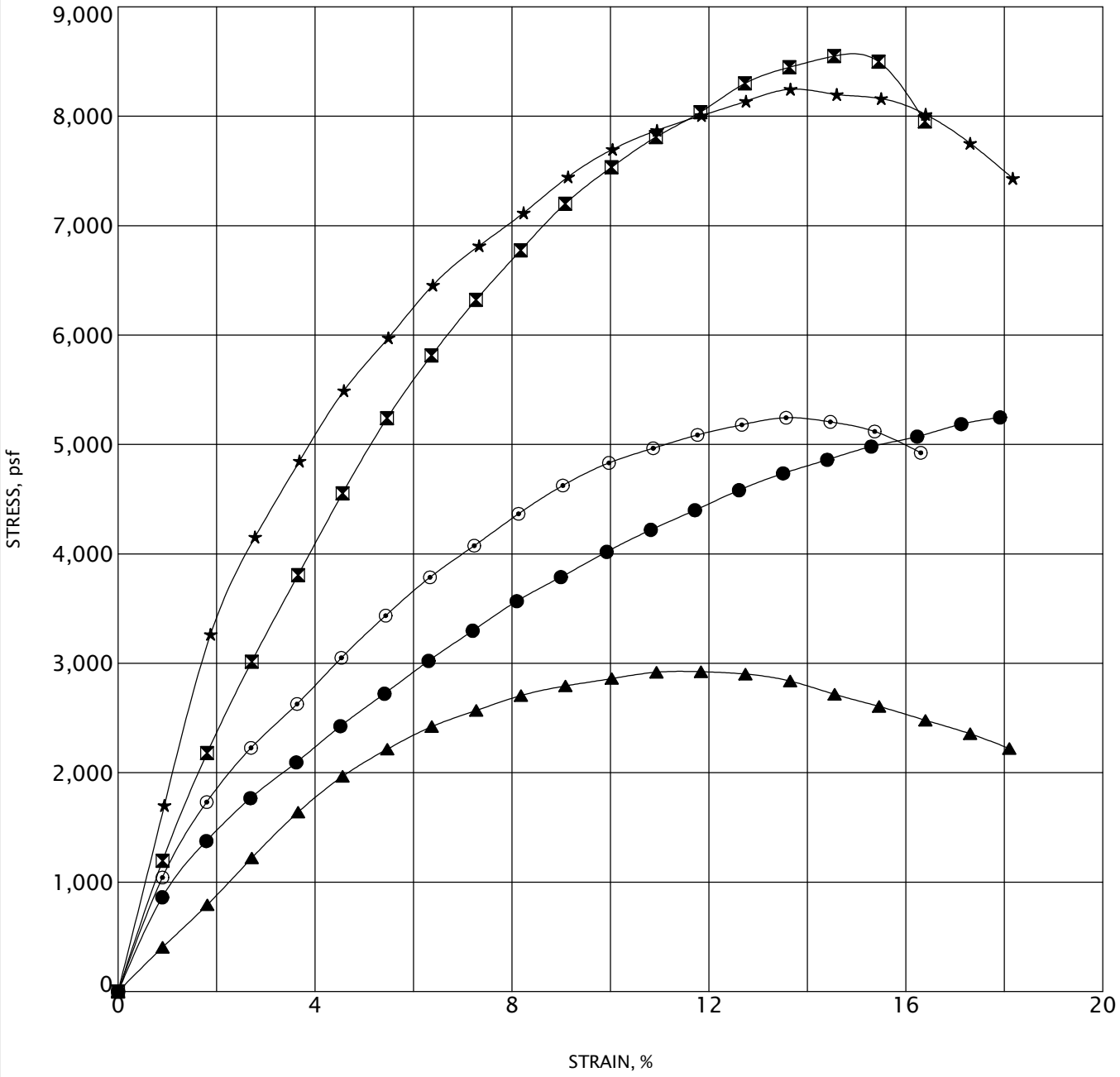
Water Level Observation:
Dry during and upon completion of drilling operations

Notes:
* Calibrated Hand Penetrometer

Excavation Backfilling Procedure:
Auger cuttings

Figure No. 44

SOIL / PAVEMENT BORING 230618.GPJ 20150116 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24



Specimen			Classification	MC%	γ_d	UC
●	B-12	S-2	Brown and Gray Silty Clay	20	111	4940
⊠	B-14	S-2	Brown Silty Clay	17	116	8550
▲	B-36	S-1	Brown Silty Clay	14	127	2920
★	B-7	S-2	Brown Silty Clay	17	113	8250
⊙	B-8	S-2	Brown Silty Clay	17	115	5240

CONSULTING GROUP

UNCONFINED COMPRESSIVE STRENGTH TEST

Project Name: Smith Middle School

Project Location: 5835 Donaldson Road
Troy, Michigan 48085

G2 Project No.: 230618

Figure No. 45

US_UNCONFINED 230618.GPJ 20140820 G2 CONSULTING DATA TEMPLATE.GDT 3/13/24

GENERAL NOTES TERMINOLOGY

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

PARTICLE SIZE

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

CLASSIFICATION

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

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

COHESIVE SOILS

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

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

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

COHESIONLESS SOILS

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

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

SAMPLE DESIGNATIONS

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

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