OCBA
LANDSCAPE
ARCHITECTS

Project Manual

Verburg Park Improvements

Bid Reference #: 98852-077.0

City of Kalamazoo
251 Mills Street
Kalamazoo, Michigan
49048

August 1, 2025

Kalamazoo

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DIVISION 32 – EXTERIOR IMPROVEMENTS

END OF DOCUMENT

DOCUMENT 00500 - AGREEMENT

PART 1 - GENERAL

1.1 AGREEMENT

A. AIA Document A101, **Standard Form of Agreement between Owner and Contractor** where the basis of payment is a Stipulated Sum (2007 Edition) will be the form used for the Owner/Contractor Agreement.

END OF DOCUMENT

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GENERAL CONDITIONS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

A. AIA Document A201, **General Conditions of the Contract for Construction** (2007 Edition) will be used to form the basis of the General Conditions for the Project. Copies are available at the Landscape Architect's office upon request.

END OF DOCUMENT

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DOCUMENT 00800 - SUPPLEMENTARY CONDITIONS - AIA (2007)

PART 1 - GENERAL

1.1 SUPPLEMENTARY CONDITIONS

These Supplementary Conditions amend or supplement the "General Conditions of the Contract for Construction" AIA Document A201, 2007 Edition, and other provisions of the Contract Documents as indicated below. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in full force and effect.

1.2 ARTICLE 1; GENERAL PROVISIONS

1.1 Basic Definitions

Add the following Subparagraph 1.1.8 to 1.1:

1.1.8 Landscape Architect
The term "Landscape Architect" is synonymous with the word "Architect".
The term "Owner's Representative" is synonymous with the word "Landscape Architect".

1.3 ARTICLE 2; OWNER

2.1 Definition

Delete Subparagraph 2.1.2 in its entirety.

2.2 Information and Services Required of the Owner

Delete Subparagraph 2.2.3 and substitute the following:

2.2.3 The Owner has supplied a survey of the project area which describes physical characteristics of the site. The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished by the owners of such Underground Facilities or by others. Unless otherwise provided in the Contract Documents:

.1 Owner and Architect shall not be responsible for the accuracy or completeness of any such information or data; and

.2 Contractor shall have full responsibility for reviewing and checking all such information and data; for locating all Underground Facilities shown or indicated in the Contract Documents; for coordination of the Work with the owners of such Underground Facilities during construction; for the safety, protection and repairing any damage thereto resulting from the Work; the cost of which will be considered as having been included in the Contract Price.

Delete Subparagraph 2.2.5 and substitute the following:

2.2.5 The Contractor will be furnished, free of charge, PDF files of Drawings and Project Manuals for the Contractor's use. Paper copies will be provided at cost of reproduction.

1.4 ARTICLE 3; CONTRACTOR

3.4 Labor and Materials

Delete Subparagraph 3.4.2 and substitute the following:

3.4.2 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of Products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). By making requests for substitutions, the Contractor:

.1 represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
.2 represents that the contractor will provide the same warranty for the substitution that the Contractor would for that specified;
.3 certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for additional costs related to the substitution which subsequently become apparent; and
.4 will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

Add the following Subparagraph 3.4.4 to Paragraph 3.4:

3.4.4 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect to evaluate the Contractor's proposed substitutions and to make agreed-upon changes in the Drawings and Specifications made necessary by the Owner's acceptance of such substitutions.

3.5 Warranty

Add the following statement:

The Contractor warrants to the Owner that the work is of good quality, free of defects, and will conform to the requirements of the Contract Documents. In addition, it is understood that the Owner may have additional rights in this regard as a matter of law, and nothing in this Agreement is intended to limit those other statutory or common law rights.

1.5 ARTICLE 5; SUBCONTRACTORS

5.2 Award of Subcontracts and Other Contracts for Portions of the Work

Delete the first sentence of Subparagraph 5.2.1 and substitute the following:

5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, not later than 10 days after the opening of bids, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work.

1.6 ARTICLE 9; PAYMENTS AND COMPLETION

9.3 Applications for Payment

Add the following sentence to Subparagraph 9.3.1:
All applications for payment shall be filed in triplicate with the Architect using AIA Document G702, Application and Certificate for Payment, supported by AIA Document G703, Continuation Sheet.

Add the following Clause 9.3.1.3 to Subparagraph 9.3.1:

9.3.1.3 Until the Work is 50% complete, the Owner shall pay up to 90% of the amount due the Contractor on account of progress payments. At the time the Work is 50% complete as determined by the Architect, and thereafter, the Architect will authorize remaining partial payments to be paid in accordance with the State of Michigan Act No. 524 of the Public Acts of 1980. When the Project is Substantially Complete, the retained amount will be only that necessary to assure completion of the Contract Work.

1.7 ARTICLE 11; INSURANCE AND BONDS

11.1 Contractor's Liability Insurance

Add the following Clauses 11.1.2.1 and 11.1.2.2 to Subparagraph 11.1.2:

Refer to Insurance Requirements as part of City of Kalamazoo specifications.

11.1.2.2 Insurance carriers shall be licensed and approved by the Insurance Bureau of the State of Michigan and be rated by Best's Key Rating Guide, current edition, at not lower than an A rating.

Add the following sentence to Subparagraph 11.1.3:
If this insurance is written in a Comprehensive General Liability policy form, the Certificates shall be AIA Document G-705, Certificate of Insurance. If this is written in a Commercial General Liability policy form, ACORD Form 25-S will be acceptable.

11.4 Property Insurance

Add the following Clause 11.4.1.6 to Subparagraph 11.1.1:

11.4.1.6 The insurance required by Paragraph 11.4 is not intended to cover machinery, tools or equipment owned or rented by the Contractor that are utilized in the performance of the work but not incorporated into the permanent improvements. The Contractor shall, at the Contractor’s own expense, provide insurance coverage for owned or rented machinery, tools or equipment, which shall be subject to the provisions of Subparagraph 11.4.7.

11.5 Performance Bond and Payment Bond

Delete Subparagraph 11.5.1 and substitute the following:

11.5.1 The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder. Bonds shall be obtained from a provider licensed and approved by the Insurance Bureau of the State of Michigan and be rated by Best's Key Rating Guide, current edition, at not lower than an A rating. The cost of the bonds shall be included in the Contract Sum. The amount of each shall be equal to 100 percent of the Contract Sum.

11.5.1.1 The Contractor shall deliver the required bonds to the Owner not later than three days following the date the Agreement is entered into, or if the Work is to be commenced prior thereto in response to a letter of intent, the Contractor shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

11.5.1.2 The Contractor shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

1.8 ARTICLE 12; UNCOVERING AND CORRECTION OF WORK

Add the following Clause 12.2.2.4 to Subparagraph 12.2.2:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of substantial Completion, the Architect will conduct and the Contractor shall attend a meeting with the Owner to review the improvements operations and performance.

END OF SUPPLEMENTARY CONDITIONS

DOCUMENT 00821 – ELLIOT-LARSEN CIVIL RIGHTS ACT AND PERSONS WITH DISABILITIES CIVIL RIGHTS ACT

Pursuant to the requirements of 1976, P.A. 453 (Elliot-Larsen Civil Rights Act) and 1976, P.A. 220 (Persons with Disabilities Civil Rights Act), the Contractor and its agents agree not to discriminate against any employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height, weight, marital status, or because of a handicap that is unrelated to the person's ability to perform the duties of a particular job or position. The Contractor and its agents further agree that any subcontract shall contain a non-discrimination provision identical to this provision and binding upon any and all subcontractors. A breach of this covenant shall be regarded as a material breach of this contract.

In connection with the performance of work or exercise of rights and privileges granted under the contract, the Contractor agrees to the following:

1) The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, national origin, handicap, age or sex. It will take affirmative action to insure that applicants are employed and that employees are treated during employment, without regard to their race, religion, color, national origin, age, sex, height, weight or marital status. Such action shall include, but not be limited to, the following: employment upgrading, demotion or transfer; recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship.

2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, religion, color, national origin, age, sex, height, weight or marital status.

3) The Contractor or its collective bargaining representative will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice advising the said labor union or workers' representative its commitments under this paragraph.

4) The Contractor will comply with all published rules, regulations, directives, and orders of the Michigan Civil Rights Commission relevant to Section 206, 1976 PA 453, as amended.

5) Upon request, the Contractor will furnish and file compliance reports within such time and upon such forms as provided by the Michigan Civil Rights Commission; said forms may also elicit information as to the practices, policies, programs, and employment statistics of each Subcontractor as well as the Contractor itself, and said Contractor will permit access to its books, records, and accounts by the Michigan Civil Rights Commission, and/or its agent, for purposes of investigation to ascertain compliance with this contract and with rules, regulations, and orders of the Civil Right Commission relevant to Section 206, 1976 PA 453, as amended.

6) In the event that the Civil Rights Commission finds, after a hearing held pursuant to its rules, that a Contractor has not complied with the contractual obligations under this Agreement, the Civil Rights Commission may, as part of its order based upon such findings, certify said findings to the State Administrative Board of the State of Michigan, which Board may order the cancellation of the Contract found to have been violated, and/or declare the Contractor ineligible for future contracts with the state and its political and civil subdivisions, departments, and officers, and

including the governing boards of institutions of higher education, until the Contractor complies with said order of the Civil Rights Commission. Notice of said declaration of future ineligibility may be given to any or all of the persons with whom the Contractor is declared ineligible to contract as a contracting party in future contracts. In any case, before the Civil Rights Commission in which cancellation of an existing contract is a possibility, the contracting agency shall be notified of such possible remedy and shall be given the option by the Civil Rights Commission to participate in such proceedings.

7) The Contractor will include, or incorporate by reference, the provisions of the foregoing Subparagraphs 1) through 6) in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Michigan Civil Rights Commission, and will provide in every subcontract or purchase order that said provisions will be binding upon each subcontractor or seller.

END OF DOCUMENT

LIST OF DRAWINGS

PART 1 - GENERAL

1.1 LIST OF DRAWINGS

A. The following Drawings shall be included in the Contract Documents:

SITE PLANS

SHEET TITLE	SHEET NUMBER
Cover Sheet	C0.0
ALTA/NSPS Land Title Survey	V1.0
ALTA NSPS Land Title Survey	V1.1
Code Sheet	C0.1
Existing Conditions, Demolition, and Key Plan	C0.2
North Demolition Enlargement Plan	C0.3
Center Demolition Enlargement Plan	C0.4
South Demolition Enlargement Plan	C0.5
North Layout Enlargement Plan	C2.0
Center Layout Enlargement Plan	C2.1
South Layout Enlargement Plan	C2.2
Layout Detail Enlargement Plan	C2.3
North Grading & SESC Enlargement Plan	C3.0
Center Grading & SESC Enlargement Plan	C3.1
South Grading & SESC Enlargement Plan	C3.2
Grading Detail Enlargement Plans	C3.3
Grading Detail Enlargement Plans	
Details	C4.0
Details	C4.1
North Landscape Enlargement Plan	L1.0
Center Landscape Enlargement Plan	L1.1
South Landscape Enlargement Plan	L1.2
Protected Tree Identification Plan – North	L1.3
Protected Tree Identification Plan – Center	L1.4
Protected Tree Identification Plan – South	L1.5
Woodland and Wetland Identification Plan	L1.6

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ADDENDA

PART 1 - GENERAL

1.1 DESCRIPTION

A. Addenda are written or graphic instruments issued prior to execution of the construction contracts which add to, delete from, clarify, or modify the Bidding Documents and the Contract Documents.

B. Addenda will be incorporated into the Bidding Documents and the Contract Documents.

C. Addenda will be issued by the Landscape Architect as they deem necessary to facilitate the construction of the Project.

1.2 BIDDER'S AND CONTRACTOR'S RESPONSIBILITIES

A. Each Bidder shall be responsible for taking the provisions of all Addenda issued prior to the Bid Date into account during the presentation of his Proposal.

B. Each Bidder shall be responsible for obtaining all Addenda, and for ascertaining that all Addenda issued prior to the Bid Date have been considered in preparing his Proposal. Acknowledge receipt of all Addenda in the space provided on the Bid Form; failure to do so may result in rejection of the Bid.

C. Each Contractor shall perform his work in accord with Addenda.

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under separate contracts.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.

B. Related Section:

1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 PROJECT INFORMATION

A. Project Identification: City of Kalamazoo Verburg Park

1. Project Location: 699 Gull Road, Kalamazoo, Michigan 49007

B. Owner: City of Kalamazoo, Michigan

1. Owner's Representative: Ashton Anthony, Park and Recreation Deputy Director, (269) 337-8191.

C. Architect: The Contract Documents, dated August 01, 2025, were prepared for the Project by O'Boyle, Cowell, Blalock & Associates, Inc., 141 East Michigan Avenue, Suite #500, Kalamazoo, Michigan 49007.

1. Architect's Representative: Rachel Hughes-Nilsson, rhnilsson@ocba.com, (269)381-3357

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. The Work includes furnishing all labor, materials, tools, equipment and services necessary to complete the removal of miscellaneous site elements, earthwork, installation of standard concrete paving, installation of playground prep work, pre-fabricated shelter, stormwork, site furniture, and landscaping.

B. Type of Contract

1. Project will be constructed under a single prime contract.

1.6 WORK UNDER SEPARATE CONTRACT

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.

1. Sinclair Recreation, 176 East Lakewood Blvd, Holland, Michigan 49424, (800)-444-4954.

a. Sales Representative: Jeremy Bosman, jeremy@sinclair-rec.com, (616)886-1726.

b. Scope: Purchase and installation of playground equipment and playground safety surfacing, refer to Construction Documents.

2. PumpTrax USA, 17820 Woodbury Avenue, Cleveland, Ohio, 44135, (614)302-3725

a. Sales Representative: Jason Schiefelbein, jason@pumptraxusa.com, (614)302-3725.

b. Scope: Purchase and installation of asphalt paved bicycle pump track, refer to Construction Documents.

3. Camp & Cruise, 1613 Hayes Street, Marne, Michigan 49435, (616)677-1274.

a. Sales Representative: Jeff Helms, jeff@campandcruise.com (616)677-1274

b. Scope: Purchase and installation of EZ Dock ADA accessible kayak launch, refer to Construction Documents.

4. Penchura, LLC., 889 South Old US 23, Brighton, Michigan 48114, (810)229-6245

a. Sales Representative: Jennifer Smith, jennifer@penchura.com (616)516-5562.

b. Scope: Purchase of Poligon pre-fabricated shelter, refer to Construction Documents. Contractor to install shelter as part of bid documents.

1.7 ACCESS TO SITE

B. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

1.8 COORDINATION WITH OCCUPANTS

A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 7:00 p.m., Monday through Friday, except as otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Project site is located along the Kalamazoo River Valley Trailway (KRVT), which is managed by Kalamazoo County. At no time should the KRVT be blocked from access by residents. No storage of materials or construction traffic is allowed to block the KRVT.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.11 MISCELLANEOUS PROVISIONS

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Sections:

1. Division 01 Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Division 01 Section 014000 "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price 1: Removal of unsatisfactory soil and replacement with engineered fill material.

1. Description: Unsatisfactory soil excavation and disposal **on-site** and replacement with engineered fill subbase from off site, as required, to be installed under new asphalt paving base material per geotech evaluation and in accordance with Division 31 Section "Earth Moving."
2. Unit of Measurement: Cubic yard (Cubic meter) of soil excavated, based upon survey of volume removed.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section "Allowances."

B. Unit Price 2: Removal of unsatisfactory soil and replacement with engineered fill materials.
1. Description: Unsatisfactory soil excavation and disposal **off-site** and replacement with engineered fill subbase from off-site, as required, to be installed under new asphalt paving base material per Geotech evaluation and in accordance with Division 31 Section “Earth Moving.”
2. Unit of Measurement: Cubic yard (Cubic meter) of soil excavated, based upon survey of volume removed.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section “Allowances.”

C. Unit Price 3: Install 1 SF concrete walk pavement (SF).
1. Description: Install 1 SF concrete walk pavement as shown in Detail 2/C4.0 and in accordance with Division 32 Section “Concrete Paving and Curb”.
2. Unit of Measurement: Square foot (SF) of concrete paving.
3. Quality Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section “Allowances”.

D. Unit Price 4: Install 1 LF straight face concrete curb (LF).
1. Description: Install 1 LF straight face concrete curb as shown in Detail 4/C4.0 and in accordance with Division 32 Section “Concrete Paving and Curb”.
2. Unit of Measurement: Linear foot (LF) of 9” wide concrete curb.
3. Quality Allowance: Coordinate unit price with allowance adjustment requirements of Division 01 Section “Allowances”

END OF SECTION 012200

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:
   1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
   2. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

   1. Substitution Request Form: Use CSI Form 13.1A.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.

b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
j. Cost information, including a proposal of change, if any, in the Contract Sum.
k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within five days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 10 days of receipt of request, or 5 days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 10 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 45 days after commencement of the Work.. Requests received after that time may be considered or rejected at discretion of Architect.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.

c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections:

1. Division 01 Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after Contract award.

2. Division 01 Section 013100 “Project Management and Coordination” for requirements for forms for contract modifications.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Division 01 Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

A. Unit-Price Adjustment: See Section 012200 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

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SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections:
1. Division 01 Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
2. Division 01 Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Division 01 Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
4. Division 01 Section 013300 "Submittal Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.

c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.

b. Owner’s name
c. Name of Architect.
d. Architect's project number.
e. Contractor's name and address.
f. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

a. Related Specification Section or Division.
b. Description of the Work.
c. Name of subcontractor.
d. Name of manufacturer or fabricator.
e. Name of supplier.
f. Change Orders (numbers) that affect value.
g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

1) Labor.
2) Materials.
3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: Progress payments shall be submitted to Architect by the 1st day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

    1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
    3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
    4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and included in previous Applications for Payment.
    b. Work completed for this Application utilizing previously stored materials.
    c. Additional materials stored with this Application.
    d. Total materials remaining stored, including materials with this Application.

F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.

10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.

16. Data needed to acquire Owner's insurance.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination drawings.
4. Requests for Information (RFIs).
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Sections:
1. Division 01 Section 011200 "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this section.
2. Division 01 Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
3. Division 01 Section 013200 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
4. Division 01 Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each

portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.

3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, [in web-based Project software directory,]and in prominent location in [each]built facility. Keep list current at all times.

1.5 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination of Multiple Contracts: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results, where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.

b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
f. Indicate required installation sequences.
g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Digital Data Files: Prepare coordination digital data files in accordance with the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as the original Drawings.
2. File Preparation Format: DWG, Version Autocadd 2018 operating in Microsoft Windows operating system.
3. File Submittal Format: Submit or post coordination drawing files using Portable Data File (PDF) format.
4. Architect will furnish Contractor one set of digital data files of the Drawings for use in preparing coordination digital data files.

a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to the Drawings.
b. Digital Data Software Program: The Drawings are available in DWG, Version Autocadd 2008 operating in Microsoft Windows operating system.
c. Contractor shall execute a data licensing agreement in the form of an Agreement form acceptable to the Owner and Architect.

1.7 KEY PERSONNEL

A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.8 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
2. Owner’s name.
3. Project number.
4. Date.
5. Name of Contractor.
6. Name of Architect
7. RFI number, numbered sequentially.
8. RFI subject.
9. Specification Section number and title and related paragraphs, as appropriate.
10. Drawing number and detail references, as appropriate.
11. Field dimensions and conditions, as appropriate.
12. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
13. Contractor's signature.
14. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716
1. Attachments shall be electronic files in PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:

a. Requests for approval of submittals.
b. Requests for approval of substitutions.
c. Requests for coordination information already indicated in the Contract Documents.
d. Requests for adjustments in the Contract Time or the Contract Sum.
e. Requests for interpretation of Architect's actions on submittals.
f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

1.9 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Lines of communications.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Preparation of record documents.
    l. Work restrictions.
    m. Working hours.
    n. Owner's occupancy requirements.

o. Responsibility for temporary facilities and controls.
p. Procedures in disruptions and shut downs.
q. Construction waste management and recycling.
r. Parking availability.
s. Office, work, and storage areas.
t. Equipment deliveries and priorities.
u. Security.
v. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Project Closeout Conference: Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for demonstration and training.
f. Preparation of Contractor's punch list.
g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
h. Submittal procedures.
i. Coordination of separate contracts.
j. Owner's partial occupancy requirements.
k. Installation of Owner's furniture, fixtures, and equipment.
l. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

D. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

    a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

        1) Review schedule for next period.

    b. Review present and future needs of each entity present, including the following:

        1) Interface requirements.
        2) Sequence of operations.
        3) Status of submittals.
        4) Deliveries.
        5) Off-site fabrication.
        6) Access.
        7) Site utilization.
        8) Temporary facilities and controls.
        9) Progress cleaning.
        10) Quality and work standards.
        11) Status of correction of deficient items.
        12) Field observations.
        13) Status of RFIs.
        14) Status of proposal requests.
        15) Pending changes.
        16) Status of Change Orders.
        17) Pending claims and disputes.
        18) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

    a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Start-up construction schedule.
2. Contractor's construction schedule.
3. Special reports.

B. Related Sections:
1. Division 01 Section 012900 “Payment Procedures” for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.
2. Division 01 Section 013300 "Submittal Procedures" for submitting schedules and reports
3. Division 01 Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of the Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

H. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

I. Major Area: A story of construction, a separate building, or a similar significant construction element.

J. Milestone: A key or critical point in time for reference or measurement.

K. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

1.4 SUBMITTALS

A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
1. Scheduled date for a first submittal.
2. Specificiations Section number and title.
3. Submittal category (action or informal).
4. Name of subcontractor.
5. Description of the Work covered.
6. Scheduled date for Architect’s final release or approval.

B. Contractor’s Construction Schedule: Submit three opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

C. Field Condition Reports: Submit three copies at a time of discovery of differing conditions.

D. Special Reports: Submit three copies at time of unusual events.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 SUBMITTALS SCHEDULE

A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
1. Coordinate Submittals Schedule with list of subcontractors, the Schedule of Values, and Contractor’s Construction Schedule.
2. Initial Submittal: Submit concurrently with preliminary schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
    a. At Contractor’s option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor’s Construction Schedule.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Procedures: Comply with procedures contained in AGC’s “Construction Planning and Scheduling”.

B. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

C. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.

2. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section 013300"Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
3. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.

D. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Limitations of continued occupancies.
c. Uninterruptible services.
d. Partial occupancy before Substantial Completion.
e. Use of premises restrictions.
f. Provisions for future construction.
g. Seasonal variations.
h. Environmental control.

2. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Startup and placement into final use and operation.

E. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

F. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

2.3 REPORTS

A. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Sections:

1. Division 01 Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.

2. Division 1 Section 013100 "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
3. Division 01 Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
4. Division 01 Section 014000 “Quality Requirements” for submitting test and inspection reports and schedule of tests and inspections.
5. Division 1 Section 017700 "Closeout Procedures" for submitting warranties.
6. Division 01 Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
7. Divisions 2 through 16 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as “informational submittals”.

1.4 SUBMITTAL PROCEDURES

A. Architect's Digital Data Files: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittals Schedule: Comply with requirements in Division 1 Section 013200 "Construction Progress Documentation" for list of submittals and time requirements for scheduled performance of related construction activities.

D. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 7 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.

E. Identification: Place a permanent label or title block on each paper copy submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.
2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
3. Include the following information for processing and recording action taken:

    a. Project name.
    b. Date.
    c. Name and Address of Architect.
    d. Name and Address of Contractor.
    e. Name and Address of subcontractor.
    f. Name and Address of supplier.
    g. Name of manufacturer.

h. Submittal number or other unique identifier, including revision identifier.

1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).

i. Number and title of appropriate Specification Section.
j. Drawing number and detail references, as appropriate.
k. Location(s) where product is to be installed, as appropriate.
l. Other necessary identification.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.

1. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

2. Additional copies submitted for maintenance manuals will not be marked with action taken and will be returned.

H. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
1. Transmittal Form: Provide locations on form for the following information:

a. Project name.
b. Date.
c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer, and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Specification Section number and title.
i. Drawing number and detail references, as appropriate.
j. Transmittal number.
k. Submittal and transmittal distribution record.
l. Remarks.
m. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked "Reviewed" or "Reviewed w/ corrections noted".

J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

K. Use for Construction: Use only final submittals with mark indicating "Reviewed" or Reviewed w/ corrections noted" taken by Architect.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. General: Prepare and submit Action Submittals required by individual Specification Sections.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
    a. Manufacturer's written recommendations.
    b. Manufacturer's product specifications.
    c. Manufacturer's installation instructions.
    d. Standard color charts.
    e. Manufacturer's catalog cuts.
    f. Wiring diagrams showing factory-installed wiring.
    g. Printed performance curves.
    h. Operational range diagrams.
    i. Mill reports.
    j. Standard product operation and maintenance manuals.
    k. Compliance with specified referenced standards.
    l. Testing by recognized testing agency.
    m. Application of testing agency labels and seals.
    n. Notation of coordination requirements.
4. Submit Product Data before or concurrent with Samples.
5. Number of Copies: Submit three copies of Product Data, unless otherwise indicated. Architect will return two copies. Mark up and retain one returned copy as a Project Record Document.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Dimensions.
b. Identification of products.
c. Fabrication and installation drawings.
d. Roughing-in and setting diagrams.
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
f. Shopwork manufacturing instructions.
g. Templates and patterns.
h. Schedules.
i. Design calculations.
j. Compliance with specified standards.
k. Notation of coordination requirements.
l. Notation of dimensions established by field measurement.
m. Relationship to adjoining construction clearly indicated.
n. Seal and signature of professional engineer if specified.
o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
3. Number of Copies: Submit three opaque copies of each submittal, unless copies are required for operation and maintenance manuals. Submit five copies where copies are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:
a. Generic description of Sample.
b. Product name and name of manufacturer.
c. Sample source.
d. Number and title of appropriate Specification Section.
3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.
4. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return one copies.
    a. Mark up and retain one returned copy as a Project Record Document.

F. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section 013200 "Construction Progress Documentation" for Construction Manager's action.

G. Submittals Schedule: Comply with requirements specified in Division 1 Section 013200 "Construction Progress Documentation."

H. Application for Payment: Comply with requirements specified in Division 1 Section 012900 "Payment Procedures."

I. Schedule of Values: Comply with requirements specified in Division 1 Section 012900 "Payment Procedures."

J. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return one copy.
    a. Mark up and retain one returned copy as a Project Record Document.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.
   1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies.
   2. Test and Inspection Reports: Comply with requirements specified in Division 1 Section 014000 "Quality Requirements."

B. Coordination Drawings: Comply with requirements specified in Division 1 Section 013100 "Project Management and Coordination."

C. Contractor's Construction Schedule: Comply with requirements specified in Division 1 Section 013200 "Construction Progress Documentation."

D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

I. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.
   4. Product and manufacturers' names.
   5. Description of product.
   6. Test procedures and results.
   7. Limitations of use.

K. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section 014000 "Quality Requirements."

L. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

M. Maintenance Data: Submit manufacturer's written and graphic instructions and procedures for operation and normal maintenance of products and equipment.

N. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

O. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

P. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect.
1. Architect will not review submittals that include MSDSs and will return the entire submittal for resubmittal.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:

1. Reviewed.

2. Reviewed w/ corrections noted.

3. Rejected.

4. Review w/ corrections noted, resubmit.

C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

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SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Sections:
1. Division 01 Section 013200 "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

A. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirement for specialists shall not supersede building codes and regulations governing the Work.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
   1. Contractor responsibilities include the following:
      a. Provide test specimens representative of proposed products and construction.
      b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
      d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
      e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
      f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
   2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
   3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
   1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 1 Section 013300 "Submittal Procedures."

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

E. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for commencement of the Work.
   1. Distribution: Distribute schedule to Owner, Architect testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:

   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

   2. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Division 01 Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

2. Division 1 Section 013300 "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.

3. Division 1 Section 017300 "Execution Requirements" for progress cleaning requirements.

1.3 DEFINITIONS

A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

1.4 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.

C. Water Service: Pay water service use charges for water used by all entities for construction operations.

D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

1.5 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

1.6 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.7 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Barriers and Fencing: The Contractor shall provide all temporary barricades and safeguards, together with sufficient lighting during periods when the work is or is not in progress. Such protection shall be subject to the approval of the Architect. However, failure of the Architect to supervise such protection shall in no way relieve the Contractor of his responsibility according to the laws of this State.

B. Temporary Controls: Provide and maintain all required temporary facilities and traffic control. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as the progress of the Work will permit.

2.2 EQUIPMENT

A. General: Provide equipment suitable for use intended.

B. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

C. Self –Contained Toilet Units: Single-occupant units of chemical, aerated recirculation, or combustion type; vented; fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
   1. Verify location for temporary facilities with Owner.

D. Drinking-Water Fixtures: Containerized, tap-dispenser, bottled water units, including paper cup supply.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

C. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

   1. Install electric power service overhead, unless otherwise indicated.

3.3 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

   1. Comply with work restrictions specified in Division 01 Section "Summary."

C. Temporary Erosion and Sedimentation Control: Comply with requirements specified in Division 31 Section "Site Clearing."

D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
   1. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
   2. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
   3. Remove erosion and sedimentation controls, and restore and stabilize areas disturbed during removal.

E. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

   1. Prohibit smoking in construction areas.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
   4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.4 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section 017700 "Closeout Procedures."

END OF SECTION 015000

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SECTION 015639 – TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. The Work of this Section Includes: General protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Sections:

1. Section 015000 "Temporary Facilities and Controls" for temporary site fencing.
2. Section 311000 "Site Clearing" for removing existing trees and shrubs.

1.3 DEFINITIONS

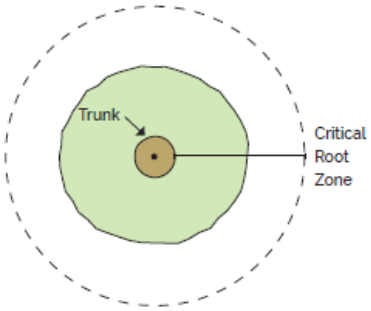
A. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape at a height 54 inches (1372 mm) above the ground line for trees with caliper of 8 inches (200 mm) or greater as measured at a height of 12 inches (300 mm) above the ground.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

C. Protected Tree: Refer to Landscape Plans and Protected Tree Spreadsheet, included at the end of this document. These trees are protected by the City of Kalamazoo's Natural Features Protection Overlay zoning ordinance and cannot be impacted by construction. Replacement of any damaged trees from construction process must follow City of Kalamazoo Natural Features Protection Overlay zoning ordinance standards.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, as indicated on Drawings, and as shown for a tree's critical root zone.

E. Critical Root Zone (CRZ): The zone encompassing the majority of a tree's roots. It is calculated by measuring the diameter of a tree trunk at breast height and measuring outward from the trunk 18-inches for every inch of trunk diameter. No work permitted within any protected tree's critical root zone. Refer to figure below.



F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

G. Woodland Protection Plan: Refer to Woodland Protection Plan Report, included at the end of this document. Protection of the Protected Trees and Woodland areas must follow this document and the City of Kalamazoo Natural Features Protection Overlay zoning ordinance standards.

H. Woodlands: Refer to Landscape Plans for woodland delineation areas as protected from construction per the City of Kalamazoo Natural Features Protection Overlay zoning ordinance. Replacement of any damaged trees within the protected area must refer to the City of Kalamazoo Natural Features Protection Overlay zoning ordinance standards.

1.4 PREINSTALLATION MEETING

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:

a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
b. Arborist's responsibilities
c. Quality-control program.
d. Coordination of Work and equipment movement with the locations of protection zones.
e. Field quality control.
f. City of Kalamazoo Natural Features Protection Overlay zoning ordinance standards.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings

1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment-movement routes and material storage locations with protection zones.
2. Detail fabrication and assembly of protection-zone fencing and signage.

C. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.

1. Species and size of tree.
2. Location on site plan. Include unique identifier for each.
3. Reason for pruning.
4. Description of pruning to be performed.
5. Description of maintenance following pruning.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work. Refer to Woodland Protection Plan, included at the end of this section.

D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.

1. Use sufficiently detailed photographs or video recordings.
2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality-control program.

1.7 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA and Certified Tree Risk Assessment Qualified as certified by ISA.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones and critical root zones:

1. Storage of construction materials, debris, or excavated material.
2. Moving or parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Stockpiled soil from location shown on Drawings of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum
3. Color: Natural.

C. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements:

1. Chain-Link Protection-Zone Fencing: Galvanized-steel fabricated from minimum 2-inch (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts; with 1-5/8-inch- (42-mm-) OD top rails and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.

a. Height: 72 inches (1800 mm)

D. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:

1. Size and Text: As provided by Owner.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain Tie a 1-inch (25-mm) blue vinyl tape around each tree trunk at 54 inches (1372 mm) above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people from easily entering protected areas except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

1. Chain-Link Fencing: Install to comply with ASTM F567 and with manufacturer's written instructions.
2. Posts: Install steel tube stand base weighted with sand bags to keep posts in place. Do not drive posts into the ground where tree roots within the critical root zone can be damaged.

B. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by Architect. Install one sign spaced approximately every 50 feet (15 m) on protection-zone fencing, but no fewer than four signs with each facing a different direction.

C. Maintain protection zones free of weeds and trash.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.

1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones according to requirements in Section 312000 "Earth Moving" unless otherwise indicated.

B. Trenching within Protection Zones and Critical Root Zones: Not Allowed.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Section 312000 "Earth Moving."

B. Root Pruning at Edge of Protection Zone and Critical Root Zone: Prune tree roots 6 inches (150 mm) outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

C. Root Pruning within Protection Zone and Critical Root Zone: Not Allowed.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as directed by arborist.

1. Prune to remove only injured, broken, dying, or dead branches unless otherwise indicated. Do not prune for shape unless otherwise indicated.
2. Do not remove or reduce living branches to compensate for root loss caused by damaging or cutting root system.
3. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and as directed by arborist.

B. Unless otherwise directed by arborist and acceptable to Architect, do not cut tree leaders.

C. Cut branches with sharp pruning instruments; do not break or chop.

D. Do not paint or apply sealants to wounds.

E. Provide subsequent maintenance pruning during Contract period as recommended by arborist.

F. Chip removed branches and spread over areas identified by Architect

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

B. Lowering Grade within Protection Zone and Critical Root Zone: Not Allowed.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone and Critical Root Zones: Not Allowed.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by Architect. Refer to Woodland Protection Plan for additional information.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.

3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern. Refer to City of Kalamazoo's Natural Features Protection Overlay zoning ordinance for replacement species, quantity, and size information.

1. Plant and maintain new trees as specified in Section 329300 "Plants."

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash, and debris and legally dispose of them off Owner's property.

END OF SECTION 015639

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:
1. Division 01 Section 012500 “Substitution Procedures” for requests for substitutions.
2. Division 1 Section 017700 "Closeout Procedures" for submitting warranties for Contract closeout.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Refer to Section 012500 “Substitution Procedures” for limitations on subsitutions.

C. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other

characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 SUBMITTALS

A. Product List: Submit a list, in tabular from, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.
   1. Coordinate product list with Contractor's Construction Schedule and the Submittals Schedule.
   2. Form: Tabulate information for each product under the following column headings:
      a. Specification Section number and title.
      b. Generic name used in the Contract Documents.
      c. Proprietary name, model number, and similar designations.
      d. Manufacturer's name and address.
      e. Supplier's name and address.
      f. Installer's name and address.
      g. Projected delivery date or time span of delivery period.
      h. Identification of items that require early submittal approval for scheduled delivery date.
   3. Initial Submittal: Within 10 days after date of commencement of the Work, submit 3 copies of initial product list. Include a written explanation for omissions of data and for variations from Contract requirements.
      a. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.
   4. Completed List: Within 20 days after date of commencement of the Work, submit 3 copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

B. Substitution Requests: Bidders wishing to obtain approval of a product or material other than those specified by name, make or catalog number, shall submit a request for substitution for any manufacturer not named. Architect and Owner reserve the right to reject any substitution requests; “equal” in the manufacturer’s or other’s eyes does not guarantee the substitutions will be allowed.
   1. Instructions to the Bidders specify time for submitting requests for substitutions during the bidding period.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified material or product cannot be provided.
      b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.

f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
h. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
i. Cost information, including a proposal of change, if any, in the Contract Sum.
j. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
k. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 10 days of receipt of request, or 5 days of receipt of additional information or documentation, whichever is later.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to Owner.

B. Submittal Time: Comply with requirements in Division 01 Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
7. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:
1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
    a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.

b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

B. Related Sections:

1. Division 01 011000 Section "Summary" for coordination of Owner’s separate contracts and limits on use of Project site.
2. Division 01 Section 013300 "Submittal Procedures” for submitting surveys.
3. Division 01 Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For land surveyor.

B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.

D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
   a. Electrical wiring systems.
   b. Plumbing piping systems.
   c. Communication systems.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where

indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

    a. Description of the Work.
    b. List of detrimental conditions, including substrates.
    c. List of unacceptable installation tolerances.
    d. Recommended corrections.

2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.

2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction. installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Temporary Support: Provide temporary support of work to be cut.

C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 011000 Section "Summary."

E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Utilize containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 014000 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Warranties.
3. Final cleaning.

B. Related Sections:
1. Division 1 Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section 017300 "Execution Requirements" for progress cleaning of Project site.
3. Division 01 Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
4. Division 01 Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section 012900 "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements.

Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first.
2. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect.
    d. Name of Contractor.
    e. Page number.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove labels that are not permanent.
h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.

i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

j. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
k. Leave Project clean and ready for occupancy.

C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections:
1. Division 01 Section 017700 "Closeout Procedures" for general closeout procedures.
2. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
1. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal: Submit one set(s) of plots from corrected Record CAD Drawings and one set(s) of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
b. Final Submittal: Submit three set(s) of marked-up Record Prints, print each Drawing, whether or not changes and additional information were recorded.

B. Record Product Data: Submit one paper copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Locations and depths of underground utilities.
d. Revisions to routing of piping and conduits.
e. Revisions to electrical circuitry.
f. Actual equipment locations.
g. Locations of concealed internal utilities.
h. Changes made by Change Order or Construction Change Directive.
i. Changes made following Architect's written orders.
j. Details not on the original Contract Drawings.
k. Field records for variable and concealed conditions.
l. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Architect.
    e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 017839

SECTION 129301 – EXTERIOR SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   a. Bike Rack

B. Related Sections include the following:
   1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
   2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, field-assembly requirements, and installation details.

B. Samples for Initial Selection: For units with factory-applied color finishes.
   1. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
   2. Size: Not less than 6-inch long linear components and 4-inch square sheet components.

C. Material Certificates: For site furnishings, signed by manufacturers.

D. Maintenance Data: For site furnishings to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of site furnishing(s) through one source from a single manufacturer.

PART 2 - PRODUCTS

2.1 PRODUCTS

A. Products: Subject to compliance with requirements, provide one of the following:
   1. Bike Rack: Three (3) Bike Racks required.
      a. Manufacturer's Product Designation:
         1) Model: "U" Rack
            a) Include optional Grout Covers, (2) required per bike rack.
         2) Mounting: Surface Mount
         3) Frame Color: Black
         4) All welded frame construction, powdercoated frame
         5) Source: Belson Outdoors
         6) Source Address: 627 Amersale Drive, Naperville, IL 60563
         7) Source Phone Number: 1-800-323-5664
         8) Or approved equal

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

3.3 CLEANING

A. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 129301

SECTION 129400 - PREFABRICATED STRUCTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. Provide all labor, materials, tools, equipment, and services necessary for completing the following:
   1. Install prefabricated Picnic Shelter.

B. Related Sections include the following:
   1. Division 31 Section "Site Clearing"
   2. Division 31 Section “Earth Moving”
   3. Division 32 Section “Concrete Paving”.

1.2 COORDINATION

A. Coordinate Work of this Section with concrete slabs and footings necessary for prefabricated structure.

1.3 REGULATORY REQUIREMENTS

A. Contractor shall obtain and pay cost of all permits, bonds, fees, and licenses necessary for completion of this Work unless specifically stated otherwise.

B. If Contractor observes that Contract Documents are in variance with any laws, regulations, and ordinances, he shall notify the Owner’s Representative and shall not proceed unless necessary changes required for compliance with said laws, regulations, and ordinances have been effected. Contractor shall be fully responsible for any work knowingly performed contrary to said laws, regulations, and ordinances and shall fully indemnify Owner against loss and bear all costs and penalties arising there from.

C. Contractor shall secure certificates of inspection and of occupancy that may be required by authorities having jurisdiction over the Work.

1.4 REFERENCES

A. ASTM A 36 - Standard Specification for Carbon Structural Steel; 2003a.

B. ASTM A 325 - Standard Specification for Structural Steel Bolts, Heat Treated, 120,000 PSI Minimum Tensile Strength; 2004.

C. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength; 2003a.

D. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2004.

E. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

F. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process; 2003.

G. ASTM A 792 - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy Coated by the Hot-Dip Process; 2003.

H. American Institute of Steel Construction (AISC).

I. American Iron and Steel Institute (AISI) Specifications for Cold Formed Members.

J. American Society of Testing Material (ASTM).

K. American Welding Society (AWS).

L. OSHA Steel Erection Standard 29 CFR 1926.750 Part R.

M. SSPC-SP 2 –Hand Tool Cleaning; Society for Protective Coatings; 2000.

N. SSPC-SP 10 -Near-White Blast Cleaning; Society for Protective Coatings; 2000.

O. ICC Evaluation Service, ESR-1006, Structural Insulated Panels

1.5 SYSTEM DESCRIPTION

A. Standard Design Loads: International Building Code (IBC 2000), 30 pounds per square foot Roof Snow load, 100 mile per hour wind speed, Exposure “C”, Seismic Design Category D.

B. Design Method shall be per applicable local building code requirements. Manufacturer’s design shall utilize a three-dimensional structural analysis to determine all member loads and forces. Design and detailing shall be in compliance with AISC 341, Part I or III.

C. The pre-engineered package shall be shipped as a pre-cut (except for standing seam roof panels) and pre-fabricated package that shall include the structural framing members, roof panels, fasteners, and trim as well as the installation instructions. The structure shall be shipped un-assembled for minimum shipping charges.

D. Field labor shall be only for the assembly of the pre-fabricated parts. No onsite welding shall be required or permitted. Tube frame connection bolts and fasteners shall be concealed, within the tubing or hidden. All rafter tails shall be factory welded into place as well as all compression ring/tube covers. On multi-tiered buildings the rafter risers shall be welded to the lower rafters for ease of installation. No through bolting shall be allowed for any connections due to the possibility of the deformation of the tube steel parts.

1.6 QUALITY ASSURANCE

A. Supplier Qualifications:
   1. The product shall be designed and fabricated at a facility operated and directly supervised by the supplier.
   2. The supplier shall have at least 5 years of experience in the design and fabrication of pre-engineered steel structures.
   3. Membership in American Institute of Steel Construction.
   4. Membership in American Welding Society.
   5. Full time on-staff licensed Professional Engineer.
   6. Full time on-staff quality control manager.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery requirements with Owner and other installers.

B. Store products in manner to prevent damage prior to installation. Where products need to be stored outdoors, store off the ground and place so that water will drain

C. Inspect parts within 48 hours of delivery, compare with manufacturer's bill of materials and report any missing or non-conforming parts to the manufacturer within this time frame.

PART 2 - PRODUCTS

2.1 PREFABRICATED SHELTER

A. Shelter to be purchased and provided by Owner and installation by Contractor.

B. For Reference: 20' square steel shelter, with 24 gauge multi-rib metal roof with ribs at 12" centers, 6:12 roof slope and E-Coat finish. Anchoring shall be surface mount with internal anchor bolt connections. Frame and roof color to be selected from manufacturer's standard colors.

C. For Reference: SQR 20. Manufactured by Poligon, Inc., locally represented by Penchura, LLC, 889 S. Old US 23, Brighton, MI, 48114, Phone 810-229-6245, or approved equal.

2.3 APPLICATIONS

A. Structures: Pre-engineered, prefabricated all-steel framed structures; column, rafter, and purlin structure, with steel roof panels, all flashing, trim, accessories, and fasteners required for a complete installation.

B. Structural framing (Columns, rafters, tie-beams, purlins, etc.) shall be Hollow Structural Sections (HSS) meeting ASTM A500 grade B. "I" beams, tapered columns, open "C" channels, cold-formed box sections or wood products shall not be accepted.

C. Compression rings shall be made of structural channel sections or welded plate sections that meet ASTM A36 grade steel.

D. Structural connections shall be made with A325 high-strength bolts and A563 structural nuts, ASTM A307 grade anchor bolts, self-drilling screws and pop-rivets.

E. Metal Roof Panel: 24-gauge galvalume roof panel with a Kynar 500 paint finish. The ribs shall be 2" high and 12" on center. The ribs shall run with the slope of the building for proper drainage. Color shall be selected from the manufacturer's standard color chart.

F. Metal Roof Trim: Roof trim shall match the color of the roof and shall be formed from 26-gauge painted galvalume steel as follows:

1. Metal ridge caps shall be preformed with a single central bend to match the roof slope. The trim shall be hemmed on both sides.

2. Roof peak cap shall be supplied on all buildings that do not include a framed cupola.

3. Edge of the roof deck shall have a preformed "J" channel eave trim, the channel shall be applied along all the eaves to trim and straighten the eave. The "J" shall have weep holes at 6" on center for roof drainage.

4. Highside trim shall be in a "J" shape and shall be supplied for all tiered buildings.

2.4 FABRICATION

A. All columns, rafters, tie-beams, purlins, compression rings shall be factory welded assemblies with provisions for bolted connections in the field. There will be no field welding required for any connections. All base plates, stiffener plates, rafter clips and end plates shall be factory welded in place.

B. Factory welded connections shall be made by certified welders in accordance with the latest edition of AWS D1.1 and D1.3 Specifications. All welders shall be AWS certified.

C. Factory Frame Finish for ICON Shelter: Double coat of TGIC polyester power coated per the manufacturer's finish specification.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that support systems have been approved

B. Beginning work of this section means acceptance of existing conditions.

3.2 PREPARATION

A. This Work shall be thoroughly reviewed with the Owner's Representative before starting.

3.3 ASSEMBLY AND INSTALLATION

A. Assemble and install structure on concrete footings as shown on Drawings, complete per approved shop drawings and manufacturer's specifications and instructions.

B. Assemble and install Structure on steel posts as shown on Drawings, complete per approved shop drawings and manufacturer's specifications and instructions.

C. Contractor shall take all necessary precautions and care to protect the powder coat finish on the premanufactured Structure. Contractor shall use manufacturer approved touch up products to repair minor scratches. Excessive finish abrasions and/or scratches will require repainting the entire frame.

3.4 CLEAN UP

A. All excess and waste material shall be disposed of legally off-site.

B. Upon completion of Work, leave areas in clean condition.

END OF SECTION 129400

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SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Removing above- and below-grade site improvements.
6. Disconnecting, capping or sealing, and removing site utilities or abandoning site utilities in place.
7. Temporary erosion- and sedimentation-control measures.

B. Related Sections:

1. Division 01 Section 015000 "Temporary Facilities and Controls" for temporary utility services, construction and support facilities, security and protection facilities**,** and temporary erosion- and sedimentation-control measures.
2. Division 01 Section 015639 "Temporary Tree and Plant Protection".
3. Division 01 Section 017300 "Execution Requirements" for field engineering and surveying

1.3 DEFINITIONS

A. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

B. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.

D. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

E. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a concentric circle with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

F. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 MATERIAL OWNERSHIP

A. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.5 SUBMITTALS

A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
   1. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

B. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

1.6 QUALITY ASSURANCE

A. Preinstallation Conference: Conduct conference at Project site.

1.7 PROJECT CONDITIONS

A. Do not remove or damage any “Protected Trees” as identified in the Construction Documents. If any “Protected Trees” are damaged during the construction process, the Contractor shall replace the tree per the City of Kalamazoo Natural Features Protection Overlay Zoning Ordinance.

B. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

   1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
   2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

C. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Architect.

D. Salvable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises where indicated.

E. Utility Locator Service: Notify utility locator service for area where Project is located before site clearing.

F. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.

G. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

H. Do not direct vehicle or equipment exhaust towards protection zones.

I. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

J. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving."

1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag each tree trunk at 54 inches (1372 mm) above the ground.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.

B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

A. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

3.4 EXISTING UTILITIES

A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.

1. Verify that utilities have been disconnected and capped before proceeding with site clearing.

B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed or abandoned in place.

1. Arrange with utility companies to shut off indicated utilities.
2. Owner will arrange to shut off indicated utilities when requested by Contractor.

C. Locate, identify, and disconnect utilities indicated to be abandoned in place.

D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.

E. Excavate for and remove underground utilities indicated to be removed.

F. Removal of underground utilities is included in Division 22, Division 23, Division 26, and Division 33 Sections.

3.5 CLEARING AND GRUBBING

A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
2. Grind down stumps and remove roots, obstructions, and debris to a depth of 18 inches (450 mm) below proposed subgrade.
3. Use only hand methods for grubbing within protection zones.
4. Chip removed tree branches and dispose of off-site.

B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

1. Place fill material in horizontal layers not exceeding a loose depth of 8 inches (200 mm), and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; trash, debris, weeds, roots, and other waste materials.

C. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).
2. Do not stockpile topsoil within protection zones.
3. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.

B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.

1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.

2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.

B. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 311000

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for walks, pavements, turf and grasses, and plants.
2. Excavating and backfilling for buildings and structures.
3. Subbase course for concrete walks and pavements.
4. Subbase course for asphalt paving.
5. Building pad aggregate material

B. Related Sections:

1. Division 01 Section "Temporary Facilities and Controls" for temporary controls, utilities, and support facilities; also for temporary site fencing if not in another Section.
2. Division 31 Section "Site Clearing" for site stripping, grubbing, stripping and stockpiling topsoil, and removal of above- and below-grade improvements and utilities.
3. Division 32 Section "Turf and Grasses" for finish grading in turf and grass areas, including preparing and placing planting soil for turf areas.
4. Division 32 Section "Plants" for finish grading in planting areas and tree and shrub pit excavation and planting.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

F. Fill: Soil materials used to raise existing grades.

G. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

H. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

I. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

J. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Classification according to ASTM D 2487 of each on-site and borrow soil material proposed for fill and backfill.
2. Laboratory compaction curve according to ASTM D 1557 for each on-site and borrow soil material proposed for fill and backfill.

1.5 QUALITY ASSURANCE

A. A Geotechnical Report has been prepared by Driesenga & Associates, Inc. (Project No. 2450962.3A, December 5, 2024), and has been included as part of this section.

B. A survey of the project area was completed by AR Engineering, Inc. (Project No. 24029003, March 4, 2025) that describes physical characteristics of the site. The information and data shown or indicated in the construction documents with respect to existing underground facilities at or contiguous to the site is based on information and date furnished by the owners of such underground facilities or by others. Unless otherwise provided by the Contract Documents.:

1. Owner and Architect shall not be responsible for the accuracy or completeness of any such information or data.
2. Contractor shall have full responsibility for reviewing and checking all such information and data; for locating all underground facilities shown or indicated in the Contract Documents; for coordination of the Work with the owners of such underground facilities during construction; for the safety, protection and repairing of any damage thereto resulting from the Work, the cost of which will be considered as having been included in the Contract Price.

C. Erosion Control: Erosion shall be controlled as described on Drawings and required by City of Kalamazoo, the State of Michigan, or other authorities having jurisdiction. Erosion control devices referenced on the plans are based on the *Standard Erosion Control Handbook* published by MDOT.

D. Preexcavation Conference: Conduct conference at Project site.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth-moving operations.
1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

B. Existing Conditions: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted in writing by Architect and then only after arranging to provide temporary utility services according to requirements indicated.
1. Notify Architect not less than two days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Architect's written permission.
3. Contact utility-locator service for area where Project is located before excavating.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 3 inches (75 mm) in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Material complying with the requirements of MDOT Class II sand.

E. Base Course: Material complying with the requirements of MDOT 21AA.

F. Engineered Fill: Material complying with the requirements of MDOT Class II sand.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch (25-mm) sieve and not more than 8 percent passing a No. 200 (0.075-mm) sieve.

H. Drainage Course: Narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch (25-mm) sieve and 0 to 5 percent passing a No. 4 (4.75-mm) sieve.

J. Sand: ASTM C 33; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

L. Cobblestone Mineral Mulch:
1. Type: Cobblestone
2. Size: 9” minimum to 12” maximum, infill voids between stones with 2”-3” stone.
3. Color: Readily available natural cobblestone color range.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf (700 N); ASTM D 4632.
3. Sewn Seam Strength: 142 lbf (630 N); ASTM D 4632.
4. Tear Strength: 56 lbf (250 N); ASTM D 4533.
5. Puncture Strength: 56 lbf (250 N); ASTM D 4833.
6. Apparent Opening Size: No. 40 (0.425-mm) sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 RELATED MATERIALS

A. Silt Fence: EcoloFence 24/11 or approved substitute.

B. Erosion Control Blankets:

1. For Slopes Less than 4:1: North American Green DS150 or approved substitute, locally represented by Price & Co., (800)248-8230.
2. For Slopes Greater than 4:1: Bionet C125BN, biodegradeable double net coconut blanket with steel wire staples designed to last in place approximately 24 months minimum as manufacturered by North American Green, or approved substitute.
   a. Local Vendor: CSI Geoturf, 1225 76th Street, SW, Byron Center, MI, (616)583-0588.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface is specified in Division 31 Section “Site Clearing”.

C. Protect and maintain erosion and sedimentation controls during earth moving operations.

D. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch (25 mm). If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

B. Excavations at Edges of Tree- and Plant-Protection Zones:
1. Excavate by hand or with an air spade to indicated lines, cross sections, elevations, and subgrades. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches (300 mm) higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches (300 mm) each side of pipe or conduit.

C. Trench Bottoms: Excavate trenches 4 inches (100 mm) deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches (150 mm) deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

3.8 SUBGRADE INSPECTION

A. Notify Architect when excavations have reached required subgrade.

B. If Architect determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
   1. Additional excavation and replacement material will be paid for according to Contract provisions for Change in Work.

C. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph (5 km/h).

   2. Proof-roll with a fully loaded, tandem axle truck.
   3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Architect, and replace with compacted backfill or fill as directed.

D. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.

E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi (17.2 MPa), may be used when approved by Architect.

   1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

   1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for Record Documents.

3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.12 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches (450 mm) of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

D. Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch (25 mm) in any dimension, to a height of 12 inches (300 mm) over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

E. Backfill voids with satisfactory soil while installing and removing shoring and bracing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches (150 mm) below subgrade under pavements and slabs.

3.13 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.14 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 1557:

1. Under structures and pavements, scarify and recompact top 12 inches (300 mm) of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 92 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches (150 mm) below subgrade and compact each layer of backfill or fill soil material at 85 percent.

3.16 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch (25 mm)
2. Walks: Plus or minus 1 inch (25 mm)
3. Pavements: Plus or minus 1/2 inch (13 mm)

3.17 SUBBASE AND BASE COURSES

A. Place subbase course and base course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place subbase course and base course under pavements and walks as follows:
   1. Place base course material over subbase course under hot-mix asphalt pavement.
   2. Shape subbase course and base course to required crown elevations and cross-slope grades.
   3. Place subbase course and base course 6 inches (150 mm) or less in compacted thickness in a single layer.
   4. Place subbase course and base course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
   5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 1557

3.18 DRAINAGE COURSE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Place drainage course 6 inches (150 mm) or less in compacted thickness in a single layer.
   2. Place drainage course that exceeds 6 inches (150 mm) in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches (150 mm) thick or less than 3 inches (75 mm) thick.
   3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.19 EROSION CONTROL BLANKET

A. Place erosion control blanket and fasten in place per manufacturer's instructions for type of blanket specified.

3.20 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing

subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:

1. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
2. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.

E. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

3.21 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Architect; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.22 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

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December 5, 2024 *via electronic mail*

Ms. Rachel Hughes-Nilsson
OCBA LANDSCAPE ARCHITECTS
141 East Michigan Avenue, Suite #500
Kalamazoo, Michigan 49007

Re: Geotechnical Pavement Recommendations
Verburg Park Improvements
669 Gull Road, Kalamazoo, Michigan
D&A Project No. 2450962.3A

Dear Ms. Hughes-Nilsson

Driesenga & Associates, Inc. (D&A) is pleased to submit the following geotechnical exploration report and recommendations for the proposed pavement improvements at Verburg Park including both new concrete paved areas and new asphalt paved paths. This work was performed in accordance with D&A proposal dated July 29, 2024, and authorized by Ms. Rachel Hughes-Nilsson of OCBA Landscape Architects on October 30, 2024.

FIELD EXPLORATION AND LABORATORY PROCEDURES

Three (3) soil borings, designated SB-1 to SB-3, were performed at selected locations on November 19, 2024, as shown on the attached Soil Boring Location Map. The soil borings were advanced with solid-stem augers to depths ranging from five (5) to ten (10) feet below the ground surface. During sampling with the drill rig, soil samples were collected from split-spoon sampling via standard penetration testing (ASTM method D 1586) at intervals of 2.5 feet to a depth of 10 feet.

Upon completion, the boreholes were backfilled with soil cuttings and the surface was repaired approximating previous conditions. The collected samples from the split-spoon sampler were transported to our laboratory and characterized in general accordance with the Unified Soil Classification System (USCS). The estimated group symbol is shown on the boring logs, just before the soil description.

Double-Ring Infiltration Testing following SEMCOG LID Manual for Michigan, Appendix E (Modified) was completed at all three (3) test locations at depths ranging from 5 to 7 feet below existing grades. A stabilized infiltration rate was calculated based on data collected in the field.

A composite soil sample was created at each boring location from soils collected from just below surface topsoil elevation to the end of the soil boring. A representative sample from each location was issued to the environmental testing laboratory for evaluation of VOC's, PNA's and MI 10 Metals.

SITE, SOIL, AND GROUNDWATER CONDITIONS

The site is currently developed as a park with maintained grass, gravel paved drives and parking area, an asphalt paved bike path and a concrete paved boat launch to the Kalamazoo River. The site is relatively flat with just a gradual downward grade along the edges of the small lake.

Surface materials encountered at the site generally consist of 6 to 12 inches of topsoil underlain by loose to medium dense sand to a depth of at least 10 feet. At 7 to 8.5 feet, a layer of peat was encountered within the sand. At boring location SB-1, approximately 1-foot of sand fill underlies the surface topsoil.

At boring location SB-1, a stabilized infiltration rate of 22.5 inches per hour was calculated at a depth of 5-feet below existing grade. At boring location SB-2, a stabilized infiltration rate of 4 inches per hour was calculated at a depth of 4.5-feet below existing grade. At boring location SB-3, a stabilized infiltration rate of 204 inches per hour was calculated at a depth of 7-feet below existing grade.

Groundwater was encountered at depths ranging from 6.5 to 9.6 feet below existing grades. Not all borings encountered groundwater. Hydrostatic groundwater levels and the elevations and volumes of groundwater should be expected to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off, and other factors. The groundwater levels (or lack thereof) indicated by the soil borings and presented in this section represent conditions at the time the readings were taken. The actual groundwater levels at the time of construction may vary.

Environmental laboratory tests revealed levels below detection limits for all VOC's and PNA's. Certain metals were detected but at levels below the statewide default background level in all circumstances based on MI EGLE Part 201 and Part 213 criteria (see attached documentation for specific details).

ANALYSIS AND RECOMMENDATIONS

It is strongly recommended that all pavement subgrade areas be evaluated by D&A after these areas has been cleared and stripped. This evaluation may be performed by proofrolling with a loaded tandem axle dump truck or another method selected by the geotechnical engineer to identify any areas of soft subgrade soil. Where soft subgrade soils are encountered, remedial actions as recommended by the geotechnical engineer will be required.

Existing fill was encountered in soil boring SB-1 and extended about 1.5 feet below the existing ground surface. Without documentation of the placement of the fill, we consider it to be "uncontrolled fill." If documentation of the existing fill is available, we would be pleased to review it to determine its suitability of pavement, and/or structural fill support.

Deeper and/or looser uncontrolled fill may be encountered at the site, particularly adjacent to existing or former structures, or in the vicinity of existing utilities. The existing fill ***may*** be suitable for support of pavements, and/or structural fill after additional evaluation and special preparation and only where it is not underlain by buried topsoil or other organic, deleterious or otherwise unsuitable soils and the owner accepts the risks in doing so. Some of the soil samples in the existing fill contained trace organic material. Existing fill with excessive organics (over 4%), voids or debris should be removed and replaced with structural fill. Test pits should be performed to identify unsuitable fill. The test pits could be performed prior to construction. However, suitability of the existing fill will need to be determined on a case-by-case basis during construction. The remaining fill, after removing unsuitable fill, is anticipated to be suitable to support pavements and structural fill, provided an increased risk of unsatisfactory performance is acceptable. We believe the risk of unsatisfactory performance such as cracking and settlement associated with the construction of pavements on or above the existing fill is relatively low after preparation.

Ultimately, if the risk of pavement performance is not acceptable, complete removal of the existing fill and replacement with structural fill should be performed. Based on the soil borings, the existing fill could extend 1.5 feet or more below the existing ground surface.

It is recommended that any fill materials be placed in or near horizontal maximum 8-inch-thick loose lifts and compacted to a minimum of 95% of Modified Proctor MDD, or 98% of Michigan Cone MDD. If a vibratory roller is used for compaction, the loose lift thickness may be increased to 12 inches. Soils used for structural fill should consist of clean sand meeting SW or SP classification in accordance with USCS criteria. Within the proposed pavement area the native sand should be proof-compacted by at least six (6) passes of a 10-ton vibratory roller. The contractor should remove standing water from the subgrade and prevent surface water from reaching the prepared subgrade. In addition, construction traffic should use haul roads and should not haphazardly traffic the site. Subgrade soils that become disturbed should be removed and replaced with structural fill or crushed aggregate. Under wet weather conditions, the subgrade may be protected by placing crushed aggregate on the exposed subgrade.

Specific traffic information was not available in developing these pavement recommendations. For design purposes, we have assumed that passenger vehicles and light trucks will traffic all light/medium duty pavement areas. Heavy duty pavement areas will include entrances, service drives and bus parking areas, and will be trafficked by semi-tractor trailers, buses, refuse trucks, and fire engines. The following Design Inputs were used in our evaluation:

- Estimated Native Subgrade CBR = 5 to 6 percent
- Design Subgrade Resilient Modulus (MR) = 5,800 to 6,600 psi
- Reliability = 85% flexible
- Standard Deviation = 0.49 flexible
- Initial Serviceability Index = 4.2
- Terminal Serviceability Index = 2.0
- New HMA Layer Coefficient = 0.42
- New Aggregate Base Layer Coefficient = 0.14

The following pavement sections are provided based on subgrade soil conditions and the assumed ESAL design requirement indicated on the tables. The ESAL design values noted below should be confirmed by the design engineers and, if different, D&A should be consulted to revise the provided design section to meet the revised ESAL requirements.

Light to Medium Duty (100,000 ESAL's)					
Layer	Material	Thickness (inches)	Structural Layer Coefficient	Drainage Coefficient	Structural Number
Surface Course	MDOT 13A/4EML or Similar	1.5	0.42	1	0.63
Leveling Course	MDOT 13A/4EML or Similar	1.5	0.42	1	0.63
Aggregate Base	MDOT 22A	6	0.14	0.75	0.63
Granular Base	Class II	10	0.08	0.75	0.60
Total Structural Number (SN)					**2.49**

Heavy Duty (400,000 ESAL's)					
Layer	Material	Thickness (inches)	Structural Layer Coefficient	Drainage Coefficient	Structural Number
Surface Course	MDOT 13A/4EML or Similar	2	0.42	1	0.84
Leveling Course	MDOT 13A/4EML or Similar	2	0.42	1	0.84
Aggregate Base	MDOT 22A	8	0.14	0.75	0.84
Granular Base	MDOT Class II	10	0.08	0.75	0.60
Total Structural Number (SN)					**3.12**

Compaction of asphalt courses should range between 92% and 96% of the Theoretical Maximum Density (TMD).

The pavement subgrade should be prepared as described above. Above the subgrade, the sand subbase should be constructed in accordance with the tables above using Michigan Department of Transportation (MDOT) Class II Fine Aggregate fill (MDOT Division 3, Section 301 "2012 Standard Specifications for Construction", April 1, 2011) compacted to a minimum of 95% of the material's MDD as determined by Modified Proctor.

The aggregate base for pavement areas should follow MDOT Dense-Graded Aggregate Base Course Materials – Division 3, Section 302 and Division 9, Section 902, using a 22A (Grading Requirements per MDOT Table 902-1) Dense-Graded Aggregate material in accordance with the tables above. This gravel base may be placed in one (1) lift and should be compacted to a minimum of 95% of the material's MDD as determined by Modified Proctor.

Construction traffic should be minimized on the new pavement. If excessive construction traffic is anticipated on the pavement structure, the initial asphalt lift thickness could be increased and placement of the final lift could be delayed until the majority of the construction activities have been completed. This action will allow repair of localized failure, if any does occur, as well as reduce load damage on the pavement system.

A bond coat of emulsion should be used between the base course and wearing course when more than 48 hours have elapsed between placement of the courses, or the surface of the base course has been contaminated by soil or dust. Performance grade asphalt cement should be used in the production of all bituminous mixtures. Reclaimed Asphalt Pavement (RAP) may be permitted in percentages in accordance with MDOT guidelines and specifications for use in the surface course mix design. We recommend following MDOT Tier 1 or Tier 2 criteria.

After the pavement is complete, we recommend instituting a regular maintenance program that includes sealing of cracks and patching of distressed areas. This should reduce the effect of water infiltration and associated frost action.

In areas where the durability of Portland cement concrete (PCC) is desired over bituminous pavement (i.e., loading areas, dumpster pads) a rigid pavement is recommended. Concrete pavement should be constructed on a base layer of at least 6 inches of Michigan Department of Transportation (MDOT) Class II sand subbase (Division 9, Section 902, Grading Requirements per Table 902-3). The concrete slab should consist of 4,000 psi, air entrained concrete (MDOT Division 6, Section 601 – PCC Pavement and Division 9, Section 901 – Cement and Lime); however, actual design of the slab including reinforcement type and spacing should be performed by the Project Structural Engineer.

These recommendations assume typical conditions during the June through September construction season. Any substitution of materials or deviation from these stated assumptions should be reviewed to assess potential impact on the recommended design.

GENERAL COMMENTS

This report and any future reports or addenda performed for this site should be supplied to potential bidders prior to them submitting their proposals. We also recommend the construction contract include provisions for dealing with differing conditions. Contingency funds should be reserved for potential problems during earthwork and pavement construction.

This report has been prepared solely for the use of the client for the project specifically described in this report. This report cannot be relied upon by other parties not involved in this project, unless written permission is granted by Driesenga & Associates, Inc. If this report or any of its contents are utilized by parties other than our original client and the project team members, Driesenga & Associates, Inc. cannot be held responsible for the suitability of the field exploration, scope of services, or recommendations made for the new project. Driesenga & Associates, Inc. also is not responsible for the interpretation of our soil boring logs and the recommendations provided herein by other parties.

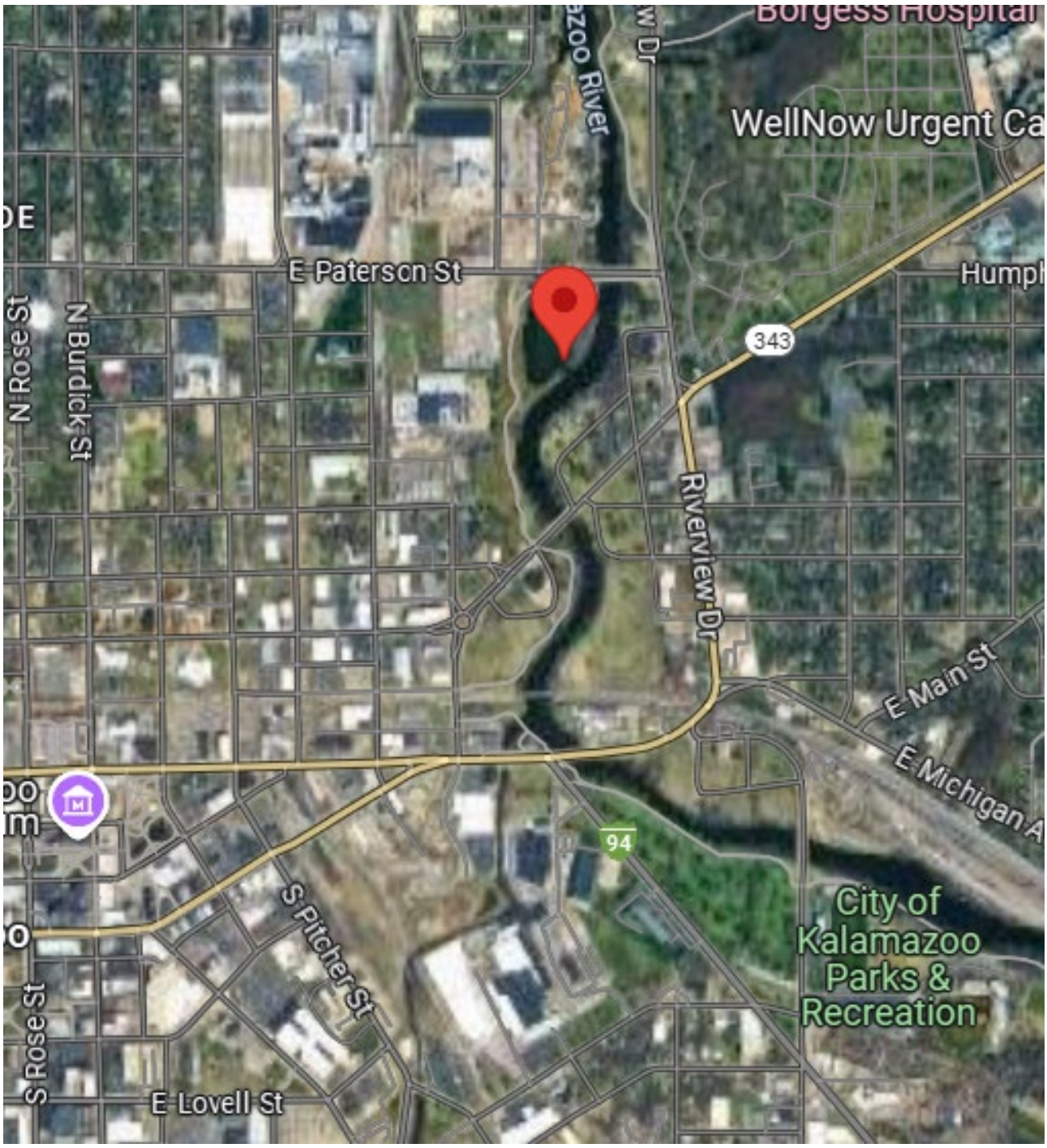
We appreciate the opportunity to be of service to you. If you have any questions, or if we can be of further service as design and construction progresses, please contact our office.

Sincerely,
DRIESENGA & ASSOCIATES, INC.

Michael Stork	Musana Nabil	Randy Pail, P.E
Senior Project Geologist	Senior Project Engineer	Director of Geotechnical Engineering

ec: James Henning, P.E. – Driesenga & Associates, Inc.

Attachments - Soil Boring Location Map
Soil Boring Logs
Laboratory Test Results
Soil Classification Sheets



N

W E

S

Scale: NTS

DRIESENGA & ASSOCIATES, INC.

Engineering · Surveying · Testing

Figure Number: 1

Site Location

Project Name:

Verburg Park Improvements

Project Number:

2450962.3A

Project Location:

669 Gull Road

Kalamazoo, Michigan

Date: 11-12-24

Sheet: 1 of 1

Modified by: MWS

N

W E

S

Scale: NTS

Boring Location

DRIESENGA & ASSOCIATES, INC.

Engineering · Surveying · Testing

Figure Number: 2

Boring Locations

Project Name:

Verburg Park Improvements

Project Number:

2450962.3A

Project Location:

669 Gull Road

Kalamazoo, Michigan

Date: 11-12-24

Sheet: 1 of 1

Modified by: MWS

DRIESENGA & ASSOCIATES, INC.

Engineering · Surveying · Testing

SB-1

Verberg Park Improvements
669 Gull Road
Kalamazoo, Michigan

Project No. 2450962.3A

Client: OCBA

Date Started	: November 19, 2024	Drilling Company	: Great Lakes Drilling
Date Completed	: November 19, 2024	Field Sampling	: J. Cook
Hole Diameter	: 6-inches	Reviewed By	: S. Ellison
Drilling Method	: Solid-Stem Auger	GW Encountered	: Dry
Sampling Method	: Split-Spoon Sampler	GW Completed	: Dry

Water Levels
▼ During Drilling
▽ After Completion

Standard-Hammer Used for SPT

Depth in Feet	Elev.	USCS	GRAPHIC	DESCRIPTION	Samples	Blow Count	N Value	Pocket Pen (tsf)	Water Level	Moisture Content %
0				TOPSOIL - 4 inches						
		SW//Fill		Fill - SAND, medium dense, brown to dark brown, fine to medium grained, trace gravel, moist.						
		SW		SAND, medium dense, brown, medium to coarse grained, trace gravel, moist.	1	6 9 9	18			
5					2	6 6 8	14			
				Stabilized infiltration rate at 5-feet below existing grade - 22.5 inches per hour						
10										

12-05-2024 C:\Users\Michael Stork\DAI Dropbox\Kalamazoo\Projects\2024\2450962.3A\QLogs\SB-1 Verberg Park.bor

DRIESENGA & ASSOCIATES, INC.

Engineering · Surveying · Testing

SB-2

Verberg Park Improvements
669 Gull Road
Kalamazoo, Michigan

Project No. 2450962.3A

Client: OCBA

Date Started	: November 19, 2024	Drilling Company	: Great Lakes Drilling
Date Completed	: November 19, 2024	Field Sampling	: J. Cook
Hole Diameter	: 6-inches	Reviewed By	: S. Ellison
Drilling Method	: Solid-Stem Auger	GW Encountered	: 6.5'
Sampling Method	: Split-Spoon Sampler	GW Completed	: 7.0'

Water Levels
▼ During Drilling
▽ After Completion

Standard-Hammer Used for SPT

Depth in Feet	Elev.	USCS	GRAPHIC	DESCRIPTION	Samples	Blow Count	N Value	Pocket Pen (tsf)	Water Level	Moisture Content %
0				TOPSOIL - 6 inches						
		SW		SAND, loose, brown, fine to medium grained, trace gravel, trace clay, moist.						
		SP		SAND, loose, brown, fine grained, trace silt, moist to wet.	1	1 3 4	7			
				Stabilized infiltration rate at 4.5' below grade - 4 inches per hour	2	2 3 3	6			
5					3	3 3 2	5		▼ ▽	
		PT		PEAT - 10 inches, black, wet.						
		SW		SAND, medium dense, brown, medium to coarse grained, trace gravel, wet.	4	4 6 7	13			
10										

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DRIESENGA & ASSOCIATES, INC.
Engineering · Surveying · Testing

SB-3

Verberg Park Improvements
669 Gull Road
Kalamazoo, Michigan

Project No. 2450962.3A

Client: OCBA

Date Started	: November 19, 2024	Drilling Company	: Great Lakes Drilling
Date Completed	: November 19, 2024	Field Sampling	: J. Cook
Hole Diameter	: 6-inches	Reviewed By	: S. Ellison
Drilling Method	: Solid-Stem Auger	GW Encountered	: 9.6'
Sampling Method	: Split-Spoon Sampler	GW Completed	: 8.9'

Water Levels
▼ During Drilling
▽ After Completion

Standard-Hammer Used for SPT

Depth in Feet	Elev.	USCS	GRAPHIC	DESCRIPTION	Samples	Blow Count	N Value	Pocket Pen (tsf)	Water Level	Moisture Content %
0				TOPSOIL - 12 inches						
		SW		SAND, loose to medium dense, brown to dark brown, medium to coarse grained, trace gravel, moist.	1	1 3 4	7			
					2	2 3 3	6			
5				Stabilized infiltration rate at 7' below grade - 204 inches per hour	3	3 3 2	5			
		SC		Clayey SAND, loose, black, fine grained, some organic material (peat), moist.	4	4 6	13		▽ ▼	
		SP		SAND, loose, dark gray, fine grained, trace topsoil, moist to wet.		7				
10										

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right solutions.
right partner.

December 03, 2024

Michael Stork
Driesenga & Associates, Inc.
12330 James Street
Suite H80
Holland, MI 49424

Work Order: **HN2409658**

Re: **Verberg Park**

Dear Michael,

Enclosed are the results of the sample(s) submitted to our laboratory.

The analytical data provided relates to the samples received by ALS Environmental and for the analysis requested.

The analytical data provided relates directly to the samples received by ALS Environmental - Holland and for only the analyses requested.

Sample results are compliant with industry accepted practices and Quality Control results achieved laboratory specifications. Any exceptions are noted in the Case Narrative, or noted with qualifiers in the report or QC batch information. Should this laboratory report need to be reproduced, it should be reproduced in full unless written approval has been obtained from ALS Environmental. Samples will be disposed in 30 days unless storage arrangements are made.

If you have any questions regarding this report, please feel free to contact me:
ADDRESS: 3352 128th Avenue, Holland, MI, USA PHONE: +1 (616) 399-6070 FAX: +1 (616) 399-6185

Jodi Blouw
/S/ JODI BLOUW

Project Manager

Narrative Documents

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658

Project: Verberg Park **Date Received:** 21-Nov-2024

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt

3 soil/solid samples were received for analysis at ALS Environmental on 21-Nov-2024. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Organics

EPA 8260D-FULL HN-5035A-10mL-S

Batch ID: 2799057

The Continuing Calibration Verification did not meet acceptance criteria with high bias, however, the sample results were non-detect for the following analytes:2-butanone
The MS recovery was below the lower control limit. The corresponding result in the parent sample may be biased low for this analyte: see qc
The MSD recovery was above the upper control limit. The corresponding result in the parent sample was non-detect, therefore no qualification is necessary. see qc
The MSD recovery was below the lower control limit. The corresponding result in the parent sample may be biased low for the following analyte(s): see qc
The MS recovery was above the upper control limit. The corresponding result in the parent sample was non-detect, therefore no qualification is necessary: see qc
The LCS recovery was above the upper control limit. All the sample results in the batch were non-detect. No qualification is necessary for this analyte: 2-butanone

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting limits.

For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: SB-1 - 5'	Lab ID: HN2409658-001					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic	3.94		0.0390	0.325	mg/kg	EPA 6020B
Barium	17.2		0.299	0.325	mg/kg	EPA 6020B
Chromium	4.38		0.143	0.325	mg/kg	EPA 6020B
Copper	4.56		0.325	0.325	mg/kg	EPA 6020B
Lead	4.02		0.156	0.325	mg/kg	EPA 6020B
Percent Moisture	6.2		0.1	0.1	%	EPA 3550C
Zinc	14.6		0.637	0.650	mg/kg	EPA 6020B

CLIENT ID: SB-2 - 5'	Lab ID: HN2409658-002					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic	2.31		0.0366	0.305	mg/kg	EPA 6020B
Barium	27.5		0.280	0.305	mg/kg	EPA 6020B
Chromium	5.61		0.134	0.305	mg/kg	EPA 6020B
Copper	4.82		0.305	0.305	mg/kg	EPA 6020B
Lead	3.92		0.146	0.305	mg/kg	EPA 6020B
Percent Moisture	9.1		0.1	0.1	%	EPA 3550C
Zinc	15.7		0.597	0.609	mg/kg	EPA 6020B

CLIENT ID: SB-3 - 7'	Lab ID: HN2409658-003					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic	1.21		0.0359	0.299	mg/kg	EPA 6020B
Barium	8.84		0.275	0.299	mg/kg	EPA 6020B
Chromium	4.05		0.132	0.299	mg/kg	EPA 6020B
Copper	2.50		0.299	0.299	mg/kg	EPA 6020B
Lead	3.51		0.144	0.299	mg/kg	EPA 6020B
Mercury	0.0172		0.0111	0.0164	mg/kg	EPA 7471B
Percent Moisture	5.5		0.1	0.1	%	EPA 3550C
Zinc	10.2		0.586	0.598	mg/kg	EPA 6020B

Sample Receipt Information

SAMPLE SUMMARY

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Workorder: HN2409658

Laboratory Sample ID	Client Sample ID	Sample Matrix	Collection Date	Date Received
HN2409658-001	SB-1 - 5'	SOIL/SOLID	11/19/24 09:35	11/21/24 12:08
HN2409658-002	SB-2 - 5'	SOIL/SOLID	11/19/24 11:40	11/21/24 12:08
HN2409658-003	SB-3 - 7'	SOIL/SOLID	11/19/24 12:00	11/21/24 12:08

Simi Valley, CA +1 805 526 7161
Kelso, WA +1 360 577 7222
Cincinnati, OH +1 513 733 5336
Everett, WA +1 425 356 2600
Fort Collins, CO +1 970 490 1511
Holland, MI +1 616 399 6070
Houston, TX +1 281 530 5656
Middletown, PA +1 717 944 5541
Valparaiso, IN +1 219 299 8127
Salt Lake City, UT +1 801 266 7700
South Charleston, WV +1 304 356 3168
Rochester, NY +1 585 288 5380

Chain of Custody Form

Page _____ of _____

COC ID: 072008

ALS Project Manager: | ALS Work Order #:

Customer Information		Project Information		Parameter/Method Request for Analysis	
Purchase Order		Project Name	Verberg Park	A	VOC's
Quote #		Project Number	2450962.3A	B	PNA's
Company Name	Driesenga & Assoc.	Bill To Company	Driesenga	C	MI 10 Metals
Send Report To	Michael Stork	Invoice Attn	Michael Stork	D	
Address	12330 James St. Ste H80	Address		E	
				F	
City/State/Zip	Holland / MI / 49424	City/State/Zip		G	
Phone	616 886 9269	Phone		H	
Fax	616 396 0100	Fax		I	
e-Mail Address	michaels@driesenga.com	e-Mail Address		J	

Environmental Division
Holland
Work Order Reference
HN2409658

Telephone : +1 616 399 6070

No.	Sample Description	Date	Time	Matrix	Pres.	# Bottles	A	B	C	D	E	Hold
1	SB-1 -5'	11-19-24	9:35am	Soil	-	3	✓	✓	✓			
2	SB-2 - 5'	11-19-24	11:40am	Soil	-	3	✓	✓	✓			
3	SB-3 - 7'	11-19-24	12:00pm	Soil	-	3	✓	✓	✓			
4												
5												
6												
7												
8												
9												
10												

Sampler(s) Please Print & Sign: Michael Stork

Shipment Method:

Turnaround Time in Business Days (BD): ☒ 10 BD ☐ 5 BD ☐ 3 BD ☐ 2 BD ☐ 1 BD Other: _____

Results Due Date:

	Date:	Time:		
Relinquished by:	11/20/24	0957	Received by:	
Relinquished by:	11/20/24	0957	Received by (Laboratory):	
Logged by (Laboratory):	11/21/24	1210	Checked by (Laboratory):	

Notes:

Cooler ID	Cooler Temp.
DP2	4.0°C

QC Package: (Check One Box Below)
☐ Level II Std QC ☐ TRRP Checklist
☐ Level III Std QC/Raw Date ☐ TRRP Level IV
☐ Level IV SW846/CLP
☐ Other _____

Preservative Key: 1-HCl 2-HNO_3 3-H_2SO_4 4-NaOH 5-$Na_2S_2O_3$ 6-$NaHSO_4$ 7-Other 8-4°C 9-5035

Note: 1. Any changes must be made in writing once samples and COC Form have been submitted to ALS Environmental.
2. Unless otherwise agreed in a formal contract, services provided by ALS Environmental are expressly limited to the terms and conditions stated on the reverse.
3. The Chain of Custody is a legal document. All information must be completed accurately.

ALS-COC-2022-R00

ALS Holland Sample Receiving Checklist

Received by:	KEITH
Date/Time:	11/20/24 0900
Carrier Name:	CLIENT
Shipping container/cooler in good condition?	Yes / No / Not Present
Custody seals intact on shipping container/cooler?	Yes / No / Not Present
Custody seals intact on sample bottles?	Yes / No / Not Present
Chain of Custody present?	Yes / No
COC signed when relinquished and received?	Yes / No
COC agrees with sample labels?	Yes / No
Samples in proper container/bottle?	Yes / No
Sample containers intact?	Yes / No
Sufficient sample volume for indicated test?	Yes / No
All samples received within holding time?	Yes / No
Container/Temp Blank temperature in compliance?	Yes / No
Temperature(s) (°C):	4.0/4.0°C
Thermometer(s):	DF2
Sample(s) received on ice?	Yes / No
Matrix/Matrices:	Soil
Cooler(s)/Kit(s):	
Date/Time sample(s) sent to storage:	11/21/24 1215
Water – VOA vials have zero headspace?	Yes / No / No Vials
Water – pH acceptable upon receipt?	Yes / No / N/A
pH strip lot #: _____	< 2 _____ > 12 _____ Other _____
pH adjusted (note adjustments below)?	Yes / No / N/A
pH adjusted by:	

Login Notes:

Miscellaneous Forms

REPORT QUALIFIERS AND DEFINITIONS

*	Value exceeds Regulatory Limit (if MCL displayed)
a	Analyte is non-accredited
B	Analyte detected in the associated Method Blank above the Reporting Limit
E	Value above quantitation range
H	Analyzed outside of Holding Time
J	Analyte is present at an estimated concentration between the MDL and Report Limit
n	Analyte accreditation is not offered
NC	Not Calculated
ND	Not Detected at the Reporting Limit
O	Sample amount is > 4 times amount spiked
P	Dual Column results percent difference > 40%
R	RPD above laboratory control limit
S	Spike Recovery outside laboratory control limits
U	Analyzed but not detected above the MDL
V	The Continuing Calibration Verification was outside of control criteria
X	Analyte was detected in the Method Blank between the MDL and Reporting Limit, sample results may exhibit background or reagent contamination at the observed level.

Holland Laboratory Certifications[1]

Agency	Type	ID	Issued	Expires
Alabama	Drinking Water (Secondary)	42500	1/1/2024	12/31/2024
Colorado	UST		6/21/2024	6/30/2025
Connecticut	Drinking Water (Secondary)	PH-0155	1/23/2023	12/31/2024
Florida	NELAP (Primary)	E871106	7/1/2024	6/30/2025
Illinois	NELAP (Secondary)	200076	12/14/2023	12/31/2024
Indiana	Drinking Water (Secondary)	C-MI-08	4/4/2024	9/4/2026
Iowa	State Specific	403	9/18/2023	9/1/2025
Kansas	NELAP (Secondary)	E-10411	7/09/2024	7/31/2025
Kentucky	Waste Water	KY98004	12/5/2023	12/31/2024
Kentucky	UST	120474	6/24/24	6/30/2025
Michigan	Drinking Water (Primary)	0022	12/19/2023	9/4/2026
Minnesota	NELAP (Secondary)	026-999-449	12/29/2023	12/31/2024
New Jersey	NELAP (Secondary)	MI015	7/1/2024	6/30/2025
New York	Drinking Water (Secondary)	12128	3/29/2024	4/1/2025
North Dakota	State Specific	R-192	9/12/2023	6/30/2024
Ohio	Drinking Water (Secondary)	87783	7/1/2024	6/30/2025
Pennsylvania	NELAP (Secondary)	68-03827	6/14/2024	7/31/2025
Texas	NELAP (Secondary)	T104704494	2/1/2024	1/31/2025
USDA	Domestic CA	Soil-MI-007	8/21/2023	2/18/2025
USDA	Soil Import	P330-19-00039	3/3/2023	3/3/2026
West Virginia	State Specific	355	6/24/2024	8/31/2025
Wisconsin	State Specific	399084510	8/15/2024	8/31/2025

1 - Scope available upon request

ANALYST SUMMARY

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park

Sample Name: SB-1 - 5' **Date Collected:** 11/19/24
Laboratory Code: HN2409658-001 **Date Received:** 11/21/24
Sample Matrix: SOIL/SOLID

Analysis Method	Preparation Lot	Prepared By	Analysis Lot	Analyzed By
EPA 3550C	1779891		2776463	Everett Chudy
EPA 6020B	1783173	Maxx Richey	2784021	Stephanie Pierson
EPA 7471B	1777418	Hunter Johnson	2774954	Hunter Johnson
EPA 8260D	1777740	Jonathan Vazquez	2799057	John Garvale
EPA 8270E SIM	1778648	Kierra Blake	2785392	Sam Marcotte

Sample Name: SB-2 - 5' **Date Collected:** 11/19/24
Laboratory Code: HN2409658-002 **Date Received:** 11/21/24
Sample Matrix: SOIL/SOLID

Analysis Method	Preparation Lot	Prepared By	Analysis Lot	Analyzed By
EPA 3550C	1781105		2778464	Ethan Cramer
EPA 6020B	1783173	Maxx Richey	2784021	Stephanie Pierson
EPA 7471B	1777418	Hunter Johnson	2774954	Hunter Johnson
EPA 8260D	1777740	Jonathan Vazquez	2799057	John Garvale
EPA 8270E SIM	1778648	Kierra Blake	2785392	Sam Marcotte

Sample Name: SB-3 - 7' **Date Collected:** 11/19/24
Laboratory Code: HN2409658-003 **Date Received:** 11/21/24
Sample Matrix: SOIL/SOLID

Analysis Method	Preparation Lot	Prepared By	Analysis Lot	Analyzed By
EPA 3550C	1781105		2778464	Ethan Cramer
EPA 6020B	1783173	Maxx Richey	2784021	Stephanie Pierson
EPA 7471B	1777418	Hunter Johnson	2774954	Hunter Johnson
EPA 8260D	1777740	Jonathan Vazquez	2799057	John Garvale
EPA 8270E SIM	1778648	Kierra Blake	2785392	Sam Marcotte

Sample Results

Organics

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 09:35
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-1 - 5'	**Units:**	µg/kg
Lab Code:	HN2409658-001		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result		MRL	Dil.	Date Analyzed	Date Extracted	Q
1,1,1-Trichloroethane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,1,2,2-Tetrachloroethane	ND	SU	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,1,2-Trichloroethane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,1-Dichloroethane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,1-Dichloroethylene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,2,3-Trichlorobenzene	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
1,2,3-Trichloropropane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,2,4-Trichlorobenzene	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
1,2,4-Trimethylbenzene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,2-Dibromoethane (EDB, Ethylene dibromide)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,2-Dichlorobenzene (o-Dichlorobenzene)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,2-Dichloroethane (Ethylene dichloride)	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
1,2-Dichloropropane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,3,5-Trimethylbenzene	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
1,3-Dichlorobenzene (m-Dichlorobenzene)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
1,3-Dichloropropene	ND	U	134	1	12/03/24 07:04	11/21/24 15:46	
1,4-Dichlorobenzene (p-Dichlorobenzene)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
2-Butanone (Methyl ethyl ketone, MEK)	ND	SU	447	1	12/03/24 07:04	11/21/24 15:46	
2-Hexanone	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
4-Methyl-2-pentanone (MIBK)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Acetone	ND	SU	224	1	12/03/24 07:04	11/21/24 15:46	
Benzene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Bromochloromethane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Bromodichloromethane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Bromoform	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Carbon disulfide	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Carbon tetrachloride	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Chlorobenzene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Chlorodibromomethane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Chloroethane (Ethyl chloride)	ND	SU	224	1	12/03/24 07:04	11/21/24 15:46	
Chloroform	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
cis & trans-1,2-Dichloroethene	ND	U	134	1	12/03/24 07:04	11/21/24 15:46	
cis-1,2-Dichloroethylene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
cis-1,3-Dichloropropene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Cyclohexane	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
Dichlorodifluoromethane (Freon-12)	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
Ethylbenzene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Isopropylbenzene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Methyl acetate	ND	U	559	1	12/03/24 07:04	11/21/24 15:46	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 09:35
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-1 - 5'	**Units:**	µg/kg
Lab Code:	HN2409658-001		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result		MRL	Dil.	Date Analyzed	Date Extracted	Q
Methyl bromide (Bromomethane)	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
Methyl chloride (Chloromethane)	ND	U	224	1	12/03/24 07:04	11/21/24 15:46	
Methyl tert-butyl ether (MTBE)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Methylcyclohexane	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Methylene chloride (Dichloromethane)	ND	U	559	1	12/03/24 07:04	11/21/24 15:46	
o-Xylene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Styrene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Tetrachloroethylene (Perchloroethylene)	ND	SU	67.1	1	12/03/24 07:04	11/21/24 15:46	
Toluene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Total Xylene	ND	U	201	1	12/03/24 07:04	11/21/24 15:46	
trans-1,2-Dichloroethylene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
trans-1,3-Dichloropropylene	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	
Trichloroethene (Trichloroethylene)	ND	SU	67.1	1	12/03/24 07:04	11/21/24 15:46	
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	ND	SU	67.1	1	12/03/24 07:04	11/21/24 15:46	
Vinyl chloride (Chloroethene)	ND	U	67.1	1	12/03/24 07:04	11/21/24 15:46	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,2-Dichloroethane-d4	100	80 - 120	12/03/24 07:04	
4-Bromofluorobenzene	91.7	80 - 120	12/03/24 07:04	
Dibromofluoromethane	92.0	80 - 120	12/03/24 07:04	
Toluene-d8	101	80 - 120	12/03/24 07:04	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 11:40
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-2 - 5'	**Units:**	µg/kg
Lab Code:	HN2409658-002		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result		MRL	Dil.	Date Analyzed	Date Extracted	Q
1,1,1-Trichloroethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,1,2,2-Tetrachloroethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,1,2-Trichloroethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,1-Dichloroethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,1-Dichloroethylene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,2,3-Trichlorobenzene	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
1,2,3-Trichloropropane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,2,4-Trichlorobenzene	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
1,2,4-Trimethylbenzene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,2-Dibromoethane (EDB, Ethylene dibromide)	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,2-Dichlorobenzene (o-Dichlorobenzene)	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,2-Dichloroethane (Ethylene dichloride)	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
1,2-Dichloropropane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,3,5-Trimethylbenzene	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
1,3-Dichlorobenzene (m-Dichlorobenzene)	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
1,3-Dichloropropene	ND	U	143	1	12/03/24 07:23	11/21/24 15:46	
1,4-Dichlorobenzene (p-Dichlorobenzene)	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
2-Butanone (Methyl ethyl ketone, MEK)	ND	SU	478	1	12/03/24 07:23	11/21/24 15:46	
2-Hexanone	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
4-Methyl-2-pentanone (MIBK)	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Acetone	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
Benzene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Bromochloromethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Bromodichloromethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Bromoform	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Carbon disulfide	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Carbon tetrachloride	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Chlorobenzene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Chlorodibromomethane	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Chloroethane (Ethyl chloride)	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
Chloroform	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
cis & trans-1,2-Dichloroethene	ND	U	143	1	12/03/24 07:23	11/21/24 15:46	
cis-1,2-Dichloroethylene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
cis-1,3-Dichloropropene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Cyclohexane	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
Dichlorodifluoromethane (Freon-12)	ND	U	239	1	12/03/24 07:23	11/21/24 15:46	
Ethylbenzene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Isopropylbenzene	ND	U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Methyl acetate	ND	U	597	1	12/03/24 07:23	11/21/24 15:46	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 11:40
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-2 - 5'	**Units:**	µg/kg
Lab Code:	HN2409658-002		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Methyl bromide (Bromomethane)	ND U	239	1	12/03/24 07:23	11/21/24 15:46	
Methyl chloride (Chloromethane)	ND U	239	1	12/03/24 07:23	11/21/24 15:46	
Methyl tert-butyl ether (MTBE)	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Methylcyclohexane	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Methylene chloride (Dichloromethane)	ND U	597	1	12/03/24 07:23	11/21/24 15:46	
o-Xylene	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Styrene	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Tetrachloroethylene (Perchloroethylene)	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Toluene	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Total Xylene	ND U	215	1	12/03/24 07:23	11/21/24 15:46	
trans-1,2-Dichloroethylene	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
trans-1,3-Dichloropropylene	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Trichloroethene (Trichloroethylene)	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	
Vinyl chloride (Chloroethene)	ND U	71.6	1	12/03/24 07:23	11/21/24 15:46	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,2-Dichloroethane-d4	99.2	80 - 120	12/03/24 07:23	
4-Bromofluorobenzene	91.0	80 - 120	12/03/24 07:23	
Dibromofluoromethane	91.4	80 - 120	12/03/24 07:23	
Toluene-d8	100	80 - 120	12/03/24 07:23	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 12:00
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-3 - 7'	**Units:**	µg/kg
Lab Code:	HN2409658-003		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result		MRL	Dil.	Date Analyzed	Date Extracted	Q
1,1,1-Trichloroethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,1,2,2-Tetrachloroethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,1,2-Trichloroethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,1-Dichloroethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,1-Dichloroethylene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,2,3-Trichlorobenzene	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
1,2,3-Trichloropropane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,2,4-Trichlorobenzene	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
1,2,4-Trimethylbenzene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,2-Dibromoethane (EDB, Ethylene dibromide)	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,2-Dichlorobenzene (o-Dichlorobenzene)	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,2-Dichloroethane (Ethylene dichloride)	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
1,2-Dichloropropane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,3,5-Trimethylbenzene	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
1,3-Dichlorobenzene (m-Dichlorobenzene)	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
1,3-Dichloropropene	ND	U	164	1	12/03/24 07:42	11/21/24 15:46	
1,4-Dichlorobenzene (p-Dichlorobenzene)	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
2-Butanone (Methyl ethyl ketone, MEK)	ND	SU	548	1	12/03/24 07:42	11/21/24 15:46	
2-Hexanone	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
4-Methyl-2-pentanone (MIBK)	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Acetone	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
Benzene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Bromochloromethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Bromodichloromethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Bromoform	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Carbon disulfide	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Carbon tetrachloride	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Chlorobenzene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Chlorodibromomethane	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Chloroethane (Ethyl chloride)	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
Chloroform	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
cis & trans-1,2-Dichloroethene	ND	U	164	1	12/03/24 07:42	11/21/24 15:46	
cis-1,2-Dichloroethylene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
cis-1,3-Dichloropropene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Cyclohexane	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
Dichlorodifluoromethane (Freon-12)	ND	U	274	1	12/03/24 07:42	11/21/24 15:46	
Ethylbenzene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Isopropylbenzene	ND	U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Methyl acetate	ND	U	686	1	12/03/24 07:42	11/21/24 15:46	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 12:00
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-3 - 7'	**Units:**	µg/kg
Lab Code:	HN2409658-003		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Methyl bromide (Bromomethane)	ND U	274	1	12/03/24 07:42	11/21/24 15:46	
Methyl chloride (Chloromethane)	ND U	274	1	12/03/24 07:42	11/21/24 15:46	
Methyl tert-butyl ether (MTBE)	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Methylcyclohexane	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Methylene chloride (Dichloromethane)	ND U	686	1	12/03/24 07:42	11/21/24 15:46	
o-Xylene	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Styrene	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Tetrachloroethylene (Perchloroethylene)	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Toluene	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Total Xylene	ND U	247	1	12/03/24 07:42	11/21/24 15:46	
trans-1,2-Dichloroethylene	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
trans-1,3-Dichloropropylene	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Trichloroethene (Trichloroethylene)	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	
Vinyl chloride (Chloroethene)	ND U	82.3	1	12/03/24 07:42	11/21/24 15:46	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,2-Dichloroethane-d4	98.4	80 - 120	12/03/24 07:42	
4-Bromofluorobenzene	91.4	80 - 120	12/03/24 07:42	
Dibromofluoromethane	92.7	80 - 120	12/03/24 07:42	
Toluene-d8	101	80 - 120	12/03/24 07:42	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 09:35
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-1 - 5'	**Units:**	µg/kg
Lab Code:	HN2409658-001		

Semivolatile Organic Compounds by GC-MS

Analysis Method: EPA 8270E SIM
Prep Method: EPA 3546

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Acenaphthene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Acenaphthylene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Anthracene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Benzo(a)anthracene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Benzo(a)pyrene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Benzo(b)fluoranthene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Benzo(g,h,i)perylene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Benzo(k)fluoranthene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Chrysene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Dibenz(a,h)anthracene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Fluoranthene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Fluorene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Indeno(1,2,3-cd) pyrene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Naphthalene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Phenanthrene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	
Pyrene	ND U	4.43	1	11/25/24 14:55	11/22/24 11:59	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2-Fluorobiphenyl	87.3	44 - 132	11/25/24 14:55	
4-Terphenyl-d14	93.0	35 - 133	11/25/24 14:55	
Nitrobenzene-d5	94.8	30 - 133	11/25/24 14:55	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 11:40
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-2 - 5'	**Units:**	µg/kg
Lab Code:	HN2409658-002		

Semivolatile Organic Compounds by GC-MS

Analysis Method: EPA 8270E SIM
Prep Method: EPA 3546

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Acenaphthene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Acenaphthylene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Anthracene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Benzo(a)anthracene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Benzo(a)pyrene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Benzo(b)fluoranthene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Benzo(g,h,i)perylene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Benzo(k)fluoranthene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Chrysene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Dibenz(a,h)anthracene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Fluoranthene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Fluorene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Indeno(1,2,3-cd) pyrene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Naphthalene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Phenanthrene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	
Pyrene	ND U	4.54	1	11/25/24 15:11	11/22/24 11:59	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2-Fluorobiphenyl	82.0	44 - 132	11/25/24 15:11	
4-Terphenyl-d14	88.4	35 - 133	11/25/24 15:11	
Nitrobenzene-d5	90.3	30 - 133	11/25/24 15:11	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 12:00
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08
Sample Name:	SB-3 - 7'	**Units:**	µg/kg
Lab Code:	HN2409658-003		

Semivolatile Organic Compounds by GC-MS

Analysis Method: EPA 8270E SIM
Prep Method: EPA 3546

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Acenaphthene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Acenaphthylene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Anthracene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Benzo(a)anthracene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Benzo(a)pyrene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Benzo(b)fluoranthene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Benzo(g,h,i)perylene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Benzo(k)fluoranthene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Chrysene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Dibenz(a,h)anthracene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Fluoranthene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Fluorene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Indeno(1,2,3-cd) pyrene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Naphthalene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Phenanthrene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	
Pyrene	ND U	4.37	1	11/25/24 15:26	11/22/24 11:59	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2-Fluorobiphenyl	90.9	44 - 132	11/25/24 15:26	
4-Terphenyl-d14	97.7	35 - 133	11/25/24 15:26	
Nitrobenzene-d5	102	30 - 133	11/25/24 15:26	

Metals

Analytical Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/24 09:35
Date Received: 11/21/24 12:08

Sample Name: SB-1 - 5'
Laboratory Code: HN2409658-001

Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	EPA 6020B	**3.94**	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Barium	EPA 6020B	**17.2**	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Cadmium	EPA 6020B	ND U	mg/kg	0.130	1	11/26/24 18:58	11/26/24 09:24	
Chromium	EPA 6020B	**4.38**	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Copper	EPA 6020B	**4.56**	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Lead	EPA 6020B	**4.02**	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Mercury	EPA 7471B	ND U	mg/kg	0.0172	1	11/25/24 11:59	11/21/24 15:18	
Selenium	EPA 6020B	ND U	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Silver	EPA 6020B	ND U	mg/kg	0.325	1	11/26/24 18:58	11/26/24 09:24	
Zinc	EPA 6020B	**14.6**	mg/kg	0.650	1	11/26/24 18:58	11/26/24 09:24	

Analytical Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/24 11:40
Date Received: 11/21/24 12:08

Sample Name: SB-2 - 5'
Laboratory Code: HN2409658-002

Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	EPA 6020B	**2.31**	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Barium	EPA 6020B	**27.5**	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Cadmium	EPA 6020B	ND U	mg/kg	0.122	1	11/26/24 19:00	11/26/24 09:24	
Chromium	EPA 6020B	**5.61**	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Copper	EPA 6020B	**4.82**	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Lead	EPA 6020B	**3.92**	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Mercury	EPA 7471B	ND U	mg/kg	0.0209	1	11/25/24 16:05	11/21/24 15:18	
Selenium	EPA 6020B	ND U	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Silver	EPA 6020B	ND U	mg/kg	0.305	1	11/26/24 19:00	11/26/24 09:24	
Zinc	EPA 6020B	**15.7**	mg/kg	0.609	1	11/26/24 19:00	11/26/24 09:24	

Analytical Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/24 12:00
Date Received: 11/21/24 12:08

Sample Name: SB-3 - 7'
Laboratory Code: HN2409658-003

Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	EPA 6020B	**1.21**	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Barium	EPA 6020B	**8.84**	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Cadmium	EPA 6020B	ND U	mg/kg	0.120	1	11/26/24 19:02	11/26/24 09:24	
Chromium	EPA 6020B	**4.05**	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Copper	EPA 6020B	**2.50**	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Lead	EPA 6020B	**3.51**	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Mercury	EPA 7471B	**0.0172**	mg/kg	0.0164	1	11/25/24 16:07	11/21/24 15:18	
Selenium	EPA 6020B	ND U	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Silver	EPA 6020B	ND U	mg/kg	0.299	1	11/26/24 19:02	11/26/24 09:24	
Zinc	EPA 6020B	**10.2**	mg/kg	0.598	1	11/26/24 19:02	11/26/24 09:24	

General Chemistry

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 09:35
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08

Sample Name: SB-1 - 5'
Laboratory Code: HN2409658-001

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Percent Moisture	EPA 3550C	**6.2**	%	0.1	1	11/22/24 20:57	NA	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 11:40
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08

Sample Name: SB-2 - 5'
Laboratory Code: HN2409658-002

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Percent Moisture	EPA 3550C	**9.1**	%	0.1	1	11/24/24 12:13	NA	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	11/19/24 12:00
Sample Matrix:	SOIL/SOLID	**Date Received:**	11/21/24 12:08

Sample Name: SB-3 - 7'
Laboratory Code: HN2409658-003

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Percent Moisture	EPA 3550C	**5.5**	%	0.1	1	11/24/24 12:13	NA	

QC Summary Forms

Organics

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park
Sample Matrix: SOIL/SOLID

SURROGATE RECOVERY SUMMARY
Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D **Analysis Lab Lot:** 2799057
Extraction Method: EPA 5035A

Sample Name	Lab Code	1,2-Dichloroethane-d4 80 - 120	4-Bromofluorobenzene 80 - 120	Dibromofluoromethane 80 - 120
SB-1 - 5'	HN2409658-001	100	91.7	92.0
SB-2 - 5'	HN2409658-002	99.2	91.0	91.4
SB-3 - 7'	HN2409658-003	98.4	91.4	92.7
Method Blank	QC-1777740-001	95.5	91.4	90.2
Laboratory Control Sample	QC-1777740-002	95.6	100	98.0
SB-1 - 5'	QC-1777740-005	96.5	105	95.0
SB-1 - 5'	QC-1777740-006	99.2	104	95.7

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park
Sample Matrix: SOIL/SOLID

SURROGATE RECOVERY SUMMARY
Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D **Analysis Lab Lot:** 2799057
Extraction Method: EPA 5035A

Sample Name	Lab Code	Toluene-d8 80 - 120
SB-1 - 5'	HN2409658-001	101
SB-2 - 5'	HN2409658-002	100
SB-3 - 7'	HN2409658-003	101
Method Blank	QC-1777740-001	99.2
Laboratory Control Sample	QC-1777740-002	99.2
SB-1 - 5'	QC-1777740-005	103
SB-1 - 5'	QC-1777740-006	103

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/2024
Date Received: 11/21/2024
Date Analyzed: 12/03/2024
Date Extracted: 11/21/2024

Duplicate Matrix Spike Summary
Volatile Organic Compounds by GC-MS

Sample Name: SB-1 - 5'
Laboratory Code: HN2409658-001
Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Units: µg/kg
Analysis Lab Lot: 2799057

		Matrix Spike			Duplicate Matrix Spike					
		QC-1777740-005			QC-1777740-006					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
1,1,1-Trichloroethane	ND	2020	2036.7	99.0	2230	2036.7	109	75-121	9.94	30
1,1,2,2-Tetrachloroethane	ND	1070 S	2036.7	52.6 S	1150 S	2036.7	56.3 S	79-125	6.89	30
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND	1900	2036.7	93.2	2030	2036.7	99.8	62-129	6.78	30
1,1,2-Trichloroethane	ND	1850	2036.7	91.0	2020	2036.7	99.0	80-123	8.42	30
1,1-Dichloroethane	ND	1710	2036.7	83.8	1880	2036.7	92.5	74-124	9.87	30
1,1-Dichloroethylene	ND	2360	2036.7	116	2550	2036.7	125	68-131	7.83	30
1,2,3-Trichlorobenzene	ND	1690	2036.7	83.0	1900	2036.7	93.1	60-135	11.5	30
1,2,3-Trichloropropane	ND	1740	2036.7	85.4	1900	2036.7	93.4	77-121	8.89	30
1,2,4-Trichlorobenzene	ND	1620	2036.7	79.6	1810	2036.7	88.8	63-130	11.0	30
1,2,4-Trimethylbenzene	ND	1750	2036.7	85.8	1850	2036.7	90.6	64-126	5.50	30
1,2-Dibromoethane (EDB, Ethylene dibromide)	ND	2430	2036.7	119	2590	2036.7	127	63-155	6.48	30
1,2-Dichlorobenzene (o-Dichlorobenzene)	ND	1810	2036.7	89.1	1960	2036.7	96.4	77-122	7.87	30
1,2-Dichloroethane (Ethylene dichloride)	ND	1960	2036.7	96.0	2180	2036.7	107	70-130	10.7	30
1,2-Dichloropropane	ND	2000	2036.7	98.0	2150	2036.7	106	71-130	7.46	30
1,3,5-Trimethylbenzene	ND	1810	2036.7	89.0	1920	2036.7	94.6	66-130	5.99	30
1,3-Dichlorobenzene (m-Dichlorobenzene)	ND	1740	2036.7	85.4	1900	2036.7	93.4	78-121	9.06	30
1,3-Dichloropropene	ND	2960	4073.3	72.7	3190	4073.3	78.3	62-124	7.45	30
1,4-Dichlorobenzene (p-Dichlorobenzene)	ND	1730	2036.7	84.8	1920	2036.7	94.4	78-122	10.7	30
2-Butanone (Methyl ethyl ketone, MEK)	ND	8030 S	2036.7	394 S	8880 S	2036.7	436 S	47-164	10.1	30
2-Hexanone	ND	2320	2036.7	114	2560	2036.7	126	70-137	9.90	30
4-Methyl-2-pentanone (MIBK)	ND	1990	2036.7	97.8	2140	2036.7	105	57-200	7.10	30
Acetone	ND	4430 S	2036.7	217 S	5030 S	2036.7	247 S	52-190	12.7	30
Benzene	ND	2140	2036.7	105	2330	2036.7	114	78-122	8.66	30
Bromochloromethane	ND	1910	2036.7	94.0	2050	2036.7	101	68-130	6.83	30

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/2024
Date Received: 11/21/2024
Date Analyzed: 12/03/2024
Date Extracted: 11/21/2024

Duplicate Matrix Spike Summary
Volatile Organic Compounds by GC-MS

Sample Name: SB-1 - 5'
Laboratory Code: HN2409658-001
Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Units: µg/kg
Analysis Lab Lot: 2799057

		Matrix Spike			Duplicate Matrix Spike					
		QC-1777740-005			QC-1777740-006					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Bromodichloromethane	ND	1770	2036.7	87.0	1900	2036.7	93.3	75-125	7.04	30
Bromoform	ND	1410	2036.7	69.2	1480	2036.7	72.8	59-120	5.14	30
Carbon disulfide	ND	1750	2036.7	86.0	1930	2036.7	94.6	60-163	9.58	30
Carbon tetrachloride	ND	1830	2036.7	89.8	1960	2036.7	96.4	69-123	7.09	30
Chlorobenzene	ND	1880	2036.7	92.5	2050	2036.7	100	79-120	8.34	30
Chlorodibromomethane	ND	1530	2036.7	75.3	1600	2036.7	78.4	57-123	3.97	30
Chloroethane (Ethyl chloride)	ND	<224 SU	2036.7	6.30 S	ND	2036.7	7.40 S	38-132	0	
Chloroform	ND	2040	2036.7	100	2180	2036.7	107	72-122	6.81	30
cis & trans-1,2-Dichloroethene	ND	3890	4073.3	95.4	4220	4073.3	104	72-127	8.29	30
cis-1,2-Dichloroethylene	ND	1890	2036.7	93.0	2040	2036.7	100	74-125	7.30	30
cis-1,3-Dichloropropene	ND	1590	2036.7	77.9	1710	2036.7	84.0	62-124	7.48	30
Dichlorodifluoromethane (Freon-12)	ND	1050	2036.7	51.4	1150	2036.7	56.4	28-137	9.19	30
Ethylbenzene	ND	1930	2036.7	94.6	2080	2036.7	102	75-121	7.62	30
Isopropylbenzene	ND	1950	2036.7	95.8	2120	2036.7	104	74-121	8.26	30
Methyl acetate	ND	2040	2036.7	100	2220	2036.7	109	61-125	8.21	30
Methyl bromide (Bromomethane)	ND	1060	2036.7	52.2	1180	2036.7	58.0	31-169	10.7	30
Methyl chloride (Chloromethane)	ND	1660	2036.7	75.3	1900	2036.7	87.1	24-119	13.5	30
Methyl tert-butyl ether (MTBE)	ND	2030	2036.7	99.9	2200	2036.7	108	79-139	7.65	30
Methylene chloride (Dichloromethane)	ND	2030	2036.7	99.8	2240	2036.7	110	62-135	9.77	30
o-Xylene	ND	1850	2036.7	91.0	1990	2036.7	97.9	75-120	7.25	30
Styrene	ND	1720	2036.7	84.2	1850	2036.7	90.8	74-126	7.54	30
Tetrachloroethylene (Perchloroethylene)	ND	3500 S	2036.7	172 S	3810 S	2036.7	187 S	76-128	8.41	30
Toluene	ND	2030	2036.7	99.5	2010	2036.7	98.7	76-120	0.807	30
Total Xylene	ND	5590	6110	91.5	6030	6110	98.6	67-129	7.54	30

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/2024
Date Received: 11/21/2024
Date Analyzed: 12/03/2024
Date Extracted: 11/21/2024

Duplicate Matrix Spike Summary
Volatile Organic Compounds by GC-MS

Sample Name: SB-1 - 5'
Laboratory Code: HN2409658-001
Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Units: µg/kg
Analysis Lab Lot: 2799057

		Matrix Spike			Duplicate Matrix Spike					
		QC-1777740-005			QC-1777740-006					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
trans-1,2-Dichloroethylene	ND	1990	2036.7	97.8	2180	2036.7	107	72-127	9.21	30
trans-1,3-Dichloropropylene	ND	1370	2036.7	67.5	1480	2036.7	72.7	66-120	7.42	30
Trichloroethene (Trichloroethylene)	ND	2640 S	2036.7	130 S	2900 S	2036.7	143 S	75-122	9.39	30
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	ND	706 S	2036.7	34.6 S	879 S	2036.7	43.2 S	51-115	21.8	30
Vinyl chloride (Chloroethene)	ND	1460	2036.7	71.7	1580	2036.7	77.8	43-128	8.22	30

QA/QC Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	NA
Sample Matrix:	SOIL/SOLID	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	µg/kg
Lab Code:	QC-1777740-001		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
1,1,1-Trichloroethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,1,2,2-Tetrachloroethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,1,2-Trichloroethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,1-Dichloroethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,1-Dichloroethylene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,2,3-Trichlorobenzene	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
1,2,3-Trichloropropane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,2,4-Trichlorobenzene	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
1,2,4-Trimethylbenzene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,2-Dibromoethane (EDB, Ethylene dibromide)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,2-Dichlorobenzene (o-Dichlorobenzene)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,2-Dichloroethane (Ethylene dichloride)	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
1,2-Dichloropropane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,3,5-Trimethylbenzene	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
1,3-Dichlorobenzene (m-Dichlorobenzene)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
1,3-Dichloropropene	ND U	60.0	1	12/03/24 02:22	11/21/24 15:47	
1,4-Dichlorobenzene (p-Dichlorobenzene)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
2-Butanone (Methyl ethyl ketone, MEK)	ND U	200	1	12/03/24 02:22	11/21/24 15:47	
2-Hexanone	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
4-Methyl-2-pentanone (MIBK)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Acetone	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
Benzene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Bromochloromethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Bromodichloromethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Bromoform	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Carbon disulfide	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Carbon tetrachloride	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Chlorobenzene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Chlorodibromomethane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Chloroethane (Ethyl chloride)	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
Chloroform	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
cis & trans-1,2-Dichloroethene	ND U	60.0	1	12/03/24 02:22	11/21/24 15:47	
cis-1,2-Dichloroethylene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
cis-1,3-Dichloropropene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Cyclohexane	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
Dichlorodifluoromethane (Freon-12)	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
Ethylbenzene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Isopropylbenzene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Methyl acetate	ND U	250	1	12/03/24 02:22	11/21/24 15:47	

QA/QC Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	NA
Sample Matrix:	SOIL/SOLID	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	µg/kg
Lab Code:	QC-1777740-001		

Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D
Prep Method: EPA 5035A

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
Methyl bromide (Bromomethane)	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
Methyl chloride (Chloromethane)	ND U	100	1	12/03/24 02:22	11/21/24 15:47	
Methyl tert-butyl ether (MTBE)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Methylcyclohexane	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Methylene chloride (Dichloromethane)	ND U	250	1	12/03/24 02:22	11/21/24 15:47	
o-Xylene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Styrene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Tetrachloroethylene (Perchloroethylene)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Toluene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Total Xylene	ND U	90.0	1	12/03/24 02:22	11/21/24 15:47	
trans-1,2-Dichloroethylene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
trans-1,3-Dichloropropylene	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Trichloroethene (Trichloroethylene)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	
Vinyl chloride (Chloroethene)	ND U	30.0	1	12/03/24 02:22	11/21/24 15:47	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
1,2-Dichloroethane-d4	95.5	80 - 120	12/03/24 02:22	
4-Bromofluorobenzene	91.4	80 - 120	12/03/24 02:22	
Dibromofluoromethane	90.2	80 - 120	12/03/24 02:22	
Toluene-d8	99.2	80 - 120	12/03/24 02:22	

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 12/03/2024
Sample Matrix: SOIL/SOLID **Date Extracted:** 11/21/2024

Laboratory Control Sample Summary
Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D **Units:** µg/kg
Prep Method: EPA 5035A **Analysis Lab Lot:** 2799057

QC-1777740-002

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
1,1,1-Trichloroethane	968	1000	96.8	75-121
1,1,2,2-Tetrachloroethane	898	1000	89.8	79-125
1,1,2-Trichloro-1,2,2-trifluoroethane (Freon 113)	1070	1000	107	62-129
1,1,2-Trichloroethane	917	1000	91.7	80-123
1,1-Dichloroethane	1010	1000	101	74-124
1,1-Dichloroethylene	1160	1000	116	68-131
1,2,3-Trichlorobenzene	864	1000	86.4	60-135
1,2,3-Trichloropropane	871	1000	87.1	77-121
1,2,4-Trichlorobenzene	854	1000	85.4	63-130
1,2,4-Trimethylbenzene	856	1000	85.6	64-126
1,2-Dibromoethane (EDB, Ethylene dibromide)	1210	1000	121	63-155
1,2-Dichlorobenzene (o-Dichlorobenzene)	915	1000	91.5	77-122
1,2-Dichloroethane (Ethylene dichloride)	966	1000	96.6	70-130
1,2-Dichloropropane	953	1000	95.3	71-130
1,3,5-Trimethylbenzene	882	1000	88.2	66-130
1,3-Dichlorobenzene (m-Dichlorobenzene)	922	1000	92.2	78-121
1,3-Dichloropropene	1610	2000	80.6	62-124
1,4-Dichlorobenzene (p-Dichlorobenzene)	936	1000	93.6	78-122
2-Butanone (Methyl ethyl ketone, MEK)	3440	1000	344 S	47-164
2-Hexanone	879	1000	87.9	70-137
4-Methyl-2-pentanone (MIBK)	1340	1000	134	57-200
Acetone	1050	1000	105	52-190
Benzene	1020	1000	102	78-122
Bromochloromethane	1000	1000	100	68-130
Bromodichloromethane	900	1000	90.0	75-125
Bromoform	734	1000	73.4	59-120
Carbon disulfide	1010	1000	101	60-163
Carbon tetrachloride	941	1000	94.1	69-123
Chlorobenzene	919	1000	91.9	79-120
Chlorodibromomethane	778	1000	77.8	57-123
Chloroethane (Ethyl chloride)	692	1000	69.2	38-132
Chloroform	991	1000	99.1	72-122
cis & trans-1,2-Dichloroethene	2040	2000	102	72-127
cis-1,2-Dichloroethylene	1010	1000	101	74-125
cis-1,3-Dichloropropene	838	1000	83.8	62-124
Dichlorodifluoromethane (Freon-12)	684	1000	68.4	28-137
Ethylbenzene	924	1000	92.4	75-121
Isopropylbenzene	952	1000	95.2	74-121
Methyl acetate	814	1000	81.4	61-125
Methyl bromide (Bromomethane)	733	1000	73.3	31-169
Methyl chloride (Chloromethane)	842	1000	84.2	24-119

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 12/03/2024
Sample Matrix: SOIL/SOLID **Date Extracted:** 11/21/2024

Laboratory Control Sample Summary
Volatile Organic Compounds by GC-MS

Analysis Method: EPA 8260D **Units:** µg/kg
Prep Method: EPA 5035A **Analysis Lab Lot:** 2799057

QC-1777740-002

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Methyl tert-butyl ether (MTBE)	1000	1000	100	79-139
Methylene chloride (Dichloromethane)	1020	1000	102	62-135
o-Xylene	910	1000	91.0	75-120
Styrene	845	1000	84.5	74-126
Tetrachloroethylene (Perchloroethylene)	984	1000	98.4	76-128
Toluene	917	1000	91.7	76-120
Total Xylene	2740	3000	91.4	67-129
trans-1,2-Dichloroethylene	1030	1000	103	72-127
trans-1,3-Dichloropropylene	774	1000	77.4	66-120
Trichloroethene (Trichloroethylene)	984	1000	98.4	75-122
Trichlorofluoromethane (Fluorotrichloromethane, Freon 11)	933	1000	93.3	51-115
Vinyl chloride (Chloroethene)	869	1000	86.9	43-128

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park
Sample Matrix: SOIL/SOLID

SURROGATE RECOVERY SUMMARY
Semivolatile Organic Compounds by GC-MS

Analysis Method: EPA 8270E SIM **Analysis Lab Lot:** 2785392
Extraction Method: EPA 3546

Sample Name	Lab Code	2-Fluorobiphenyl 44 - 132	4-Terphenyl-d14 35 - 133	Nitrobenzene-d5 30 - 133
SB-1 - 5'	HN2409658-001	87.3	93.0	94.8
SB-2 - 5'	HN2409658-002	82.0	88.4	90.3
SB-3 - 7'	HN2409658-003	90.9	97.7	102
Method Blank	QC-1778648-001	81.8	86.5	87.6
Laboratory Control Sample	QC-1778648-002	85.9	90.3	95.5
Batch QC	QC-1778648-005	77.6	82.3	92.8
Batch QC	QC-1778648-006	80.0	84.4	104

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/18/2024
Date Received: 11/19/2024
Date Analyzed: 11/25/2024
Date Extracted: 11/22/2024

Duplicate Matrix Spike Summary
Semivolatile Organic Compounds by GC-MS

Sample Name: Batch QC
Laboratory Code: HN2409496-001
Analysis Method: EPA 8270E SIM
Prep Method: EPA 3546

Units: µg/kg
Analysis Lab Lot: 2785392

	Matrix Spike				Duplicate Matrix Spike					
	QC-1778648-005				QC-1778648-006					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
2-Methylnaphthalene	ND	531	642.96	82.6	554	652.09	84.9	32-158	4.15	30
Acenaphthene	ND	518	642.96	80.6	551	652.09	84.5	42-155	6.13	30
Acenaphthylene	ND	562	642.96	87.5	596	652.09	91.5	39-149	5.88	30
Anthracene	ND	588	642.96	91.5	604	652.09	92.6	41-155	2.55	30
Benzo(a)anthracene	ND	598	642.96	93.1	628	652.09	96.2	39-155	4.75	30
Benzo(a)pyrene	ND	582	642.96	90.4	610	652.09	93.4	36-158	4.75	30
Benzo(b)fluoranthene	ND	573	642.96	89.1	594	652.09	91.0	36-146	3.51	30
Benzo(g,h,i)perylene	ND	587	642.96	91.3	615	652.09	94.3	26-166	4.60	30
Benzo(k)fluoranthene	ND	553	642.96	86.0	592	652.09	90.8	36-150	6.83	30
Chrysene	ND	567	642.96	88.3	592	652.09	90.8	41-162	4.30	30
Dibenz(a,h)anthracene	ND	598	642.96	92.9	627	652.09	96.2	27-167	4.84	30
Fluoranthene	ND	555	642.96	86.4	583	652.09	89.4	39-156	4.79	30
Fluorene	ND	617	642.96	96.0	655	652.09	100	37-153	5.97	30
Indeno(1,2,3-cd) pyrene	ND	625	642.96	97.2	659	652.09	101	24-171	5.25	30
Naphthalene	ND	570	642.96	88.7	610	652.09	93.6	43-156	6.79	30
Phenanthrene	ND	542	642.96	84.3	573	652.09	87.8	39-152	5.53	30
Pyrene	ND	573	642.96	89.2	602	652.09	92.4	32-147	4.95	30

QA/QC Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	NA
Sample Matrix:	SOIL/SOLID	**Date Received:**	NA
Sample Name:	Method Blank	**Units:**	µg/kg
Lab Code:	QC-1778648-001		

Semivolatile Organic Compounds by GC-MS

Analysis Method: EPA 8270E SIM
Prep Method: EPA 3546

Analyte Name	Result	MRL	Dil.	Date Analyzed	Date Extracted	Q
2-Methylnaphthalene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Acenaphthene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Acenaphthylene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Anthracene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Benzo(a)anthracene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Benzo(a)pyrene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Benzo(b)fluoranthene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Benzo(g,h,i)perylene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Benzo(k)fluoranthene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Chrysene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Dibenz(a,h)anthracene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Fluoranthene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Fluorene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Indeno(1,2,3-cd) pyrene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Naphthalene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Phenanthrene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	
Pyrene	ND U	4.17	1	11/25/24 13:22	11/22/24 12:00	

Surrogate Name	% Rec	Control Limits	Date Analyzed	Q
2-Fluorobiphenyl	81.8	44 - 132	11/25/24 13:22	
4-Terphenyl-d14	86.5	35 - 133	11/25/24 13:22	
Nitrobenzene-d5	87.6	30 - 133	11/25/24 13:22	

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 11/25/2024
Sample Matrix: SOIL/SOLID **Date Extracted:** 11/22/2024

Laboratory Control Sample Summary
Semivolatile Organic Compounds by GC-MS

Analysis Method: EPA 8270E SIM **Units:** µg/kg
Prep Method: EPA 3546 **Analysis Lab Lot:** 2785392

QC-1778648-002

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
2-Methylnaphthalene	621	666.6	93.2	32-158
Acenaphthene	653	666.6	98.0	42-155
Acenaphthylene	669	666.6	100	39-149
Anthracene	694	666.6	104	41-155
Benzo(a)anthracene	715	666.6	107	39-155
Benzo(a)pyrene	675	666.6	101	36-158
Benzo(b)fluoranthene	659	666.6	98.8	36-146
Benzo(g,h,i)perylene	682	666.6	102	26-166
Benzo(k)fluoranthene	639	666.6	95.9	36-150
Chrysene	684	666.6	103	41-162
Dibenz(a,h)anthracene	694	666.6	104	27-167
Fluoranthene	671	666.6	101	39-156
Fluorene	760	666.6	114	37-153
Indeno(1,2,3-cd) pyrene	729	666.6	109	24-171
Naphthalene	674	666.6	101	43-156
Phenanthrene	657	666.6	98.6	39-152
Pyrene	686	666.6	103	32-147

Metals

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	NA
Sample Matrix:	SOIL/SOLID	**Date Received:**	NA

Sample Name: Method Blank
Laboratory Code: QC-1777418-001

Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Mercury	EPA 7471B	ND U	mg/kg	0.0200	1	11/25/24 11:47	11/21/24 15:19	

Analytical Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: NA
Date Received: NA

Sample Name: Method Blank
Laboratory Code: QC-1783173-001

Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Barium	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Cadmium	EPA 6020B	ND U	mg/kg	0.100	1	11/26/24 18:40	11/26/24 09:25	
Chromium	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Copper	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Lead	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Selenium	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Silver	EPA 6020B	ND U	mg/kg	0.250	1	11/26/24 18:40	11/26/24 09:25	
Zinc	EPA 6020B	ND U	mg/kg	0.500	1	11/26/24 18:40	11/26/24 09:25	

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 10/01/2024
Date Received: 10/01/2024
Date Analyzed: 11/25/2024
Date Extracted: 11/21/2024

Duplicate Matrix Spike Summary
Metals

Sample Name: Batch QC
Laboratory Code: HN2407091-001
Analysis Method: EPA 7471B
Prep Method: Method

Units: mg/kg
Analysis Lab Lot: 2774954

		Matrix Spike			Duplicate Matrix Spike					
		QC-1777418-004			QC-1777418-005					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Mercury	0.425	0.237 S	0.13144	25.0 S	0.291 ES	0.13741	63.2 S	75-125	20.5	35

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/12/2024
Date Received: 11/13/2024
Date Analyzed: 11/26/2024
Date Extracted: 11/26/2024

Duplicate Matrix Spike Summary
Metals

Sample Name: Batch QC
Laboratory Code: HN2409282-001
Analysis Method: EPA 6020B
Prep Method: EPA 3050B

Units: mg/kg
Analysis Lab Lot:2784021

	Matrix Spike				Duplicate Matrix Spike					
	QC-1783173-004				QC-1783173-005					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Arsenic	0.624	5.99	5.6818	94.9	6.75	6.068	101	75-125	12.0	20
Barium	3.34	9.26	5.6818	107	10.4	6.068	119	75-125	11.5	20
Cadmium	ND	5.55	5.6818	97.5	5.80	6.068	95.5	75-125	4.50	20
Chromium	2.22	7.54	5.6818	95.3	8.34	6.068	102	75-125	10.1	20
Copper	2.16	7.51	5.6818	95.8	8.36	6.068	104	75-125	10.7	20
Selenium	ND	5.68	5.6818	99.7	5.86	6.068	96.4	75-125	3.17	20
Silver	ND	5.67	5.6818	99.7	5.92	6.068	97.4	75-125	4.26	20

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/12/2024
Date Received: 11/13/2024
Date Analyzed: 11/27/2024
Date Extracted: 11/26/2024

Duplicate Matrix Spike Summary
Metals

Sample Name: Batch QC
Laboratory Code: HN2409282-001
Analysis Method: EPA 6020B
Prep Method: EPA 3050B

Units: mg/kg
Analysis Lab Lot:2786514

	Matrix Spike				Duplicate Matrix Spike					
	QC-1783173-004				QC-1783173-005					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Lead	1.77	9.45 S	5.6818	136 S	8.48	6.068	112	75-125	10.8	20

QA/QC Report

Client: Driesenga & Associates, Inc.
Project: Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/12/2024
Date Received: 11/13/2024
Date Analyzed: 11/27/2024
Date Extracted: 11/26/2024

Duplicate Matrix Spike Summary
Metals

Sample Name: Batch QC
Laboratory Code: HN2409282-001
Analysis Method: EPA 6020B
Prep Method: EPA 3050B

Units: mg/kg
Analysis Lab Lot: 2786514

		Matrix Spike			Duplicate Matrix Spike					
		QC-1783173-004			QC-1783173-005					
Analyte Name	**Sample Result**	**Result**	**Spike Amount**	**% Rec**	**Result**	**Spike Amount**	**% Rec**	**% Rec Limits**	**RPD**	**RPD Limit**
Zinc	6.00	12.3	5.6818	115	14.7 S	6.068	148 S	75-125	18.2	20

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 11/25/2024
Sample Matrix: SOIL/SOLID **Date Extracted:** 11/21/2024

Laboratory Control Sample Summary
Metals
Mercury

Analysis Method: EPA 7471B **Units:** mg/kg
Prep Method: Method **Analysis Lab Lot:** 2774954

Sample Name	Laboratory Code	Result	Spike Amount	% Rec	% Rec Limits
Laboratory Control Sample	QC-1777418-002	0.188	0.1665	113	80-120

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 11/26/2024
Sample Matrix: SOIL/SOLID **Date Extracted:** 11/26/2024

Laboratory Control Sample Summary
Metals

Analysis Method: EPA 6020B **Units:** mg/kg
Prep Method: EPA 3050B **Analysis Lab Lot:** 2784021

QC-1783173-002

Analyte Name	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	4.89	5	97.9	80-120
Barium	4.93	5	98.7	80-120
Cadmium	5.02	5	100	80-120
Chromium	4.94	5	98.7	80-120
Copper	5.02	5	100	80-120
Lead	5.08	5	102	80-120
Selenium	4.92	5	98.5	80-120
Silver	5.21	5	104	80-120
Zinc	5.01	5	100	80-120

General Chemistry

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	NA
Sample Matrix:	SOIL/SOLID	**Date Received:**	NA

Sample Name: Method Blank
Laboratory Code: QC-1779891-001

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Percent Moisture	EPA 3550C	ND U	%	0.1	1	11/22/24 20:57	NA	

Analytical Report

Client:	Driesenga & Associates, Inc.	**Work Order:**	HN2409658
Project:	Verberg Park	**Date Collected:**	NA
Sample Matrix:	SOIL/SOLID	**Date Received:**	NA

Sample Name: Method Blank
Laboratory Code: QC-1781105-001

General Chemistry Parameters

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Percent Moisture	EPA 3550C	ND U	%	0.1	1	11/24/24 12:13	NA	

QA/QC Report

Client: Driesenga & Associates, Inc.
Project Verberg Park
Sample Matrix: SOIL/SOLID

Work Order: HN2409658
Date Collected: 11/19/2024
Date Received: 11/21/2024
Date Analyzed: 11/24/2024

Replicate Sample Summary
General Chemistry Parameters

Sample Name: SB-2 - 5'
Laboratory Code: HN2409658-002

Units: %

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample QC-1781105-004 Result	RPD	RPD Limit
Percent Moisture	EPA 3550C	0.1	9.1	8.9	2.78	10

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 11/22/2024
Sample Matrix: SOIL/SOLID

Laboratory Control Sample Summary
General Chemistry Parameters
Percent Moisture

Analysis Method: EPA 3550C **Units:** %
Analysis Lab Lot: 2776463

Sample Name	Laboratory Code	Result	Spike Amount	% Rec	% Rec Limits
Laboratory Control Sample	QC-1779891-002	100	100	100.0	98-102

QA/QC Report

Client: Driesenga & Associates, Inc. **Work Order:** HN2409658
Project: Verberg Park **Date Analyzed:** 11/24/2024
Sample Matrix: SOIL/SOLID

Laboratory Control Sample Summary
General Chemistry Parameters
Percent Moisture

Analysis Method: EPA 3550C **Units:** %
Analysis Lab Lot: 2778464

Sample Name	Laboratory Code	Result	Spike Amount	% Rec	% Rec Limits
Laboratory Control Sample	QC-1781105-002	100	100	100.0	98-102

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

Per ASTM D 2487—00
(Based on Unified Soil Classification System)

Soil Description: Secondary Soil Type BASIC SOIL TYPE, Consistency/Relative Density, Color, Supplemental Soil Type, Moisture, Miscellaneous comments.

Ex. Silty SAND, loose, brown, fine to medium, trace gravel, moist.

Secondary Soil Type – adjective for the BASIC SOIL TYPE describing material making up greater than 12% but less than 50% of the primary soil type by weight. For sands this also includes a description of grain size (fine, medium or coarse).

BASIC SOIL TYPE – primary constituent of sample; material making up greater than 50% of the sample by weight. Material is classified by grain size and material properties.

Consistency/Relative Density – a measurement of in-situ consistency or density of cohesive or cohesionless soils, respectively, based upon Standard Penetration Testing blow counts (N) per ASTM D 1586.

Color – visual inspection of soil appearance.

Supplementary Soil Type – a description of any other material that may be mixed with the BASIC SOIL TYPE. Qualifying terms are based on the percentage of the supplementary soil type in the sample by weight.

Moisture – description of the in-situ moisture content of the sample (dry, moist or wet).

Miscellaneous Comments – anything observed in the sample or in the field that does not fit into the above categories but should be noted (odor, etc.).

CALIBRATED AUTO HAMMER CONSISTENCY/RELATIVE DENSITY				
COHESIONLESS SOILS		COHESIVE SOILS		
SPT N-VALUES	IN-SITU RELATIVE DENSITY	SPT N-VALUES	SHEAR STRENGTH (PSF)	IN-SITU CONSISTENCY
0-3	VERY LOOSE	0-1	BELOW 250	VERY SOFT
4-8	LOOSE	2-3	250 - 500	SOFT
9-23	MEDIUM DENSE	4-6	500 - 1,000	MEDIUM STIFF
24-38	DENSE	7-12	1,000 - 2,000	STIFF
>38	VERY DENSE	13-25	2,000 - 4,000	VERY STIFF
		>26	OVER 4,000	HARD

STANDARD HAMMER CONSISTENCY/RELATIVE DENSITY				
COHESIONLESS SOILS		COHESIVE SOILS		
SPT N-VALUES	IN-SITU RELATIVE DENSITY	SPT N-VALUES	SHEAR STRENGTH (PSF)	IN-SITU CONSISTENCY
0-4	VERY LOOSE	0-2	BELOW 250	VERY SOFT
5-10	LOOSE	3-4	250 - 500	SOFT
11-30	MEDIUM DENSE	5-8	500 - 1,000	MEDIUM STIFF
31-50	DENSE	9-16	1,000 - 2,000	STIFF
>50	VERY DENSE	17-32	2,000 - 4,000	VERY STIFF
		>32	OVER 4,000	HARD

SUPPLEMENTAL TEXTURE QUALIFYING TERMS	
DESCRIPTOR	PERCENTAGE BY WEIGHT
TRACE	1-10%
LITTLE	10-20%
SOME	20-35%
AND	35-50%

SOIL CLASSIFICATION CHART (Per ASTM D2487)

Criteria for Assigning Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name
COHESIONLESS SOILS More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 Sieve	Clean Gravels Less than 5% fines[C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3[E]	GW	Well-graded gravel[F]
			Cu < 4 and/or 1 > Cc > 3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands More than 50% of coarse fraction retained on No. 4 Sieve	Clean Sands Less than 5% fines[D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3[E]	SW	Well-graded sand[F]
			Cu < 6 and/or 1 > Cc > 3[E]	SP	Poorly graded sand[F]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
COHESIVE SOILS 50% or more passes the No. 200 Sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI ≥ 7 and plots on or above 'A' line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below 'A' line[J]	ML	Silt[K,L,M]
		Organic	Liquid limit - oven dried < 0.75	OL	Organic clay[K,L,M,N]
			Liquid limit - not dried < 0.75		Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above 'A' line	CH	Fat clay[K,L,M]
			PI plots below 'A' line	MH	Elastic Silt[K,L,M]
		Organic	Liquid limit - oven dried < 0.75	OH	Organic Clay[K,L,M,P]
			Liquid limit - not dried < 0.75		Organic silt[K,L,M,O]
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat

A Based on the material passing the 3-in. sieve

B If field sample contained cobbles or builders, or both, add "with cobbles or boulders or both" to group name

C Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

D Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

E $Cu = D_{60}/D_{10}$ $Cc = (D_{30})^2/(D_{10}*D_{60})$

F If soil contains ≥ 15% sand, add "with sand" to group name.

G If fines classify as CL-ML, use dual symbol GC-GM or SC-SM

H If fines are organic, add "with organic fines" to group name.

I If soil contains ≥ 15% gravel, add "with gravel" to group name.

J If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant

L If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.

M If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name

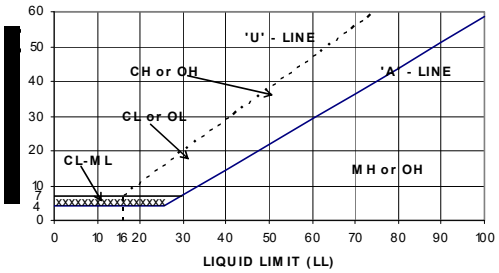
N PI ≥ 4 and plots on or above 'A' line.

O PI < 4 or plots below 'A' line.

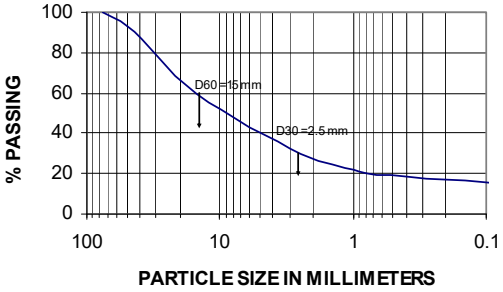
P PI plots on or above 'A' line.

Q PI plots below 'A' line.

For classification of fine-grained soils and fine-grained fraction of coarse-grained soils



SIEVE ANALYSIS



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SECTION 321313 - CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior cement concrete pavement for the following:
   1. Concrete curbs
   2. Walkways and ramps.

B. Related Sections include the following:
   1. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
   2. Division 31 Section "Earth Moving" for subgrade preparation, grading, and subbase course.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with ground granulated blast-furnace slag (GGBFS).

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete pavement mixture. Include alternate mixture designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Minutes of preinstallation conference.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed pavement work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: Manufacturer of ready-mixed concrete products who complies with ASTM C 94 requirements for production facilities and equipment.

C. ACI Publications: Comply with ACI 301, "Specification for Structural Concrete," unless modified by requirements in the Contract Documents.

D. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

E. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and each aggregate from one source.

F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.

1. Use flexible or curved forms for curves with a radius 100 feet (30.5 m) or less.

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.

C. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed.

D. Plain Steel Wire: ASTM A 82, as drawn.

E. Deformed-Steel Wire: ASTM A 496.

F. Joint Dowel Bars: Plain steel bars, ASTM A 615/A 615M, Grade 60 (Grade 420). Cut bars true to length with ends square and free of burrs.

G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete, and as follows:

1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout the Project:

1. Portland Cement: ASTM C 150, Type IL

B. Normal-Weight Aggregates: **Limestone** of hard, durable, uncoated particles. Gradation and physical requirements to conform to MDOT 6AA.
1. Do not use fine or coarse aggregates containing substances that cause spalling.

C. Fine Aggregate: MDOT 2NS

D. Water: ASTM C 94.

E. Air-Entraining Admixture: ASTM C 260.

F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.4 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: **ASTM D 994, asphalt joint filler**. Fiber isolation joint material is **NOT** acceptable.

B. Epoxy Adhesives: ASTM C 881, two component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements. Subject to compliance with requirements. Submit certification of compliance.

2.6 CONCRETE MIXTURES

A. Prepare design mixtures, proportioned according to ACI 301, for each type and strength of normal-weight concrete determined by either laboratory trial mixes or field experience.

1. Use a qualified independent testing agency for preparing and reporting proposed concrete mixture designs for the trial batch method. Do not use Owner's field quality-control testing agency as the independent testing agency.

B. Proportion mixtures to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 4000 psi.
2. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45.
3. Slump Limit: 4 inches (100 mm) plus or minus 1 inch.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
1. Air Content: 6 percent plus or minus 1.5 percent for 1-inch nominal maximum aggregate size.

D. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement as follows:
1. Ground Granulated Blast-Furnace Slag: 30 percent.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Proof-roll prepared subbase surface below concrete pavements with heavy, fully loaded dump truck equipment to identify soft pockets and areas of excess yielding.
   1. Correct subbase with soft spots and areas of pumping or rutting according to requirements in Geotechnical Report.

B. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted subbase surface immediately before placing concrete.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork and screeds for grade and alignment to following tolerances:
   1. Top of Forms: Not more than 1/8 inch in 10 feet.
   2. Vertical Face on Longitudinal Axis: Not more than ¼ inch in 10 feet.

C. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch (50-mm) overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.
2. Provide tie bars at sides of pavement strips where indicated.
3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.
5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals of 50 feet (15.25 m), unless otherwise indicated.
2. Extend joint fillers full width and depth of joint.
3. Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant is indicated.
4. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
5. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
6. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
7. Trim excess joint filler material flush with pavement surface after concrete expansion.

D. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a 1/4-inch (6-mm) radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch (6-mm) radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcement before placing concrete. Do not place concrete on frozen surfaces.

C. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

D. Comply with ACI 301 requirements for measuring, mixing, transporting, and placing concrete.

E. Do not add water to concrete during delivery or at Project site.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

H. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Architect.

I. Screed pavement surfaces with a straightedge and strike off.

J. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

K. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as

specified for formed concrete. If results are not approved, remove and replace with formed concrete.

L. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

M. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

N. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mix designs.

O. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 FLOAT FINISHING

A. General: Do not add water to concrete surfaces during finishing operations.

B. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
1. Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.

3.8 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

B. Comply with ACI 306.1 for cold-weather protection.

C. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

D. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

E. Curing Methods: Cure concrete by curing compound as follows:
   1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.9 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch.
2. Thickness: Plus 3/8 inch, minus 1/4 inch.
3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).
4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch.
5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch.
6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).
7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches.
8. Joint Spacing: 3 inches.
9. Contraction Joint Depth: Plus 1/4 inch, no minus.
10. Joint Width: Plus 1/8 inch, no minus.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.
2. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.
3. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
4. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
5. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

    a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.11 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

E. Remove all hard water stains (white chalky build-up) from the top of the sealer surface, with commercial grade lime.

F. Asphalt joint fillers to be trimmed by Contractor to prevent any tripping hazards.

END OF SECTION 321313

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SECTION 321373 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:
   1. Expansion and contraction joints within cement concrete pavement.

B. Related Sections include the following:
   1. Division 32 Section 321313 "Concrete Paving" for constructing joints in concrete pavement.

1.2 SUBMITTALS

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

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.

B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials to comply with manufacturer's written instructions to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.5 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

   1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
   2. When joint substrates are wet or covered with frost.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than that allowed by joint sealants manufacturer for application indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect's Representative from manufacturer's full range.

2.2 COLD-APPLIED JOINT SEALANTS

A. Type NS Silicone Sealant for Concrete: Single-component, low-modulus, neutral-curing, nonsag silicone sealant complying with ASTM D 5893 for Type NS.

B. Available Products: Subject to compliance with requirements, cold-applied joint sealants that may be incorporated into the Work include, but are not limited to, the following:

1. Type NS Silicone Sealant for Concrete:
   a. Roadsaver Silicone-SL; Crafco Inc. (800) 528 8242.
   b. 888; Dow Corning.

2.3 JOINT-SEALANT BACKER MATERIALS

A. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.

B. Round Backer Rods for Cold- and Hot-Applied Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

C. Backer Strips for Cold- and Hot-Applied Sealants: ASTM D 5249; Type 2; of thickness and width required to control sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

D. Round Backer Rods for Cold-Applied Sealants: ASTM D 5249, Type 3, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.

2.4 PRIMERS

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

B. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

3.3 INSTALLATION OF JOINT SEALANTS

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

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

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

1. Do not leave gaps between ends of backer materials.
2. Do not stretch, twist, puncture, or tear backer materials.
3. Remove absorbent backer materials that have become wet before sealant application and replace them with dry materials.

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

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses provided for each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealants from surfaces adjacent to joint.
2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.

F. Provide joint configuration to comply with joint-sealant manufacturer's written instructions, unless otherwise indicated.

G. Provide recessed joint configuration for silicone sealants of recess depth and at locations indicated.

3.4 CLEANING

A. Clean off excess sealants or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 321373

SECTION 32 9200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Fertilizer and mulch.
3. Topsoil.
4. Lawn renovation.

B. Related Sections:

1. Division 31 Section 31 1000 "Site Clearing" for topsoil stripping and stockpiling.
2. Division 31 Section 31 2000 "Earthwork" for excavation, filling and backfilling, and rough grading.
3. Division 32 Section 329300 “Plants” for trees.

1.3 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. All submittals must be received 30 days prior to installation.

C. Soil test including physical properties.

D. Chemicals and fertilizers to be used (including MSDS)

E. Imported top soil analysis

F. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

G. Material Test Reports: For existing surface soil and imported topsoil.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers.

1.7 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: May 15th to June 30th
2. Fall Planting: September 1st to October 31st

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit. Planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.8 MAINTENANCE SERVICE

A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: 90 days from date of Substantial Completion.

a. When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.

B. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth lawn.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch. Anchor as required to prevent displacement.

C. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources and to keep lawn uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn at a minimum rate of 1 inch per week.

D. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 40 percent of grass height. Remove no more than 40 percent of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow grass 3-31/2 inches high.

E. Lawn Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. A phosphorous free fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to lawn area.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Fresh, clean and new crop seed mixture. Each seed type certified blue or gold tag.

1. Mixed by an approved method.
2. Test for germination made within preceding six months. Not to exceed 0.25% weed seed. Seeding rates shall be determined by the percent pure live seed, where PLS = % pure seed x % germination x 100.
3. Turfgrasses:
    1) General Seed Mixture:
        a) Annual Rye: 10%
        b) Perennial Rye: 30%*
        c) Creeping Red Fescue: 20%
        d) Turf Type Fescue: 40%**
        e) *Note: Provide a minimum of two varieties of Perennial Rye seed from the following list. Affinity, APM, Buccaneer, Nighthawk, Partner, Saturn, Seville or other varieties that meet the minimum rating of 6.0 or higher for a seed tested at a Michigan location on the National Turfgrass Evaluation Program (NTEP) National Test.
        f) **Note: Provide a minimum of three varieties of Turf Type Tall Fescue from the following list: Jubilee, Veranda, Morgan, Stagecoach, or other varieties that meet the minimum rating of 6.0 or higher for a seed tested at a Michigan location on the National Turfgrass Evaluation Program (NTEP) National Test.
    2) Athletic Seed Mixture:
        a) Champion Turfgrass seed mix as manufactured by La Crosse Seed, 2541 Commerce Street, La Crosse, WI, 54603, (800)356-7333, or approved equal.

4. Obtain the Owner’s specific written acceptance for substitution of seed other than those named above. Proposed substitutes shall have essentially the same characteristics as seed specified in appearance, ultimate height, shape, habit of growth, general soil, and other requirements. Average cost and value of seed specified. Seed of greater value may be accepted without additional cost to the Owner.

5. Seed rate for turf establishment shall be 8lbs/1000sq.ft. of pure live seed.

2.2 HYDROMULCH

A. Hydromulch slurry mixture is to be composed of a suitable rate of mulch and water to allow for even coverage of seed that will protect plant growth while allowing necessary light and water to penetrate.

2.3 WATER

A. Free of substance harmful to plant growth.

2.4 TOPSOIL, SOIL MIXES, SOIL AMENITIES

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, 4 percent organic material minimum, free of stones 3/8 inch or larger in any dimension, and other extraneous materials harmful to plant growth. Soil shall be a loam or sandy loam texture and free of debris.

1. Topsoil Source: Import topsoil from off site sources as necessary. Obtain topsoil from naturally well-drained sites where topsoil occurs at least 4 inches deep; do not obtain from bogs and marshes.

B. Lime: ASTM C 602, Class T, agricultural limestone.

2.5 PLANTING SOIL MIX

A. Planting Soil Mix: Mix topsoil with the following soil amendments in the following quantities:

1. Ratio of Loose Compost to Topsoil by Volume: 1:3.

2.6 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.7 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer for turf seed establishment shall be a starter fertilizer with a ratio of 1:2:1 for NPK.

2.8 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

C. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

2.9 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

3. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding overspray.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Verify limits of seeding material with the Owner’s Representative in the field before starting seeding and sodding work.

D. Limit preparation to areas which will be immediately seeded.

E. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

F. Spread topsoil to a depth of 4 inches minimum to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

G. Fine grade to a smooth even surface with no 'bird baths', having loose, uniformly fine texture. Remove trash, debris, stones larger than 1-inches in any dimension, and other objects that may interfere with planting or maintenance operations.

H. Fine grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit fine grading to areas that can be planted in the immediate future.

I. Reduce elevation of planting soil to allow for soil thickness of sod.

J. Apply fertilizers by mechanical rotary or drop type distributor thoroughly and evenly incorporated with soil. Fertilize areas inaccessible to power equipment with hand tools and incorporate into soil.

K. Restore prepared areas to specified condition of eroded, settled, or otherwise disturbed after fine grading and prior to seeding and sodding.

L. Moisten prepared lawn areas before planting when soil is dry and allow surface to dry before planting.

3.3 INSTALLATION

A. Seeding:

1. Hydroseeding is preferred. If any other method of seeding occurs, the seeded area must be covered with mulch immediately.
2. Seed immediately after preparation of bed. Seed during a period that promotes germination and establishment for the seed blend. Seeding at times other than those locally recognized as acceptable shall be unacceptable.
3. Seed indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.
4. Evenly distribute seed by sowing equal quantities. Rake seed lightly into top 1/8 inch of topsoil, ensuring good seed/soil contact, and water with fine spray.

    a. Seeding Rate should be 8lbs/1000sq.ft.
    b. Protect seeded areas with slopes less than 1:6 against erosion by spreading mulch after completion of seeding operations and anchor by crimping into topsoil. Spread uniformly at a minimum rate of 2 tons per acre.

5. Apply Commercial Fertilizer 1/2/1 at 200 lbs./acre.

3.4 MULCHING

A. Hydromulch seeded areas within 24 hours after seeding.

B. Owner will replace mulch displaced before grass has made a growth of 1- to 1-1/2-inch.

C. Provide straw bale checking in ditches or problem swales at intervals required to adequately slow water velocity and impede soil loss or other methods as required by governmental agencies.

D. During germination period, the Contractor shall protect and water seeded areas, maintain top 1/2- to 1 inch soil in a moist condition. Continue watering until turfgrass is established.

3.5 PREPARATION FOR EROSION-CONTROL MATERIALS

A. Prepare area as specified in "Lawn Preparation" Article.

B. For erosion-control blanket, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

C. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.6 LAWN RENOVATION

A. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish lawn where settlement or washouts occur or where minor regrading is required.

B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

D. Mow, dethatch, core aerate, and rake existing lawn.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply seed and hydromulch as required for new lawns.

I. Water newly planted areas and keep moist until new lawn is established

3.7 SATISFACTORY LAWNS

A. Lawn installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.8 CLEANUP AND PROTECTION

A. Any soil, peat or similar material which has been brought onto paved areas by hauling operations or otherwise shall be removed promptly. Upon completion of planting, all excess soil, stones, and debris shall be removed from the site or disposed of as directed by the Owner. All planting areas shall be prepared for final inspection.

B. Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.

D. Remove nondegradable erosion-control measures after grass establishment period.

3.9 ACCEPTANCE

A. Inspection to determine acceptance of installed turfgrass will be made by Owner's Representative and Landscape Architect.

1. New turfgrass areas will be acceptable provided all requirements, excluding maintenance, have been compiled with.
2. No individual turfgrass area shall have bare spots or unacceptable cover totaling more than 2% of the individual areas requested to be inspected.

B. Planted areas will be inspected at completion of installation and accepted subject to compliance with specified materials and installation requirements.

END OF SECTION 32 9200

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SECTION 33 4100 – STORM WATER DRAINAGE SYSTEM

PART 1 - GENERAL

1.1 SUMMARY:

A. This Section includes, but is not necessarily limited to the furnishing and installation of a - drainage system for the play area as outlined on the Drawings, as specified herein, and as necessary for the proper and complete performance of the work.

B. Related Sections:
   1. Documents affecting work of this Section include, but are not necessarily limited to:
      a. Section 311000 Site Clearing
      b. Section 312000 Earth Work

1.2 REFERENCES

A. Except as herein specified or as indicated on the Drawings, the work of this Section shall comply with the following:
   1. ASTM Standard Specifications:
      a. D-1248 – Material Smooth Interior Corrugated HDPE Pipe Installation
      b. D-2321 – Installation, Smooth Interior Corrugated HDPE Pipe Installation
      c. D-2412 – Minimum Stiffness, Smooth Interior Corrugated HDPE Pipe Installation
      d. C-478 – Precast Concrete Manhole Sections
      e. C-923 – Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes
      f. D-499 – Asphalt Used in Damp-Proofing and Water Proofing
      g. MDOT
         1) 2003 Standard Specifications for Construction.
      h. City of Kalamazoo Standard Specifications.

1.3 DEFINITIONS

A. Abbreviations:
   1. EJIW – East Jordan Iron Works
   2. PVC - Polyvinyl chloride
   3. PE – Polyethylene pipe.
   4. HDPE - High density polyethylene corrugated pipe with an integrally formed smooth interior.
   5. PVC – Polyvinyl Chloride Pipe.

1.4 SUBMITTALS

A. Submit information on all materials for Landscape Architects or Engineers approval.

1.5 QUALITY ASSURANCE

A. Qualifications:
   1. Fabrication and installation personnel:
      a. Trained and experienced in the fabrication and installation of the materials and equipment.
      b. Knowledge of the design and the review of Shop Drawings.

B. Manufacturer Service:
   1. Submit Manufacturer's sworn statements that the materials furnished comply with this Specification.

C. Testing of Material Installation:
   1. Light or reflected light test for alignment.
   2. Visual inspection for leakage and workmanship.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Advanced Drainage System, 4640 Trueman Blvd., Hilliard, Ohio, 43026, or approved equal.

2.2 MATERIALS

2.3 LEACHING BASINS

A. Precast concrete drywell basins – 4’ Diameter:
   1. Precast reinforced concrete:
      a. Base Section: ASTM C 478, base riser section with integral floor.
      b. Riser Sections: ASTM C 478
      c. Joints: Premium, ASTM C 443, O-ring.
   2. Castings:
      a. Grates:
         1) Leaching basins: EJIW #6508-O for lawn areas.
         2) Steps 10” deep x 10” wide, tread depth, 5”, rail height 2”, reinforced with a 3/8” diameter steel bar.
      b. Mortar: ASTM C 270, Type M.
      c. Brick
         1) Concrete: ASTM C 55, Type I, Grade N., Brick ASTM C-32
      d. Grade rings: ASTM C 478.
         1) Reinforced with a 3/8” diameter steel bar.
      e. Waterproofing
         1) Bituminous – ASTM D 449
      f. Leaching Beds – Leaching Basins or Pipe
   3. Drainage Aggregate:
      a. 6-A Washed Gravel

4. Geo-Textile Fabric:
   a. DuPont type R Typar 3401 non-woven or equal

PART 3 - PRODUCTS

3.1 PREPARATION

A. Alignment and grade:
   1. If there is a grade discrepancy or an obstruction which is not indicated on the Drawings. Notify Landscape Architect and obtain instructions prior to proceeding.
   2. Control:
      a. Laser Beam:
         1) Check line and grade at: Set-up point, 25 feet, 50 feet, and 100 foot intervals.
         2) Reset projector at each catch basin.
      b. Allowable deflection:
         1) Horizontal: 0.20 feet
         2) Vertical: 0.10 feet

3.2 INSTALLATION

A. General:
   1. Install pipe, fittings and appurtenances in accordance with Manufacturer's recommendations except as herein specified or indicated on the Drawings.
   2. Prevent entrance of foreign materials

B. Pipe Laying
   1. Bearing: Support entire length of pipe barrel evenly with extra excavation at joints.
   2. Direction: Commence at outlet and proceed up grade with spigot ends pointing in direction of flow.

C. Jointing:
   1. Per ASTM D-2321
   2. Per Manufacturer's recommendation

3.3 CLEARING

A. Debris: Remove all dirt and debris, including cemented or wedged material from the inside of all sewers and catch basins.

B. Final acceptance: Clean all sewers, and leaching basins before requesting final acceptance.

3.4 TESTING AND INSPECTION

A. Observation: By the Landscape Architect and City's Civil Engineer.

B. Notification:
   1. Testing: Arrange with the Landscape Architect or Engineer prior to backfilling.

C. Equipment and manpower: Provide everything necessary for visual review.

D. Alignment and grade tests:
   1. Visual:
      a. Each catch basin or inlet
      b. Mirrors or lights or TV: Adequate to determine alignment and reveal a clean interior pipe.

END OF SECTON 334100