

BIDDING SPECIFICATIONS

Powell Township
DRAVER COMMUNITY PARK &
TRAILHEAD
MDNR Spark ARPA-0205

Documents Issued:
Tuesday, November 26, 2024

Pre-Bid Meeting:
(No Pre-Bid Meeting)

Bids Due:
Thursday, January 9, 2025, 2 p.m.

Beckett & Raeder, Inc.
535 West William, Suite 101
Ann Arbor, MI 48103

734.663.2622 ph
734.663.6759 fx

Petoskey Office
113 Howard Street
Petoskey, MI 49770

231.347.2523 ph
231.347.2524 fx

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SECTION
00010
ADVERTISEMENT FOR BIDS

PROJECT: Draver Community Park & Trailhead
Powell Township

1. Bid Due Date and Location

- A. Sealed proposals are due and will be received no later than 2:00 p.m. local time, Thursday, January 9, 2025 at the following location:

Powell Township Hall
101 Bensinger Street
Big Bay, MI 49808

- B. The project includes but is not necessarily limited to, soil erosion and sedimentation control measures; demolition and removal of concrete pavement, gravel surfacing and bituminous pavement; structure demolition, excavation and grading, asphalt and concrete pavement, gravel surfacing, playground installations, architectural and M/E/P improvements and site sanitary and stormwater utilities.

2. Document Availability

- A. An electronic copy of the bidding documents will be available on or after 12:00 p.m. local time, Tuesday, November 26, 2024, as follows:

By E-mail

E-mail Tim Knutsen at tknutsen@bria2.com. and request an electronic copy of the bidding documents.

3. Bid Security/Performance Bonds

- A. Bid security, Performance and Labor and Material Bonds are required.

4. Site Inspection

- A. Each representative shall inspect the site and become familiar with existing conditions and limitations of the site and construction, means of access to the site and to work areas, relationship of existing and new work, and other conditions which might affect the proper performance and completion of the work. No allowance will be made after opening of Bids for errors through failure to properly estimate the effect of the existing conditions and limitations on the scope and/or cost of the work.

- B. All questions during bidding regarding clarification or interpretation of the documents shall be directed to the following:

Beckett & Raeder, Inc.
(231) 347-2523
Attn: Tim Knutsen
tknutsen@bria2.com

5. Pre-Bid Conference

- A. There is no Pre-Bid Conference for this project. Contractors are required to visit the project site to inform their bid and are strongly encouraged to submit requests for information in writing.

6. Bidder Qualifications

- A. Contractors submitting proposals for this project shall have qualifications as follows:
 - 1. Shall be a reputable, recognized organization, with at least 5 years' successful experience on work of this type, of equal or greater complexity than this project including coordination and management of multiple trade sub-contractors.
 - 2. Shall have a license where required by public authorities.
 - 3. Shall have ample financial resources for work of this magnitude.
 - 4. The successful bidder shall submit evidence of above, if requested, prior to Award of Contract.

Waiver: Powell Township reserves the right to accept or reject any or all bids, to waive technicalities and to accept the bid deemed to be in the best interest of Powell Township.

-END OF SECTION-

SECTION
00100
INSTRUCTIONS TO BIDDERS

ARTICLE 1 DEFINITIONS

- 1.1 All definitions set forth in the General and Supplementary Conditions of the Contract for Construction are applicable to these Instructions to Bidders.
- 1.2 Bidding documents include the Advertisement, Instructions to Bidders, Proposal Form, bid security, certificate of compliance or awardability and the proposed contract documents including any addenda.
- 1.3 Addenda are written, or graphic instruments issued prior to the execution of the contract which modify or interpret the bidding documents, including drawings and specifications, by additions, deletions, clarifications or corrections.
- 1.4 As used in these Instructions to Bidders the term "bid" means a proposal prepared and submitted as required herein.

ARTICLE 2 BIDDER'S REPRESENTATION

- 2.1 Each bidder, by submitting his/her bid, represents that the bidder has read and understands the bidding documents, has visited the site and is familiar with the local conditions under which the work is to be performed.

ARTICLE 3 EXAMINATION OF BIDDING DOCUMENTS

- 3.1 Each bidder shall examine the bidding documents carefully and, not later than ten days prior to the date for receipt of bids, shall make written request to the Landscape Architect/Engineer or Architect for interpretation or correction of any ambiguity, inconsistency or error therein which are discovered. Only a written interpretation or correction by addendum shall be binding. No explanations or interpretations requested or made orally will be considered binding.

ARTICLE 4 BIDDING SCHEDULE

- 4.1 The sequence of important dates during the bidding period consists of the following:
 1. Tuesday, November 26, 2024 – Documents, including Drawings and Specifications, will be available as described in Section 00010, Advertisement for Bids.
 2. There is no Pre-Bid Conference for this project. Contractors are required to visit the project site to inform their bid and strongly encourage to submit requests for information in writing.
 3. Monday, January 6, 2025 – Questions and requests for clarifications will be received from bidders until 5:00 p.m. Note that no further questions or requests for clarification will be received after this time.
 4. Tuesday, January 7, 2025 – A final Addendum will be issued by 5:00 p.m. providing answers to questions and requests for clarifications and including minutes of the Pre-Bid Meeting. Note that other Addendums may be issued as needed prior to this time.
 5. Thursday, January 9, 2025 – Bids will be received until 2:00 p.m. electronically at the following email address:

Tim Knutsen
tknutsen@bria2.com

ARTICLE 5 SUBSTITUTIONS

- 5.1 Each bid or proposal shall be based upon the materials and equipment described in the bidding documents. **Substitutions will only be considered where the equipment specified is followed by the phrase "or approved equal".**
- 5.2 Whenever a material, article or piece of equipment is identified on the drawings or in the specifications by reference to manufacturers' or vendors' names, trade names, catalog numbers, or the like, it is so identified for the purpose of establishing a standard, and any material, article, or piece of equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design will be considered equally acceptable provided the material, article, or piece of equipment so proposed is, in the opinion of the Landscape Architect/Engineer, Architect and owners, of equal substance, appearance and function.
- 5.3 No substitution will be considered unless written request has been submitted to the Landscape Architect/Engineer or Architect for approval at least 14 days prior to the date for receipt of bids. Each such request shall include a complete description of the proposed substitute, the name of the material or equipment for which it is to be substituted, drawings, cuts, performance and test data and any other data or information necessary for a complete evaluation. A bidder requesting approval of a substitute shall also promptly submit additional data if requested by the Landscape Architect/Engineer or Architect. Only approvals embodied in a written addendum shall be binding.

ARTICLE 6 BIDDING PROCEDURES

- 6.1 All bids must be submitted, in duplicate, on the Proposal Form provided as part of the bidding documents and in accordance with these Instructions to Bidders.
- 6.2 A bid is invalid if it has not been deposited at the designated location prior to the time and date for receipt of bids indicated in the advertisement or prior to any extension thereof issued by addendum to the bidders. Bids received after the time and date for receipt of bids will be returned unopened.
- 6.3 No bidder shall modify, withdraw or cancel a bid or any part thereof for 60 days after the time designated for the receipt of bids.
- 6.4 Prior to the receipt of bids, addenda will be mailed or delivered to each person or firm recorded by the Landscape Architect/Engineer or Architect as having received the bidding documents and will be available for inspection wherever the bidding documents are kept available for that purpose. No addendum will be issued later than six days prior to the date for receipt of bids except an addendum, if necessary, postponing the date for receipt of bids or withdrawing the request for bids. Each bidder shall ascertain prior to submitting a bid that he/she has received all addenda issued and shall acknowledge receipt in the bid.
- 6.5 All bids must be signed as follows:
 - .1 Corporations: Signature of official shall be accompanied by a certified copy of the resolution of the board of directors authorizing the individual signing to bind the corporation.
 - .2 Partnerships: Signature of one partner shall be accompanied by a certified copy of the power of attorney authorizing the individual signing to bind all partners. If a certified copy of the partnership's certificate submitted with the bid indicates that all partners have signed, no authorization is required.

- .3 Bids submitted by joint venturers shall be signed by one of the joint venturers and shall be accompanied by a certified copy of the power of attorney authorizing the individual signing to bind all the joint venturers. If a certified copy of the joint venturer's certificate submitted with bid indicates that all joint venturers have signed, no authorization is required.
- .4 Individual signing on own behalf: No authorization is required.
- .5 Individual signing on behalf of another: Power of attorney or comparable evidence of authority shall accompany bid.
- 6.6 Bids shall be prepared on unaltered proposal forms furnished with the bidding documents. The bidder shall make no additional stipulations on the bid form nor qualify his/her bid in any other manner.
- 6.7 Bids shall be submitted in an opaque, sealed envelope. Identify the envelope with:
 - .1 Project name.
 - .2 Name and address of bidder.
 - .3 Notation "BID ENCLOSED".
- 6.8 No responsibility shall attach to the Landscape Architect/Engineer, the Architect, the owner, or the authorized representatives of either one, for the premature opening of any proposal which is not properly addressed, delivered and identified.
- 6.9 The bidder shall assume full responsibility for timely delivery at location designated for receipt of bids.
- 6.10 Oral, telephonic, or telegraphic bids are invalid and will not receive consideration.
- 6.11 The bidder may modify his/her bid by telegraphic communication at any time prior to the scheduled closing time for receipt of bids, provided such telegraphic communication is received by the owner prior to the closing time. The telegraphic communication shall not reveal the base bid sum but shall provide the amounts to add or subtract so that the final base bid sum will not be known by the owner until the sealed bid is opened.
- 6.12 Negligence in preparation, improper preparation, errors in and/or omissions from the bid shall not relieve the bidder from fulfillment of any and all applicable obligations and requirements of the contract documents.
- 6.13 The owner or Landscape Architect/Engineer in making electronic copies of the bidding documents available do so only for the purpose of obtaining bids on the work and do not confer a license or grant for any other use.
- 6.14 The Landscape Architect/Engineer or Architect will prepare the copies of the agreement based upon the bids submitted by the low responsive bidder. These agreements, when executed, will constitute the contract between the state and the contractor.

ARTICLE 7 CONSIDERATION OF BIDS

- 7.1 The bidder acknowledges the right of the owner to reject any or all bids and to waive any informality

or irregularity in any bid received. In addition, the bidder recognizes the right of the owner to reject a bid:

- .1 if the bidder fails to furnish any required bid security, certificate of compliance or awardability or to submit the data required by the bidding documents; or
 - .2 if the bid is in any way incomplete or irregular; or
 - .3 if the bidder's performance as a contractor was unsatisfactory under a prior contract for the construction, repair, modification, or demolition of a facility with the owner, or a contractor in privity of contract with the owners, which was funded, directly or indirectly, by the owners; or
 - .4 if the bidder was an employer of construction mechanics working on the construction of facilities funded, directly or indirectly, by the State of Michigan through contracts under 1984 PA 431, MCL 18.1101 et seq; MSA 3.516(101) et seq, and was determined by the Michigan Department of Labor to have failed to comply with a contractual provision requiring the payment of Department of Labor's prevailing wage or the maintenance of Department of Labor's apprentice-journey-person ratio determinations for construction mechanics for that facility.
- 7.2 It is the intent of the owners, if he/she accepts any alternates, to accept them in the order in which they are listed in the bid form, but the owners shall have the right to accept alternates in any order or combination and to determine the low bidder on the basis of the sum of the base bid and the alternates accepted.
- 7.3 It is the intent of the owners to award a contract to the lowest responsible bidder provided the bid has been submitted in accordance with the requirements of the bidding documents and does not exceed the funds available.
- 7.4 Bidders to whom award of a contract is under consideration shall submit to the Landscape Architect/Engineer upon his request a properly executed Contractor's Qualification Statement, A.I.A. Document A305 or other information format specified by the Landscape Architect/Engineer.

ARTICLE 8 BID SECURITY

- 8.1 The bidder's proposal shall be accompanied by a certified check or cashier's check payable to Powell Township by a satisfactory bid bond executed by the bidder and a security company authorized to do business in the State of Michigan, in an amount of not less than five percent of the final base bid sum. The check or amount of bid bond shall be forfeited to the owner upon failure of the successful bidder to enter into a contract within 15 days after acceptance or proposal. The providing of security hereunder shall not preclude the owner from recovering from the bidder the full difference between the amount bid and the amount for which the owner ultimately contracts to have the work done, nor shall it entitle the owner to recover an amount greater than such difference. Bonds signed by attorney-in-fact must be accompanied by a certified and effectively dated copy of their power of attorney.
- 8.2 The bid security, exclusive of bid bonds, of all unsuccessful bidders will be returned when an award is made or upon substitutions of a bid bond. The bid security of the successful bidder will be returned when the performance bond and labor and material bond are approved.

ARTICLE 9 PERFORMANCE AND LABOR AND MATERIAL BONDS

- 9.1 The bidder, if awarded the contract, shall within 15 days after the acceptance of any proposal

provide evidence from a surety company that a performance bond and labor and material bond, covering up to the full amount of the contract sum as security for the faithful performance of all work under the contract and payment of all charges in connection therewith is being issued. Cost of said bonds shall be included as part of base bid. The bidder shall obtain such bonds in a manner consistent with Michigan law. Bonds signed by attorney-in-fact must be accompanied by a certified and effectively dated copy of their power of attorney.

ARTICLE 10 MICHIGAN RIGHT-TO-KNOW LAW

- 10.1 All contractors must conform to the provisions of the Michigan Right-to-Know Law, 1986 PA 80, which requires employers to:
- .1 develop a communication program designed to safeguard the handling of hazardous chemicals through labeling of chemical containers, and development and availability of Material Safety Data Sheets;
 - .2 provide training for employees who work with these chemicals; and
 - .3 develop a written hazard communications program.
- 10.2 The law also provides for specific employee rights. These include:
- .1 the right to be notified (by employer or contractor posting) of the location of Material Safety Data Sheet (MSDSs);
 - .2 the right to be notified (by employer or contractor posting) of new or revised MSDSs no later than five working days after receipt; and
 - .3 the right to request copies of MSDSs from their employers.
- 10.3 Provisions of Michigan's Right-to-Know law may be found in those sections of the Michigan Occupational Safety and Health Act (MIOSHA) which contain Right-to-Know provisions, and the Federal Hazard Community Standard, which is part of the MIOSHA Right-to-Know Law through adoption.

-END OF SECTION-

SECTION
00300
PROPOSAL FORM

BIDDER'S NAME

ADDRESS

TELEPHONE NUMBER(S)

Draver Community Park & Trailhead

PROJECT NAME

Powell Township

OWNER

Beckett And Raeder Inc.

LANDSCAPE ARCHITECT / ENGINEER

PROPOSAL

Powell Township Government Offices and Township Hall,
101 Bensinger Street,
Big Bay, MI, 49855

Dear Sir/Madam:

In response to the invitation for bids, the undersigned tenders the following offer to enter into a contract with Powell Township extends this offer for 60 calendar days subsequent to the opening of bids. This offer has been prepared after our examination of the complete plans and specifications, together with their related documents, and our examination of the site and conditions surrounding the construction of the proposal work including the availability of materials, equipment, and labor. Included in this offer are all costs necessary to complete all work in accordance with the contract documents prepared within the time set forth herein for the total base proposal sum.

_____ dollars

(\$ _____)

ADDENDA RECEIVED

No. 1, dated _____

No. 4, dated _____

No. 2, dated _____

No. 5, dated _____

No. 3, dated _____

No. 6, dated _____

The bidder must acknowledge all addenda received and acknowledges that they have been considered in the preparation of this bid.

1. **BID FORM**

The lump sum bid provided above includes all work as shown on the Construction Drawings and Specifications Manual. Bidder shall provide all cost information as required in this bid form.

2. **ALTERNATES**

In addition to the base bid above, the bidder may supply a lump sum for the following alternate:

Alternate 1:

Add/Deduct _____ Dollars (\$ _____).

Voluntary Alternate Description:

Add/Deduct _____ Dollars (\$ _____).

3. **UNIT PRICES**

The Bidder shall submit the following unit prices to be used for additions to or subtractions from the work. The unit prices shall be valid for modifications to the work up to an aggregate amount of 35% of the total lump sum base bid. The unit prices shall include contractor mark-up, profit and overhead.

Description	Unit	Unit Cost
DEMOLITION		
Strip Lawn & Stockpile Topsoil	sy	\$ _____
Tree Removal	ea	\$ _____
Remove Bituminous Pavement	sy	\$ _____
Remove Gravel Surfacing	sy	\$ _____
Remove Concrete Sidewalk	sy	\$ _____
SOIL EROSION AND SEDIMENTATION CONTROL		
Construction Entrance Mat System	ls	\$ _____
Tree Protection Fence	lf	\$ _____
Filter Fabric Fence	lf	\$ _____
EARTHWORK		
Cut & Fill	cy	\$ _____
Haul Material offsite and legally dispose	cy	\$ _____
SURFACING		
Bituminous Pavement	sy	\$ _____
Concrete Sidewalk 5"	sf	\$ _____
Reinforced Gravel Surfacing	lf	\$ _____
Concrete Cheek wall	lf	\$ _____
Pavement Striping	lf	\$ _____
Poured in Place Surfacing	sf	\$ _____
Engineered Wood Fiber Playground Mulch	cy	\$ _____

RECREATION AND SITE FURNISHINGS

Fencing	lf	\$ _____
Bench	ea	\$ _____
Deciduous Tree, 2.5" Cal.	ea.	\$ _____
Concrete Bumper Blocks	ea.	\$ _____
Barrier Free Sign	ea.	\$ _____
Grill	ea.	\$ _____
Topsoil	cy.	\$ _____
Lawn Seeding	sy.	\$ _____

4. SCHEDULE OF VALUES

Provide costs for each work item below. *Include all associated construction including removals and replacements to complete the work category.* Sum of Schedule of Values shall equal the Proposal Sum.

- a. Site Demolition \$ _____
- b. SESC Measures \$ _____
- c. Architectural and M/E/P \$ _____
- d. Site Improvements \$ _____
- e. Site Utilities \$ _____

5. BASIS OF AWARD

The Owner reserves the right to award a contract on the basis of the base proposal sum only or the base proposal sum plus a combination of alternates deemed in the best interests of the Owner.

6. FORFEITURE OF BID SECURITY

If within the 60 days that this offer is valid a letter is sent notifying the undersigned of the acceptance of this proposal, the undersigned agrees to deliver within the ten succeeding days surety bonds in the form specified. Failure to deliver the bonds will forfeit the enclosed certified or cashier's check or bid bond which accompanies this proposal.

7. TIME OF COMPLETION

To accommodate contractor schedules, the project offers two options for the project start date, and time of completion:

- A. Start Date: April 7, 2025 (may begin earlier upon approval)

Project shall be substantially complete on or before October 17, 2025

Project shall be complete on or before October 31, 2025

NOTE: Contractor will be responsible for completing all work within a 14-week construction period within the start and final completion dates indicated above. Final schedule to be negotiated prior to contract.

8. SCHEDULING LIMITATIONS

Work schedule limited to Monday through Saturday, 7:30 a.m. to 7 p.m. Work schedule may be expanded upon request.

9. **ACCEPTANCE**

The undersigned agrees that if this lump sum proposal is accepted by the Owner, he/she will enter into the Contract, furnishing all bonds and other contract requirements, within 5 days of notice of award and will complete the entire work of the Contract within the given schedule and the provisions of the project specifications.

Dated and signed at _____, State of _____ this
_____ day of _____, 2025.

Name of Bidder

Waiver: Powell Township reserves the right to accept or reject any or all bids, to waive technicalities and to accept the bid deemed to be in the best interest of Powell Township.

SECTION
00400
AFFIDAVIT OF NONCOLLUSION BY CONTRACTOR

State of Michigan _____)
County of _____) SS

_____, BEING DULY SWORN deposes and says

that he/she is _____
(Title)

of _____
(Insert Name of Bidder)

who submits herewith a Proposal and Bid for the project Draver Community Park & Trailhead,

That all statements of fact in such proposal are true;

That such bidder has not, directly or indirectly by agreement, communication or conference with anyone attempted to induce action prejudicial to the interest of Powell Township or of any other bidder or anyone else interested in the proposed contract; and further

That prior to the public opening and reading of proposals, said bidder:

- a. Did not directly or indirectly, induce or solicit anyone else to submit a false or sham proposal;
- b. Did not, directly or indirectly, collude, conspire, connive or agree with anyone else that said bidder or anyone else would submit a false or sham proposal, or that anyone should refrain from bidding or withdraw his proposal;
- c. Did not, in any manner, directly or indirectly seek by agreement, communication or conference with anyone to raise or fix the proposal price of said bidder or of anyone else, or to raise or fix any overhead profit or cost element of his proposal price, or of that of anyone else;
- d. Did not, directly or indirectly, submit his proposal price or any breakdown thereof, or the contents thereof, or divulge information or data relative thereto, to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof, or to any individual or group of individuals, except to any person or persons who have a partnership or other financial interest with said bidder in his business.

Subscribed and sworn to before me this _____

_____ day _____, 20____ by _____

Notary Public Title

SECTION
00500
CONTRACT

ARTICLES OF AGREEMENT, made and entered into this __day of _____, 2025, by and between Powell Township, Michigan, hereinafter designated FIRST PARTY and _____, hereinafter designated SECOND PARTY.

WITNESSETH:

In consideration of the mutual promises of the parties hereto, IT IS HEREBY AGREED:

1. That all copies of the attached proposals, specifications, plans, general conditions, instruction to bidders, and the attached bonds shall be and they are hereby made a part of this agreement and contract.
2. That the Second Party, under penalty of bonds attached, shall furnish all labor, materials and appliances necessary and does hereby covenant, to do all the work in accordance with the plans and specifications entitled Draver Community Park & Trailhead, prepared by Beckett & Raeder Inc., dated November 26, 2024, in a manner, time and place, all and singular as therein set forth.
3. First Party hereby agrees and promises to pay to the Second party the sum provided in the attached proposal, namely, \$_____, which includes acceptance of the Base Proposal Sum in the amount of \$_____ the acceptance of Alternate 1 for a credit of \$_____ and Alternate 2 for a credit of \$_____ and the acceptance of Alternate 3 for an additional cost of \$_____, all in the time and manner therein provided.
4. For the faithful performances of all and singular of the stipulations, terms and covenants and conditions of this agreement, said parties hereto respectively bind themselves, their heirs, successors, personal representatives and assigns.
6. This project requires full compliance with 1976 PA 453 and 1976 PA 220.

IN WITNESS WHEREOF, said parties have hereunto set their hands and seals, on the day and year first hereinabove written.

IN THE PRESENCE OF

POWELL TOWNSHIP, MICHIGAN

by _____

FIRST PARTY

IN THE PRESENCE OF

by _____

(designate official capacity)

by _____

(designate official capacity

(_____.)

SECTION 00700
STANDARD GENERAL CONDITIONS OF THE CONSTRUCTION CONTRACT

The General Conditions shall be the current edition of the ASCE Document EJCDC C-700 "Standard General Conditions of the Construction Contract".

SECTION
00900
SUPPLEMENTAL GENERAL CONDITIONS

1. Overview

- A. All requirements contained in the *SUPPLEMENTAL GENERAL CONDITIONS* shall take precedence over conflicting information found elsewhere in the *SPECIFICATIONS*.

2. Insurance Requirements

- A. The Contractor shall maintain during the life of this contract such liability policy as shall protect it, Beckett & Raeder, Inc., and Powell Township from claims for damages which may be incurred as a result of the work to be performed under this contract in an amount no less than Two Million (\$2,000,000.00) Dollars for each occurrence for bodily injury or personal injury including death there from and Five Million (\$5,000,000.00) Dollars in the aggregate. In addition, property damage liability insurance shall be maintained in the amount of One Million (\$1,000,000.00) Dollars for each occurrence and Two Million (\$2,000,000.00) Dollars in the aggregate.

In addition, the Contractor shall provide evidence of comprehensive automobile liability insurance in an amount no less than Two Million (\$2,000,000.00) Dollars for each occurrence of bodily injury liability and One Million (\$1,000,000.00) Dollars for each occurrence of property damage liability including not owned and hired car liability insurance. Evidence of this insurance shall also contain a clause stating that Powell Township shall be given thirty (30) days advanced written notice in the event of cancellation or material change in the policy. Further the Contractor agrees to provide copies of said insurance policies to Powell Township prior to commencement of Work and shall provide to Powell Township a current enforce policy for the term of this contract.

The Contractor shall maintain workers disability compensation insurance for all employees and that said insurance shall comply with all applicable rules, regulations and statutes of the State of Michigan.

The Contractor shall simultaneous with or prior to the execution of this Contract provide proof of said insurance to Powell Township and shall immediately upon demand, at the time of renewal or change of insurance carriers, provide to the township forthwith a copy of the additional or replacement insurance policies evidencing that the Contractor has complied with the terms and conditions heretofore stated.

3. Dispute Resolution

Any controversy or claim arising out of or relating to any performance under the terms of this Agreement, including, but not limited to claims based upon or arising from an alleged tort, and including all claims among or between the Owners, the Owners' agents (including but not limited to the Landscape Architect/Engineer and Architect), and the Contractor, shall at the request of any of these parties be determined by binding arbitration, to be administered under the Construction Industry Arbitration Rules of the American Arbitration Association, and before an arbitrator to be mutually agreed upon from the Association's neutrals roster.

Judgment upon the award rendered by the arbitrator may be entered in any court having jurisdiction. The institution and maintenance of an action for judicial relief or the pursuit of a provisional or ancillary remedy shall not constitute a waiver of the right of any of the aforementioned parties' right to submit the controversy or claim to arbitration.

4. Discrimination Clause

- A. In connection with the performance of services to be provided, the Contractor agrees to comply with the provisions of the Elliot-Larsen Civil Rights Act, Public Act 453 of 1976, as amended, the Michigan Handicappers' Civil Rights Act, Public Act 220 of 1976, as amended and specifically agrees not to discriminate against any individual, employee or applicant for employment with respect to hire, tenure, terms conditions, or privileges of employment because of a handicap that is unrelated to the individual's ability to perform the duties of a particular job position, or because of race, color, religion, national origin, age, sex, height, weight, or marital status. Breach of this covenant may be regarded as a material breach of this agreement.

-END OF SECTION-

DIVISION 1 - GENERAL REQUIREMENTS

SECTION 01000
OVERVIEW

Sections of Division 1 - General Requirements, are specifications written to cover the administrative requirements and Work-related requirements of the Contract. The basic titles and section numbers are as follows:

<u>SECTION NO.</u>	<u>TITLE</u>
01010	Summary of Work and Permit Requirements
01020	Allowances
01030	Alternates/Alternatives
01040	Coordination
01050	Field Engineering and Surveying
01060	Regulatory Requirements
01070	Abbreviations and Symbols
01100	Special Project Procedures
01200	Project Meetings
01300	Submittals
01400	Quality Control
01500	Construction Facilities and Temporary Controls
01600	Material and Equipment
01700	Contract Closeout

SECTION 01010
SUMMARY OF WORK

Section 01011
Work Covered by Contract Documents

The project includes but is not necessarily limited to, soil erosion and sedimentation control measures; demolition and removal of concrete pavement, and bituminous pavement; excavation and grading, asphalt and concrete pavement, rain garden installations, architectural and M/E/P improvements and site sanitary and stormwater utilities.

SECTION 01015
Permit Requirements

The Contractor shall be responsible for all conditions and requirements of permits, if required, and the same shall be considered a condition of the contract.

SECTION 01020
ALLOWANCES

No allowances are a requirement of this project and Contract.

SECTION 01030
ALTERNATES/ALTERNATIVES

The alternates listed in the schedule of alternates below are utilized to receive a quote from the bidder for certain construction activities. Amounts for the alternates shall be inserted on the Proposal form.

Add Alternate No. 1:

VOLUNTARY ADD/DEDUCT ALTERNATES

The bidder may submit voluntary substitutions to the specified scope of work, and the corresponding alternate prices for such substitutions, in order to realize significant cost savings to the Owner without substantially changing the project.

SECTION 01040
COORDINATION

Section 01043
Cooperation By Contractor

Prior to beginning Work the Contractor shall meet with the Owner and Landscape Architect/Engineer to arrange the schedule for the project. Once the project is started, it shall be carried to completion without delay.

Phasing of Work shall be clearly established and verified with the Landscape Architect/Engineer prior to commencing Work in any area. No cutting or removal Work shall begin until authorized by Landscape Architect/Engineer, Architect or Owner.

Any building utility service interruptions or outages required by the Contractor in performing the Work shall be prearranged with the staff of the Owner and shall occur only during those scheduled times.

Section 01045
Cutting and Patching

The Contractor shall do all cutting, fitting or patching of the Work that may be required to make its several parts fit together properly or make new Work join with the existing structure. The Contractor shall take proper precautions so as not to endanger any Work by cutting or digging. The Contractor shall not cut or alter existing structural members or foundations, except where called for on the Drawings or in the specifications or where later approved by the Landscape Architect/Engineer or Architect.

All adjacent finished surfaces that are damaged by the Work shall be patched with materials matching existing surfaces. Joints between patched and existing material shall be straight, smooth and flush. All patching material shall be applied by workers skilled in its installation.

SECTION 01050
FIELD ENGINEERING AND SURVEYING

The Contractor shall employ a licensed surveyor who shall supervise the establishment of project boundaries, and maintain all lines and levels for layout and constructing the work. The Contractor agrees to assume all responsibility due to inaccuracy of any work of said surveyor and including incorrect bench marks, their loss or disturbance. Upon completion of the project, the Contractor shall submit two copies of the site layout drawings prepared for the project and certified by the surveyor.

SECTION 01060
REGULATORY REQUIREMENTS

Section 01061
Applicable Codes

The Contractor shall comply with all State rules, ordinances and regulations relating to buildings, employment, the preservation of public health and safety, and so forth. All necessary permits or certificates of inspection shall be paid for and obtained by the Contractor.

Flammable Liquid Storage: The Materials and installation shall meet all local requirements and be in strict

SECTION 01070
ABBREVIATIONS AND SYMBOLS

Section 01071
Abbreviations

"MDOT" - The Michigan Department of Transportation
"ASTM" - The American Society of Testing Materials
"AWWA" - The American Water Works Association
"ANSI, ASA" - The American National Standards Institute (Formerly: The American Standards Association and United States of American Standards Institute)
"AISI" - The American Iron and Steel Institute
"ASME" - The American Society of Mechanical Engineers
"ACI" - American Concrete Institute
"SSPC" - Steel Structures Painting Council
"IEEE" - The Institute of Electrical and Electronic Engineers
"NEC" - The National Electric Code
"NEMA" - The National Electric Manufacturer's Association
"IPCEA" - The Insulated Power Cable Engineers Association
"AASHTO" - American Association of State Highway and Transportation Officials
"ASCE" - American Society of Civil Engineers
"AWS" - American Welding Society
"CRSI" - Concrete Reinforcing Steel Institute
"Fed Sec" - Federal Specification
"NPC" - National Plumbing Code
"OSHA" - Occupational Safety and Health Act
"UL" - Underwriter Laboratories

SECTION 01100
SPECIAL PROJECT PROCEDURES

Section 01101
Demolition Procedures

Furnish all equipment, materials, labor and services necessary to complete all demolition required in connection with the existing conditions, in order to permit the installation of new Work called for on the Drawings.

Preparation: Protect all existing Work that is to remain and restore in an approved manner any such Work that becomes damaged.

Rubbish and debris resulting from the Work shall be removed immediately from the site by the Contractor.

Coordination: Demolition work, in connection with any new unit of Work, shall not be commenced until all new materials required for completion of that new item of work are at hand.

SECTION 01200
PROJECT MEETINGS

Section 01201
Pre-Bid Conference

There is no Pre-Bid Conference for this project. Contractors are required to visit the project site to inform their bid and are strongly encouraged to submit requests for information in writing.

Section 01202
Preconstruction Conferences

The Landscape Architect/Engineer or Owner will schedule a preconstruction conference to be attended by the Owner and the Contractors. The Contractor, prior to beginning any Work, shall meet with the Landscape Architect/Engineer, Architect or Owner and arrange a Work schedule for the project. Once the project has been started, the Contractor shall carry it to completion without delay.

Section 01203
Progress Meetings

The Landscape Architect/Engineer or Owner will schedule meetings to be held on the job site whenever needed to supply information necessary to prevent job interruptions, to observe the Work or to inspect completed Work. The Contractor shall be represented at each progress meeting by persons with full authority to act for the Contractor in regard to all portions of the Work.

SECTION 01300
SUBMITTALS

SECTION 01310
CONSTRUCTION SCHEDULES

Within five days of Notice of Award of Contract and prior to start of any work, the Contractor shall submit to the Landscape Architect/Engineer, Architect or Owner, a progress schedule showing the work sequence for all trades involved in the project and all major work items.

SECTION 01340
Shop Drawings and Product Data

Within 10 days of notice of award of Contract and prior to the delivery of any material or equipment to the job site, the Contractor shall submit to the Landscape Architect/Engineer a complete list of material suppliers, subcontractors, and brand names of all materials proposed to be used in the project. The Contractor shall check and verify all field measurements. Thereafter the Contractor shall submit to the Landscape Architect/Engineer with such promptness as to cause no delay in the Work, a minimum of five copies of Shop Drawings, product data catalogs, material schedules, etc. Following examination by the Landscape Architect/Engineer, three copies will be retained for Owner's use and remaining copies will be returned to the Contractor with indication of approval or with notations for correction. The following materials, building systems and equipment require submission of Shop Drawings, material lists, products data catalogs, etc. The Landscape Architect/Engineer may request submission of information on other material or equipment at any time.

<u>SECTION NO.</u>	<u>REQUIRED SUBMITTAL</u>
31-1000	Manufacturer product data for soil erosion and sedimentation control.
329200	Seed dealer's guarantee of percentages of purity and germination.

329113	Certified analysis of topsoil from each offsite source.
329113	Topsoil deficiency correction plan.
321123	Aggregate samples.
321200	Marshall Mix Design.
321623	Proposed mix design and product data for joint filler, admixtures, etc.
329200	Seed mix and certification
329300	Shredded bark mulch sample.
329300	Data for anti-desiccants, tree wound dressing and herbicides.
321623	Mix designs for concrete work.

Submit the following information printed on each and every sheet of Shop Drawings and on the cover page of each and every specification, catalog or pamphlet.

Name and location of the project.

Drawing Number.

Date of Drawing.

Contractor's Signature or approval stamp indicating that the information is accurate and complete and conforms to the intent of the Drawings and specifications.

A 5-inch wide by 4-inch-high clear space for Landscape Architect/Engineer approval stamp.

Section 01341
Samples

The Contractor shall deliver all samples of material of equipment to the job site for examination by the Landscape Architect/Engineer. Samples will be examined for conformance with the design concept of the project and for compliance with the information given in the Contract Documents. The Contractor shall furnish all Work in accordance with approved samples. Samples of other items may be requested by the Landscape Architect/Engineer at any time.

Section 01370
Schedule of Values

Before submission of first application for payment, the Contractor shall submit a schedule of values, approved by the Landscape Architect/Engineer or Owner, of the various tasks that must be performed to complete all the Work. The schedule shall show each task and the corresponding value of the task, including separate monies allocated for General Condition items and project close out. The aggregate total value for all tasks shall be equal to the total contract sum.

SECTION 01400
QUALITY CONTROL

All testing required by state law shall be done at the expense of the Contractor.

The Owner will employ an Independent Testing Laboratory, which will perform all compaction and materials testing required, except as otherwise called for in the Specifications. For materials covered by ASTM, AWWA, or Federal Specifications, unless otherwise stipulated, the required tests are to be made by the product manufacturer, at no additional expense to the Owner, and the certificate thereof submitted to the Owner.

All compaction and material tests shall be coordinated by the Contractor and made at the expense of the Owner. If the Contractor fails to coordinate compaction and material test, Contractor shall be liable to remove installed materials at Contractor's expense and shall reimburse the Owner for compaction and material testing prior to installation of materials. Owner shall be reimbursed for cancelled testing operations that result in hourly charges to the Owner when no testing is performed. If a compaction and material test fails at a specific

location, the Owner will pay for a subsequent test. If the subsequent test fails, the Contractor shall reimburse the Owner for each test thereafter.

Submit a minimum of three copies of each test report to the Landscape Architect/Engineer or Architect for evaluation and subsequent distribution. Additional submissions may be required by the Landscape Architect/Engineer at any time.

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

The Contractor shall furnish and install all temporary facilities and controls required by the Work, shall remove them from Owner's property upon completion of the Work, and the grounds and existing facilities shall be restored to their original condition.

Section 01511
Water and Electricity

Water and electricity may be available in the area where Work will be performed. The Contractor shall arrange for use of these services for construction operation. The Contractor shall pay for the electrical service. Water service will be provided by the City at no charge to the contractor. The Contractor shall pay costs for installation and removal of any temporary connections including necessary safety devices and controls. Use of services shall not disrupt or interfere with operations of the Owner. If electricity is not available, Contractor shall provide an appropriate generator for the work.

Section 01516
Temporary Sanitary Facilities

Temporary Toilets: The Contractor shall provide and maintain portable temporary toilets in the locations approved by the Landscape Architect/Engineer, Architect or Owner. There shall be sufficient number for the work force, and they shall comply with all federal, state and local code requirements. The Contractor shall maintain the temporary toilets in a sanitary condition at all times and shall remove them when the Work under the Contract is complete. The Contractor's employees shall not make use of any existing Owner toilet facility.

Section 01520
Construction Aids

The Contractor shall furnish, install, and maintain as long as necessary and remove when no longer required, safe and adequate scaffolding, ladders, staging, platforms, chutes, railings, hoisting equipment, etc., as required for proper execution of the Work. All construction aids shall conform to federal, state, and local codes or laws for protection of workmen and the public.

Pumping and Drainage: The Contractor shall provide all pumping necessary to keep excavations and trenches free from water the entire period of work on the Contract, and to facilitate work along the shoreline indicated in the drawings. The Contractor shall construct and maintain any necessary surface drainage systems on the Work site so as to prevent water entering existing structures or to flow onto public or private property adjacent to the Owners' land except for existing drainage courses or into existing drainage systems. The contractor shall prevent erosion of soils and blockage of any existing drainage system.

Section 01530
Barriers

Barriers, Signs and Lights: The Contractor shall furnish, install and maintain as long as necessary and remove when no longer required adequate barriers, warning signs or lights at all dangerous points throughout the

Work for protection of property, workers and the public. The Contractor shall hold the Owner and Landscape Architect/Engineer harmless from damage or claims arising out of any injury or damage that may be sustained by any person or persons as a result of the Work under the Contract.

Section 01590
Field Offices and Sheds

Field Office: At the beginning of the Work the Contractor may provide a field office and storage building at the site. The building may be either a shanty or trailer as preferred. The Contractor shall provide such other temporary buildings as he may require for the use of workmen and safe storage for tools and materials. The location of field offices and storage buildings must be approved in writing by the Owner.

SECTION 01600
MATERIAL AND EQUIPMENT

Section 01620
Storage and Protection

All materials and equipment delivered to and used in the Work shall be suitably stored and protected from the elements. The areas used for storage shall only be those approved by the Landscape Architect/Engineer or Owners. The Owner and Landscape Architect/Engineer assume no responsibility for stored material. The ownership and title to materials will not be vested in the Owner before materials are incorporated in the Work, even if payment is made by the Owner for stored materials and equipment. After delivery, before and after installation, the Contractor shall protect materials and equipment against theft, injury or damage from all causes. The Contractor assumes liability for all materials stored on the Owner's property before installation.

Bulk materials subject to deterioration because of dampness, the weather or contamination shall be covered and protected while in storage. Materials in containers shall be kept in original sealed containers, unopened, with labels plainly indicating manufacturer's name, brand, type and grade of material. Containers which are broken, opened, watermarked and/or contain caked, lumpy or otherwise damaged materials are unacceptable and shall be immediately removed from the Work site.

Equipment stored outdoors shall be kept from contact with the ground, away from areas subject to flooding and covered with weatherproof plastic sheeting or tarpaulins.

SECTION 01700
CONTRACT CLOSEOUT

Section 01705
Substantial Completion

The Contractor shall notify the Landscape Architect/Engineer, Architect or Owner when the Work will be substantially complete and ready for inspection and preparation of a list of minor replacement, correction, and adjustment items (punchlist). The Contractor shall be represented on the job site at the time this inspection is made and thereafter shall complete all Work by the date set for final acceptance by the Landscape Architect/Engineer or Owner.

Section 01710
Cleaning

Regular Cleaning: All scrap or removed material, debris or rubbish shall be regularly removed from the project site at the end of each working day and more frequently whenever the Landscape Architect/Engineer deems such material to be a hazard. No discarded material shall be deposited on the grounds of the Owner without

the expressed permission of the Owner. No salvage or surplus material may be sold on the premises of the Owner.

Final Cleaning: Just prior to final acceptance by the Owner, the Contractor shall clean all of the Work and existing surfaces, building and site elements that were soiled by his operations and make repairs for any damage or blemish that was caused by the Work.

Section 01720
Project Record Documents

The Contractor shall furnish the Landscape Architect/Engineer with as-built drawing mark-ups following completion of the work.

Section 01740
Guarantees and Bonds

The Contractor shall obtain and forward to the Office of the Landscape Architect/Engineer or Owner statements concerning Guarantee and Indebtedness, and any other special guarantees or requirements of the Contract Documents. All required material shall accompany Contractor's request for final payment.

Contractor shall include all operation and maintenance data required by the Contract Documents.

- END OF DIVISION 1 -

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
- C. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

1.2 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.

1.3 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

NONE.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities 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. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 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.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- B. Parking: Establish parking areas for construction personnel.
- C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.

3.4 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.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- 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.
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
- D. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to soil erosion- and sedimentation-control Drawings.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant-protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. 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: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."
- G. 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.

END OF SECTION 015000

SECTION 116800 - PLAY FIELD EQUIPMENT AND STRUCTURES

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 playground equipment as follows:
 - 1. Freestanding playground equipment.
 - 2. Composite playground equipment.

1.3 DEFINITIONS

- A. Fall Height: According to ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."
- B. HDPE: High-density polyethylene.
- C. Use Zone: According to ASTM F 1487, "the area beneath and immediately adjacent to a play structure that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."
- D. Definitions in ASTM F 1487 apply to Work of this Section.
- E. IPEMA: International Play Equipment Manufacturers Association.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site, Trenton Rotary Park.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of playground equipment.
 - 1. Include plans, elevations, sections, and attachment details.

2. Include fall heights and use zones for playground equipment, coordinated with the critical-height values of protective surfacing specified in Section 321816.13 "Playground Protective Surfacing."
- C. Samples for Initial Selection: For each type of exposed finish.
 1. Manufacturer's color charts.
 2. Include Samples of accessories involving color selection.
 - D. Samples for Verification: For each type of exposed finish on the following products:
 1. Include Samples of accessories to verify color and finish selection.
 2. Posts and Rails: Minimum 6 inches (150 mm) long.
 3. Platforms: Minimum 6 inches (150 mm) square.
 4. Molded Plastic: Minimum 3 inches (76 mm) square.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer and manufacturer.
 - B. Product Certificates: For each type of playground equipment.
 - C. Material Certificates: For the following items:
 1. Shop finishes.
 2. Wood-Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - D. Field quality-control reports.
 - E. Sample Warranty: For manufacturer's special warranties.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
 - B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide the following playground equipment manufactured by the following:
1. HAGS 'Norna Tilia', 6 pairs total (8038425) or approved equal.
 2. HAGS 'Inclusive Roundabout Spinmee' (8093903) or approved equal.
 3. HAGS 'Pull Up' (8055006), or approved equal.
 4. HAGS 'Trinity Cycle' (8055004) or approved equal.
 5. HAGS 'Push Hands' (8055005) or approved equal.
 6. UPC Parks 'Mama Bear' (14401) or approved equal.
 7. Miracle 'Multi-Pondo' (150-060) or approved equal.
- B. Playground equipment and components shall have the IPEMA Certification Seal.

2.2 PERFORMANCE REQUIREMENTS

- A. Safety Standard: Provide playground equipment according to ASTM F 1487.

2.3 FREE STANDING PLAYGROUND EQUIPMENT

- A. UPC Parks Imagacast & PolyFiberCrete freestanding climbers or approved equal. Representative contact: Jay Oosterhouse, We Build Fun. Email: Jay@webuildfun.com
1. 'Mama Bear' (14401) or approved equal.
 - a. Color: Manufacture's standard.
 - b. Installation: Manufacture's standard. Landscape Architect to approve placement in field.
- B. HAGS Play components and exercise stations or approved equal. Representative contact: Jay Oosterhouse, We Build Fun. Email: Jay@webuildfun.com
1. 'Norna Tilia', 6 pairs total (8038425) or approved equal.

- a. Color: Landscape Architect to choose from manufacturer's full range.
 - b. Installation: Manufacturer's standard. Landscape Architect to approve placement in field.
 2. HAGS 'Inclusive Roundabout Spinmee' (8093903) or approved equal.
 - a. Color: Landscape Architect to choose from manufacturer's full range.
 - b. Installation: Manufacturer's standard.
 3. HAGS 'Pull Up' (8055006) or approved equal.
 - a. Color: Landscape Architect to choose from manufacturer's full range.
 - b. Installation: Manufacturer's standard. Landscape Architect to approve placement in field.
 4. HAGS 'Trinity Cycle' (8055004) or approved equal.
 - a. Color: Landscape Architect to choose from manufacturer's full range.
 - b. Installation: Manufacturer's standard. Landscape Architect to approve placement in field.
 5. HAGS 'Push Hands' (8055005) or approved equal.
 - a. Color: Landscape Architect to choose from manufacturer's full range.
 - b. Installation: Manufacturer's standard. Landscape Architect to approve placement in field.
- C. Miracle freestanding Motion play components, or approved equal. Representative contact: Jay Oosterhouse, We Build Fun. Email: Jay@webuildfun.com
1. 'Multi-Pondo' (150-060) or approved equal.
 - a. Color: Landscape Architect to choose from manufacturer's full range.
 - b. Installation: Manufacture's standard.

2.4 PLAYGROUND EQUIPMENT FABRICATION – GENERAL

- A. Assemble items in the shop to the greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structures, including supporting members and connections, means of access and egress, designated play surfaces, barriers, guardrails, handrails, handholds, and other components indicated or required for equipment indicated.
- B. Wood Frame: Fabricate main-frame upright support posts from wood.
1. Fabricate secondary frame members, bracing, and connections from either steel or aluminum. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer's standard drainable bottom plate or support flange.
 2. Form simple and compound curves in bars and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.
 3. Cut, drill, and punch metals cleanly and accurately. Remove sharp or rough areas on exposed surfaces.

SECTION 116800
PLAY FIELD EQUIPMENT AND STRUCTURES

4. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
 5. Comply with AWS recommended practices for shop welding. Weld behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.
 6. Provide weep holes where water may accumulate.
- C. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap to receive finish hardware, screws, and similar items, unless otherwise indicated.
- D. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.
- E. Play Surfaces: Provide manufacturer's standard elevated drainable decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed to withstand loads; fabricated from wood plank made into floor units with slip-slip-resistant foot surfaces. Fabricate units in manufacturer's standard modular sizes and shapes to form assembled play surfaces indicated.
- F. Elevated Play Surfaces: Guardrails or protective barriers completely surround elevated play surface except for access openings, if play-surface heights above protective surfacing exceed the following for use by age group indicated:
1. Elevated surface greater than 20 inches (510 mm) intended for use by children aged 2 through 5.
 2. Elevated surface greater than 30 inches (760 mm) intended for use by children aged 5 through 12.
- G. Stepped Play Surfaces: Provide manufacturer's standard infill between stepped platforms.
- H. Protective Barriers and Guardrails: Fabricate according to ASTM F 1487 Extend barriers to height above the protected elevated surface according to requirements for use by age group indicated. Fabricate units in manufacturer's standard modular sizes and shapes to form assembled play surfaces indicated.
- I. Handrails: Welded metal pipe or tubing, OD between 0.95 and 1.55 inches (24.1 and 39.4 mm). Provide handrails at height for use by age group indicated below:
1. Ages: Between 2 and 5 and 5 and 12 years.
 2. Height of Top Surface: 29 inches (737 mm) intended for use by children aged 2 through 5 and 38 inches (965 mm) intended for use by children aged 5 through 12.
 3. Close exposed ends of handrails with returns with clearance of 1/4 inch (6 mm) or less.
- J. Signs: Manufacturer's standard sign panels, fabricated from manufactures standard attached directly to playground equipment.
1. Text: Minimum informational content according to ASTM F 1487.
 2. Colors: As selected by Landscape Architect from manufacturer's full range.

- K. All hardware shall be stainless steel.
- L. PVC (vinyl, plastisol) is not allowed.

2.5 MATERIALS

- A. Aluminum: Material, alloy, and temper recommended by manufacturer for type of use and finish indicated.
- B. Steel: Material types, alloys, and forms recommended by manufacturer for type of use and finish indicated.
- C. Stainless-Steel Sheet: Type 304; finished on exposed faces with No. 2B finish.
- D. Wood: Surfaced smooth on all sides and all edges rounded.
- E. Plywood: PS 1, Exterior grade; smooth surfaced with rounded edges preservative treated after fabrication.
- F. Opaque Plastics: Color impregnated, UV stabilized, and mold resistant.
- G. Transparent Plastic: Abrasion-resistant, UV-stabilized polycarbonate sheet; not less than 3/16 inch thick.
- H. Suspension Chain and Fittings: ASTM A467/A467M, Class CS, 4/0 or 5/0, welded-straight-link coil chain; PVC coated; with commercial-quality, hot-dip galvanized or zinc-plated steel connectors and swing or ring hangers.
- I. Suspension Cable: Manufacturer's standard PVC-coated cable; with commercial-quality, [hot-dip galvanized or zinc-plated steel connectors and swing or ring hangers.
- J. Iron Castings and Hangers: Malleable iron, ASTM A47/A47M, Grade 32510, hot-dip galvanized.
- K. Post Caps: Cast aluminum or color-impregnated, UV-stabilized, mold-resistant polyethylene or polypropylene; color to match posts.
- L. Platform Clamps and Hangers: Cast aluminum or zinc-plated steel, not less than 0.105-inch.
- M. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a vandal-resistant design.
- N. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or zinc-plated steel and iron, or stainless steel; permanently capped; and theft resistant.

2.6 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment: Pressure-treat wood products according to AWPA U1 and the following:
 - 1. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

2.7 CAST-IN-PLACE CONCRETE

- A. Concrete Materials and Properties: Comply with requirements in Section 321303 "Concrete Pavement".

2.8 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Minimum dry film thickness of 1.5 mils medium gloss. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- B. PVC Finish: UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on PVC finish, with flame retardant added, and with minimum dry film thickness of 80 mils. Comply with coating manufacturer's written instructions for pretreatment and application.

2.9 IRON AND STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils. Comply with coating manufacturer's written instructions for pretreatment, applying, and baking.
- B. PVC Finish: UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on PVC finish, with flame retardant added, and with minimum dry film thickness of 100 mils. Comply with coating manufacturer's written instructions for pretreatment and application.

2.10 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for earthwork, subgrade elevations, surface and subgrade drainage, and other conditions affecting performance of the Work.
 - 1. Do not begin installation before final grading required for placing playground equipment and protective surfacing is completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written installation instructions for each equipment type unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
 - 1. Maximum Equipment Height: Coordinate installed fall heights of equipment with finished elevations and critical-height values of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
- B. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
- C. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
- D. Post Set with Concrete Footing: Comply with Section 033000 "Cast-in-Place Concrete" for measuring, batching, mixing, transporting, forming, and placing concrete.
 - 1. Set equipment posts in concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
 - a. Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
 - 2. Embedded Items: Follow equipment manufacturer's written instructions and drawings to ensure correct installation of anchorages for equipment.
 - 3. Finishing Footings: Smooth top, and shape to shed water.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform the following tests and inspections with the assistance of a factory-authorized service representative.
 - 1. Perform inspection and testing for each type of installed playground equipment according to ASTM F1487.
- C. Playground equipment items will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Notify Landscape Architect 48 hours in advance of date(s) and time(s) of testing and inspection.

END OF SECTION 116800

SECTION 31 20 00 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating and filling for rough grading the Site.
2. Preparing subgrades for Slabs on grade, pavements, turf, grasses and plants.
3. Excavating and backfilling for buildings and structures.
4. Drainage course for concrete slabs-on-grade.
5. Subbase course for concrete pavements.
6. Subbase course and base course for asphalt paving.
7. Excavating and backfilling trenches for utilities and pits for buried utility structures.

1.2 DEFINITIONS

A. Backfill: Soil 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. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. 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.

- G. Fill: Soil materials used to raise existing grades.
- 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.

1.3 INFORMATIONAL SUBMITTALS

- A. Material test reports.

1.4 FIELD CONDITIONS

- A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth-moving operations.
- B. Do not commence earth-moving operations until plant-protection measures specified in Section 015639 "Temporary Tree and Plant Protection" are in place.

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 D2487 or a combination of these groups; free of rock or gravel larger than 3 inches 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 D2487 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: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.
- F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.
- G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940/D2940M; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200.
- H. Drainage Course: Narrowly graded mixture of [washed] crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and zero to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

- A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.
- B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

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. Protect and maintain erosion and sedimentation controls during earth-moving operations.
- C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 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.
 - 1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.4 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.
- 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 each side of pipe or conduit.
- C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
- D. Trenches in Tree- and Plant-Protection Zones:
 - 1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. 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. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 - 3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.5 SUBGRADE INSPECTION

- A. Proof-roll subgrade [below the building slabs and pavements] <Insert locations> with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.6 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 may be used when approved by Architect.
 - 1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.7 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.

3.8 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 of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Section 033000 "Cast-in-Place Concrete."
- D. Initial Backfill: Place and compact initial backfill of satisfactory soil, free of particles larger than 1 inch in any dimension, to a height of 12 inches 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. Final Backfill: Place and compact final backfill of satisfactory soil to final subgrade elevation.
- F. Warning Tape: Install warning tape directly above utilities, 12 inches (300 mm) below finished grade, except 6 inches below subgrade under pavements and slabs.

3.9 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.

3.10 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.

3.11 COMPACTION OF SOIL BACKFILLS AND FILLS

- A. Place backfill and fill soil materials in layers not more than [inches in loose depth for material compacted by heavy compaction equipment and not more than 4 inches 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 D698] [ASTM D1557]:
 - 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 Insert number percent.
 - 2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92percent.
 - 3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 85 percent.

4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.12 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.
- B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to elevations required to achieve indicated finish elevations, within the following subgrade tolerances:
 1. Turf or Unpaved Areas: Plus or minus 1 inch .
 2. Walks: Plus or minus 1 inch
 3. Pavements: Plus or minus 1/2 inch .
- C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.13 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

- 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. Shape subbase course and base course]to required crown elevations and cross-slope grades.
 2. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
 3. 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 D698 .

3.14 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

- 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 that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.

2. Compact each layer of drainage course to required cross sections and thicknesses to not less than [95] <Insert number> percent of maximum dry unit weight according to ASTM D698.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform inspections:
- B. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.
- C. 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.
- D. 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.
- 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.

3.16 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.
- 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.

3.17 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

SECTION 31 20 01 – FINISH GRADING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Finish grade subsoil and proof roll.
- B. Place, level and compact topsoil.

1.2 REGULATORY REQUIREMENTS

- A. All work of this section shall be accomplished in accordance with City of Trenton & State of Michigan Soil Erosion & Sedimentation Control Standards.

1.3 PROTECTIONS

- A. Protect landscaping and other features remaining as final work.
- B. Protect existing structures, fences, roads, sidewalks, paving and curbs.

1.4 SUBMITTALS

- A. Submit a certified analysis of topsoil for any imported topsoil sources.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reuse stockpiled topsoil. All reused topsoil shall be mechanically screened.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify site conditions and note irregularities affecting work of this section.

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

3.2 SUBSOIL PREPARATION

- A. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove subsoil contaminated with petroleum products.
- B. Scarify subgrade to depth of 2 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.3 PLACING TOPSOIL

- A. Spread stockpiled topsoil evenly on areas to be seeded.
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours or subgrade.
- D. Remove stones larger than 1/2", roots, grass, weeds, debris and foreign material while spreading.
- E. Manually spread topsoil around trees to prevent damage.
- F. Lightly compact placed topsoil.
- G. Remove surplus subsoil and topsoil from area being finished to areas of site as directed by Landscape Architect/Engineer.
- H. Restore stockpile area with seeding.

3.4 TOLERANCES

- A. Top of Topsoil: Plus or minus 0.05 foot.

END OF SECTION 31 20 01

SECTION 31 21 00 – AGGREGATE BASE

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Aggregate Base for Bituminous and Concrete Pavements

1.2 REGULATORY REQUIREMENTS

- A. All work of this section shall be accomplished in accordance with City of Trenton & State of Michigan Soil Erosion & Sedimentation Control Standards.

1.3 REFERENCES

- A. Michigan Department of Transportation (MDOT): 2012 Standard Specification for Construction Protect existing structures, fences, roads, sidewalks, paving and curbs.

1.4 SUBMITTALS

- A. Submit pit certification of aggregate compliance with MDOT gradation requirements.

1.5 TESTS

- A. Representatives of the Testing Laboratory will make all tests of aggregate base materials to determine compaction and may supervise the place of aggregate base.
- B. Representatives of the Testing Laboratory and the Landscape Architect/Engineer shall have the power of rejection of materials, equipment, or operating procedures of the aggregate base operation. The Contractor shall replace, rework or correct work which does not meet the specifications as directed by the Testing Laboratory and/or the Landscape Architect/Engineer.

PART 2 - PRODUCTS

2.1 AGGREGATES AND GEOGRID

- A. Aggregate Base for Pavements (subject to vehicular traffic): MDOT designated 21AA Crushed Limestone
- B. Aggregate Base for Sidewalk: MDOT designated Class II.
- C. Geogrid; Will be installed if soil conditions warrant soil remediation measures as determined during construction and as directed by the Engineer. Geogrid, if utilized, will be paid for from the Owner's Contingency Allowance.
 - a. Tensar BX 1100, or
 - b. Syntec SBX 11, or
 - c. Tenax 3D Grid Type S

PART 3 - EXECUTION

3.1 INSPECTION

- A. Proof roll subbase as directed by Testing Laboratory Representative. Verify compacted subbase is dry and ready to support aggregate base and imposed loads. Soft or yielding areas which cannot be mechanically stabilized shall be removed and replaced with approved compacted granular material. See also requirements of Section 02211, Rough Grading for conditioning of sub-grade.
- B. Verify gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.

3.2 PLACING AGGREGATE

- A. Place aggregate base within 24 hours of subbase preparation.
- B. Spread aggregate over prepared subbase to achieve a total compacted depth as indicated on drawings.
- C. Place aggregate in maximum 6-inch layers and compact.
- D. Level surfaces to elevations and gradients indicated.
- E. Compact placed aggregate materials to achieve 95% Modified Proctor Density (ASTM D1557).
- F. Add water to assist compaction. With an excess water condition, rework topping and aerate to reduce moisture content.

3.3 TOLERANCES

- A. Top Surface of Aggregate Base: Plus or minus 0.05 foot.

3.4 FIELD QUALITY CONTROL

- A. Representatives of the testing laboratory will confirm compaction of the aggregate base and shoulder.

END OF SECTION 31 20 00

SECTION 31 25 00 – EROSION AND SEDIMENTATION CONTROLS

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Construction of erosion controls.
- B. Maintenance of erosion controls.
- C. Removal of erosion controls.

1.2 REGULATORY REQUIREMENTS

- A. All work of this section shall be accomplished in accordance with City of Trenton & State of Michigan Soil Erosion & Sedimentation Control Standards.
- B. Pursuant to Part 91 of 1994 PA 451, Soil Erosion and Sedimentation Control (SESC), formerly 1972 PA 347, as amended, The Department of Technology, Management and Budget (DTMB), Facilities Administration (FA), an Authorized Public Agency (APA), has promulgated standard procedures and specifications for erosion control that shall be considered a part of the Contract Documents. SESC measures will be monitored and enforced by Facilities Administration through the review of the Contractor's Implementation plans and site inspections. Facilities Administration or the Engineer will notify the Contractor in writing of any violation(s) of the applicable SESC statutes and/or the corrective action(s) undertaken by the Owner and may issue stop work orders. Facilities Administration has the right to assess a fine (up to \$500.00 / day and assessment of actual damage costs) to the Contractor for non-compliance with the provisions of the Contract Documents and/or SESC regulations applicable to this work, and fines shall be in addition to any other remediation costs or liquidated damages applicable to the project and may exceed the value of the Contract.
- C. The work on this project will be executed under the act as stated above.

1.3 SUBMITTALS

- A. Submit manufacturer product data, including manufacturer recommendations for continued maintenance of permanent erosion control measures and products for Owner's reference.
- B. Submit seed dealer's guaranteed statement of the percentages of purity and germination.
- C. No materials, equipment, or products shall be installed on the project without prior approval of shop drawings, product data and/or samples by the Project Engineer.

- D. Submit Soil Erosion Control Schedule and implementation plan according to Boyne City requirements and copy to Landscape Architect/Engineer. If approved, an authorization to proceed will be issued.

PART 2 - PRODUCTS

- 2.1 SEDIMENT CONTROL FABRIC FENCE: shall be AMOCO Propex Silt Stop Sediment Control fabric or approved equal.
- 2.2 SEED: Provide temporary stabilization with an annual seed mixture.
- 2.3 MULCH BLANKET: All 2:1 slopes shall receive a mulch blanket.
- A. Specified Mulch Blanket - North American Green SC150 BN with B10 stakes (North American Green Bio Stakes) and or an approved equal.

PART 3 - EXECUTION

- 3.1 TIMING, MAINTENANCE AND REMOVAL OF SOIL EROSION AND SEDIMENTATION CONTROL
- A. Construct controls prior to grubbing or grading of area.
- B. Where controls cannot be constructed before work begins; temporary controls may be required between successive construction stages, as directed by the Landscape Architect/Engineer.
- C. Time Limitations: All grading sections shall be brought to final grade immediately as grading progresses. Permanent soil erosion controls for all slopes, channels, ditches or any disturbed areas shall be completed within 5 days after completion of the grading in any area. All areas not brought to final grades shall have temporary controls implemented within 5 days after grading is completed. All temporary measures shall be maintained as necessary until permanent controls are completed.
- D. Area Limitations: The area of excavation, borrow, embankment, or other exposed areas shall be limited commensurate to the Contractor's ability to keep the finish grading, mulching, seeding and other controls current.
- E. Construction of erosion and sedimentation controls shall meet the requirements specified or as directed by the Landscape Architect/Engineer.
- F. Maintenance of erosion and sedimentation controls shall be done by the Contractor for all temporary and permanent controls until contract completion and acceptance.

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EROSION AND SEDIMENTATION CONTROLS

Maintenance consists of repair of all damaged areas, replacements of lost facilities, and periodic removal of sediment.

- G. Temporary sedimentation controls shall be removed after permanent controls are in place or as directed by the Landscape Architect/Engineer.
- H. Specific control measures and their locations shall be as shown on the drawings and as required by Boyne City and The State of Michigan.

END OF SECTION 31 25 00

SECTION 32 12 16 - ASPHALT 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. Section Includes:
 - 1. Hot-mix asphalt patching.
 - 2. Hot-mix asphalt paving.
- B. Related Requirements:
 - 1. Section 312000 "Earth Moving" for subgrade preparation, fill material, separation geotextiles, unbound-aggregate subbase and base courses, and aggregate pavement shoulders.
 - 2. Section 321313 "Concrete Paving" for concrete pavement and for separate concrete curbs, gutters, and driveway aprons.
 - 3. Section 321373 "Concrete Paving Joint Sealants" for joint sealants and fillers at pavement terminations.
 - 4. Section 321400 "Unit Paving" for bituminous setting bed for pavers and for stone and precast concrete curbs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include technical data and tested physical and performance properties.
 - 2. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
 - 3. Job-Mix Designs: For each job mix proposed for the Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Manufacturer and testing agency.
- B. Material Certificates: For each paving material.
- C. Material Test Reports: For each paving material, by a qualified testing agency.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by Michigan Department of Transportation (MDOT).
- B. Testing Agency Qualifications: Qualified according to ASTM D3666 for testing indicated.
- C. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of the Michigan Department of Transportation (MDOT) for asphalt paving work.
 - 1. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - 1. Prime Coat: Minimum surface temperature of 50 deg F.
 - 2. Tack Coat: Minimum surface temperature of 50 deg F.
 - 3. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 - 4. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Subbase Coarse Aggregate: MDOT Class II Granular Material.
- C. Base Aggregate: MDOT Dense graded Aggregate 22A

2.2 ASPHALT MATERIALS

- A. Asphalt Binder: ASTM D6373 or AASHTO M 320 binder designation PG 58-28.
- B. Tack Coat: ASTM D977 or AASHTO M 140 emulsified asphalt, or ASTM D2397/D2397M or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
- C. Water: Potable.

2.3 AUXILIARY MATERIALS

- A. Recycled Materials for Hot-Mix Asphalt Mixes: Reclaimed asphalt pavement; reclaimed, unbound-aggregate base material; and recycled from sources and gradations that have performed satisfactorily in previous installations, equal to performance of required hot-mix asphalt paving produced from all new materials.
- B. Joint Sealant: ASTM D6690, hot-applied, single-component, polymer-modified bituminous sealant.

2.4 MIXES

- A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes approved by Michigan Department of Transportation (MDOT) and local authorities having jurisdiction and complying with the following requirements:
 - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - 2. Reclaimed Asphalt Pavement (RAP) is allowed for privately owned paved surfaces and in accordance with City of Traverse City Standards within the public right of way. Where RAP is allowed, it shall conform to MDOT guidelines for recycled hot mix asphalt mixtures. Leveling course bituminous asphalt shall conform to Tier 2 mixture requirements. Top course bituminous asphalt shall conform to Tier 1 mixture requirements
 - 3. Leveling course shall conform to M.D.O.T. Bituminous Mixture Designation No. 13A in heavy duty pavement areas and 13A in standard duty pavement areas as shown on the Drawings.
 - 4. Top course – Traverse City public right of way for 6th Street, Beaumont and Madison shall conform to M.D.O.T. Bituminous Mixture Designation 13A in standard duty pavement areas as shown on the Drawings and City of Traverse City details.
 - 5. Top course – Munson Parking Lots shall conform to M.D.O.T. Bituminous Mixture Designation No. 36A in heavy duty pavement areas and 36A in standard duty pavement areas as shown on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving.
- B. Proceed with paving only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protection: Provide protective materials, procedures, and worker training to prevent asphalt materials from spilling, coating, or building up on curbs, driveway aprons, manholes, and other surfaces adjacent to the Work.

- B. Proof-roll subgrade below pavements with heavy 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. Limit vehicle speed to 3 mph.
 - 2. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 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.

3.3 COLD MILLING

- A. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - 1. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
 - 2. Control rate of milling to prevent tearing of existing asphalt course.
 - 3. Repair or replace curbs, driveway aprons, manholes, and other construction damaged during cold milling.
 - 4. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
 - 5. Patch surface depressions deeper than 1 inch after milling, before wearing course is laid.
 - 6. Keep milled pavement surface free of loose material and dust.
 - 7. Do not allow milled materials to accumulate on-site.

3.4 PATCHING

- A. Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Portland Cement Concrete Pavement: Break cracked slabs and roll as required to reseal concrete pieces firmly.
 - 1. Undersealing: Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseal pieces firmly.
 - 2. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into perimeter of adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
- C. Tack Coat: Before placing patch material, apply tack coat uniformly to vertical asphalt surfaces abutting the patch. Apply at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- D. Placing Patch Material: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.5 REPAIRS

- A. Leveling Course: Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than 1 inch in existing pavements.
 - 1. Install leveling wedges in compacted lifts not exceeding 3 inches thick.

3.6 SURFACE PREPARATION

- A. Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
- B. Cutback Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.15 to 0.50 gal./sq. yd. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- C. Emulsified Asphalt Prime Coat: Apply uniformly over surface of compacted unbound-aggregate base course at a rate of 0.10 to 0.30 gal./sq. yd. per inch depth. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure.
 - 1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
 - 2. Protect primed substrate from damage until ready to receive paving.
- D. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.7 PLACING HOT-MIX ASPHALT

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand in areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt base course in number of lifts and thicknesses indicated.
 - 2. Place hot-mix asphalt surface course in single lift.
 - 3. Spread mix at a minimum temperature as outlines in MDOT Standard Specifications for Construction (Latest Edition).
 - 4. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes unless otherwise indicated.
 - 5. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

- B. Place paving in consecutive strips not less than 10 feet wide unless infill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Overlap mix placement about 1 to 1-1/2 inches from strip to strip to ensure proper compaction of mix along longitudinal joints.
 - 2. Complete a section of asphalt base course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.8 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.
 - 2. Offset longitudinal joints, in successive courses, a minimum of 6 inches.
 - 3. Offset transverse joints, in successive courses, a minimum of 24 inches.
 - 4. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."
 - 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 - 6. Compact asphalt at joints to a density within 2 percent of specified course density.

3.9 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 - 1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - 1. Average Density: 96 percent of reference laboratory density according to ASTM D6927 but not less than 94 percent or greater than 100 percent.
 - 2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D2041, but not less than 90 percent or greater than 96 percent.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
- H. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.10 INSTALLATION TOLERANCES

- A. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Base Course: Plus or minus 1/2 inch.
 - 2. Surface Course: Plus 1/4 inch, no minus.
- B. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Base Course: 1/4 inch.
 - 2. Surface Course: 1/8 inch.

3.11 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D979.
 - 1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D2041/D2041M, and compacted according to job-mix specifications.
 - 2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D1188 or ASTM D2726/D2726M.
 - a. One core sample will be taken for every 1000 sq. yd. or less of installed pavement, with no fewer than three cores taken.
 - b. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D2950 and correlated with ASTM D1188 or ASTM D2726/D2726M.

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- E. Replace and compact hot-mix asphalt where core tests were taken.
- F. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION 321216

SECTION 32 13 13 - CONCRETE PAVING

PART 1 - GENERAL

1.1 Work Included

- A. Concrete pavements
- B. Detectable Warning Plates
- C. Reinforcement.
- D. Surface finish.
- E. Curing.

1.2 References

- A. ACI 301 - Specifications for Structural Concrete for Buildings.
- B. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- C. ASTM A615 - Deformed and Plain Billet-Steel for Concrete Reinforcement.
- D. ASTM C33 - Concrete Aggregates.
- E. ASTM C94 - Ready Mixed Concrete.
- F. ASTM C150 - Portland Cement.
- G. ASTM C260 - Air-Entraining Admixtures for Concrete.
- H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- I. ASTM C494 - Chemical Admixture for Concrete.
- J. CRSI-Concrete Reinforcing Steel Institute, Manual of Standard Practice.

1.3 Quality Assurance

- A. Obtain materials from same source throughout.
- B. Perform work in accordance with Michigan Dept. of Transportation (MDOT) 2012 Standard Specification for Construction.

1.4 Demonstration Concrete Pour

- A. The Contractor shall be required to make one demonstration flatwork pour to verify quality of workmanship and conformance with requirements of the Specifications. The pour shall be inspected and approved by the Landscape Architect/Engineer and the Owner prior to commencing other concrete work. The location of the demonstration pour will be determined jointly by the Landscape Architect/Engineer and Contractor and may be a portion of the proposed work. The pour shall consist of an area of at least 200 square feet and shall include at least one expansion joint, one control joint and one formed curved edge. Following the demonstration pour, an inspection will be made by the Landscape Architect/Engineer, the Owner and the Contractor. If it is determined the workmanship is satisfactory and conforms to all requirements of the Specifications, the work may remain in place and will become the standard by which all subsequent concrete work will be evaluated and approved or rejected. If the demonstration pour is determined to be unsatisfactory for reasons of unacceptable workmanship or non-conformance with the Specifications, it shall be removed and replaced until a satisfactory result is achieved.

1.5 Tests

- A. The Owner will employ a qualified Testing Laboratory to furnish all required testing and inspection.
- B. Submit proposed mix design to Landscape Architect/Engineer for review prior to commencement of work.
- C. Testing firm will take cylinders, perform slump and air entrainment tests in accordance with ACI 301.

1.6 Submittals

- A. Submit product data on joint filler, admixtures, and curing compounds.

1.7 Environmental Requirements

- A. Do not place concrete on frozen base, or when rain is threatening.

PART 2 - PRODUCTS

2.1 Concrete Materials

- A. Cement: ASTM C150 - Type I Portland type, gray color.
- B. Fine and Coarse Aggregates: ASTM C33, fine MDOT designated 2NS, coarse MDOT designated 6AA.
- C. Water: Clean and not detrimental to concrete.

2.2 Form Materials

- A. Wood or steel form materials, profiled to suit conditions.

2.3 Detectable Warning Plates

- A. East Jordan Iron Works, 24" deep iron, natural finish, or approved equal.

2.4 Reinforcement

- A. Reinforcing Steel: ASTM A615; 60 ksi yield grade; deformed billet steel bars, uncoated finish.
- B. Welded steel wire fabric: plain type, ANSI/ASTM A185; in flat sheets or coiled rolls; uncoated finish.
- C. Tie wire: annealed steel, minimum 16 gauge.

2.5 Accessories

- A. Curing Compound: Clear fugitive dye.
- B. Expansion Joint: 1/2" or 1" as specified, pre-molded vinyl.

2.6 Admixtures

- A. Air Entrainment: ASTM C260.
- B. Chemical Admixture: ASTM C494, Type B and D only, Type B - Retarding, Type D - water reducing and retarding.

2.7 Concrete Mix

- A. Mix concrete in accordance with ASTM C94.
- B. Concrete mixture shall meet MDOT designated grade 35S, 3500 psi 28 day compressive strength, 5-7% air-entrainment, 564 lbs. cement content per cubic yard.
- C. Use set-retarding admixtures during hot weather only when approved by Testing Laboratory.

2.8 Granular Base

- A. MODT 21AA Limestone aggregate under Heavy Duty Vehicle Concrete Pavement
- B. MDOT Class II under all other concrete walks and pavements.

PART 3 - EXECUTION

3.1 Inspection

- A. Verify compacted subgrade is ready to support paving and imposed loads.
- B. Verify gradients and elevations of subgrade are correct.
- C. Beginning of installation means acceptance of existing conditions.

3.2 Preparation

- A. Set and adjust all utility structures located within pavement area.
- B. Place and compact granular base material under pavement to thickness as detailed on plans.
- C. Moisten base to minimize absorption of water from fresh concrete.
- D. Notify Landscape Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

3.3 Reinforcement

- A. Place reinforcement as detailed on plans.
- B. Interrupt reinforcement at expansion joints, except where dowel expansion joint is indicated.

3.4 Formed Joints

- A. Place expansion and control joints in the EXACT location shown on the drawings.
- B. Place expansion joint filler between paving components and building or other appurtenances. Recess top of filler 1/2 inch.

3.5 Placing Concrete

- A. Place concrete in accordance with ACI 301.
- B. Hot Weather Placement: ACI 301.
- C. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.
- D. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- E. Place concrete to scoring pattern indicated on drawings. All joints to be straight lines or smooth curves.

3.6 Detectable Warning Plate Installation

- A. Install as detailed on MDOT Standard Sidewalk Ramp plans and as recommended by the manufacturer.

3.7 Finishing

- A. Vehicular Pavement: Light broom.
- B. Walk Paving: Medium broom.
- C. Curbs and Gutters: Light broom.
- D. Place clear fugitive dye curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions. Apply at minimum rate of one gallon per 200 square feet.

3.8 Field Quality Control

- A. Field inspection and testing will be performed by Testing Laboratory.
- B. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature and test samples taken.

3.9 Protection

- A. Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, mechanical injury and vandalism.

END OF SECTION 321313

SECTION 32 13 73 - CONCRETE PAVING JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cold-applied joint sealants.
 - 2. Hot-applied joint sealants.
 - 3. Joint-sealant backer materials.
 - 4. Primers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.

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.

2.2 COLD-APPLIED JOINT SEALANTS

- A. Multicomponent, Nonsag, Urethane, Elastomeric Joint Sealant: ASTM C920, Type M, Grade NS, Class 25, for Use T.
- B. Single Component, Pourable, Urethane, Elastomeric Joint Sealant: ASTM C920, Type S, Grade P, Class 25, for Use T.

2.3 JOINT-SEALANT BACKER MATERIALS

- A. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
- B. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
- C. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

2.4 PRIMERS

- A. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated.

PART 3 - EXECUTION

3.1 INSTALLATION OF JOINT SEALANTS

- A. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Cleaning of Joints: Clean out joints immediately to comply with joint-sealant manufacturer's written instructions.
- C. Joint Priming: Prime joint substrates where indicated or where recommended in writing by joint-sealant manufacturer.
- D. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions.
- E. Install joint-sealant backings to support joint 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 joint-sealant backings.
 - 2. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - 3. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
- F. Install joint sealants immediately following backing installation, using proven techniques that comply with the following:

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1. Place joint sealants so they fully contact joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- G. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements 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 joint sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- H. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.
- I. Clean off excess joint sealant as the Work progresses, by methods and with cleaning materials approved in writing by joint-sealant manufacturers.

END OF SECTION 321373

SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes painted markings applied to asphalt and concrete pavement.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 PAVEMENT-MARKING PAINT

- A. Pavement-Marking Paint: MPI #32, solvent-borne traffic-marking paint.
 - 1. Color: As Indicated.
- B. Pavement-Marking Paint: MPI #97, latex traffic-marking paint.
 - 1. Color: As Indicated.

PART 3 - EXECUTION

3.1 PAVEMENT MARKING

- A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Architect.
- B. Sweep and clean surface to eliminate loose material and dust.

- C. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of 15 mils
 - 1. Apply graphic symbols and lettering with paint-resistant, die-cut stencils. Apply paint so that it cannot run beneath stencil.
 - 2. Broadcast glass beads uniformly into wet markings at a rate of 6 lb/gal.

END OF SECTION 321723

SECTION 321816.13 – PLAYGROUND PROTECTIVE SURFACING

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. Unitary, seamless surfacing.

1.3 DEFINITIONS

- A. Definitions in ASTM F2223 apply to Work of this Section.
- B. Critical Height: Standard measure of shock attenuation according to ASTM F2223; same as "critical fall height" in ASTM F1292. According to ASTM F1292, this approximates "the maximum fall height from which a life-threatening head injury would not be expected to occur."
- C. SBR: Styrene-butadiene rubber.
- D. Unitary Surfacing: A protective surfacing of one or more material components bound together to form a continuous surface; same as "unitary system" in ASTM F2223.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of protective surfacing.
 - 1. Include plans, sections, placement details, and attachment to substrates.
 - 2. Include accessories and edge terminations.
 - 3. Include fall heights and use zones for equipment and structures specified in Section 116800 "Play Field Equipment and Structures," coordinated with the critical heights for protective surfacing.
- C. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include Samples of accessories involving color selection.

- D. Samples for Verification: For each type of protective surfacing and exposed finish.
 - 1. Include Samples of accessories to verify color and finish selection.
 - 2. Unitary, Seamless Surfacing: Minimum 6 by 6 inches (150 by 150 mm).
 - 3. Edging: 6 inches (150 mm) long by full width and cross section.
 - 4. Stabilizing Mats: Minimum 12 by 12 inches (300 by 300 mm).
 - 5. Drainage/Separation Geotextile: Minimum 12 by 12 inches (300 by 300 mm).
 - 6. Drainage Panel: Minimum 6 by 6 inches (150 by 150 mm).
 - 7. Weed-Control Barrier: Minimum 12 by 12 inches (300 by 300 mm).

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each type of loose-fill surfacing.
- C. Product Certificates: For each type of unitary surfacing product.
- D. Field quality-control reports.
- E. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For playground protective surfacing to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by the manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for materials and execution.
 - 1. Build mockups for protective surfacing including accessories.
 - a. Size: 6 inches by 6 inches.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of protective surfacing that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Reduction in impact attenuation as measured by reduction of critical fall height.
 - b. Deterioration of protective surfacing and other materials beyond normal weathering.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain protective surfacing materials, including loose-fill accessories, from single source from single manufacturer.
 - 1. Provide geosynthetic accessories of each type from source recommended by manufacturer of protective surfacing materials.

2.2 PERFORMANCE REQUIREMENTS

- A. Impact Attenuation: Critical fall height tested according to ASTM F1292.
- B. Accessibility Standard: Minimum surfacing performance according to ASTM F1951.

2.3 UNITARY, SINGLE-DENSITY, SEAMLESS SURFACING

- A. Description: Manufacturer's standard, site-mixed and applied, single-layer material in thickness as required, tested for impact attenuation according to ASTM F1292 and for accessibility according to ASTM F1951.
 - 1. VITRITURF TK System or approved equal. www.penchura.com
 - 2. Composition: Blend of recycled SBR and EPDM rubber, particles and binder, forming a wearing and cushioning product.
 - 3. Binder: Weather-resistant, UV-stabilized, flexible, nonhardening, 100 percent solids polyurethane.
 - 4. Critical Height: As indicated on Drawings.
 - 5. Overall Thickness: As indicated on Drawings.
 - 6. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location.
 - 7. Color(s): As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for subgrade elevations, slope, and drainage and for other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and without high spots, ridges, holes, and depressions.
- B. Hard-Surface Substrates: Verify that substrates are satisfactory for unitary, protective surfacing installation and that substrate surfaces are dry, cured, and uniformly level within recommended tolerances according to protective surfacing manufacturer's written requirements for cross-section profile.
 - 1. Asphalt Substrates: Verify that substrates are dry, sufficiently cured to bond with adhesive, and free from surface defects, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with protective surfacing or that may interfere with adhesive bond.
 - 2. Concrete Substrates: Verify that substrates are dry and free from surface defects, laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with protective surfacing or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by protective surfacing manufacturer.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates to receive surfacing products according to protective surfacing manufacturer's written instructions.
- B. Hard-Surface Substrates: Clean surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with protective surfacing.
 - 1. Repair: Fill holes and depressions in unsatisfactory surfaces with leveling and patching material.
 - 2. Treatment: Mechanically abrade or otherwise prepare concrete substrates according to protective surfacing manufacturer's written instructions to achieve adequate roughness.
 - 3. Terminal Edges: Saw cut concrete for terminal edges of protective surfacing.
 - 4. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through protective surfacing.

3.3 INSTALLATION OF SEAMLESS SURFACING

- A. Mix and apply components of seamless surfacing according to manufacturer's written instructions to produce uniform, monolithic, and impact-attenuating protective surfacing of required overall thickness.
 - 1. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
 - 2. Poured Cushioning Layer: Spread evenly over primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints.
 - 3. Intercoat Primer: Over cured cushioning layer, apply primer at manufacturer's standard spreading rate.
 - 4. Wearing Layer: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation and, except where color changes, with no cold joints. Finish surface to produce manufacturer's standard wearing-surface texture.
 - 5. Lacquer Topcoat: Spray or roller applied at manufacturer's standard coating rate in one continuous operation.
 - 6. Edge Treatment: As indicated on Drawings. Fully adhere edges to substrate with full coverage of substrate. Maintain fully cushioned thickness required to comply with performance requirements.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests.
- B. Perform the following tests with the assistance of a factory-authorized service representative:
 - 1. Perform "Installed Surface Performance Test" according to ASTM F1292 for each protective surfacing type and thickness in each playground area.
 - 2. Perform installed-surface-performance tests at no less than one series of tests for each 1000 sq. ft. of each type and thickness of in-place protective surfacing or part thereof.
- C. Playground protective surfacing will be considered defective if it does not pass tests.
- D. Prepare test reports.

3.5 PROTECTION

- A. Prevent traffic over seamless surfacing for not less than 48 hours after installation.

END OF SECTION 323300

SECTION 323300 - SITE FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Picnic Tables
 - 2. Benches
 - 3. Trash Receptacles

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 Products:

- A. Picnic Table: DuMor 'Table 100 or approved equal, 4 total. 800.598.4018, www.dumor.com.
 - 1. Length: 8 ft, ADA Accessible
 - 2. Surface option: Recycled Plastic
 - 3. Colors: As selected by Landscape Architect from manufacturer's standard range.
- B. Bench: DuMor 'Bench 11 or approved equal, 3 total. 800.598.4018, www.dumor.com.
 - 1. Length: 6'
 - 2. Surface option: Recycled Plastic
 - 3. Colors: As selected by Landscape Architect from manufacturer's standard range.
- C. Trash Receptacle: DuMor 'Receptacle 70-32TD-SO' or approved equal, 4 total. 800.598.4018, www.dumor.com.
 - 1. Size: 32 Gallon
 - 2. Surface option: Recycled Plastic
 - 3. Colors: As selected by Landscape Architect from manufacturer's standard range.

D. EXECUTION

2.2 INSTALLATION

- 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.
- D. Picnic Table A: Surface-mount secured to pavement surface per Manufacturers' Specifications.
- E. Benches: Surface-mount secured to pavement surface per Manufacturers' Specifications.
- F. Trash Receptacles: Surface-mount secured to pavement surface per Manufacturers' Specifications.

END OF SECTION 323300

SECTION 32 91 13 - SOIL PREPARATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes planting soils specified by composition of the mixes.
- B. Related Requirements:
 - 1. Section 311000 "Site Clearing" for topsoil stripping and stockpiling.
 - 2. Section 329700 "Vegetated Roof Assemblies" for growing media (soil).

1.2 DEFINITIONS

- A. Duff Layer: A surface layer of soil, typical of forested areas, that is composed of mostly decayed leaves, twigs, and detritus.
- B. Imported Soil: Soil that is transported to Project site for use.
- C. Manufactured Soil: Soil produced by blending soils, sand, stabilized organic soil amendments, and other materials to produce planting soil.
- D. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified as specified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
- E. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
- F. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- G. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil"; but in disturbed areas such as urban environments, the surface soil can be subsoil.
- H. USCC: U.S. Composting Council.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

- B. Samples: For each bulk-supplied material in sealed containers labeled with content, source, and date obtained; providing an accurate representation of composition, color, and texture.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent, state-operated, or university-operated laboratory; experienced in soil science, soil testing, and plant nutrition; with the experience and capability to conduct the testing indicated; and that specializes in types of tests to be performed.

PART 2 - PRODUCTS

2.1 PLANTING SOILS SPECIFIED BY COMPOSITION

2.02 Plant Mixture

.01 The material which is used for tamping around the balls and roots in the process of planting shall be prepared on site by mixing four (4) parts topsoil to one (1) part peat, and adding five (5) pounds of superphosphate to each cubic yard of the mixture.

- (1) Peat shall be granulated raw Canadian peat or baled Canadian peat, containing not more than 9% mineral on a dry basis. For ericaceous plants, baled peat with a pH of 4.0 shall be used.
- (2) Superphosphate shall contain 40% of phosphoric acid.
- (3) Topsoil: from on-site stockpile.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: T, with a minimum of 99 percent passing through a No. 8) sieve and a minimum of 75 percent passing through a No. 60 sieve.
 - 2. Class: O, with a minimum of 95 percent passing through a No. 8 sieve and a minimum of 55 percent passing through a No. 60 sieve.
 - 3. Form: Provide lime in form of ground dolomitic limestone.

- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent elemental sulfur, with a minimum of 99 percent passing through a No. 6 sieve and a maximum of 10 percent passing through a No. 40 sieve.
- C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
- D. Perlite: Horticultural perlite, soil amendment grade.
- E. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through a No. 50 sieve.
- F. Sand: Clean, washed, natural or manufactured, free of toxic materials, and according to [ASTM C33/C33M]

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost: Well-composted, stable, and weed-free organic matter produced by composting feedstock, and bearing USCC's "Seal of Testing Assurance," and as follows:
 - 1. Reaction: [pH of 5.5 to 8] <Insert range>.
 - 2. Soluble-Salt Concentration: Less than [4] <Insert value> dS/m.
 - 3. Moisture Content: [35 to 55] <Insert number range> percent by weight.
 - 4. Organic-Matter Content: [30 to 40] [50 to 60] <Insert number range> percent of dry weight.
 - 5. Particle Size: Minimum of 98 percent passing through a 4-inch sieve.
- B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture with 100 percent passing through a 1/2-inch sieve, a pH of 3.4 to 4.8, and a soluble-salt content measured by electrical conductivity of 5 max.
- C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture with 100 percent passing through a 1/2-inch > sieve, a pH of 6 to 7.5, a soluble-salt content measured by electrical conductivity of maximum 5 Insert value or range dS/m, having a water-absorbing capacity of 1100 to 2000 percent, and containing no sand.
- D. Wood Derivatives: Shredded and composted, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
- E. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

2.4 FERTILIZERS

- A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

- B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - 1. Composition: 1 lb/1000 sq. ft. of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

- C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified testing agency.

PART 3 - EXECUTION

3.1 GENERAL

- A. Place planting soil and fertilizers according to requirements in other Specification Sections.
- B. 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 planting soil.

3.2 PLACING AND MIXING PLANTING SOIL OVER EXPOSED SUBGRADE

- A. General: Apply and mix unamended soil with amendments on-site to produce required planting soil. Do not apply materials or till if existing soil or subgrade is frozen, muddy, or excessively wet.
- B. Subgrade Preparation: Till subgrade to a minimum depth of 4 inches in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
- C. Compaction: Compact each blended lift of planting soil to [75 to 82] <Insert number range> percent of maximum Standard Proctor density according to ASTM D698 and tested in-place] except where a different compaction value is indicated on Drawings].
- D. Finish Grading: Grade planting soil to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

3.3 PROTECTION AND CLEANING

- A. Protection Zone: Identify protection zones according to Section 015639 "Temporary Tree and Plant Protection."
- B. Protect areas of in-place soil from additional compaction, disturbance, and contamination. Prohibit the following practices within these areas except as required to perform planting operations:
 - 1. Storage of construction materials, debris, or excavated material.
 - 2. Parking vehicles or equipment.
 - 3. Vehicle traffic.
 - 4. Foot traffic.
 - 5. Erection of sheds or structures.
 - 6. Impoundment of water.
 - 7. Excavation or other digging unless otherwise indicated.
- C. Remove surplus soil and waste material including excess subsoil, unsuitable materials, trash, and debris and legally dispose of them off Owner's property unless otherwise indicated.
 - 1. Dispose of excess subsoil and unsuitable materials on-site where directed by Owner.

END OF SECTION 329113

SECTION 32 92 00 - TURF AND GRASSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding.

1.2 DEFINITIONS

- A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
- B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation".

1.3 INFORMATIONAL SUBMITTALS

- A. Certification of grass seed.
- B. Product certificates.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.
 1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 2. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the National Association of Landscape Professionals:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Lawn Care Manager.
 - c. Landscape Industry Certified Lawn Care Technician.
 3. Pesticide Applicator: State licensed, commercial.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

PART 2 - PRODUCTS

2.1 SEED

- A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.
- B. Grass-Seed Mix: Proprietary seed mix as follows:
 - 1. Products: Subject to compliance with requirements:
 - a. As Specified on Plans.

2.2 FERTILIZERS

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.3 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

PART 3 - EXECUTION

3.1 TURF AREA PREPARATION

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation.
- B. Reduce elevation of planting soil to allow for soil thickness of sod.

- C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 SEEDING

- A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
 - 1. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - 2. Do not use wet seed or seed that is moldy or otherwise damaged.
 - 3. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
- B. Sow seed at a total rate of 2 lb/1000 sq. ft.
- C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
- D. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas.
 - 1. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
- E. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of 3/16 inch, and roll surface smooth.

3.3 TURF MAINTENANCE

- A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
- B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

3.4 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Turf: 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 .
 2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
- B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

END OF SECTION 329200

SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.

B. Related Requirements:

1. Section 329600 "Transplanting" for transplanting non-nursery-grown trees.

1.2 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

C. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 329113 "Soil Preparation" for drawing designations for planting soils.

D. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at [Project site] <Insert location>.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples of each type of mulch.

1.5 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.7 QUALITY ASSURANCE

- A. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - 1. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver bare-root stock plants within [24 hours] [36 hours] <Insert time> of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.
- B. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- C. Handle planting stock by root ball.
- D. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- E. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.9 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
 - b. Structural failures including plantings falling or blowing over.
 - 2. Warranty Periods: From date of Substantial Completion.
 - a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
- B. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

2.2 FERTILIZERS

- A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 - 1. Size: 5-gram tablets.
 - 2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

- A. Organic Mulch: Double Processed Shredded hardwood.

2.4 TREE-WATERING DEVICES

- A. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over an extended time period; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic. Provide one (1) per tree.

PART 3 - EXECUTION

3.1 PLANTING AREA ESTABLISHMENT

- A. General: Prepare planting area for soil placement and mix planting soil according to Section 329113 "Soil Preparation."
- B. Coordinate "Placing Planting Soil" Paragraph below with Section 329113 "Soil Preparation" or Section 329115 "Soil Preparation (Performance Specification)."
- C. Placing Planting Soil: Place and mix planting soil in-place over exposed subgrade
- D. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.2 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits.
 - 1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 2. Excavate approximately three times as wide as ball diameter.
 - 3. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - 4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
- B. Backfill Soil: Subsoil and topsoil removed from excavations [may] [may not] be used as backfill soil unless otherwise indicated.

3.3 TREE, SHRUB, AND VINE PLANTING

- A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball

to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

- B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Set each plant plumb and in center of planting pit or trench with root flare 1 inch above adjacent finish grades.
 - 1. Backfill: Planting soil: For trees, use excavated soil for backfill.
 - 2. Balled and Burlapped Stock: After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Balled and Potted and Container-Grown Stock: Carefully remove root ball from container without damaging root ball or plant.
 - 4. Fabric Bag-Grown Stock: Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 5. Bare-Root Stock: Support stem of each plant and spread roots without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working. Carefully work backfill around roots by hand. Bring roots into close contact with the soil.
 - 6. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 7. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.
 - a. Bare-Root Stock: Place tablets beside soil-covered roots; do not place tablets touching the roots.
 - b. Quantity: As indicated on Drawings.
 - 8. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.4 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.5 GROUND COVER AND PLANT PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on Drawings.
- B. Use planting soil for backfill.
- C. Dig holes large enough to allow spreading of roots.
- D. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- E. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- F. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.6 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees in Turf Areas: Apply mulch ring of 2-inch average thickness, with 36-inch radius around trunks or stems. Do not place mulch within 3 inches of trunks or stems.
 - 2. Planting Areas: Apply 2-inch average thickness of organic mulch extending 12 inches beyond edge of surface of planting area, and finish level with adjacent finish grades. Do not place mulch within 3 inches of trunks or stems.

3.7 INSTALLING SLOW-RELEASE WATERING DEVICE

- A. Provide one device for each tree.

3.8 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings.

- B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- D. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.
- E. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- F. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.9 MAINTENANCE SERVICE

- A. Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:
 - 1. Maintenance Period for Trees and Shrubs: 12 months from date of Substantial Completion.
 - 2. Maintenance Period for Ground Cover and Other Plants: Six] months from date of Substantial Completion.

END OF SECTION 329300

SECTION 33 31 00 - SANITARY SEWER

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 furnishing and installation of exterior sanitary sewer system. If there is a facility service lead, this exterior sanitary sewer specification for the service lead is applicable starting at five feet outside the building.
- B. Section Includes:
 - 1. Pipe and fittings.
 - 2. Cleanouts.
 - 3. Manholes.

1.3 DEFINITIONS

- A. FRP: Fiberglass-reinforced plastic.
- B. PVC: Polyvinyl chloride
- C. ACI: American Concrete Institute
- D. ASTM: American Society for Testing and Materials
- E. AWWA: American Water Works Association
- F. AASHTO: American Association of State and Highway Transportation Officials
- G. GCDC-WWS: Genesee County Drain Commissioner Water and Waste Services
- H. SDR: Standard Dimension Ratio

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For manholes and castings. Include plans, elevations, sections, details, and frames and covers.
- C. Manufacturer Certification: All pipe furnished shall be accompanied by the manufacturer's certificate of test showing conformity with the Specifications. Each certificate shall identify a specific lot number, quantity of pipe, and show actual test results for the lot furnished. These certificates shall be submitted to the Inspector at the time of unloading. Coordinate unloading with Inspector.

- D. Cut sheets for Contractor layout and staking locations.
 - E. Mandrel details and certification.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Field quality-control reports regarding elevation of pipe.
 - B. Testing reports, passed tests upon completion of testing.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Do not store plastic manholes, pipe, and fittings in direct sunlight.
 - B. Protect pipe, pipe fittings, and seals from dirt and damage.
 - C. Handle manholes according to manufacturer's written rigging instructions.
- 1.7 PROJECT CONDITIONS
- A. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - 1. Notify Owner no fewer than five working days in advance of proposed interruption of service. Coordination of a building system shutdown requires a minimum of 10 working days.
 - 2. Do not proceed with interruption of service without Owner's written permission.
 - B. Product Inspection: All materials furnished shall be subject to inspection on arrival at the job site by the Owner. The purpose of the inspection shall be to cull and reject products that, independent of physical tests specified under the standard specifications designated herein, fail to conform to the requirements of these specifications. Materials shall be subject to rejection on account of any of the following:
 - 1. Variation in any dimension exceeding the permissible variations given in the material specifications. Pipe in all cases shall be full diameter.
 - 2. Fractures or cracks passing through the barrel or socket.
 - 3. Chips or fractures on the interior of the pipe exceeding two inches in length, one inch in width, or depth more than $\frac{1}{4}$ of the thickness of the wall.
 - 4. Blisters that are either broken, exceed three inches in diameter, or project more than $\frac{1}{8}$ inches above the surrounding surface of the pipe.
 - 5. Variation of more than $\frac{1}{16}$ inch per lineal foot in alignment of pipe intended to be straight.
 - C. Rejected materials shall be clearly marked by the Inspector and immediately removed from the site of work by the Contractor, without cost to the Owner.

PART 2 - PRODUCTS

2.1 PVC PRESSURE SEWER PIPE

- A. PVC Poly (vinyl chloride) (PVC) plastic pipe, Sch. 40 and Sch. 80, type 1, grade 1, meeting requirements of ASTM D1784 and D1785, unless otherwise designated. Joints shall be of solvent weld specified.
- B. Solvent cement shall be a compatible solution of type 1, grade 1, unplasticized PVC plastic compound in accordance with ASTM D2564 and ASTM D1784, free-flowing and free of lumps, undissolved particles or foreign matter that will adversely affect ultimate joint strength or chemical resistance.
- C. Provide fittings, couplings, gaskets, unions, and other accessories as shown and as required to connect together the various types of pipe.
- D. Join PVC plastic pipe with solvent cement joints using procedures of ASTM D2855 and manufacturers recommendations.

2.2 CLEANOUTS

A. PVC Cleanouts:

- 1. Pipe: ASTM D 3034-83, SDR 26 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM D 3212-81, elastomeric seals for gasketed joints.
 - a. Lubricant used shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with manufacturer's requirements.
 - b. The following information shall be clearly marked on each length of pipe:
 - 1) Manufacturer's name or trademark.
 - 2) Nominal pipe size.
 - 3) The PVC cell classification.
 - 4) The legend.
 - 5) The designation "Specification D 3034".
- 2. Casting: Neenah R-7506-D, EJCO 1574 or Engineer approved equal.
 - a. Casting shall be stamped with "Sanitary"
- 3. Fittings: ASTM D 3034-83, SDR 26 wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM D 3212-81, elastomeric seals for gasketed joints.
 - a. Lubricant used shall be supplied by the pipe manufacturer and the joints shall be coupled in accordance with manufacturer's requirements.
 - b. The following information shall be clearly marked on each fitting
 - 1) Manufacturer's name or trademark.

- 2) Nominal size.
- 3) The material designation "PVC".
- 4) "PSM".
- 5) The designation "Specification D 3034".

2.3 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 8-inch minimum thickness for floor slab and 5-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 5-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type as indicated; with top of cone of size that matches grade rings.
7. Joint Gaskets: ASTM C 443, rubber O-ring gasket. Joints pointed with mortar after installation, both inside and outside of the manhole.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection. Neoprene rubber shall meet ASTM C 443 and have a minimum thickness of 3/8 inch. Pipe clamps shall be of corrosion-resistant steel. Pipe connectors shall be one of the following:
 - a. Flexible neoprene rubber boot securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacture and shall be accurately located within 1/2 inch of proposed sewer centerline.
 - b. Self-adjusting mechanical pipe to manhole seal providing resilient flexible and infiltration-proof joint.
 - c. Flexible rubber wedge firmly secured against a rubber gasket cast into the manhole.
 - d. Engineer approved equal.
9. Steps: ASTM C 478 injection molded copolymer, polypropylene, encapsulating a 1/2 inch grade 60 steel reinforcing bar with an impact resistance of 300 ft-lbs and a pull out force resistance of 1500 lbs; Cast or anchor steps into sidewalls at 15-inch intervals. Step depth shall a minimum of 6 inches.
10. Grade Rings: 3-inch, 4-inch or 6-inch maximum height, with diameter matching manhole frame and cover. Install all MH's with grade rings to accommodate future adjustment in elevation. A maximum of two grade rings will be allowed.
11. Flow Channel: Construct flow channel the full diameter of the incoming and outgoing pipe with class A concrete.
12. Aggregate Base: Structure shall be placed on a minimum of 4 inches of 21AA limestone bedding.
13. Ground water monitor: In areas where ground water is known to exist and sewer is to be air tested, the Contractor shall install a 1/2 inch diameter, 10-inch-long pipe nipple through the manhole wall above one of the sewer lines entering the manhole. The pipe nipple shall be capped for use in air testing.

B. Manhole Frames and Covers:

1. Description: City of Flint Standard.
2. Material: ASTM A 48, Class No. 30, gray iron unless otherwise indicated.

2.4 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318 and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: The following are the grades of concrete recognized for use with sanitary sewers:

1. Class A concrete.
 - a. 564 lbs cement (6 sacks) per cubic yard of concrete.
 - b. Minimum 28-day compressive strength of 3,500 psi, conforming to MDOT Sec 7.01, Grade 35P.
 - c. Air content shall be between 5-7%
 - d. Water-cement ratio may not exceed 0.45 for air entrained concrete and 0.50 for non-air entrained concrete.
2. Class X concrete.
 - a. 282 lbs cement (3 sacks) per cubic yard of concrete.
 - b. Minimum 28-day compressive strength of 1,000 psi.

C. Cement mortar shall consist of one-part Type II Portland cement, two parts fine aggregate, and sufficient water to produce a workable mix.

D. Steel Reinforcement

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

E. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - a. Invert Slope: 1 percent minimum through manhole.
2. Benches: Concrete, sloped to drain into channel.
 - a. Slope: 8 percent.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving" with bedding and trench details per GCDC-WWS as noted on the drawings.

3.2 PIPING INSTALLATION

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
- C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow, non-pressure, drainage piping according to the following:
 - 1. Install piping pitched down in direction of flow, at the slope indicated on the drawings. Each pipe, as laid, shall be checked by the Contractor. A variation of $\frac{1}{4}$ inch from plan grade will be deemed sufficient reason to reject the work and require Contractor re-lay the pipe, at no cost to the Owner.
 - 2. Install piping with 5-foot minimum cover or depth as indicated on the drawings.
 - 3. Install ductile-iron, gravity sewer piping according to ASTM A 746.
 - 4. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
- F. Install force-main, pressure piping according to the following:
 - 1. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - 2. Install piping with 5-foot minimum cover or as indicated on the drawings.
 - 3. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41.
 - 4. Install ductile-iron special fittings according to AWWA C600.
- G. Maintain dry trench during sewer and manhole construction by pumping, as necessary.

- H. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.3 MANHOLE INSTALLATION

- A. General: Install manholes complete with appurtenances and accessories indicated.
- B. Install precast concrete manhole sections with sealants according to ASTM C 891.
- C. Install FRP manholes according to manufacturer's written instructions.
- D. Form continuous concrete channels and benches between inlets and outlet.
- E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.
- F. Install manhole-cover inserts in frame and immediately below cover.
- G. Manholes shall be placed at every change in grade, direction and pipe size as well as at junctions of sewers.
- H. All sewer connections, outside of sewer service leads, shall occur at a manhole.
- I. Install outside drop manhole connections whenever a sewer enters a manhole at an invert elevation of more than 24 inches above the manhole invert elevation. Outside drop connections shall be sized at least one half the size of the incoming sewer or next larger size, but in no cases not less than 8 inches in diameter.
- J. Place cast-in-place concrete according to ACI 318.

3.4 CLEANOUT INSTALLATION

- A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Install piping so cleanouts open in direction of flow in sewer pipe.
- B. Set cleanout frames and covers in earth 3 inches above surrounding grade. If in pavement, set cleanout frames and covers at pavement elevation.

3.5 CONNECTIONS

- A. Make connections to existing piping and underground manholes.
 - 1. All connections, unless specifically noted otherwise, shall occur at a manhole. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

2. Make branch connections from side into existing piping. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.
3. Make branch connections from side into existing piping, NPS 21 or larger, or to underground manholes by cutting opening into existing unit large enough to allow 3 inches of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in 6 inches of concrete for minimum length of 12 inches to provide additional support of collar from connection to undisturbed ground.
 - a. Use concrete that will attain a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
 - b. Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
4. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

3.6 CLOSING ABANDONED SANITARY SEWER SYSTEMS

- A. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 1. Close open ends of piping with at least 8-inch thick, brick masonry bulkheads.
 2. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
- B. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 1. Remove manhole and close open ends of remaining piping.
 2. Remove top of manhole down to at least 36 inches below final grade. Break the bottom of the manhole. Fill with class II sand up to roadway cross section or 4 inches where outside of pavement influence. Fill the remainder with the typical or required roadway section where in the roadway and with 4 inches of top soil and seed where outside of the pavement influence.
- C. Backfill to grade according to Section 312000 "Earth Moving."

3.7 IDENTIFICATION

- A. Comply with requirements in Section 31200 "Earth Moving" for underground utility identification devices. Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.
3. All sanitary sewer shall be locatable. Use tracer wire for all sanitary sewer not following direct route between sanitary structures.

3.8 FIELD QUALITY CONTROL

- A. All sanitary sewers, including leads, 36 inches and smaller shall be air tested by the Contractor, documented by the Contractor provided to the Owner, and witnessed by Owner's representative. (Required by U-M) All sanitary sewers greater than 36 inches shall be infiltration or exfiltration tested by the Contractor, documented by the Contractor provided to Owner, and witnessed by authority having jurisdiction. The authority having jurisdiction will decide whether infiltration or exfiltration testing is performed based upon ground water conditions.

All sewers, except 4-inch and 6-inch leads, shall be television inspected by the Contractor. Television inspection shall follow current MDOT procedures. (Required by U-M)

All PVC sanitary sewer main shall be mandrel tested (Required by U-M).

1. Submit separate report for each system inspection.
 2. Defects requiring correction include the following:
 - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
 - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - d. Infiltration: Water leakage into piping.
 - e. Exfiltration: Water leakage from or around piping.
 3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 4. Reinspect and repeat procedure until results are satisfactory.
- B. Mandrel Test: Test sanitary sewerage according to the requirements of the following:
1. Mandrel shall be commercially produced, nine fin mandrel with the following labelled on the mandrel:
 - a. Pipe diameter intended for.
 - b. Percent deflection accounted for.
 - c. ASTM or AASHTO standard stamp.
 2. Mandrel test shall take place a minimum of 30 days after installation of the sewer.
 3. Mandrel shall be pulled from manhole to manhole for each section of pipe installed.
 - a. Passing freely through each section of pipe shall indicate a satisfactory result.

- b. Failure to freely pass through any section of pipe will require that section be exposed, examined and corrective actions taken, as necessary.
- 4. The mandrel shall meet the following schedule of sizing:

<u>Pipe I.D.</u>	<u>PVC Mandrel O.D.</u>
8"	7.28"
10"	9.08"
12"	10.79"
15"	13.20"
18"	N/A
24"	N/A

- 5. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:
 - a. Ground water level shall be determined by removing the cap from the previously installed pipe nipple, blowing air through the pipe into the ground, connecting a clear plastic tube to the pipe. The tube should be vertical and a measurement of the height in feet of water above the pipe centerline shall be taken. The height in feet shall be divided by 2.31 to establish the pressure (in psig) that will be considered to be the average ground water back pressure.
 - b. The following is the sequence and time requirements for air testing:
 - 1) Each end of the pipe shall be plugged with pneumatic plugs capable of holding line pressure. There shall be three hose connections to the pneumatic plug with one being used for inflation, one used for continuously reading the air pressure in the line, and the third used for introducing low pressure air into the sealed line.
 - 2) Low pressure will be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be above the pipe. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the pressurization hose shall be disconnected to prevent air from entering or escaping from the line. There shall be a pressure gauge for reading the internal pressure of the line being tested. The gauge shall be capable of showing pressure as low as 0 psig up to no greater than 20 psig. In the 0-10 psig range the gauge shall be both calibrated and accurate to one-tenth of one pound. The 0-10 psig portion of the gauge dial shall cover at least one-half of the complete dial range. This gauge shall have a tee fitting to allow simultaneous pressure reading by Owner gauge.
 - 3) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

Pipe (Inches)	PVC & DIP SEWERS	
	Holding Time (Seconds)	Minimum Holding Time (min:sec)
4	0.380 x L	3:46
6	0.854 x L	5:40
8	1.520 x L	7:34
10	2.374 x L	9:26
12	3.418 x L	11:20
15	5.342 x L	14:10
18	7.692 x L	17:00
21	10.470 x L	19:50
24	13.674 x L	22:40
30	21.366 x L	28:20
36	30.768 x L	34:00

6. Infiltration Test, if required: Contractor shall test infiltration in all sewers larger than 36 inch or as required by the Authority Having Jurisdiction.
 - a. Temporary weirs shall be placed, within manholes, at either ends of the sewer being tested. Test shall not exceed 1,200 feet.
 - 1) Allowable infiltration shall not be more than 200 gallons per inch of pipe diameter per mile of sewer per 24 hours, including manholes.
 - 2) If allowable limit of infiltration is exceeded on any test section, the Contractor shall reconstruct or repair the defective portion of the sewer and re-test.
 - 3) Visible leaks shall be repaired regardless the results of the infiltration test.

7. Exfiltration Test, if required: Contractor test either exfiltration or infiltration in all sewers larger than 36 inches or as required by the Authority having jurisdiction.
 - a. Standpipe method will be used from manhole to manhole for each length of pipe.
 - 1) Hydrostatic head of 10 feet to the sewer's average centerline elevation will be required with adjustments for external submergence due to water in the trench.
 - 2) Owner will establish time durations and procedures for each test.
 - 3) Maximum allowable exfiltration rate will be 200 gallons per inch of pipe diameter per mile of sewer per 24 hours including manholes.
 - 4) Contractor shall pump all water out of the downstream manhole to a storm sewer at the completion of the test.

8. Television Inspection: Contractor shall perform a preliminary television inspection prior to acceptance of sewers and prior to any building connection being made.
 - a. All sewer lines shall be thoroughly cleaned prior to television inspection.

- b. Inverts of sewer shall be wetted by pouring clean water in the upstream manhole until it appears in the downstream manhole.
 - c. The camera shall be connected to a video monitor and recorder.
 - d. The camera shall pass from manhole to manhole of each pipe section installed.
 - e. Television inspection deemed satisfactory if no visible defects, including but not limited to, dips or low spots, high spots, errors in horizontal or vertical alignment, joint offsets, leaks, cracks, or debris are present.
- C. Any defects in the sewer shall constitute repairs be made.
 - D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.
- 3.9 CLEANING
- A. Clean dirt and superfluous material from interior of piping.

END OF SECTION 33 31 00